



**Providing an evidence base for antibiotic
stewardship for midwives in the Kabarole District
of Uganda: a modified action research study.**

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Abstract

This study has taken a modified action research approach to explore the understanding held by midwives working across four healthcare facilities in the Kabarole district of Uganda about antibiotic resistance and antibiotic stewardship. Antibiotic resistance is fast becoming a threat to the health of the global population. Antibiotic resistance arises when an antibiotic becomes ineffective at treating a bacterial infection which it once could. Antibiotic resistance is a natural phenomenon, but the ineffective use of antibiotics, such as inappropriate prescribing by healthcare professionals and poor adherence to prescribed regimens by patients, is increasing the speed at which resistance is developing. Antibiotic stewardship is the name for a collective group of activities that aim to prolong the effectiveness of antibiotics.

In using a modified action research methodology the study has gone through five cycles of action using a mixed methods approach to data collection. Data collected from observational work that was informed by ethnographic approaches, and secondary data analysis were used throughout the five cycles. Interviews with midwives were used in three of the five cycles. Findings from the first two cycles of action found that knowledge held by midwives about antibiotic resistance and antibiotic stewardship was lacking. The remaining three cycles of this study sought to bridge these knowledge gaps. An evidence base for antibiotic stewardship was presented to the midwives in the form of a training session. This session was followed up with monthly feedback for the midwives reporting on their responses to the evidence base in terms of their adherence to antibiotic stewardship practices.

Findings have demonstrated that a simple intervention in the shape of a training session combined with monthly feedback and a longitudinal approach to mentorship, have supported the midwives in this study to progressively bring their antibiotic stewardship activities into line with evidence-based guidelines. The extent to which the antibiotic stewardship practices of the midwives in this study changed to align with evidence-based guidelines differed between individuals and healthcare facilities. These findings underline the important role that context plays in behaviour change. Future efforts to modify the

practice of midwives should take this factor into consideration when designing interventions aimed at changing behaviours.

Chapter one – Introduction

Maternal mortality, the role of the midwife and task shifting

The current United Nations Development Programme “sustainable development goals” (SDGs) (UNDP, 2015) which follow the previous millennium development goals (MDGs) are a set of targets that United Nations member states have agreed to try and achieve by the year 2030. Part of their focus is to eradicate poverty and improve universal access to healthcare, with a strong emphasis on maternal health. Globally, the maternal mortality ratio (MMR) in 2015 was estimated to be 216: 100,000 (World Health Organisation [WHO], 2016a). This translates to 830 women dying per day due to pregnancy and birth related complications, with almost two-thirds of these deaths occurring in sub-Saharan Africa where the MMR is 547: 100,000 (WHO, 2016a). Uganda, the country that this study has chosen to focus on, has significantly high levels of maternal morbidity and mortality. Despite the strong focus of the previous MDGs, a report by the United Nations suggests that the maternal morbidity and mortality rates in Uganda have remained stagnant (United Nations, 2013), with the WHO estimating the MMR to sit at 343: 100,000 (WHO, 2016a).

Midwives across the world are a special cadre of healthcare professional. The word “midwife” arises from Old English and literally translates as “with woman” (Oxford English Dictionary, 2012). In many countries the midwife is the lead care provider for women embarking on the childbearing process. When a woman is deemed to be “low risk”, that is she has no significant health complications and the pregnancy itself is normal with no complications, the midwife can provide all of her care throughout the antenatal, intrapartum and postnatal period, with no need for input from a doctor. Within the healthcare setting this is quite a unique position to be in. Nurses, often considered to be of equivalent status to a midwife, lack this level of autonomy, having to defer patient treatment decisions to doctors. Midwives potentially play a key role in reducing rates of maternal morbidity and mortality on a global level and their influence in achieving the targets set out in the SDGs should not be underestimated. Midwives often hold a position in their communities that gives them an insight into the issues faced by those that they serve. They are therefore able to create effective solutions to these problems (Toyln Saraki,

2015). Pregnancy itself disposes women to make changes to their behaviours and lifestyle and indeed, during the antenatal period this willingness to change is at its peak (Schrader McMillan, Barlow and Redshaw, 2009). The 2014 Lancet Midwifery series notes that the midwife has the potential to play an important role in the extension of healthcare services beyond midwifery alone to women and their families across the globe (Horton & Astudillo, 2014). Indeed, the definition of a midwife by the International Confederation of Midwives (ICM) highlights that the midwife's role includes health education and counselling for the woman, her family and the wider community (ICM, 2017). Rather nicely, one of my Ugandan colleagues calls midwives "small doctors." She recognises our status as autonomous healthcare professionals whilst acknowledging that occasionally a woman's needs fall beyond the scope of our remit and the subsequent need for us to involve members of the wider disciplinary team. This could include obstetricians, doctors from other specialities, health visitors or social workers amongst others.

Bringing together such multidisciplinary teams and achieving the SDGs has proved difficult in low-and-middle-income countries (LMICs) partly due to a chronic shortage of human resources in the healthcare setting. The World Health Organisation (2016a) produced a report detailing health worker requirements for universal health coverage and the SDGs to be achieved. The report estimated Africa to have a deficit of 4.2 million healthcare workers in 2013 which included doctors, nurses, midwives and other cadres of healthcare professional (WHO, 2016a). Figures from Uganda indicate that only 7.4% of the 2018/19 government budget was allocated to healthcare (Businge, 2018). Additionally, Regional Referral Hospitals have an average healthcare staff deficit of 28% (Uganda National Academy of Sciences [UNAS], 2015). This deficit is associated with positions being unfilled usually due to a lack of desirability to work in the area where a healthcare facility is located. The Ugandan Ministry of Health (2015) report that only 45% of positions in health centre IIs, which are usually based in rural areas, are filled, whilst health centre IIIs and IVs have 70% and 71% of positions filled respectively. It is this human resource crisis in Uganda that propels the health crisis of the country and ultimately drives the need for task shifting. Endorsed by the WHO (2007a), task shifting has been implemented in the global healthcare setting in an effort to combat healthcare worker shortages, increase efficiency and cut costs. In general terms task shifting is the delegation of a specific task to a lower cadre

(WHO, 2008), for example midwives performing manual removal of placenta, a task usually performed by an obstetrician. Theoretically speaking, utilising the available workforce in this manner promotes the more effective and efficient use of human resources. With greater numbers of healthcare staff being able to offer certain aspects of care or perform certain clinical procedures, it follows that there is an increased ability to provide healthcare services, coupled with improvements to healthcare worker skills, greater efficiency within the healthcare system, and cost savings (WHO, 2007a). Task shifting in the West implies an increase in remuneration and substantial investment in continuous professional development. The same cannot be said in LMICs where healthcare professionals are often burdened with additional responsibilities without being compensated accordingly. Nonetheless, task shifting is recommended as a method to reduce healthcare worker shortages in the maternity setting (WHO, 2012a). Despite a lack of policy framework to support task shifting in Uganda, it has been unofficially practised in the country since 1918 (Baine, Kasangaki and Baine, 2018). Until recently midwives in Uganda have never had official job descriptions. Published in 2017 the “Schemes of Service for the Nursing and Midwifery Cadre” remain vague (Ministry of Public Service, 2017). Although not listed as a midwifery role in the “Schemes of Service for the Nursing and Midwifery Cadre” (Ministry of Public Service, 2017), one of the tasks that has been informally shifted to midwives in the Ugandan setting is the prescription of antibiotics. This is important as antibiotics are a precious resource without which Jasovsky, Littman, Zorzet and Cars (2016) argue that the SDGs, specifically SDG3 “to ensure healthy lives and promote wellbeing for all at all ages” are unachievable. Indeed, Mendelson et al. (2016) cite Requejo et al. (2013) as stating that the 50% reduction in maternal and child deaths since 1990 has been heavily influenced by access to antibiotics. Antibiotics are a member of a group of drugs called antimicrobials and are unique in the sense that their use can lead to resistance (HM Government, 2014). This is significant as the emergence of antibiotic resistance is fast becoming a threat to the health of the global population (HM Government, 2014). With antibiotic resistance posing a threat to the already compromised health of women in Uganda, there is a need to assess whether midwives working in Uganda are adequately trained and prepared for the responsibility of antibiotic prescribing.

Antibiotics, antibiotic resistance and antibiotic stewardship

Antimicrobials are a group of drugs that are used to treat a variety of infections. Infections can be caused by bacteria (these are treated with antibiotics), viruses such as human immunodeficiency virus (HIV), (treated with antivirals), fungi (treated with antifungals) or parasites (antimalarials are an example of treatment for a parasitic infection) (HM Government, 2014). The World Health Organisation, as cited by Davies (2013), suggest that the use of antimicrobials can add 20 years to every individual's life expectancy. Indeed, healthcare was revolutionised by Alexander Fleming's accidental discovery of penicillin in 1928. Since then antibiotics have been prescribed by healthcare professionals in increasing amounts to cure bacterial infections (Bebell and Muiru, 2014). In addition to curing infections, antibiotics have transformed modern medicine. Without antibiotics, medical procedures that include surgery such as caesarean sections and joint replacements, as well as treatments that depress the immune system such as chemotherapy for cancer, may become too risky to perform (HM Government, 2014).

With the use of antibiotics comes the development of antibiotic resistance. Antibiotic resistance occurs when a bacterium survives in the presence of an antibiotic that once would have treated the infection arising from the bacterium (Bebell and Muiru, 2014). Antibiotic resistance is a natural phenomenon that would occur by a process of bacterial evolution even without a bacterium being exposed to antibiotics (Bartlett, 2011). However, the use of antibiotics, both appropriate and inappropriate, assists the development of antibiotic resistance. Inappropriate use includes using antibiotics when they are not required, incorrect antibiotic prescribing by healthcare professionals in terms of choice of antibiotic, dose, route of administration and length of treatment, as well as poor adherence to treatment regimens by patients.¹ Alexander Fleming himself warned us of the dangers of the nonjudicious use of antibiotics as early as 1945, and laid out his hopes that intragenerational justice, in terms of access to antibiotics, would be realised (Fleming 1945 as cited by Karanika, Paudel and Mylonakis, 2017). He may be disappointed to know that estimates suggest that up to 50% of all current antibiotic prescriptions are inappropriate

¹ It has recently been argued that there is little evidence that failure to complete a course of antibiotics assists the development of antibiotic resistance (Llewelyn et al., 2017). However, the idea to stop a course of antibiotics once a patient feels well has not currently been translated into current practice.

(Centers for Disease Control and Prevention [CDC], 2013). This finding is consistent across the globe. A report by the Uganda National Academy of Sciences alludes to the fact that healthcare professionals in Uganda over prescribe antibiotics (2015). Recent research has identified that up to 79% of inpatients in a hospital in Uganda received at least one antibiotic during their admission (Kiguba, Karamagi and Bird, 2016).

As it is the bacterium and not the individual that becomes resistant to antibiotics the use of antibiotics for one patient has consequences that reach far beyond the individual and can have effects on the population at large (Laxminarayan et al., 2016; Shallcross, Howard, Fowler and Davies, 2015). In posing a threat to the effectiveness of antibiotics, antibiotic resistance also threatens the general health of the global population. A review commissioned by the UK government has published predictions that by 2050 there will be 10 million deaths annually across the globe from the effects of antimicrobial resistance (HM Government, 2014).

Bacteria that are resistant to antibiotics are not respectful of boundaries and can infect all demographic groups in all countries of the world (Carlet, Pulcini and Piddock, 2014). Increasing mobilisation of the population globally has been key in the spread of resistant bacteria and infectious diseases (Charani and Holmes, 2013). We only need to consider the swine influenza pandemic of 2009 to see how easy the spread of infection in the global context is. The importance of good infection prevention and control (IPC) practices has always been integral to the provision of healthcare and more generally in society to curb the spread of infection. Tackling head on the causes of infection plays an integral part in the effort to preserve the effectiveness of antibiotics; a decrease in the spread of infections converts to a decrease in the demand for antibiotics (Ardal et al., 2016).

A disparity between the knowledge held by healthcare professionals about IPC and their actual practice, especially in terms of hand hygiene, is well documented (WHO, 2009). In LMICs basic IPC practices such as hand hygiene, environmental cleaning, and the disinfection and sterilisation of equipment are often undermined by a lack of financial resources to support them (Allegranzi et al., 2011; Dar et al., 2016). With antibiotic resistance currently viewed as one of the biggest threats to global health the need for healthcare professionals to master a sound knowledge and, more importantly, demonstrate effective IPC practice, is imperative and plays a significant role in tackling

antibiotic resistance. Vaccinations form another arm of IPC practice and it is argued that upscaling of their use, especially in LMICs, is an effective and efficient means of curbing the need for antibiotics and the rate at which antibiotic resistance develops (Ardal et al., 2016; Dar et al., 2016).

As the speed at which antibiotic resistance develops increases with the increasing use of antibiotics, the lifespan of an individual antibiotic becomes transitory and, with a limited amount of antibiotics available, antibiotic resistance poses a threat to the ongoing integrity of this supply (Bartlett, 2011). A perpetual cycle of innovation is required to ensure continued access to antibiotics (Ardal et al., 2016). However, the development of new antibiotics incurs hefty costs and lengthy time frames, meaning that the rate of development of new antibiotics is in decline (Bartlett, 2011). Where newer antibiotics are available in high income countries (HICs), their costs often mean they are not available in LMICs, and if they are, they are unaffordable to public health systems or the average patient. Taking all these factors into consideration paints a very bleak picture for the future of antibiotics and therefore for the health of the global population.

Antibiotic stewardship is an umbrella term for initiatives designed to prolong the lifespan of existing antibiotics (Bartlett, 2011). As mentioned earlier, examples include activities aimed at reducing the incidence and spread of infections as well as guidance for optimal use of antibiotics (Dar et al., 2016; Charani and Holmes, 2013; Cunha, Varughese, and Mylonakis, 2013). At the same time as preserving the efficacy of antibiotics, antibiotic stewardship has the potential to improve patient outcomes and reduce side effects caused by antibiotic use (Karanika et al., 2017). Antibiotic stewardship also presents itself as a means of establishing cost effective antibiotic prescribing practices. In a global climate where economic resources are limited, the National Health Service (NHS) under strain in the UK, and inadequate resources to sustain an effective healthcare system in Uganda, antibiotic stewardship is economically justifiable as a means of maintaining healthcare costs (Cuhna, 2017).

Antibiotics in low- and middle-income countries

It has taken time for improvements in morbidity and mortality rates to be seen in LMICs due to lack of access to all types of antibiotics, especially newer and more expensive antibiotics. Globalisation means that high income countries are destroying the effectiveness of antibiotics before they have even reached LMICs; whilst the world is facing the dawn of the 'post-antibiotic era' many populations in LMICs haven't even reached the 'antibiotic era' (Jasovsky et al., 2016). This is paradoxical and demonstrates a lack of global and intragenerational justice. Whilst antibiotic resistance is posing a threat to the health of the global population, inadequate access to antibiotics poses just as much of a threat to the health of populations in LMICs as antibiotic resistance does (Laxminarayan et al., 2013). Indeed, Daulaire, Bang, Tomson, Kalyango and Cars (2015) state that lack of antibiotics for treatable infections contributes to 5.7 million deaths globally each year. Mendelson et al. (2016) recognise this inequitable access to antibiotics and posit that in the short-term unrestricted access to antibiotics can have a positive effect on the health of the global population.

Increasing access to antibiotics is fraught with difficulties. In LMICs it is questionable if there are any examples of successful systems for the distribution of antibiotics (Heyman, Cars, Bejarano and Peterson, 2014). Insufficient access in rural areas can coincide with excessive use in urban areas. Populations in LMICs can have limited or no access to healthcare facilities or professionals and rely heavily on the availability of antibiotics from over-the-counter sales. In many LMICs these sales are made without any prior healthcare assessment or prescription. Poor surveillance and regulation of pharmacies and drug shops by national drug authorities means not only are populations using antibiotics when they are not required, but they may also be being sold substandard, counterfeit drugs (Mendelson et al., 2016). Compounding these problems are poor levels of education and literacy amongst the population. Antibiotic resistance is not understood and individuals discontinue treatments once they begin to feel better. Witch doctors or traditional healers are still accessed by others with anecdotal evidence suggesting that some add sub-therapeutic levels of pharmacological antibiotics to the herbal medicines they supply (Planter, 2007). It is clear then that extending access to antibiotics without an effective antibiotic stewardship program to underpin it will not lead to sustainable access or

sustainable effectiveness. Rather, it has the potential to accelerate resistance and deplete current supplies of antibiotics (Abdula, Macharia, Motsoaledi, Swaminathan and VijayRaghaven, 2016; Ardal et al., 2016).

Inequalities in terms of access to antibiotics and the fight against antibiotic resistance don't stop there for LMICs. Compared to the rest of the world LMICs are disadvantaged in the fight against antibiotic resistance as financial, infrastructural and human resource limitations take their toll (Mendelson et al., 2016). LMICs carry a disproportionately high incidence of the global infectious disease burden (Murray et al., 2012), have rates of healthcare associated infections (HCAIs) that are estimated to be three times higher than found in high income countries (HICs) (Allegranzi et al., 2011), lack equipment for diagnosis of infection and corresponding antibiotic susceptibility, and have poor access to first line² antibiotics, let alone second and third line antibiotics³ required in the treatment of resistant bacteria. Compounding these challenges are weak and under resourced public healthcare systems found in LMICs. A lack of adequately trained healthcare professionals and infrastructure to support public health initiatives further makes the management of antibiotic resistance in LMICs a battle (Abdula et al., 2016).

Achieving adequate access to antibiotics in LMICs at the same time as tackling antibiotic resistance poses a multifaceted challenge to healthcare systems requiring more than just increased access to quality assured antibiotics. General strengthening of healthcare systems is a necessity to tackling antibiotic resistance in LMICs, with the populations of these countries requiring increased access to improved healthcare services (Heyman et al., 2014). With this there needs to be accessible education and guidance for both healthcare professionals and the public about antibiotic resistance, its development and their role in reducing the speed of its development (Das and Horton, 2016). Indeed, the second national conference in Uganda for antimicrobial resistance, which was held in 2017 carried the theme "Antimicrobial Resistance: a call for united action" and the idea that "everyone contributes to the problem, so everyone should contribute to the solution" was a key

² A first line treatment is a standard treatment known to treat a particular condition

³ Second and third line treatments are treatments given in the event that the treatment that was given preceding them failed to work.

message at the conference. Having said all this, substantial improvements in antibiotic access have resulted in improved life expectancy in LMICs (Laxminarayan et al., 2016).

Developing an antibiotic stewardship program in sub-Saharan Africa

Increasing awareness of antibiotic resistance amongst healthcare professionals and aligning practice to try and tackle its development requires the global dissemination of antibiotic stewardship practices. A study by Howard et al. (2015) identified that Africa ranked poorly in terms of antibiotic stewardship programme coverage in hospitals, with only 20% reporting that they had national antibiotic stewardship standards compared to 81% in Europe.

With resistance profiles differing nationally and even regionally, adopting a blanket approach to antibiotic stewardship is short sighted and would prove to be ineffective. Surveillance of patterns and rates of antibiotic resistance is a precondition to the establishment of effective guidelines that are contextualised to adjust for local antibiotic resistance profiles (Ardal et al., 2016). Such surveillance is costly, time consuming, and requires functional laboratories (Ardal et al., 2016). Weak healthcare systems coupled with poor infrastructure means that functional laboratories and staff to operate them are lacking in LMICs. This limits the capacity of LMICs to carry out surveillance initiatives (Dar et al., 2016). Uganda has made a commitment to tackling antibiotic resistance. This began with a situational analysis of antimicrobial resistance in Uganda (UNAS, 2015), which was followed up in November 2018 with the release of the Antimicrobial Resistance National Action Plan for Uganda (Government of Uganda, 2018).

Equally, other contextual factors will feed into the development of local antibiotic stewardship programs. The availability of diagnostic testing equipment and antibiotics as well as human resource factors in terms of the skill mix of health professionals available for antibiotic prescribing, will play their part in shaping local antibiotic stewardship recommendations. Other contextual factors that influence individual prescribing behaviours also need to be considered in the development of antibiotic stewardship strategies (Cunha et al., 2013). One of these is the understanding held by antibiotic prescribers about antibiotic resistance and antibiotic prescribing.

Rationale for the study

Having completed a degree in economics at Durham University in 2003, I realised that I wanted to become a midwife. I commenced my midwifery training in September 2004 at the University of Dundee and qualified in September 2007. When I qualified, I moved to Cambridge to start work as a full-time rotational midwife. Over the course of the next six years I became a permanent member of staff on the birth centre and completed a part time Masters in Advanced Practice Midwifery. At the beginning of 2014 I took unpaid leave for 15 months and joined Voluntary Services Overseas. I was deployed to work as midwife clinical tutor at Holy Family College of Nursing and Midwifery in Phalombe, Malawi. I thoroughly enjoyed the experience, splitting my time between the academic teaching and clinical supervision of a group of 50 student midwives. The experience was life changing, and on my return to the UK in 2015 I felt unsettled and had the desire to work abroad again.

I stumbled across the charity Knowledge for Change (K4C) by chance at a conference organised by the Tropical Health Education Trust (THET) in September 2015. K4C went on to offer me the opportunity to work as a volunteer midwife in Fort Portal, Uganda for an extended period of time of my choice. Due to personal circumstances I delayed taking up the offer, but eventually decided to accept the position. It was at this time that the suggestion of undertaking a PhD arose. I didn't have to think twice about it and moved to Uganda in November 2016 as a K4C volunteer midwife and University of Salford PhD student.

Having worked academically and clinically as a midwife in Malawi for 14 months, I found myself having a certain level of awareness about the operational status of healthcare systems in sub-Saharan Africa, as well as a cultural awareness with regard to ways of working. One of the things I noticed in Malawi was the over use of antibiotics. Having spent two weeks in Uganda in May 2016 on a scouting visit, I observed the same extensive use of antibiotics. Furthermore, I noted that midwives were responsible for prescribing antibiotics for pregnant women attending antenatal clinics. It was these observations coupled with my awareness that antibiotic resistance poses an increasing threat to the health of the global population, that spurred my decision to study Ugandan midwives'

knowledge about antibiotic resistance and antibiotic stewardship with a particular focus on influences on their antibiotic prescribing practices.

Research aims and objectives

The aim of this study was to develop and implement an evidence base about antibiotic stewardship for midwives working in the Kabarole District of Uganda. The study then aimed to assess the midwives' responses to the evidence base in terms of their adherence to antibiotic stewardship practices.

In order to achieve this, the following objectives were identified:

- To explore Ugandan midwives' understanding of antibiotic resistance and antibiotic stewardship.
- To explore Ugandan midwives' antibiotic prescribing and dispensing practices, including quantifying the volume and type of antibiotics being prescribed.
- To identify existing cultural practices and/or protocols that inform current antibiotic prescribing practices.
- To identify any challenges/barriers that influence the ability of midwives to carry out antibiotic stewardship activities.
- To identify strategies to enhance Ugandan midwives' awareness and practice of antibiotic stewardship activities.

Overview of the research strategy

Lewin (1946) emphasised the need for social scientists and practitioners to combine their expertise in practical, problem solving studies in order to bring about social change. This led to the birth of action research: research that moves away from being *on* people, to research that is participatory, *with* people, and *for* people (Reason 1988 as cited by Meyer, 1993). This study recognised the escalating threat that antibiotic resistance poses to the health of the global population. As I came to the study having made the decision to introduce midwives in Uganda to antibiotic stewardship, this study cannot be said to be 'pure' action research. Pure action research arises when all participants are involved in the

identification of the initial problem (Herr and Anderson, 2015; Reason and Bradbury, 2006; Kemmis and McTaggart, 2005). This study is therefore a modified form of action research which has adopted a mixed methods approach, with the aim to make a “simultaneous contribution to social science and social change” (Lewin 1952 as cited by Carr & Kemmis, 1986, p.164). This modified action research study has drawn upon the cycle of research as devised by O’Leary (2004) as depicted in figure 1.1. The model conveys a cyclical process that concerns itself with learning from and improving on the previous cycles of action to allow for a steady convergence towards improved understanding and enhanced action implementation (Koshy, Koshy and Waterman, 2011).

Figure 1.1. O’Leary’s cycles of research

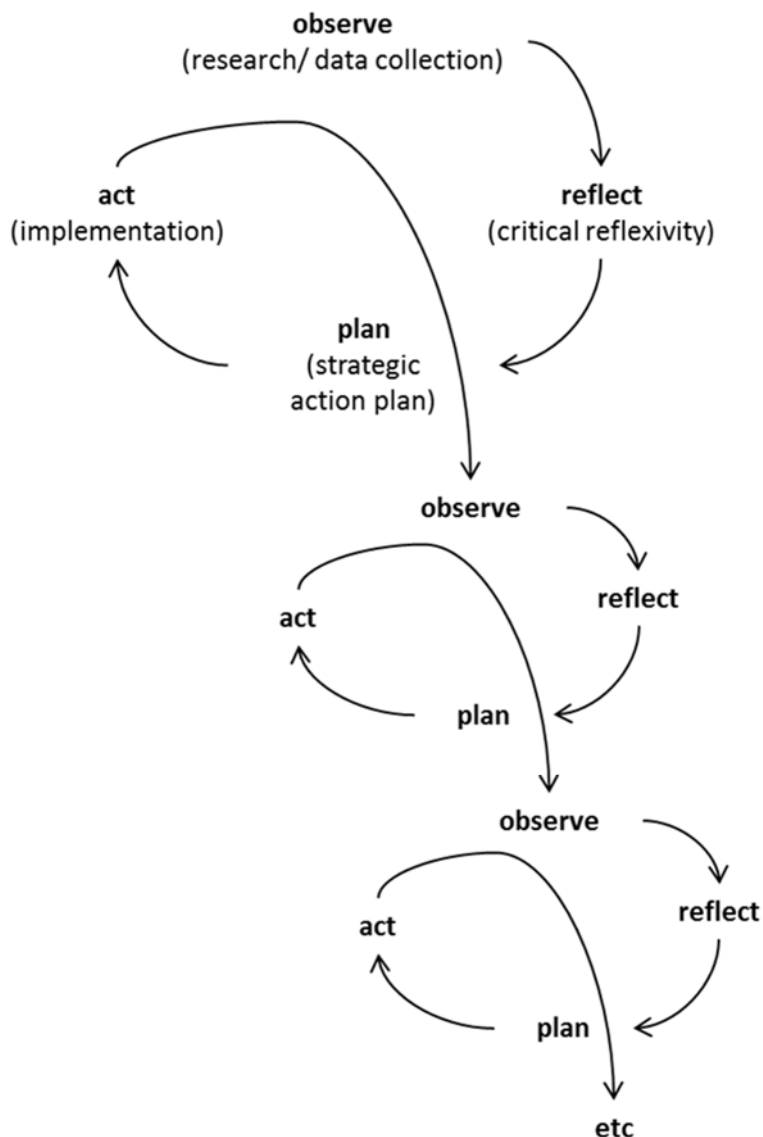


Table 1.1 presents the five cycles of action that took place in this study in tabular form. The table lists data collection methods used during each cycle as well as information regarding any interventions that took place and the time frames for each cycle of activity.

Table 1.1. Cycles of action

CYCLE	DATA COLLECTED	INTERVENTION	PERIOD OF TIME
1. Pilot	<ul style="list-style-type: none"> • Interviews (5) • Observational data⁴ • Secondary data analysis of maternity registers 	Continuous mentorship	February 2017 – May 2017
2. Context	<ul style="list-style-type: none"> • Interviews (17) • Observational data • Secondary data analysis of maternity registers 	Continuous mentorship	June 2017-February 2018
3. Champions	<ul style="list-style-type: none"> • Observational data • Secondary data analysis of maternity registers 	Attended national conference for antimicrobial resistance with two midwives Continuous mentorship	November 2017
4. Training	<ul style="list-style-type: none"> • Observational data • Secondary data analysis of maternity registers 	Continuous medical education sessions for 18 midwives plus 3 others Monthly analysis of maternity registers with feedback sessions and continuous mentorship	March 2018 – August 2018
5. Review	<ul style="list-style-type: none"> • Interviews (8) • Observational data • Secondary data analysis of maternity registers 		September 2018

⁴ The manner in which these observations took place were informed by ethnographic approaches

Structure of the report

Broadly speaking there are two main approaches to conducting research: quantitatively and qualitatively. These approaches seek answers to research questions in different ways. Given the fundamental differences between quantitative and qualitative research, differences arise in the way each is written up (Lynch, 2014). Traditionally following an introduction, a research report will proceed with a literature review followed by a presentation of the chosen methodology and methods before leading into findings and discussion chapters. Holliday (2007) likens the write up of qualitative research to an unfolding story and quotes Richardson and St. Pierre (2005) as saying “qualitative work carries its meaning in its entire text.” Although I have used a mixed-methods approach to this study I feel this is completely true and this is why I have chosen to adopt a ‘mystery story’ (Silverman, 2000) approach to the write up of this thesis. In order to tell a coherent story Silverman (2000) argues that the structure of a thesis should not deviate from the order in which findings were uncovered. I had begun working clinically in the research sites chosen for this study in Uganda and had commenced observational work whilst I was engaging with literature related to this study. As I was reading I was able to make meaningful comparisons between findings from the literature and the experiences of the midwives I was working with. It is for this reason that I have unconventionally chosen to present the methodology chapter of this thesis before the literature review. As the reader will discover the literature review is peppered with data collected from my observational work in the clinical setting which should be taken as early findings from this study. As action research follows a cycle of observation, reflection, planning and acting, this study has moved in a cyclical nature. In line with Silverman’s (2000) recommendation to present findings in the order that they were uncovered and to illustrate how this study unfolded, the reader will note that the structure of this thesis continues to differ from the traditional PhD. In particular, findings from the first two cycles of action (the pilot and context cycles) were analysed and are presented in a findings chapter and then discussed in a discussion chapter as one would expect from a traditional thesis. However, as these findings were used as a foundation to consider and develop the ongoing cycles of action a further literature review was undertaken in response to these initial findings. This second literature review was undertaken to assist in identifying strategies to enhance midwives’

awareness and practice of antibiotic stewardship practices and is therefore presented later in the thesis. Similarly, as interventions were developed and implemented as part of the final three cycles of action (the champions, training and review cycles) a further findings chapter and a further discussion chapter are presented at the end of this thesis thereby adhering to Silverman's (2000) recommendation that findings are presented in the order that they were uncovered.

To summarise, this chapter has given a brief overview of the role of the midwife in prescribing antibiotics and the associated problems of overuse of antibiotics, namely antibiotic resistance. The chapter has presented the rationale for the study.

Chapter two gives the reader a comprehensive overview of the study context. It briefly touches on the historical, political and economic history of Uganda before giving an in-depth insight into the healthcare system. The chapter introduces the four healthcare facilities that make up the research sites in this study and discusses the role of the midwife in Uganda as a prescriber of medication.

Chapter three introduces the research methodology. The chapter outlines my epistemological position and discusses how I locate myself in the research, before going on to introduce the chosen research methodology for the study. It also discusses chosen methods of data collection, target population, sampling methods, methods of data analysis and finally ethical considerations. I chose to place this chapter here as one of the main means that I have chosen to collect data in this study is via the means of observation, as influenced by ethnographic approaches. Placing the chapter prior to the first literature review has enabled me to begin presenting findings from these observations within the literature review.

Chapter four presents a discussion of the findings from the current literature pertaining to task shifting, knowledge held by healthcare professionals about antibiotic resistance, influences on the antibiotic prescribing practices of healthcare professionals and theories of behaviour change. As previously mentioned this chapter begins to present findings from observational work that took place in the first two cycles of action (the pilot and context cycles) of this study.

Chapter five presents the findings from the first two cycles of action in this modified action research study; the pilot cycle and the context cycle. These two cycles focused on learning about the knowledge midwives in the study hold about antibiotic resistance and stewardship and further explored factors that influenced their antibiotic prescribing practices. These findings are made up of data collected from interviews with midwives, observations and secondary data analysis of maternity registers.

Chapter six discusses the findings from the pilot and context cycles of action in relation to current literature that reports on the knowledge held about antibiotic resistance by healthcare professionals who are responsible for antibiotic prescribing. The chapter draws comparisons about influences on antibiotic prescribing practices and compares the antibiotic prescribing trends identified in this study with those reported elsewhere.

Chapter seven acknowledges that findings from the pilot and context cycles of action revealed the need for an evidence base about antibiotic stewardship to be developed for the midwives participating in this study. It therefore reviews the literature on the implementation of antibiotic stewardship initiatives and discusses their applicability to the Ugandan maternity setting. The chapter concludes by discussing and justifying the interventions chosen by the midwives and myself that were implemented in the remainder of the action research cycles.

Chapter eight presents the findings from the final three cycles of action (the champions, training and review cycles) that were implemented with the intention of introducing an antibiotic stewardship evidence base for the midwives in this study. In conjunction with these findings the chapter considers and discusses possible explanations for the differing patterns of antibiotic prescribing that were seen following the implementation of interventions in the four healthcare facilities participating in this study.

Chapter nine considers the findings of this study in conjunction with three theories of behaviour change in an attempt to explain why some healthcare facilities in this study have been more successful in bringing their practice into line with evidence than others.

Chapter ten draws the final conclusions from this study. It reviews the findings, reflecting on its strengths and weakness and makes recommendations for moving forwards to support midwives and other healthcare professionals in Uganda in their role as antibiotic

stewards and antibiotic prescribers. Chapter ten also presents my own personal reflection on my time living and working in Uganda as a midwife and researcher. As a midwife reflection is integral to my practice. Furthermore, reflection has played a significant role in this study due to its presence in the action research cycles. Having spent two years living in Uganda I felt it important to reflect on my experiences of working in a foreign country and undertaking research with this group of midwives. This reflection has given me the opportunity to consider the impact my presence has had in the community I have been living and working in and also given me the opportunity to consider how Uganda has shaped me.

Chapter two - Uganda – Setting the scene

Introduction

This chapter introduces Uganda, the country where this study took place. It gives a brief summary of the political, economic and social history of the country before moving on to look at the healthcare sector, with a focus on maternity care and midwifery education. The chapter introduces the UK charity, Knowledge for Change, and my role as a volunteer midwife with the charity. The final section of the chapter considers the role of the midwife in Uganda as an antibiotic prescriber. Additionally, it introduces prophylactic medications routinely prescribed for women in Uganda in pregnancy and gives an overview of some of the common conditions women present with in pregnancy that may require antibiotic treatment.

Uganda – Political, economic and social history

Uganda was declared a British protectorate in 1894 and remained so until 9th October 1962. Following independence from Britain Uganda has faced political upheaval including several military coups. In 1971 the infamous Idi Amin, then the commander of the Ugandan army, led one such coup. He declared himself president and under his rule Uganda was led by a ruthless dictator. Amin expelled all Asians from the country and under his control it is estimated that 300,000 Ugandans were killed by him or his agents, many of them tortured. His reign came to an end in 1979 when he was driven into exile, and Uganda had a fresh start. This fresh start was not to be, and over the next seven years political turmoil ensued with the result of thousands of civilians being killed. On 26th January 1986 President Yoweri Museveni was sworn in as president. Fears that Museveni would be another Amin were overturned as Museveni appointed a broad-based government, appointed a Human Rights Commission, encouraged the return of Asians to the country, and even attempted to tackle corruption. During his early leadership political stability improved, and the economy prospered, for which Museveni was given credit. More recently his credibility has been questioned. Reports of corruption and a poor human rights record fuel calls for Museveni to step down. He shows no signs of doing so. In 2004 the presidential term limit was

scrapped. As a result, questionable election results in 2006, 2011 and 2016 have left Museveni in power. More recently, in 2017, the presidential age limit was scrapped, leaving Museveni open to standing for a sixth successive term in 2021.

Uganda has a free market economy which has prospered under the reign of Museveni and has maintained an average economic growth rate of 5.5% between 2010 and 2014 (WHO, 2016c). Agriculture accounts for about 60% of gross domestic product (GDP). The majority of the working population, 64%, are subsistence farmers (Uganda Bureau of Statistics [UBOS], 2016), with coffee, tea and tobacco being Uganda's major exports. However, some 19.7% of the population were living below the poverty line in 2012/13 (Republic of Uganda, 2015).

The Uganda National Census of 2014 estimated the population of Uganda to be 34.6 million, of which 47.9% were aged 0-14 (UBOS, 2016). With a population growth rate of 3.03%, Uganda is one of the youngest and fastest growing populations in the world (WHO, 2016c). Religion plays an important part in the life of Ugandans, with Christianity and Islam being the main religions in the country. English, Swahili and Lugandan are the predominant languages of Uganda, although many other languages are spoken across the country.

Uganda – The healthcare system

The national health service of Uganda is made up of both public and private sector institutions. All government health facilities that are run under the Ministry of Health fall into the public health sector. The private health sector comprises of Private Health Providers (PHPs), Private Not for Profit (PNFPs) providers and Traditional and Complementary Medicine Practitioners (TCMPs). In Uganda the health status of an individual correlates with their ability to pay for healthcare; those who can afford to pay shy away from using public health facilities (Ackers and Ackers-Johnson, 2017). Inequalities in the care provision between public and private facilities are stark. In maternity care, for example, data collected by Ackers and Ackers-Johnson (2017) noted only one death in the private maternity ward in Mulago National Referral hospital between January 2011 and

October 2012, yet 183 women died in the same time period in the public ward⁵. Access to healthcare is also unequal in rural and urban areas. A Ugandan Ministry of Health strategic plan noted findings from the 2002 UBOS Uganda Population and Housing Census which suggested that 70% of medical officers and 40% of nurses and midwives worked in urban areas but were only serving 13% of the population (Ministry of Health [MoH], 2010). More recently, reports suggest that 72% of the population live within 5km of a health facility. However, in Kampala there are 8.4 health facilities per 10,000 members of the population, whereas in the more rural district of Yumbe there are only 0.4 health facilities per 10,000 people (MoH, 2015).

The provision of healthcare in Uganda is decentralised into districts and health sub-districts and is structured to include National Referral Hospitals (NRHs), Regional Referral Hospitals (RRHs), general hospitals, health centre IVs, IIIs and IIs. A health centre I consists of teams of village health technicians (VHTs) who work as a link between the community and the health centres. The Ugandan healthcare system works on a referral basis and has a hierarchical structure. Patients should access smaller health centres. If the health centre is unable to treat a patient due to lack of expertise or resources, then they will be referred on to the next level facility. This is not always the case. Some patients, including pregnant women, choose to access a higher level healthcare facility when they could be treated at a lower level facility. This is usually related to travel convenience or the belief that only RRHs are adequately staffed. Hierarchy is an ingrained feature of the Ugandan healthcare system. At the top of this hierarchy are medical officers; at the bottom, patients. It is not unusual to see a patient bow down on one knee when addressing a healthcare professional, whether that be nurse, midwife or medical officer. Equally nurses and midwives, especially those with little experience, rarely challenge the decisions of medical officers.

Health Centre I (HC I) – Village Health Technicians (VHTs)

The role of the VHT is to facilitate health promotion and encourage community participation and utilisation of health services. VHTs aren't qualified to prescribe

⁵ Births in the private wing and the public wing between January 2011 and October 2012 averaged 164 and 2602 per month respectively

medication, so should a member of the community require any investigations or treatment the VHT will refer them to the nearest health centre.

Health Centre II (HC II)

Health centre IIs provide basic outpatient and community outreach services only. HCIIIs are staffed by nurses and nursing assistants. Patients should be able to access treatments for common conditions such as malaria in HCIIIs. Nurses working in HCIIIs are expected to prescribe and dispense antibiotics for uncomplicated conditions.

Health Centre III (HC III)

Health centre IIIs are located in every sub-county. In addition to having an outpatient department which is led by a clinical officer (a clinician with three years of medical training), a health centre III provides basic essential obstetric care (BEOC). Women can access antenatal and postnatal care here, as well as labour care, provided they are deemed to be 'low-risk' – that is they have no significant health, pregnancy or obstetric related problems. Midwives are available to provide this care, but there are no medical officers⁶ to support maternity services on site at a health centre III. Antibiotics are prescribed for women by midwives working in HCIIIs in the antenatal, intrapartum and postnatal period. A laboratory providing simple diagnostic testing is also available at a HCIII.

Health Centre IV (HC IV)

In addition to the services provided at a HCIII, a HCIV is set up to provide emergency obstetric care (EmOC). Health centre IVs have inpatient wards for adults and children and an operating theatre. At least one medical officer (a clinician with five years of medical training) will work in a HCIV. Even though a medical officer is available at a HCIV, midwives lead the antibiotic prescribing for women attending antenatal clinic.

⁶ A medical officer is a doctor who has undertaken five years of medical training.

Regional Referral Hospital (RRH)

Each district in Uganda should have a RRH. RRHs offer specialist clinical services including mental health and dentistry. Higher levels of medical and surgical support are available, with multiple theatres and a greater availability of diagnostic tests. Consultant medical staff are also available. Midwives working in antenatal clinics in RRHs are the lead antibiotic prescribers for pregnant women with uncomplicated conditions.

National Referral Hospital (NRH)

There are two NRHs in Uganda. One is a referral hospital for mental health (Butabika), the other for all other health issues, Mulago, is based in Kampala. NRHs provide comprehensive specialist services in addition to the services available in RRHs. NRHs are heavily involved in research and teaching.

Challenges in the Ugandan healthcare system

The Ugandan healthcare system faces many challenges. Figures for the 2018/19 budget report that 7.4% of the government budget will be spent on healthcare, which is down from 8.3% in the financial year 2017/18 and significantly short of the 15% target set by the Abuja Declaration (Businge, 2018). Although recommendations in the Uganda Health Sector Strategic and Investment Plan urge per capita spending for emergency medicines and health supplies (EMHSs) to be \$12 per capita, only \$2.4 dollars per capita were spent on this in 2014 (MoH, 2015).

The Ministry of Health (2010) openly acknowledge that infrastructure is inadequate. Maintenance of buildings and equipment is poor, with estimates from the 2008/9 health sector performance report suggesting that only 40% of available equipment was in good working condition (MoH, 2010). To underline the significance of this, only 57% of RRHs in the country have oxygen cylinders or a functioning central oxygen supply (MoH, 2015). Uganda has an estimated 1.55 healthcare workers per 1000 members of the population compared to the WHO recommendation of 2.28 per 1000 persons (MoH, 2015). Shortages of healthcare staff both in terms of numbers and skill mix are present in all healthcare

facilities with variations arising between districts, rural and urban settings and level of health facility. Indeed, it is estimated that 25% of healthcare worker positions are vacant in HCIIIs and 19% in RRHs (MoH, 2015).

Accountability is lacking at all levels of the Ugandan healthcare system, with evidence suggesting that the Uganda Nurses and Midwives Council is under-resourced to provide effective regulation (MoH, 2012). There are no consequences for healthcare professionals if they don't turn up for work. Equally when cases arise where patients die, they are rarely investigated to assess for signs of negligence. Staff wages are low, and often healthcare professionals are left for months at a time without being paid. Financial constraints on healthcare employees lead to many of them 'moonlighting' – taking a second job, to earn enough money to survive. This leads to healthcare professionals trying to 'clear the lines' as quickly as possible so that they can attend second jobs. This results in healthcare professionals finding themselves under more pressure as they try to complete a full day's work in one morning. Unsurprisingly absenteeism is rampant and deemed to be the principal waste factor in the health sector, with one report approximating the annual costs of absenteeism to be 26 billion UGX (MoH, 2010).

Availability and access to drugs is a significant problem. Although the MoH (2015) does report that the pharmaceutical sector has improved to increase access to essential medicines and health supplies from 43% in 2009/2010 to 63.8% in 2014/2015. The system is not free of corruption. With a lack of accountability and poor healthcare worker salaries it is not surprising that evidence points to the resale of drugs as a source of income for healthcare workers (Ferrinho and Van Lerberghe, 2002). Fees for care in government healthcare facilities were abolished in 2001. However, unofficial fees in the public health sector (Konde-Lule, Gitta and Lindfors, 2010; Parkhurst and Ssenigooba, 2009) long waiting times, quality of healthcare information provided by caregivers during care, and other health worker related behavioural problems have been found to have an impact on user satisfaction (MoH, 2010). In short, poor access, lack of medicine and other supplies, coupled with a severe shortage of human resources mean that healthcare facilities in Uganda are underutilised (MoH, 2010). For those able to access healthcare facilities the growing population creates overcrowding and puts further strain on already limited resources. National health budgets are constrained magnifying equipment and medication

shortages, which coupled with healthcare worker shortages, mean that the system is bursting at the seams with little hope of recovery.

Uganda – The health of the population

The twenty year period of civil unrest which began in the early 1970s had a negative impact on the health system in Uganda with corresponding downward trends in health indices (MoH, 2012). Increasing support from the government and international donors has seen improvements in healthcare services and health indices, but Uganda still has a long way to go (MoH, 2015). Life expectancy at birth in Uganda in 2014 was 62.2 for males and 64.2 for women (UBOS, 2016), compared to 79.5 and 83.2 respectively in the UK (WHO, 2016d). Uganda has, like many other countries in sub-Saharan Africa, a high burden of infectious diseases (UNAS, 2015). Communicable diseases account for the largest proportion of morbidity and mortality in Uganda, although there has been a growth in non-communicable diseases (NCDs) (MoH, 2012). Furthermore, the health and immunity of an estimated 5.9% of adults aged 15-49 is compromised by HIV/AIDS (UNAIDS, 2017). This picture should not be so bleak, and indeed the Ugandan MoH (2010) recognise that 75% of the disease burden in Uganda is preventable through improved hygiene and sanitation, vaccinations, good nutrition and other preventative measures such as the use of bed nets for malaria.

Uganda – Maternal health

Whilst the need to improve health has been recognised in the previous United Nations' millennium development goals (MDGs) and current sustainable development goals (SDGs), maternal and child health have often been found to be at the forefront of the targets for improvements in health. As mentioned previously, Uganda has one of the fastest growing populations in the world, with a reported total fertility rate per woman⁷ in 2016 of 5.4 (UBOS, 2017). The United Nations 2015 target for the maternal mortality ratio (MMR) for

⁷ The total fertility rate refers to the total number of children born to one woman in her lifetime if she were subject to the prevailing rate of age-specific fertility in the population (WHO, 2019).

Uganda was set at 131 per 100,000 livebirths. Whilst there has been a large increase in the proportion of women being assisted in birth by a trained healthcare professional, from 42% in 2006 to 58% in 2011, the MMR remained almost stagnant at 438 per 100,000 (Ministry of Finance, Planning and Economic Development, 2013) or 343: 100,000 as estimated by the WHO (2016b). Figures on maternal mortality in Uganda vary considerably from source to source, and with poor reporting and records management in healthcare facilities in Uganda, rates presented are questionable. Furthermore, with only 73% of women delivering in healthcare facilities (UBOS, 2017), little is known about those delivering in the community with no skilled attendant, suggesting MMR rates are under reported. A benchmarking exercise undertaken by McKay and Ackers (2013) which involved a detailed audit of case files at the RRH in Mbale and Hoima, suggested a MMR ratio closer to 1000 per 100,000 livebirths. Recent data from the Kabarole district of Uganda, the district where this study took place indicate a MMR rate of 881: 100,000 live births (personal communication), more than double the previously mentioned estimates of the WHO (2016b). Severe bleeding, infection, hypertensive disorders and obstructed labour account for the main causes of maternal mortality in Uganda (WHO, 2012b). Other conditions which are aggravated by pregnancy such as malaria, diabetes, anaemia and hepatitis also contribute to the high MMR.

A combination of challenges in the healthcare system and social determinants of health are contributing to the stagnation of the MMR (WHO, 2007b). Shortages of trained and motivated midwives (the MoH (2015) reports that only 76% of midwifery positions are filled across the country), coupled with poor access to medication contributes to the high MMR (WHO, 2007b). Furthermore, maternal outcomes are affected by levels of income and education; 75% of women with higher education are more likely to deliver in a healthcare facility compared to 25% of women with no education (WHO, 2007b).

Thaddeus and Maine (1994) first outlined the “Three Delays” to accessing appropriate healthcare as a means of explanation for high levels of maternal mortality in LMICs. The first delay arises as women delay seeking care in a timely fashion. It is argued that this arises for several reasons. Firstly, cultural beliefs about labour and birth mean that in some communities in Uganda women are not permitted to independently seek medical care. In cases where they are able, restrictions in terms of education and finances impede their

decision to do so. Furthermore, the perceived benefit of attending a public hospital in Uganda is outweighed for many women by the prospect of receiving poor care and treatment (Ellis, Schummers and Rostoker, 2011). Poverty and poor transportation infrastructure, including delays occurring as women await transfers from a rural healthcare facility to a regional referral hospital, are considered to cause the second delay in accessing suitable care (Ellis et al., 2011). The third and final, and perhaps most crucial delay, occurs when women reach the healthcare facility but are delayed due to an incorrect diagnosis or treatment, or unavailability of trained staff, medication and blood products (Ellis et al., 2011).

Midwifery Education

Midwives can obtain a qualification in midwifery at three different levels in Uganda; certificate, diploma and degree level. Individuals undertaking these courses pay their fees independently. Occasionally funding is available from an outside organisation, but this is not the norm. On the whole, most midwives enter their training straight from school at the certificate level. The certificate in midwifery is a three year course. Once a midwife has obtained her certificate in midwifery and registered with the Ugandan Nurses and Midwives Council (UNMC), she can commence work either in a government or a private facility. Following at least two completed years of clinical practice at this level a midwife can opt to apply to return to midwifery education and undertake a diploma in midwifery. Sometimes these midwives will be granted paid study leave to undertake a higher midwifery qualification. However, this is not the norm and on the whole midwives will complete a diploma course whilst maintaining a full time clinical job. The course content for the diploma is much the same as that of the certificate, and includes time on clinical placements, but is condensed into 18 months, and may, although not always, involve a research module. With course content the same, the question is raised as to why midwives would choose to pay a significant amount of money to learn something that they know already. The answer comes down to a financial incentive. Midwife jobs in Uganda are advertised at certificate level and diploma level – with diploma level jobs being paid up to 50% more than a certificate level job. However, to benefit from this increase in salary, a

diploma job has to be available for them to apply for. It is common for midwives with diploma level qualifications to be paid at the certificate level in the government sector because no opportunities for her to apply for a diploma level job have arisen since she graduated.

The degree in midwifery in Uganda is a relatively recent addition to the midwifery curriculum, with only a handful of degree courses running in the country. As previously described in relation to the diploma, in order for a midwife to undertake the degree she must possess a lower level qualification in midwifery, the diploma, in order to be eligible for the course. The midwifery degree course runs as a part-time three year course and includes clinical placements and a research module. Again, the incentive for midwives to obtain a degree is financial. However, as the midwifery degree is relatively new to Uganda there is no formal structure in terms of role or pay for midwives who have obtained the qualification. Nevertheless, midwives undertake the degree with the assumption that a midwife with a degree can move swiftly up the ranks both clinically and administratively.

A study by the United Nations Population Fund (UNFPA, 2009) investigating the quality of midwifery education in Uganda uncovered a number of alarming issues. Firstly, the study reported that the Uganda Nurses and Midwives Council (UNMC) has poor skills in strategic planning and organisational development, and further lack in their partnership and networking skills and ability to write proposals and raise funds. The report is highly critical of the UNMC, reporting that it is ill equipped to undertake effective regulation to the extent that it has little control over the quality of midwifery in Uganda.

The study reports that the quality of midwifery courses vary between institutions, with course content, including pharmacology modules which cover antibiotic prescribing, differing between them. Overall, midwifery courses were deemed to be of poor quality, with the midwifery degree course and the nursing degree course, which provides basic midwifery education for nurses⁸, offering the highest quality of midwifery training. This is concerning as the majority of midwives in Uganda don't undertake training at degree level. On the whole midwifery courses were not found to be well supported by tutors and

⁸ Nurses are provided with a basic level of midwifery education in the event that they find themselves working in a health centre where there are no midwives present but a woman presents in advanced labour with no option for transfer.

teaching aids, with observed teaching ratios of 1:60. The study also noted that tutors rarely attended to students in clinical placements to offer supervision, thereby swamping already overwhelmed midwives with the task of clinical teaching. The general consensus of the report was that midwives going through the programs are not well skilled when they graduate.

Knowledge for Change (K4C)

Knowledge for Change is a UK based charity that has been working in Uganda across multiple healthcare sites since 2012. The primary focus of the charity is to improve the standard of healthcare provision in LMICs for the poorest members of society. The core values of K4C centre on achieving ethical, sustainable and mutually beneficial improvements in health infrastructure and capacity of staff and students in LMICs and the UK. In addition to staff training and capacity building the work of K4C also involves infrastructural development within healthcare facilities and the provision and repair of medical equipment. K4C are also involved with local healthcare training institutions in the development and delivery of a midwifery undergraduate curriculum. Furthermore, they facilitate exchange placements for Ugandan staff and educational elective placements for UK based students.

I began working with K4C in Uganda in November 2016. From then until June 2018 I took on the role of volunteer midwife. This role was multifaceted. In addition to undertaking my PhD studies, I worked clinically in three health centres and one regional referral hospital in the Kabarole district of Uganda, supervised UK students on elective placements, and taught one course unit per semester on the Bachelor of Midwifery program at the University located in Fort Portal. I received funding for the final year of my PhD studies in April 2018 and so at this point took a step back from my volunteer role with K4C. I remained in Uganda until December 2018. During this time, I continued to work clinically in the four healthcare facilities taking part in this study, although I significantly scaled back the amount of time I spent doing this so that I could focus on PhD writing. At the same time, I taught for two days a week on the Bachelor of Midwifery program at a university in Kampala, supporting final year students to undertake their own research projects.

Where I worked in Uganda and what it is *really* like

I worked in one health centre III, two health centre IVs, and one regional referral hospital. For the purposes of this study I have given them names so that the reader can become more familiar with each site.

Elgon health centre III

Elgon health centre has an outpatient department and a maternity department. Elgon health centre is led by a clinical officer who works clinically and acts as the overall ‘in-charge’⁹ of the facility. The maternity department has a midwifery lead known as the “midwife in-charge”. In terms of maternity, it is the equivalent to a standalone midwifery unit in the UK, offering a midwife led service. Operating 24 hours a day, the five midwives here offer antenatal, intrapartum and postnatal care to low risk mothers. A new cervical screening service, which is also run by the midwives, has recently been introduced by K4C and is slowly establishing itself. There are no medical officers or pharmacists on site and no operating theatre. A laboratory offers testing for HIV, malaria and syphilis. Urinalysis testing is available¹⁰. Microbiology¹¹ testing is not available. On average 35 women give birth at the unit each month.

Moroto health centre IV

Moroto health centre has an overall ‘in-charge’ who operates in a managerial capacity only. There is also a midwife in-charge at Moroto. As a health centre IV, Moroto midwives, of which there are five, should be supported by a medical officer, anaesthetist and theatre staff so that they are able to provide antenatal, intrapartum and postnatal care to both low and high-risk mothers. However, with no medical officer, anaesthetist, pharmacist or operating theatre available, Moroto health centre IV functions in the same vein as a health

⁹ The term ‘in-charge’ is a colloquial term used to describe the overall manager of a healthcare facility or department within a healthcare facility.

¹⁰ These tests are dependent on a trained laboratory technician being available for microscopy testing or alternative urinalysis consumables being available.

¹¹ Microbiology testing allows for culture and sensitivity testing to take place. A culture is taken to identify the agent causing an infection. A sensitivity check identifies which medication the causative agent is susceptible to.

centre III. Microbiology testing is not available in the on-site laboratory. However, urinalysis and tests for HIV, malaria and syphilis are offered provided the consumables required to run these tests are available. On average 8-10 women give birth at the health centre each month.

Speke health centre IV

Speke health centre IV has an outpatient department and inpatient services for adults and children. Speke is led by a medical officer, who works clinically, and acts as the overall “in-charge”. Like Elgon and Moroto there is also a lead midwife for the maternity department. The maternity department is staffed by a team of eleven midwives and neonatal nurses working alongside three medical officers and two anaesthetically trained nurses. There is no pharmacist. A simple laboratory offers HIV, malaria, syphilis and urinalysis. Speke health centre provides antenatal, intrapartum and postnatal care to low and high-risk pregnant women, and they have the ability to perform caesarean sections. There is also a neonatal intensive care unit (NICU) that is slowly establishing itself. On average the health centre has 130 births per month, of which approximately 10% are caesarean sections.

Stanley regional referral hospital

This is the main hospital in the region which offers outpatient services. It is overseen by a medical director who is a medical officer of consultant that no longer works clinically. There are a variety of inpatient wards including surgical and paediatric wards, and three operating theatres, one earmarked for maternity cases only. Stanley hospital also offers an x-ray service, ultra sound scanning and is currently being supported to develop a laboratory that is capable of carrying out a wider range of haematology, biochemistry and microbiology tests than are available in health centre IIIs and IVs. One qualified pharmacist works at Stanley hospital. A lead midwife oversees inpatient maternity services. A team of midwives work alongside medical officers, some of whom are interns on a rotation, and others who have chosen to specialise in obstetrics in the maternity department. The hospital provides antenatal, intrapartum and postnatal care to both low and high-risk women and has a NICU. Antenatal care is provided in the outpatient department and is led

by a midwife who oversees the antenatal, family planning and child immunisation departments. Three midwives work in the antenatal clinic of which one is the “midwife in-charge”. As a referral hospital Stanley hospital frequently have women transferred to them from health centre IIIs when the care they require falls out of the scope of the midwife. Additionally, Stanley hospital also receive referrals from health centre IVs, with issues such as medical officers, anaesthetists and blood for transfusion not being available cited as reasons for transfer. On average the hospital has around 620 births per month, of which approximately 33% are caesarean sections.

Infrastructure

These four facilities differ greatly in their infrastructure. Although under the control of the District Health Office, Speke health centre is heavily supported by an American NGO and is perhaps what one might consider to be the ‘nicest’ of the healthcare facilities. The NGO contributed a significant amount of money to the construction of the building which took place in 2015. The facility is therefore modern and compared to other health centres is ‘fresh’ and has a cleaner feel about it. Funds and donations from the NGO are additional to supplies provided by the government, which means that Speke health centre vary rarely have ‘stock outs’ of medications, intravenous fluids and consumables such as gloves, catheters, needles and syringes. Furthermore, four of the nurses who work in NICU and one of the midwives have their salaries funded by the NGO. Up until the end of March 2018 the NGO also funded one medical officer to work at Speke. He covered maternity as well as adult and paediatric inpatients. In the labour ward there are two labour beds available, with both the antenatal and postnatal inpatient wards each having eight beds.

Of the remaining three health care facilities, Elgon is by far the most spacious and offers more comfortable surroundings. Support from K4C over the past three years has enabled Elgon health centre to add partitions to the building, knock holes in walls, and thus extend their labour ward. There are two beds on the labour ward, and the combined antenatal and postnatal ward has seven beds.

Moroto health centre was given the status as a health centre IV in 2010, but even now, in 2019, the district health office has failed to convert it and provide the space, equipment

and human resources it requires to function at that level. This unit is particularly small and it is not uncommon to see women spilling out of the waiting area on to the steps and ground outside. It has two labour beds, one of which is broken, so is never used. The combined antenatal and postnatal ward has 3 beds, and a freestanding partition separates them from the couch that is used for conducting antenatal visits.

Based on my experiences of working there, women are cared for in an undignified manner and potentially dangerous environment at Stanley hospital. The labour ward has five cubicles for women to labour in, which really is not enough when there can be 20 to 25 women giving birth each day. Each cubicle, which isn't as big as one standard individual room on the delivery unit at my old hospital in the UK, has two birthing couches in it. Women give birth side by side, with less than a metre between them, in fact just enough room for the midwife to stand between the two couches. On more than one occasion I have seen a baby being born to a woman on one couch, whilst in the bed next to her was a woman who had, only hours earlier, given birth to a stillborn baby. Lack of space impacts on a woman's labour care in more ways than just being insensitive to her feelings; once a woman has been examined and found to be in established labour, she may or may not get to stay on labour ward. If, on examination, a woman is found to be less than 8cm dilated and the fetal heart rate is fine, she will be ushered off labour ward to ambulate and drink sugary tea, in an attempt to help her labour progress. This frees up room for other women to be assessed, as there simply isn't enough room for women to have their own bed for the duration of their labour. As a result, many women in labour aren't monitored, which means there can be a delay in diagnosing maternal or fetal distress. It also means that occasionally when a woman is mobilising she doesn't have the time to get back to the labour ward. As a result, I have seen more than one woman give birth outside the labour ward in full view of the public.

To paint a picture of the caesarean section postnatal ward, imagine a room that is about the size of a 25 metre long swimming pool. There are 17 beds in this room, eight down each side and one at the end in the middle. As with all the health centres in this study, there is no hospital linen so the women supply all their own sheets and blankets for themselves and their babies. There are no curtains between beds or in the windows, it is one large communal room. Capacity for postnatal women doesn't stop there however, and

on most days there can be anything from two to five 'floor cases' - women lying on mattresses on the floor. The women on the floor are the women most recent from theatre, as they have arrived once all the beds have gone. So, what you see is the woman's relatives wheeling her down from theatre to the postnatal ward on a metal transfer trolley and then between them, they lift her off the trolley and deposit her on the mattress on the floor. Later in the day when other women have been discharged home, she will get up and move to a bed. The other postnatal ward, for 'low-risk' women who have had a normal delivery, often overflows out of the ward and onto beds and mattresses (which the women have had to bring themselves) in the corridor outside. This corridor is one of the main corridors in maternity, so as you transfer a woman from labour ward to theatre, or theatre to the caesarean section postnatal ward, you find yourself shuffling past women who are patiently waiting to be discharged home.

In terms of equipment, Elgon and Moroto health centres who have been supported by K4C and Speke health centre who is supported by an American NGO, generally have basic equipment including blood pressure cuffs, thermometers and pinnard stethoscopes to hand, although in small quantities. It is a different story at Stanley hospital, who although supported by various outside agencies, lack equipment. There can be one pinnard stethoscope on the labour ward, one blood pressure cuff but no stethoscope and no thermometers. Midwives working on the combined postnatal and gynaecology ward have access to one blood pressure cuff and on a good day, a thermometer may be available. Gaining a comprehensive picture of the health of a woman and baby becomes difficult when such equipment is not available and basic but important observations such as blood pressure and temperature cannot be taken.

'Stock outs'

The government is responsible for supplying medications and consumables for use in all public healthcare facilities in Uganda. 'Stock outs' occur when these medications are either not supplied by the government or have been used up prior to the next delivery. Health centre IIs and IIIs are provided with a standard list of medications that the government assess will be needed. HCIVs and hospitals have slightly more autonomy over their

requirements and can make specific requests for types and volumes of medications. All medications are allocated to a central pharmacy store when they are delivered to a healthcare facility. Should a department need to top up their supply of medications they are required to complete a requisition form. This is taken to the central pharmacy store where the medications are checked out of the store and dispensed to the department. This process allows all medications leaving the store to be accounted for.

On the whole Elgon, Moroto and Speke health centres are well stocked with medications that are commonly used in the antenatal period, although it is not unusual to see 'stock outs' from time to time. When 'stock outs' occur, medication, including antibiotics, is prescribed as required, and women encouraged to purchase them from local pharmacies and drug shops if they can afford to do so. At Stanley hospital 'stock outs' occur more frequently, and not just of drugs. Women's attendants¹² are frequently sent to buy catheters, medication, intravenous fluids, needles, syringes, and even suture material required in the event of a caesarean section. There is an expectation that women will bring their own gloves for the midwives to use during delivery of the baby. Women also provide a razor blade for cutting the cord following birth and for an episiotomy to be performed where necessary. In all healthcare facilities cord clamps are fashioned from the rim of a glove.

Staffing

As already discussed there is a significant shortage of health care professionals working in Uganda. At Elgon and Moroto health centres there is always one midwife on shift. If other services are being offered on a particular day such as cervical screening, a second midwife may be rostered on. This leaves one midwife with the task of seeing all women attending for antenatal appointments, which can range from 2 to 30 women, whilst at the same time caring for any women in labour and any women who are admitted with antenatal complications, as well as those who are there in a postnatal capacity. Things are slightly better at Speke health centre, where there will be three midwives rostered on each day.

¹² An attendant is a family member or friend, usually female, who supports the woman during her hospital stay. This will include making her meals, emptying her catheter and cleaning her linen amongst other things.

One covers the antenatal clinic which sees anything from 20 to 70 women a day, another covers the antenatal, labour and postnatal wards, and the other works in NICU. The midwives are very flexible and will help their colleagues out if their workload is lighter. Despite the fact that Stanley hospital has a greater number of midwifery staff, the pressures on these midwives are far greater than those felt by midwives working in health centres. The labour ward usually has two midwives working on a day and night shift, although it is not uncommon for one midwife to be working independently. This is quite shocking and is even more so, when you realise that this midwife is also responsible for attending theatres to 'catch a baby' when a woman goes for a caesarean section. 'Catching a baby' involves receiving the baby from the medical officer at birth, assessing the baby's condition, performing resuscitation if required, weighing the baby, giving any required medications and generally ensuring the wellbeing of the baby. In addition, the midwives working on the labour ward are expected to attend to all the women admitted to the antenatal ward with pregnancy complications, and all the low-risk postnatal mothers awaiting discharge home. The caesarean section postnatal ward is no better, with one or two midwives on a day and night shift caring for 17 plus women and their babies, in addition to all the women on the gynaecology ward.

Given these staffing ratios it is not surprising that much of the basic nursing care that women receive is provided by their attendants. This is true for all the healthcare facilities that I have worked in in Uganda. Additional nursing and midwifery care also falls to student midwives, nurses and medical officers. As previously discussed, the training that these midwifery students acquire in their respective schools is lacking (UNFPA, 2009). It is not unusual therefore to see students making clinical decisions about women and babies and administering drugs with no theoretical understanding of what they are doing and worse still, no formal supervision.

Infection prevention and control (IPC)

The poor quality of infrastructure coupled with a lack of resources mean that the implementation of sound infection and prevention control practices (IPC) is severely lacking in all public healthcare facilities in Uganda. Effective hand hygiene has been

identified time and again as a key component in reducing the spread of infections (WHO, 2009). With only one to three sinks being available in each health centre, and soap rarely available, compliance with hand hygiene is understandably challenging. K4C have in the past provided alcohol hand gels and towels for hand drying in all healthcare facilities that they work in. This has proved to be unsustainable for two reasons. Firstly, towels used for hand drying need to be washed and dried following use. Levels of motivation for staff to do this are low, and success for this initiative has only been achieved at Elgon health centre. In terms of the hand gel, it is unsustainable for K4C to continue providing it now that the hand hygiene project that funded it has been completed. Furthermore, as the healthcare facilities included in the project used to receive the hand gel free of charge, there is a reluctance for them to now pay for it.

Cleaning equipment in general is limited and as I write this there is currently a national shortage of bin liners, meaning all medical waste is thrown directly into plastic bins. Healthcare facilities often look visibly dirty, with old blood splashed on walls, floors and beds a familiar sight. 'Stock outs' of gloves leave healthcare professionals with little protection when taking bloods and caring for HIV positive patients. Cramped conditions fuel the spread of infection. In short, even if Ugandan healthcare professionals were motivated to adhere to infection control practices, a lack of equipment hinders their ability to do so.

Documentation

The Uganda Nurses and Midwives Council (2014) stipulate that record keeping is a key component of the midwife's role and plays a vital function in the provision of safe care. Reality tells a different story. Little value is placed on documentation by all members of the multidisciplinary team. During pregnancy women carry with them small exercise books that are used to document antenatal care. Between pregnancies these are usually lost, and with them any information about the pregnancy and birth. Poor communication between healthcare professionals and women mean that in the most part, women can't recount any complications they have had in previous pregnancies. Documentation of labour care is poor. When women are admitted in labour an entry is made into the delivery notes

detailing an initial assessment. It is rare that any further written documentation takes place. In some cases, this is because the woman has been sent to 'ambulate' and no further care has taken place. If care has been provided it is documented on the partograph, a chart used to record maternal and fetal wellbeing. It is not unusual for this to be left unfilled or for midwives to deliberately falsify observations and the level of care that has been provided post-delivery.

The role of the midwife as an antibiotic prescriber

The Ugandan Ministry of Public Service (2017) recently published a document entitled "Schemes of Service for the Nursing and Midwifery Cadre." The document lists "administer treatment as prescribed" as one of the key duties and responsibilities of a midwife educated at certificate level (Ministry of Public Service, 2017; p.70). No mention is made of the role the midwife has in prescribing these treatments, suggestive that the role of a midwife does not include being a prescriber.

A lack of human resources in the Ugandan healthcare system mean that midwives find themselves being prescribers even though it is not defined as their role in these Schemes of Service. With medical officers not available in health centre IIIs and a limited number of them employed to work in health centre IVs and RRHs, it is simply not possible for midwives to defer prescribing decisions to medical officers. It is imperative to understand that midwives in Uganda find themselves prescribing antibiotics for pregnant women. ***They are not simply dispensing them.*** They make a clinical assessment of a woman's signs and symptoms, a diagnosis and a subsequent prescribing decision. The midwife will then dispense any medication that she has prescribed free of charge. If it is out of stock the midwife will advise the woman to attend a pharmacy to buy the medication.

With prescribing not forming part of the Schemes of Service the question arises as to whether midwives are adequately taught how to be prescribers during their training. Anecdotal evidence suggests they are not. Having taught on two Bachelor of Midwifery courses in the country I am aware that pharmacology was not on the curriculum for one of the courses. The other course did contain pharmacology modules, with one listing "rational prescribing and prescription" as part of its course content. For various reasons the quality

of this content remains questionable; the students themselves reported that they had not been taught about antibiotic prescribing, and the course itself was not accredited by the Uganda Nurses and Midwives Council. Evidence from Africa supports this observation; only 36.7% of nurses responding to a survey reported that they had received antimicrobial stewardship training during their undergraduate schooling, and further, such training was not formally structured (Bulabula, Jenkins, Mehtar and Nathwani, 2018).

Pharmacists

Ensuring that antibiotics, and indeed other medications, are prescribed appropriately in Uganda is impeded by a lack of a qualified pharmacists in the country. Correspondence between the Pharmaceutical Society of Uganda and Knowledge for Change in December 2018 revealed that there are only 45 pharmacists working in public hospitals in Uganda. Dispensing of medication falls therefore to a variety of different cadres from clinical officers to midwives, to nurses, to village health technicians. In this study there are no pharmacists at Elgon, Moroto or Speke health centres. In the maternity departments of these health centres medication is **prescribed by the midwife** and then *dispensed* by either the prescribing midwife or a village health technician working within the healthcare facility. With a non-pharmacist dispensing the medication there is no scope for prescriptions to be cross checked or quality controlled. There is one pharmacist allocated to work in the Stanley Hospital. Her role however sees her spending little, if any, time in the pharmacies of the hospital checking prescriptions and dispensing medications. Instead the role falls to pharmacy technicians who have had a basic level of training at diploma level. Having met the qualified pharmacist at Stanley hospital on several occasions, I came to learn that she too self-medicated for a simple cough or cold and believed the use of antibiotics for these conditions was appropriate. Her behaviour raises questions about the quality of education pharmacists and pharmacy technicians receive in preparation for their role and their own understanding of antibiotic resistance.

A note about pregnancy in Uganda

Women in Uganda receive several prophylactic medications during their pregnancy which the midwife, in the absence of a medical officer, will prescribe and dispense at each antenatal visit. Table 2.1 presents the medications that women receive routinely during their pregnancy in Uganda.

Table 2.1. Medications prescribed by midwives in Uganda for pregnant women

Medication	Indication	When prescribed
Folic acid	Prevention of neural tube defects in the fetus (defects of the spinal cord and brain)	Women receive this in the 1 st trimester of pregnancy (<13 weeks pregnant)
Ferrous sulphate	Prevention of anaemia in the pregnant women	Women receive this four weekly in the 2 nd and 3 rd trimesters of pregnancy (>13 weeks pregnant)
Mebendazole	Treatment of parasitic worm infections	Women receive this once in pregnancy at any point following the 1 st trimester of pregnancy
Sulfadoxine Pyrimethamine (SP) ¹³	Prevention of malaria	Given four weekly in the 2 nd and 3 rd trimesters of pregnancy
Tetanus Toxoid (TT)	Vaccination against tetanus	Given five times in a lifetime – given according to history of woman's previous TT vaccinations

¹³ SP is not given to women who are HIV positive.

All individuals who are HIV positive in Uganda receive as part of their treatment, daily prophylactic antibiotics. This regimen remains unchanged during pregnancy so any HIV pregnant woman will be taking a daily dose of antibiotics.

Common conditions in pregnancy

Pregnancy immunocompromises women leaving them susceptible to infections (Mor and Cardenas, 2010). Furthermore, malnourishment and anaemia commonly seen in sub-Saharan Africa can further increase the risk of infection, with evidence from Uganda suggesting that when women are anaemic their immune systems are suppressed further (Baingana, Enyaru, Tjalsma and Swinkels, 2015). Detailed below are some of the common conditions women are susceptible to in pregnancy. All of these have been seen recorded in the antenatal registers of the healthcare facilities in this study as a diagnosis for a woman's complaint in pregnancy.

Respiratory tract infections

Pregnancy increases a woman's susceptibility to developing pneumonia and pulmonary oedema which can complicate simple respiratory tract infections. As the uterus enlarges in late pregnancy the lungs become compressed by the diaphragm which can impede ventilation and make the clearing of secretions difficult (Coad and Dunstall, 2011).

Urinary tract infections

During pregnancy progesterone alters the tone of the bladder, which coupled with upward pressure on the bladder from the growing uterus can lead to urine retention. Increased levels of progesterone in pregnancy also cause the ureters to dilate resulting in urinary stasis. These changes coupled with a change in the pH of the urine and an increase in glycosuria and proteinuria (glucose and protein in the urine) creates a conducive environment for bacterial growth leaving women more susceptible to urinary tract infections (Matuszkiewicz-Rowinska, Malyszko and Wieliczko, 2015).

Urinary tract infections not only compromise the health of the women, but can predispose her to pre-term labour, thereby having consequences for the fetus.

Genital tract infections

Changes to the pH of the genital tract during pregnancy increase the risk of infection (Coad and Dunstall, 2011) with candida albicans (thrush), a fungal infection, commonly seen in pregnant women.

Lower abdominal pain and backache

A growing uterus and fetus combined with pelvic joints relaxing due to the effects of progesterone in pregnancy predispose women to lower abdominal pain and backache (Murray and Hassall, 2014). Whilst this is a common complaint in pregnancy it is important that any complaint of lower abdominal pain or backache is assessed appropriately to rule out urinary tract infections, pre-term labour or labour, or other medical complications.

Postnatal infections

Evidence from the UK suggests that one in ten women who have sustained perineal tears will develop a perineal wound infection (Johnson, Thakar and Sultan, 2012). Midwives in Uganda are conscious of these infection rates. Although not recommended by the World Health Organisation (2013) or the Uganda Clinical Guidelines (MoH, 2016) in some healthcare facilities the prescription of prophylactic antibiotics for all women undergoing vaginal birth, regardless of perineal trauma, is standard practice.

A note on syndromic treatments

Due to a lack of diagnostic testing facilities, midwives in Uganda use a syndromic approach in the treatment of women presenting with abnormal vaginal discharge. Midwives will identify the clinical signs and symptoms of the abnormal vaginal discharge. In conjunction

with the algorithm presented in the Uganda Clinical Guidelines (MoH, 2016) the midwives prescribe treatment that targets all the known pathogens causing the signs and symptoms. Whilst this is a simple and time efficient method it carries the risks associated with over-treatment and may mean that asymptomatic conditions are overlooked.

Conclusion

This chapter has presented a detailed account of the reality of the Ugandan public healthcare system with a particular focus on maternity care and the healthcare facilities that are the focus of this PhD. The complexity of the Ugandan healthcare system should not be underestimated. It is under resourced in terms of human resources, general equipment, medications and consumables. Given these shortages it becomes a little easier to understand why health outcomes for the population, and maternal mortality rates in particular, are so poor. The next chapter will consider how research should be conducted in such a complex environment.

Chapter three – Methodology

Introduction

Epistemology, methodology and methods are inextricably linked (Young and Temple, 2014). As a researcher my epistemological position will influence my choice of methodology. At the same time my research objectives and questions, as well as my study design, will influence my choice of methodology. Methods arise from and are shaped by epistemological positions and methodological choices (Carter and Little, 2007). The relationship between these three elements of research is dynamic. It is important that the epistemological beliefs underpinning my approach to research are made explicit and are congruent with my choices of methodology and methods. Ultimately my epistemological beliefs arise from my position as a researcher and my own personal beliefs. This chapter discusses my personal position and motivations for this study, how these have shaped my epistemological position and methodological approach and explains how these link together to underpin the choice of methods of data collection. The chapter continues with a description of the methods employed in this study. This includes a discussion of sampling strategy, methods of data collection and analysis and ethical issues that have been taken into consideration during the study design.

Epistemology

Epistemology deals with difficult questions: what is knowledge? How is knowledge generated? What counts as knowledge in the social world? Put more simply, epistemology can be defined as a theory of what is valid knowledge (Young and Temple, 2014). The epistemological beliefs of a researcher will define how they go on to study the social world (Bryman and Becker, 2012.) Broadly speaking differing epistemologies arise from the differing philosophical views which are embedded in positivism and those paradigms that have arisen to challenge positivism. In turn these are bound to objective and subjective knowledge respectively. To frame this in another manner, the difference between the two approaches centres on the truth claims or generalisability that we can generate from research findings.

Positivism theorises that social life can be studied in a scientific manner that creates objective, irrefutable truths that can be generalised across populations (Guba, 1990). There is a belief that knowledge is 'out there' waiting to be discovered using scientific methods (McNiff and Whitehead, 2006) and standardised methods of data collection (Hammersley and Atkinson, 1995). The positivist researcher is 'disinterested' (Carr and Kemmis, 1986), and argues that there is a universal truth that they can gain access to. In gaining access to this truth positivist researchers posit that they can distance themselves from the research process, thereby eliminating the effect of the researcher on findings (Hammersley and Atkinson, 1995). Positivist researchers seek precision to produce laws of behaviour and apply them in an authoritarian and paternalistic way to control social behaviour (Susman and Evered, 1978; Guba, 1990). Such an epistemological approach, in its search for precision, places an emphasis on quantitative methods dealing with large samples that are more concerned with breadth than depth of data (Guba, 1990).

Conversely, other paradigms have come to exist that challenge positivism, arguing that the generalisability associated with positivist research is often not realised in local contexts (Glaser and Strauss, 1967 as cited by Guba, 1990). These alternative paradigms acknowledge that individuals see and experience the social world differently, giving rise to multiple and subjective truths which are contextual, the corollary of which is there is no overriding universal truth (Carr and Kemmis, 1986; Eisner, 1990). Furthermore, researchers adopting alternative paradigms recognise the fundamental role that they play in research and demonstrate an awareness that they cannot completely remove themselves and their own predispositions from their work (Guba, 1990). Epistemologies that challenge positivism are more commonly grounded in qualitative or mixed methods research which seeks to explore at length the social world. Positivists criticise qualitative methods as they argue that they lack scientific rigour (Hammersley and Atkinson, 1995). However, it is not unusual, and often found to be complementary, to have quantitative methods incorporated into research that is founded on an alternative epistemology to positivism.

Despite the differences between positivism and those paradigms that challenge it, both epistemologies share common ground in that they are seeking the truth. The differences between each epistemology and the way each subsequently effects the methodology and

methods employed in a study means that findings between studies with different epistemologies may differ, giving alternative versions of the truth.

As a clinical midwife whose career has been shaped by the need to provide evidence-based care I have spent much of my working life reflecting on findings from large randomised controlled trials that have been designed with a positivist epistemology in mind. As the term midwife literally translates as “with woman” (Oxford English Dictionary, 2012), the provision of holistic care has influenced the way in which I care for women. Holistic care recognises that all women are different. These differences mean that findings of large population studies may not be applicable to the individual and therefore undermine the findings of research conducted using a positivist approach (Greenhalgh, 2018). Being a midwife therefore creates dilemmas when it comes to providing care for women, and further leaves me straddling the two worlds of positivist epistemology and those paradigms that challenge it. The question arises therefore as to what my epistemological position is. My masters study saw me undertaking qualitative research to explore midwives’ experiences of birth plans. This coupled with the fact that I see myself as a midwife who tries to tailor care to the individual has led me to hold an interpretivist philosophical stance in relation to epistemology. In the continuum of epistemological beliefs, interpretivism adopts the view that “knowledge is socially constructed, subjective and influenced by culture and social interactions” (Koshy, Koshy and Waterman, 2011, p.12). Interpretative research concerns itself with discovering the meanings that individuals assign to their daily actions; their motives, intentions and purpose. Without discovering these meanings the action itself is unintelligible (Carr and Kemmis, 1986). Furthermore, it acknowledges that different individuals may interpret the same physical stimulus differently (Hammersley and Atkinson, 1995).

In adopting this framework, I acknowledge myself and my experiences as an active player in the research process who will be inextricably etched in all stages of the research. My interactions with the midwives that I am making enquiries with will shape the findings of this study. Being able to locate myself in the research and be transparent about my position is important in ensuring an understanding of how I may, as an individual, influence the participants in the data collection process and therefore the subsequent research findings.

My position

All researchers bring their own personal backgrounds, personalities and motivations to their research, all of which can drive a study in a particular direction. These variables need to be declared and integrated in order to be able to validate any truth claims made from the findings of the research. As a midwife I view myself as a practical person. My work is in the most part clinical. It is about seeing a process through from start to finish. My ultimate goal is to ensure that at the end of the pregnancy, childbirth and puerperium continuum there is a healthy mother and baby.

I trained as a midwife in Scotland and have spent the majority of my career working in the UK. At the heart of my midwifery education and the Nursing and Midwifery Council's "The Code" (2015) was the message that as healthcare professionals we need to provide evidence-based care. Midwives play an important role in contributing to the evidence base for midwifery; they are ideally placed to understand the needs of women and have many skills that lend themselves to conducting research (Rowland and Jones, 2013).

At the beginning of my PhD journey I attended two conferences focusing on antimicrobial resistance, one in South Africa and one in Uganda. Whilst I found these experiences enlightening, I also found them to be incredibly frustrating for two reasons. The first was that I noticed many of the research findings being presented at the conferences reported on sub-optimal antimicrobial stewardship practices amongst healthcare workers in the sub-Saharan Africa region. There were few studies that were using these findings to actively inform those working on the ground and initiate changes in practice. Secondly, many of the delegates at the conferences were lead professionals in the field of antimicrobial resistance. Whilst it is useful to share our findings with our colleagues, I sometimes feel that conferences spend their time preaching to the converted.

Based on these feelings and observations, and as a midwife and researcher I felt that I wanted to try and use my three year PhD as effectively as possible. Whilst I wanted my research to identify whether or not midwives were practising antibiotic stewardship activities appropriately within their context, I also wanted to understand the internal and external influences behind their antibiotic stewardship practices. I wanted to see if their antibiotic stewardship practices were grounded in evidence. With antibiotic resistance

taking a prominent position on the global health agenda, coupled with evidence reporting that countries across the world are struggling to adopt antibiotic stewardship practices, my expectations as I started this study were that there was likely to be some knowledge-practice gap in antibiotic stewardship activities conducted by the midwives in this study. I felt it important that were these expectations correct, that it wasn't the only finding and outcome of three years' work. Indeed, social research has been criticised for having too little impact on social change and should take steps to become more action orientated (Hammersley and Atkinson, 1995). Taking this observation into consideration, I decided that I wanted to use this research study to support Ugandan midwives in the provision of evidence-based care that benefits not only the women they care for but also the wider population. These personal motivations led this study to have an action orientation. As I began this study I was aware that my task would not be easy. I was aware of my limitations as an individual and knew that my PhD would not be able to resolve all of the issues associated with midwives' antibiotic stewardship practices. My experience of working in Malawi for fourteen months as a volunteer midwife clinical tutor combined with my knowledge of current literature related to the role of professional volunteers working in Uganda (Ackers and Ackers-Johnson, 2017), left me under no illusion that changing practice and behaviours would be easy or even possible.

Methodology

Ugandan midwives' understanding of antibiotic resistance and influences on their antibiotic stewardship activities, and in particular, their antibiotic prescribing behaviours have not been explored to date. This opens the field in terms of possible methodological approaches which are congruent with an interpretivist epistemological approach. Grounded theory is a research methodology that was developed by Glaser and Strauss in the 1960s, which generates theory from data (Holloway and Wheeler, 2010). Researchers using grounded theory have little pre-existing theory or expectations of findings. Instead, new theories emerge from the data (Hansen, 2006). Owing to the fact that there is no existing research exploring Ugandan midwives' understanding of antibiotic resistance or influences on their antibiotic stewardship practices, grounded theory presented itself as a

potential methodological approach. However, evidence from existing literature coupled with my own personal experiences meant I had some predetermined ideas and expectations before the study commenced, therefore rendering grounded theory inappropriate for the design of this study.

Phenomenology was developed by the philosopher Edmund Husserl and is concerned with people's lived experiences in relation to a particular issue under study (Robson and McCartan, 2016). This approach to research provided a fit for my interpretivist philosophical stance, and therefore phenomenology offered itself as an alternative methodology that could be used to explore midwives' understanding of antibiotic resistance and influences on their antibiotic stewardship practices. However, given that phenomenology tends to focus on a particular time or life event experienced by individuals it was considered too narrow approach for this study.

Ethnographic studies offer a detailed "description and interpretation of the culture and social structure of a social group" (Robson and McCartan, 2016, p.156). Traditionally this is achieved by the researcher immersing themselves completely in a particular social group for an extended period of time. As a midwife from the UK who would be living in Uganda as part of the community, and working alongside midwives in Uganda for two years, ethnography offered itself up as an appropriate methodological approach to this study. Criticisms of ethnography include that the intense presence of an individual in a particular group has the potential to disturb and distort the natural setting, thereby calling into question the quality and reliability of research findings generated in this manner (Robson and McCartan, 2016). As detailed earlier, my personal motivations as a researcher have been to seek to change culture in a manner that brings about improvements in the practices of midwives. Such motivations are to an extent at odds with the intentions of classical ethnography whose primary intention is to understand rather than change the group being studied (Barab, Thomas, Dodge, Squire and Newell, 2004).

Carter (2018) argues that the concept of ethnographic methods undermine the reality of ethnography as a methodology. There are many methods available to the ethnographer including participant observation, interviews and audio recordings. These methods are also available as a means of data collection for researchers utilising a methodology that differs from ethnography. Therefore, the use of such methods does not equate to an ethnographic

methodology being employed. This study utilises participant observation and interviews yet does not identify itself as ethnography. Indeed, there are two significant differences between this study and ethnography. Firstly, ethnography is a style of research that seeks to communicate the perspectives of others. The reader of this thesis will note that the manner in which the findings from the observational work in this study are presented primarily take the form of excerpts from reflective field diaries. The use of reflective field diaries can be considered quite rigid in comparison to the manner in which ethnography seeks to present findings which instead allows for thick description and comparative perspectives to be considered (Hammersley and Atkinson, 1995). Secondly, given that ethnographic enquiry is open ended in nature, the researcher cannot know in advance how to carry out the research or what findings will emerge from their enquiries (Carter, 2018). This study however anticipated the finding that there was likely to be some knowledge–practice gap in the antibiotic stewardship activities of the midwife participants, and furthermore, that the study would address them in the form of an intervention. Thus whilst it cannot be denied that this study has utilised methods of data collection traditionally associated with ethnography it cannot be classed as ethnography.

Research and discussions have taken place in many forums to explore ways to tackle antibiotic resistance, however, converting these into practical responses has been less successful (Charani et al., 2013). This may be attributable to the fact that many studies attempting to improve antibiotic stewardship practices overlook contextual influences and change processes when designing interventions (Charani et al., 2011). Given my position as a researcher immersed in my field of study, my previously discussed personal motivations, and the observations of Charani et al. (2011), I identified with action research and felt confident that it was the most appropriate methodological approach for this research study. One of the defining features of action research is that both the lead researcher and the stakeholders who take part in the action research co-define the research problem (Reason and Bradbury, 2008). In this study however, the identification of the research problem in the conceptual phase arose from research evidence relating to antibiotic stewardship rather than the midwives themselves. Ultimately then, the decision for this study to develop an intervention to solve the problem of poor antibiotic stewardship practices was based on my own personal beliefs and understanding that had

been developed prior to the start of the study. Given that the participants in this study did not participate in the construction of the initial problem, this study may be viewed as a modified action research study.

No clear definition exists as to what constitutes feminist research. However, feminist research is much more than research conducted by women or research focusing solely on women. Instead it seeks to break down the traditional roles seen between the researcher and those being researched, with a focus on removing any power imbalances between the two groups (Webb, 1993). Feminist research therefore tends to adopt an epistemology that challenges positivism (Webb, 1993) and views the construction of knowledge to be contextually bound (Kralik and van Loon, 2008). A number of features help to distinguish feminist research from traditional research that focuses on systematic, measurable and objective outcomes. Firstly, feminist research seeks to recognise oppressive influences and challenge these in a manner that seeks to contribute to social change (Kralik and van Loon, 2008). Secondly, feminist research is shaped by feminist values and beliefs that facilitate women to tell their stories, and to make sense of and give meaning to their worlds. Finally, approaches to feminist research are diverse which allows for methods to be influenced by the research context and the purpose of the study (Webb, 1993). Feminist research and the chosen methodology for this study, modified action research, cohere in many ways. They share an epistemological position that fits with my own and both have an action orientation that seek to collect and analyse data in a manner that is context sensitive with the overall intention of making a contribution to social change. Whilst this is the case, a theoretical feminist position was not actively adopted when devising this study.

Action research

It was the writing of van Buul et al. (2014) that inspired me to consider modified action research as apt in the design of this study. Although van Buul et al. (2014) don't present a tried and tested case study where action research has been used to effectively implement an antibiotic stewardship programme, their argument for using participatory action research for such an intervention resonated very strongly with me. Lewin (1946) emphasised the need for social scientists and practitioners to combine their expertise in

practical, problem solving studies in order to bring about social change. This led to the birth of action research: research that moves away from being *on* people, to research that is participatory, *with* people, and *for* people (Reason 1988 as cited by Meyer, 1993). Indeed Carr & Kemmis (1986, p.164) cite Lewin (1952) who identified that one of the leading principles of action research is that it makes a “simultaneous contribution to social science and social change.” This is important because the possession of knowledge alone does not deliver behaviour change. Implementing evidence-based care, which is at the heart of this study, can be a complicated process that depends on behaviour change (Michie, van Stralen and West, 2011). Behaviour change is complex in all areas of life and healthcare research continues to try and understand why training and education frequently fail to translate into changed behaviours:

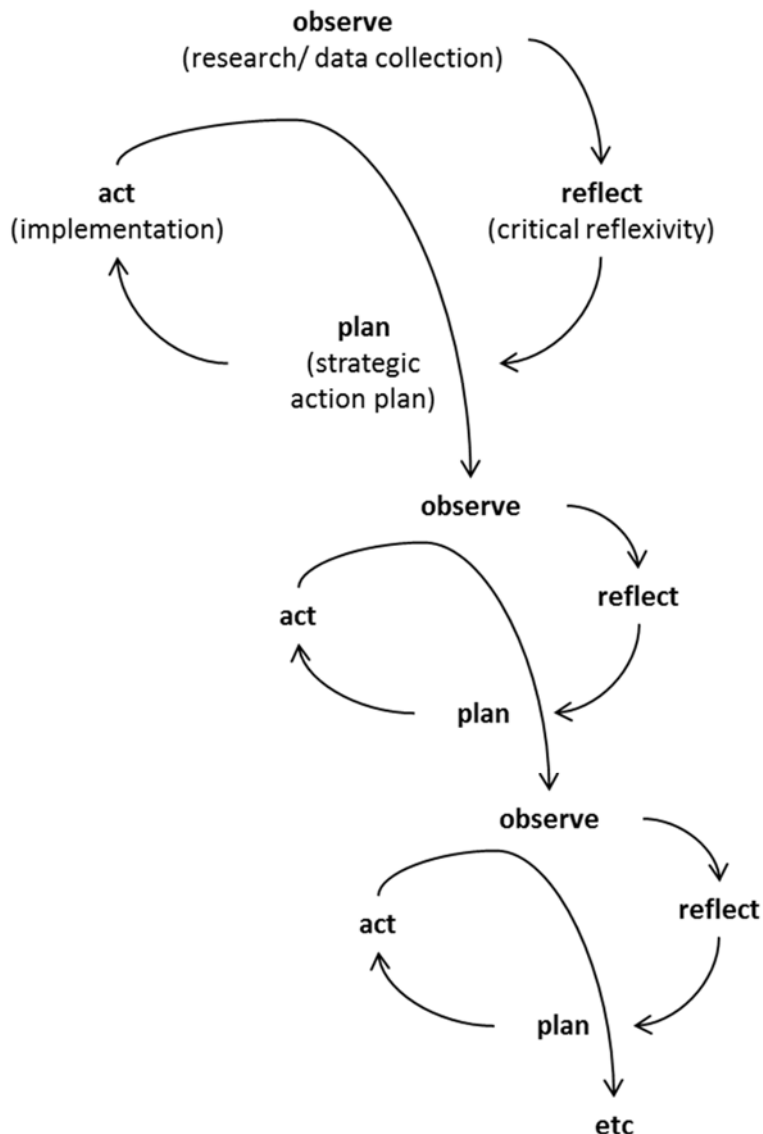
“For most health behaviours [...] knowledge is not an important source of variance” (Cane, O’Connor and Michie, 2012, p.15).

This leaves us with the task of understanding what causes variance and how we respond to it. Action research is helpful here. One approach to action research is to follow a cycle of observation, reflection, planning and acting which can be repeated as required. The cycle approach was devised by Lewin (1946) but has over the years been adapted by others. As mentioned previously, one of the defining features of action research is that both the lead researcher and the stakeholders who take part in the action research co-define the research problem (Reason and Bradbury, 2008). As the midwives in this study were not involved in the conceptual phase, they were not involved in the decision for the study to develop an intervention to solve the problem of poor antibiotic stewardship practices. Rather, this came from myself and my beliefs and understanding of antibiotic stewardship that I had developed from research evidence on the subject. Although as the study progressed, collaboration between the midwives and myself developed, the research problem in this case cannot be said to be co-defined. As a result, this study should be viewed as a modified form of action research.

In designing this modified action research study, I was drawn to the cycle of research as presented by O’Leary (2004) which is depicted in figure 3.1. The model conveys a cyclical process that concerns itself with learning from and improving on the success of previous

cycles so that the end result is convergence towards improved understanding and enhanced action implementation (Koshy, Koshy and Waterman, 2011). Action research enables us to make choices about how to proceed at various stages of the cycle so that progressive changes can be made on a small scale (Reason and Bradbury, 2008). Reason (2004) contends that in demonstrating an awareness and transparency about these choices, the researcher can contribute to the quality of the research. For the purposes of this study, a modified action research approach has been used to try and understand midwives' behaviours in relation to antibiotic stewardship activities with a strong focus on their antibiotic prescribing practices, so that behaviours can be modified to facilitate evidence-based practice. Action research acknowledges that behaviour change is a complex process and may take multiple rounds of differing interventions to achieve incremental changes in practice.

Figure 3.1. O’Leary’s cycles of research



Self-reflection by participants, the second element of the action research cycle devised by O’Leary (2004) is a key component to the participant’s ability to improve their own practice (Carr and Kemmis, 1986). Reflection is an integral part of midwifery training and ongoing lifelong learning in the UK and is advocated by professional, statutory, and regulatory bodies (Royal College of Midwives [RCM], 2003; Nursing and Midwifery Council [NMC], 2009). The ability to reflect is beneficial in the process of experiential learning, the development of critical thinking and underpins the integration of theory and practice (Collington and Hunt, 2006). Indeed, to revalidate as a midwife in the UK, a process which a midwife has to undertake every three years, she must complete five written reflections

and discuss these with a colleague. In reality midwives reflect informally on their practice every day. Transforming this reflection into changes in clinical practice is not so obvious, but ultimately the reflection process tries to hone the minds of midwives to ensure they provide the highest possible standards of care.

As an action researcher I am aware that I cannot independently change social realities without the understanding and cooperation of those whose behaviour I am trying to change. Action research addresses this issue as it is a methodology that centres itself on inclusive, respectful relationships (McNiff and Whitehead, 2006). As a volunteer midwife in Uganda I am undertaking development work. The term 'development work' is a broad concept, but generally it is concerned with making sustainable changes that allow countries to overcome poverty (Bolton, 2007). Meyer (2000) suggests that action research provides a solid foundation for development work; it embraces the need for agency as participants are required to recognise the need for change and take an active role in making that change. This is important for two reasons. Firstly, evidence has shown that antibiotic stewardship programmes need to be sensitive to local culture and context in order to be successful and sustainable (Charani and Holmes, 2013). Secondly and specifically in relation to Uganda, it has been observed that continuous medical education updates often appeal to staff for purposes other than knowledge transfer. Staff are motivated to attend updates due to the 'per diems' (daily cash payments or top ups) that they receive (Ackers and Ackers-Johnson, 2017). This undermines the training process as those opting in are motivated by cash payments and avoidance of clinical work at the cost of other, clinically motivated individuals attending. By encouraging midwives to take ownership of improvements in their antibiotic stewardship activities via a modified action research approach, rather than being passive objects in large scale training sessions, it is hoped they will be motivated to bring their practice into line with evidence-based recommendations.

Action research and leadership

Meyer (2000) discusses the issue of democracy in the action research process, noting that participants in action research should be as equal as possible. Using action research helps us to build an inclusive approach to learning (McNiff and Whitehead, 2006) and a move away from a didactic approach to continuous medical education that is commonplace in

Uganda. As discussed in chapter two there is very much a sense of hierarchy in Uganda, not least in the healthcare system. In the UK and other high-income countries there has been a move towards transformational leadership in healthcare management (Murphy, 2005). Many of the features of transformational leadership are synonymous with those of action research; it motivates staff to pursue mutual goals in an empowering culture that supports group interaction and decision making. Evidence suggests transformational leadership is one of the most influential theories guiding leadership in healthcare (West, Armit, Loewenthal, Eckert, West and Lee, 2015). The provision of quality care in healthcare requires culture change that allows services to adapt. With evidence positing that leadership is a key influence on the culture of an organisation (West et al. 2015), those leading organisations need also to adapt and engage to lead effectively and to support and enable those that they are leading to change. Having worked clinically in the UK for eight years, I am aware of how different leadership styles have motivated or demotivated my participation in group projects. I recognise that the midwives I am working alongside in Uganda are skilled professionals whose clinical practice is frequently challenged by a lack of resources. My role as a midwife is to support my Ugandan colleagues to develop their practice within the confines of available resources, and not to dictate how I think care should be provided based on my experiences from working in a different context. By adopting a modified action research approach, which has similarities with transformational leadership, I aim to motivate all participants to be active contributors to the research. At the same time, as a midwife trained in the UK I am not qualified to prescribe antibiotics. This modified action research study therefore aims to facilitate two way knowledge translation, which is a core value of Knowledge for Change, the charity I have been working with in Uganda.

Given the rate at which antibiotic resistance is becoming a threat to the health of the global population, this modified action research approach could be considered the most ethical approach to address any suboptimal antibiotic stewardship practices that may have been adopted by midwives in Uganda. Rather than acting as an enquirer and observer, I am, as an action researcher, sharing knowledge and giving feedback and advice on a daily basis to my midwifery colleagues about their role in antibiotic stewardship, enabling changes to

occur during the research process, therefore in a more timely fashion than if recommendations are made at the end of the study.

Reflexivity

The role of the researcher can have an obvious impact on the findings of qualitative research, more so than in quantitative research (Breuer, Mruck, and Roth, 2002). Self is a major contributor to the development of the research question and research itself; researchers often choose an area of interest to them to study, thus come to the study with their own personal experiences in the field and may hold a set of beliefs about what they expect to find before they have commenced the research (Drake, 2010). This is where the need for the researcher to be reflexive comes in, and indeed, reflexivity is a crucial element of research, especially where 'insider' research is concerned (Drake, 2010). Reflexivity is important to the demonstration that the findings of a research study are valid (Koshy, Koshy, and Waterman, 2011). It requires the researcher to reflect on their influence on the research process which ultimately may affect data collected and interpretation of findings that may in turn influence and even bias overall findings (Koshy, Koshy, and Waterman, 2011; Becker, Bryman, and Ferguson, 2012).

In line with the recommendations of Webb (1992) I adopted the use of first person in the write up of this thesis as one means of pursuing a reflexive approach to this study. Furthermore, throughout the course of this modified action research study I used personal dairies to help me develop my ability to be a reflexive researcher. Throughout my two years in Uganda I kept detailed dairies that recorded my personal feelings, reactions and reflections of my own participation in the research. One of the ways in which I did this was by writing a blog about my experiences of living and working as a midwife in Uganda. My blog detailed elements of the clinical setting I found myself working in, as well as the challenges that Ugandan working conditions brought both generally and in relation to this study. I also used the blog to record more personal and social elements of my stay in Uganda, with the resultant effect that the blog has acted as a reflective diary of my lived experiences.

Insider or outsider?

Locating oneself in the research process is an important element in being reflexive. My position as a UK midwife researcher in a Ugandan setting put me in a unique position. I was both an insider and an outsider to the research. I too am a woman and a midwife. I worked alongside Ugandan midwives to provide care as part of a team. Where some volunteers came and left after three or six months, I was consistently present in the health centres and hospital in which I undertook research. Further I was part of the community in which the midwives live. Midwives came to my house for dinner, I went to theirs. I celebrated my first Christmas in Uganda with one of the midwives and her family.

I was informed by one of the midwives at Elgon health centre that midwives 'talk'. Not just midwives in one health centre, but across healthcare facilities. They talk about the UK volunteers working with them. I was told that I was seen as a volunteer midwife who was mindful of the constraints that shape midwives' practice in Uganda. The fact that I took these differences into consideration was appreciated. This was not always easy and from time to time I found my patience lacking and my sense of frustration rising as I struggled to understand how to try and make sustainable change to midwifery practice. For example, I had had repeated discussions with midwifery colleagues about the use of antibiotics, only for a year down the line for one of them to tell me when I visited her house that she had just given metronidazole to a friend who had stomach cramps. In these moments I found it important to remember to focus on all the interactive discussions I had had with my colleagues as a means of reassurance that the work we were doing was not in vain.

During my time working for Knowledge for Change the charity were researching elements of respectful care in the maternity setting in Uganda. The components of respectful care are multifaceted and incredibly complex. I attended one of the workshops that was held as part of the data collection process on respectful care which involved approximately 20 Ugandan midwives. It became apparent that one of the conditions midwives felt they required in order to provide respectful care was respect. Despite my frustrations that arose in everyday clinical work in Uganda, I view myself as a professional and feel that over the course of my working life in Uganda I developed respectful and effective working relationships with my colleagues. We communicated well and discussions about antibiotic

use were always professional and friendly. In turn I hope that my personality and behaviours have contributed to the participatory element of this modified action research study and has enabled true team working to form the cornerstone of this project.

Whilst my position as a long-term midwife volunteer facilitated the development of good relationships with my Ugandan colleagues that made me in part an 'insider', I was also very much an 'outsider.' I am white. I am a midwife from a high-income country. The education and experiences that have shaped my midwifery practice are very different to those that my Ugandan colleagues have had. There are stark differences in the way that we have been taught to practise. Scale is another factor that has influenced my working relationships with the midwives in different health centres. A bigger team of midwives work at Speke health centre. With a larger team and a greater geographical distance from where I live, I was not able to develop the same level of intimacy with the midwives working there as I did at Elgon health centre for example. Where bigger teams of midwives work, I could find myself working with one midwife one week and then I wouldn't see her for another four weeks due to our working patterns. Trying to understand and appreciate our different ways of working was therefore challenging. This difficulty in developing close working relationships with midwives was compounded by the fact that I split my time between three health centres and one hospital. I was, quite simply, a work colleague. Sometimes, at Speke health centre I felt that I was not even seen as that. Working for a UK based charity with a focus on improving maternity care sometimes left me feeling that I was seen as someone who was there to give handouts. This is perhaps not surprising as Speke health centre is heavily supported by an American NGO who provide equipment and financial incentives for staff. I lost count of the amount of times I have been asked to get a midwife some scrubs or pay her tuition fees so she can upgrade her midwifery qualification or buy for them the same steriliser that someone has donated for the neonatal intensive care unit (NICU). It was, at times, quite tiresome, insulting and demotivating. This was noted by UK volunteers other than myself. As a charity K4C are continuously addressing the issue and trying to improve working relationships. Even in Elgon health centre where I had good personal and working relationships with the midwives, and felt like I was part of the furniture, I was still seen as an outsider who could 'report them.' K4C support midwives from Uganda to go to the UK for Commonwealth Fellowships. The midwives were often worried that if they did

something wrong at work that I would report them to my “boss”, who would then have taken this privilege away from them.

In this modified action research study, I have not clearly been an insider, but nor have I clearly been an outsider. The extent to which I have been either has varied between the healthcare institutions that I have worked in as well as between the individual midwives. Being an ‘insider’ can be advantageous in the sense that my colleagues may have been more open with me in sharing their thoughts and experiences. Drake (2010) argues that with this privileged access to participants that comes with being an ‘insider’ is the drawback that the researcher may not be able to critically engage with the data collected. For example, as an insider one can lose their objectivity and simply accept that things are just the way they are and not look to understand *why* they are that way. Being an ‘insider’ may also lead to an assumed understanding, whereby the midwives do not expand on their commentary of a situation. Consequently, being an ‘insider’ may have blocked my access to information to the same extent as it may have improved my access to it (Kara, 2015). Of course, the reverse may hold true when I have been viewed as an ‘outsider’. Hammersley and Atkinson (1995) cite Schutz (1964) who argues that the outsider who becomes the insider may be able to gain a more objective view of practices than those who are members of the culture already; those who are already members of the society being studied see it simply ‘how the world is’, lacking an awareness of what can sometimes be very distinctive cultural attributes that shape their realities. As I have moved between the positions of ‘insider’ and ‘outsider’ I feel I have been able to gain a good insight into working practices and have been guarded from losing an objective approach to the study. My position amongst my Ugandan midwifery colleagues has been blurred. Being an outsider has meant that the midwives expected me to have questions about practices that differ from those I have previously experienced. They were therefore most helpful in answering these questions. At the same time as I became closer to the midwives and was seen as an insider I noticed them sharing information with me that they had not shared with other, short term, UK volunteers. This undefined territory has not necessarily been a bad thing and has enriched the data collected during this study.

Working as a volunteer in a foreign country – ethical dilemmas

During my time in Uganda I was very conscious of my position as a white, female professional working in a low income country. Having read “Dead Aid” by Dambisya Moyo (2009) during my time in Malawi, and Graham Hancock’s (1989) “Lords of Poverty” during my time in Uganda I was acutely aware as to how I may be viewed as a foreign volunteer. In recent years the role of volunteers and aid workers in low and middle income countries has been put under the spotlight, and a picture of the ‘white saviour’ stereotype has emerged. The ‘white saviour’ refers to a white person who acts in a manner to help non-white people, but whose behaviour may be seen as self-serving.

There is a story that is often told in relation to ‘development work’ about the ‘good’ intentions of aid workers that demonstrates the ‘white saviour’ stereotype. The story tells of the scenario where an aid agency descend on a village and build a well so that the women of the village no longer have to walk five kilometres every day to collect water. Those working for the aid agency made the assumption that walking such a distance for water was of great inconvenience to the women, and that the quality of their lives would be improved with the simple intervention of building a well in the village. However, by not first discussing the idea with the women and their wider community, they did not know that the women enjoyed these walks. That they felt this time was theirs. Time when they could catch up with their friends, talk about life, and escape other household duties. In not seeking the opinion of the local community and imposing their expectations for what constitutes an effective means of water distribution, the aid workers in this scenario had a negative impact on the wellbeing of the very people they were trying to assist. From the outside, this study, which has been led by me, and with a topic chosen by myself, may epitomise for some this ‘white saviour’ stereotype. This was constantly on my mind as I undertook the study. Indeed, it cannot be denied that I arrived in Uganda with antibiotic stewardship on my personal agenda. An agenda that would eventually lead to me obtaining a PhD. How do I differ then from the ‘white saviour’ or the well intending aid worker?

My experiences in both Malawi and Uganda have seen me witness such ‘white saviour’ behaviours. I have observed volunteers with three to six months experience of working in obstetrics at a junior level wish to lead a teaching session on the management of an

obstetric emergency for a group of qualified midwives who have been managing such emergencies, often independently, with fewer resources for a much longer period of time. This did not sit easy with me and I challenged the appropriateness of such an action. Although it fell on deaf ears, I believe this is one of many examples that demonstrate the level of self-awareness I held about my position as a midwife and researcher in a foreign context.

From early on in the study it became apparent that the midwives were aware and appreciative of my approach to working in an unfamiliar setting. During the interviews that took place in the pilot cycle Monica commented that collectively the midwives I was working with had noticed that I behaved differently to other volunteers that they had encountered. In particular it had been noted that I was mindful of the daily contextual constraints they faced as they sought to provide maternity care. Although I chose to introduce the midwives in this study to antibiotic stewardship I did so in a timely manner. The continuous medical education (CME) session that took place in the training cycle took place some 17 months after my arrival in Uganda. Waiting such a length of time allowed for the pilot and context cycles to build a picture of the setting in which antibiotic stewardship was being introduced. This coupled with the fact that the midwives in the study were involved in the design and presentation of the CME, played a part in lessening the extent to which I may be viewed as a 'white saviour.' Furthermore, having taken a modified action research approach the midwives participating were able to choose their level of involvement and engagement with the study. The extent to which they wished to learn about antibiotic stewardship or implement antibiotic stewardship into their personal practices was at their discretion. There are no governance structures in situ in Uganda in relation to antibiotic stewardship practices. My role as a researcher was to enable the midwives in this study to make the changes they wished to, rather than force them to change.

Naturally, there were times when I felt frustrated about the care that was being provided in the Ugandan maternity setting. Sometimes this was in relation to antibiotic stewardship, although more often than not, it was related to other aspects of care. When these feelings arose I often debriefed with a fellow volunteer, but also sought to understand how my Ugandan colleagues perceived the situation. Again, I feel that this approach was well

received by the midwives, with feedback at the end of the study from Irene, a midwife working in a different healthcare facility to Monica, reaffirming Monica's comments. She stated that "other volunteers come and only look for fault" but that I hadn't behaved in that manner. I found this comment reassuring. Ultimately the study has revealed gaps in knowledge about antibiotic resistance and stewardship and has attempted to bridge them. Irene's comment suggests that she did not find the way in which the study has been conducted or the way in which I have behaved as being judgemental. In part, I believe this is due to the relationships that I was able to establish during my time in Uganda.

As I was in Uganda for two years I was able to develop both close friendships and working relationships with the midwives who participated in the study. Of course the closeness of these relationships differed between midwives, with some becoming close friends, whilst others maintained a work colleague relationship. By far the closest friendships I had were with the midwives working at Elgon health centre. One of the midwives from Elgon invited myself and the two other Knowledge for Change volunteers to spend Christmas with them shortly after I had arrived in Uganda. On Christmas morning we went with Laureen, her husband and children to their Church, and subsequently we were introduced to other members of their community. From there we returned to their family home to share a meal with them and an afternoon of games. This formed a foundation of a solid friendship that lasted the two years I was in Uganda. I would often meet Laureen for dinner on an evening, sometimes at a local café, other times at my house or hers. If she was having a quiet weekend shift at the health centre I would pop down and we would share stories about our lives or what was going on locally in the community. Sometimes we played card or board games together during these quiet times. Occasionally at a weekend I would meet Laureen and we would take her children swimming. I was open with Laureen about my personal life and she was aware of the struggles I faced in my day to day life in Uganda. If I was struggling with a situation, she was on hand to listen and offer advice and vice versa. Since my return to the UK we continue to be in contact. We talk about how her family are, what is happening at Elgon, she asks me how I am, and even invited me to her wedding. This relationship wasn't unique to Laureen. I spent many an evening with other midwives having dinner at their house, them having dinner at mine. I remember one weekend afternoon sitting on the floor at Harriet's house shelling groundnuts and discussing her

relationship with her then boyfriend as well as my personal relationships. She and I used to go and give blood together, go for walks, and go on shopping trips. Although I didn't have the same level of personal contact with the midwives from the other three healthcare facilities, in terms of spending time with them outside of working hours, I did develop personal relationships with them. Quiet afternoons in the maternity unit were frequently spent talking. Conversations varied but included topics about our families, our life histories, our personal aspirations for the future and so on. With the exception of the midwives from Speke health centre, I am still in contact with the midwives from Elgon, Moroto and Stanley that I developed close relationships with. I receive emails updating me about how they are getting on with their studies, family events and sometimes they surprise me by giving me a spontaneous update me about their antibiotic prescribing practices. I believe that these personal relationships contributed to the strength of this study and also set me apart from the 'white saviour' stereotype; I was accepted as part of the community and the midwives were aware that I wasn't only interested in them as participants in research.

As a midwife in Uganda I was aware of the reciprocity of the relationships I had with my Ugandan colleagues. I felt I had much to learn from them in terms of providing maternity care in a resource poor environment and made this clear to them. I frequently sought their advice and engaged in discussions with them about care provision. The professional relationships that I developed with the midwives aided this reciprocity; they weren't afraid to reprimand me if they felt I was doing something wrong and they felt comfortable questioning my practices. I wasn't offended by this. I was very aware that I was a visitor in a foreign country, working in a complex clinical setting and that I needed to adapt my ways of working to fit with the new context within which I found myself. The fact that I was receptive to learning from my Ugandan midwifery colleagues played a role in our individual and collective learning journeys. I believe that their questioning of my practices worked as learning opportunities for both of us as they opened the floor to discussions about the rationale for our individual behaviours.

Both these close friendships and professional working relationships shaped the manner in which I was able to mentor the midwives about antibiotic stewardship throughout all the cycles of action in this study. Rather than approach mentorship in a strict or regimented manner with formal teaching sessions in the clinical setting, learning opportunities related

to antibiotic stewardship were informal. The midwives would often seek me out if they were caring for a woman and had queries about how they should treat her presenting condition or plan her ongoing care. Together we would review a case, consult guidelines, sometimes seeking further advice from a more senior midwife or healthcare professional. These cases were often reflected on at the end of the day or acted as discussion prompts with other midwives. Additionally, such cases prompted us to discuss other scenarios that we had previously encountered or that we felt may arise. My close working relationships enabled humour to ensue when discussing antibiotic stewardship practices that I had observed, with the result again that mentorship was seen to be informal. I feel this informal and more relaxed approach to mentorship both made the midwives feel comfortable with approaching me for advice and contributed to the effective manner in which we could discuss antibiotic stewardship practices and learn in a collective manner.

One of the drawbacks of the close relationships that I developed with the midwives has been related to the write up of the study. Working with such small teams in individual healthcare facilities has limited the amount of detail I have been able to share when presenting data that were collected from my observational work. In particular had I revealed too much about a personal relationship or observation then the identity of the participant midwife may have been revealed.

Methods

Some schools of thought hold the perception that action research prohibits the use of quantitative data analysis. This is not the case; quantitative data can provide essential feedback in action research when combined with qualitative data (McDonnell and McNiff, 2016). This study was designed to be a mixed method study. The mixed method movement in research began in the 1990s. It is seen to be useful in the research of complex social situations and is not simply just the collection of both qualitative and quantitative data within one study. Instead it is about integrating both sets of data in order to generate knowledge combinations and gain a deeper understanding of a social situation or research problem (Creswell, 2015).

I opted to use a mixed-methods approach for this study to enhance my understanding of the issues relating to midwives' understanding of antibiotic resistance and the influences on their antibiotic stewardship practices. The study has used interviews, observational data collection methods that were informed by ethnographic approaches, and secondary data analysis of maternity registers detailing any antibiotic prescriptions being made, to paint a picture of the challenges facing midwives in their role as antibiotic stewards and in particular antibiotic prescribers. Using a mixed-method approach can be seen to enhance the validity of research as it is a means of triangulation. Triangulation involves using multiple sources of data collection to ensure findings are rigorous (McDonnell and McNiff, 2016). In particular the use of observational work and secondary analysis of maternity registers has not only complimented data collected from interviews but has sought to authenticate the narratives given by midwives in the interviews.

The following section of this chapter outlines the methods that were chosen to collect data and includes details of the study population and sample and ethical considerations that have been taken into account.

Population and sample

As previously discussed in chapter two, I chose to come and work in Uganda as a volunteer midwife following my experiences of working as a midwife in Malawi. K4C, the charity who employed me, already had strong working relationships with the District Health Officer (DHO) of the Kabarole District. The role of the DHO is to manage all of the healthcare facilities in the District. The one exception to this is the regional referral hospital which falls under the management of the Ministry of Health (MoH). When I arrived in Fort Portal in November 2016 K4C were working in three public health centres: Elgon, Moroto and Speke. As my role involved me working in these three health centres, it was an obvious choice to use the midwives working in them as my sample population. When I first came to Uganda, the Ugandan Nurses and Midwives Council stipulated that I needed to undertake an eight week orientation period at Stanley hospital. This orientation was necessary for me to become familiarised with the Ugandan maternity care system, and further to obtain my three year Ugandan Nurses and Midwives Council licence. K4C do not

routinely place UK volunteers to work at Stanley hospital as it has been their experience that working in large scale settings limits our ability to make sustainable changes to working practices. During this placement I spent three weeks working in the antenatal clinic. It became apparent during this three week rotation that the midwives working in the antenatal clinic were charged with a great deal of responsibility when it came to prescribing antibiotics; there were no medical officers working in the antenatal clinic to support midwives in the diagnosis of infections and subsequent antibiotic prescribing decisions. Based on these observations and the large numbers of women accessing antenatal care services I decided that the midwives working in the antenatal clinic at Stanley hospital should also be included in the study.

Sampling strategy

Given my working commitments as a volunteer midwife with K4C I used convenience sampling to identify the participants of the study; namely the midwives working in the four healthcare facilities in which I worked. The Ugandan midwives working in these healthcare facilities can be broken down into two groups; those employed and those volunteering. Employed midwives have been employed by the government to work as midwives. Ugandan volunteer midwives are midwives who have undergone their midwifery training and are either awaiting their exam results and subsequent registration with the Ugandan Nurses and Midwives Council, or who are yet to find employment. With permission from the DHO they are allocated to different health centres to work clinically in order to consolidate and maintain their skills whilst they seek employment. Table 3.1 shows the breakdown of the midwives working at each healthcare facility.

Table 3.1. Number of Ugandan midwives employed and volunteering at the healthcare facilities participating in the study

	Elgon	Moroto	Speke	Stanley	Total
No. of midwives employed	5	5	11	3	24
No. of volunteer midwives	3	0	2	0	5
Total	8	5	13	3	29

To be included in the study a midwife had to be working in one of these four healthcare facilities, with all midwives offered inclusion regardless of their level of qualification or years of clinical experience. The only exclusion criteria placed on these midwives was their informed decision not to take part.

There are some drawbacks associated with convenience sampling. In particular action research requires active involvement from those participating, but it is crucial that this participation is voluntary. Changing practice requires a commitment and motivation that some individuals have, and others lack. It could be argued that by choosing the three health centres and one regional referral hospital in the study based on the pre-existing working relationships that K4C had in the district, I overlooked the opportunity to work with other groups of midwives who may have been more motivated to take part. Furthermore, although all of the midwives involved in the study agreed to participate in one way or another, it is possible that they felt a pressure to do so due to my position as a volunteer with K4C. However, I feel confident that the midwives in this study understand the notion of informed consent and were able to practice this.

Observational work/data collection informed by ethnographic approaches

Ethnography as the study of a group over a prolonged period of time seeks to generate rich data from researchers who are immersed in their field of study (Hammersley and Atkinson, 1995). This data goes beyond simple description of a phenomenon to reach levels of contextual understanding (Robson and McCartan, 2016). Research conducted using ethnography is often done so by researchers who are there in an observational capacity only, almost like a fly on the wall, which compounds the feeling of 'hanging around waiting for something to happen' that is traditionally associated with ethnographic research. My position as a volunteer midwife working alongside midwives across four healthcare facilities has enabled me to underpin this study with observational data that was collected in a manner informed by ethnographic approaches. From February 2017, when I received ethical approval, each day that I worked clinically was used for observational data collection and has played a significant role in understanding the contextual factors effecting the antibiotic stewardship activities and antibiotic prescribing decisions of

midwives. Indeed, observational work took place continuously throughout all five cycles of action. Some researchers fear they are never truly accepted into their observational field by participants, making data collection perhaps slightly more complicated than for an individual who is accepted into the field (Hammersley and Atkinson, 1995). As previously discussed I have been both an insider and an outsider to the midwives that I have worked alongside in this study. In the clinical area however I have ultimately been a midwife who has shared the workload with my Ugandan colleagues. This position removed the 'hanging around' element of my observational work which is traditionally associated with ethnography. I feel that this position has in some respects enabled my observational data collection to be unobtrusive. Research informed by ethnographic approaches opens the door to various data collection methods which include not only observations but interviews, field notes, informal discussions and personal reflections. For example, as I have been part of the midwifery team we have frequently discussed cases that have arisen where uncertainty has existed over a woman's diagnosis and subsequent treatment requirements. Ordinarily as an observational researcher I would not have been privy to these discussions were it not for my status as a midwife.

With such advantages come other corollaries. Many argue that ethnographic research is time consuming. Whilst it is, I don't see it in that manner because I have been a participant in the day and not simply an observer. Days where I worked clinically flew by. Undertaking observational work has not been a chore, instead it has given an added interesting element to my role. Perhaps most importantly it has allowed me to act as a mentor which has been instrumental to the change component of this study. Other difficulties with ethnographic research arise in relation to consent. In particular, my continued presence in my field of data collection presented complexities in relation to ongoing informed consent on the part of participants. This will be discussed later.

The observational aspect of this research was designed to complement the knowledge gained from interviews and was not designed as a means of 'checking up' on midwives. Nonetheless, my observational work has revealed discrepancies between knowledge and practice in relation to antibiotic prescribing decisions made by the midwives. Without this knowledge that practice differs significantly from some of the answers I was given in

interviews, interventions to improve knowledge and practice may have been inappropriate in design.

Observational data collection (as informed by ethnographic approaches)

I commenced the undertaking of observational work in the clinical setting in February 2017 once I had obtained ethical approval for the study. These observations were ongoing until the end of September 2018. As discussed above, every day that I worked clinically, whether that be a day where I was providing antenatal, intrapartum or postnatal care, also served as an observational data collection day. During the course of a clinical working day I made short notes about conversations I had had with the midwives or observations of clinical practice and interactions between midwives and clinical staff and midwives and women. At the end of the day I wrote these up in a more detailed manner following the recommendations of Gobo (2008). This allowed me to record my field notes with a four way approach:

- i. Observational notes – logged events during the day including details of who was involved
- ii. Methodological notes – recorded any issues arising during the research process and how I dealt with these
- iii. Emotional notes – detailed my personal feelings in response to events
- iv. Theoretical notes – noted any patterns or themes arising

I found this approach particularly useful as it gave me the opportunity to be reflexive, reflecting on how I was involved in interactions. Furthermore, using theoretical notes aided me in the management of the data collected and in the data analysis process.

Analysis of data collected by means of observation

As I commenced my observational work I was aware that I would generate an overwhelming amount of data in terms of field notes and diary entries over my time in Uganda. I chose Gobo's (2008) approach to ethnographic note taking in preparation for

this. The fourth aspect of note taking using Gobo's (2008) approach involves the researcher making theoretical notes; noting down any patterns or themes arising. This was crucial to my ability to manage the data generated from my observational work. As time passed and more data was generated I was able to begin grouping these themes together.

Challenges associated with carrying out research informed by ethnographic approaches

Whilst I gained a significant amount of data from undertaking observational work the process was not always straightforward and subject to several challenges. Firstly, the issue of consent has the potential to become blurred in relation to longitudinal observational work. Consent was obtained from the midwives in question to undertake observations over the full period of time that I lived and worked in Uganda. My status may therefore have become blurred as was discussed earlier when I grappled with the notion of being both an insider and an outsider in the research. Predominantly when I worked clinically with the midwives and was not 'obviously' collecting data in the form of an interview or analysis of a maternity register, I was seen as part of the team, getting on with work. The question arises as to whether this invalidates the consent that I had previously obtained as my role as a researcher may have been overlooked. Hammersley and Atkinson (1995) argue that ethnographers seek to achieve this level of rapport with those that they are observing in order to reduce reactivity. I was therefore reluctant to reiterate my position as a midwife researcher performing observational work every day that I turned up to work clinically. I thought this would weaken my relationship with the midwives as I felt they would view me as someone who's heart wasn't in working clinically and someone who was trying to assert superiority over them. Furthermore, the anonymity I obtained as an insider midwife researcher facilitated midwives to work in ways that they always have, so that I got to see the 'true' elements of antibiotic stewardship and prescribing practiced by midwives in Uganda, rather than them conforming to practices to which they felt obliged because of my presence. Hammersley and Atkinson (1995) cite Bell (1977) who suggests that reiterating your status as a researcher can be disruptive and been seen as some sort of 'policing' of participant practice. On reflection, I have had many discussions with midwives

about clinical cases where the use of antibiotics has been questionable. Sometimes this has resulted in a change of practice, other times it has not.

Working clinically whilst undertaking observational work left me privy to observing and partaking in various aspects of clinical care other than those directly related to antibiotic stewardship practices. Handling situations where care provided by my Ugandan midwifery colleagues has been at odds with evidence-based practice has proved to be challenging during the observational data collection period. Resource constraints in Uganda mean that the provision of care and the nature with which some tasks are carried out differ from recommendations and from what I have become used to as a UK based midwife. Mostly these situations are unavoidable, and care provided is provided to the highest standard based on resources available. However, I have also witnessed care being provided that breaches the ethical code of non-maleficence. An excerpt from my reflective diary demonstrates one such case:

I had quite a distressing time at Elgon health centre today. I was caring for a woman in labour alongside Pauline. The woman was having her first baby and she progressed really well to fully dilated. That's when the problems started. Here in Uganda I have witnessed SO many times a sense of urgency for a baby to be born within about 15 minutes once a woman is fully dilated. But actually, evidence suggests the second stage of labour in a first time mother can take over an hour, even two, and it is completely safe for this to happen provided the woman and baby are well. Anyway, the woman was pushing and the midwife was obviously panicked that they baby hadn't yet been born so she was slapping the woman's thigh whilst Susan (the village health technician who frequently works at Elgon) was covering the woman's mouth with her hand. Both these actions were being performed to "encourage" the woman to push.

I felt really uncomfortable as I saw what was happening as abusive care or obstetric violence. I took myself to the head of the bed to offer support to the woman and offer her a friendly face whilst trying to encourage Pauline and Susan to stop slapping her and holding her mouth. I was so surprised to see this happening as I had never seen it before at Elgon. I didn't think this happened at Elgon. Susan was saying "No! She needs to push Jo, and this will help her." Fortunately, the baby was born quickly and the event was over.

Afterwards, once everything had settled and the woman had been transferred to the postnatal ward I broached the subject with Pauline and Susan. I explained to them how the situation had made me feel uncomfortable and why I thought their actions were inappropriate. They listened to what I had to say, but their point of view was still different to mine. They felt their actions expedited the labour and the baby was fine. They argued that had it been a longer second stage then the baby may not have been born in good condition, so their actions were, as far as they were concerned, justified.

Other volunteers have said that they have witnessed similar behaviour in other healthcare facilities and even seen a woman's family member, a woman's mother, participating in such actions. At the end of the day I am working in a different culture when this practice is still viewed as acceptable by some. I did my best to support the woman and discussed it with those involved. I'll speak to Beatrice (the midwife in charge of Elgon) about it and see what she thinks. Perhaps she might talk to the team about obstetric violence. I think what would help would be for these members of staff to witness a woman have a longer second stage and have a well baby at the end of it. Then, maybe, and only maybe, they might see that it can be safe to have a second stage longer than 15 minutes. But as I know, changing the habit of a lifetime doesn't happen overnight, especially in an environment that lacks accountability.

Reflective diary – 27th March 2018

As this case demonstrates undertaking observational work is fraught with challenges. A variety of both similar and differing situations arose during the time that I worked clinically

in Uganda. Where they did, I always took the time to explain my concerns and feelings with local staff and opened the floor to discussion, providing evidence to support these discussions. Some cases, which were related to organisational issues within a healthcare facility, were referred to higher authorities including the District Health Officer. Sometimes this resulted in these authorities getting involved, sometimes they did not see the need. Where they did get involved it often had detrimental effects of the working relationships between the individual healthcare facility and Knowledge for Change and Knowledge for Change volunteers. Regardless of the case I remained respectful of the fact that I was a foreigner in the clinical environment and took time to listen my Ugandan colleagues as they shared their views, opinions and experiences with me. I was always mindful of how I would feel if the roles were reversed and my practice in the UK was being questioned by someone whose experience was contextually different. These situations were difficult, often frustrating and sometimes upsetting. Personally, I relied heavily on my Knowledge for Change colleagues to debrief and brainstorm for ways to move forwards. As much as the situation was challenging it was beneficial to this study. I gained a deep insight into the healthcare system as a whole and the intricacies of individual practices. On a personal level, I learnt a lot about midwifery, culture and life.

Interviews

The use of interviews in qualitative research and action research is common (Mason, 2002; Koshy, Koshy, and Waterman 2011). Kvale and Brinkmann (2009, p.xvii) summarise exactly why interviews are so useful:

“If you want to know how people understand their world and their lives, why not talk to them? ... Through conversation we get to know other people, learn about their experiences, feelings, attitudes, and the world they live in. In an interview conversation, the researcher asks about, and listens to, what people themselves tell about their lived world.”

When deciding on methods for data collection in relation to understanding midwives' understanding of antibiotic resistance and the influences on their antibiotic stewardship and prescribing practices, I initially considered using focus group discussions. I felt this

would enable participants to work cohesively increasing the capacity for action research to reach its potential as a means of changing the behaviours of the group. Furthermore, the research that I undertook at Masters level involved the use of focus group discussions, so I felt confident in their use. Focus group discussions can often become stifled and lead to reduced contributions when group members feel threatened by other members of the group (Koshy, Koshy, and Waterman, 2011). Given the important role that hierarchy plays in Uganda and having attended meetings in Uganda where discussions have generally not been forthcoming, I felt the aforementioned disadvantage of focus group discussions may materialise and was therefore deterred from using them as a method of data collection.

Instead, individual interviews were chosen as an additional means of qualitative data collection in order to grasp an in depth level of understanding about the knowledge held by midwives about antibiotic resistance and the influences on their antibiotic stewardship practices. The interview is a complex data collection tool that must not be underestimated. Used correctly it can capture a wealth of information and allow for a deep exploration of a participants' experiences, thoughts and views (Robson and McCartan, 2016). Conversely, an interview, if performed without any prior planning can generate responses that are of little use to the researcher in understanding participants' views on a particular phenomenon (Mason, 2002). Interviews are commonly classified as being unstructured, structured or semi-structured. I opted to implement the semi-structured interview in this study as it allows a handful of questions to guide the interview without confining it to a rigid structure and direction. This is particularly helpful as it allows the researcher to be responsive to the interviewee and the information that they share (Robson and McCartan, 2016).

Difficulties can arise in interviews when the agenda of the interviewer and interviewee may be at odds, which, in turn, can make interactions strained. Interviews have the potential to evoke responses from participants that are viewed to be socially acceptable; answers given by the interviewee are given on the basis that they are what they expect the interviewer wishes to hear, rather than the true reality of the subject in question (Koshy, Koshy, and Waterman, 2011). As mentioned earlier, the use of observations aimed to overcome this phenomenon and acted as a means of triangulation. Many of the midwives in this study approached the interviews as if it were a test of their knowledge on which they would be

marked and were anxious that they would be found lacking. I spent a significant amount of time before each interview reassuring the midwives that I was using the interview to understand their level of understanding, with the ultimate goal of assisting them in improving their knowledge of antibiotic resistance and appropriate antibiotic stewardship practices. Once the midwives understood that the interview process was one phase in a process aimed at practice improvement it became a more reciprocal process that generated requests for further education in the subject matter. These requests helped to shape the following cycles of action in the study.

Conducting the interviews – Pilot cycle

The semi-structured interview schedule I used during the pilot cycle was devised prior to my move to Uganda. It contained six questions designed to stimulate discussion around midwives' knowledge and practice of antibiotic stewardship¹⁴. I began the process of inviting midwives for an interview and interviewing them from February to March 2017. In this pilot cycle I interviewed five midwives, all from Elgon health centre. I chose to do this for several reasons. Firstly, I had by this time developed good working relationships with the midwives working at Elgon and felt that they would be ready to share information with me. Secondly, it offered the opportunity for me to practice my interview skills and use these preliminary interviews to further shape and refine my interview guide. Interviews were conducted in the place of choice by the midwife in question. Four of the midwives opted to be interviewed in their place of work whilst they were on shift, at a time of day when their workload had lightened. One midwife opted to be interviewed in an outside restaurant. The restaurant has a secluded seating area which we utilised to ensure the interview remained confidential. Findings from these interviews, coupled with those from my observational work and secondary data analysis of maternity registers informed the amendments and updates made to the interview schedule. Using the enhanced interview guide I was able to begin the process of interviewing other midwives within the sample during the context cycle.¹⁵

¹⁴ See appendix 1 for a copy of the interview guide that was used in the pilot cycle.

¹⁵ See appendix 2 for a copy of the interview guide that was used in the context cycle.

Conducting the interviews – Context cycle

Initially my plan had been to interview all of the midwives working in all of the healthcare facilities in this study. I soon realised that this plan was unrealistic. Firstly, although all the midwives in the population agreed to be observed in clinical practice, not all felt they wanted to be interviewed. This demonstrates the true participatory nature of action research as participants are able to choose their level of involvement (Chataway, 1997). For the purposes of this study some midwives were more comfortable with being observed than being interviewed.

The second reason why interviewing all midwives became unrealistic was due to constraints around data analysis. A researcher needs to immerse themselves completely in the data collected so that they have a grasp on the full depth and breadth of the content (Braun and Clarke, 2006). As my clinical work progressed I realised I was accumulating a wealth of data from my observational work. Much of this was obtained from discussions taking place in the clinical setting which covered many of the topics contained in the interview schedule. Whilst the interviews gave a solid foundation from which I was able to understand the thought processes and actions behind the midwives' antibiotic stewardship practices, my observational work afforded me the opportunity to gain a deeper understanding. To interview all of the midwives then would have resulted in much duplication of findings from the observational work.

Again, interviews were conducted in the place of choice by the midwife in question. The majority of participants (n=14) opted to be interviewed in their place of work whilst they were on shift, at a time of day when their workload had lightened. The remaining three participants chose alternative locations for their interviews. One midwife opted to be interviewed in an outside restaurant. The same restaurant that was used for an interview in the pilot cycle, with the secluded seating area, was used as a venue to ensure the interview remained confidential. The remaining two midwives chose to have their interviews in their home and their place of study respectively. Each interview was recorded with prior consent. Interviews ranged from 23 to 73 minutes. The shortest interview was cut short due to the midwife feeling unwell. Regardless of where the interview took place, each midwife was provided with a soft drink during the interview.

I frequently reflected on my interview technique to ensure that I wasn't asking leading questions or appearing to be judgemental in the questions being put forward. I often found that some of the richest responses I obtained were towards the end of the interview when I tried to leave the floor completely open to questions from participants.

Conducting the interviews – Review cycle

In order to gain an insight into how the midwives in this study had viewed the whole modified action research project the final review cycle involved interviewing eight midwives, two from each healthcare facility, to seek their opinions and feedback. Interviews were conducted following a semi-structured format¹⁶ and were significantly shorter than those in the context cycle, only ranging from 12 to 27 minutes in length. I feel these interviews were shorter because, on the whole, the midwives felt that the intervention that took place in the training cycle had helped them to develop and improve their antibiotic stewardship skills. As a result, despite probing, they had a limited range of ideas and suggestions for moving the work of this study forwards. Furthermore, the interviews were short as the midwives had already reflected informally on the study with me and given feedback in the clinical setting.

Interviews - Data analysis

As mentioned earlier in this chapter the philosophical stance that I adopted in relation to epistemology in this study was that of interpretivism. A large proportion of the data collected in this study was qualitative in nature and sought to explore the subjective realities and experiences of midwives in relation to their antibiotic stewardship practices. Braun and Clarke (2006) argue that many forms of qualitative data analysis are thematic analysis, although they are often rebranded differently. Thematic analysis allows for patterns (themes) to be identified, analysed and reported. As a minimum outcome, thematic analysis allows for data to be organised, but can go much further, allowing data

¹⁶ See appendix 3 for a copy of the interview schedule used in the review cycle.

to be analysed in a comprehensive manner and report on the experiences and realities of participants (Braun and Clarke, 2006).

Where thematic analysis is theory led it can be viewed as a 'top down' approach to analysis (Hayes, 1997 as cited by Braun and Clarke, 2006) and can lead to data analysis being restricted to fit with preconceived ideas held by the researcher or found in current literature. Conversely, a 'bottom up' or inductive approach allows for data driven analysis whereby data is coded without trying to fit it to pre-existing theories. Of course, the researcher plays an active role in thematic analysis – themes don't just appear passively out of the data, they are actively sought. Thematic analysis therefore usually combines both a 'top down' and 'bottom up' approach. This brings about the unavoidable fact that identified themes will to a certain extent be informed by the researcher's personal and theoretical standpoints (Taylor and Ussher, 2001).

Thematic analysis is a dynamic and recursive process comprised of various phases. The process requires flexibility and involves backwards and forwards movement between the entire data set. The phases of thematic analysis as outlined by Braun and Clarke (2006) were used to guide the analytical stage in this study.

Braun and Clarke (2006, p.87) – 'Phases of thematic analysis'

1. **Familiarising yourself with the data:** transcribing data (if necessary), reading and re-reading the data, noting down initial ideas.
2. **Generating initial codes:** coding interesting features of the data in a systematic fashion across the entire data set, collating data relevant to each code.
3. **Search for themes:** collating codes into potential themes, gathering all data relevant to each potential theme.
4. **Reviewing themes:** checking if the themes work in relation to the coded extracts (level 1) and the entire data set (level 2), generating a thematic map of the analysis.
5. **Defining and naming themes:** Ongoing analysis to refine the specifics of each theme, and the overall story the analysis tells, generating clear definitions and names for each theme.
6. **Producing the report:** the first opportunity for analysis. Selection of vivid, compelling extract examples, final analysis of selected extracts, relating back of the analysis to the research question and literature, producing a scholarly report of the analysis.

I transcribed the initial five interviews in the pilot cycle and the eight interviews in the review cycle independently and as soon as possible after they had taken place. This allowed

me to commence data analysis almost immediately after the interviews had taken place. The interviews that took place in the context cycle were transcribed by a K4C colleague working in an administrative role. I then listened to the interviews that she had transcribed with the text in front of me to check for accuracy and made corrections as required. During this period I started to become familiar with the data, and feel being involved in the transcription process laid a solid foundation for ongoing data analysis. I read all the transcriptions over and over with an active mind, making notes of my initial thoughts. I continued to work through the phases of thematic analysis as outlined by Braun and Clarke (2006) using the software package NVivo 11 which proved useful in assisting me to manage and code all data collected.

Secondary data analysis of maternity registers

Secondary data analysis is typically used as another means of answering research questions (Dunn, Arslanian-Engoren, DeKoekkoek, Jadack and Scott, 2015). Secondary data analysis was chosen as a means of data collection in this study to support qualitative data collection. Antenatal, intrapartum and postnatal registers are completed on a daily basis at all healthcare facilities providing maternity care throughout the Kabarole district. These registers therefore offer an opportunity to collect secondary data. This is beneficial as not only does it allow for practice to be analysed and assessed, but as the data exists independently of this research, it is a resource that can be accessed easily and reduce the time commitments associated with primary data collection (Dunn et al., 2015). Whilst collecting data in this manner has the advantage of time savings, it has its equal, if not more pronounced drawbacks. Firstly, the quality of data collected relies on the proficiency of the individual recording the data at the point of collection (Rowlingson, 2012). As mentioned in chapter two, one of the stark differences in healthcare between the UK and Uganda is the quality of written documentation and general record keeping. On the whole in Uganda written documentation is found to be lacking. One issue that I have found to arise time and time again in the maternity registers in Uganda is that when a woman has been prescribed antibiotics, the person completing the register has omitted to complete the “diagnosis” column identifying the condition for which the antibiotics have been

prescribed. This is sometimes due to the fact that the midwife carrying out the assessment has not documented a diagnosis in the woman's handheld antenatal record and therefore the information is not known when the register is completed. Alternatively, the person filling in the register simply omits the information. Whilst this compromises the quality of the data collected, it still proved useful to collect such data in order to estimate the volume of antibiotics prescribed by midwives.

I have also witnessed deliberate falsification of documentation at some of the health centres. The partograph is a chart that records maternal and fetal observations during labour, as well as the progress of cervical dilation. Partographs are used to help midwives assess if the mother, the fetus and the progress of labour are remaining within normal parameters, and act as a guide to initiate intervention if any deviations from normal occur during labour. Partographs in Uganda have a back page which acts as a summary sheet for labour detailing issues such as time of birth and blood loss, and postnatal care which includes maternal observations for up to six hours after delivery. From my observational work I frequently witnessed midwives document maternal postnatal observations, such as blood pressure, pulse and temperature, when they had not taken any observations. Sometimes the midwives even recorded postnatal observations at six hours on the summary sheet when the birth only occurred 30 minutes prior to them documenting their 'findings'.¹⁷ This falsification is not unique to Uganda. Lavender et al. (2011) reported that student midwives working in Kenya frequently saw midwives 'cook the details' recorded in the partograph using figures from the normal ranges assigned to vital signs rather than those taken from an individual woman. In the context of this study I feel this duplicity arose as the midwives in the health centre where I most frequently witnessed this behaviour were offered financial incentives from a Belgian NGO if there was evidence that the partograph had been fully completed. Should a researcher analyse the data in these partographs, they would undoubtedly construct truth claims from their findings which would be false. Such behaviour justifies the use of additional methods of data collection, in particular the observational element of this study, to ensure validity of findings.

It is also worth bearing in mind other limitations associated with secondary data analysis. In the Ugandan setting maternity registers are tailor made for the data collection purposes

¹⁷ These observations were reported to the appropriate authorities.

of the Ugandan Ministry of Health. As a result, some of the information that would be useful for this study was not available. For example, none of the maternity registers recorded if a woman being prescribed antibiotics had been subject to any diagnostic tests prior to diagnosis and treatment decision. Equally whilst the type of antibiotic used for treatment was detailed in the register, information pertaining to the dose prescribed was often missing. Finally, despite the registers being generic across the country, Speke health centre used a different version of the antenatal register for the first full year of the study. Collecting data using this version proved to be almost impossible. Furthermore, when the standardised version of the register was implemented at Speke health centre, staff members filling it out demonstrated poor documentation skills, so that only very small numbers of women being prescribed antibiotics had any medical condition recorded. I addressed this issue many times with the individual responsible for completing the register. This would have a very short lasting impact on her documentation, with the result that she normally reverted back to her preferred documentation methods the following day. As a consequence, findings from secondary data analysis of antenatal registers at Speke health centre is limited.

Secondary data analysis – What data to collect?

Women in Uganda are prescribed antibiotics throughout the pregnancy continuum including the postnatal period. In some healthcare facilities it is common practice for prophylactic antibiotics to be given to every woman following birth, even if she has had a normal birth with an intact perineum and no risk factors for infection. Although this study reports briefly on the use of prophylactic antibiotics for postnatal women, the main focus of this study in terms of antibiotic prescriptions has been in the antenatal period. The decision to omit secondary data analysis of postnatal antibiotic use was based on several reasons:

- When deciding to include Stanley hospital as one of the healthcare facilities in this study I chose only the antenatal clinic as a focus. This is because medical officers are present on the labour and postnatal wards at Stanley hospital, but they never work in the antenatal clinic. Given the limitations that come with the level of

documentation in Uganda it would have been impossible to determine if antibiotic prescribing decisions in the postnatal period were made by medical officers or midwives.

- As with the antenatal register, the postnatal register at Speke health centre was mostly incomplete in terms of medication prescribed to postnatal women. No reliable data could therefore be collected from this register.
- Moroto health centre were already aware that prophylactic antibiotics were not required for all postnatal women and were therefore only prescribing antibiotics for the women with risk factors for infection.

Data were collected each month from the antenatal registers and inputted into the spreadsheet Microsoft Excel. Data collected included the total number of women attending the antenatal clinic each month, the conditions for which antibiotics were prescribed and the type of antibiotic prescribed for each condition. Data analysis using Microsoft Excel therefore allowed the total number of women receiving antibiotics for each condition to be calculated as well as the percentage of women receiving antibiotics each month. Furthermore, the percentage of antibiotics prescribed for each condition as a proportion of total antibiotics prescribed was also calculated each month. These findings have been presented in the form of tables and graphs both in the findings chapters of this thesis and to midwives on a monthly basis as a means of feedback about their antibiotic prescribing practices. Using the data in this way has provided a benchmark for the midwives to work with and try and improve upon.

Combining all analysed data

Data analysis was a continuous exercise throughout my time in Uganda. Daily observations were documented and themes identified. Each interview was transcribed, and the analysis process commenced as soon as possible after it had taken place. Secondary data analysis took place on a monthly basis. I was constantly immersed in my data. Furthermore, I was able to draw on findings from one source of data whilst analysing another. As I was using a modified action research approach and required each cycle of action to help inform the

activities of the following cycle, I found myself undergoing three intensive analysis periods where I brought all the data collected together in a more systematic manner (see table 3.2). Each time it was overwhelming given the amount of data generated. However, having undertaken an almost continuous analysis process that allowed for fluidity between data sets, these intensive analysis periods were manageable and supported the ongoing process of the modified action research study.

Table 3.2. Intensive data analysis periods

Cycle	Type of data collected	Period of data collection
Pilot	Interviews (5) Observational data Secondary data analysis	February 2017 – May 2017
Intensive data analysis period: April – May 2017		
Context	Interviews (17) Observational data Secondary data analysis	June 2017 – February 2018
Intensive data analysis period: December 2017-February 2018		
Champions	Observational data Secondary data analysis	November 2017
Training	Observational data Secondary data analysis	March 2018 – August 2018
Review	Interviews (8) Observational data Secondary data analysis	September 2018
Intensive data analysis period: September – November 2018		

Ethical considerations

A move away from custom and habit in clinical healthcare practice has seen the emergence of evidence-based care as the gold standard for all healthcare professionals to base their clinical practice on (Stevens, Abrams, Brazier, Fitzpatrick and Lilford, 2001). Obtaining this evidence requires research which must be of good quality and ethically sound in design and implementation (Royal College of Nursing [RCN], 2009). Long and Johnson (2007) posit

that all research, regardless of its nature, has the potential to cause harm to participants. Reducing the risk of such harm arising requires the ethics of research to be considered. Ethics in research can be seen as an umbrella term that captures various elements in their own right such as consent, confidentiality and anonymity.

Consent

Informed consent is integral to the provision of healthcare. Midwives facilitate informed consent on a daily basis; in the UK a woman must consent to any care that she receives from a midwife (Nursing and Midwifery Council [NMC], 2015). Consent may be obtained in such a way that it is passive, for example a woman offering her arm to the midwife in order for her blood pressure to be measured. Equally verbal and written consent are commonly exercised in the UK maternity setting. The Ugandan maternity setting offers a somewhat different approach to informed consent. As discussed in chapter two there is very much a culture of hierarchy in Uganda which permeates into the healthcare system. Healthcare professionals are very rarely challenged by patients over the care that they provide and on the whole patients are submissive and become passive objects in the delivery of care. Despite Ugandan midwives possessing an awareness of informed consent, it is not something that they practice in their daily work lives. One day when I was working with a Ugandan student midwife at Stanley hospital, I asked her to translate for me so that I could obtain consent to examine a woman's perineum to assess for any damage following birth. The student told me not to ask the woman as she might say no. This attitude underlines a fundamental misunderstanding about consent and is widespread in the maternity setting in Uganda.

In this context, in order to ensure that midwives participating in this study were fully aware of the expectations placed on them as participants, and that they themselves were able to make an informed decision to consent to the study, a number of steps were taken. Firstly, ethical approval was sought from the University of Salford and Mountains of the Moon University (based in Fort Portal), which was granted in both cases¹⁸. Once this was obtained, I contacted the District Health Officer who manages the healthcare facilities

¹⁸ See appendix 4 for copies of ethical approval letters

included in the study, and the Medical Director of Stanley hospital in order to gain approval for the research to take place in their respective institutions. Once I had permission letters from both managers¹⁹, I approached the midwives in person. Each midwife when invited to take part in an interview was given a participant information sheet²⁰ detailing the purpose of the study, what was expected of them, and how I, as a researcher, would make sure that I carried out the research in an ethical manner. This was followed up with the opportunity for midwives to ask questions prior to obtaining final consent. Consent was obtained for interviews in the form of a signed consent form²¹. Midwives were made aware that they had the right to withdraw from the study at any time, without consequence, and that any data already collected from them or in relation to them would not be used in the study.

When it came to gaining consent from the midwives to undertake both observational work and secondary analysis of maternity registers I used the permission letters from the District Health Officer and Medical Director as a means of introduction to the method of data collection and explained how my observations would be used. By discussing my research with the midwives that I was to be working alongside, I clearly stated my position and intentions as a volunteer midwife and researcher. With their verbal consent, I spent almost two years working with them in the capacity which we discussed.

Language and communication

Uganda has 43 listed languages of which English is one. Language barriers and literacy rates have the potential for complicate research in terms of translation and consent respectively (Kara, 2015). In Uganda it is standard practice for students at school and college to be taught in English, and English is predominantly used in the workplace. The midwives participating in this study all speak English and were taught midwifery in the English language. This mitigates some of the issues that arise when conducting research in foreign countries. I am aware that as the research progressed, some phrases have arisen that are particular to Uganda. However, having lived in the community that I was researching for

¹⁹ See appendix 5 for copies of these permission letters

²⁰ See appendix 6 for a copy of the participant information sheet

²¹ See appendix 7 for copy of consent form

the duration of the study, I came to understand such phrases, so do not feel they were misinterpreted in a manner that could invalidate the findings of the study.

Confidentiality and anonymity

Having worked clinically as a midwife in the UK for eight years I have a strong understanding of the need for information governance and am aware of the potential consequences of breaching data protection requirements. I am registered with the UK Nursing and Midwifery Council, have undertaken regular training on the principles of confidentiality and am bound by The Code (NMC, 2015). In order to maintain participant confidentiality and anonymity I have adhered to the recommendations of Salford University. In particular:

- I anonymised each individual participant's identity on completion of their interview. Midwife respondents were given an identity which was uploaded to the University password protected F-Drive so that comparisons can be made between initial and follow up interviews.
- Recordings of interviews and transcripts of interviews were uploaded to the University password protected F-Drive.

Dissatisfaction

The participant information sheet provided midwives with contact details of my PhD supervisor and the research and innovation manager from the University of Salford. These were provided so that any midwife who had a complaint about myself as a researcher or the research being undertaken, could raise it following a formal channel.

Conclusion

This chapter has outlined my epistemological position in relation to my research. I have also outlined my personal motivations behind the study and its design and demonstrated that my epistemological position is congruent with my choice of methodology. This chapter has given me the opportunity to exhibit an understanding of the important role that reflexivity plays in establishing the validity research. The need for a researcher to be

transparent about his or her position in the research has also been addressed as I have reflected on and discussed my position as a British midwife working and undertaking research in the Uganda. The chapter progressed to lay out the methods employed in the study, detailing ethical considerations that were taken into account in its design. The following chapter reviews the literature related to a number of subjects relevant to this research study.

Chapter four – Literature review

Introduction

This chapter gives a comprehensive overview of a number of issues that relate to midwives as antibiotic stewards and, in particular, antibiotic prescribers. Firstly, it explores the role of task shifting in modern day healthcare as a means of improving access to healthcare services and reducing costs, with a focus on Uganda and maternity care in low- and middle-income countries (LMICs). The chapter goes on to discuss the levels of understanding that healthcare workers in sub-Saharan Africa have about antibiotic resistance and antibiotic prescribing. Influences on antibiotic prescribing practices are also discussed. The chapter concludes by considering theories of behaviour change.

Reviewing literature

Literature reviews are conducted to draw together existing sources of information with the intention of providing the reader with a comprehensive overview of current evidence related to a specific topic (Steen and Roberts, 2011). There are two standard approaches that can be taken when conducting a literature review; a systematic review or a non-systematic or narrative review (Ferrari, 2015). Broadly speaking systematic and non-systematic reviews differ in their objectives and methods.

Explicit and rigorous criteria are used in the systematic review to identify and appraise literature (Cronin, Ryan, and Coughlan, 2008). In terms of health sciences, a systematic review of a collection of randomised controlled trials sits at the pinnacle of the hierarchy of evidence as outlined by Greenhalgh (2010). In pooling together a number of studies that individually may lack statistical significance, these systematic reviews seek to produce statistically significant findings using meta-analysis (Greenhalgh, 2010). Alternatively, meta-synthesis refers to the case where findings from individual qualitative studies are drawn together to create new interpretations and concepts (Polit and Beck, 2006). Such an approach to a systematic review can be aligned with a positivist epistemology as the review

of literature is concerned with scientific methods which strive for precision and an overarching truth.

By comparison the non-systematic or narrative literature review whilst still seeking to critique and summarise a collection of literature, does so in a manner to provide the reader with a comprehensive overview of the subject in hand (Cronin et al., 2008). A researcher with an epistemological position that challenges positivism may be more likely to identify with a narrative approach to reviewing literature as such an approach doesn't seek to streamline multiple subjective truths into one objective truth. A narrative literature review therefore may address more than one subject and may or may not be explicit about the selection criteria for included literature (Ferrari, 2015). This leaves the narrative review open to criticism; if inclusion criteria are not systematic and explicit there is the potential for the review to be subject to selection bias.

As defined in the previous chapter this study has been shaped by my own epistemological position, interpretivism. In reviewing the literature related to this study I identified a number of subject areas that required knowledge; task shifting, levels of understanding held by healthcare professionals about antibiotic resistance, influences on the antibiotic prescribing practices of these individuals and theories of behaviour change. As a result, a narrative approach to the literature review has been chosen for this study. Literature searches were run at the beginning of the study and were repeated at regular intervals to allow for emerging literature to be incorporated in both the literature review and discussions in the thesis. I sought to include literature which had been conducted in the Ugandan setting. Where this was not possible literature from sub-Saharan Africa was selected for inclusion. I chose to do this because contextual variations between LMICs and high-income countries (HICs) limit the transferability of findings between these contexts. However, with Uganda and sub-Saharan Africa often being under-represented when it comes to published research findings, I had to widen my field of reference to obtain relevant literature when it came to reviewing influences on antibiotic prescribing practices and behaviour change theories. In this case I sought evidence from LMICS and HICS to inform my understanding of the potential issues relating to midwives' understanding of antibiotic resistance and influences on their antibiotic stewardship and prescribing practices.

Task shifting

With shortages of doctors, nurses and midwives and other cadres of healthcare professional estimated to be approximately 4.2 million in Africa (WHO, 2016a), task shifting seems like an ideal tool to address this deficiency. Counter arguments contend that shifting tasks to lower cadres of staff, such as doctors passing on tasks to midwives or midwives passing on tasks to nursing assistants, can lead to the provision of substandard care as those delegated tasks outside of their usual remit are poorly trained and supported in providing them (Baine, Kasangaki, and Baine 2018). Equally, with no financial reward or elevation in status on offer to recognise the increase in an individual's skill set and workload, demotivation of staff may offset any perceived improvements in the efficiency and effectiveness of service provision. Indeed Baine et al. (2018) and Baine and Kasangaki (2014) identified ambiguous career progression as a contributing factor to the migration of many Uganda healthcare workers.

In Uganda the lack of a formal task shifting policy blurs the lines of practice, as is the case for antibiotic prescribing in midwifery. As mentioned in chapter one, a recent document detailing the schemes of service for midwives (Ministry of Public Service, 2017) does not list prescribing any type of medication including antibiotics as part of the midwives' role. However, midwives in Uganda have been prescribing medication, including antibiotics (Baine et al., 2018) for pregnant women, with no clear government standpoint or health authority guidance on the issue. It seems therefore that antibiotic prescribing has been informally task-shifted to midwives.

Task shifting regulation

Current literature pertaining to task shifting in Uganda has identified serious concerns from both individuals involved in healthcare at the policy making level and those working at the point of service provision over the lack of formal policy underpinning the use of task shifting (Baine et al., 2018; Baine and Kasangaki, 2014; Dambisya and Matinhure, 2012). Respondents in all three studies expressed concerns that healthcare workers carrying out shifted tasks have no formal legal protection in the event of an undesirable outcome, a finding echoed by Spies (2016) and Colvin et al. (2013). Despite sharing congruent

concerns, the groups differed in their opinions of how task shifting should be formalised in Uganda. Front line healthcare workers felt that regulation in the form of policy and guidelines was required at the level of service provision to formalise and improve implementation and monitoring. Those working within regulatory bodies however, felt that new laws would need to be imposed to legally support different cadres in changing their scope of practice. Achieving this may prove difficult. Representatives from the Ugandan Ministry of Health and various health regulatory bodies who were interviewed in the study by Baine et al. (2018) concluded that implementing task shifting in accordance with World Health Organisation recommendations is too costly. Respondents concluded that it would in fact be more cost effective to employ those highly skilled healthcare workers in Uganda who are currently unemployed. With a government veto on the recruitment of new human resources coupled with a low budget assigned to cover healthcare worker salaries, it seems this solution to the healthcare worker crisis in Uganda will not be implemented.

Task shifting in maternity care

Dawson, Buchan, Duffield, Homer and Wijewardena (2013) conducted a narrative synthesis review of literature relating to the performance of maternal and reproductive health task shifting interventions and associated workforce issues from 2000 to 2011 in low income countries (LICs). The review highlighted that many of the tasks shifted in the maternity setting were in Emergency Obstetric Care (EmOC), with a focus on health professionals other than midwives. Nonetheless, findings indicate that there was scope in maternity care for task shifting. Where task shifting was implemented in EmOC, it led to an increase in the provision of EmOC services with no significant differences in patient outcomes between care provided by non-physician clinicians and physicians. Equally, the use of task shifting for the provision of family planning services was viewed to be successful, with no differences in client satisfaction or quality of care provided, and an overall increase in contraceptive use, being found when community health workers took responsibility for the provision of injectable contraceptives. Similarly, the review identified equivalent outcomes for women undergoing manual vacuum extraction in the case of

abortion (this is the equivalent term for miscarriage in the UK) when treated by midwives or doctors. Finally, Dawson et al. (2013) identified that shifting antenatal education from midwives to trained lay nurses was deemed to be successful, with the same number of messages being shared by both professional groups.

The review conducted by Colvin et al. (2013) reported that task shifting in maternity care also had potential benefits for the midwives involved, citing improved job satisfaction, sense of achievement and increased clinical confidence for midwives as examples. Both of these reviews depict task shifting in a positive light. However, Dawson et al. (2013) report on tasks that have not been shifted to midwives or away from midwives in this setting, making it difficult to establish if these findings are transferable to this setting and study.

Barriers to task shifting

Whilst task shifting has been shown to be beneficial in the scaling up of healthcare service provision, it does not come without its difficulties. These difficulties have been found to be similar across both LMICs and HICs. In Uganda, respondents from the research conducted by Baine et al. (2018) Baine and Kasangaki (2014) and Dambisya and Matinhure (2012) expressed concerns regarding quality of care, suggesting it may be compromised due to a lack of induction, initial training and ongoing supervision for staff performing shifted tasks. This finding is echoed by Mijovic, McKnight and English (2016), Colvin et al. (2013) and Dawson et al. (2013). More recent research from Uganda has identified that the content of the training curriculums of those 'less-skilled' workers are inadequate in preparing them to perform the range of tasks expected of them, thereby putting the population at risk of various complications including drug resistance (Baine et al., 2018). My experiences of teaching midwifery on two degree courses in Uganda concur with these findings. Although one course integrates a pharmacology module, the content does not cover antibiotic resistance or stewardship. Instead the module focuses more on the science behind pharmacology such as how the body metabolises medications as opposed to familiarising the students with different types of medications and their appropriate use. To demonstrate the drawbacks of this approach I refer to one of the midwives in this study. Although recently graduated from a certificate level course of midwifery as opposed to the degree,

as a newly qualified midwife she persistently failed to recognise that metronidazole, one of the most commonly used antibiotics in Uganda, is actually an antibiotic. Limited opportunities for continuous medical education and supervision, as well as a lack of access to relevant guidelines, have also been identified as a barrier to safe and effective task shifting in Uganda (Baine et al., 2018).

Research suggests that higher cadres of staff feel task shifting threatens their status (Mijovic et al., 2016; Colvin et al., 2013; Dawson et al., 2013). Further, discomfort on the part of higher cadres of staff has been found to arise from concerns about the potential for task shifting to compromise the quality of patient care (Baine and Kasangaki, 2014; Dambisya and Matinhure; 2012). Indeed, the review by Colvin et al. (2013) found that for midwives in LMICs the ability to learn and perform new clinical skills doesn't always translate to sound clinical reasoning and decision making, a concern also raised by Baine et al. (2018), Baine and Kasangaki (2014) and Dambisya and Matinhure (2012). In a similar vein, Dawson et al. (2013) point out that an increase in the number of procedures performed as a result of task shifting is no guarantee of improved healthcare worker competence or patient outcomes.

A reluctance on the part of health care workers to change their practice and behaviours (Colvin et al., 2013; Dambisya and Matinhure, 2012) as well as a lack of motivational factors such as remuneration reflective of increased responsibilities (Baine et al., 2018; Dawson et al., 2013; Dambisya and Matinhure, 2012) are acknowledged as potential barriers to the successful implementation of task shifting. Despite the fact that task shifting theoretically increases a midwife's skill set and widens her scope of practice, it is not met with corresponding opportunities for promotion in Uganda. Indeed, even when midwives undertake further training to top up their qualification from certificate to diploma level, they are not always financially rewarded. In Uganda, a midwife with a diploma should be paid more than a midwife with a certificate. As mentioned in chapter two, there are many midwives holding diplomas who are still paid at the certificate level because no diploma jobs are available. Personal communication with a midwife working at Elgon health centre suggests that midwives perform extra work that is brought to them via informal task-shifting because they care about the community and want to offer a service if it is available.

However, she also suggested that midwives find the extra work troubling and would like a 'reward' for their extra efforts.

HICs broadly speaking, have two complementary approaches to maternity care – the midwife-led care approach and the medical model of care. Colvin et al. (2013) found that midwives felt that task shifting posed a threat to the midwifery model of care when they were upskilled to provide care falling outside of their usual remit, such as the provision of EmOC. Similarly, midwives felt that their personal relationships with women were compromised when tasks traditionally performed by themselves were shifted to lower cadres of staff. This indicates some level of territorialism that is sometimes seen in midwifery. Midwives often talk about "my woman" when they are discussing care that they are providing. In some respects this can be seen in a positive light as it suggests midwives are concerned about the provision of continuity in care. Indeed, evidence suggests that outcomes for women are improved where a continuity of carer model is adopted (Sandall, Soltani, Gates, Shennan and Devane, 2016). However, it also holds negative connotations that suggest midwives are reluctant to share care with other healthcare professionals, which may be to the detriment of the woman. The transferability of the latter finding to the Ugandan health setting is questionable however, as three of the four studies in the review by Colvin et al. (2013) that reported this finding were conducted in HICs.

Poor coordination of task shifting initiatives and a lack of basic resources (Dawson et al., 2013), a lack of awareness from each member of the wider multidisciplinary team about their colleagues' roles, and a lack of coordination overall between team members was seen to be a factor effecting the sustainability of task shifting (Colvin et al., 2013). In particular, poor clarity of job descriptions, thereby creating 'grey areas' over practice, were seen to compromise the effectiveness of task shifting. As detailed in chapter one, even though a scheme of service has been published for midwives in Uganda it remains vague in detailing the core elements of a midwife's role. This could be seen to hinder their ability to provide safe and effective care. With the schemes of service not listing antibiotic prescribing as a midwifery role this study is justified as it attempts to provide an evidence base for antibiotic stewardship with the overall intention of improving safety for women and their families.

Task shifting summary

A major concern noted in the literature pertaining to Uganda is that there is no policy framework to support task shifting, leaving healthcare professionals vulnerable to the possibility of breaching professional boundaries, and possible legal action. Additionally, real concerns exist over levels of training and guidance that are provided to support healthcare professionals in their task shifted roles, which has implications for quality assurance. Antibiotic prescribing by midwives is an example of informal task shifting in Uganda. Given the rising threat of antibiotic resistance, this practice potentially poses significant risks to women, their families and the wider community. The following section of this chapter looks at how well antibiotic resistance is understood by healthcare professionals in sub-Saharan Africa.

Knowledge of antibiotic resistance and antibiotic prescribing practices in sub-Saharan Africa

Those charged with the responsibility of prescribing antibiotics in the healthcare setting, wherever they are in the world and whatever their qualification, need to understand how antibiotics work and the implications of their use. Without such an understanding the inappropriate use of antibiotics will continue to fuel the development of antibiotic resistance. Literature pertaining to the knowledge, understanding and practice of antibiotic prescribers is limited when it comes to sub-Saharan Africa, with no published data pertaining to Uganda. This lack of research has been recognised, and slowly, newly published studies are starting to come forth from this part of the world. The following section of this chapter looks at these studies and their findings.

Level of understanding

Lyimo, Sigalla, Emidi, Mgabo and Kajeguka (2018) give us one of the most up to date insights about influences on antibiotic prescribing practices in their study in Tanzania. The study assessed knowledge about appropriate antibiotic prescribing by asking eight questions. Findings suggested general levels of knowledge about appropriate antibiotic

prescribing practices were good, with 95.9% of the 217 participants in this questionnaire survey agreeing that misuse of antibiotics can put patients at risk. Furthermore 72.8% of respondents identified that antibiotic resistance was a significant global problem. The majority (56.5%) of respondents considered inappropriate antibiotic use to be attributable to poor skills and knowledge, with 54.8% calling for additional education on strategies to reduce the development of antibiotic resistance. This latter request for additional training is not surprising given that only 24% of respondents reported receiving regular training about appropriate antibiotic prescribing. It is difficult to say whether these findings are transferable to Uganda as no midwives were questioned in the survey. However, 68.7% of respondents were assistant nursing officers. As this cadre is similar to that of a midwife it is possible that similar knowledge findings regarding antibiotic prescribing practices may be found in Ugandan midwives.

An online questionnaire survey was used by Bulabula et al. (2018) to assess the level of training nurses across Africa had had in antimicrobial stewardship. Findings of the survey may be limited in their transferability to midwives in the Ugandan setting as 61.7% of respondents were from South Africa, and further, all respondents were nurses. Nonetheless, only 36.7% of nurses responding reported that they had received antimicrobial stewardship training during their undergraduate schooling. Furthermore, this training was not formally structured (Bulabula et al, 2018). Similar to the findings of Lyimo et al. (2018), 95.4% of respondents requested further education in the area of antimicrobial stewardship. Although focused on nurses, these findings indicate that antimicrobial stewardship is underrepresented on the nursing curriculum across Africa. These findings may be indicative of the content of midwifery curriculums across Africa and provide justification for this study to use a modified action research approach to introduce Ugandan midwives to antibiotic stewardship.

A range of scenario-based questions were used to assess the knowledge of 264 antibiotic prescribers about appropriate antibiotic prescribing practices in South Africa (Farley, Stewart, Davies, Govind, van der Burgh, and Boyles, 2018). Findings must be treated with caution as the majority (248/264) of respondents were doctors who were mainly practising in the private sector. Findings indicated that knowledge scores were suboptimal with more recently qualified healthcare workers demonstrating higher knowledge scores, and 87.5%

of respondents reporting that they wished for further education on appropriate antibiotic use. The authors attributed this to a lack of understanding about antibiotic resistance on older medical education courses. As mentioned previously, with antibiotic resistance and antibiotic stewardship failing to feature in undergraduate midwifery degree programs in Uganda, it is possible that these suboptimal knowledge scores may be also be found amongst the midwives taking part in this study.

Whilst the study undertaken in Kenya by Tegagn, Yadesa and Ahmed (2017) included midwives, the transferability of the findings to the Ugandan setting may be limited as they only accounted for 10.3% of the sampled population. Nonetheless, findings from Kenya echo those of Lyimo et al. (2018) in Tanzania with 85% of the 107 respondents agreeing that inappropriate antibiotic use can lead to antibiotic resistance, and a further 84.3% recognising that such use can lead to the patient being treated ineffectively. However, 43% of respondents did not believe that antibiotics are overused. The authors did not explore this finding further, so it is difficult to say if this result is because antibiotic misuse in Kenya is low, or if the respondents held unrealistic views about levels of antibiotic use in the workplace.

Asante et al. (2017) give us a detailed insight into knowledge of antibiotic resistance and antibiotic prescribing practices amongst prescribers in their study in Ghana. Whilst their cross-sectional survey doesn't include any midwives, 50% of the population sampled were nurses, whose cadre can be approximated to the midwife. Other participants included doctors (13%), physician assistants (these can be broken down into three groups: medical assistants, dental assistants and anaesthesia assistants – although the study does not make it clear which group the included physician assistants fall in to) (19%) and 18% community health officers (CHOs). All participants were asked to complete a questionnaire, with 33 of these individuals also taking part in interviews. However, these in-depth interviews were only conducted with doctors and physician assistants, so may not be representative of the views of lower cadre staff.

Levels of understanding about antibiotic resistance corresponded directly with cadre, with those most qualified demonstrating a higher level of knowledge. Whilst the proportion of prescribers who identified that current antibiotics may become ineffective in the future ranged from 96.1% in doctors to 69% in CHOs, it is unclear if they understood how this

resistance is manifested. Indeed, a range of 2% to 32.4% of prescribers across cadres thought that antibiotics will always be effective in the treatment of the same infections in the future, suggesting there may be some gaps in prescribers' knowledge of antibiotic resistance. However, prescribers were able to correctly identify inappropriate antibiotic prescribing, patient non-compliance to treatment regimens, and unregulated over-the-counter sales of antibiotics as drivers for the development of antibiotic resistance.

The majority of prescribers across all cadres demonstrated a knowledge that antibiotics are effective in the management of bacterial infection. Of concern however is the proportion of nurses who wrongly identified that antibiotics are effective in treating viral infections, fungal infections and for the management of the common cold, 33.5%, 60.6% and 48.9% respectively. Such misconceptions can contribute to inaccurate prescribing decisions, and the findings suggest that nurses need further education about how to correctly prescribe antibiotics.

Wasserman et al. (2017) conducted research into the current prescribing education for medical students across three training institutions in South Africa. Their concern being that poor undergraduate training may translate to poor antibiotic prescribing practices and aid the development of antibiotic resistance. With a response rate of 51%, 289 medical students returned a questionnaire that had been designed to assess perceptions, knowledge and attitudes about antibiotic use and resistance. Additionally, the questionnaire sought to assess perceived quality of education in preparation for becoming an antibiotic prescriber.

The findings of the study raise questions about the quality of antibiotic prescribing education that medical students receive in South Africa, with an average of only 63% of students stating that they felt the education they had received on antibiotics was useful. There were significant differences in the overall knowledge scores of students between the three training institutions, suggesting that curriculum design and delivery can have an impact on the antibiotic prescribing practices of graduates. Mean knowledge scores were higher among students who reported using prescribing guidelines, suggesting that access to local information can improve the appropriateness of antibiotic prescribing decisions. Similar to the findings of Lyimo et al. (2018) and Bulabula et al. (2018), 95% of medical

students reported a desire for further education on the appropriate use of antibiotics, and on antibiotic resistance in general (90%).

Abera, Kibret and Mulu (2014) undertook a cross-sectional survey of physicians and nurses in Ethiopia to assess knowledge and beliefs about antibiotic resistance. In line with the findings of Lyimo et al. (2018), Bulabula et al. (2018), Farley et al. (2018) and Wasserman et al. (2017) 65% of physicians and 98% of nurses felt that they needed further training on antibiotic resistance, with 49.3% of nurses stating that they didn't have current information about it. Whilst both physicians and nurses identified that overuse of antibiotics, use of broad-spectrum antibiotics and poor patient adherence to treatment regimens contribute to the development of antibiotic resistance, a higher proportion of physicians than nurses were knowledgeable about its causes. These findings support those of Asante et al. (2017) who found that levels of understanding of antibiotic resistance correspond to level of cadre.

Both physicians and nurses identified that upper respiratory tract infections, unknown febrile illnesses, urinary tract infections and diarrhoea are conditions for which antibiotics are often prescribed unnecessarily. However, the average percentage of physicians and nurses recognising the inappropriate use of antibiotics for these conditions were 33.4%, 39.7%, 23.1% and 25.4% respectively, suggesting that a significant proportion of these healthcare workers lack an understanding of what causes medical conditions and the treatments they require. This finding is similar to those of Asante et al. (2017) who found high proportions of nurses believing that antibiotics are suitable in the treatment of viral and fungal infections and the common cold.

Using a questionnaire, Thriemer et al. (2013) attempted to gain an understanding of the knowledge, attitudes and practices of final year medical students and doctors in the DR Congo towards antibiotic prescribing. Of the questionnaires completed 89 were by medical doctors and 106 by final year medical students. Knowledge was assessed using 8 questions within the questionnaire and was rated according to how well respondents scored. Thriemer et al. (2013) concluded that knowledge scores were modest and found no significant difference in scores according to years of clinical experience. In a similar vein to the work conducted by Asante et al. (2017) and Abera et al. (2014) 27.9% of respondents in this study reported that they would treat a cough with antibiotics. The findings between

the studies are not perfectly comparable as in this case the result was based on a scenario presented in the questionnaire, whereas in the work of Asante et al. (2017) participants were asked to agree or disagree with the statement that antibiotics are effective in managing the common cold. Nonetheless, the findings across these studies (Asante et al. 2017; Abera et al. 2014; Thriemer et al. 2013) demonstrate that a significant proportion of healthcare professionals would treat a cough, a viral infection which is non-responsive to antibiotics, with antibiotics. My observational work has revealed that such behaviours are present amongst the midwives in this study:

Brenda was telling me today that she wasn't feeling very well as she had the 'flu'. She described the symptoms of 'flu' as having an irritable cough, a runny nose, a tendency to sneeze and sometimes blocked sinuses. So really, it's like a cold. She told me that she was taking amoxicillin to try and get better. When I asked her why she was taking an antibiotic for this, she said that was the treatment for it. It was what she had always been given when she had 'flu', ever since she was a little girl.

Reflective diary – 22nd February 2017

Sources of knowledge informing antibiotic prescribing

The core resource drawn on for making antibiotic prescribing decisions by antibiotic prescribers in Ghana and medical students in DR Congo was formal training (Asante et al., 2017; Thriemer et al., 2013). This finding is similar to that of Wasserman et al. (2017) who found that following graduate training in South Africa, few opportunities arise for healthcare professionals to receive updates on antibiotic prescribing. As discussed in chapter two the quality of this education in Uganda is questionable, and if relied on alone may perpetuate the development and spread of antibiotic resistance. Lack of access to the internet, a lack of a uniform source of information about antibiotic prescribing regimens and a lack of information about local antibiotic resistance patterns were identified as factors contributing to the lack of knowledge held by prescribers about the appropriate use of antibiotics (Asante et al., 2017).

In addition to formal training, doctors in the DR Congo cited pharmaceutical companies as the leading source of knowledge informing their antibiotic prescribing decisions (Thriemer et al., 2013). The ethical stance that pharmaceutical companies take as they promote their

supply of drugs is open to debate. Using them as a source of knowledge to inform antibiotic prescribing decisions is therefore questionable.

Adorka, Dikokole, Mitonga and Allen (2013) identified that 94% of nurses and doctors in their study in Lesotho felt that the introduction of guidelines would help to improve antibiotic prescribing practices. In reality it is uncertain if their availability would actually translate to their use, as Thriemer et al. (2013) found that antibiotic guidelines were used 68.9% of the time by medical students and only 62.8% of the time by doctors. Similarly, only 68.2% of respondents in the Kenyan study by Tegagn et al. (2017) reported that guidelines were referred to in the treatment of infectious diseases, with an even lower proportion of respondents (38.7%) reporting that they used guidelines to inform antibiotic prescribing decisions. Furthermore, even though 50.2% of those healthcare workers questioned by Lyimo et al. (2018) felt guidelines to support antibiotic prescribing were not always accessible, nearly one quarter of respondents (22.1%) reported that they never followed antibiotic prescribing guidelines. The reasons for this were not made clear by the authors. From my observational work, even when there are prescribing guidelines readily available (sometimes they are not) I have rarely witnessed them being consulted by midwives when prescribing antibiotics.

Influences on prescription decisions

Antibiotic prescribers in Ghana reported that their choices over what antibiotics to prescribe were linked to availability of antibiotics, patient ability to pay for antibiotics, patient drug history, and to a much lesser extent, patient expectations (Asante et al., 2017). Where uninformed patient expectations were mentioned there was evidence that prescribers would take time to educate patients about the correct use of antibiotics. However, these findings were elicited from interviews with doctors and physician assistants, so may not be representative of nurses and midwives. It was also noted that a lack of availability of laboratory tests impairs the ability of the prescriber to identify the bacteria causing the infection, and subsequently prescribe, or not prescribe, the correct antibiotic.

Contrary to these findings are those of Farley et al. (2018), Abera et al. (2014) and Thriemer et al. (2013) who reported pressure from patients as a factor contributing to the decision to prescribe (often unnecessary) antibiotics. This was felt to be more acute in the community setting than the hospital setting in DR Congo (Thriemer et al., 2013). This finding is not unique to sub-Saharan Africa, with a survey in the UK reporting that 55% of General Practitioners felt pressurised to prescribe antibiotics to patients, even in cases when they may not have been necessary (Torjesen, 2014).

It is reassuring to note that the study by Thriemer et al. (2013) revealed that decisions over what type of antibiotics to prescribe were driven more by the cause of infection than availability of antibiotics. Similarly, in their respective studies of antibiotic prescribers in Tanzania and Lesotho Lyimo et al. (2018) and Adorka et al. (2013) found that prescribing decisions were mostly influenced by the patient's clinical condition, rather than by patient requests. However, in the study by Adorka et al. (2013) this finding differed between doctors and nurses, with only 3% of doctors admitting to being influenced by patient expectations compared to 33% of nurses. Whilst it is reassuring that prescription behaviours are based on patient condition, the findings of Adorka et al. (2013) also reported the concerning fact that only 25% of prescribers waited for the results of laboratory investigations prior to prescribing antibiotics. Of even more concern, 51% of prescribers reported that they prescribe antibiotics when they are unsure of the patient's diagnosis. Furthermore, where facilities were available for microbiology testing it became apparent that only 32% of respondents said that they would send a specimen for such tests (Adorka et al., 2013). Comparatively, although rates still indicate there is room for improvement, findings from Tanzania suggested that 50.7% of antibiotic prescribers would rely on microbiology results to inform their decision to prescribe antibiotics (Lyimo et al., 2018). Both these findings suggest that even where facilities are available to inform antibiotic prescribing decisions, they are not fully utilised. Reasons for this underutilisation include long waiting times for results, and heavy patient workloads (Adorka et al., 2013). Similarly, Farley et al. (2018) reported that the inability of patients to pay for laboratory tests contributed to the inappropriate use of antibiotics in the South African setting. Nurses and doctors in Lesotho further reported that stock outs of hospital pharmacy antibiotics often mean they are unavailable for use, and therefore restrict the ability of staff to treat

infections effectively (Adorka et al., 2013). Finally, and of serious concern, was the finding that 60.4% of nurse and doctor prescribers in Ethiopia felt that the need for private hospitals to make a profit also drives the prescription of unnecessary antibiotics (Abera et al., 2014).

Infection prevention and control (IPC) overlooked

As discussed in chapter one, IPC practices form one of the cornerstones of antibiotic stewardship programs. It is of serious concern that IPC practices as a means of controlling the spread of antibiotic resistance was overlooked by all cadres of staff in a number of studies (Asante et al., 2017; Wasserman et al., 2017; Abera et al., 2014). In particular, antibiotic prescribers in Ghana failed to mention how poor IPC practices can contribute to the spread of antibiotic resistance, although it was noted that there was a lack of IPC committees within the hospitals in which prescribers work (Asante et al., 2017). Similarly, 38% of medical students in South Africa were neutral or disagreed with the statement that lack of hand hygiene amongst healthcare professionals contributes to the spread of antibiotic resistance (Wasserman et al., 2017). Paradoxically, despite the lack of recognition that poor IPC practice can spearhead the rate of antibiotic resistance, over 90% of respondents felt that the establishment of an infection control committee would also help to reduce antibiotic resistance (Abera et al., 2014).

Confidence in prescribing

In contrast to the modest knowledge scores of medical students and doctors in DR Congo about antibiotic resistance and antibiotic prescribing, confidence levels surrounding knowledge about antibiotics and in personal antibiotic prescribing abilities was high. No statistically significant differences were found between medical students and doctors, with 85.7% and 94.8% being confident in their prescribing abilities respectively (Thriemer et al., 2013).

This finding is contrary to those of Lyimo et al. (2018) and Wasserman et al. (2017) who found that only 32.3% of respondents and 33% of medical students respectively felt

confident to prescribe antibiotics. It is unclear why this discrepancy arises between countries but may be attributable to the quality of medical education provided. However, the findings of the study by Wasserman et al. (2017) also produced other contradictions. Firstly, whilst respondents reported they were confident in their ability to prescribe, 55.4% of them reported that choosing the right antibiotic for treatment was difficult. Secondly, despite this admission, respondents reported seeking advice from a colleague regarding prescribing decisions only sometimes (79.4%). Finally, despite high confidence levels, 98.8% of respondents expressed a wish for additional training in antibiotic prescribing. Suggestions were put forward to improve antibiotic prescribing confidence, which in order of popularity included the use of a local handbook or guideline, contact with an infectious disease specialist, more bedside tutorials and the use of apps on smart phones, with formal lectures and computer-based tutorials being the least popular.

Detachment

From research conducted with antibiotic prescribers in DR Congo and medical students in South Africa it is clear that a detachment between personal responsibility for antibiotic resistance and practice exists (Wasserman et al., 2017; Thriemer et al., 2013). When antibiotic prescribers from the DR Congo discussed antibiotic resistance, they acknowledged it as an important problem, more so in the DR Congo than worldwide, but not so much in their personal practice. The following three findings from the study by Thriemer et al. (2013) all demonstrate a lack of understanding about the development and spread of antibiotic resistance, perhaps giving an explanation for a detachment from personal responsibility for the spread and development of antibiotic resistance. Firstly, 54.4% of respondents reported that they prescribe antibiotics more than once a day. Secondly, 21.7% of respondents thought that giving patients antibiotics when they are not required will not cause the patient harm. Finally, almost a third of respondents didn't think that in-hospital transmission of antibiotic resistance is a contributing factor to the development of antibiotic resistance in the DR Congo. Similarly, this lack of awareness about how personal practices can contribute to the development of antibiotic resistance is highlighted by the fact that the majority of medical students in the study by Wasserman et

al. (2017) perceived overuse of antibiotics in South Africa (92%) and antibiotic resistance to be a significant problem (87%), but a smaller proportion of them attributed these facts to their place of work; 63% and 61% respectively.

Understanding of antibiotic resistance and influences on antibiotic prescribing decisions in sub-Saharan Africa summary

This review of literature focusing on knowledge of antibiotic resistance and antibiotic prescribing practices in sub-Saharan Africa has yielded some insightful findings. It is important to note that only one of the studies included a small number of midwives, so the findings must be treated with caution as they may not be transferrable to the midwifery profession. Nonetheless, whilst the studies have demonstrated that healthcare professionals working in SSA have an understanding of antibiotic resistance, it is not clear if they understand how this is manifested.

Equally, whilst healthcare professionals across all studies displayed an understanding of the causes of antibiotic resistance, a number of the studies also found that the same healthcare workers didn't recognise antibiotic resistance to be a problem within their working environment. This is ironic as it appears that a significant proportion of healthcare professionals, across all cadres, are using antibiotics to treat conditions that are not responsive to antibiotics. The common cold is one such example, and indeed, I have frequently seen women attending the antenatal clinics in this study being given antibiotics when they have a simple cough. Furthermore, the importance of good IPC practices, which form the cornerstone of quality healthcare, were not recognised as a means of controlling the spread of antibiotic resistance. Also of concern is that fact that evidence, albeit only from one study, suggests that where diagnostic tests are available they are not fully utilised to inform prescribing decisions. These findings suggest that healthcare professionals are perhaps not aware of the impact they can have as an individual on the spread and development of antibiotic resistance. These issues need to be addressed with some urgency. One of these issues is what influences the prescribing practices of those who prescribe antibiotics. In understanding what influences good (and bad) practice, steps can be made to address these.

Influences on antibiotic prescribing practices

As previously discussed, constraints of resources, and in particular human resources, have led to task shifting. One of the tasks informally delegated to midwives in Uganda is antibiotic prescribing. Such task shifting also happens in the UK, the difference being however, that nurses and midwives entrusted with antibiotic prescribing in the UK receive thorough training and assessment before being charged with the new responsibility. Shifting such tasks to nurses and midwives is logical as both cadres play key roles in infection prevention and may have a role in antibiotic prescribing restrictions (Ness, Malcolm, McGivern, and Reilly, 2015). When such tasks are delegated it is important to ensure those entrusted with the responsibility of antibiotic prescribing understand the wider issues surrounding antibiotic use. From my early observational work as a volunteer midwife working in Uganda I have witnessed sub-optimal antibiotic prescribing practices on the part of midwives:

I have been analysing the maternity registers at Elgon health centre today. Over the past few months I have noticed that many of the diagnoses they are making and treating with antibiotics aren't necessarily conditions caused by bacteria, so it is unlikely that giving antibiotics will help the condition. In addition to things like 'flu' I have seen antibiotics prescribed for backache, morning sickness, joint pain, leaking breasts and malaria. I spoke to Peace about it as she was working today, and she said that's the way it has always been. If you're not sure – give antibiotics.

Reflective diary – 2nd May 2017

Michie (2008) identifies that in order to change the health of the population we need to change behaviours; behaviours of those who are healthy to stop them from partaking in activities that put their health at risk, those who are ill to encourage them to adhere to health advice, and those who are providing health care. However, challenging and changing ingrained practices is a momentous task. Hulscher, Grol and van der Meer (2010) argue that changing professional behaviour is often approached in a naïve way; those trying to initiate behaviour change expect that providing information about what should be done will be sufficient to change practice. They argue that this attitude overlooks the need for professionals to have the time, motivation, skills and resources to apply new knowledge to

clinical practice. This theory is supported by Cabana et al. (1999) who argue that attitudes need to be changed in order to make effective and sustainable changes to practice.

In order to change the antibiotic prescribing behaviours of Ugandan midwives we need to first understand the social, cultural, contextual and behavioural determinants behind their prescribing practices. One way to find out is to explore midwives' understanding of antibiotic resistance and their motivations behind their prescribing practices by interviewing them. Another way is to carry out a review of current literature related to these issues. Below I present a review of some of the literature that investigates what influences antibiotic prescribing practices amongst healthcare professionals as well as perceived barriers to changing these practices.

Patient influences

Evidence suggests that patient specific factors such as the presenting symptoms and test results coupled with consideration of risk factors such as allergies, contraindications and side effects inform the antibiotic prescribing decisions of healthcare professionals (Ljungberg, Kettis Lindblad, and Tully, 2007). The transferability of these findings to the midwifery setting in Uganda is limited however due to the fact that the study focus was with doctors in Sweden who prescribe in the secondary care setting. These findings are, however, supported by Skodvin, Aase, Charani, Holmes, and Smith (2015) who found effective utilisation of microbiology tests amongst doctors working in Norway. In particular, Skodvin et al. (2015) found that doctors adhered to best practise by taking specimens from patients prior to antibiotics being prescribed and commenced. Additionally, it was apparent that doctors took time to follow these results up so that amendments to initial antibiotic prescriptions could be made if required. Whilst these findings are reassuring for patients accessing care in their respective countries, those in Uganda cannot hope for the same. A lack of availability of laboratory tests inhibits prescribers to make well informed decisions. Even if diagnostic testing were available, with no telephone lines of communication open, travel expenses may inhibit patients from returning to collect their results. Furthermore, as previously mentioned, evidence from Lesotho indicates that even when facilities are available for microbiology testing, they are underutilised by doctors and nurses due to heavy patient workloads and time constraints (Adorka et al., 2013).

Despite the best practice identified by Skodvin et al. (2015) their study also found a tendency for doctors and nurses to use antibiotics where ambiguity surrounded a patient's history and diagnostic test results. Findings from a review that attempted to understand healthcare workers' views on antibiotic prescribing in LMICs revealed that a lack of access to diagnostic testing facilities contributed to their inability to make informed antibiotic prescribing decisions (Pearson et al., 2018). These findings are relevant to Uganda where diagnostic testing is not readily available. Instead patient history and clinical observations form the foundation of antibiotic prescribing decisions. Where sepsis, a life-threatening condition, is concerned, it is acceptable to commence a patient on broad spectrum intravenous antibiotics without awaiting laboratory results. Treatment can then be modified once test results are available and bacterial susceptibility is identified. For less serious conditions this method is far from ideal and flawed further in Uganda by a lack of equipment, such as blood pressure cuffs and thermometers that would usually allow midwives to make objective assessments of a patient's condition.

Furthermore, from my observational work as a volunteer midwife I have noted that relying on patient history taking is unreliable as a means of making a diagnosis for two reasons. Communication in the healthcare setting in Uganda differs significantly from my experiences in the UK. Hierarchical structures in Uganda often lead to patients being shy which translates to them sharing minimal details about their medical complaints (Ackers, Webster, Mugahi and Namiiro, 2018). This is compounded by the fact that patients in Uganda are not as actively involved in decision making when it comes to planning their own care. The result of which is that often healthcare professionals do not explain to a patient what condition they have:

I was working at Stanley antenatal clinic today. We must have seen around 70 women. I'm really finding taking histories from women quite difficult. Partly this is because my grasp of the language is poor so I have to rely on students or other staff members to translate for me. But even when I have help translating, getting a sound history is hard work. I must have asked at least five women today why they had had a previous caesarean section. Only one of them could tell me. The others said that the doctor had told them that they needed one. This feels so different to my experiences in the UK where women are given full explanations about what is happening and why they need a caesarean section. Women in the UK are also debriefed and are given the opportunity to come back at a later date for a further debrief and to ask any questions about what happened. Rarely have I seen such practice in Uganda.

Reflective diary – 7th September 2017

Secondly, underdeveloped communication skills amongst some midwives inhibit them from taking full, relevant histories from women. For example, a woman will come into the labour ward and report that she has been feeling labour like pains for some time. As noted, the midwife may or may not take a full set of vital signs depending on whether or not she has the equipment or motivation required. She will then perform an abdominal palpation to assess the lie and presentation of the fetus, and to auscultate the fetal heart. Following this she will perform a vaginal examination to assess cervical dilation. This final single examination usually forms the basis of her decision about whether the woman is in active labour or not. The midwife rarely takes a full history of the contraction pattern or palpates them herself to assess for their strength, length, and frequency, thus missing the full clinical picture in her diagnosis. Consequently, you often find that the midwife will tell you that a woman is in labour as her cervix is 4cm dilated when actually she is only contracting every hour and she has had six babies before, which explains why her cervix appears to be dilated. This serves as an example that midwives sometimes rush care due to time constraints²². With these findings in mind, and the fact that midwives often make a diagnosis of labour based on piecemeal information, it is plausible that they are making the same errors when diagnosing conditions of pregnancy that may or may not require antibiotic treatment.

²² These time constraints may be self-imposed: many Ugandan healthcare workers have second jobs in the private sector. They try to 'clear the lines' so that they can leave work to get to this second job.

Whilst identifying the bacteria causing a condition in a patient is the key to appropriate antibiotic prescribing, other patient factors have been found to be at play in the antibiotic prescribing decision making process. A group of Australian doctors who were interviewed by Broom, Broom and Kirby (2014) identified their need to provide benevolent care as an influence on their decision whether or not to prescribe antibiotics. Patients and family members were felt to hold certain expectations for what constitutes quality care, the provision of antibiotics being one of those things, a finding also identified by De Souza et al. (2006). Coupling this with what was described as an “emotional responsibility” to provide all immediate treatment options regardless of the wider consequences, led doctors to prescribe antibiotics when perhaps they were not necessary. Additionally Broom et al. (2014) identified that associated patient risk contributed to their antibiotic prescribing decisions – doctors were concerned that withholding antibiotics may lead to an adverse outcome. Furthermore, this fear of not prescribing antibiotics outweighed the perceived embarrassment associated with over prescribing. This is a valid argument. In the UK and Uganda we give women prophylactic antibiotics in the case where there is preterm rupture of membranes. As a prophylactic measure this could be deemed unnecessary, yet such action is justifiable on the grounds that it may prevent life threatening infections. As mentioned earlier the studies by Farley et al. (2018), Abera et al. (2014) and Thriemer et al. (2013) revealed pressure from patients to be an influencing factor in their antibiotic prescribing decisions, even in cases where antibiotics were not required. This phenomenon has also been noted in Pakistan (Shahid et al., 2017), Peru (Garcia et al., 2011) and China (Reynolds and McKee 2009) and may well be an influencing factor in the decision of midwives working in Uganda to prescribe antibiotics. I have witnessed on several occasions women questioning a midwife’s treatment decisions, even asking if they will be given some amoxicillin. Furthermore, evidence from Cambodia suggests that even where patients do not demand antibiotics, healthcare staff still prescribe them based on perceived demand (Om, Daily, Vlieghe, McLaughlin and McLaws 2016).

Broom et al. (2014) and De Souza et al. (2006) found doctors in their studies to demonstrate a clear understanding of antibiotic resistance, the risks it poses and the need to curb it. However, whilst they understood the theoretical importance of this, when faced with the reality of the individual patient, the issue of antibiotic resistance and its impact on

the wider community did not feature in their decision to prescribe treatment. This is supported by the findings of the review by Hulscher et al. (2010), who found some studies that hypothesise that healthcare professionals think the risk to the patient immediately in front of them is higher than the long-term risks of prescribing antibiotics. I have in fact had such a conversation with a UK volunteer doctor working for K4C, who openly admitted that they based their decision to treat a patient with antibiotics solely on the patient, without considering the wider effects of that decision.

Habit

Decision making autonomy was identified as a theme by Charani et al. (2013) in their study of antimicrobial prescribing habits of doctors, pharmacists, nurses and one midwife across four London hospitals. Senior doctors were found to rely heavily on their professional judgement in their antibiotic prescribing decisions, often over ruling the opinions of an infection specialist and viewing anecdotal evidence and their clinical experience as superior to evidence-based guidelines. The only exception to this was when doctors needed recommendations from outside their speciality, then they would seek support from an appropriate colleague. It was noted that these attitudes meant that prescribing decisions of senior doctors were rarely questioned, demonstrating the significant influence that they have over both prescribing decisions and their junior colleagues. In a similar vein Ljungberg et al. (2007) identified personal habits as a precursor in prescribing habits of Swedish doctors. In particular, previous experiences and familiarity with drugs played an important role in their prescribing decisions. Ljungberg et al. (2007) called these actions “therapeutic traditions,” in the sense that things are ‘just done that way’.

Cabana et al. (1999) found in their systematic review that lack of outcome expectancy influenced the prescribing decisions of physicians. Namely, if physicians didn’t expect a drug to work then they wouldn’t prescribe it. From my experiences of working in Uganda, I feel that this finding is applicable. For example, if I suggest a woman is prescribed paracetamol for her sore throat and explain that the virus causing the sore throat will eventually subside, the midwives find it difficult to follow my advice. They inherently believe that a sore throat should be treated with antibiotics, and so this is what they will

prescribe. In some respects this belief is difficult to argue with. There is no diagnostic test in the form of a throat swab available in Uganda to confirm the cause of the sore throat. By assuming all sore throats are caused by viral infections midwives are left susceptible to overlooking a bacterial infection that could go on and cause further harm to the patient. The question then arises as to how to balance the risks of contributing to antibiotic resistance and failing to treat a patient appropriately. There is no easy answer to this dilemma.

Antibiotic prescribing decisions of doctors working in Ireland were found to be heavily influenced by personal experiences, and as their career progressed this influence became greater in significance (De Souza et al., 2006). Indeed, many of the respondents believed that their training left them ill-prepared to be prescribers at intern level, and felt that continuous updates when qualified, including sessions on local resistance patterns, would be beneficial. There was one anomaly to this finding. Five participants in the study who were from middle income countries reported that they had had a stronger foundation in infectious diseases and greater autonomy over prescribing decisions at an earlier stage of their careers. However, this greater autonomy was linked to less supervision and limited availability of antibiotics. I have witnessed similar levels of autonomy amongst student midwives, student medical officers and interns working in maternity care in Uganda. When it comes to clinical placements for student midwives they get little supervision. The antenatal clinic at the Stanley hospital can see in excess of 50 women in one morning. With only one or two qualified midwives working in the antenatal clinic, providing care for these women whilst supervising the ten to twenty student midwives on clinical placement proves to be almost impossible. Consequently, unless a student seeks advice from a qualified member of staff, they are left to make their own prescribing decisions and are given the responsibility of prescribing antibiotics for what are deemed minor ailments such as coughs, colds and urinary tract infections. Theoretically these student midwives should have had education about appropriate antibiotic prescribing prior to the clinical placements. As discussed in chapter two, this is rarely the case, meaning that the decisions student midwives make are often misinformed and inappropriate. The benefit therefore of greater autonomy early on in the career of midwives and medical officers is questionable.

Hierarchy

A culture of hierarchy has been identified time and time again in the literature as a central influence on the prescribing habits of healthcare professionals, with those who are more junior and lack experience seeking advice and support from their seniors (Skodvin et al., 2015; Broom et al., 2014; Charani et al., 2013; Ljungberg et al., 2007; De Souza et al., 2006). Furthermore, Skodvin et al. (2015) found that formal training held irregularly was less helpful than support from experienced clinical colleagues. Caution must be exercised when applying these findings to midwives in Uganda as all of these studies took place in high income countries and mainly sought to understand the prescribing decisions of doctors. However, in some respects these findings seem intuitive – those with experience mentor those who do not have experience. As we have seen earlier however, senior doctors often rely on anecdotal evidence and their experiences rather than up to date guidelines to inform their prescribing decisions. This becomes problematic when such practices are not evidence based and junior doctors begin emulating the potentially poorly informed practices of their seniors rather than using evidence-based guidelines (Charani et al., 2013), so that such “therapeutic traditions” are upheld through time (Ljungberg et al., 2007). Of interest, De Souza et al. (2006) found that although junior doctors appreciated support from their senior colleagues, and in fact this was the most influential factor informing their prescribing choices, they were able to distinguish between instructions based on evidence and instructions based on habits. Despite an ability for junior doctors to make this distinction, evidence suggests that hierarchical structures inhibit juniors from challenging their seniors, leaving them to prescribe in a way to suit conventional senior preferences rather than offering evidenced-based treatment options (Broom et al., 2014). In contrast to the influence that senior doctors have on prescribing behaviours, Skodvin et al. (2015) found that overall leadership in antibiotic stewardship policies from management was lacking.

From my experiences of working clinically in Uganda it is difficult to say how hierarchical structures influence midwives’ antibiotic prescribing behaviours. In many health centres that provide maternity care midwives are lone workers and have no one to discuss prescribing decisions with. Even in settings where medical officers are expected to be at work, they are limited in number and on many occasions I have seen them fail to attend

for work, thus leaving the majority of prescribing decisions to midwives. Part of the hierarchical structure in the healthcare setting in Uganda means that there are leaders allocated at each healthcare facility. These include a midwifery lead in addition to an overall lead for each healthcare facility. My observational work however has identified that these leaders are frequently absent from the clinical area at Moroto and Speke health centres. At Stanley hospital the credibility of the medical director has been under question for some time with accusations that maladministration is affecting service delivery (Tusiime, 2018). Additionally, despite the hierarchical structure in Uganda, governance is lacking. When it comes to antibiotic prescribing there are currently no mechanisms by which antibiotic prescribing is audited in the district, thus outcomes and cost implications are overlooked.

Time

Time pressures were identified by Broom et al. (2014) in their study of Australian doctors as a factor affecting antibiotic prescribing decisions. Firstly, doctors felt that they didn't have enough time to make full clinical assessments of patients and compensated for this by prescribing antibiotics to cover themselves. Secondly, when clinical uncertainty regarding diagnosis arose as a consequence of not being able to make a full clinical assessment, broad spectrum antibiotics, which fuel antibiotic resistance more than the use of narrow spectrum antibiotics, were prescribed more frequently. Broom et al. (2014) also noted that the time of day a patient is admitted may influence prescribing decisions; if there were no other doctors around to consult in treatment decisions, the need to 'do something' led to antibiotics being prescribed. Finally, it was thought that discharging a patient *without* antibiotics consumed more of a doctor's time due to the in-depth explanations that patients required in order to understand why they weren't being given antibiotics. Consequently, discharging patients home with antibiotics was the preferred decision where time pressures were acutely felt. These findings were echoed by Pearson et al. (2018) who found that fleeting encounters with patients restricted the ability of healthcare workers to make sound clinical diagnoses and subsequent antibiotic prescribing decisions.

Time, or a lack of it, is without a doubt an issue in the Uganda healthcare setting. Midwives in Uganda are poorly paid and often not on time, so they 'moonlight' and take other jobs so that they can afford to live. This means they try to cram a whole day's work in antenatal clinic into one morning so they can get to their second job, putting further time pressures on them. Even in ward settings where care is provided as a 24 hour service you will find one or two midwives caring for 50 or more women. Such carer patient ratios leave little time for the provision of basic care, let alone in depth clinical assessment and time for explanation. At the second national conference for antimicrobial resistance in Uganda in November 2017 such time pressures were observed by delegates in open discussions as they noted "there is that long line and they want to finish (work)," and further that "time has become limited – by the time the patient ends his story or narrative someone has already prescribed (antibiotics)." In Uganda, it is rare that midwives spend time explaining to women anything about the treatment that they are being given. Indeed, when I have asked Ugandan student midwives to explain to a woman why we are giving her different medications, and how these medications will help her, I have been laughed at. It is something that is simply not done.

Guidelines

Given the previously discussed findings that senior healthcare professionals rely heavily on their clinical experience to inform their prescribing decisions, it is perhaps not surprising that Skodvin et al. (2015) found that the usefulness of national guidelines by doctors in Norway corresponded to their level of clinical experience; those with less experience were more reliant on guidelines, those with seniority saw guidelines as a suggestion rather than a set of given rules for treatment.

Whilst the findings of De Souza et al. (2006) found that doctors thought guidelines were helpful, they felt they could be made more user friendly, using less text and more flow diagrams. Of concern however, the same study found that most participants were not aware that such guidelines existed as they were only available on the intranet. These findings are analogous to those of the systematic review carried out by Cabana et al. (1999) to identify barriers to guideline adherence between 1966 and 1998. Cabana et al. (1999)

found that 10% of physicians were not aware of 78% of the guidelines that were available. They also concluded that even where physicians were aware that guidelines were available, it did not mean they were familiar with them, knew how to use them, or used them. Pearson et al. (2018) drew together data from nine LMICs with the intention of understanding the views held about antibiotic prescribing by healthcare professionals. One of their findings suggested that access to prescribing guidelines was limited and therefore inhibited the ability of healthcare workers to make appropriate antibiotic prescriptions. These findings are supported by those of Lyimo et al. (2018), Tegagn et al. (2017), and Thriemer et al. (2017) who all noted reduced access to or underutilisation of prescribing guidelines.

In Uganda there are both prescribing guidelines available and guidelines for the management of common conditions. These have been developed by the Ugandan Ministry of Health (2016) in order to support healthcare professionals in the management of common conditions. From my observational work I have noted that these guidelines have been inconsistently available in the clinical areas. Furthermore, I have observed that unless a specific programme is being implemented, adherence to these guidelines is not audited. In my experiences of working clinically I have only seen outside non-governmental organisations attempt to audit the management of certain conditions. Such audits have always had a focus on human immunodeficiency virus (HIV) and tuberculosis (TB), and thus linked to their own targets.

Culture

Hulscher et al. (2010) reviewed the literature pertaining to cultural, contextual and behavioural determinants influencing antibiotic prescribing practices in hospitals. Their review however did not include literature from low income countries, so the transferability of these findings to midwives working in Uganda is limited. Nonetheless, they noted that different countries view antibiotics and how they should be used in different ways, which understandably impacts on antibiotic use. Hulscher et al. (2010) cite the work of Deschepper and Vander Stichele (2001) who proposed that societies that wish to avoid uncertainty use antibiotics widely and in a defensive manner. Equally, they found that

hierarchical societies also use more antibiotics. Despite the fact that the work of Deschepper and Vander Stichele (2001) was based on findings from 14 European countries, these findings are congruent with my observational work in Uganda. For example, in some healthcare facilities every woman who has a baby is prescribed antibiotics postnatally, regardless of mode of delivery, on a prophylactic basis as there is uncertainty surrounding hygiene and sanitation both in the hospital and home settings.

The review of literature by Hulscher et al. (2010) further identified that contextual aspects, and in particular the organisational structure of hospitals has an impact on appropriate antibiotic use. However, when it came to discussing organisational policies that may influence antibiotic prescribing practices, many of them were irrelevant to the Ugandan setting; the resources they identified, such as requiring authorisation from a pharmacist or infection control specialist for each prescription, are not available in Uganda. Antibiotics not being available, time, and workloads of nursing staff were identified as organisational obstacles affecting the timeliness of antibiotic delivery, all of which are issues in the maternity setting in Uganda. Hospital and health centre stock levels of antibiotics in Uganda are decided by the government, with little or no input from the health centres on their local medication requirements. In Stanley Hospital these stocks frequently run out, with patients asked to buy their own. Additionally, as previously mentioned, the number of midwives staffing the health centres and wards is minimal, leaving them little time to ensure the timely administration of antibiotics to women.

Organisational structure

This literature review has identified hierarchical structures and the influence of senior colleagues over junior healthcare professionals as a leading determinant of individual antibiotic prescribing practices. Furthermore, it appears that clinical experience and anecdotal evidence take precedent over evidence-based guidelines in the prescribing decisions of senior colleagues. These combined findings are of concern. If senior doctors are basing their prescribing decisions on foundations other than those based in evidence, and in turn are educating the antibiotic prescribers of the future, inappropriate antibiotic prescribing will perpetuate.

The Ugandan healthcare setting differs greatly from that of high-income countries both in terms of administrative and organisational structure. Of significance is the level of autonomy that midwives and other healthcare professionals in Uganda have in relation to antibiotic prescribing. In day to day practice it is unlikely that a midwife will have a senior colleague to consult should she have any doubt about the need to prescribe antibiotics. Contrary to this, whilst midwives have a high level of autonomy in one respect, they do not in others – the prescribing decisions of healthcare professionals in Uganda are heavily restricted by what antibiotics are available in health centres and hospitals, with only about three main antibiotics being available in smaller health centre settings. Due to these differences it is questionable how much of an influence senior staff and hierarchy have on the prescribing practices of midwives. However, findings from this study which will be discussed in more detail in the next chapter, have revealed that midwives' antibiotic prescribing practices are profoundly influenced by what they learn "in the field" regardless of what they have been taught in training. It seems possible therefore that the general findings from the literature with regard to hierarchy are applicable to the Ugandan health care setting.

So far this literature review has identified that healthcare workers in sub-Saharan Africa lack knowledge to be confident antibiotic prescribers and further that their antibiotic prescribing practices are influenced by a multitude of factors. Globally if we are going to tackle antibiotic resistance then behaviours need to change; the prescribing behaviours of healthcare professionals as well as the consumption patterns of patients. Understanding this has helped in the design of this study, and in particular the realisation that it needed to be approached using a modified action research methodology. The final section of this literature review therefore considers a selection of theories of behaviour change.

Theories of behaviour change

The need and desire to change the behaviour of individuals and groups is found in all aspects of life. This study has introduced an evidence-base about antibiotic stewardship to midwives in Uganda and tried to support them in adapting their clinical practice so that it aligns with current evidence. Other studies seek to understand why people continue to smoke with the knowledge that it increases their risk of developing lung cancer or why

individuals continue to eat unbalanced, unhealthy diets, when their weight is already a threat to their health. Theories of behaviour change are abundant with many overlapping in design. For example, Grol, Wensing, Bosch, Hulscher and Eccles (2013) list cognitive theories, educational theories, motivational theories, theories on communication, social learning theory, social network and influence theory, theories on leadership, theories on organisational culture and so on and so on as valid theories addressing the implementation of change in healthcare. What is clear from the literature is that behavioural change theories need to consider several interweaving factors in their design. Various theorists who have addressed implementing change in healthcare have identified a variety of factors that influence behaviour change; the formulation of the innovation itself, the group of individuals whom the innovation is aimed at and who will be expected to implement it, the patients who are on the receiving end of the innovation, the setting in which the innovation is to be implemented, the organisational, economic and administrative environment and finally the methods used to implement the innovation (Grol, 1992 and Wensing et al., 2010 both as cited by Grol et al., 2013). Given the complexity that is associated with behaviour change it is not surprising that little empirical evidence is available to support one theory over another and no one model for behaviour change has been found that 'fits all.'

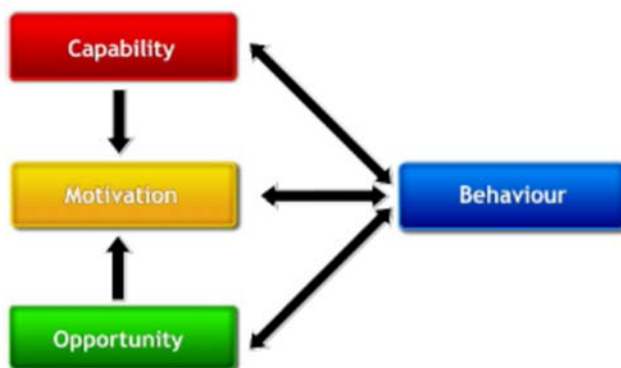
Discussions surrounding behaviour change take many formats. Some focus on theories of how to change behaviour, others look to evaluate the credibility of using different interventions to implement and support change. To avoid getting lost in the maze of behaviour change theories I have chosen to consider three theories of behaviour change. The behaviour change wheel of Michie et al. (2011) was chosen due to its simplicity. The Promoting Action on Research Implementation in Health Services (PARIHS) framework (Kitson, Harvey and McCormack, 1998) was chosen as recent literature has considered Ugandan midwives' perceptions of behaviour change using the PARIHS framework as a baseline model. Finally, the choice was made to look at the work of Canibano, Encinar and Munoz (2006) in order to obtain a perspective from outside the realms of healthcare, in this case from an economic point of view.

The behaviour change wheel

Michie et al. (2011) developed the behaviour change wheel (BCW) in response to a systematic review of the literature on behaviour change theory. With an emphasis on changing behaviour rather than understanding it, the BCW has the individual at its forefront. Initially used in healthcare in the UK as a means of predicting patient responses to public health initiatives surrounding smoking and obesity, the BCW implies that dysfunctional individuals are at the heart of the problem when it comes to changing behaviour.

In developing the behaviour change wheel (BCW) Michie et al. (2011) first devised the COM-B system. This framework proposes that capability, opportunity and motivation interact with each other to create behaviour which in turn can shape these key components (see figure 4.1). The beauty of this model is its simplicity. The model says the changing the behaviour of an individual comes down to the capability (knowledge and skills) held by the individual coupled with the opportunity for them to utilise their capability and their individual motivation to do so.

Figure 4.1. The COM-B System



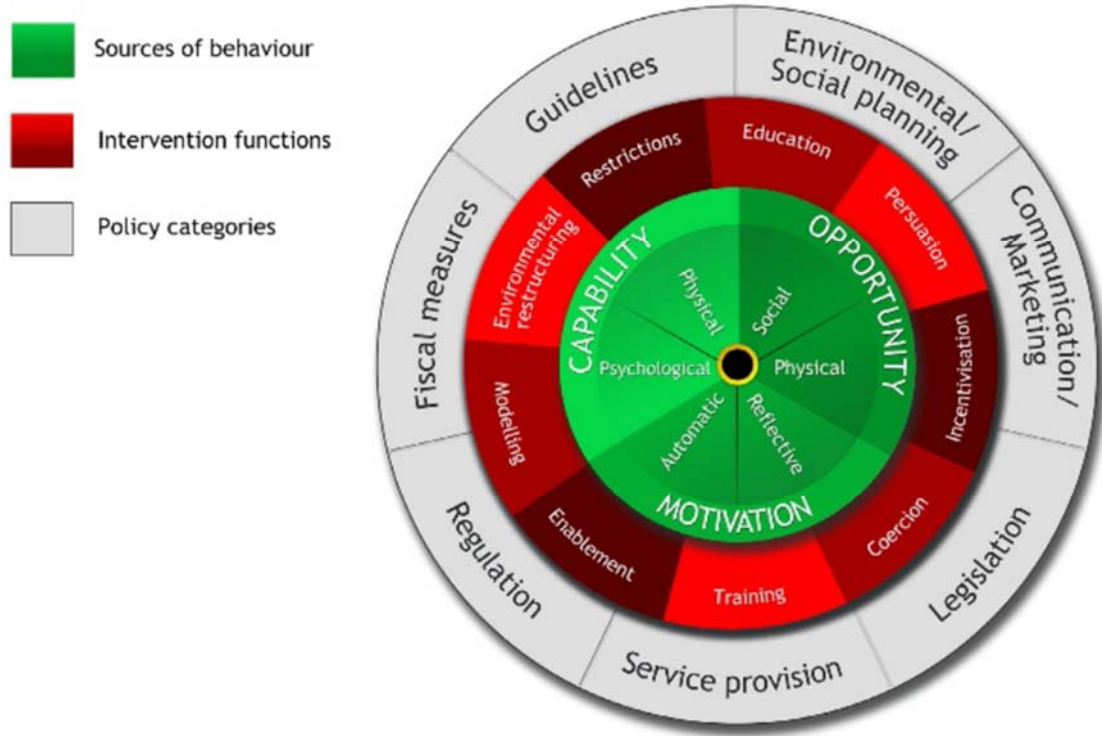
Source: Michie et al. (2011)

Michie et al. (2011) define an individual's capability as their psychological and physical ability, which includes the possession of the relevant knowledge and skills to take on the activity concerned. Opportunity concerns itself with factors that enable behaviour but that fall beyond the scope of the individual. Finally, those processes involved in directing an

individual's behaviour, including habits, emotional responses and critical decision making skills are encapsulated in motivation. In turn each aspect of the COM-B model is multifaceted. For example opportunity comprises physical and social opportunities. The former considers the environment in which the change takes place, the latter acknowledges how culture influences thinking. By modelling opportunity in this manner Michie et al. (2011) argue that the role of context in behaviour change is accounted for.

At the centre of the BCW is the COM-B model (see figure 4.2). The middle layer of the BCW identifies nine potential intervention functions, with the outer layer of the wheel taking into consideration seven policy categories. The BCW theorises that once a problem has been identified and context has been taken into consideration that these intervention functions and policies may be implemented as an intervention to try and change behaviour. The distinction between interventions and policies was made by Michie et al. (2011) as they noted that an intervention with a particular target can be enabled by differing policies. The BCW is thus dynamic. Rather than being linear in nature the BCW permits interactions both within and between layers. Considering the BCW as a behaviour change theory supports the use of modified action research in this study. Both the BCW and action research are dynamic processes requiring interaction and engagement with the individuals whose behaviour is trying to be changed. Furthermore, the use of interviews, observational work and secondary data analysis allows for the elements of the COM-B system to be thoroughly investigated allowing for contextual understanding to be realised prior to the design and implementation of any interventions.

Figure 4.2. The Behaviour Change Wheel



Source: Michie et al. (2011).

Promoting Action on Research Implementation in Health Services (PARIHS)

The PARIHS framework was developed by Kitson et al. (1998). It identifies that knowledge translation is shaped by three main foundations; evidence, context and facilitation. Each of these elements are broken down into sub-elements. Evidence encompasses the sub-elements of research, clinical experience and patient experience. Culture, leadership and evaluation form the sub-elements of context, and finally, facilitation has the sub-elements; purpose role, and skills and attributes. Each element and sub-element have their own continuum that ranks from high to low. For example, the sub-element of research within the element of evidence would be ranked as ‘high’ if were deemed to be research that has been well designed and executed. Conversely it would be ranked as ‘low’ if the research design was inappropriate. The PARIHS framework theorises that if sub-elements are ranked towards the ‘high’ end of the continuum then implementing evidence-based care is more likely to be successful.

Bergstrom, Peterson, Namusoko, Waiswa and Wallin (2012) used the PARIHS theoretical framework to guide them in their research exploring Ugandan midwives' experiences of facilitating knowledge translation in their clinical practice. The midwives in the study by Bergstrom et al. (2012) identified the element of context, as well as the sub-elements of culture, leadership and evaluation as factors contributing to their ability to effectively translate knowledge into behaviour change. Midwives in the study identified the need for leadership to provide supportive supervision in order to identify unsuccessful interventions and guide the introduction of new interventions to enhance the chance that knowledge translation will transpire. Table 4.1 depicts the low and high rankings associated with each of these sub-elements identified by the midwives in the study by Bergstrom et al. (2012). An additional contextual factor, namely commitment to work, was identified by the Ugandan midwives and managers as an influence on their ability to change their behaviours.

Table 4.1. Elements of the Promoting Action on Research Implementation in Health Systems (PARIHS) framework identified in the study by Bergstrom et al. (2012).

CONTEXT	Sub-element	Low	High
	Culture	<ul style="list-style-type: none"> • Task driven • Low regard for individuals • Low morale • Little or no continuing education 	<ul style="list-style-type: none"> • Learning organisation • Patient centred • Valuing people • Continuing education
	Leadership	<ul style="list-style-type: none"> • Diffuse roles • Lack of team roles • Poor organisation or management of services • Poor leadership 	<ul style="list-style-type: none"> • Clear roles • Effective teamwork • Effective organisational structure • Clear leadership
	Evaluation	Absence of: <ul style="list-style-type: none"> • Audit and feedback • Peer review • External audit • Performance review of junior staff 	<ul style="list-style-type: none"> • Audit and feedback used routinely • Peer review • External evaluation

Source: Kitson et al. (1998)

Context

When it came to discussing context, the midwives in the study by Bergstrom et al. (2012) commented on the receptiveness of context. Resources, or rather a lack of them, created frustration amongst midwives when they were taught new skills but were left unable to implement them due to a lack of human resources, equipment, medication, general consumables, space and time. This could well be the case for the midwives in this study as resources are often found to be lacking.

Culture

On-the-job learning supported by teamwork and effective communication and cooperation were identified by the midwives in the study by Bergstrom et al. (2012) as cultural components required to support the translation of knowledge into practice.

Leadership

The need for a leader to be a role model, capable, physically present, and part of the team was identified by the midwives in the study by Bergstrom et al. (2012) as a key requirement to assisting the transition of knowledge into clinical practice. They also pinpointed that an autocratic leadership style had the potential to demotivate clinical staff.

Evaluation

The role of evaluation was also recognised by the midwives in the study by Bergstrom et al. (2012) as a key factor in the process of translating knowledge into practice. Evaluation was thought of as supportive supervision by an individual who is able to identify where interventions are failing and introduce and monitor the success of alternative interventions. Community participation as a means of evaluation was also identified by the midwives in the study by Bergstrom et al. (2012) as a driver for healthcare professionals to change their practice.

Commitment and informal payment

Two additional elements not recognised in the PARIHS framework were highlighted by midwives in the study by Bergstrom et al. (2012) as contextual factors influencing their ability to implement evidence-based care; commitment and informal payment. In a similar vein to the COM-B model, midwives felt that their commitment to work was compromised due to a loss of morale or motivation attributable to low salaries, heavy workloads, lack of appreciation and scant resources. Furthermore, informal payments were identified as a means of obtaining work; people pay to get a position at the cost of the more appropriately skilled and motivated individual getting the job.

The PARIHS framework and action research

Based on the findings of Bergstrom et al. (2012) it again seems appropriate to adopt a modified action research methodology for this study. As discussed in chapter three this modified action research study has used methods of data collection informed by ethnographic approaches. This allows for context and culture to be taken into consideration in the development and introduction of an evidence base for antibiotic stewardship. Furthermore, with action research drawing parallels with transformational leadership, the sub-element of leadership as identified by the midwives in the study by Bergstrom et al. (2012) is addressed when using a modified action research methodology. Finally, with action research adopting a cycle of observation, reflecting, planning and acting, the evaluation sub-element of the PARIHS framework is naturally incorporated in to the design of this study.

Evolutionary economics and behaviour change

In reviewing the central explanatory components of economic evolution Canibano et al. (2006) describe economic systems as constantly evolving systems which embody continuous endogenous change. Canibano et al. (2006) suggest that at the heart of economic change is the individual agent, whether that be an individual or an organisation, and the changes in their knowledge over time. These changes occur due to the

development of “novelties”. Of these novelties, some are discarded and others retained to facilitate the process of self-transformation. What is key to the theory proposed by Canibano et al. (2006) is the individual agents’ formulation of goals. Each individual has the dynamic capability to identify their knowledge requirements or capabilities and modify their behaviour in order to achieve a certain outcome. Accordingly, the model of economic change implies that the agent’s capabilities are driven by their intentions; individual agents develop capabilities in a manner that helps them achieve their intention. As each agent is heterogeneous, each will utilise different methods to develop their capabilities. Heterogeneity of agent therefore explains why variations occur in capabilities obtained and subsequently the success with which one agent achieves their target compared to a counterpart. Ultimately heterogeneity of agent provides an explanation as to why organisations evolve in different ways. Canibano et al. (2006) coin the phrase ‘enacted intention’ to explain that imagining a future reality does not equate to its realisation without the agent orienting their action towards the achievement of that future reality; unless an individual agent orientates their actions towards their goals, then obtaining their imagined reality will be unsuccessful. Critically, the authors also acknowledge that desired goals of agents may not be met as capacity may be lacking.

Canibano et al. (2006) recognise that with such a model, new capabilities create new patterns of behaviour which over time become the ‘norm’ to the extent that any individual entering the organisation may well adopt these patterns of behaviour without question. In the Ugandan healthcare setting one could argue that this antibiotic prescribing has succumbed to this habitual process. For example, in the treatment of cough, medical officers, nurses, midwives, and even individuals who self-medicate seek remedy in the form of antibiotics, mostly amoxicillin. This is an example of how individual agents can lose their sense of conscious deliberation and forget to question why they are doing what they are doing.

The key additional element that Canibano et al. (2006) introduce to the theory of economic change is the role of intention within the innovation process. They claim that intention plays a critical the link between dynamic capabilities and evolving capabilities. The authors argue that intention can be likened to an action plan whereby the goal of the individual agent is in mind from the start of the innovation process. Intention therefore drives the

capability development process; new capabilities are developed in order to reduce the gap between current reality and goal. Constant feedback shapes and reshapes capabilities again enabling progress towards the target goal to be realised. At the same time, as capabilities are developed the potential for new possibilities of action arises. As a result a stage is reached where intention activates the development of capabilities whilst capabilities can activate intentions; the process is dynamic. This is reassuring as it allows us to move away from the development of a stationary state where patterns of behaviour become habitual and towards an evolving state where the application of critical thinking plays a key role in the process of change.

The model proposed by Canibano et al. (2006) has been in some ways tricky to understand due to the inaccessibility of the language and concepts used in their narrative. As I have taken time to familiarise myself with their work, I have come to liken their theory to action research. As discussed in chapter three the modified action research model adopted in this study follows a cyclical process that aims to learn and improve on the success of previous cycles so that the end result is convergence towards enhanced action implementation (Koshy, Koshy and Waterman, 2011). Despite the similarities between the theory of Canibano et al. (2006) and action research, there is one crucial element in the former theory that is missing in action research; innovative intentionality. Innovative intentionality is defined as “the will to conceive or imagine realities which differ from the perceived realities with the purpose of making them effective” (Canibano et al., 2006, p.319). Simply put innovative intentionality drives individuals to act in a way that enables them to generate a change in their reality. As individual agents or organisations are, as already discussed, heterogeneous, their transforming intentions differ. The divergence in innovative intentionality between individual agents offers therefore an explanation as to why the trajectory of individual agents differs. As a midwife with a background in economics, I found the concept of innovative intentionality interesting. In essence the theory proposes the need for those involved in the change process to be able to visualise realities that differ from their current reality. Imagining a reality that is different to the current reality of healthcare in Uganda, whether that be in the maternity setting or the general medical setting, is quite difficult.

Behaviour Change – Conclusion

This discussion has focused on three theories of behaviour change, two of which were developed with the healthcare setting in mind. From this short analysis it is possible to see that the COM-B system and the PARIHS framework overlap in their theories of what is required to achieve behaviour change. Whilst the COM-B approach is relatively straightforward and contains fewer elements than the PARIHS framework, it is clear that meeting all the requirements to change behaviour is not easily attainable. Whilst the theory of Canibano et al. (2006) has a basis in economic theory the role of innovative intentionality, the ability of individual agents to imagine a different reality, is deemed to be the key in one's ability to change their behaviour.

Conclusion

Antibiotics are a precious resource in healthcare and have played a pivotal role in the reduction of morbidity and mortality across the globe. The lifespan of an antibiotic is limited, and the rate at which we are reaching a time where antibiotics are ineffective is being sped up by our own inappropriate use of antibiotics. Furthermore, inequalities in access mean that populations in LMICs are only just beginning to reap the benefits of antibiotics as we approach an era where they will become ineffective.

We have seen that various cadres of healthcare professionals in sub-Saharan Africa are, by the means of task shifting, entrusted with the responsibility of prescribing antibiotics. However, evidence presented in this chapter has shown that training, and therefore subsequent antibiotic prescribing practices of these healthcare professionals is suboptimal. This needs to be addressed urgently in the hope that we can curtail the rate at which antibiotic resistance develops. Aligning practice with evidence often requires changes to behaviour. How to achieve behaviour change is open to discussion, and as seen in this chapter, there are a variety of theories about how to support and encourage this. The various components of the behaviour changes theories that have been discussed in this literature review support the use of a modified action research methodology for this study. In particular, as this study has been underpinned with observational work that was influenced by ethnographic approaches, it has been able to take context and culture into

consideration as the study has progressed. Furthermore, with these behaviour change theories pinpointing the need for effective leadership and evaluation in the behaviour change process, modified action research, which addresses both, can be considered an appropriate methodology. The next chapter looks at the findings from the first two cycles of this modified action research study. These cycles have attempted to gain an insight into the knowledge held by the midwives in this study related to antibiotic resistance and stewardship and further, have sought to understand the contextual influences on their antibiotic prescribing practices.

Chapter five – Findings part one

Introduction

This chapter introduces findings from the first two action cycles. The cycle of action research as presented by O’Leary (2004) which underpins this study presents itself as being cyclical, neat and tidy, with the cycles being presented in chronological order. The reality of action research is somewhat different; it is messy and often difficult to manage. My continued presence as a work colleague and simultaneous observer providing mentorship in antibiotic stewardship throughout the study means that the various cycles in this modified action research study have overlapped or run concurrently with other cycles. To make the process of the cycles undertaken in this study understandable I describe them one at a time, whereas the reality involved some overlap. I have named the action cycles to reflect what took place in them. In this chapter I present findings from the pilot cycle, where I piloted the semi-structured interview schedule²³, and the context cycle which was used to understand the context within which the midwives in this study were working, and the subsequent influences on their antibiotic stewardship practices.

First some important points

As I present these findings I feel it is important to clarify a number of points to ensure that they are interpreted appropriately.

1. **My role as a mentor:** from the beginning of this study in February 2017 until the data collection period ended at the end of August 2018 I acted as a mentor for the Ugandan midwives, Ugandan volunteer midwives, and student midwives that I was working alongside. During that time the way I undertook my mentorship role changed. From February 2017 until the end of February 2018 I worked clinically for three and a half days a week across all the healthcare facilities (with the exception of Moroto health centre where I ceased working clinically in November 2017). I used each clinical working day as an opportunity to provide mentorship. Each week

²³ See appendix 1 for a copy of the pilot cycle interview schedule.

I tried to attend every facility, although this schedule was sometimes modified when I was responsible for mentoring UK students on their elective placements with Knowledge for Change. Whilst the focus of this study has been antibiotic stewardship in the maternity setting my role as a mentor, especially between the period of February 2017 to February 2018, extended beyond this focus. In addition to supporting Ugandan midwives and Ugandan volunteer and student midwives in their antibiotic stewardship practices, I also offered support and mentorship in other areas including the provision of antenatal, intrapartum and postnatal care, and care of the newborn. As I was able to offer mentorship about antibiotic stewardship in each cycle of action, this acted as part of the act component of the pilot and context cycles of action.

2. **Prophylactic antibiotics for HIV positive women:** as mentioned in chapter two all individuals who are HIV positive in Uganda receive as part of their treatment daily prophylactic antibiotics (cotrimoxazole). This regimen remains unchanged during pregnancy, so any HIV pregnant woman will be taking a daily dose of cotrimoxazole. *The antibiotics that HIV women take prophylactically in pregnancy are **NOT** included as antibiotics prescribed by the midwives for women during pregnancy in this study.* To clarify only antibiotics that have been prescribed by midwives for a presenting condition and subsequently documented in the antenatal register are captured in secondary data analysis in this study.
3. **Classification of bacterial and non-bacterial conditions:** It is essential to make an important note about the diagnosis of bacterial and non-bacterial conditions in the Ugandan healthcare setting. For the purposes of this study the conditions for which midwives prescribed antibiotics were analysed each month and classified as either bacterial or non-bacterial in nature according to the Uganda Clinical Guidelines (MoH 2016), or, in the case where the data were missing²⁴, were classified as unknown conditions. In reality however, as microbiology testing is not available in the majority of healthcare facilities in Uganda, most of these diagnoses were based simply on the signs and symptoms that a woman presented with. The documented indication for antibiotics is therefore simply a reflection of the prescribing midwife's

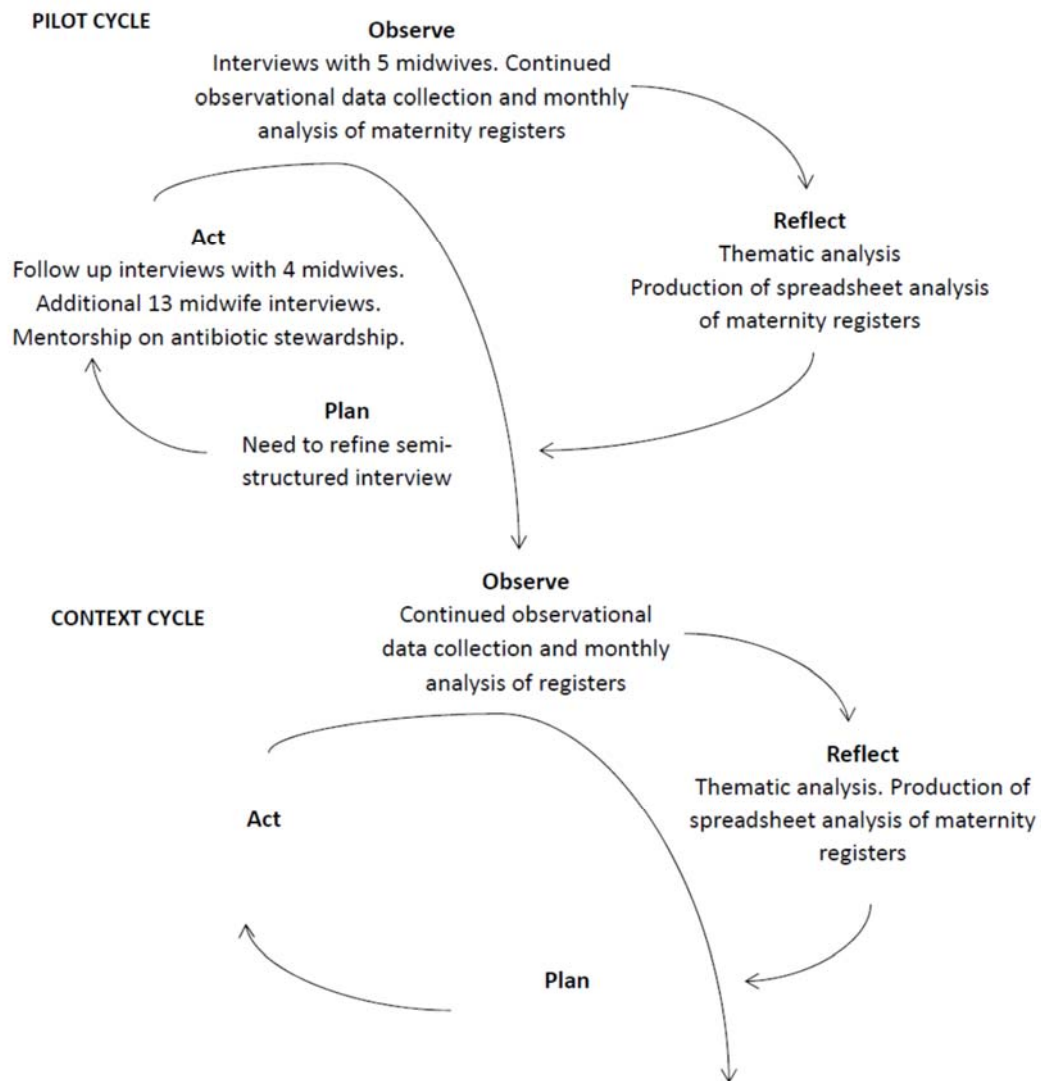
²⁴ Missing data in this case refers to the situation where antibiotics have been documented in the column of the antenatal register entitled "Other treatments" but the "Diagnosis" column has been left blank.

interpretation and therefore diagnosis based on these signs and symptoms. Secondary analysis of antenatal registers has revealed the diagnosis of conditions such as pneumonia, bronchitis, and pyelonephritis. All of these are indeed bacterial conditions that require treatment with antibiotics, however, I suspect in many of these cases the diagnosis and subsequent treatment is incorrect. Some tests are available to support midwives in the diagnosis process. In the case of syphilis a rapid diagnostic test is used to determine if a woman has such an infection. All women are tested for syphilis in pregnancy. Additionally, for the diagnosis of urinary tract infection (UTI) microscopy is occasionally available to support clinical decision making. However, even with microscopy testing there are limitations - where a UTI is confirmed on microscopy, the causative bacteria is not identifiable and therefore gives the midwife no information on which to base her decision regarding type of antibiotic to prescribe. Similarly, urinalysis can be performed using a simple test. Again, due to limitations with this method it is difficult to confirm if indicators for signs of infection using this method appear as a result of a UTI or a genital tract infection. Midwives are also able to send women for a sputum test if they suspect tuberculosis. As we consider these findings then we must bear in mind that there may be some error involved in these estimates. Nonetheless, it is important to note that even if the diagnosis is incorrect due to a lack of diagnostic testing equipment, the midwives made a theoretical diagnosis. To underline the fact that these diagnoses have not been clinically confirmed using a diagnostic test I have classified them as “perceived bacterial condition” and “perceived non-bacterial condition” and used these titles in the presentation of these findings.

Cycles of action

Figure 5.1 presents the first two cycles of this modified action research study; the pilot and context cycles.

Figure 5.1. Pilot and context cycles



Pilot cycle

The pilot cycle was undertaken in order to help me to formulate clear research questions and ensure that the methodological approach that I had chosen was relevant. The pilot cycle also served to assess both the effectiveness of the proposed semi-structured interview schedule and the mentorship needs of the midwives in relation to antibiotic resistance and antibiotic stewardship. As mentioned in chapter three, the pilot interviews and observations that make up the pilot cycle were conducted with midwives working at

Elgon health centre and began in February 2017. Five interviews were conducted over a period of two weeks. Findings from these interviews were supported by observational work and secondary analysis of the maternity data from the health centre from February 2017 to May 2017. Data collected were intensively analysed in April and May 2017, which revealed preliminary findings on the subject of midwives' understanding of antibiotic resistance and influences on their antibiotic stewardship practices. These findings were presented as part of the interim assessment (IA) in June 2017, and at the Second Ugandan National Conference for Antimicrobial Resistance in November 2017. The findings from the pilot cycle coupled with further reading of current literature led to the development of the revised semi-structured interview schedule²⁵ which was used in the context cycle. Themes arising from the data generated in the pilot and the context cycles were consistent and are therefore presented and discussed in detail simultaneously.

Context cycle

The observation period for the context cycle of action took place over a number of months. From July 2017, when I returned to Uganda following a trip to the UK for my interim assessment, until September 2017 there was a strong focus on data collected by observational work. This continued hand in hand with semi-structured interviews which took place between October 2017 and January 2018, with midwives across all three health centres and the one regional referral hospital. A total of 29 midwives work across the four healthcare facilities participating in this study. During this interview period a total of 17 of these midwives agreed to be interviewed. These included follow up interviews with four of the midwives who took part in the interviews in the pilot cycle. One of these took place in the UK when I was there for the Christmas holidays as the midwife in question was there undertaking a commonwealth fellowship. The remaining midwife from the pilot cycle could not be interviewed as she had left the district to pursue a diploma in midwifery at a training institution in the Uganda's capital city, Kampala.

²⁵ See appendix 2 for a copy of the interview schedule used in the context cycle

Participation rates

Table 5.1 shows the number of midwives who consented to be observed in the clinical setting throughout the study, and those who opted to be interviewed. All of the midwives in the population agreed to be observed in the clinical setting. Fewer midwives however were interviewed. Table 5.2 lists all the midwives who took part in the interviews in the pilot and context cycles and includes their level of qualification and total years qualified as a midwife. At Elgon and Moroto health centres and Stanley hospital antenatal clinic, all but one of the midwives in each health facility agreed to be interviewed. The midwife that did not participate in an interview at Elgon health centre was at the time of the interviews away studying, whilst both of the midwives not interviewed at Moroto health centre and Stanley hospital antenatal clinic were on maternity leave at the time the interviews were conducted.

Table 5.1. Number of midwives consenting to be observed in the clinical setting and interviews²⁶

	Elgon	Moroto	Speke	Stanley	Total
No. of midwives eligible to participate	8	5	13	3	29
No. of midwives consenting to be observed in the clinical setting	8	5	13	3	29
No. of midwives consenting to interviews	7	4	5	2	18

It is clear to see from participant numbers in table 5.1 that a small proportion of midwives from Speke health centre were involved in the interviews compared to the respective

²⁶ A total of eleven interviews were conducted with seven midwives at Elgon HCIII. One midwife was interviewed in the pilot cycle only. Four midwives were interviewed initially in the pilot cycle and then again in the context cycle. Two midwives were interviewed in the context cycle only.

proportions of midwives taking part from the other healthcare facilities. I believe the reason for this is twofold. Midwives working at Speke health centre are generally busier than the midwives working at Elgon and Moroto health centres and Stanley hospital. This is because of the higher birth rate at Speke. Generally, at all the healthcare facilities in this study, by the afternoon all women attending an antenatal clinic have been seen. For the midwives working in Stanley antenatal clinic, this means their work is then done. For the midwives working at Elgon, Moroto and Speke health centres they are left to attend to any women in labour. With lower birth rates at Elgon and Moroto health centres, time was often available for interviews in the afternoons. At Speke health centre where the birth rate is higher, little time was available in the afternoons to spend time interviewing midwives. This was compounded by the fact that few midwives from Speke health centre were willing to meet outside of work to be interviewed compared to the counterparts at Elgon, Moroto and Stanley. This could be attributable to the costs involved in travelling to meet, although I always offered to meet midwives in a location of their choice. This brings me to the second reason that may have contributed to only five midwives out of the 13 working at Speke health centre being interviewed. The nature of observational data collection requires no extra effort on the part of the midwife in terms of giving her up time; whilst she is at work she can be observed at no cost to her. Interviews on the other hand, if unable to be performed in work time, incur costs to the individual such as travel costs and a loss of personal time that individuals may wish to be compensated for. All midwives were provided with refreshments when being interviewed, but no financial incentive was offered for participation. As mentioned in chapter two, Speke health centre have strong working relationships with an American NGO who offer 'per diems' (daily top ups) for attendance at workshops. It is possible therefore that midwives from Speke health centre wished to be compensated for their participation in interviews as they have become accustomed to receiving financial incentives.

Table 5.2. Midwives participating in pilot and context cycle interviews²⁷

Midwife	Highest Midwifery Qualification	Number of years Qualified
Harriet	Certificate	Just qualified
Elizabeth	Certificate	Just qualified
Miriam	Certificate	Just qualified
Saudah	Certificate	2
Winifred	Certificate	2
Lillian	Certificate	3
Hellen	Certificate	4
Gloria	Certificate	12
Edith	Diploma	5
Peace	Diploma	6
Hope	Diploma	6
Irene	Diploma	8
Hildah	Diploma	10
Laureen	Diploma	13
Brenda	Diploma	13
Monica	Diploma	14
Beatrice	Diploma	16
Edidah	Diploma	18

Findings

The combined analysis of semi-structured interviews, notes made during and after periods of observation, and secondary data collected from maternity registers in both the pilot and context cycles revealed two overarching themes. The first relates to the knowledge midwives hold about antibiotic resistance and antibiotic stewardship, and how they have obtained this knowledge. The second conceptualises the environment in which this

²⁷ Pseudonyms have been used

knowledge is operationalised. Table 5.3 summarises each theme and its corresponding sub-themes. Findings indicate that the midwife’s role as an antibiotic steward and prescriber in Uganda is complex, with connections between many of the issues arising.

Table 5.3. Themes and sub-themes (from pilot and context cycles)

Theme	Sub-themes
<p>Knowledge about antibiotic resistance and antibiotic stewardship and how this is obtained</p>	<ul style="list-style-type: none"> • Knowledge • Midwifery education • Learning in the field • Personal preferences
<p>Operationalising knowledge</p>	<ul style="list-style-type: none"> • Human resources • Time • Diagnostic testing equipment • Laboratory supplies and staff • Guidelines • Access to antibiotics • Infection prevention and control practices • Protection • Self-medication • Midwives’ personal practices

Knowledge about antibiotic resistance, antibiotic stewardship, and antibiotic prescribing and how this is attained

Lack of knowledge about antibiotic resistance and antibiotic stewardship, attributable to poor midwifery education, was a theme that arose in more than one context throughout the pilot and context cycles. As midwives felt their midwifery education left them poorly prepared for their role as antibiotic prescribers, they sought knowledge from alternative sources which included learning ‘in the field’.

Knowledge

In relation to antibiotic resistance, most midwives taking part in the study could explain why antibiotic resistance occurs, with inappropriate use of antibiotics, the use of the wrong

antibiotics for an infection, and non-adherence to antibiotic regimens, being cited as the main causes:

“Resistance (long pause), resistance, resistance. OK, it develops mostly, what I know is when you, you take a drug and don’t complete a dose then the microorganisms don’t clear. Then next time you take it, it will be familiar because it has eaten the drug so maybe it will not treat. That is the resistance I am meaning.” Laureen

“Most times it is caused by, when a patient or a client takes a drug, if you don’t comply to treatment. And half way towards the dose you feel you are ok and you leave the drug. That will cause resistance. Somehow the microbes will become resistant. And another thing that can cause resistance. Umm, it could be, for example if you give a drug, an antibiotic, for the wrong condition in that, for example, it can be something that doesn’t require an antibiotic and you end up prescribing that antibiotic. So then somehow the microbes will become familiar with this drug.” Hildah

Whilst this knowledge indicates a general level of understanding about antibiotic resistance, it became evident that there was an incoherent level of knowledge amongst midwives about the sequelae of antibiotic resistance. In particular antibiotic resistance was viewed by a number of the midwives that took part in the interviews as a problem for the individual – the individual body and not the bacteria becomes ‘used to’ and therefore resistant to the antibiotics:

“If this community member who has gotten that infection has also been taking her own antibiotics maybe that can also cause resistance. It is not general. It is just the person, somebody else, but it is not...it can’t be resistance in the whole community. There can’t be resistance of everyone and antibiotics in the whole community, yeah.” Peace

Discussions in interviews and in the clinical work setting, combined with analysis of antenatal registers provided additional evidence that there is a knowledge-practice gap when it comes to Ugandan midwives prescribing antibiotics. In particular, midwives repeatedly talked of the need to treat coughs, colds, stomach aches and various other conditions with antibiotics, when in fact they are not bacterial conditions and are non-responsive to antibiotics. These findings were observed in the clinical setting:

I was discussing with one of the midwives at Elgon health centre today how if we are certain that a woman has vaginal candidiasis only and has no other symptoms of any genital tract infection that the Uganda Clinical Guidelines say we do not need to treat with metronidazole. When I said that treating with metronidazole can actually cause vaginal candidiasis in the first place or make it worse because it is an antibiotic the midwife said, “but metronidazole is not an antibiotic.” We then discussed how it is both an antibiotic and an antiprotozoal medicine.

Reflective diary – 7th August 2017

Tables 5.4, 5.5 and 5.6 show the number of women seen monthly in each antenatal clinic at Elgon and Moroto health centres and Stanley hospital respectively and the corresponding percentage of them who received antibiotics. Data from Speke health centre are excluded from this report as it was only available from January 2018 due to a difference in the antenatal registers. Rates vary from 3% to 23%. The information depicted in these tables shows the trends in antibiotic prescribing during the antenatal period but does not explain the variations in trends.

Table 5.4. Numbers of women attending Elgon antenatal clinic and percentage of these receiving antibiotics. Source: Elgon antenatal clinic register

ELGON	Feb 17	Mar 17	Apr 17	May 17	Jun 17	Jul 17	Aug 17	Sep 17	Oct 17	Nov 17	Dec 17	Jan 18	Feb 18
No. of women	135	173	166	239	196	225	337	242	264	274	226	270	212
% receiving Abx	3	5	5	10	8	10	5	9	7	12	15	3	11

Table 5.5. Numbers of women attending Moroto antenatal clinic and percentage of these receiving antibiotics. Source: Moroto antenatal clinic register

MOROTO	Feb 17	Mar 17	Apr 17	May 17	Jun 17	Jul 17	Aug 17	Sep 17	Oct 17	Nov 17	Dec 17	Jan 18	Feb 18
No. of women	134	136	121	173	147	135	161	110	153	123	84	122	114
% receiving Abx	8	13	11	11	9	7	22	18	9	18	23	18	13

Table 5.6. Numbers of women attending Stanley hospital antenatal clinic and percentage of these receiving antibiotics. Source: Stanley hospital antenatal clinic register

STANLEY	Feb 17	Mar 17	Apr 17	May 17	Jun 17	Jul 17	Aug 17	Sep 17	Oct 17	Nov 17	Dec 17	Jan 18	Feb 18
No. of women	848	1107	923	1052	902	1137	1286	990	920	807	713	899	683
% receiving Abx	11	16	12	10	11	12	9	7	8	4	6	12	10

Further analysis of the maternity registers provides an insight into these levels of antibiotic prescriptions. Whilst the midwives did prescribe antibiotics for perceived bacterial conditions that are responsive to antibiotics, they frequently prescribed antibiotics for perceived non-bacterial conditions. Tables 5.7, 5.8 and 5.9 show the breakdown of percentages of antibiotics being prescribed for perceived bacterial conditions and perceived non-bacterial conditions at Elgon, Moroto and Stanley antenatal clinics respectively. Where gaps in documentation in the antenatal clinic registers were found these conditions were classified as unknown conditions. These findings show that at Elgon antenatal clinic over the period February 2017 to February 2018 there were large fluctuations in the percentage of antibiotics prescribed for perceived bacterial and perceived non-bacterial conditions, with up to 66% of antibiotic prescriptions each month being made for perceived non-bacterial conditions, conditions that do not respond to antibiotics. These fluctuations are also noted at Moroto and Stanley antenatal clinics where up to 50% and 70% of antibiotic prescriptions each month were made for perceived non-bacterial conditions respectively.

Table 5.7. Percentage of antibiotics prescribed for perceived bacterial and perceived non-bacterial conditions at Elgon antenatal clinic each month as a proportion of total antibiotics prescribed

ELGON	Feb 17	Mar 17	Apr 17	May 17	Jun 17	Jul 17	Aug 17	Sep 17	Oct 17	Nov 17	Dec 17	Jan 18	Feb 18
% perceived bacterial condition	0	62	55	39	34	35	28	29	37	51	24	42	49
% perceived non-bacterial condition	50	13	11	48	53	47	66	57	32	37	64	15	47
% unknown condition	50	25	34	13	13	18	6	14	31	12	12	43	4

Source: Elgon antenatal clinic register

Table 5.8. Percentage of antibiotics prescribed for perceived bacterial and perceived non-bacterial conditions at Moroto antenatal clinic each month as a proportion of total antibiotics prescribed

MOROTO	Feb 17	Mar 17	Apr 17	May 17	Jun 17	Jul 17	Aug 17	Sep 17	Oct 17	Nov 17	Dec 17	Jan 18	Feb 18
% perceived bacterial condition	63	42	54	73	61	50	39	50	21	49	53	40	47
% perceived non-bacterial condition	27	47	46	11	8	50	30	20	42	37	26	33	47
% unknown condition	10	11	0	16	31	0	31	30	37	14	21	27	6

Source: Moroto antenatal clinic register

Table 5.9. Percentage of antibiotics prescribed for perceived bacterial and perceived non-bacterial conditions at Stanley antenatal clinic each month as a proportion of total antibiotics prescribed

STANLEY	Feb 17	Mar 17	Apr 17	May 17	Jun 17	Jul 17	Aug 17	Sep 17	Oct 17	Nov 17	Dec 17	Jan 18	Feb 18
% perceived bacterial condition	36	26	33	33	29	30	44	50	31	33	29	39	26
% perceived non-bacterial condition	56	69	57	63	64	63	52	50	69	67	67	56	70
% unknown condition	8	5	10	4	7	7	4	0	0	0	4	5	4

Source: Stanley antenatal clinic register

Closer observation of the antenatal registers revealed some of the common non-bacterial conditions that midwives in the study regularly prescribe antibiotics for. The first are coughs, which, usually viral in nature, do not respond to antibiotics. The second, lower

abdominal pain²⁸ (LAP) is a common complaint in pregnancy, attributable to the growing uterus and fetus combined with the pelvic joints relaxing due to hormonal changes in pregnancy (Murray and Hassall, 2014). Each month these two conditions account for up to 60% of all antibiotic prescriptions made by midwives in each of the healthcare facilities. Tables 5.10, 5.11 and 5.12 depict the combined percentages of women receiving antibiotics in the antenatal period for cough and LAP, as a percentage of total antibiotics prescribed, at Elgon, Moroto and Stanley antenatal clinics respectively.

Table 5.10. Percentage of antibiotics prescribed for cough and lower abdominal pain at Elgon antenatal clinic each month as a proportion of total antibiotics prescribed

ELGON	Feb 17	Mar 17	Apr 17	May 17	Jun 17	Jul 17	Aug 17	Sep 17	Oct 17	Nov 17	Dec 17	Jan 18	Feb 18
% Cough	25	13	0	35	20	27	17	43	16	21	48	0	13
% Lower abdominal pain	0	0	0	4	33	9	22	5	5	3	12	0	22

Source: Elgon antenatal clinic register

Table 5.11. Percentage of antibiotics prescribed for cough and lower abdominal pain at Moroto antenatal clinic each month as a proportion of total antibiotics prescribed

MOROTO	Feb 17	Mar 17	Apr 17	May 17	Jun 17	Jul 17	Aug 17	Sep 17	Oct 17	Nov 17	Dec 17	Jan 18	Feb 18
% Cough	9	41	31	0	8	40	19	10	21	18	16	5	40
% Lower abdominal pain	18	6	8	5	0	10	0	0	14	9	5	23	0

Source: Moroto antenatal clinic register

²⁸ Lower abdominal pain may be secondary to other conditions such as ectopic pregnancy, preterm labour or urinary tract infection and so on. As the midwives in this study have documented in the antenatal register "lower abdominal pain" as a diagnosis this has been taken as the diagnosed condition. Observational work has confirmed that where a midwife suspects ectopic pregnancy, preterm labour or urinary tract infection, she will document that as the diagnosis in the maternity register and take appropriate action.

Table 5.12. Percentage of antibiotics prescribed for cough and lower abdominal pain at Stanley antenatal clinic each month as a proportion of total antibiotics prescribed

STANLEY	Feb 17	Mar 17	Apr 17	May 17	Jun 17	Jul 17	Aug 17	Sep 17	Oct 17	Nov 17	Dec 17	Jan 18	Feb 18
% Cough	21	27	24	21	33	31	30	36	40	22	36	28	15
% Lower abdominal pain	27	28	21	22	19	20	7	9	18	31	22	23	38

Source: Stanley antenatal clinic register

Whilst these findings are of concern they provided me with hope for the ongoing cycles of action:

I've been spending a lot of time recently analysing the data I've collected from the interviews from the first two cycles. As anticipated there are definitely some gaps in the knowledge that the midwives have about antibiotic resistance and antibiotic stewardship. The good thing is everyone that I have interviewed has acknowledged that they lack knowledge AND everyone has asked for my help in updating them and educating them about antibiotic stewardship. This makes me think that this action research project may have some impact on their antibiotic stewardship activities – the midwives are already showing an interest in improving their clinical practice.

Reflective diary – 12th December 2017

Midwifery education

All of the midwives said that they had been taught about the use of antibiotics during their midwifery training, but alluded to the fact that this education was lacking and was a contributing factor to their lack of knowledge:

“Even a diploma, the curriculum doesn't cover a lot of things. It is small. It covers small things.” Hope

Findings from secondary analysis of maternity registers highlighted that different midwives prescribe different combinations of antibiotics to treat the same condition. When questioning midwives in the study about why these variations occur, differences in the quality of the training institutions that they had attended was pinpointed as a reason. In particular midwives identified that the quality of teaching staff was questionable:

“because there are some schools which have tutors who are not qualified. You just finish your diploma, they give you a job for teaching. So I don’t expect such a person to give the right information or the same information with the person who did the tutorship....that’s the funny thing with Ugandan education, because even the things which were phased out, they are still being taught...And in real practice, like when you are here, you very well know that that thing is no longer in practice, but they are still teaching it.” Hellen

Observations from my work at the local university has reinforced the notion that midwifery education needs further regulation:

I have been teaching at the local university today. The organisation of this university and the commitment and knowledge of the teaching staff is of interest. My co-teacher (we teach alongside a Ugandan lecturer to ensure there is the opportunity for knowledge exchange) sometimes appears to be presenting something in class that she doesn’t understand or is irrelevant to the Ugandan clinical setting. For example today she was talking about using a cardiotocograph (CTG) to monitor the fetus in labour (this machine allows the fetal heart rate to be monitored continuously in labour). There are no CTGs in the public healthcare facilities in this district nor as far as I am aware in the private healthcare facilities. It seems that this course needs to be reviewed to make sure the relevant learning is being imparted.

Reflective diary – 18th March 2017

Discrepancies in the quality of different midwifery training institutions seemed to be accepted by the midwives in this study, and of concern, they held the belief that it was normal for different training institutions to teach different things about why, when and how antibiotics should be prescribed:

“Different institutions [laughs] train differently. Though we are all midwives but different categories of midwives.” Monica

“Yeah, different midwives treat differently according to what everyone knows, like how they have studied. For real. Like this one will tell you “for me at school, they taught me this, so I will do this.” And another one will tell you “They also taught me this, so I will do this.” So you might find you are deferring because you studied from different places. Like you have been to different places.” Elizabeth

These findings reinforce the previous finding that midwives lack knowledge about how to prescribe antibiotics appropriately. Antibiotics are only effective if we use them in certain ways. Whilst different resistance patterns are present in different districts within a country, and between countries, general rules on how to use antibiotics are standardised across the

globe, and are not changeable depending on your midwifery education, district or country of practice.

As mentioned in chapter two, midwifery education in Uganda works such that midwives generally qualify at the certificate level, and then can top up to the diploma and eventually the degree. One midwife tried to explain the differences between the course to me:

Chatting to Edith today who I met at the nursing school where she is studying for her diploma in midwifery. I was trying to grasp from her what the difference is between the certificate and diploma course. She said the difference that she sees is that the certificate course tells you what you should do as a midwife to manage a particular situation. She gave the example of rubbing up the uterus to in the event of postpartum haemorrhage. She said that, yes, the diploma course tells you the same thing, but at diploma level you learn why you have been told to perform this action, in this case rubbing up the uterus stimulates a contraction. So, it seems that the diploma course tries to explain the rationale behind taking a certain action. With this explanation from Edith I can see why critical thinking and understanding sometimes seems to be lacking in the certificate level midwifery students that I work with on the wards.

Reflective diary – 26th October 2017

Evidence from interviews and observational work indicates that midwifery training in the Kabarole district is failing to provide basic information about medications to students. Over the past two years I have worked with newly qualified midwives who have little grasp of how to use antibiotics and even fail to recognise that one of the most commonly used antibiotics in Uganda, metronidazole, is an antibiotic:

“Other antibiotics we give in case of pain, they also help, like at times, as I have told you, we also use metro as an antibiotic, but it is not an antibiotic.” Harriet

In the clinical setting I have also encountered student midwives who have just finished their training and have been awaiting their exam results who lacked knowledge about the standard medications that all pregnant women receive in the antenatal period:

I was working in Stanley antenatal clinic today and met a new Ugandan volunteer midwife. I was really pleased that she was spending the time to ask me questions about providing antenatal care. But I was surprised that as a midwife who had just completed her training that she showed little grasp of the standard medications that women are given in the antenatal period. In some ways I can understand this – midwifery students receive minimal mentorship when they are working clinically. Another issue that will impede this learning is the fact that some of the midwifery students working here today tell me that they spent the majority of their second year working on general wards rather than in the maternity setting.

Reflective diary – 4th September 2017

Learning 'in the field'

Those going through their midwifery education and those who find themselves newly qualified seek alternative means of educating themselves about how to prescribe antibiotics appropriately. They find this information 'in the field' from midwives who have also been subject to a midwifery education that has failed to prepare them for the role as antibiotic prescribers:

“And most things we find them in the field. Not because that’s how we are taught. We give them because we found them there doing that.” Harriet

With hierarchy playing an integral role in the Ugandan healthcare system even those midwives who have a grasp on antibiotic resistance and appropriate antibiotic prescribing techniques often find themselves conforming to the practices of their seniors 'in the field' as to fit in:

“Actually mostly the environment also affects you. Like you can’t be like odd man out obviously, so when you come you adapt to the culture, how they are doing the things, that’s how you will do them also.” Elizabeth

I have directly witnessed this phenomenon with a Ugandan volunteer midwife wanting to follow the instructions of her senior even though she had evidence in front of her that contradicted the senior midwife’s recommendation for treatment:

Today I was working at Elgon health centre with a midwife and Ugandan volunteer midwife. I witnessed an example of Ugandan student/volunteer midwives learning in the field incorrectly. We had a woman come in who was RPR (syphilis) positive and so the midwife on duty told the Ugandan volunteer midwife that the treatment was a four times a day dose of erythromycin for 5 days. I had the guidelines out and showed the volunteer midwife that the Ugandan guidelines recommended a different treatment or a longer course of erythromycin. Her response was “but the midwife said we should give erythromycin for 5 days.” It turned out to be a great opportunity as I was able to explain the implications of under dosing a woman with antibiotics and I was able to update both the midwife and volunteer midwife on the correct treatment of syphilis.

Reflective diary – 12th February 2018

Continued mentorship is an integral part of midwifery training that facilitates the translation of knowledge gained in the classroom to clinical practice in the healthcare setting. From my observational work as a volunteer midwife I have had many encounters with Ugandan midwifery students working on maternity wards that have reinforced my concerns that limited clinical mentorship is available to students. Most of the midwifery training institutions in the region choose to place their students at Stanley hospital for their clinical placements. This is done as a means of maximising student exposure to complex clinical cases and learning opportunities which are generally not available in smaller health centres. These large numbers of students make it hard for midwives to mentor students as noted from my observational work:

There were so many students working in the antenatal clinic today at Stanley hospital. There must have been up to 10 students in a cubicle at any point when a woman was being seen. This makes it incredibly difficult to try and teach the students. It seems that the students have log books to complete and so they are often more interested in recording the woman’s details than participating in her care. Equally, if the students take it in turns to assess a woman then by default they are getting fewer chances to practice their clinical skills. It can require a lot of patience to teach all these students. I even noticed that sometimes the midwife working in the other cubicle left the students alone. So they were making clinical assessments independently with no mentorship at all.

Reflective diary – 1st March 2017

Despite the fact that students are poorly mentored in the clinical setting, student midwives and medical officers were seen by the midwives in this study to be over confident in their clinical skills, which by extension contributes to the high levels of inappropriate antibiotic use:

“You know sometimes you find there are doctors there but these students think themselves to be doctors. Then they are always very busy doing something, even though maybe they are not sure of something, they will just write and then they will send the patient to the ward.” Harriet

It could be argued that this ‘confidence’ is not what it seems and arises as students are left with no choice but to work unsupervised. One recently qualified midwife said that this was not the case for her, and instead, fear of getting into trouble from her mentors for doing something wrong motivated her to always seek advice if she was unsure about an antibiotic prescribing decision:

“And most times I was always scared of the supervisors. Because I knew that whenever I would do a mistake they wouldn’t call you slowly to correct you, they would just bark at you in front of the mothers, and you would just feel small. So most things I was scared of being ashamed so I would not do so. I would just tell the mother, either go to the other supervisor or please go to the other nurse, she is going to help you.” Harriet

Midwives in the study gave conflicting opinions about how well they were able to monitor antibiotic prescriptions made by medical students working in the antenatal clinic at Stanley hospital:

“We have so many, so many schools around us who come to the hospital for their teaching practices. And of course maybe when you are busy a student will prescribe a drug and maybe it can be an oversight for you to what? To know what the student has really prescribed. So, of course I know you are supposed to supervise them, but sometimes you find maybe your colleagues are busy, they have left duty, and you find yourself you are alone with the students.” Brenda

“Students they don’t have enough information and even sometimes they don’t know the dosage. So for us here, we are very strict. We work with them. We guide them and we make sure what they have prescribed, we have to review and make changes where necessary.” Irene

My personal experiences of working at Stanley antenatal clinic concur with the opinion of Brenda. The inability of qualified staff to provide mentorship to hone the antibiotic decision making skills of student midwives leads them to being poorly equipped to take an

appropriate history and therefore make a decision about the need for antibiotic treatment as I have witnessed:

There were so many students working in the antenatal clinic today at Stanley hospital. There must have been up to 10 students in a cubicle at any point when a woman was being seen. This makes it incredibly difficult to try and teach the students. It seems that the students have log books to complete and so they are often filling these out and missing out on learning opportunities. Equally, if the students take it in turns to assess a woman then by default they are getting fewer chances to practice their clinical skills. I even noticed that sometimes the midwife working in the other cubicle left the students alone. So they were making clinical assessments independently with no mentorship at all.

Reflective diary – 1st March 2017

Personal preferences

Midwives also referred to how their personal preferences and experiences shape their antibiotic prescribing decisions:

“Every midwife does her own things. She does what she saw and she does out of experience. You might find Lillian, according to the investigations the mother has a UTI she has been given amoxicillin, panadol and metro. And you find Hellen, giving erythromycin. It’s all about what I know and out of experience.” Lillian

“First of all we went to different schools. We went to different schools and maybe our years of practice are different and someone would prefer doing something in a way that they feel that is comfortable to them. Yes.” Hildah

This practice is not confined to midwives. It is systemic as I have observed during episodes of observational work:

I was on a ward round today with one of the doctors at Speke health centre seeing postnatal caesarean section women. He discontinued the gentamycin that one woman had been prescribed as her prophylactic antibiotic post-delivery. I asked him why she had been prescribed that rather than the usual regime of ceftriaxone and metronidazole. He said that it was probably the preference of the doctor that prescribed them. This made me think of the midwives who said that antibiotics are often prescribed according to personal preferences.

Reflective diary – 10th February 2018

Operationalising knowledge

Resources in all shapes and forms are lacking in the Ugandan public healthcare system which impedes the ability of all healthcare professionals to provide standards of care that are the norm in high income countries. In particular the environment that midwives work in leaves them short of human resources, medical equipment, diagnostic testing facilities and antibiotics themselves. Operationalising any knowledge that midwives hold about correct antibiotic stewardship practices and, in particular, antibiotic prescribing practices becomes difficult where such resources are lacking.

Human Resources

First and foremost the Ugandan healthcare setting lacks the human resources required for the system to provide safe and effective care and has led to task-shifting. Some midwives dispute that antibiotic prescribing has been task-shifted to them, and take the stand point that it is not part of their role:

“Sometimes we do because the doctors are out of place. We just prescribe to save the mother’s lives. But in actual sense we are not supposed to prescribe.” Lillian

On the whole however midwives noted that a lack of medical officers and the makeup of the professional team in smaller health units meant that antibiotic prescribing decisions were left to them, with some midwives feeling they are inadequately prepared for the responsibility:

“The doctor has the right to prescribe all drugs but a few drugs midwives do prescribe in Africa, a few drugs. But ideally the right thing it is the doctor to prescribe first. Whereby there are few doctors, you can’t get a doctor in a health centre 3 or a centre 2. That’s why we come in and prescribe. Knowing a little about. I, we have to save the mother or the baby that is where we come in and we prescribe.” Peace

“Like a midwife, I think you have to prescribe the drugs. Because here in Uganda, the way they take midwives, they take them, as I told you, like small doctors. Doctors are not always available. You do your best. You do whatever is required. Then if the treatment fails, that is beyond, that is when you call for the doctor.” Harriet

“Then also maybe lacking somebody to guide you. Like in health centre IIs you find a midwife is alone. Alone! Not like us, for us we are like 5. You can consult this one. But in some health centres you find only one midwife, she is the one to take the decision. Whether wrong or right, nobody to consult. She is a doctor, she is a clinical officer, she is everything. So that one also can because that.” Edith

Time constraints

The overall lack of human resources, in this case midwives, creates further problems when it comes to diagnosing and treating bacterial infections. At Elgon health centre there is one midwife on the day shift. Her responsibilities include conducting antenatal visits for up to 30 women whilst at the same time she cares for any women in labour and any mothers and babies that are inpatients on the combined antenatal and postnatal ward. Whilst there are more midwives on a day shift at Speke health centre only one of them is assigned to work in the antenatal clinic, so she can see anything from 20 to 60 women a day. Similarly, at Stanley antenatal clinic there can be two to three midwives working, but up to 100 women attending for antenatal appointments. By comparison in the UK a solitary midwife will see a maximum of 18 women in one working day, and she will not be expected to run a labour and combined antenatal and postnatal ward at the same time. Given these statistics time also becomes a precious resource with some midwives arguing that time pressures impact on how they perform their clinical assessments and their subsequent antibiotic prescribing decisions:

“people don’t take time with patients, they don’t give them the attention, right? Because you find someone comes just asks ‘what is wrong with you?’ ‘This and this.’ ‘OK, I give you this.’... At times it’s the nature of somebody, at times you find that we as health workers, you are one on duty, and the patients are very many and so you have to work on each and

every one. So with that pressure, you find yourself not going deep into the patient's details, getting them from the patient." Brenda

Midwives also cited impatience on the part of women as a reason why they don't wait for test results and subsequently force midwives to make antibiotic prescribing decisions based on incomplete information:

"Sometimes like if they go to the lab and they find the line is very long, they tend to be impatient. They come back. So sometimes we are forced to prescribe according to signs and symptoms." Irene

Other midwives disagree over whether time constraints influence their decision to send a woman to the laboratory for testing:

"It depends on the complaints of the client. You might find someone takes long, the other one takes a short time. It depends on the complaints of the client that she has presented with. If she has got a lot, you have to listen to her. If you don't listen to her next time she will come, she will not come back and when she comes back she will not expose anything to you. She will say, ah that one doesn't have time for me....So you have to listen according to what she has come with. If she has a lot, you have to give her time, not thinking of the others who are still outside, you have to take time because you are here for them." Beatrice

My observational work across the four healthcare facilities in this study has seen both of these scenarios arising. At Elgon health centre the midwives always send the women to the laboratory for testing if it is required. At Stanley antenatal clinic I have observed other behaviours:

Today whilst I was palpating a woman I could hear Irene talking to the student midwives working in the antenatal clinic. She sounded frustrated and was telling them not to keep sending women to the laboratory for urinary (we were seeing many women with query urinary tract infection) and malaria testing as the queues would be too long. Instead she advised them to treat according to a woman's symptoms.

Reflective diary - 13th September 2017

Equally, at Stanley antenatal clinic I have seen women being sent to the laboratory and by the time they have come back with their results the antenatal clinic has finished, the midwives have locked up and gone home or to their second job. This leaves the woman with a result but no prescription of medication.

Diagnostic testing equipment

A lack of diagnostic testing equipment was recognised by the midwives in this study as a hindrance to their ability to make appropriate diagnoses and subsequent antibiotic prescribing decisions:

“Actually here in Uganda it’s very difficult because culture and sensitivity is not done. Because we would be very happy if we do culture and sensitivity, you would see the drug that is the one you’re supposed to treat.” Lauren

Even though culture and sensitivity is available at Stanley hospital a number of operational issues impede its use; few staff have been trained to know that the testing is available, fewer still know how to take the samples appropriately, and in most cases the swabs required to take the samples are not available in the clinical setting:

I did a shift today on the postnatal ward at Stanley hospital. I was involved in the care of a woman who arrived on the ward with apparent sepsis following a caesarean section 8 days ago. It is recommended that you take samples for microbiology testing prior to starting antibiotics, but that antibiotics need to be started within 60 minutes. For us to be able to take swabs from her wound and a urine sample I had to go to three different wards around the hospital to find a swab and urine container.

Reflective diary - 31st May 2017

Failing to provide front line health workers with the knowledge, skills and equipment to utilise diagnostic testing facilities lead to underutilisation of the resource with inappropriate antibiotic prescriptions being maintained.

In the smaller healthcare centres some laboratory tests are available. In the antenatal period women are offered the rapid plasma reagin (RPR) blood test which looks for antibodies which indicate the presence of syphilis. It is not uncommon for the reagents to perform this test to be out of stock and the test therefore unavailable unless the woman purchases the reagents from a local drug store or pharmacy. Other tests that women are commonly sent for in the antenatal period include a rapid diagnostic test (RDT) or a blood smear test to assess for the presence of malaria, and urinalysis testing. Urinalysis testing can be performed either as a urinalysis dipstick test, whereby a woman provides a urine sample and a test stick is dipped into it to assess for the urine in a number of ways. Alternatively, if a laboratory technician who is capable of operating a microscope is

available, then a urine sample can be sent for microscopic analysis. Secondary analysis of maternity registers at the healthcare facilities in this study indicate that UTI is one of the top three most common conditions for which women are prescribed antibiotics in the antenatal period. Tables 5.13, 5.14 and 5.15 chart the percentage of women who receive antibiotics for a UTI as a proportion of the women receiving antibiotics each month at Elgon, Moroto and Stanley antenatal clinics respectively.

Table 5.13. Percentage of antibiotics prescribed for UTI at Elgon antenatal clinic each month as a proportion of total antibiotics prescribed

ELGON	Feb 17	Mar 17	Apr 17	May 17	Jun 17	Jul 17	Aug 17	Sep 17	Oct 17	Nov 17	Dec 17	Jan 18	Feb 18
% UTI	0	13	11	13	0	23	11	14	21	21	15	14	9

Source: Elgon antenatal clinic register

Table 5.14. Percentage of antibiotics prescribed for UTI at Moroto antenatal clinic each month as a proportion of total antibiotics prescribed

MOROTO	Feb 17	Mar 17	Apr 17	May 17	Jun 17	Jul 17	Aug 17	Sep 17	Oct 17	Nov 17	Dec 17	Jan 18	Feb 18
% UTI	46	12	39	21	31	30	22	25	14	40	26	23	27

Source: Moroto antenatal clinic register

Table 5.15. Percentage of antibiotics prescribed for UTI at Stanley antenatal clinic each month as a proportion of total antibiotics prescribed

STANLEY	Feb 17	Mar 17	Apr 17	May 17	Jun 17	Jul 17	Aug 17	Sep 17	Oct 17	Nov 17	Dec 17	Jan 18	Feb 18
% UTI	28	19	28	26	23	23	40	45	27	33	29	35	25

Source: Stanley antenatal clinic register

Neither of these tests are diagnostic, they indicate that a woman *may* have an infection if leucocytes are found to be present on the urine dipstick analysis or pus cells are seen on a microscopic test. Leucocytes or pus cells may in fact indicate that the sample was contaminated and the woman may not have any type of infection or she may have an infection of the genital tract that might not even be bacterial in nature. Furthermore, these tests do not tell the midwife which bacteria are causing the infection, and therefore offer no guidance on what antibiotic should be prescribed in the event the woman has a UTI.

These test results contribute to the midwives viewing infections as being 'weak' or 'strong'. If the laboratory technician documents the presence of a plus of pus cells (pus cells +) the midwives interpret that there is a 'weak' infection. If there are multiple plusses of pus cells (pus cells +++) the midwives interpret the result as the woman having a 'strong' infection. These arbitrary classifications will then inform the midwife's choice of antibiotic prescription, when in fact the presence of pus cells does not provide diagnostic proof that there is a bacterial condition, let alone which antibiotics the bacterial condition is susceptible to. I have also witnessed cases where women have been given intravenous antibiotics for a UTI when there has been no evidence to suggest she had one:

Today there was a woman on the antenatal ward who had been admitted 4 days ago. On admission she complained of abdominal discomfort but no backache and no urinary symptoms. No urinalysis testing had been performed but the medical officer had made a diagnosis of a urinary tract infection and treated her with a 1g IV stat dose of ceftriaxone and 5 days of amoxicillin 500mg TDS.

Reflective diary – 14th August 2017

Secondary analysis of antenatal maternity registers revealed a wide variation in the antibiotic treatments that midwives prescribe for UTI, when the Ministry of Health Uganda Clinical Guidelines (Ministry of Health, 2016) recommend a choice of two. Similarly, there were wide variations in the antibiotic treatment prescribed by midwives for abnormal vaginal discharges. When questioning the midwives in the study to try and understand this phenomenon, it became apparent that, again, a lack of diagnostic testing resources led to these variations, and more specifically the need for midwives to treat such conditions as syndromes:

“So from the guidelines from the ministry of health we have, there is a way we categorize those STIs (sexually transmitted infections), the syndromes. They brought up that approach just because we are not, we don't have the laboratories that are going to carry out the tests to be able to know which type of infection you are treating. So it's like you give different drugs to target the different microbes that may be present at that time.”

Hildah

Whilst this approach appears sensible it relies on the history taking skills of midwives and a thorough clinical assessment. The Uganda Clinical Guidelines (MoH, 2016) recommend that a physical inspection is made in order to classify the vaginal discharge. However, in

clinical practice, unless I have initiated a physical examination, I have never seen this happen. This in part is due to the previously discussed lack of human resources and time, as well as the physical consumables required to carry out the examination.

Laboratory supplies and staff

Unreliability of laboratory supplies and staff often leads to midwives making antibiotic prescribing decisions based on their clinical assessments and the signs and symptoms which women present with:

“We really have a challenge. First of all we can send the mothers and there are no kits. So the mother tells you “I have come from a distance” and you find she is really in pain. So most times, to be honest we prescribe for them asymptotically because of challenges. Sometimes there are no reagents and sometimes they come in late when the lab guys have already even gone for lunch.” Irene

“It can happen. Now like, now you find the lab is closed, you don’t have the key, you cannot access the person. Like it can happen on a weekend and you have got a mother, and the mother is sick. You just prescribe, you can just give, without the lab.” Elizabeth

Guidelines

Whilst the Uganda Clinical Guidelines (MoH, 2016) recommend that midwives take a syndromic approach to diagnosing and treating abnormal vaginal discharges, the approach is flawed when the guidelines are not followed correctly. For example, in the treatment of abnormal vaginal discharge where the midwife also identifies erythema excoriations²⁹ or thrush, the guidelines recommend that the woman should be treated with clotrimazole pessaries and a 2g stat dose of metronidazole. In practice the midwives prescribe pessaries and a five day course of metronidazole. It is possible that the reason midwives fail to follow the recommendations of the Uganda Clinical Guidelines is due to their lack of availability in the clinical setting:

“We have small books, guidelines which we normally use but still we find we have only one for the whole unit, which is used in the OPD (outpatient department), ART (anti-retroviral therapy) clinic, maternity which is challenging. You may run to get it from OPD and they are using it, yet you have a client here. Or you run to get it from ART clinic, they

²⁹ The skin appears red with scrapes or scratches

are still using it. You find they are organised poorly and you give the wrong drug for the condition, yeah. Peace

My experience of working in the clinical setting suggests that the presence of the guidelines is somewhat hit and miss. Sometimes they are available, sometimes they are not. Where possible I tried to locate and consult the guidelines in conjunction with the midwife or midwifery, nursing or medical students that I was working with when making an antibiotic prescribing decision and use it as an opportunity to educate about appropriate antibiotic prescribing practices. On more than one occasion I worked with a medical student who had the guidelines available in soft copy format on their phone. This is not always possible and as a result many midwives prescribe out of habit, recalling the information from memory:

“Yes I already know the...if I already know the condition I don’t open there because I have met it several times and prescribed drugs and same drugs I know it is this. I give this, I give this. So I, because sometimes you don’t have time [laughs]” Laureen

My observational work has noted that such memory recall often leads to the wrong information being used to make prescribing decisions leading to the incorrect use of antibiotics.

Access to antibiotics

In situations where the clinical guidelines have been available the lack of availability of the recommended antibiotics to treat the condition has been highlighted as a factor contributing to inappropriate antibiotic prescriptions being made. Restrictions over the supply of antibiotics, particularly expensive antibiotics, has been raised as an issue by many midwives:

“Yeah, every three months we put in orders. We request for other drugs. Sometimes they are brought, sometimes they are not brought (mmm hmm) they are the ones to decide from above which drugs to bring here or not.” Peace

“We order the drugs because they don’t like for us to order expensive drugs. Saying that government will not be able to buy them. So they even limit you on the drugs to order, because of the cost.” Laureen

Restrictions on available antibiotics impact on the antibiotic prescribing decisions made by midwives. The Uganda Clinical Guidelines (MoH, 2016) recommend two choices of antibiotic for the first line management of a UTI in a pregnant woman. My observational

work has revealed that one of these antibiotics is almost always available in the healthcare centres (until it runs out), whilst the second antibiotic I have only seen in stock once or twice in the past two years and only in one healthcare facility. Equally, erythromycin is recommended to treat an abnormal vaginal discharge that has persisted following first line treatment, yet I have never seen it available in any of the health centres in which I have worked. Where the antibiotics are supplied, demand is high so it is common for them to get used up quickly, leaving the healthcare centre to have 'stock outs':

"Stock outs. Yeah sometimes we have. Like erythromycin which is commonly used in mothers, at times it gets out of stock. At times like drugs like ceftriaxone they get out of stock and is one of the commonly used drugs, like in NICU." Hope

With an inability to control the type of antibiotics available for dispensing at the health centres midwives find themselves making their prescribing decisions based on antibiotic availability rather than clinical assessment and diagnosis:

"Then also there is availing the midwives with all the drugs which are necessary, because as we talk for like my health centre we can have drugs, but the other health centre has, sometimes you get when they are out of stock. And when you think of writing the right one which could help this patient, is not there. Then again, telling this patient they are going to go and look for the one which is suitable for her condition, it is also hard because some of them just argue and say, "we are not going." Some of them will get noise around the population that 'when you go there they don't give you drugs.' So sometimes you are forced to give the one which can try to help, which is not the real one." Edith

Midwives have an alternative choice to prescribing an inappropriate antibiotic - if they think a woman has the financial capacity and personal motivation to buy the recommended treatment, then they will prescribe it and send the woman to a local pharmacy or drug shop to purchase the antibiotics:

"Like most times, a few of them are always stocked in, like amoxicillin and metronidazole. But most of the others, the rest are, we tell them to buy from the pharmacy. We direct them to the pharmacy where we expect they can be." Irene

If the woman does not have the finances available, the midwives may prescribe an alternative which may not even treat the condition:

"I think this one has to take amoxicillin because it is the only one that we have (laughs) and yet you know erythromycin maybe works better, but because you don't have erythromycin, and this woman will not buy the erythromycin. Instead of leaving her we give what we have." Lauren

Infection prevention and control practices

Midwives in this study noted how a lack of infection and prevention control resources, which range from appropriate infrastructure to support the supply of clean water in facilities, to a lack of human resources in terms of cleaning staff required to keep maternity wards clean, affect the spread of infection:

“The work load is too much. The work load is too much. You cannot leave a mother, you cannot leave these mothers to die and then you go to clean the beds. The priority is to give them what they need.” Lillian

“It is also hard because sometimes you may find water is not on, like either you are lacking water, so it may also be a problem. So another time is may be lacking of the hand gels. Another time some of the people don’t know when and where and how to wash hands. So that is another thing. But another way is having too many patients sometimes you immediately forget. You end up touching the patient without washing your hands that’s another challenge but other times you try.” Harriet

“Then for sterilization, sometimes you find it is not easy in most health facilities. The requirements like electric bills, people look at electric bills, they look at paraffin, there is no money to keep on buying paraffin. Then the sterilizers, they are not provided in the facilities, when they are provided, the stove is not there, so you find it’s a challenge on sterilizing those instruments.” Elizabeth

However, on the whole many midwives thought that the birthing environments found in Ugandan healthcare facilities are satisfactory, rather it is the poor personal hygiene of women that is the major contributing factor to sepsis:

“As you have noticed many mothers are coming without pads without what? And after delivering you don’t really know what happens when they reach home. The living condition is totally different. You may find a woman who has just delivered is sharing a house with animals and everything and maybe she is not washing her pads. They are not real pads they are cloths, they hang them outside they bring them in. So for this woman to be safe what we do is we cover her [laughs]. We give her metronidazole, amoxicillin in case of any infection.” Monica

I too have seen women using dirty cloths as maternity pads, and babies wrapped in dirty blankets. Other observations from the clinical setting give weight to the concerns of the midwives about the cleanliness of women’s home environments:

I witnessed another example of why midwives might worry that a woman's home environment may not be clean...there was a woman in theatre today whose back was cleaned by the anaesthetist prior to the insertion of the spinal. I was quite surprised that it took several cotton swabs to clean her back with at least the first four being black with dirt.

Reflective diary – 29th August 2017

It is not just the women's home environments that are cause for concern. From my observational work I have rarely seen midwives washing their hands. When they do it is usually because they are about to eat their lunch, but almost never between touching patients. In part this comes down to a lack of resources; alcohol hand gels are rarely available, and whilst there is a good water supply in the district, the number of sinks and their placement within the wards are not conducive to encouraging hand hygiene. Where midwives do use the sinks, soap is often unavailable and, aside from Elgon health centre, there are no facilities provided for midwives to use to dry their hands.

There is no sterile field when a woman gives birth, as she lies on cloths that she has brought from home, which may be dirty. Used needles are more often than not found on work surfaces. It is common practice for a midwife to cannulate a woman or give an injection and then use the mattress that the woman is lying on as a pin cushion for the used needle until she is ready to dispose of it. When the midwife does dispose of a needle into a sharps box container it is often overflowing as it has not been sealed when it has reached maximum capacity. Old blood can be found on beds that have not been cleaned properly between use or splashed on the walls and curtains that act as a privacy screens between beds. The toilets provided for patients are dirty to the point that staff members refuse to use them. There are no single rooms in which to isolate infectious patients. When the wards are cleaned the cloths used by the cleaners are repeatedly rinsed in already dirty, contaminated water and then used again to clean work surfaces. The list goes on and on. Evidence from observational work demonstrates that midwives have poor skills in performing aseptic and clean techniques:

This morning I assisted a volunteer midwife to insert a catheter into the woman with obstructed labour. She struggled to carry out this procedure in a sterile manner. She wiped the end of the catheter with a piece of gauze that had until that time just been sat on the other couch and was not at all sterile. She touched with woman's leg with it. Again, a good teaching opportunity to explain the how to maintain sterility. Equally, on the postnatal ward the intravenous giving sets are used for 3 days. They are on the ward, open to all sorts of bacteria getting into them. The ward is crowded with people coming and going. Attendants handle the giving sets as well as midwives. No one cleans the end of the giving set before it gets attached to the woman's cannula.

Reflective diary – 7th February 2018

Protection

A handful of midwives in this study have commented that the conditions of healthcare facilities in Uganda are somewhat lacking and contribute to the spread of infection and further act as a precursor for the use of prophylactic antibiotics in the postnatal period to protect women:

“Because there are sometimes when you are conducting a delivery of course the hygiene, even the things we use, sometimes you will find the mothers in second stage, sometimes there is a lot of contamination. So that is why we prescribe what? The antibiotic cover in case of ascending infection.” Brenda

“then in postnatal mothers we suspect infections. We give also antibiotics after delivery. It is routine for us in Uganda. It is not a must but for us it is routine because we don't trust our environments. Delivery environments. So whichever mother delivers we try to give metronidazole, amoxicillin and a pain killer.” Peace

Self-medication

In line with a lack of knowledge held by midwives about how to use antibiotics effectively, community level understanding of antibiotics and their mode of action was deemed to be low by midwife respondents. Midwives perceived the local population to hold the belief that antibiotics are a necessity for the treatment of any condition, to the extent that women may request antibiotics from the midwife:

“They think when they come to the unit they must get drugs and they must get antibiotics most especially amoxicillin everyone expects it...Unless you take treatment from the health setting or unless you take such amoxicillin capsules you can't get cured. So they come knowing it is a must. They must get it.” Peace

I have witnessed such behaviour in practice on more than one occasion:

Today I again witnessed a woman requesting antibiotics from the midwives. There was a woman in antenatal clinic who looked surprised at the end of her assessment that she hadn't been given amoxicillin for her lower abdominal pain (the urinalysis showed no signs of infection) and she asked the midwife why she wasn't hadn't been given any and could she have some. Of course, we explained to her why she didn't need them, but as the midwife said to me, amoxicillin is so commonly used, that some women think they are a cure for all, and so ask for them for any complaint.

Reflective diary – 25th April 2017

Uganda differs from many countries, especially high income countries, in the sense that antibiotics are available to purchase over the counter in pharmacies and small drug shops without the need for a prescription. One midwife noted that access to antibiotics is improved by the presence of pharmacies who stock a greater variety of antibiotics than can be found in most government health facilities:

“I think the pharmacies has both positive and negative. On positives, things I will talk about is when they get the correct prescription, they will provide the right drug to the patient. They are really there to provide drugs to the patient in case they are out of stock. In most health centres like ours, even hospitals, drugs are always out of stock. But these pharmacies, they help so much. They will provide the drug according to how the patient has asked for them.” Harriet

However, whilst pharmacies were identified as helping to overcome medication shortages in government facilities, they were also criticised by a number of midwives as being careless in their dispensing practices with a motivation to make money rather than the best interests of the patient:

“And you know for the clinics and drug shops, for them their aim is just to make money. It's not to prescribe for you. And the best way is to give you the most expensive one.”

Lillian

This is certainly true and I have witnessed such a scenario:

I popped into the Knowledge for Change house today. Rosemary was there. She had just come back from a private health clinic who had diagnosed her with abnormal vaginal discharge syndrome. They had prescribed her intravenous antibiotics for three days. She had been to the pharmacy and bought all the equipment and medication and asked me to cannulate her and give her the antibiotics. I got the Uganda clinical guidelines up on my laptop and checked the treatment. As I suspected, what she had been prescribed was incorrect. I told Rosemary what I thought and suggested we went to an alternative health centre with a better reputation for a second opinion. Their diagnosis was the same, but the treatment they prescribed was in line with the Uganda clinical guidelines and only required oral antibiotics. Rosemary asked me to go back to the other pharmacy with her to take the intravenous antibiotics back as she said she wouldn't get a refund if she went by herself.

Reflective diary – 6th November 2017

Midwives' personal practices

Self-medication is not limited to patients, with all of the midwives in the study admitting that they bypassed seeking assistance from a healthcare professional when they felt unwell, with the result that they frequently self-prescribed medications including antibiotics:

"Yeah, I can't lie to you. I can't lie. The fact is, when I am unwell I just prescribe for myself. But if I feel the condition is too much, if it is beyond, that's when I get the doctor. But I do prescribe for myself (laughter) which is not good." Brenda

Whilst the majority of midwives identified non-adherence to antibiotic treatment regimens as a contributory factor in the development of antibiotic resistance, many confessed that they did not adhere to treatment guidelines and discontinued antibiotics if they felt their condition was improving:

"No, sincerely speaking, me I have never completed a dose." Brenda

"But most cases when I am OK, I just stop the medication. But it was one time when I had to complete the dose, I was like every time I tell mothers "you complete your doses", and me personally, I don't." Saudah

These findings are of concern. When the midwives were telling me about their self-medication and non-adherence habits they were laughing, possibly through embarrassment, but they did not appear to be taking the issue seriously.

Main concerns

During the pilot and context cycles of this study I never failed to be surprised by what I saw on a day to day basis in the clinical setting with regard to poor antibiotic stewardship practices. My main concerns about these practices are not so much the practices themselves but the level of awareness that the midwives seem to hold about them. The findings of this study so far have found midwives to be lacking in all aspects of antibiotic stewardship. Furthermore, where knowledge does exist, there is a significant gap between that knowledge and practice. It is inappropriate to apportion blame for this. These midwives are part of a system that is failing, and as one midwife said their “hands are tied.” The aim of this study was to try and loosen those ties so that midwives are empowered to improve their antibiotic stewardship practices.

Conclusion

This chapter has laid out the findings from the pilot and context cycles of this modified action research study. It has identified that the knowledge held by midwives about antibiotic resistance and antibiotic stewardship, although there, is lacking. The midwives in the study recognised this themselves and called for assistance in improving their knowledge and their antibiotic stewardship activities with a focus on their antibiotic prescribing practices. However, as presented in this chapter, influences on the antibiotic prescribing practices of midwives are complex and multifaceted. As an independent researcher, tackling some of these issues is almost impossible without engaging key stakeholders at high levels. For example, improving and sustaining improvements to diagnostic testing facilities at healthcare facilities will take a long-term financial commitment from the government. Nonetheless, as a group of midwives we have the potential to improve not only our knowledge, but the knowledge of the community we serve about the correct use of antibiotics, in the hope that this improved knowledge will change antibiotic prescription and consumption patterns.

Chapter six - Discussion of findings from the pilot and context cycles

Introduction

In low- and middle-income countries (LMICs) where antibiotic resistance is just starting to feature on the health agenda little research has been conducted on the use of antibiotics generally, let alone with a focus in the maternity setting. Equally in high income countries (HICs), where only a handful of midwives are trained to prescribe antibiotics, there has been, until now, no call to research the antibiotic stewardship practices of midwives. Benchmarking the antibiotic stewardship practices of the Ugandan midwives in this study has therefore been difficult. This chapter seeks to draw mindful comparisons where possible between the findings from the pilot and context cycles with research that has gone before. This discussion proceeds by considering the themes and sub-themes that arose from the pilot and context cycles. In addition, levels of antibiotic use will be discussed separately, as will the use of antibiotics for urinary tract infections.

Knowledge and understanding of antibiotic resistance

Data drawn together from nine studies undertaken with the aim of understanding levels of awareness of antimicrobial resistance and knowledge of antibiotics held by prescribing professionals in LMICs offers some findings that parallel those of this study (Pearson et al., 2018). The report highlights that knowledge held by healthcare professionals about antimicrobial resistance and antibiotics was higher than expected across sites, although the report does not detail what levels of knowledge were expected. Based on my previous experiences of working in Malawi and my initial scouting visit to Uganda in May 2016 I anticipated that the findings from the pilot and context cycles would reveal some gaps in the knowledge held by Ugandan midwives about antibiotic resistance and antibiotic stewardship but had not quantified this. Findings from the pilot and context cycles indicate a basic level knowledge amongst Ugandan midwives about antibiotic resistance, although levels of knowledge are inconsistent between midwives. As no predetermined expectations were set in this study about levels of knowledge it is difficult to say how the findings of Pearson et al. (2018) align to this study. Findings from Reynolds and McKee

(2009) demonstrate that the midwives in this study are in the company of some Chinese healthcare workers when it comes to believing that the individual and not the bacteria become resistant to antibiotics.

As discussed in chapter four many of the studies that have taken place in sub-Saharan Africa to evaluate the knowledge held by healthcare professionals about antibiotic resistance have highlighted gaps in knowledge, and further documented calls from those taking part in the studies for further education on the subject (Bulabula et al. 2018; Lyimo et al., 2018; Farley et al., 2018; Wasserman et al., 2017; Abera et al., 2014; Thriemer et al., 2013). Given that the participants in the aforementioned studies were mainly comprised of medical doctors and medical students, it is unsurprising that this study has found midwives in Uganda, who have little formal training about antibiotic resistance, stewardship and prescribing during their midwifery training, also making requests for further educational support in these areas.

Midwifery education

The literature review in chapter four identified conflicting evidence concerning the relationship between knowledge of antibiotic resistance, professional cadre and level of experience. Asante et al. (2017) found knowledge to correspond to level of cadre, whereas Thriemer et al. (2013) found no significant differences in knowledge scores according to experience. It has been noted that those midwives included in this study who were newly qualified at the time of interview held very little knowledge about antibiotic resistance and the appropriate use of antibiotics. This is concerning as the midwifery curriculum, as it prepares the midwives of the future to be antibiotic prescribers, should be arming students with current evidence about antibiotic resistance and appropriate prescribing information. Indeed, the midwifery curriculum content for the bachelor of midwifery program at the local university states antimicrobial agents are covered in two pharmacology modules, although no reference is made to antibiotic resistance or stewardship. Having discussed antibiotic resistance and appropriate antibiotic prescribing practices with final year students on this course, it became apparent that their knowledge in these areas was lacking despite them having undertaken these modules in their first and second years.

Furthermore, following this discussion they asked me to provide a continuous medical education session for them on these subjects so that they could add to their knowledge. It seems that these findings reflect the current state of midwifery education in Uganda; that it is of a poor standard (United Nations Population Fund, 2009). Recent evidence from a study in Uganda gives weight to these findings and suggests that the quality of midwifery education has failed to improve since the UNPF report. Research into the use of partographs in Uganda found that midwifery clinical tutors do not understand how to complete and use the partograph, yet they 'teach' students how to use it (Personal communication). The midwives in this study also noted discrepancies in the quality of midwifery education provided between different institutions which is in line with the findings of the United Nations Population Fund (2009) report on midwifery education.

The inability of midwifery training institutions to develop and adapt to the need to teach midwives to provide evidence-based care is contributing to a perpetual cycle of poor antibiotic prescribing decisions made by midwives. These findings underline the urgent need for midwifery education to be regulated and standardised across Uganda. This is imperative to improving not only the antibiotic prescribing habits of midwives, but the standard of care provided in the maternity setting as a whole.

Learning in the field and personal preferences

The pilot and context cycles identified that lack of knowledge about antibiotic resistance, antibiotic stewardship, and appropriate antibiotic prescribing practices led to two behaviours arising amongst midwives; substituting academic midwifery education with learning 'in the field', and the use of personal preferences to inform antibiotic prescribing decisions. This first finding is not unique to this study or setting, with a number of researchers having previously identified that junior staff in HICs frequently seek support and advice from their seniors about antibiotic prescribing decisions (Skodvin et al., 2015; Broom et al., 2014; Charani et al., 2013; Ljungberg et al., 2007; De Souza et al., 2006).

Equally personal preferences based on experiences and familiarity with antibiotics have been found to guide antibiotic prescribing decisions in Sweden (Ljungberg et al., 2007) and Ireland (De Souza et al., 2006). These findings are relevant to the ongoing cycles of this

modified action research study. As the midwives and I moved forwards we needed to consider if we could have any influence over the training midwifery students are receiving at their respective training institutions. Equally we needed to focus on bringing the practices of qualified midwives working in the field into line with current evidence, so that when learning 'in the field' takes place it is based on current evidence for practice.

Levels of use

Evidence from Uganda suggests extensive antibiotic use in the treatment of patient complaints, with one study reporting that 79% of inpatients across four wards received at least one antibiotic during their hospital stay at Mulago National Referral Hospital between December 2013 and April 2014 (Kiguba, Karamagi, and Bird, 2016)³⁰. Similarly, although the study by Mukonzo et al. (2013)³¹ evaluated levels of dispensing of antibiotics, their samples were based on patients attending healthcare facilities and then accessing the corresponding dispensing facility. Findings suggested that at least four out of every ten people attending a healthcare facility are prescribed an antibiotic to treat their complaint (Mukonzo et al., 2013). Despite these findings, there is no published evidence from Uganda that reports on antibiotic consumption amongst pregnant women. As a result, there is a need to consider evidence from other countries to make comparisons with the findings of this study. As mentioned previously, with research on antibiotic use in LMICs only recently attaining status on the research agenda there also continues to be little evidence generated from sub-Saharan Africa about antibiotic consumption amongst pregnant women. The following discussion therefore draws on the small amount of evidence available from sub-Saharan Africa before turning to that available from other settings, mainly from HICs.

The study by Mensah, Opoku-Agyeman and Ansah (2017) in Ghana, West Africa, sought to consider the impact of antibiotic use on birth outcomes in terms of birth weight, Apgar scores³² and congenital birth defects. Immediately it is clear to see that the research aims

³⁰ These findings are reported based on ill individuals suffering from various complaints. They are perhaps therefore more likely to require antibiotics than pregnant women who are essentially well.

³¹ As for footnote 30

³² The Apgar score is a measure of the immediate physical condition of the newborn at birth.

and objectives of the study by Mensah et al. (2017) differ significantly from that of this study. Furthermore, the study by Mensah et al. (2017) does not detail what cadre of healthcare professional prescribed the antibiotics, so to draw a comparison with this study which has focused on midwives as antibiotic prescribers is not wholly appropriate. Nonetheless, the study does report on how frequently women attending antenatal clinic in a rural hospital in Ghana between 2011 and 2015 were exposed to antibiotics during pregnancy. Mensah et al. (2017) found that 65% of all women attending antenatal clinic received antibiotics at some stage during their pregnancy. Of concern is the fact that there was a steady increase in the prevalence of antibiotic use between 2013 and 2015 from 54.8% to 77.8%. It is difficult to draw a comparison between the findings of Mensah et al. (2017) and those found in this study due to the manner in which they have been reported; this study has looked at what percentage of women attending antenatal clinic each month receive antibiotics rather than considering the trajectory of each woman's antenatal care and assessing antibiotic consumption. However, using caution, some comparisons between the two studies can be made.

When categorising the different conditions for which women were prescribed antibiotics in the antenatal period, Mensah et al. (2017) included premedication for caesarean section as one category. In my study secondary data analysis of antenatal care registers does not consider women receiving antibiotics as premedication for caesarean section. This difference needs to be taken into consideration when drawing comparisons. Mensah et al. (2017) report that 12% of all antibiotics given to women in the antenatal period were for respiratory tract infections. By comparison in my study the mean average percentages of women receiving antibiotics for a respiratory tract infection in the antenatal period, as a percentage of all antibiotics prescribed in a month, at Elgon, Moroto and Stanley antenatal clinics were 22%, 19% and 28% respectively between February 2017 and February 2018. On first inspection this would indicate the pregnant women in Uganda are prescribed antibiotics for respiratory tract infections more frequently than their counterparts in Ghana. However, should the category of premedication for caesarean be removed from the Ghanaian data there would be a rise in the percentage of women receiving antibiotics for a respiratory tract infection, although the total rate may still be below those found in my study.

Regardless of the differences in categorisation of conditions requiring antibiotic prescription, similarities are seen in the case of urinary tract infection (UTI). In particular 60% of all antibiotics prescribed in the study by Mensah et al. (2017) were for women with UTIs. In my study the mean average percentage of women receiving antibiotics for a UTI in the antenatal period, as a percentage of all antibiotics prescribed between February 2017 and February 2018, were 12%, 27% and 29% for Elgon, Moroto and Stanley antenatal clinics respectively. Whilst these figures are much lower, it is still clear that UTI in my study is one of the lead conditions for which midwives prescribe antibiotics, matched closely by the use of antibiotics for respiratory tract infections. Mensah et al. (2017) report that gastroenteritis (5.5%), premature rupture of membranes (2.8%), pelvic inflammatory disease (1.7%) and unspecified indications (3.7%) were cited in women's files as the only other conditions for which antibiotics were prescribed in the antenatal period. From these findings it seems that women accessing antenatal care in Ghana only receive antibiotics for a limited number of conditions. By comparison my study has identified that midwives prescribe antibiotics for a range of ailments from backache to abnormal vaginal discharges to dental problems to mention but a few. My study has identified that midwives frequently prescribe antibiotics for conditions that are perceived to be non-bacterial in nature. It is difficult to compare this finding to the findings reported by Mensah et al. (2017) as it is unclear from their data whether unspecified conditions that were treated with antibiotics were bacterial in nature.

The study by Mensah et al. (2017) is the only available evidence that discusses antibiotic use amongst pregnant women in sub-Saharan Africa. With no other evidence available in this setting, the discussion now moves to make comparisons about antibiotic use in pregnancy with evidence from HICs. A study carried out in the UK between 1992 and 2007 sought to examine the patterns of oral antibiotic use in pregnancy within the primary care setting (Peterson, Gilbert, Evans, Ridolfi and Nazareth, 2010). Again, with each study collecting their data in different ways with differing inclusion criteria for antibiotic use, comparing findings is fraught with difficulties. It is interesting however to note estimated levels of use. On average in the UK one third of the pregnant women in the study received antibiotics during their pregnancy, with the majority, 65%, receiving only one prescription. In a similar vein to the study by Mensah et al. (2017) antibiotic use in pregnancy in the UK

between 1992 (29%) and 2007 (34%) has been on the rise, with a brief decline from 38% in 1997 to 30% in 2002-03. With data for current day use being unavailable it is unclear if this rising trend has continued, or if awareness about the rising threat of antibiotic resistance has curbed the use of antibiotics in pregnancy in the UK. Despite access to microbiology testing, national safety bodies and developed governance structures, evidence from other HICs present similar findings and rising trends in the levels of antibiotic use in pregnancy (Broe, Pottegard, Lamont, Jorgensen and Damkier, 2014; Stockholm et al. 2013).

Incomplete documentation has complicated this study, especially in terms of data collected from Speke antenatal clinic. Chapter two, in detailing the intricacies of the Ugandan healthcare system highlighted that documentation in the Ugandan setting does not meet the standards found in the UK. It is not unsurprising therefore that the antenatal registers at Speke health centre have been found to be consistently incomplete. The study by Peterson et al. (2010) however suggests that documentation in the UK is also prone to significant gaps; the authors noted large proportions, over 40%, of antibiotic prescriptions, were made with no indication documented. Peterson et al. (2010) found that for those conditions that were documented respiratory, urinary, skin and ear infections were the leading complaints for which antibiotics were prescribed. During pregnancy antibiotic prescriptions for urinary indications increased, whilst those for respiratory, skin and ear indications decreased. Despite these trends, respiratory indications were found to be the leading documented condition for which antibiotics were prescribed accounting for 228 out of every 1000 antibiotic prescriptions. Given that physiological changes in pregnancy predispose women to UTI (Murray and Hassall, 2014) it is not surprising to note that Peterson et al. (2010) found the rate of antibiotic prescriptions for UTI to increase from 93 per 1000 pre-pregnancy to 164 prescriptions during pregnancy, although compared to respiratory tract infections, UTI was a distant second in terms of rates of antibiotic prescription. It is interesting to compare these findings from the UK, which are now up to twenty years old with those from this study. With no data available about the current use of antibiotics for respiratory tract infections in pregnancy in the UK a contemporaneous comparison to the findings of this study is not possible. As mentioned previously, between February 2017 and February 2018 22%, 19% and 28% of women attending the antenatal clinic at Elgon and Moroto health centres and Stanley hospital received antibiotics for

respiratory tract infections respectively. These rates are comparable to the average rate of 228 out of 1,000 women who were receiving antibiotics for the same condition between 1997 and 2007 in the UK.

In the current climate where the serious threat that antibiotic resistance poses to the health of the global population has been recognised, respiratory tract infections are commonly cited as conditions where antibiotics are misused. The Annual Pharmaceutical Sector Performance Report for Uganda 2015 to 2016 (Ministry of Health, 2017a) reported a mere 36% compliance rate with the Uganda Clinical Guidelines for the management of upper respiratory tract infections. Often viral and self-limiting in nature, the use of antibiotics in respiratory tract infections brings little benefit to the patient, with a Cochrane review estimating that their use reduces the duration of acute bronchitis by less than half of one day (Smith, Fahey, Smucny and Becker, 2017). Should the study by Peterson et al. (2010) be replicated now it would be interesting to see if levels of antibiotic prescriptions for respiratory tract infections have declined in response to national and international campaigns targeting the use of antibiotics for coughs and the common cold. As recently as 2017 Public Health England have invested in mass media campaigns aimed at the general public to raise awareness about antibiotic resistance. In particular the use of antibiotics for colds and flu is underlined as being inappropriate, which suggests that the UK is still struggling to contain the use of antibiotics for respiratory tract infections. In spite of increased education for healthcare professionals and the general public about appropriate antibiotic use and antibiotic resistance, the decline in the use of antibiotics for respiratory tract infections in the 1990s in the UK was found to have stagnated (National Institute for Health and Clinical Excellence [NICE], 2008). More recently, research from 2014 in the UK, although focused on adults aged 18-59 being treated by general practitioners, reports that in 54% of respiratory tract infection consultations antibiotics were prescribed³³ (Gulliford et al., 2014).

Over the counter sales of antibiotics in Uganda make it difficult to estimate the true levels of use of antibiotics for common conditions such as coughs and colds. However, looking back 20 years to 1997 it is fair to say that the UK healthcare system was much more advanced than the Ugandan healthcare system is today. In some respects then, these

³³ This percentage is a median estimate. The range was from 39% to 69%.

findings offer a glimmer of hope for Uganda in their fight against inappropriate antibiotic use and antibiotic resistance. Mass media campaigns promoting the appropriate and judicious use of antibiotics are noticeably absent in Uganda, and although a commitment has been made at national level to tackle antibiotic resistance, this has yet to filter down to the majority of front-line healthcare workers who are responsible for antibiotic prescribing, let alone the general public. As almost a blank canvas then, the introduction of health education to both healthcare professionals and the general public poses the potential for Uganda to take great strides in reducing their antibiotic use.

A report by Public Health England (2015) identified that four fifths of antibiotic prescribing in the UK takes place in the primary healthcare setting. With little data available to determine levels of prescribing in the primary and secondary healthcare settings in Uganda, it is yet again difficult to make a comparison with these UK based findings. Nonetheless it is clear that the antenatal clinics in this study account for a substantial proportion of antibiotics prescribed. The report by Public Health England (2015) also indicated some similarities in the behaviour of antibiotic prescribers in the primary care setting to those of the midwives in this study. Namely, there is an awareness amongst prescribers that their antibiotic prescribing decisions may not always clinically benefit their patients. Similar to the findings of this study, Public Health England (2015) report that primary care prescribers identified the 'norm', patient expectations, in particular the potential for patients to be disappointed if they don't receive antibiotics, and fear that something should happen if antibiotics are withheld, as influences on their antibiotic prescribing decisions.

Urinary tract infections

Given that this study has found high percentages of antibiotics being prescribed for urinary tract infections in pregnancy it seems apt to review this finding in line with current literature. The study by Sekikubo, Hedman,, Mirembe and Brauner (2017) offers evidence from Uganda to suggest that making a diagnosis of UTI in pregnant women based on their symptoms alone may lead to a high level of inappropriate antibiotic use. The study tested the urine of 2,562 women during pregnancy. Of those that reported symptoms of UTI only

4% of them had a culture proven UTI leading the authors to propose that 96% of women who are treated for UTI based on their symptoms alone do not require antibiotic treatment. At the same time asymptomatic bacteriuria, the presence of bacteria in the urine of a woman who is asymptomatic of a UTI, complicates the diagnostic and treatment challenges faced by Ugandan midwives. A study conducted in Uganda's National Referral Hospital, Mulago, in 2009 found that 13.3% of women who were asymptomatic of a UTI had significant bacterial growth in their urine sample (Andabati and Byamugisha, 2010).³⁴ Given these findings it would be sensible to make the recommendation that all women at all antenatal visits in Uganda should have their urine checked for the presence of a UTI. The reality of the Ugandan healthcare system, which frequently sees stock outs of UTI testing equipment, means that this recommendation is not currently feasible. Further findings from the study by Andabati and Byamugisha (2010) noted that 62% of the UTI causative bacterial isolates were resistant to amoxicillin, which is one of the two recommended first line treatment for UTI in the Uganda Clinical Guidelines (MoH, 2016). It is concerning that these findings were published in 2010, whilst the current Uganda Clinical Guidelines were updated in 2016. This suggests that local evidence is not being used in the development of treatment guidelines in Uganda. This observation raises warning flags. Uganda have commenced their battle on antibiotic resistance with a commitment to increasing surveillance of antibiotic resistance patterns. Whether the findings of this surveillance will be translated into the development of evidence-based treatment guidelines remains to be seen.

These two studies alone have demonstrated the complexities of analysing the findings of research and applying them to the wider population. One study tells us that many Ugandan pregnant women who are symptomatic of a urine infection are infection free, whilst another tells us that many Ugandan pregnant women who are asymptomatic of a urine infection are actually harbouring an infection that could seriously complicate their pregnancy. To further illustrate this point, a study conducted in the neighbouring country of Tanzania found that 17.9% and 13% of pregnant women, who were symptomatic and asymptomatic of UTI respectively, were diagnosed with a UTI by means of mid-stream

³⁴ Total sample size was 218

urine culture (Masinde, Gumodoka, Kilonzo and Mshana, 2009).³⁵ It is clear that diagnosing a UTI by means of clinical history and signs and symptoms only is inappropriate. Without the availability of microbiology testing the midwives in this study face significant uncertainty in their diagnostic capabilities and treatment decisions. Where antibiotics are called for, a lack of clarity over the causative bacteria may lead midwives to prescribe antibiotics that are ineffective, thereby contributing to the development of antibiotic resistance whilst leaving women and their unborn babies susceptible to morbidity and mortality. Moving forwards with this study therefore and supporting midwives in antibiotic stewardship, with a focus on supporting their antibiotic prescribing, poses many challenges and must balance a range of risks and benefits.

Operationalising knowledge

Findings from the pilot and context cycles revealed that resource constraints in the healthcare setting in Uganda have a significant influence over the ability of midwives to operationalise the knowledge they hold about antibiotic resistance, antibiotic stewardship and appropriate antibiotic prescribing. These findings are unique in the sense that they relate to midwives but have been recorded elsewhere in research conducted throughout all corners of the globe amongst other cadres of healthcare professional. Pearson et al. (2018) found that even where healthcare professionals in LMICs held accurate knowledge of antibiotic resistance and appropriate use of antibiotics, it did not guarantee the use of evidence-based practice when it came to them prescribing and dispensing antibiotics. This next part of the discussion continues by exploring the literature around the relationship between resource constraints and the ability of healthcare professionals to effectively prescribe antibiotics.

Human resources and time constraints

Findings in this study that consistently high patient numbers coupled with human resource shortages reduced the time available for midwifery consultations are supported by

³⁵ The total sample size was 247. Women reporting symptoms of a UTI = 78. Women asymptomatic of UTI = 169.

evidence from both HICs (Broom et al., 2014) and LMICs Pearson et al. (2018). The additional finding from the report by Pearson et al. (2018) that shortages of human resources reduced the amount of time healthcare professionals could devote to antibiotic stewardship activities, such as maintaining a clean clinical environment, were echoed by the comments of midwives working in Uganda. This lack of human resources leads not only to midwives being left with tasks that they feel are outside of their remit but leaves them lacking support and mentorship to support them in lifelong learning and the development of skills to facilitate the application of care based on evidence. In such a scenario inappropriate antibiotic prescribing practices become difficult to recognise let alone change.

Diagnostic testing equipment, laboratory supplies and staff

Findings from this study suggesting a lack of diagnostic testing equipment and laboratory supplies and staff impede a midwife's ability to make a correct diagnosis and subsequent antibiotic prescription have been noted elsewhere in sub-Saharan Africa. Pearson et al. (2018) reported similar constraints at work in LMICs including Sierra Leone, Nigeria and Ethiopia, with Asante et al. (2017) reporting similar findings in the Ghanaian setting and Farley et al. (2018) finding similar results in South Africa.

Clinical laboratories form the cornerstone of clinical decision making in HICs. Laboratories are, in fact abundant in Uganda, with a survey conducted by Elbireer et al. (2013) recording 954 laboratories in Kampala alone. The quality of these laboratories however is questionable. Elbireer et al. (2013), using a checklist modified from the WHO laboratory strengthening tool, identified that only 45 (5%) of these laboratories obtained a rating that met or exceeded the lowest quality standards as outlined by World Health Organisation. Of concern, of the 954 laboratories, 688 (72%) were not even registered with the Ministry of Health. On a positive note, more than two thirds of public sector laboratories met or surpassed minimum standards. Indeed, 16 out of the 45 laboratories meeting minimum standards were public sector laboratories. Laboratories with higher workloads, in terms of median numbers of laboratory tests conducted daily, were associated with higher quality standards. The authors noted that larger laboratories were more frequently linked to

ministries of health, thus potentially exposed to improved oversight and access to external funding. As noted in chapter two, inequalities in access to healthcare between urban and rural areas exist. It is difficult therefore to say how these findings may translate to other districts and settings within Uganda. Certainly, when it comes to the public healthcare setting in the Kabarole district where this study has been conducted, it is clear that microbiology testing, the gold standard for diagnosis of bacterial conditions, is only available in the public healthcare setting at Stanley hospital. Addressing the limited access to microbiology testing is beyond the realms of this study. As we move forwards then, we need to ensure we make the most of the resources that are available.

Findings from this study that midwives treat abnormal vaginal discharges as syndromes, and further, that they often modify recommended treatments has been observed before in Uganda. Tann et al. (2006) reported on the effectiveness of syndromic management of vaginal infections in Entebbe. Their findings revealed that healthcare professionals undermined the effectiveness of treatment guidelines by modifying them and subsequent prescriptions based on their own clinical judgement. Such personal preferences are problematic as they are not evidence-based, women may receive the wrong treatment, and furthermore, any students working alongside midwives who modify treatment regimens are taught incorrect antibiotic prescribing practices. Misinformed practice therefore perpetuates. It is imperative therefore that as we move forwards with this study we address midwives using personal preferences for antibiotic treatment, attempting to bring their behaviour in line with current evidence-based guidelines.

Guidelines and guideline implementation

In line with findings from the pilot and context cycles, lack of access to information in the form of guidelines, or relevant information on local resistance patterns was identified by respondents in the report by Pearson et al. (2018) as a barrier to making a diagnosis and subsequent antibiotic prescribing and dispensing decisions. Similarly, Lyimo et al. (2018) reported that guidelines were not always available in the Tanzanian setting. The findings of this study and that of Pearson et al. (2018) and Lyimo et al. (2018) differ from those of research conducted in HICs where guidelines were on the whole available but use

corresponded to level of clinical experience (Skodvin et al., 2015), and user friendliness in terms of format was criticised (De Souza et al., 2006). The need to ensure guidelines are readily available, and further, user friendly, is a consideration that can be easily addressed and needs to be taken on board as this modified action research study moves forwards.

Access to antibiotics in healthcare facilities

The report by Pearson et al. (2018) continues to draw similar conclusions about the influences on healthcare professionals' antibiotic prescribing practices as this study. In particular antibiotics were identified in the report by Pearson et al. (2018) as frequently being unavailable, or in the case of antibiotics required for second- and third-line treatment, unaffordable. These difficulties in access to antibiotics led healthcare professionals in the report to acknowledge that they often resorted to an over reliance on available rather than appropriate antibiotics and therefore a tendency to prescribe treatment that may not only be ineffective in the management of the identified bacterial condition, but also contribute to the development of antibiotic resistance. Similarly, the respondents in the report by Pearson et al. (2018), much like the midwives in this study, testified that shortages of antibiotics in the public health sector drive purchases from private sector pharmacies and drug shops, many of which are unregulated. In my study it has been noted that if a midwife felt that the woman could afford to purchase the correct antibiotic for her condition, then she would write the corresponding prescription and direct the woman to a pharmacy or drug shop. Evidence from the Ugandan Annual Pharmaceutical Sector Performance Report for 2015-2016 (MoH, 2017a) confirms these medication shortages. Over the quarter of April to June 2016 availability of a basket of 41 commodities was assessed. Of the 41 items, 15 were classified as essential medicines and health supplies (EMHS). On average only 89% of these 15 items were available in reporting facilities. Furthermore, only 52% of facilities had 95% availability of these 15 commodities across the quarter. Facilities included in the report included those from the public sector and private sector, and leaves the reader uniformed about any differences in the availability of EMHS between sectors.

Self-medication

Shortages of medication in healthcare facilities coupled with low levels of understanding in the lay population about appropriate antibiotic use were seen by midwives in my study as drivers for self-medication in the community. Local news reports in Uganda in September 2017 alluded to research carried out by the pharmaceutical society of Uganda that estimated up to 60% of the population self-medicated (Lyatuu, 2017). Further evidence from Northern Uganda reports rates of self-medication with antimicrobial medications to be as high as 75.7% (Ocan et al., 2014). This finding in itself is of concern, yet the study went on to reveal that almost one third (30.3%) of the conditions treated through self-medication did not require antimicrobial treatment. Additionally, Ocan et al. (2014) reported that in 57.6% of cases self-medication had been initiated by drug shop attendants. This suggests that those staffing drug shops may have inadequate knowledge to recommend appropriate treatments for common conditions. Northern Uganda is an area still recovering from conflict thereby limiting the generalisability of these findings to the rest of the country. Nonetheless, they are of concern. Indeed, midwives from this study reported feeling troubled when they referred women to pharmacies and drug shops. In particular they were concerned that women would either be sold medications that they did not require, or they would only buy the amount of medication they could afford, thereby leading to under dosing. Evidence suggests these concerns are warranted. A survey conducted in 2014 of 170 registered drug shops in the Mukono District of Uganda concluded that only 8% of the providers surveyed had had training on antibiotics (Mbonye et al., 2016). The survey also found that lower cadres of drug shop staff including nursing assistants and enrolled nurses overprescribed antibiotics. Finally, similar to the findings of this study, the survey by Mbonye et al. (2016) reported that few drug shops had access to guidelines leading to nearly a third of staff inappropriately identifying antibiotics to be the first line treatment for childhood diarrhoea. Again, addressing these issues in this study is problematic as it is almost impossible for the midwives and myself to influence the distribution of medications by the government to public healthcare facilities. As we are unable to do so, self-medication practices will perpetuate.

Midwives' personal practices

The midwives in this study revealed that they were in the habit of self-medicating for various health complaints, often with antibiotics, and further had a tendency to ignore recommended treatment regimens. Evidence from other countries in sub-Saharan Africa indicate that this phenomenon is not unique to Uganda. A recent study in Ethiopia investigating the self-medication habits of public sector healthcare professionals reported a prevalence rate of 67.5%, with antibiotics being used in 36% of cases (Sado et al., 2017). Similarly, more than half (52.1%) of the healthcare staff who were surveyed at a hospital in Nigeria reported practising self-medication (Babatunde et al., 2016). These behaviours are not restricted to sub-Saharan Africa. Indeed, Oxtoby (2012) cites a poll conducted in a UK General Practitioner (GP) magazine that reported 43% of GPs disclosed writing prescriptions, including those for antibiotics, for personal use. Whilst these settings differ to Uganda, these findings suggest self-medication is a global problem that has the potential to contribute to the development of antibiotic resistance. The midwives in this study reported that they knew self-medication and shortened courses of antibiotics to be inappropriate, yet they continued to practise such habits. As healthcare professionals, midwives are often seen as role models, with members of the community looking to them for guidance. Tackling these personal self-medication practices of the midwives in this study in subsequent cycles of action may therefore be beneficial in trying to change the habits of their wider social groups as well as the women in their care.

Infection prevention and control and prophylactic antibiotic use

Analogous to the midwives in this study prescribing prophylactic antibiotics to all postnatal women, respondents in the report by Pearson et al. (2018) testified that their antibiotic prescribing decisions were influenced by concerns over infection control practices and sanitation standards within healthcare settings as well as hygiene and sanitation standards in the community. Such behaviours have been reported in other LMICs with a study conducted in India and Bangladesh reporting that all labouring women were given antibiotics irrespective of whether the birth was normal or complicated in 13 out of 15 healthcare facilities spread across the public and private sector (Afsana et al., 2015 as cited

by Graham et al., 2016). Given the previously discussed finding from this study and that of Pearson et al. (2018) that time pressures reduce the ability of midwives to ensure a clean and safe clinical environment is maintained, it is not surprising to learn that the midwives in this study consider the birthing environment to harbour infection. Even without time pressures, the fact that healthcare facilities in LMICs are considered to be risky environment is unsurprising based on recent research findings. A WHO (2015) survey across 54 LMICs revealed that there was no access to basic water sources or basic sanitation resources in 38% and 19% of healthcare facilities respectively. Furthermore, it is well documented that basic hand hygiene, such a crucial component of IPC, is poorly practised by healthcare professionals (WHO, 2009). Findings from this study that midwives frequently failed to wash their hands when providing care are supported by recent evidence from the region. A study undertaken to assess healthcare worker compliance with IPC practices at Stanley hospital reported the compliance rate for hand hygiene to sit at a mere 17.4% (Mbabazi, 2018). These findings suggest that even in the face of shortages of IPC resources, steps could be taken to try and improve compliance rates with IPC guidelines.

Other operational issues

A handful of midwives in the pilot and context cycles talked of prescribing antibiotics as a means of meeting consumer expectations and mitigating risk; they felt it safer to give antibiotics than not too, especially where it had been difficult to make a diagnosis. These findings are echoed by the findings of Farley et al. (2018), Pearson et al. (2018), Garcia et al. (2011) and Reynolds and McKee (2009). This phenomenon is not unique to the LMIC setting, with similar findings reported frequently in HICs (Broom et al., 2014). In HICs one of the drivers of prescribing antibiotics 'just in case' is the threat of being held accountable and facing disciplinary action or litigation. In Uganda there is little accountability in the healthcare setting. Indeed Omaswa (2014) argues that Africa has normalised the unacceptable. There is no denying this. The Annual Health Sector Performance Report (MoH, 2017b) estimates rates of absenteeism without approval to have dropped from 50% in 2015/16 to 10% in 2016/17. This estimate is based on figures generated from the

automated attendance analysis initiative that was rolled out across all 116 districts in the country by June 2017. The automated attendance analysis initiative is a system whereby healthcare staff working in the public sector have to sign in to work using their thumb print on an electronic monitor. In relation to my study, this monitor is only located in one hospital in the district. Furthermore, I have witnessed staff who live on the hospital site sign in and then return home for the day, only to come back and sign out at the end of their 'shift'. It would appear then that levels of absenteeism are much higher than the estimated 10%, with Uganda suffering one of the highest rates of healthcare worker absenteeism in Africa (Tweheyo et al., 2017). Anecdotal evidence as presented by Ackers, Ackers-Johnson, and Ssekitoleko (2018) suggests that these high absenteeism rates haven't gone unnoticed, with senior managers openly reporting that they are aware of the problem, even estimating a 60-85% generic healthcare worker absenteeism rate on an average day. As such behaviour is allowed to perpetuate and trickle down the system, absenteeism has become an acceptable part of the healthcare system. With accountability lacking at all levels the question arises as to why midwives choose to prescribe antibiotics as a mechanism to protect themselves from being seen to be negligent. One reason could be that they fear disciplinary action from an alternative source; it is not unheard of that bereaved families will turn to the police if they feel negligence has contributed to the death of a loved one. Alternatively, it could be related to a sense of duty. One of the midwives in this study told me that she and her counterparts continue to provide extra services to the community simply because they care about the community they serve. Regardless of the reason it is vital that as we move forwards midwives are made aware that prescribing antibiotics 'just in case' could equally be viewed as negligent due to the contribution such practice can make to the development of antibiotic resistance.

Conclusion

This chapter has drawn comparisons between the findings from the pilot and context cycles with evidence from the rest of the world. It has demonstrated that even though knowledge about antibiotic resistance is widespread the behaviour of healthcare professionals and patients alike is struggling to align with recommendations aimed at slowing its

development. Furthermore, the discussion has highlighted that influences on the prescribing practices of healthcare professionals are similar across the globe despite glaringly obvious differences between countries in terms of the resources available to assist in the process. The findings from the pilot and context cycles exposed the need for action to be taken to try and improve the knowledge held by midwives about antibiotic resistance and further, have disclosed requests from the midwives to provide them with support to improve their antibiotic stewardship activities, and in particular, their antibiotic prescribing practices.

Resource constraints pose restrictions not only on the ability of midwives to diagnose and treat bacterial conditions, but also on the ongoing cycles of this modified action research study. Tackling shortages of human resources, diagnostic testing equipment, antibiotics and consumables that enable sound infection prevention and control measures to be implemented requires substantial support and investment from stakeholders at high levels within the Ugandan government. Despite my presence in Uganda affording me the opportunity to develop engaging relationships with the District Health Officer of the Kabarole District, it has been beyond the scope of this study to tackle all of the issues influencing the ability of midwives to carry out antibiotic stewardship activities. However, findings from the pilot and context cycles revealed areas that could be worked on collectively as a group to address gaps in knowledge, and, in turn lead to improvements in the antibiotic stewardship activities of the midwives in this study. The next chapter discusses the antibiotic stewardship initiatives that were considered as the ongoing cycles of this study were designed.

Chapter seven - Moving forwards: designing an antibiotic stewardship evidence base

Introduction

The spread of antibiotic and antimicrobial resistance is a pandemic. A pandemic, like others, that has its biggest impact in the developing world (Nweneka, Tapha-Sosse, and Sosa, 2009). The rise of multi drug resistant tuberculosis (MDR-TB) is reaching alarming proportions, whilst antimalarial drugs are rapidly losing their effectiveness (HM Government, 2014). In a world where the discovery and development of new antibiotics is almost stagnant, antibiotic resistance is spreading at a rate so rapid that a real threat to the health of the global population exists. Tackling this threat requires the implementation of effective antibiotic stewardship programmes. To recap antibiotic stewardship is an umbrella term for initiatives designed to prolong the lifespan of existing antibiotics (Bartlett, 2011). These initiatives include activities aimed at reducing the incidence and spread of infections, including the use of vaccines, as well as offering guidance to support the appropriate and optimal use of antibiotics (Dar et al., 2016; Charani and Holmes, 2013; Cunha, Varughese and Mylonakis, 2013). As highlighted in chapter one, Africa as a nation lags behind others in terms of antibiotic stewardship; only 20% of respondents in the African region, from a worldwide survey reported that they had antibiotic stewardship standards in place, compared to 81% of respondents in Europe (Howard et al., 2015). It is only in recent years that political commitments to tackle antibiotic resistance have been made, with Uganda only publishing its first National Action Plan for Antimicrobial Resistance in November 2018 (Government of Uganda, 2018).

Findings from the pilot and context cycles revealed a mixed level of understanding about antibiotic resistance amongst midwives in this study. Whilst some understood that inappropriate antibiotic use could contribute to the development of resistance, they did not seem to realise that by prescribing antibiotics appropriately and carrying out effective infection and prevention (IPC) activities that they themselves are stewards who have the potential to play a part in reducing the speed at which antibiotic resistance develops. Given these findings, coupled with the fact that the midwives who participated in the interviews called for assistance on developing their knowledge, the need to consider how to develop

and introduce an evidence base for antibiotic stewardship for the midwives in this study became apparent. Figure 7.1 depicts the barriers that limit the ability of the midwives in this study to carry out antibiotic stewardship activities as identified from the findings of the pilot and context cycles. Several of these barriers are outside the influence of this study. Two barriers were identified as areas that this study could aim to affect.

Figure 7.1 Barriers affecting the implementation of antibiotic stewardship practices



Figure 7.1 shows the barriers to antibiotic stewardship that are outside the influence of this study in blue. The barriers that are highlighted in green refer to those that this study felt able to address. Evaluating antibiotic stewardship interventions that have gone before allows successful interventions to be replicated and those that have succumbed to pitfalls either modified or avoided. This chapter reviews the literature on antibiotic stewardship practices across the globe, with an awareness of our sphere of influence, as a means to support the development and design of the ongoing cycles of action in this study.

Evidence from sub-Saharan Africa to support antibiotic stewardship interventions

One of the more recent studies focused on implementing an antibiotic stewardship program in sub-Saharan Africa offers little guidance for my study due to the interventions used and the country and sector of implementation; South Africa and the private setting. The work of Brink et al. (2016) displays promising findings in that the introduction of an audit and feedback antibiotic stewardship strategy led by non-specialised pharmacists significantly reduced levels of antibiotic use. Replicating this in Uganda and in the public sector which are both substantially poorer, is not feasible. The teams involved in achieving this level of success included doctors, pharmacists, nurses and others including infection prevention practitioners. There is one qualified pharmacist working at Stanley hospital who oversees the three pharmacies within the hospital and pharmacy technicians who run them. Additionally, as mentioned in chapter two, medical officers are commonly absent from regional referral hospitals and health centre IVs and are not part of the multidisciplinary team in health centre IIIs. As a result, bringing together a similar team to that suggested by Brink et al. (2016) to tackle antibiotic misuse is simply not possible. This is also problematic as doctors are often viewed as leaders. Evidence suggests that leadership plays a key role in culture change and requires leaders to be authentic and align their leadership actions with their visions (West et al., 2015). Absent medical officers and team leaders in the healthcare facilities in this study, by the nature of their absence, powerfully communicate a disengagement from the other team members in the pursuit of attaining such visions. However, with some modifications, in terms of those professionals leading the audit and feedback process, this modified action research study could implement the tools of audit and feedback as used by Brink et al. (2016) to try and improve the antibiotic prescribing practices of the midwives in this modified action research study.

Boyles et al. (2013) used similar interventions to Brink et al. (2016) to successfully reduce antibiotic use by 19.6%, again in South Africa. This was achieved via the introduction of an antibiotic prescription chart and weekly antibiotic stewardship ward rounds on two medical wards at a teaching hospital. The authors were unable to attribute the success of the study solely to one intervention or another, though they felt the ward rounds had the most impact on the reduction in antibiotic use. These ward rounds included infectious

diseases specialists, microbiologists, infection prevention control nurses and ward pharmacists. Yet again, such multidisciplinary teams don't exist in the majority of settings in Uganda. Furthermore, as an intervention in the inpatient setting the study by Boyles et al. (2013) is limited in its applicability to my study.

The systematic review by Van Dijck, Vlieghe, and Cox (2018) considered the success of antibiotic stewardship interventions in LMICs. Of the 27 studies in the review, only three were from sub-Saharan Africa. Due to the heterogeneity of interventions considered in the review coupled with the poor methodological quality of the included studies, findings were inconclusive, offering no guidance for recommendations about implementing antibiotic stewardship interventions in LMICs.

Improving antibiotic stewardship using behaviour change strategies

Given the lack of evidence from sub-Saharan Africa pertaining to successful antibiotic stewardship interventions, this chapter looks at findings from studies from other parts of the world reporting on components that are perceived to form the constituent parts of successful antibiotic stewardship programs. As noted in chapter three, changing the behaviour of an individual or group is complex. In recent years therefore, the use of behavioural scientists in devising interventions to change behaviours in the healthcare setting has become customary. Given the limited literature pertaining to antibiotic stewardship interventions in sub-Saharan Africa and the call from the midwives in this study to improve their antibiotic stewardship activities via some form of intervention, the remainder of this chapter also considers interventions that have been assessed in terms of their ability to change clinician behaviour. Due to the lack of literature from sub-Saharan Africa related to behaviour change, the majority of the literature consulted has been derived from research in countries out with sub-Saharan Africa, most of which are HICs. Nonetheless, gaining an insight into potential interventions that lead to changed behaviours was the first step in this next action cycle as we aimed to tailor interventions to support the implementation of an evidence base for antibiotic stewardship that suited the needs of this group of midwives.

Organisational level interventions

Through their literature review, Robertson and Jochelson (2006) identified the need for various organisational constructs to be in place in order to support the ability of healthcare professionals to change their behaviours. In particular, resources, including time and human resources, need to be available, which, in turn, need to be underpinned with strong leadership, and effective communication systems. These findings echo the theories of behaviour change presented in chapter four; the opportunity element of the COM-B system as outlined by Michie et al. (2011) identified that resources need to be available to support the individual to change their behaviours. Similarly, using the Promoting Action on Research Implementation in Health Services (PARIHS) framework, the Ugandan midwives in the study by Bergstrom et al. (2012) reported that a lack of resources impeded their ability to change their behaviours and bring practices in to line with evidence. Equally the PARIHS framework pinpointed clear and effective leadership as a prerequisite for assisting the transition of knowledge into clinical practice. Indeed, West et al. (2015) argue that leadership is the key influence on an organisation's culture and therefore the ability of that culture to change.

Possibly most importantly, the review by Robertson and Jochelson (2006) emphasised the need for behaviour change interventions to be tailored to the local context, and further to be thoroughly monitored, evaluated and amended accordingly. Through a cycle of observation, reflection, planning and acting, this modified action research study has aimed to do just that. As addressed in chapter six, many of the contextual factors that inhibit midwives from prescribing antibiotics appropriately are beyond the realms of this study to change. In this case my study cannot provide extra human resources to ensure that clinics are better staffed. In turn then, my study has little ability to reduce the time pressures on midwives. Despite these limitations, as action research centres itself on inclusive and respectful relationships (McNiff and Whitehead, 2006) it is possible that as a group we can aim to develop our communicative relationships. Additionally, given the important role that leadership plays in behaviour change, natural leaders should be recognised and encouraged to engage those who are less motivated to lead, to support and enable them to adopt antibiotic stewardship activities into their clinical practice.

Restrictive interventions

The Cochrane review by Davey et al. (2013) included literature assessing interventions to improve antibiotic prescribing practices for hospital inpatients from 1980 to 2009. Their main comparison in the review was to compare interventions that were restrictive in nature and those that were persuasive in nature. Restrictive interventions, those that seek to reduce the freedom of prescribers to prescribe antibiotics, were found to be the most effective at improving antibiotic prescribing practices. Such interventions include formulary restrictions and the need for the antibiotic prescriber to seek prior approval from an infection specialist in order to prescribe an antibiotic. Implementing such restrictive interventions in Uganda is impossible given the lack of qualified pharmacists and infection specialists in the country.

In response to the Chief Medical Officer's report in 2013, Public Health England (2015) reviewed literature on antibiotic stewardship interventions grounded in behavioural sciences in order to make recommendations for new interventions aimed at slowing the development of antibiotic resistance. The recommendations of the report by Public Health England (2015) are based on two literature reviews; the first considered context and prescribing behaviours that contribute to antibiotic resistance, the second focused on areas responsive to behavioural interventions. The report led to the development of 15 recommended opportunities for antibiotic stewardship interventions. These were categorised into interventions that would be appropriate over different time frames; short, medium and long term. One of the medium-term interventions suggested by Public Health England (2015), which could be classed as a restrictive intervention, is the substitution of antibiotic therapy with alternative medications. With supplies of medications in healthcare facilities mostly dictated by the Ugandan government however, there is little scope for this intervention. This again links to the theories of behaviour change as presented by Michie et al. (2011) and Bergstrom et al. (2012); resources need to be available to support changes in practice. For example, in the case of respiratory tract infections, which are mostly viral and self-limiting in nature, the use of cough linctus could work as a beneficial substitute. However, as the government do not supply this to healthcare facilities, the cost of buying such remedies would fall to the patient. Quite simply, many women wouldn't be able to afford this, and as discussed previously, patient expectations to receive medications may

leave midwives continuing to prescribe antibiotics to placate women. In such a system the behaviour change theory of innovative intentionality as outlined by Canibano et al. (2006) is relevant. If the Ugandan government do not amend the supply of medications to healthcare facilities, the reality is that medications available for the midwives to prescribe do not change. They are therefore left questioning how they can change their behaviours to align with evidence.

An alternative medium-term restrictive intervention aimed at curbing the use of antibiotics as suggested in the Public Health England report (2015) is to reduce the amount of appointments in the primary care setting for self-limiting infections. Logistically the authors suggested the use of posters to educate patients in waiting rooms that they would not receive antibiotics for such conditions as coughs and colds. It was felt that over time these messages would reach patients, subsequently leading to less booked appointments. This is at odds with current practice in Uganda where women are actively being encouraged to access healthcare services rather than seeking care from traditional birth attendants or worse still, not seeking care at all. Evidence suggests that as little as 8% of staff working in private drug shops in the Mukono District of Uganda (Mbonye et al., 2016) had received training about antibiotics. If women perceive that they are not welcome at healthcare facilities for minor ailments they may choose to seek care and medication from such outlets, thereby having the opposite and undesirable effect of increasing levels of inappropriate antibiotic use.

A number of additional restrictive measures with similar mechanisms have been suggested by Public Health England (2015) to reduce inappropriate antibiotic use in the medium and long term. In the medium term it was proposed that monitoring the prescribing decisions of prescribers would encourage prescribing clinicians to confirm a diagnosis rather than prescribe antibiotics 'just in case.' Such monitoring and feedback mechanisms were identified as effective elements to support behaviour change in the PARIHS framework (Bergstrom et al. 2012). Furthermore, leaders who monitor, reward and reinforce evidence-based practice are more likely to successfully achieve behaviour change than those leaders whose actions are at odds with their vision (West et al., 2015). Lack of laboratory services makes this very particular target difficult to attain in the Ugandan setting. Similarly, in the longer term the suggestion was made to add friction to the

antibiotic prescribing process. In particular, those prescribing antibiotics would require a second signature for a written prescription. Lack of human resources in Uganda means that midwives are mostly solitary workers, limiting their ability monitor one another's practice and therefore to implement such an intervention. A final alternative suggestion made by Public Health England (2015) to tackle inappropriate antibiotic use is the use of back-up systems of prescribing. Back-up systems, whereby prescribers can write a prescription for the future which patients return to collect in a set number of days if their condition has not improved was put forward as an intervention to curb the use of antibiotics for respiratory tract infections. The availability of antibiotics over the counter, coupled with the fact that many patients in Uganda are unable to afford a repeat journey to access healthcare advice or medication, significantly reduces the scope for this intervention to be successful in the context of this study. Longer term interventions outlined in the Public Health England (2015) report include increasing the cost of antibiotics. In a country where access to antibiotics is already unequal due to geographical and financial constraints, and furthermore people continue to die as a result of lack of access to antibiotics, imposing cost increases could be viewed as unethical.

Persuasive interventions

Findings from the pilot and context cycles exposed differing levels of knowledge about antibiotic resistance and appropriate antibiotic prescribing amongst the midwives. Changing the antibiotic prescribing behaviours of midwives in this study will undoubtedly require improving their knowledge base in both these areas, which may require the provision of educational materials. The Cochrane Review by Davey et al. (2013) suggested the use of persuasive interventions, those interventions that are aimed at trying to change professional behaviours and include a broader range of initiatives, to address inappropriate antibiotic prescribing activities. Such interventions include the dissemination of educational resources, reminders, audit and feedback, and educational outreaches. In terms of the behaviour change wheel of Michie et al. (2011) these initiatives could be seen to increase the individual's capabilities, which in turn influences their capacity to change their behaviour. Similarly, such interventions have been identified in the sub-element

culture of the PARIHS framework as a means of supporting midwives to modify their clinical practice (Bergstrom et al., 2012). The review by Davey et al. (2013) found that these persuasive interventions were successful at improving antibiotic prescribing and in some cases reducing rates of hospital infections. Additional work by Davey, Peden, Charani, Marwick and Michie (2015) advocated the use of behaviour change strategies, in particular the combination of feedback and action planning in the development of antibiotic stewardship interventions. Similarly, Ranji, Steinman, Shojana and Gonzales (2008) found that where active clinical education was used there was a greater effect in reducing the levels of antibiotics prescribed than when passive education techniques were used. Details of active versus passive techniques were not supplied by the authors however, so difficulty arises in assessing the eligibility of these interventions in the Ugandan maternity setting. Evidence from a neonatal care programme in Myanmar provides examples for what could be viewed as passive and active educational techniques (Royal College of Paediatrics and Child Health [RCPCH], 2018). Training in emergency paediatric care was provided in several hospitals. Eight of these hospitals received short course training only (passive education), whilst ten hospitals received short course training complemented by 6-9 months of in-situ mentorship (active education). Findings indicated that whilst both groups were seen to improve practice, the groups that had received additional mentorship maintained a trend of improvement over time whilst the effects of short course training only tailed off over the same period (RCPCH, 2018). The provision of education and educational resources, such as guidelines is not beyond the scope of this study and are advocated in the behaviour change theories of Michie et al. (2011) and Bergstrom et al. (2012) as elements that support behaviour change. Additionally, mentorship has been integral to this study. Continuing to offer this in the following cycles of action may be instrumental in the change process. Finally, as mentioned previously, auditing the antibiotic prescribing practices of the midwives in this study could be easily implemented, and coupled with feedback, could work as a mentorship intervention in the ongoing cycles of action.

A literature review focusing on interventions that aim to change clinician behaviour, although not focused on antibiotic stewardship per se, discusses similar intervention strategies to those of Davey et al. (2013) and Ranji et al. (2008) and offers evidence to support their use (Robertson and Jochelson, 2006). The review acknowledged that the

provision of education materials alone, especially when disseminated in a passive manner, was found to be insufficient in generating behaviour change. Rather, incorporating the provision of education materials with other behaviour change strategies was found to be more effective. There are no rules for deciding on what strategies to combine with the provision of education materials in order to have the maximum behaviour changing effect, but some of the other interventions reviewed by Robertson and Jochelson (2006) present themselves as potential options in the ongoing development of this modified action research study. In particular, educational meetings that are smaller in scale, were found in the review to allow for greater interaction and resultantly were found to be more effective in facilitating behaviour change than large scale didactic meetings, especially where complex behaviours were being targeted. It is unclear from the findings of the review however what attributes of smaller scale meetings contribute to more effective behaviour change. Nonetheless, evidence suggests that effective team working is crucial to the development of a culture that is able to adapt and change to ensure quality services are provided (West et al., 2015). However, the review by Robertson and Jochelson (2006) could not draw any conclusions about the sustainability in the longer term of changes that were made in the short term following the educational meetings. An alternative means of providing educational sessions was also identified by Robertson and Jochelson (2006). Educational outreach visits whereby professionals are visited in their place of clinical practice, had proved to be effective in changing the prescribing behaviours of healthcare professionals. Weighing up the benefits of changed behaviour against the time and costs associated with individual outreach visits has not been investigated and therefore the cost effectiveness of such an intervention is not known. Nonetheless, these interventions could be implemented in this study with relative ease, and therefore present themselves as a set of potential options to help us move forwards.

Persuasive interventions in the shape of a peer comparison have been found to be effective in reducing the volume of antibiotics prescribed for respiratory tract infections in America (Meeker et al., 2016). This intervention was email based, with those antibiotic prescribers who prescribed most appropriately receiving an email at the end of the month telling them that they were in the top group of antibiotic prescribers. Those who were not in that group received an email telling them that they were not a top performer. One of the suggestions

made by Public Health England (2015) as a short-term intervention was similar to that of Meeker et al. (2016). In particular the authors of the report suggested giving feedback to prescribers on their antibiotic prescribing practices in conjunction with feedback about the antibiotic prescribing practices of their peers, thereby allowing for a comparison to be made. The idea of such an intervention is to motivate individuals to compete with their peers in achieving best practice. Such an initiative could be viewed using the PARIHS framework for behaviour change (Bergstrom et al. 2012) as a means of evaluation, and therefore a wholly appropriate activity to encourage midwives to change their antibiotic prescribing practices. This initiative could work in the Ugandan setting and this study if the mechanism of reporting was changed from the use to email to verbal feedback. However, caution must be exercised when using this method as participants may be motivated to reduce antibiotic prescribing as to effectively compete with their midwifery counterparts at the cost of women's health.

An alternative intervention that has proved to be useful in reducing antibiotic use for respiratory tract infections in America is the use of an accountable justification system (Meeker et al., 2016). This involves a prompt arising on the computer screen of any doctor making an antibiotic prescription for respiratory tract infection. The prompt asks them to justify their decision to prescribe antibiotics for an infection that is non-responsive to antibiotics. Implementing this kind of intervention in the Ugandan setting will prove difficult, if not impossible given that present local reporting and documentation systems are paper based. The suggestion by Public Health England (2015) to create hospital prescription charts could be viewed as a persuasive measure to support midwives in the prescribing decisions. Designing and incorporating prescription charts into practice in the Ugandan setting however bears not only the challenge of changing behaviours but also the sustainability issues surrounding resource and financial challenges associated with the physical production of such tools.

Persuasive interventions can also be aimed at modifying the behaviours of women accessing maternity care. Public Health England (2015) highlighted the importance of educating and advising patients about their own antibiotic use as a means of reducing inappropriate consumption. The same report proposed that the use of an educational leaflet could enhance the knowledge held by patients accessing care about appropriate

antibiotic use. The development of a leaflet could be useful for both healthcare professionals and women accessing maternity care in Uganda as a means of improving knowledge about antibiotic resistance and appropriate antibiotic use. However, the costs associated with its design, production and distribution may prohibit its use and reduce its sustainability as an intervention. The review by Robertson and Jochelson (2006) also revealed an alternative persuasive intervention aimed at changing the behaviours of the community; the use of opinion leaders to disseminate information to key groups. This idea is based on the theory that people will imitate the behaviours of those that they respect. Such an initiative requires the actions of such leaders to align with the message that they are sharing (West et al. 2015). This suggestion was in fact put forward by one of the midwives in this study during an interview. Given Uganda's level of religiosity, she suggested that religious leaders could relay messages at key gatherings in order to begin addressing the knowledge deficit in the community about antibiotic resistance and antibiotic use. Evidence surrounding the effectiveness of such an intervention was inconclusive (Robertson and Jochelson, 2006). For the purposes of this study the focus needs to be on midwives. Midwives are leaders and thereby role models in their community. They are not just leaders in the healthcare setting, but in their homes and local community. The preference for self-medication with antibiotics that the midwives in this study revealed in the pilot and context cycles needs to be addressed and modified. Only when their personal behaviours align with evidence will any messages they pass on about antibiotic resistance and appropriate antibiotic use be credible in the eyes of those they are sharing these messages with.

Communication

Communication is a central tenant in the delivery of safe, effective and respectful healthcare, both in terms of patient and healthcare professional relationships as well as multidisciplinary relationships. Furthermore, leadership competencies are said to include excellent interpersonal skills (West et al., 2015). Pakyz et al. (2014) found in their qualitative study of American pharmacists and doctors that communication that was seen to be facilitative and non-confrontational was important in building relationships between

members of the antibiotic stewardship team. In particular the development of good working relationships was seen to increase receptiveness of antibiotic stewardship interventions. Indeed, evidence suggests that a leadership model that facilitates effective team work leads to the development of a culture that is adaptable to change (West et al., 2015). Furthermore, the study by Pakyz et al. (2014) identified that face-to-face communication was felt to be an effective means of knowledge transfer as it enabled conversations to take place, rather than individuals just being given a page of explanatory text. In fact, in situations where there was resistance to recommendations being made, face-to-face discussions allowing direct communication were found to be beneficial in ironing out disagreements. Communication is central to the provision of maternity care regardless of setting. As action research is based on respectful relationships this study views effective and respectful communication to be a key component and contributor to the success of our work. Given the lack of information technology resources in Uganda it is promising to note that face-to-face communication, which is the main form of communication we have used to date, is deemed to be effective for knowledge transfer.

Guideline development

Castro-Sanchez (2017) underlines that nurses have successfully been managing infections such as HIV and TB in South Africa with the help of evidence-based decision making algorithms. This is true of the midwives I work alongside in Uganda who independently run HIV clinics for antenatal women and mothers who have babies that have been exposed to HIV. Hope can be drawn from this observation as it demonstrates how midwives have expanded their scope of practice to successfully treat HIV. These successes indicate that with support, midwives can improve their practice and use of clinical guidelines for antibiotic use and therefore their management of bacterial conditions. One of the steps that can be taken in the following action research cycles is to ensure that midwives have access to clinical guidelines, especially for those conditions commonly treated in the pregnancy continuum.

Financial incentives

The use of financial incentives for adherence to antibiotic prescribing guidelines has been reported as being successful amongst Ethiopian nurses (Castro-Sanchez, 2017). Such an intervention could be seen as targeting an individual's motivation, one of the components of the COM-B system at the centre of the behaviour change wheel (Michie et al., 2011). For the purposes of this modified action research study this intervention is not feasible or sustainable. This intervention is also undesirable as it may encourage midwives to withhold antibiotics and thereby compromise the health of the woman. Alternatively, and has been witnessed in my clinical practice here, such financial incentives have been noted to be associated with the deliberate and flagrant falsification of documentation which compromises the care that women receive. Should financial incentives be provided to recognise appropriate antibiotic prescribing practices in the following cycles of action, there is the possibility that midwives would not change their practice. Rather, they may change their documentation, and omit any details of antibiotic prescriptions being made from the antenatal register, thereby leading to an over-estimation of apparent improvements in antibiotic prescribing practises. As an alternative to financial incentives in the following action research cycles, where midwives are noted to have improved their antibiotic stewardship practices, substitute rewards such as refreshments could be offered, although it is unlikely that this practice would be sustainable beyond the end of this study.

Information technology

A study in America assessing the facilitators and barriers to implementing antimicrobial stewardship strategies by Pakyz et al. (2014) noted the effectiveness of some antibiotic stewardship programs was thought to be hindered by a lack of access to information technology systems. In particular where electronic surveillance programs and clinical decision support tools are not readily available antibiotic stewardship initiatives were seen to be less successful. Certainly, Public Health England (2015) identified the significant contribution that information technology can play in reducing antibiotic prescribing levels. In particular using information technology to reinforce guidelines and support prescriber decision making was suggested as an intervention that has been seen in practice with

promising results. Evidence also suggests that reminders, generally through the use of a computer system have proved to be effective in changing behaviours, although oral and written reminders were also found to be effective if given at the point of decision making (Robertson and Jochelson, 2006). Resource limitations automatically inhibit the adoption of such information technology based interventions in the Ugandan setting. Maternity records in Uganda are all handwritten, so whilst it is useful to know that information technology can be a supportive mechanism in antibiotic stewardship programs, there are more pressing, basic issues that need addressing before we consider the implementation of antibiotic stewardship electronic surveillance systems.

Online learning is becoming one of the forerunners in providing education both for those enrolled in academic courses and for others seeking to widen their knowledge independent of an institution. Massive open online courses (MOOCs) offer opportunities for individuals to widen their knowledge across a broad range of subjects, antibiotic stewardship being one of them. Indeed, prior to starting my PhD I undertook a MOOC on antimicrobial resistance that had been developed by the University of Dundee. Rocha-Pereira, Lafferty and Nathwani (2015) argue that online courses hold the potential to support antibiotic stewardship education on a global level, provided that the learning needs and practices of different cultures are taken into account in course design. With direct connections to the local university in Fort Portal, the development of a small scale online learning module presents itself as a potential option to increase the antibiotic stewardship knowledge of local healthcare professionals in training. Considerations such as student awareness of available courses as well as practical issues such as the time management skills of students and internet connection speeds have been highlighted in Egypt as barriers to their effectiveness (Aboshady et al., 2015), and of course should be considered in any design development.

Data reporting

The study by Pakyz et al. (2014) that interviewed doctors and pharmacists who were part of antibiotic stewardship teams in America, found that arming front line antibiotic prescribers with local data on both prescribing and antibiotic resistance patterns provided

a rationale for prescribing decisions and was deemed to be an effective antibiotic stewardship strategy. The study also highlighted that team members felt receiving feedback on rates of compliance to guidelines was a useful tool in improving prescribing behaviours. Both of these initiatives arm health workers with knowledge. In terms of the behaviour change wheel (Michie et al., 2011) this improves the individual's capability and therefore propensity to change. Equally, in terms of the PARIHS framework (Bergstrom et al., 2012) such knowledge assists the individual to align practice with evidence. In a similar vein to Pakyz et al. (2014), the literature review by Robertson and Jochelson (2006) found audit and feedback to have moderate effects on changing the behaviours of healthcare professionals, with the effects greater when feedback was given to coincide with practice. This finding supports those of the RCPCH (2018) that were mentioned earlier; combining short course training with prolonged mentorship has been linked to sustained improvements in care. According to Robertson and Jochelson (2006) this relied heavily on clinician 'buy in' prior to audit and feedback being initiated. The review failed to conclude how feedback should be given in order for it to be most effective, but recommendations for feedback included tailoring it to the local context. For the purposes of the ongoing cycles of action, it is possible to implement data reporting systems as part of a mentorship programme to give midwives feedback about their antibiotic prescribing practices.

Personnel

Having a dedicated champion who holds an interest in antibiotic stewardship has been highlighted as being useful in the dissemination of antibiotic stewardship program initiatives (Pakyz et al., 2014). In particular Pakyz et al. (2014) suggest that communication of antibiotic stewardship interventions could be relayed initially to a team pharmacist who would then impart these messages to the team. Such methods were thought to be an effective means of avoiding the development of an antibiotic stewardship 'police image' (Pakyz et al., 2014). The same study also identified the need for those leading antibiotic stewardship programs to be viewed by the wider team as trustworthy in order for such programs to be successful. Where a respected leader was in place there was the assertion that any messages that they convey would also be respected. Additional evidence supports

the requirement for a leader to be respected, with personal integrity being deemed a key personality trait required for a leader to be effective (West et al., 2015). Pakyz et al. (2014) found that team members felt that where a respected leader were in place, they would accept that recommended interventions were in the patient's best interests, rather than the need to make cost savings. In January 2018 when attending a workshop organised by a local charity the concept of having a 'champion' who has undergone training and then trains and oversees their colleagues, arose. This model is frequently used in the Ugandan setting by foreign NGOs in an attempt to maximise the number of healthcare professionals who are reached by training and is thought to be a sustainable way to impart knowledge and skills. I was interested to hear from other members of the group that I was working with that this method of training is not favoured by Ugandans for two main reasons. Firstly, the person who is selected to be the champion feels they are given extra responsibility without corresponding compensation. Secondly, and compounding the previously mentioned feelings of the champion, those members of the team that are not champions go on to off load other responsibilities onto the champion in an attempt to relieve themselves of extra work. Introducing a champion into any ongoing cycles in this study needs to be approached with caution and discussed fully with all midwives to assess if such an intervention would be effective in the development of a localised antibiotic stewardship program.

A final barrier to the effective implementation of antibiotic stewardship strategies as identified by the respondents in the study by Pakyz et al. (2014) was a lack of personnel in terms of the number of pharmacists or infection control specialists. As already discussed Uganda lacks pharmacists and infection control specialists, in fact they are a rarity. Locating them and incorporating them into a small, local, maternity focused antibiotic stewardship team is almost impossible.

So, what did the midwives in this study want?

As with all action research studies participation from group members plays a key role in the success of any interventions that are implemented. Throughout the pilot and context cycles I actively engaged with midwives to try to understand how they viewed we could

move forward from this point to improve our knowledge and practice of antibiotic stewardship. The midwives participating in the study were forthcoming with ideas, with the majority of them calling for a continuous medical education (CME) session to be held to assist them in improving their knowledge about antibiotic resistance and antibiotic stewardship activities. This suggestion was in line with the behaviour change theories of Michie et al. (2011) and Bergstrom et al. (2012) who have identified the role knowledge plays in facilitating individuals to change their behaviours. Midwives had different views on the location of the session. It is common practice in Uganda for one group of healthcare professionals to attend a CME and then travel, in the following weeks, to other healthcare facilities within their workplace district so that they can independently disseminate recommendations for evidence-based practice. Some of the midwives suggested a model similar to this for the provision of updates about antibiotic resistance and antibiotic stewardship: that it should take place in the work setting as to train midwives on the job. This doesn't work in the same way as the mentorship that I associate with practice in the UK. Instead, it is more a case of an individual arriving at a healthcare facility, often unannounced, and taking the time to speak with any available staff. This could be at any time during the day; in the middle of a busy antenatal clinic or in the afternoon when the flow of women attending for care has settled. The session usually involves a discussion between the educator and healthcare staff. In some cases visual aids or new documentation that is being introduced are used in the discussion. Once the discussion is over, the educator will leave. The onus is then on the member(s) of staff who have received the CME to disseminate the findings to their colleagues. Differing shift patterns mean that sharing information verbally with all members of the team is not always possible. Handouts may be left for members of staff to read over, others will receive the message second or third hand, often with key messages missed. When CMEs are held in this manner the opportunity for continued mentorship to supervise practice and ensure new guidance is implemented effectively is generally not available. In some cases the educator will return to audit practice and give feedback. Where this does happen the educator may meet a different person or group of people those they initially shared the information with. Once again, the same issues arise when it comes to feeding back findings from the audit to the rest of the team. In situations where audit targets are set by outside NGOs who make payments based on outcomes, these messages are generally well relayed and practice

modified accordingly, although as previously discussed, financial incentives may lead to false documentation and therefore over exaggerated improvements in clinical practice. Other midwives countered the argument for CMEs to be held in the clinical setting. They felt that only midwives who were working on the day of the CME would attend thereby reducing the numbers of midwives who would be trained. Additionally, it was felt that those midwives who were working would be distracted by the need to provide clinical care thus the effectiveness of the CME would be significantly reduced. With these concerns in mind many midwives made the alternative suggestion to hold the CME away from the work setting.

What did we do?

As it transpired during the time that we were discussing the best way to move forwards, we stumbled upon an almost accidental intervention. The Second National Antimicrobial Resistance Conference for Uganda was taking place in November 2017. The conference presented itself to be an educational opportunity and so two midwives from two different healthcare facilities in the study attended the conference with myself. Both of these midwives were the lead midwife in their respective healthcare facilities. Although small in scale and only directly involving two of the 29 midwives in this study, their attendance at the conference acted as the third cycle - 'champions' of this modified action research study. Following the conference, I discussed with the midwives who had attended with me how they felt we could best move forwards in the following cycles to share the messages they had learnt, taking into consideration the suggestions presented by their colleagues during the interviews in the pilot and context cycles, as well as the evidence presented in this chapter. In line with the recommendations of Robertson and Jochelson (2006) they felt that holding continuous medical education (CME) sessions that provided educational materials, for midwives across the four healthcare facilities would be the most effective way to introduce midwives to antibiotic stewardship. Their preference was for a venue away from the clinical setting and for small group CME sessions. One of the midwives felt confident in her knowledge and was keen to lead aspects of the CME, whilst the other

midwife felt she wanted to be a participant in the CME with a view to becoming involved as a leader in future sessions.

The continuous medical education (CME) session

The midwife who wished to take a leading role in the CME worked alongside myself to devise the session. We held three sessions, each of which were the same, on three mornings of the same week at the beginning of March 2018. We chose to do this to maximise the number of attendees without having a detrimental impact on the provision of care; three sessions meant that most midwives were able to attend on one of their days off work from the healthcare facility. Many of the midwives in the study commented that CMEs begin to lose their effectiveness when they run on for hours. We chose to design the sessions in a manner that hoped to avoid this phenomenon, with each session beginning at 9am and concluding with a meal at lunchtime.

Given that Ranji et al. (2008) found active clinical education had a greater effect in reducing levels of antibiotics prescribed we designed the CME session to be interactive and involve group activities, educational games and discussions. The CME was divided into two sections, with a break between each. The first section introduced midwives to the concepts and theory of antibiotic resistance and antibiotic stewardship. During this session a game using dice was used to inform the midwives how bacteria with differing resistance levels respond to antibiotic treatment. At the beginning of the game we started out with 100 dice, 70 were white and they represented normal bacteria in our bodies. 25 were purple and represented bacteria in our bodies that are mildly resistant to antibiotics, and the final 5 were red and represented bacteria that were strongly resistant to antibiotics. The game was a game of probability. Each dice had to be rolled once. Depending on the number that was rolled, the bacteria either survived or were killed, with each round of rolling representing a dose of antibiotics being taken. Of course, the survival rates of each bacteria differed – with normal bacteria surviving only if a 6 was rolled, mildly resistant bacteria survived a 4, 5 or 6 being rolled, and strongly resistant bacteria survived if a 2, 3, 4, 5, or 6 was rolled. So for the first dose of antibiotics we rolled all 100 dice once to see if they survived or were killed by the antibiotic. The ones that survived were subject to a second dose of antibiotics – a second roll - to see if they survived or were killed by a further dose

of antibiotics, and so on and so on until we had simulated 12 doses of antibiotics or all the bacteria had been killed. By the end of the game it became clear that although there were far fewer strongly resistant bacteria to be killed, they survived the longest as they were harder to kill. The game therefore demonstrated how stopping a course of antibiotics early enables bacteria to develop a greater resistance to antibiotics. Additionally, the game demonstrated that if antibiotics are stopped early that strongly resistant bacteria can survive and multiply.

Following a tea break, the second section of the CME focused on the Ugandan midwife's role in antibiotic stewardship. This section was presented by the midwife who had attended the conference and assisted in the development of the CME. Data that had been collected from antenatal maternity registers were shared with the midwives to show them the conditions for which they had been prescribing antibiotics for over the period of February 2017 to February 2018. Data collected showed recurring conditions for which midwives had prescribed antibiotics on a regular basis in the antenatal period. In order to ensure that the information presented during the CME was relevant to the local context and practice of the midwives, we chose to focus on these conditions. We went through each condition one by one, discussing the current antibiotic prescribing practices that the midwives were using to treat each condition. Then, in conjunction with the Uganda Clinical Guidelines (Ministry of Health, 2016) we discussed the recommended treatment. This allowed for discrepancies in practice to be noted with the intention that drawing comparisons and referring to the guidelines directly would assist midwives in adopting evidence based antibiotic prescribing practices. Copies of the Uganda Clinical Guideline (MoH, 2016) recommendations for the treatment of these common conditions were also made available to all healthcare facilities following the CME.

The final aspect of antibiotic stewardship that was covered in the CME was infection prevention and control (IPC). I invited another Ugandan healthcare professional to present this section. The presenter was a qualified midwife who, at the time, taught at the School of Clinical Officers in Fort Portal. She had extensive teaching experience and had, over the past year, attended intensive training with the Infection Control Africa Network (ICAN) covering all aspects of IPC. She was well known to many of the attendees due to shared histories of their midwifery training and working in the clinical setting. Just prior to the end

of the CME and the final activity, the midwives were asked to reflect on and discuss what they had learnt from the CME. Furthermore, they were asked to make suggestions about how we could move forwards as a group from that point to try and support the implementation of the knowledge they had gained into practice. The suggestions they put forward will be discussed later.

The very final part of the CME involved an activity. Prior to lunch, which was served at the end of the CME, the midwives were asked to rub a hand cream into their hands that is visible under ultraviolet light. In this scenario we suggested that the cream on their hands represented the bacteria that their hands may be contaminated with in the clinical setting. Each midwife then looked at her hands under an ultraviolet light so she could see where the 'bacteria' were located. Following this the midwives were provided with soap, water and a towel so that they could wash and dry their hands and then reinspect them to see how much 'bacteria', if any, remained, before they ate their lunch. This proved to be an entertaining moment of the CME with some friendly competition witnessed between the midwives as they sought to see who had cleaned their hands most effectively. Some surprise was noted by the midwives that the 'bacteria' had been difficult to wash away, and that in the majority of cases, some 'bacteria' remained on their hands. It was hoped that this activity underlined the importance that infection prevention and control plays in antibiotic stewardship, and further, would encourage the midwives to be more vigilant when washing their hands when caring for women and their families.

Assessing the effectiveness of the CME

Knowledge gained from CMEs is often measured by the use of pre and post testing mechanisms. Indeed, the study by Tamboli, Pundarikaksha, Ramaiah, Bhatt and Prasad (2016) assessing the impact of educational sessions on the knowledge and attitudes towards antimicrobial prescribing and awareness of antimicrobial resistance concluded that the sessions had had a significant impact in the improvement of attitude and basic knowledge of antimicrobial resistance and prescribing across a group of medical, dental and nursing students in Bangalore, India. From my point of view this felt like too crude a measure to assess the knowledge gained by the midwives in my study from this

intervention. During my time in Uganda I have participated in teaching neonatal resuscitation and emergency obstetric courses which have employed such means of assessment. Whilst pre and post testing from these sessions has demonstrated a remarkable leap in knowledge, observation in clinical practice has not been seen to align with this increased knowledge. I decided therefore not to use such tests to measure the impact of the CMEs. With behaviour change being a complex process, research findings that report on interventions that improve knowledge and assess the translation of this knowledge into improved patient care is elusive. As a modified action research study with a focus on changing practice to incorporate an evidence base for antibiotic stewardship, this study chose to measure outcomes over a longer period of time with the continued use of observations and secondary analysis of maternity registers. Such a longitudinal approach allowed for continuous mentorship to ensue which has been shown to increase the likelihood of observing and sustaining some level of behaviour change (RCPCH, 2018). At the same time, a longitudinal approach allowed the study to assess the sustainability of introducing an evidence based for antibiotic stewardship.

As discussed in chapter three, providing healthcare professionals with knowledge about evidence-based practice does not always result in a change in practice. As groups we acknowledged the difficulties associated with changing behaviours in the clinical setting and so concluded each CME by discussing how we could move forwards to try and support the implementation of this new knowledge into practice. Suggestions put forward from all the groups were similar and incorporated the ideas linked to the theories of behaviour change according to Michie et al. (2011) and Bergstrom et al. (2012) and to the findings of Brink et al. (2016) about the need for audit and feedback. Furthermore, similar to the suggestions of Pakyz et al. (2014) and Robertson and Jochelson (2006) the midwives recognised the need for feedback to coincide with their practices and relate to their own compliance rates with guidelines. The midwives therefore requested monthly reports about their antibiotic prescribing practices to be made. They requested that these were fed back to each individual healthcare facility so that they were able to assess their successes and identify areas for improvement. Similar to the suggestions of Public Health England (2015) and Meeker et al. (2016), they requested that this feedback also included information on how their counterparts were performing in other healthcare facilities.

The CMEs were held at the beginning of March 2018. For the following six months, March 2018 to August 2018, secondary data analysis of the antenatal registers continued to take place. This served as our monthly audit with the information collected being used to provide individual feedback for each healthcare facility on their antibiotic prescribing practices. This feedback was given in the form of a poster³⁶ which detailed the total percentage of women receiving antibiotics in the month, a breakdown of the conditions for which these antibiotics were prescribed and reminders about guideline recommendations based on the practices that had been identified from the monthly audit. Educational outreach sessions, as suggested by Robertson and Jochelson (2006) are an effective means of changing behaviour and were used to give feedback; when the poster was presented to the healthcare facility I discussed the findings with any midwives present at that time and addressed any questions or problems that they had. This monthly meeting acted as an opportunity for mentorship and clinical supervision. The midwives appreciated the time taken over these sessions. We were able to use them to facilitate learning, clarifying any queries arising, and acted to refresh the midwives' memories about the evidence base provided during the CME sessions.

Conclusion

In light of the knowledge gaps identified in the pilot and context cycles in relation to the understanding midwives in this study had about antibiotic resistance and antibiotic stewardship, as well as requests from all midwives participating in the study for further education on these topics, this chapter has considered current evidence from across the globe pertaining to effective antibiotic stewardship programs and interventions based on behavioural change theories. Developing an effective antibiotic stewardship program is a complex process. Indeed, evidence suggests that adopting a multifaceted approach to behaviour change is more likely to result in a change to said behaviours (Robertson and Jochelson, 2006). Evidence suggests that there are multiple elements to antibiotic stewardship design from the use of information technology, to the need for audit and feedback to good communication. The need for strong, respected and trustworthy

³⁶ See appendix 8 for an example of a monthly poster

leadership in the development of an effective antibiotic stewardship program has been highlighted, suggesting it is imperative to engage senior staff and seek their endorsement in the design and implementation of such initiatives. Additionally, the way in which an antibiotic stewardship program is framed, be that restrictive or persuasive in nature, can affect its level of success. Whilst restrictive approaches have proved to be the more successful design, the combination of both restrictive and persuasive elements into an antibiotic stewardship program may prove to increase its effectiveness as a behaviour changing tool, as opposed to using one technique in isolation.

Most of the evidence presented in this discussion relates to antibiotic stewardship programs in HICs. Uganda lacks many resources that are taken for granted in these areas. Incorporating the considerations outlined in this discussion into a local antibiotic stewardship program may therefore prove to be difficult or even completely inappropriate. What is clear however is the need to consider the issues raised by midwives in the pilot and context cycles regarding local culture and context and their influence of antibiotic stewardship activities. Using this understanding and further, involving the midwives from this study has helped us in the development of an antibiotic stewardship program, that has aimed to act as a relevant and sustainable package that supports midwives to adopt antibiotic stewardship activities, which in turn will lead to improved clinical practice. The next chapter presents the findings of the final three action cycles of this study.

Chapter eight – Findings part two

Introduction

This chapter presents the findings from the final three cycles of this modified action research study; the champions, training and review cycles. As discussed in chapter five, whilst the action research cycles of O’Leary (2004) present as being cyclical and chronological in order, the reality of action research is that there is some overlap between the cycles. I describe each of these cycles individually to allow for clarity, however it should be noted that the cycles necessarily intersected with each other. This chapter is broken down into three main sections. Firstly, it describes the findings of the champions cycle. It then goes on to give a description of those who participated in the training and review cycles, before lastly presenting the findings of these cycles. These findings are broken down into two elements, the first reports on the antibiotic prescribing practices of midwives across the four healthcare facilities, the second looks at more general antibiotic stewardship outcomes following the intervention carried out in the training cycle.

Cycles of action

Figure 8.1 presents the full set of completed cycles of action in this study including the pilot and context cycles. Findings from the pilot and context cycles were presented in chapter five, whilst this chapter focuses on findings from the champions, training and review cycles. In addition to the ‘act’ interventions noted in the cycles it is important to remember that throughout each cycle of activity my clinical activity in the four healthcare facilities allowed me to provide continuous mentorship to midwives in the study to support them in their antibiotic stewardship practices. The role that I played in mentoring the midwives changed during these final three cycles. I received funding for the final year of my PhD studies in April 2018 and so at that point took a step back from my volunteer role with Knowledge for Change (K4C). I remained in Uganda until December 2018. During this time, I continued to work clinically in the four healthcare facilities taking part in this study, although I significantly scaled back the amount of time I spent doing this so that I could focus on PhD writing. From April 2018 until September 2018 my clinical days and mentorship role had a

much stronger focus on supporting midwives to implement the antibiotic stewardship practices we had learnt about in the CMEs. As discussed in chapter seven, at the end of each month once data had been collected regarding antibiotic use, I visited each healthcare facility to present the findings to the midwives. Meeting in this manner facilitated a mentorship session focused completely on antibiotic stewardship.

Champions cycle

During the context cycle of this study the Second National Antimicrobial Resistance Conference for Uganda took place. I had submitted an abstract sharing the findings from the pilot and context cycles and was subsequently invited to present at the conference. At the time it was evident from the interviews that were being conducted, and from the discussions that I was having in clinical practice, that the midwives in this study were calling for further education about antibiotic resistance and antibiotic stewardship. I therefore took the opportunity to invite two Ugandan midwives to attend the conference with me. The rationale being that they could learn about antibiotic resistance from their Ugandan counterparts working in the Ministry of Health and from those working as part of the team developing a national action plan to tackle antibiotic resistance in Uganda. When I asked the two midwives to attend I also had in mind the idea that they may then be able to take a leading part in any further interventions arising in the ongoing cycles of action. When asking them to attend the conference I made these intentions clear and both reported that they would be happy to do so.

Figure 8.1. Complete set of cycles of action

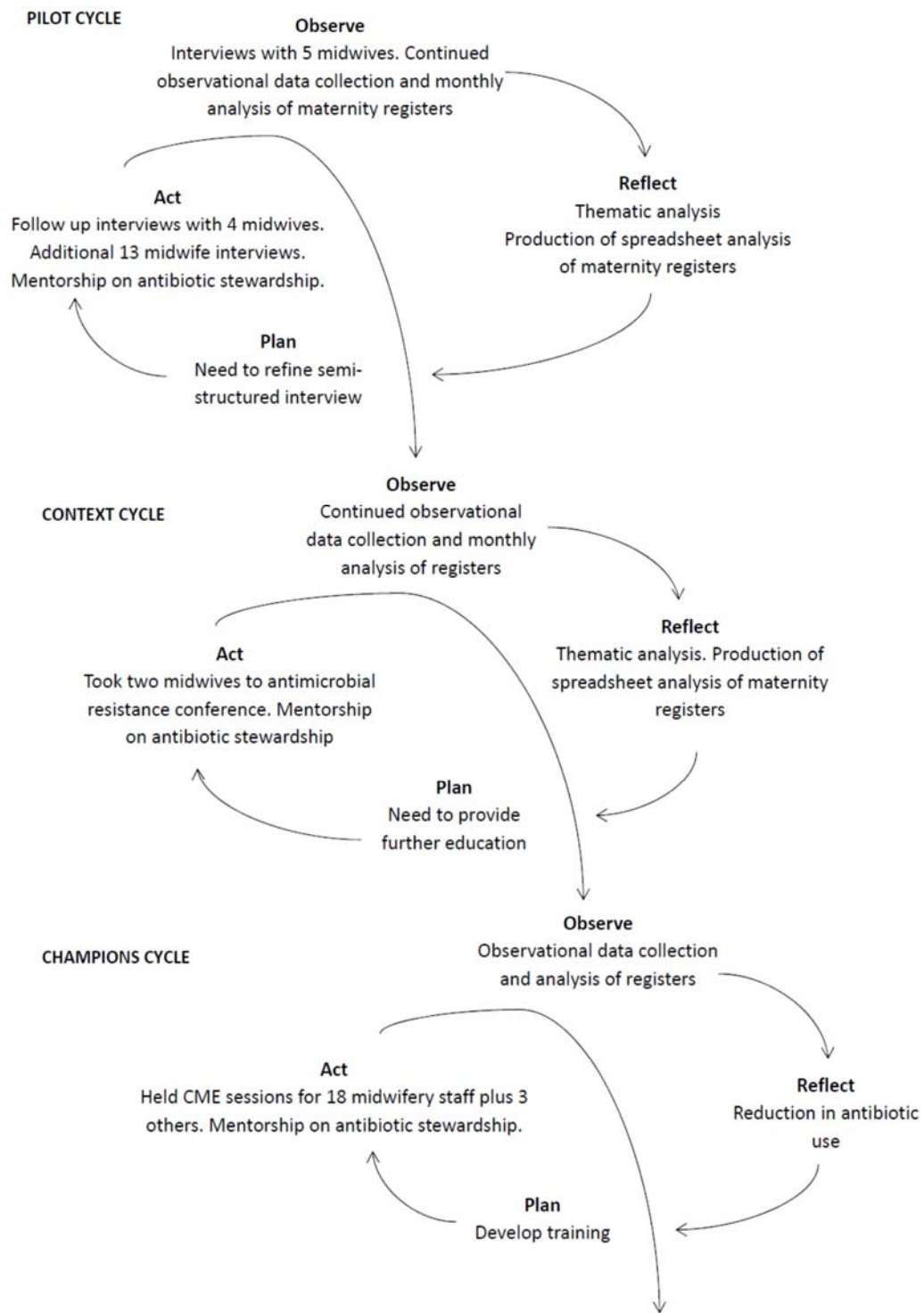
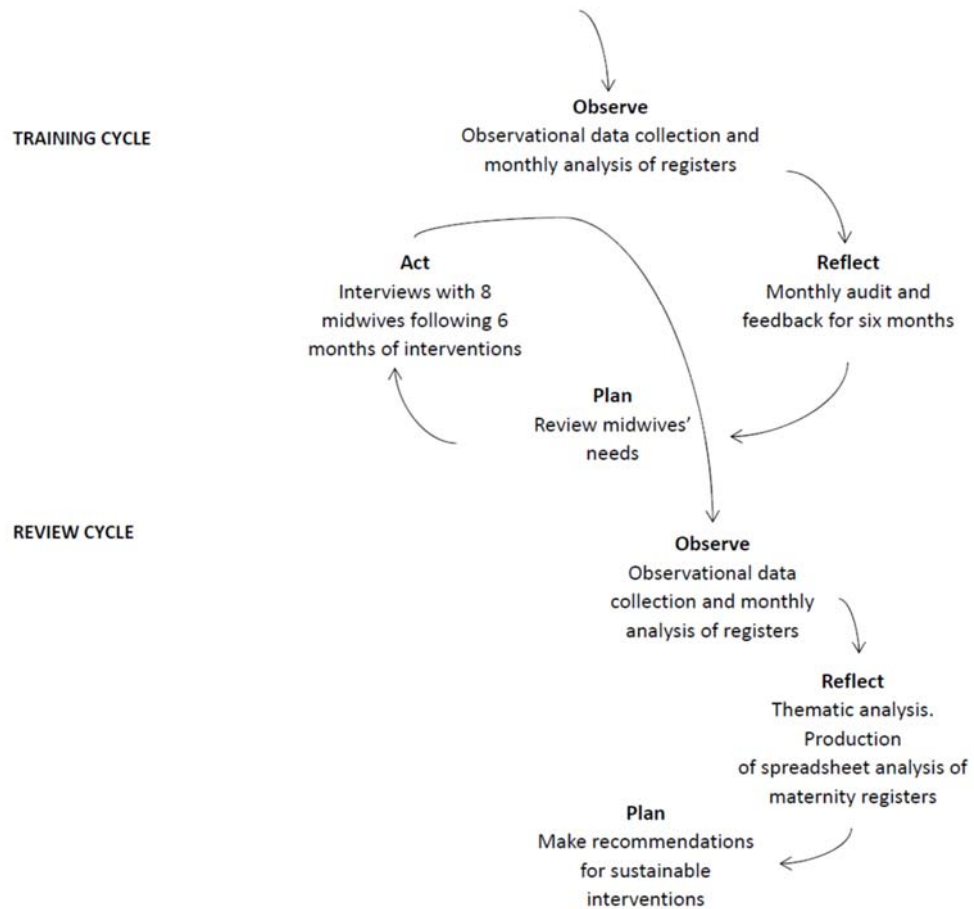


Figure 8.1. cont.



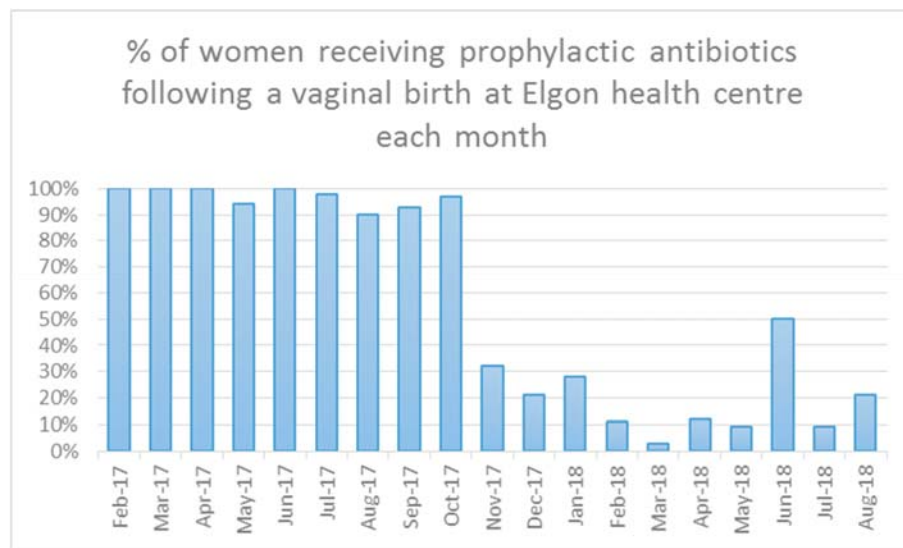
The two midwives were chosen due to their position of authority; both were the lead midwife in their respective healthcare facilities. They were both delighted to be involved and extremely grateful for the opportunity to attend the conference. I realised the significance that this action intervention was having on the first night of the conference:

Today was the first day of the antimicrobial resistance conference. I think bringing Beatrice and Brenda has really helped to clarify things for them. Tonight, once the conference had finished, Beatrice invited us to go and visit her brother and his family. He is a veterinarian and so we ended up discussing what we had been learning about today and the implications of cross-sector antibiotic use. I really felt like Beatrice and Brenda had grasped what antibiotic resistance is, how it develops and its implications. And then just before we left Beatrice's brother's house we said some prayers. Beatrice asked in her prayer for God to support and guide us "to go forth and spread the gospel of antibiotic resistance." I think taking Beatrice and Brenda to this conference has really increased their knowledge and I hope empowered them to share these messages with their colleagues. I am excited to see what happens when we get back to Fort Portal.

Reflective diary – 13th November 2017

My optimism was well founded. Following the conference, I observed immediate changes to practice, albeit antibiotic prescribing practices in the postnatal period. Advice from the World Health Organisation (2013) recommends that women undergoing a normal vaginal birth do not require prophylactic antibiotics following birth unless they have risk factors for infection. Prior to attending the conference, the percentage of women giving birth at Elgon health centre each month who went on to receive prophylactic antibiotics in the postnatal period ranged from 90-100%. Secondary analysis of the postnatal maternity register at Elgon health centre showed that this practice changed the day after we returned from the conference. One of the midwives that had attended the conference came back and shared the knowledge that she had gained from the conference with all her midwifery work colleagues at the facility. Since then midwives at Elgon health centre have been spending more time on providing health education about care of the perineum following birth and reducing the amount of antibiotics that they prescribe. The result; prophylactic antibiotic use in the postnatal period has reduced, with no increase in reported cases of sepsis. Figure 8.2 depicts these findings. We attended the conference in the middle of November 2017. It is clear to see that rates of prophylactic antibiotic prescriptions have reduced and been maintained since then.

Figure 8.2. Postnatal prophylactic antibiotic prescriptions at Elgon health centre



Source: Elgon health centre intrapartum and postnatal register

Data presented in figure 8.2 show that the midwives working at Elgon health centre did not completely eradicate the use of prophylactic antibiotics for women having undergone vaginal birth, and indeed in June 2018 once again a significant proportion (50%) of women received prophylactic antibiotics postnatally. These findings can be explained. Whilst the midwives felt comfortable modifying their antibiotic prescribing practices in the postnatal period, they remained cautious about eradicating the use of antibiotics for women who had sustained an episiotomy or a vaginal tear. This links back to the findings from the pilot and context cycles where midwives identified poor infection and prevention control practices both within the clinical setting and within the woman's domestic environment as risk factors for infection. As an episiotomy or vaginal tear increases a woman's susceptibility to postnatal infection, the midwives at Elgon health centre continued to feel the need to prescribe prophylactic antibiotics for women sustaining such a birth injury as a means of protecting her and reducing her risk of infection. In June 2018 12 of the 24 women giving birth incurred a vaginal tear or episiotomy, hence the 50% prescription rate of postnatal prophylactic antibiotics.

This sudden and sustained change in practice suggested to me that the midwives participating in this study were motivated to learn and furthermore, and possibly most importantly, open and willing to adapt and change their practices. With these thoughts in

mind plans were made to commence another cycle of action that offered all the midwives in the study the opportunity to strengthen their knowledge of antibiotic resistance and antibiotic stewardship practices.

Training cycle

All the midwives interviewed in the pilot and context cycles expressed a desire to receive further education about antibiotic resistance and antibiotic stewardship with a focus on antibiotic prescribing. Chapter seven gave a detailed account of how, as a group, we decided to move forwards. This included a small scale educational continuous medical education (CME) session at the beginning of March 2018 which was followed up with monthly feedback about antibiotic prescribing practices in each facility until the end of August 2018.

Training cycle – Participants

Table 8.1 shows the number of midwives, broken down according to their place of work, that attended the CME on each day. In total 18 midwives were trained during the CME sessions, with three additional attendees also participating in the training over the three days. On day one the midwife who facilitated the infection prevention and control (IPC) sessions in section two of the CME was a participant in the rest of the CME. On day two the clinical officer who is the overall in-charge of Elgon health centre attended the training along with a midwife who had previously worked as a volunteer at Moroto health centre but was at this stage an employed midwife in a local private hospital that provides maternity care.

Table 8.1. Midwives participating in the CME (by healthcare facility)

	No. trained from Elgon	No. trained from Moroto	No. trained from Speke	No. trained from Stanley	No. of others trained	Total
Day one	2	2	3	1	1	9
Day two	0	2	1	1	2	6
Day three	4	0	1	1	0	6
Total	6	4	5	3	3	21

Following the CME sessions, I reflected on those attending and those who were absent:

I was really pleased that Moreen requested to attend one of the CME sessions this week. Although she isn't involved in maternity care at Elgon health centre, she is the overall in-charge. She was paying attention, interactive, asking questions, noting things down and seemed keen to support her staff in implementing antibiotic stewardship activities – and not just the midwives – she said she wanted to pass the things she was learning about on to her staff in the outpatient department. Beatrice, the midwife in charge of Elgon was also present, and helped run the sessions. So overall Elgon had good leadership representation at the CMEs. The lead midwife of Stanley antenatal clinic also attended, but there was no leadership representation from Moroto or Speke health centres. The midwife in-charge of Moroto was on maternity leave so I suppose that couldn't really be avoided. But I invited both the medical director and the lead midwife from Speke and neither of them wanted to come.

Reflective diary – 9th March 2018

Table 8.2 depicts the combined number of Ugandan midwives employed and volunteering at each healthcare facility in the study and the number of these that were trained. Midwives from Stanley antenatal clinic had the highest level of attendance with 100% of their midwives attending the CME. Four out of five of the midwives working at Moroto health centre attended the training, with the absent midwife from this group being on maternity leave. Eight Ugandan midwives are recorded in the table as being employed or volunteering at Elgon health centre. This includes a midwife who at the time of the follow up interviews in the context cycle and during the CME sessions was not available due to her studying in Kampala. Nonetheless, she was kept in the figures as she was employed at the healthcare facility when the study commenced and hopes to return once her studies are complete. The second midwife from Elgon health centre that did not attend the training was looking after a sick relative that week.

Table 8.2. Proportion of midwives from each healthcare facility attending the continuous medical education session

	Elgon	Moroto	Speke	Stanley
No. of midwives employed	8	5	13	3
No. of midwives trained	6	4	5	3
Percentage trained	75%	80%	38%	100%

It is worth noting the significantly lower rate of attendance at the CME by the midwives from Speke health centre. Only five of thirteen eligible midwives attended the training. Of those that didn't attend one was away attending to family matters, two were on night shifts, one was on maternity leave, and one had left. The remaining three midwives said that they would attend but cancelled on the day of the CME and despite being offered the opportunity to attend on a different day, declined. There are several factors that may have contributed to the low attendance rates of midwives from Speke health centre. Firstly, as discussed in chapter two, with a larger team of midwives working at Speke, I wasn't able to develop the same working relationships with the midwives there as I did at the other health centres. As a result, the midwives from Speke health centre may have felt less motivated to attend the training. Secondly, Speke health centre have strong connections with an American NGO. This NGO offers 'per diems' (a daily top up) to those attending CME sessions. As this was not on offer for the CME held as part of the training cycle, it is possible that the midwives at Speke health centre were not motivated to attend the training as they felt they were not duly compensated for giving up their time. Finally, from my time working in Uganda I have observed differences in the working relationships between K4C and Speke health centre as compared to the other health care facilities in this study. K4C have been working with midwives at Elgon health centre for several years and have developed close working relationships, to the extent that the District Health Officer (DHO) views K4C and Elgon health centre as a 'family'. This is quite possibly true and can be linked to other benefits. In particular this 'family' relationship has seen K4C providing additional support for Elgon health centre in terms of infrastructure development, equipment donations and perhaps most importantly, support for the midwives working there to visit the UK on commonwealth fellowships schemes. The midwives at Speke health centre never see these benefits from K4C. As a relatively new build, Speke health centre hasn't needed any assistance with infrastructure. Aside from UK volunteers making donations of equipment themselves, in my time in Uganda K4C never donated any equipment to Speke. Whilst this is most likely because the American NGO frequently make such donations and K4C did not wish to duplicate and therefore waste resources, the midwives may not have seen it this way. Recently in an attempt to strengthen our working relationships with Speke health centre K4C decided to give all the midwives working there new uniforms. K4C told the midwives the plan, measured them all for uniforms and made the subsequent purchase.

The plan was to have a party with the DHO as guest of honour to reintroduce K4C to Speke. However, when the day arrived the DHO was no longer available, the idea of a party was cancelled and the midwives never got their uniforms. Instead the uniforms were given to the midwives working at Elgon health centre. Unsurprisingly the midwives working at Speke asked on numerous occasions where the uniforms that they were promised were. It is possible to imagine that they may have felt disappointed when they were told that they have been given to midwives at another health care facility. Additionally, the medical director and midwives at Speke health centre are aware that K4C pay Stanley hospital and another private hospital to host UK students on their elective placements. Speke are very flexible in accommodating UK students on elective placements and have been for several years, but do not receive this same reimbursement. Whilst Elgon health centre do not either, they receive benefits in kind from K4C as discussed earlier. From these examples alone then it is possible to see that the midwives working at Speke health centre may not feel valued by K4C. This could be a contributing factor in their reduced participation levels in this study both in the context and training cycles.

Review cycle

Following the CME in March 2018 and six months of audit and feedback of antenatal registers, interviews were conducted with eight midwives to seek their views on the whole modified action research project to date. Two midwives from each healthcare facility were interviewed. Table 8.3 presents the midwives who took part in these interviews and provides information relating to their level of qualification and years qualified. All of the midwives interviewed had been interviewed in the context cycle, with the exception of Joniah who was interviewed for the first time during the review cycle. Joniah had been absent from work during the previous cycles of action and had returned to work following the CME in March 2018, although she was not a participant in the CME. Given the need for changes in antibiotic stewardship practice to be sustainable, Joniah was asked to participate in the interviews as a means of assessing how effective her colleagues had been at sharing with her the knowledge that they had gained from the CME.

Table 8.3. Midwives participating in interviews in the review cycle³⁷

Midwife	Highest Midwifery Qualification	Number of years Qualified
Hellen	Certificate	4
Hope	Diploma	6
Irene	Diploma	8
Hildah	Diploma	10
Laureen	Diploma	13
Brenda	Diploma	13
Joniah	Diploma	13
Beatrice	Diploma	16

Findings from the training and review cycles

Data collected and analysed in the training cycle had a strong focus on secondary data analysis of maternity registers with the intention of evaluating whether the CME carried out had had any effect on practice in terms of bringing the antibiotic prescribing practices of midwives into line with guideline recommendations. The first section of this findings chapter reports on antibiotic use in the antenatal period following the introduction of the evidence-base for antibiotic stewardship in the CME. Data collected from observational work also continued during these cycles to support the findings of secondary data analysis. As in the pilot and context cycles, interviews in the review cycle were analysed using thematic analysis assisted by the software package NVivo version 11. Two of the sub-themes arising in the training and review cycles were the same as those in the pilot and context cycles; learning in the field and midwives personal practices. The additional themes of infection prevention and control practices, women's responses, outside influences on prescribing practices, and attitude also arose from the training and review cycles. These are presented in the second section of this chapter. The final section of this chapter presents findings around the ability of the midwives in the study to apply the knowledge they gained from the training cycle into their wider practice. Finally, findings are used to

³⁷ Pseudonyms have been used

discuss the changes that occurred in practice following the training cycle as perceived by the midwives compared to reality.

Antibiotic use

Prior to the CME it was clear that midwives were prescribing a range of antibiotics for a variety of conditions, some of which, when classified by the midwives, did not appear to be bacterial in nature and therefore non-responsive to antibiotics. Midwives were also prescribing antibiotics for what they perceived to be bacterial conditions, although sometimes the prescribed antibiotic was found to differ from recommendations in the Uganda Clinical Guidelines (MoH, 2016). Each of the healthcare facilities and groups of midwives in this study have followed different paths in adjusting their antibiotic prescribing practices. Findings will consider the overall rates of antibiotics being prescribed and what percentage of these are prescribed for perceived bacterial conditions for each facility. As findings from the pilot and context cycles identified that midwives in the study were frequently prescribing antibiotics for the perceived non-bacterial conditions of cough and lower abdominal pain (LAP), this chapter will also present the antibiotic prescribing rates for these conditions following the CME. Finally, the use of antibiotics for urinary tract infections (UTIs) was identified in the pilot and context cycles as being problematic, thus findings from the training and review cycles will take time to consider any changes in antibiotic prescribing practices of midwives at each facility for UTI. The CMEs were held in March 2018, with follow up data collected during this month up until August 2018. Findings are therefore presented in a manner that allows for comparisons to be made between the months of March to August 2017 and March to August 2018 in the hope that any possible seasonal variations are accounted for. As Speke health centre only commenced using the same antenatal register as the other healthcare facilities in October 2017 these comparisons cannot be made for Speke.

As mentioned in chapter three, significant problems were encountered at Speke health centre in terms of documentation. As data is missing for the indication of antibiotic prescriptions at Speke health centre, the only findings in terms of antibiotic use that can be reported on is that of overall use.

Overall antibiotic use

Table 8.4 shows the numbers of women attending Elgon antenatal clinic each month and the corresponding proportion of them that received antibiotics. These findings are depicted in graph form in figure 8.3 which allows for a clear comparison of this data between March to August 2017 and 2018.

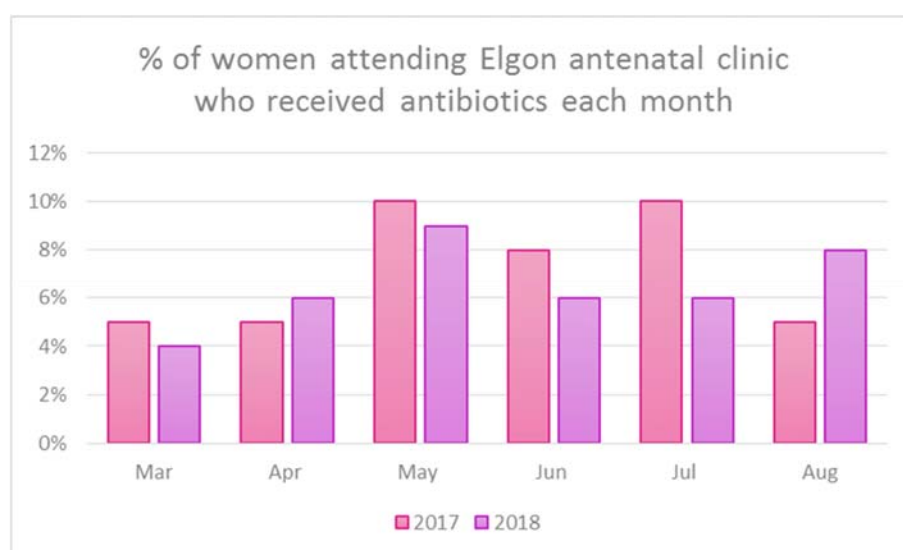
Table 8.4. Numbers of women attending Elgon antenatal clinic and percentage of these receiving antibiotics (pre and post CME)

ELGON	Feb 17	Mar 17	Apr 17	May 17	Jun 17	Jul 17	Aug 17	Sep 17	Oct 17	Nov 17	Dec 17
No. of women	135	173	166	239	196	225	337	242	264	274	226
% receiving Abx	3	5	5	10	8	10	5	9	7	12	15

ELGON	Jan 18	Feb 18	CME	Mar 18	Apr 18	May 18	Jun 18	Jul 18	Aug 18
No. of women	270	212		235	215	253	242	253	218
% receiving Abx	3	11		4	6	9	6	6	8

Source: Elgon antenatal clinic register

Figure 8.3.



Source: Elgon antenatal clinic register

These findings indicate that the rate of antibiotic prescribing at Elgon antenatal clinic continues to show small fluctuations with no clear reason as to why. In March, May, June and July 2018 the percentage of antibiotics prescribed were lower than in their counterpart months of 2017. However, April and August 2018 had higher rates of antibiotic prescriptions than April and August 2017. From March to August 2017 the mean average percentage of women prescribed antibiotics each month in Elgon antenatal clinic was 7%. This mean average was the same from March to August 2018 suggesting little overall variation in the antibiotic prescribing practices of midwives at Elgon health centre. In considering the six months following the CME there are some potential explanations that may account for changes in antibiotic prescribing levels. In March 2018 only 4% of women attending the antenatal clinic received antibiotics. As the CME took place during the first week of March 2018 it is possible that the midwives at Elgon were feeling enthusiastic about implementing what they had learned from the CME, and further, the knowledge they had obtained, was fresh in their minds. April and May 2018 saw the percentage of antibiotics prescribed to antenatal women increase to 6% and the highest of the six month period, 9% respectively. It was during these months that Elgon health centre had an influx of Ugandan volunteer midwives. Volunteer midwives in Uganda are Ugandan midwives that have finished their midwifery training but have yet to receive their results or find employment. With permission from the District Health Officer they are allocated to different health centres to work clinically as to maintain their skills whilst they seek employment. In relation to this study there are two combined potential problems with this that may have contributed to the increase in the percentage of antibiotic prescriptions. Firstly, as reported in chapter five, the findings from the pilot and context cycles identified that current midwifery education leaves newly qualified midwives unprepared for their role as antibiotic prescribers. Secondly, the Ugandan volunteer midwives were not working at Elgon at the time of the CME, so missed the training, and further, may not have been given an update when they started working from those colleagues who attended the CME:

“I don’t know for us because we need to maybe orientate them about antibiotics. Like the training we got. I have never done that. I have never done that to them, that you know, this is what is supposed to be done as far as antibiotic prescription is concerned. So I don’t know if there is any other person that did that. Myself I have not met them individually or as a group to tell them how antibiotics have been prescribed. And it is us who is supposed to tell them because it is us who had the training [laughs].” Laureen

Other midwives from Elgon health centre informed me that they had given the Ugandan volunteer midwives a brief update from the CME. Either way, it is possible that the information passed on to the Ugandan volunteer midwives may have lacked some detail. This suggests the need for new staff to be fully inducted into the clinical area with appropriate information provided pertaining to evidence based antibiotic prescribing practices.

The issues facing Moroto health centre in adapting their antibiotic prescribing practices to align with evidence differ from those of Elgon health centre. Table 8.5 and figure 8.4 present details of the number of women attending Moroto antenatal clinic and the corresponding percentages of them receiving antibiotics. Findings indicate that average monthly antibiotic use increased at Moroto health centre following the CME; the mean average percentage of antibiotics prescribed over the months March to August 2017 and March to August 2018 increased from 12% to 14% respectively. Furthermore, for every comparable month between 2017 and 2018, with the exception of August, antibiotic use was higher in 2018.

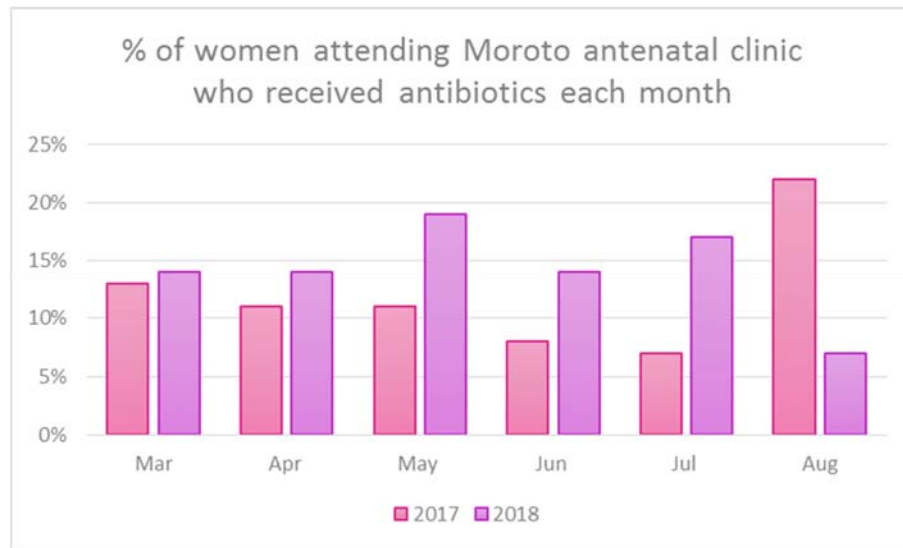
Table 8.5. Numbers of women attending Moroto antenatal clinic and percentage of these receiving antibiotics (pre and post CME).

MOROTO	Feb 17	Mar 17	Apr 17	May 17	Jun 17	Jul 17	Aug 17	Sep 17	Oct 17	Nov 17	Dec 17
No. of women	134	136	121	173	147	135	161	110	153	123	84
% receiving Abx	8	13	11	11	9	7	22	18	9	18	23

MOROTO	Jan 18	Feb 18	CME	Mar 18	Apr 18	May 18	Jun 18	Jul 18	Aug 18
No. of women	122	114		108	114	124	88	109	125
% receiving Abx	18	13		14	14	15	14	17	7

Source: Moroto antenatal clinic register

Figure 8.4.



Source: Moroto antenatal clinic register

One possible explanation for this relates to the presence of K4C volunteers from the UK working at Moroto health centre. When I first went to Uganda in November 2016, K4C had been working with the midwives at Moroto health centre for approximately three months. By the following November due to a lack of engagement from the Moroto team, K4C decided to withdraw from working at Moroto health centre. During the time that K4C were working at Moroto it was clear that the midwives working there viewed UK volunteers as substitute labour. The busiest days in antenatal clinic at Moroto are Monday and Tuesday. On a Monday the midwife on duty runs antenatal clinic and the child immunisation clinic. A Tuesday will see the midwife run the antenatal clinic and the prevention of mother to child transmission (PMTCT) for HIV clinic. As a result, the midwives working at Moroto requested UK volunteers to work with them on these days. For the months of December 2016 to May 2017 a UK obstetrician worked at Moroto on a Monday, running the antenatal clinic almost independently. Equally I worked there regularly over the same period on a Tuesday. At the time I reflected on how this may impact on the findings of this study:

I collected the data for April from Moroto's antenatal clinic register today. I had a good look back through the register and it was obvious that most women attend for antenatal care on a Monday or Tuesday – the days that Angela and I work. Even looking at the register it is her handwriting and my handwriting in the register on these days. I need to be cautious in drawing any conclusions from the findings of secondary data analysis at Moroto as they might have lower rates of antibiotics being prescribed than the other health centres, but that isn't a reflection of the midwives' practice. It is a reflection of Angela and I working there and being used as substitute labour.

Reflective diary – 2nd May 2017

From June 2017 onwards a reduced number of UK volunteers working with K4C saw my ability to work at Moroto lessened as I was required to spend time in other healthcare facilities that could accommodate UK students on elective placements. It is possible therefore that the lower rates of antibiotic prescribing seen in the months February to June 2017 reflect the fact that it was not in fact Ugandan midwives who were assessing the majority of women attending antenatal clinic during this time. Both the UK obstetrician and myself, a UK midwife, have a good grasp of what constitutes appropriate antibiotic prescribing, and therefore we may have biased antibiotic prescribing rates during this period.

By the end the training cycle, (August 2018) the percentage of antibiotics prescribed at Moroto was at least half that of the months March to July 2018. I believe that this demonstrates that it takes time and repetition for knowledge to be embedded and furthermore put into practice. During the six month training cycle when I attended Moroto health centre to give monthly feedback, I was almost always met by the same two midwives regardless of what day of the week it was. It transpired that these two midwives consistently worked weekdays, the days on which antenatal clinic sees the most women. As we came together every month for small group meetings I reflected they were more able to effectively learn from feedback and apply it to their practice as time went on:

It doesn't matter what day of the week I go to Moroto to give monthly feedback, I always find Hildah and Joniah on duty. I think that is because the others seem to take it in turns to cover nights. In a way it feels beneficial as we can sit and discuss their antibiotic prescribing over the past month and talk about how we can improve etc... By seeing them every time I can see them becoming more familiar with the Uganda Clinical Guidelines. It is almost the same at Stanley antenatal clinic, as generally the whole team are there when I go to give feedback. But at Elgon and Speke it feels different. I meet a different midwife each time. I'm not sure they always pass on any issues arising that we have discussed.

Reflective diary – 15th June 2018

By comparison to Elgon and Moroto health centres, the midwives working at Stanley hospital antenatal clinic appeared to change their antibiotic prescribing practices immediately after the CME. In particular the mean average percentage of antibiotics prescribed in antenatal clinic during the months March to August 2017 and March to August 2018 fell from 12% to 7% respectively, with percentages between March and August 2018 consistently below 10%. These findings are depicted in table 8.6 and figure 8.5.

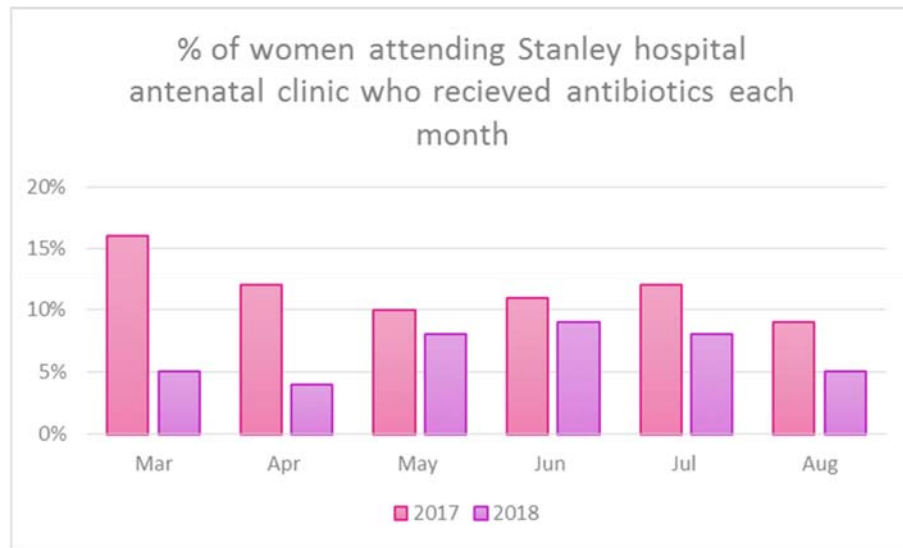
Table 8.6. Numbers of women attending Stanley hospital antenatal clinic and percentage of these receiving antibiotics (pre and post CME).

STANLEY	Feb 17	Mar 17	Apr 17	May 17	Jun 17	Jul 17	Aug 17	Sep 17	Oct 17	Nov 17	Dec 17
No. of women	848	1107	923	1052	902	1137	1286	990	920	807	713
% receiving Abx	11	16	12	10	11	12	9	7	8	4	6

STANLEY	Jan 18	Feb 18	CME	Mar 18	Apr 18	May 18	Jun 18	Jul 18	Aug 18
No. of women	899	683		830	804	893	785	836	785
% receiving Abx	12	10		5	4	8	9	8	8

Source: Stanley hospital antenatal clinic register

Figure 8.5.



Source: Stanley hospital antenatal clinic register

It is interesting that the midwives working at Stanley hospital reduced, quite considerably, the percentage of antibiotics they prescribed over these six months. This result could possibly be explained by the differing work patterns of these midwives. Specifically, these midwives all work together every week day in the antenatal clinic *only*. This has given them the opportunity to put into practice what they learned in the CME every day so that changes in practice have become the norm quite quickly. In contrast all the midwives working at Elgon, Moroto and Speke health centres have differing shift patterns, meaning they may work weekends and nights when there are no antenatal appointments. Coupling this with the fact that they see fewer women in their antenatal clinics and that they are responsible for providing intrapartum and postnatal care whilst simultaneously providing antenatal care leaves them with less of an opportunity to consolidate the messages shared in the CME about appropriate antibiotic prescribing practices. Initially, when the midwives at Stanley antenatal clinic were making such good progress in reducing the percentage of antibiotics prescribed each month, I had some concerns. I became worried that the midwives at Stanley antenatal clinic may have been concerned about reducing their antibiotic prescribing levels to be seen as the best performing healthcare facility, as opposed to ensuring women were getting antibiotics when they were required. However,

on discussion with the midwives it became clear that this wasn't their target, and that they understood there will always be some women that will need antibiotics:

I was giving the midwives at Stanley antenatal clinic feedback today about their antibiotic prescribing practices for May 2018. We were comparing the results for March, April and May. Brenda was saying that the group were disappointed that their overall percentage of antibiotics prescribed in May 2018 had gone up to 8% when it had been 5% and 4% in March and April respectively. She had hoped to maintain a lower percentage antibiotic prescription rate. I was relieved however that on discussion she acknowledged that there will always be conditions that require treatment with antibiotics, and that she knew that the rate would never reach 0%.

Reflective diary – 13th June 2018

Finally, and as previously discussed, it is difficult to draw any conclusions about the antibiotic prescribing practices of the midwives at Speke health centre due to missing data. Table 8.7 presents the data that was available. It is important to note that the transition period where Speke started using the same antenatal register as the other healthcare facilities in this study began in October 2017 and finished at the end of December 2017. During these three months two types of register were being used to document details of antenatal visits and therefore data for these three months is incomplete.

Table 8.7. Numbers of women attending Speke antenatal clinic and percentage of these receiving antibiotics (pre and post CME). Source: Speke antenatal clinic register

SPEKE	Oct 17	Nov 17	Dec 17
No. of women	185	246	302
% receiving Abx	15	12	21

SPEKE	Jan 18	Feb 18	CME	Mar 18	Apr 18	May 18	Jun 18	Jul 18	Aug 18
No. of women	443	416		355	411	436	410	459	449
% receiving Abx	18	13		10	14	15	13	14	14

Despite that fact that comparisons cannot be made between years it is possible to see that the percentage of antibiotics prescribed in Speke antenatal clinic following the CME have

remained constant, with a monthly mean average of 13% of women being prescribed antibiotics between March and August 2018. With no details pertaining to the percentage of antibiotics being prescribed each month at Speke antenatal clinic prior to the CME, few conclusions can be drawn about any changes in antibiotic prescribing habits.

On the surface these initial findings are disheartening. They illustrate little reduction in the percentages of antibiotics being prescribed across the four healthcare facilities, with one facility even seeing a rise in the percentage of antibiotics prescribed each month. These findings should not be considered in isolation, as closer inspection offers evidence of improved antibiotic prescribing practices.

Antibiotic use for perceived bacterial infections

Again, taking each healthcare facility one at a time, findings show changes in the use of antibiotics for appropriate conditions, namely there has been an increase in the percentage of antibiotics being prescribed for perceived bacterial conditions. This is not to say that midwives were prescribing more antibiotics, rather they were making appropriate antibiotic prescribing decisions as they had become able to identify conditions for which antibiotics should be prescribed. This increase is coupled with a reduction in the prescription of antibiotics for perceived non-bacterial conditions. It is again essential at this point to make the important note that was made in chapter five about the classification of perceived bacterial and perceived non-bacterial conditions in the Ugandan healthcare setting. A lack of diagnostic testing facilities leads midwives to make diagnoses, and subsequent antibiotic prescribing decisions, based solely on the signs and symptoms that a woman presents with. Findings therefore do not guarantee to reflect that these perceived bacterial and perceived non-bacterial conditions are indeed bacterial and non-bacterial conditions; they may have been classified incorrectly.

At Elgon health centre there have been mixed findings in relation to prescribing for perceived bacterial and perceived non-bacterial conditions; in the first three months following the CME there was a rise in the percentage of antibiotics prescribed for perceived non-bacterial conditions compared to the same months in 2017. Furthermore, in May 2018 there was an increase in the percentage of antibiotics prescribed for perceived non-

bacterial conditions (54%) as compared to April 2018 (23%). I pondered on many occasions why these fluctuations in antibiotic prescriptions were arising:

I collected data from antenatal clinic registers today and trying to get my head around the fluctuations at Elgon health centre. In part there are new Ugandan volunteer midwives who are perhaps not familiar with the training that we did. I do try and talk to them about it, but as I am not present as much as I used to be and they don't know me so well, I am not sure that they are fully taking the message on board. I don't think it is just them though. All the midwives working at Elgon have both been taking antibiotics and prescribing them for all sorts of conditions for years. I can still sense from Pauline and Monica that they prefer to err on the side of caution and give antibiotics, which is understandable. It is hard to change the habit of a lifetime. And Peace admits that she still self-medicates for her own simple cough, so it is not surprising that she is still prescribing antibiotics for cough. I must remember that old habits die hard and change takes time. Laureen and Beatrice seem more confident in their antibiotic prescribing decisions, so perhaps with time this will filter to the others.

Reflective diary – 18th June 2018

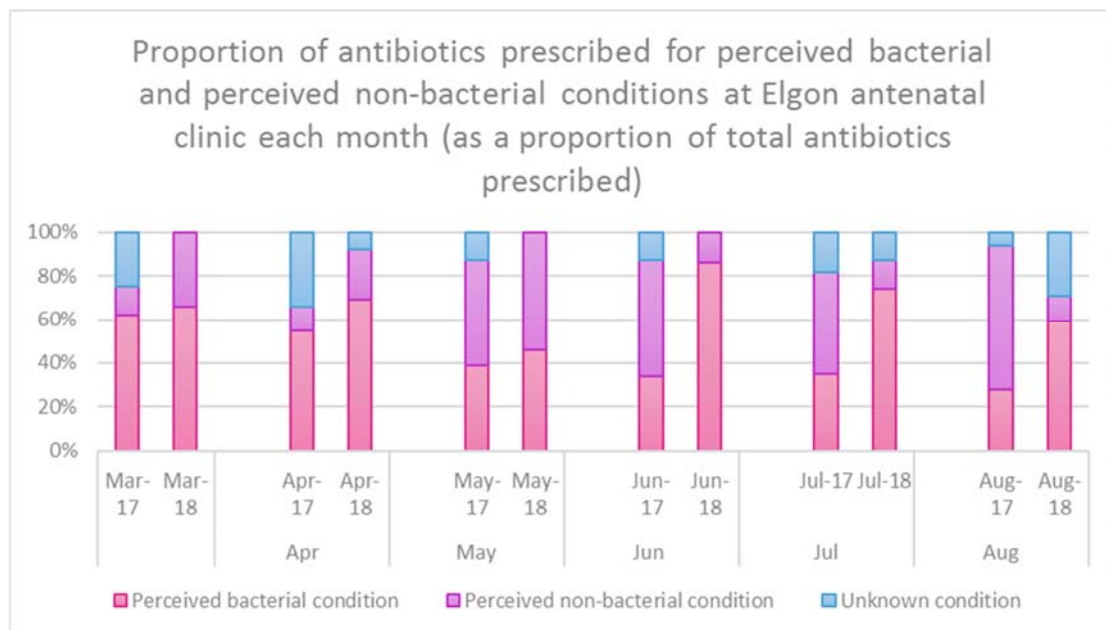
In the final three months following the CME, June, July and August 2018 findings show a continued reduction in the percentage of antibiotics prescribed for perceived non-bacterial conditions at 14%, 13% and 12% respectively. Table 8.8 and figure 8.6 depict these findings.

Table 8.8. Percentage of antibiotics prescribed for perceived bacterial and perceived non-bacterial conditions at Elgon health centre each month (as a percentage of total antibiotics prescribed).

ELGON	Year	Perceived bacterial condition	Perceived non-bacterial condition	Unknown condition
March	2017	62%	13%	25%
	2018	66%	34%	0%
April	2017	55%	11%	34%
	2018	69%	23%	8%
May	2017	39%	48%	13%
	2018	46%	54%	0%
June	2017	34%	53%	13%
	2018	86%	14%	0%
July	2017	35%	47%	18%
	2018	74%	13%	13%
August	2017	28%	66%	6%
	2018	59%	12%	29%

Source: Elgon antenatal clinic register

Figure 8.6.



Source: Elgon antenatal clinic register

These findings suggest that over time the midwives have been able to improve their practice; in June, July and August 2018 they consistently reduced the percentage of antibiotics prescribed for perceived non-bacterial conditions. Consideration of the percentages of antibiotics prescribed for perceived bacterial conditions however, raises questions. Whilst in every comparable month from March to August there was an increase in the percentage of antibiotics prescribed for perceived bacterial conditions in 2018 as compared to 2017, the percentage fluctuated between 46% and 86%, with the lowest percentage of antibiotics prescribed for perceived bacterial conditions occurring in May 2018. This finding again coincides with the introduction of the new Ugandan volunteer midwives working at Elgon health centre and underlines the need for induction training to take place. Of concern in the final three months following the CME, the percentage of antibiotics prescribed for perceived bacterial conditions steadily decreased from 86% in June 2018, to 74% in July 2018 and 59% in August 2018. This coincided however with a reduction in antibiotics being prescribed for perceived non-bacterial conditions. It seems that this phenomenon can be explained by the fact that in July and August 2018 there was an increase in the percentage of antibiotic prescriptions made for an “unknown condition”. In other words, the antenatal register was not filled out correctly – the “other treatment” column recorded that antibiotics had been given, but the “diagnoses” column was left

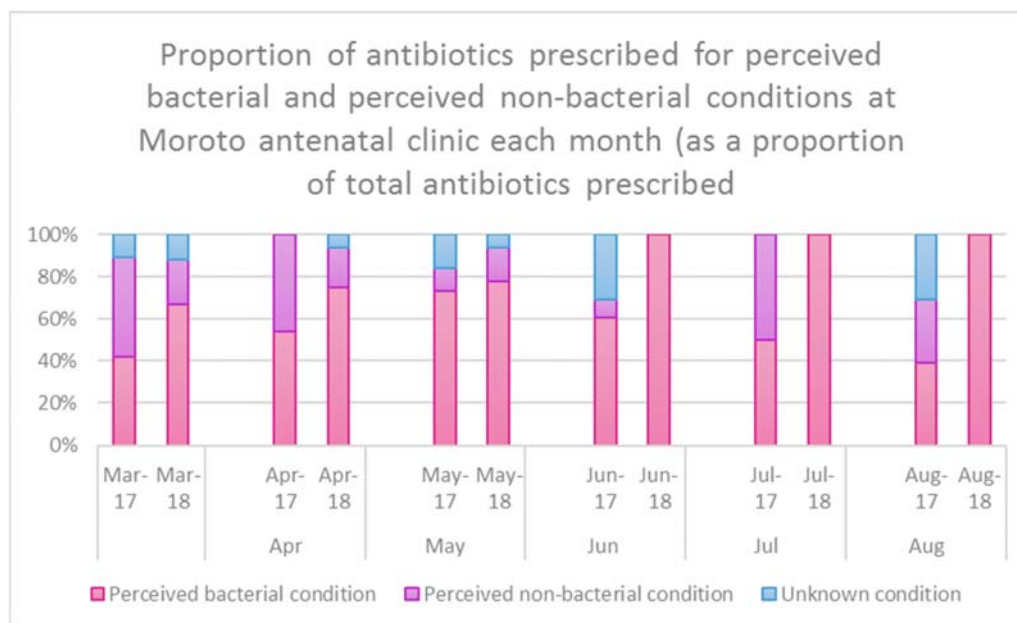
blank. This finding can be explained. In July and August a temporary midwife was recruited to work at Elgon health centre to assist in covering the rota to allow the full time midwives to undertake some research work. The midwife recruited was newly qualified and although had worked in 2017 at Elgon health centre in the capacity of a volunteer midwife, had spent the majority of her time in that role undertaking the “hands on” clinical work whilst the full time midwife had documented findings in the antenatal register. It is possible therefore that this increase in the percentage of antibiotics being prescribed for an unknown condition is attributable to the inexperience of the midwife employed to cover the clinic. Indeed, on analysing the register, it was her handwriting that had documented ‘normal pregnancy’ in the “diagnoses” column in cases where antibiotics had been prescribed.

Despite the overall increase in the percentage of antibiotics prescribed in antenatal clinic at Moroto following the CME, improvements have been seen in the appropriate use of antibiotics. Despite a comparative increase in the percentage of antibiotics prescribed for non-bacterial conditions between May 2017 (11%) and May 2018 (16%) in every other comparable month there was a decrease in the percentage of antibiotics being prescribed for perceived non-bacterial conditions and an increase in the percentage of antibiotics being prescribed for perceived bacterial conditions. The final result in June, July and August of 2018 showed that 100% of all antibiotic prescriptions made at Moroto antenatal clinic were made for perceived bacterial conditions. These findings are depicted in table 8.9 and figure 8.7.

Table 8.9. Percentage of antibiotics prescribed for perceived bacterial and perceived non-bacterial conditions at Moroto antenatal clinic each month (as a percentage of total antibiotics prescribed). Source: Moroto antenatal clinic register

MOROTO	Year	Perceived bacterial condition	Perceived non-bacterial condition	Unknown condition
March	2017	42%	47%	11%
	2018	67%	21%	12%
April	2017	54%	46%	0%
	2018	75%	19%	6%
May	2017	73%	11%	16%
	2018	78%	16%	6%
June	2017	61%	8%	31%
	2018	100%	0%	0%
July	2017	50%	50%	0%
	2018	100%	0%	0%
August	2017	39%	30%	31%
	2018	100%	0%	0%

Figure 8.7.



Source: Moroto antenatal clinic register

As mentioned earlier, two midwives at Moroto health centre consistently worked the day shifts from Monday to Friday. With these days being the main days on which an antenatal clinic is held, these two midwives were able to consolidate what they had learnt from the CME over time. Indeed, findings reflect that as time passed, steady increases were made

in appropriate antibiotic prescribing practices. Additionally, as previously mentioned, whenever I attended Moroto health centre to give monthly feedback I was always met by one, or both, of these midwives. I feel that having repeated discussions with the midwives who were consistently running the antenatal clinic has been a contributing factor in the ability of the midwives to appropriately prescribe antibiotics.

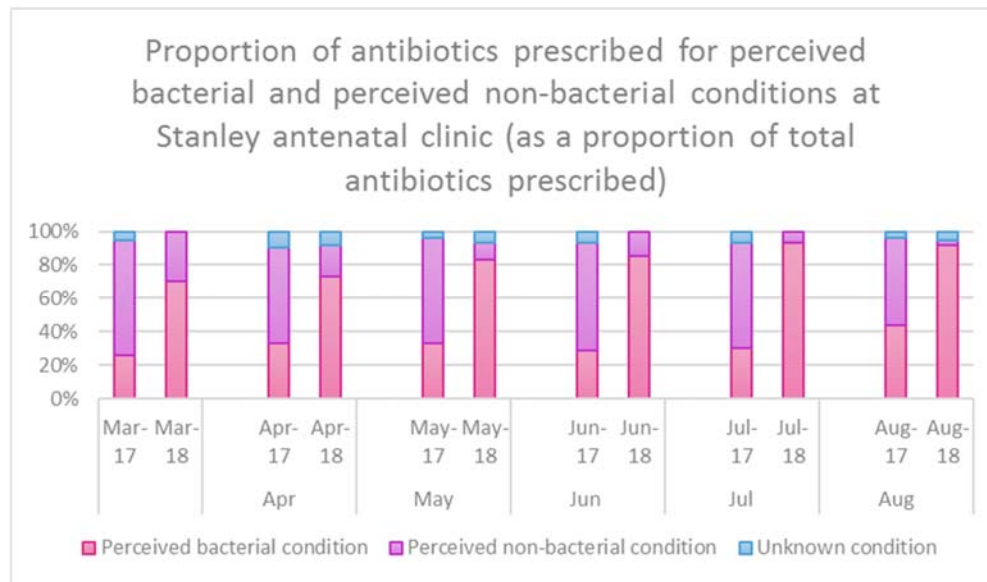
Unlike Moroto, the midwives working in Stanley antenatal clinic did not see their antibiotic prescription rates for perceived bacterial conditions reach 100% in any one month. Nonetheless, Stanley antenatal clinic has seen changes in the antibiotic prescribing rates for perceived bacterial and perceived non-bacterial conditions. In every comparable month between March to August 2017 and 2018, there was a reduction in the amount of antibiotics prescribed for perceived non-bacterial conditions. Furthermore, over the six month period from March to August 2017 the percentage of antibiotics prescribed for perceived bacterial conditions ranged from 26-44% at the Stanley antenatal clinic. Following the CME there has been an improvement with the percentage of antibiotics prescribed for perceived bacterial conditions ranging from 70-93%. These findings are depicted in table 8.10 and figure 8.8.

Table 8.10. Percentage of antibiotics prescribed for perceived bacterial and perceived non-bacterial conditions at Stanley hospital antenatal clinic each month (as a proportion of total antibiotics prescribed)

STANLEY	Year	Perceived bacterial condition	Perceived non-bacterial condition	Unknown condition
March	2017	26%	69%	5%
	2018	70%	30%	0%
April	2017	33%	57%	10%
	2018	73%	19%	8%
May	2017	33%	63%	4%
	2018	83%	10%	7%
June	2017	29%	64%	7%
	2018	85%	15%	0%
July	2017	30%	63%	7%
	2018	93%	7%	0%
August	2017	44%	52%	4%
	2018	92%	3%	5%

Source: Stanley antenatal clinic register

Figure 8.8.



Source: Stanley antenatal clinic register

I feel these increasing levels of antibiotic prescriptions for perceived bacterial conditions, and therefore appropriate conditions, at Stanley hospital are, again, perhaps attributable to the working patterns of the midwives working in the antenatal clinic. As discussed earlier the midwives working at Stanley hospital run the antenatal clinic every day and have been able to consistently put what they learnt in the CME into practice with the result that they have been able to enhance their antibiotic prescribing practices. Furthermore, and similarly to the situation at Moroto health centre, as all the midwives at Stanley antenatal clinic work every weekday, I was always able to address two to three of the team at one time during the monthly feedback sessions. This means that month on month the majority of midwives working in the antenatal clinic were present for ongoing discussions about appropriate antibiotic prescribing practices. Ultimately then, they were repeatedly reminded of the evidence base for antibiotic stewardship that was presented in the CME. These repetitive reminders may explain why midwives working at Stanley antenatal clinic consistently increased the percentage of antibiotic prescriptions they made for perceived bacterial conditions, as compared to the midwives working at Elgon antenatal clinic. Usually only one midwife works on any one day at Elgon health centre, so when I attended to give feedback sessions, I was unable to directly reach all of the midwives working there. The midwives working at Elgon antenatal clinic therefore had less exposure to reminders

about appropriate antibiotic prescribing practices as compared to their counterparts working at Moroto and Stanley.

Despite the differences in the percentages of antibiotics being prescribed between the midwives working in different health care facilities, these findings suggest overall that as time has passed following the CME, midwives became more able to distinguish between conditions that require antibiotics and those that do not. These findings are reflected in the reduction in the percentage of antibiotics being prescribed for conditions such as cough and lower abdominal pain (LAP).

Antibiotic use for cough and lower abdominal pain

Given the general increase in antibiotics being prescribed for perceived bacterial conditions in the months of March to August 2018 compared to the same period in 2017, and combined decrease in antibiotics being prescribed for perceived non-bacterial conditions, it is perhaps not surprising to note that there was a reduction in the percentage of antibiotics being prescribed each month at Elgon antenatal clinic for the non-bacterial conditions of cough and LAP.

Whilst the percentage of antibiotic prescriptions for cough were higher in March and April 2018 compared to March and April 2017, the following months, May to August 2018, saw a reduction in the percentage of antibiotics being prescribed for cough by the midwives at Elgon health centre compared to the same months in 2017. These findings are presented in table 8.11 which also contains figures related to antibiotic prescriptions made for LAP.

Table 8.11. Percentage of antibiotics prescribed for cough and LAP at Elgon antenatal clinic each month (as a proportion of total antibiotics prescribed).

ELGON	Year	Cough	Lower abdominal pain
March	2017	13%	0%
	2018	22%	0%
April	2017	0%	0%
	2018	8%	8%
May	2017	35%	4%
	2018	17%	8%
June	2017	20%	33%
	2018	0%	0%
July	2017	27%	9%
	2018	13%	0%
August	2017	17%	22%
	2018	6%	0%

Source: Elgon antenatal clinic register

The midwives working at Elgon health centre continued to prescribe antibiotics for cough in spite of evidence to the contrary. It was only in June 2018 that they did not prescribe any antibiotics for cough. I discussed this with the midwives during our monthly feedback sessions and a reason that was repeatedly mentioned for the use of antibiotics for cough was the presence of HIV; midwives felt that HIV positive women needed antibiotics to fight the cough as they are already immunocompromised. The midwives were concerned therefore that if the cough was not treated the condition may worsen and the woman deteriorate and develop a severe infection. However, on inspection of the antenatal registers, the majority of women who had been prescribed antibiotics for a cough were not HIV positive. Although we know behaviour change is notoriously difficult, it is interesting to consider why the midwives struggled more than their counterparts at Stanley antenatal clinic to reduce the percentage of antibiotics prescribed each month for cough. As mentioned previously, an influx of Ugandan volunteer midwives working at Elgon in April and May 2018, who were given brief updates about appropriate antibiotic prescribing practices, may have been a contributing factor to these prescriptions for cough. An alternative explanation relates to the individual beliefs that each midwife holds about the use of antibiotics for coughs:

I popped to Elgon today to say hello to the midwives. They were all having a meeting. Peace told me that she was feeling unwell since yesterday and that overnight she had had a fever and a cough. When I asked her if she had been drinking plenty and if she had taken any paracetamol to soothe any pain, she grinned at me and laughed! She told me "Jo! I have taken amoxicillin. The cough will not get better without it." Fortunately, the other midwives were listening to our conversation and so it was them that told Peace she needed to get herself to the market and buy some fresh fruit and some lemon and honey so that she could add it to hot water to soothe her throat and cough. Whether or not she will take their advice I don't know. It seems she still believes antibiotics are required to cure a simple cough.

Reflective diary – 6th August 2018

In the case of Elgon health centre I feel there are two midwives who struggled more than others to change their treatment decisions for cough. As presented above, one midwife working at Elgon health centre openly stated that she continued to use antibiotics herself when she has a cough or cold. Given that she maintained the view that antibiotics are effective in treating these conditions, it is possible that she continued to prescribe antibiotics to women presenting with cough at Elgon antenatal clinic. It is very difficult to try and change this ingrained habit without the midwife herself having first-hand experience of recovering from a cough without using antibiotics. Equally, one of the midwives working at Elgon health centre recently undertook training to be a clinical officer. Clinical officers in Uganda are the equivalent to general practitioners (GPs) in the UK, but with less training. It was clear when working with this midwife that she approached midwifery care with a more medical-model in mind; she was more cautious than her fellow midwives and transferred women easily to the regional referral hospital in cases where other midwives would not. This is not to say her practice was unsuitable. In fact, some may argue in light of the three delays framework as outlined by Thaddeus and Maine (1994), that early referrals may help to reduce rates of maternal and neonatal morbidity and mortality. Nonetheless, with a background that is medical in nature it is possible that this midwife, who only worked day shifts and therefore frequently ran the antenatal clinic, may had a greater tendency to prescribe antibiotics for cough than her counterparts working at both Elgon and the other health care facilities in this study.

In the case of LAP at Elgon antenatal clinic no antibiotics were prescribed for this condition in March 2018 or from June to August 2018 but were prescribed in April and May 2018. Again, several reasons for these patterns may be suggested, although no strong conclusions can be drawn. The reduced rates of antibiotic prescriptions for LAP in March 2018 may be attributable to the fact that the CME took place this month and therefore midwives were enthusiastic about implementing the new knowledge they had. The arrival of the Ugandan volunteer midwives who were given brief updates about appropriate antibiotic prescribing may help to explain the return to antibiotic prescriptions for LAP in April and May 2018. However, it is possible that these findings are completely random, as in the past, prior to the CME, there have been months where antibiotics weren't prescribed for LAP.

At Moroto antenatal clinic findings show that with the increase in the percentage of antibiotics prescribed for perceived bacterial conditions a decrease was noted in the percentage of antibiotics being prescribed for cough and LAP as depicted in table 8.12.

Table 8.12. Percentage of antibiotics prescribed for cough and LAP at Moroto antenatal clinic each month (as a proportion of total antibiotics prescribed)

MOROTO	Year	Cough	Lower abdominal pain
March	2017	41%	6%
	2018	7%	0%
April	2017	31%	8%
	2018	19%	0%
May	2017	0%	5%
	2018	16%	0%
June	2017	8%	0%
	2018	0%	0%
July	2017	40%	10%
	2018	0%	0%
August	2017	19%	0%
	2018	0%	0%

Source: Moroto antenatal clinic register

Findings show that following the CME antibiotics have not been prescribed for LAP at all, whilst they were prescribed in four out of the same six months the previous year. This is not to say that LAP has not presented during this time. In fact, and reassuringly, the antenatal register had cases of LAP documented where by women had been given

paracetamol for this condition rather than antibiotics. Similar to Elgon antenatal clinic, the midwives working at Moroto did not eradicate the use of antibiotics for cough in the antenatal period. Indeed, findings show that midwives prescribed antibiotics for cough in March, April and May of 2018. June, July and August 2018 paint a different picture however as no antibiotics were prescribed for cough during this period, suggesting that midwives at Moroto took time to adapt their practice to align with evidence-based guidelines. Again, I believe this is attributable to the repeated feedback sessions that I had with the midwives running antenatal clinic for each of the six months of the training cycle.

Finally, secondary data analysis of antenatal registers indicates that the Stanley hospital antenatal clinic midwives took steps to reduce the percentage of antibiotics prescribed for cough and LAP (see table 8.13).

Table 8.13. Percentage of antibiotics prescribed for cough and LAP at Stanley hospital antenatal clinic each month (as a proportion of total antibiotics prescribed)

STANLEY	Year	Cough	Lower abdominal pain
March	2017	27%	28%
	2018	5%	15%
April	2017	24%	21%
	2018	0%	3%
May	2017	21%	22%
	2018	0%	0%
June	2017	33%	19%
	2018	3%	5%
July	2017	31%	20%
	2018	0%	3%
August	2017	30%	7%
	2018	0%	0%

Source: Stanley antenatal clinic register

Prior to the CME from the months March to August 2017 the mean average percentage of antibiotics prescribed each month for cough as a proportion of total antibiotics prescribed was 28% in antenatal clinic at Stanley hospital, compared to 19% and 23% at Elgon and Moroto antenatal clinics respectively. Following the CME this dropped to 1% at Stanley and 11% and 7% respectively at Elgon and Moroto. In real numbers from March to August 2017 206 women out of 6407 seen in antenatal clinic at Stanley hospital received antibiotics for cough. From March to August 2018 this dropped to 4 women out 4933. This reduction in the number of antibiotic prescriptions for cough is attributable to the fact that in four of

the six months following the CME the midwives working at Stanley antenatal clinic reduced the percentage of prescriptions for cough to zero. Certainly, the midwives working at Stanley hospital have taken the message not to use antibiotics for the treatment of cough on board to the extent that they have told me that they no longer self-medicate when they themselves have a cough.

Furthermore, analysis of the antenatal register at Stanley hospital has revealed comments such as “advised on home remedies for treatment of cough”. Additionally, several of the midwives interviewed in the review cycle, shared their own stories of how they had modified their antibiotic prescribing behaviours for cough in the clinical setting:

“Then also the remedies have also very, helped them greatly. Because initially we were giving every mother with cough antibiotics. But these days we advise them on lemon, er, or honey. Mixing those contents and plenty of fluids and avoiding coldness. And they are coming back when they have no signs (of cough).” Irene

Given that cough generally occurs in the population again and again has, I believe, contributed to the fact that many of the midwives in this study personally trialled home remedies for cough. Some of them were even quite surprised that they recovered without treatment. This simple act of trialling home remedies themselves seems to have played an important role in helping the midwives in this study modify the treatment regimens that they recommend for cough:

I met Laureen for dinner last night and she was telling me that she was now not using antibiotics for her children when they had a cough, but was giving cough linctus. She said that she had done this three times since the CME (her kids must have cough a lot), and it was working. Their coughs were disappearing without needing to use antibiotics. So she said she was starting to believe that coughs really don't need antibiotics. .

Reflective diary – 28th April 2018

Similar to the findings at Elgon health centre, antibiotic prescriptions for LAP have persisted at Stanley antenatal clinic. One possible explanation for this is the presence of large numbers of students working in the antenatal clinic at Stanley hospital. On the whole my experiences of working at Stanley antenatal clinic has seen midwives quality controlling any prescriptions made by students, as when they transfer information from a woman's antenatal book to the antenatal register, they question any prescriptions seen to be

inappropriate. However, I have observed in the clinical setting other scenarios that may contribute to inappropriate antibiotic prescriptions being made:

This morning in antenatal clinic all of the midwives went to an emergency meeting about the ebola outbreak on the Congolese border. As they went they told the students to start the antenatal clinic and start seeing the women. No mentorship was provided at all by the midwives for nearly two hours. The students told me that this is not the only time that this has happened, and that the midwives often leave them to run clinic independently for a few hours.

Reflective diary – 1st August 2018

On the whole however, the mean average percentage of antibiotics prescribed each month for LAP as a proportion of total antibiotics prescribed has fallen from 20% between March and August 2017 to 4% for the corresponding period in 2018. The antenatal register at Stanley antenatal clinic provides evidence that a number of LAP cases are still recorded but treated solely with paracetamol.

Antibiotic use for urinary tract infections (UTI)

Comparisons between March to August 2017 with the same months in 2018 indicate that following the CME in March 2018 the mean percentage of antibiotics prescribed each month for UTI rose across all three healthcare facilities. For Elgon antenatal clinic this monthly mean average jumped from 12% in 2017 to 26% in 2018. Respectively it rose from 26% to 30% at Moroto, and the antenatal clinic at Stanley hospital showed a change in the percentage of antibiotics prescribed for UTI from 27% in 2017 to 66% in 2018. Tables 8.14, 8.15 and 8.16 tabulate these findings for Elgon, Moroto and Stanley antenatal clinics respectively.

Table 8.14. Percentage of antibiotics prescribed for UTI at Elgon antenatal clinic each month (as a proportion of total antibiotics prescribed)

ELGON	Year	UTI
March	2017	13%
	2018	11%
April	2017	11%
	2018	46%
May	2017	13%
	2018	8%
June	2017	0%
	2018	50%
July	2017	23%
	2018	13%
August	2017	11%
	2018	29%

Source: Elgon antenatal clinic register

On initial examination of these findings from Elgon antenatal clinic, one may be concerned over these increased percentage of antibiotics used for the treatment of UTI during pregnancy. With little evidence available pertaining to average rates of UTI in pregnancy in Uganda it is difficult to benchmark these findings. However, on closer inspection there are interesting relationships noted between prescription levels for UTI and LAP. For example, if we take June there was a reduction in the percentage of antibiotic prescriptions for LAP from 33% to 0% in 2017 to 2018. This was matched by an increase in the percentage of prescriptions for UTI from 0% in June 2017 to 50% in June 2018. At first glance then these findings suggest that previously midwives may have been treating LAP with antibiotics when in actual fact it was a UTI that the woman had had. These findings suggest that the midwives at Elgon antenatal clinic may, following the CME, be more proficient in making the correct diagnosis. However, this pattern is not consistent for the other five months for which data were collected, leaving the door open to reasons as to why there was such an increase in the prevalence of UTI being treated with antibiotics in June 2018. Again, it could come down to the presence of Ugandan volunteer midwives working in the health centre, which may also explain why 46% of all antibiotic prescriptions in April 2018 were for UTI. However, with only 8% of antibiotics prescribed for UTI in May 2018 a shadow is cast over this theory. Findings from Moroto antenatal clinic give weight to the first argument presented that LAP and UTI were being treated interchangeably prior to the CME as in

March, May and July reductions in the percentage of antibiotics prescribed for LAP in 2018 compared to 2017 coincided with increases in the percentage of antibiotics prescribed for UTI.

Table 8.15. Percentage of antibiotics prescribed for UTI at Moroto antenatal clinic each month (as a proportion of total antibiotics prescribed)

MOROTO	Year	UTI
March	2017	12%
	2018	20%
April	2017	39%
	2018	13%
May	2017	21%
	2018	47%
June	2017	31%
	2018	25%
July	2017	30%
	2018	50%
August	2017	22%
	2018	22%

Source: Moroto antenatal clinic register

Further weight is given to the theory that prior to the CME midwives were prescribing antibiotics for LAP when they were treating UTI from the findings collected from Stanley antenatal clinic: a reduction in the percentage of antibiotics prescribed for LAP from 2017 to 2018 was met with increases in the percentage of antibiotics prescribed for UTI from over the same time frames.

Table 8.16. Percentage of antibiotics prescribed for UTI at Stanley hospital antenatal clinic each month (as a proportion of total antibiotics prescribed)

STANLEY	Year	UTI
March	2017	19%
	2018	61%
April	2017	28%
	2018	56%
May	2017	26%
	2018	63%
June	2017	23%
	2018	76%
July	2017	23%
	2018	73%
August	2017	40%
	2018	65%

Source: Stanley antenatal clinic register

When I was working with students at Stanley antenatal clinic I spent a lot of time teaching them how to differentiate between LAP and UTI. Specifically, I have taught them that when a woman complains of LAP follow up questions need to be asked to rule out UTI, and where there is doubt, I taught the students to ask the woman to attend the laboratory for urinalysis testing³⁸.

Given that many of the midwives interviewed in pilot and context cycles reported that antibiotics were sometimes prescribed for LAP because it is considered a symptom of UTI, I initially had some concerns regarding the sudden increase in prescriptions of antibiotics for UTI. In particular I was concerned that midwives may have still been diagnosing UTI based on the women’s symptoms only as opposed to increasing the utilisation of urinalysis testing in the laboratory. Furthermore, as the midwives were aware their practice was being audited I was concerned they may simply have modified their documentation to indicate they were prescribing antibiotics for UTI rather than LAP. These concerns were alleviated through the use of observational work in the clinical setting:

³⁸ Despite the availability of microbiology testing at Stanley hospital, women who are sent to the laboratory for urinalysis testing have their urine tested by dipstick or microscopy.

I felt quite relieved today. I had been worried that the midwives at Stanley antenatal clinic were just not prescribing antibiotics for women so that they could show a real improvement in their practice. When I was working there today it transpired that the midwives are taking antibiotic stewardship practices seriously. I was helping fill out the antenatal register at the end of the day and suddenly about 12 antenatal books appeared on the desk in front of me. I asked Irene where they had all come from. It turns out they were the books from every woman who had been sent to the laboratory for UTI testing. Testing had revealed that just over a third of them had a UTI.

Reflective diary – 16th May 2018

Furthermore, the midwives themselves reported changes in their behaviour regarding sending women to the laboratory for investigations:

“Before it was not easy for us because every mother who could complain of backache, lower abdominal pain, cough, we could just go straight. We could just treat syndromically without testing, without doing any investigation.” Brenda

“But after the training, we are really doing well. Because now we really prescribe when we have done investigations. And other mothers who come with common pains and we just counsel. They come back when they are fine without treatment.” Irene

When I was interviewing one of the midwives, asking her about the sustainability of this study, she made it quite clear that changes in practice were not simply to please me, but were taking place because they had a new understanding of the dangers associated with inappropriate antibiotic use:

“Even if you, we are not doing it that maybe you are coming to review it, no. We see it is not necessary for every mother to go out with a pile of antibiotics.” Irene

This finding is reassuring and suggests that findings presented to date provide reliable evidence that midwives have changed their antibiotic prescribing practices following the CME.

Learning ‘in the field’

Findings from the pilot and context cycles highlighted the underlying issue of poor midwifery education and the concurrent effect this has on the antibiotic prescribing practices of midwives. Learning ‘in the field’ was identified by the midwives in this study as

a means to fill gaps in their antibiotic prescribing knowledge and develop their prescribing practices. Evidence from the training and review cycles suggest that this manner of learning has in part been effective in disseminating information learned by midwives attending the CME to their colleagues and students under their supervision:

“And though we have so many students around here, we have also tried to educate them on antibiotic treatment. Yeah, so at least they have also picked up. It has not remained to just us the nurses, but still also to the students who are neighbouring this hospital.”

Brenda

“We pass it on to everyone, even doctors. We have KIU doctors who are practising from here and they have really been prescribing antibiotics, so we sit them down and we are like ‘it’s not good.’ And we even take them through the, the monthly review. And then of course they have appreciated.” Irene

Another midwife reported that on returning from the CME she shared the knowledge with her nursing colleagues working in the outpatient department:

“I am meaning fellow staffs from outpatient because for them they are like, they are in their own department, and we are in this department of maternity. So when we tried to share with them, because after the training I had to give them a CME about antibiotics. That CME helped them so much even in prescribing to the clients themselves.” Beatrice

The same midwife also reported that when she visits other healthcare facilities in the role of an auditor she passes on the lessons she learnt from the CME if she witnesses evidence of inappropriate antibiotic use:

“Yeah. Sharing the message. I pass it one whenever I am cross checking these registers. Because sometimes we do data cleaning, like checking their registers, how they are filled, how they do their monthly reports, what they report, what they have done throughout the month. So as we are doing that and I find such cases where they give antibiotics unnecessarily I have to share with them.” Beatrice

These findings are promising as such practice offers the potential for a longer term ‘trickle’ effect from the CME to be realised as messages are passed on from those that attended the training to qualified colleagues as well as nursing, midwifery and medical students. I have witnessed this in practice, however observational work has also highlighted limitations with this technique especially in relation to sharing lessons learned with students. As presented in previous excerpts from my reflective diary, one of two scenarios tend to arise. Either students are left to attend to women with minimal clinical supervision from the midwives working, thus minimising any opportunity for knowledge transfer

between qualified staff and students. Whilst this is far from ideal, the manner in which the antenatal clinic runs allows for what could be viewed as quality control checks on the prescribing decisions of students; once each woman has been seen by the midwife or student the details of her visit are recorded in the antenatal register, including details of any conditions that require treatment with medication. The midwife entering the information does not hold back in reprimanding students if they have incorrectly prescribed any medication and so students who have made mistakes have the opportunity for feedback. Having said that reprimanding students for errors they have made when they have not been taught how to prescribe appropriately in the first place may not be the most effective teaching and learning mechanism.

An alternative scenario arises when the midwife decides that students are too slow in seeing women and so take over the consultation themselves. In some respects whilst this restricts the opportunity for the student to gain hands on clinical experience, there is still the opportunity to learn from observation. Taking for example treatment of cough. The reduction in the volume of antibiotics being prescribed for cough coupled with seeing midwives advise women to use home remedies for cough, may mean that students are less likely to view antibiotic treatment for cough as the norm and adapt their practice accordingly. However, large student numbers mean that consultations are often crowded with the result that students rapidly lose interest in what is happening, thereby minimising learning opportunities.

Evidence from interviews further suggests that the potential of these 'trickle' down effects may be limited. In particular I interviewed a midwife in the review cycle who had not attended the CME as she had been working night shifts. She reported that none of her colleagues who had attended the CME gave her any updates. As a result her knowledge of antibiotic resistance, antibiotic stewardship, and appropriate antibiotic prescribing practices remained limited. Whilst I was able to use the interview as a means of updating and educating her about these issues, the fact that she had not been updated by her colleagues left me feeling disheartened and aware that tackling antibiotic resistance requires a continuous and sustained effort. The idea that educating and updating midwives about appropriate antibiotic use needs to be a continuous process was recognised by one

of the midwives. They noted that high staff turnover rates reduce the opportunity for messages to be shared between colleagues:

“Things have somehow been improving. But still weaknesses are still there. Err, we have been getting new midwives, most of them we are still orienting, so it is a process. I think it has to be a continuous process of teaching them to understand, yeah.” Hope

My clinical observations have also highlighted the need for multidisciplinary training in the area of antibiotic prescribing:

I was caring for a woman on the antenatal ward at Elgon health centre today who had been admitted with multiple complications. One of which was abnormal vaginal discharge syndrome. Whilst we were reviewing her it was noted the correct dose of metronidazole (2g) had been prescribed for her condition. The correct prescription however had not been translated into the correct dose being administered to her - she had received a five day course of metronidazole. The prescription had been made by the clinical officer of Elgon health centre who had attended the CME on antibiotic stewardship. Where the outpatient department (OPD) differs from the maternity department at Elgon is that midwives prescribe and dispense medication, whereas the OPD has separate prescribers and dispensers. In this case it is unclear if the dispenser saw the prescription of metronidazole and went into ‘automatic mode’ giving the standard five day dose that is given for a variety of conditions, or if they made an assumption that the prescription was incorrect and modified it according to their habitual practice. Regardless, this scenario underlines the ongoing need for both the multidisciplinary team and women to be educated about appropriate antibiotic use.

Reflective diary – 6th August 2018

These observations underline the need for multidisciplinary training about antibiotic stewardship. Curbing the development of antibiotic resistance requires input from all; from healthcare professionals working across different specialities, to lay members of the public.

Midwives’ personal practices

The pilot and context cycles revealed that self-medication with antibiotics was not restricted to patients alone, with all of the midwives interviewed reporting that they frequently self-medicated when they felt unwell. Furthermore, they also reported that they often failed to comply with treatment regimens, stopping the course of antibiotics once they felt better. In June 2018 I was talking to one midwife who had attended the CME

who was telling me that she was tired as she had been up throughout the previous night with cough and fever. On asking her if she had taken any medication she reported that she had taken ibuprofen and amoxicillin. Her colleagues promptly told her that she should be taking fluids and paracetamol and to get herself to the market for some mangoes. This incident is contrary to the feedback that the majority of midwives have given about their own personal antibiotic consumption practices, with many of them reporting that they no longer self-medicate for cough with antibiotics:

"I no longer! Immediately I got the information, I no longer use antibiotics. I just take drinks and recently I had a serious cough that even I could not talk. But since it was not pneumonia I just took a lot of fluids, I had to take a lot of drinks day and night. And eventually I responded. I didn't believe unless I practised myself. Then I got the experience from my, myself. Then I realised that it works for everyone. I no longer use antibiotics."

Joniah

Another midwife was delighted to tell me how proud she was of herself for not taking antibiotics for a cold that she had had. Instead she had taken plenty of fluids and paracetamol and reported that she felt the cold had gone away more quickly than if she had taken antibiotics. Of interest she discussed with her friend, a teacher, her decision to not take antibiotics who apparently said, "surely you will die." Like this midwife, others told me that they shared messages about appropriate antibiotic use with their family and friends in addition to the women they see in antenatal clinic:

"Even now my boys, they know. "Mum, I have cough." Yeah. So he just says, "can I make some honey?" So he puts honey with those garlic and lemons." Brenda

"Even my friends when I am talking with them I just pass on the message. You find someone is having like a cough or flu, she is running for antibiotics. So I just say "NO! Stop that! This is like this and this and this. You shouldn't be prescribing for antibiotics for a flu." So they are like, "Ah! What?!" Then after that's when they realise "ah we have been not doing it well." Beatrice

These examples demonstrate that there is scope for the message about alternative treatments to antibiotics for coughs and colds to be spread amongst the social groups of the midwives in the study with supporting evidence that not using antibiotics is sometimes completely appropriate and safe. This may contribute to the 'trickle' down effect of the CME, although measuring these outcomes in terms of antibiotic consumption rates is almost impossible.

Infection prevention and control (IPC) practices

In some respects it is difficult to say whether infection prevention and control practices changed following the CME. Certainly, after holding the sessions I noticed some promising practices. On one of the days that I attended the antenatal clinic at Stanley hospital I found one of the midwives cleaning the sink. I had never seen this happen before, but that may be due to coincidence; maybe it is always cleaned, but on a different day to the days I was attending the clinic. The midwife did not know that I would be there that day so she had not made a pre-meditated decision to clean the sink for the benefit of my observation.

On another day at Elgon health centre I witnessed a midwife apply an alcohol rub to her hands between each woman that she saw in the antenatal clinic. I have seen this in practice before. Conversely, following the training I also saw midwives fail to clean their hands between seeing women in the antenatal clinic. This may be related to the availability of alcohol hand gel in the clinical area; sometimes it is available and sometimes it is not. Quite simply if it is not available, it can't be used. In the same vein a midwife from another healthcare facility felt that following the CME efforts were being made to ensure that soap was available for handwashing:

"Infection prevention? Yeah, they are trying because mostly, mostly they do handwashing and at least they try to make sure that soap is available for handwashing." Hope

One midwife who had attended the training immediately began identifying infection control risks at her healthcare facility:

Beatrice came to me and said she had been in the health centre yesterday afternoon looking at infection risks. She had noted that the mattress on one of the labour beds had a hole in its cover. Rightly so she identified it as an infection risk and asked for Knowledge for Change's assistance in replacing the cover and eliminating the infection risk.

Reflective diary – 7th March 2018

Similarly, one of her colleagues used critical thinking skills to react to what appeared to be an infection outbreak in the facility:

"Maybe with the children. With the poor hygiene of the ward. Children sometime back were having almost all of them, like in two weeks, high temperatures, which led them to

be referred to be treated. So we had to damp dust and do the cleaning, thorough cleaning. I think now it has reduced.” Laureen

A retired midwife from the UK came to volunteer at Elgon health centre for three weeks in November 2017. She actively encouraged the midwives to start using an autoclave to sterilise equipment that is used during a birth, such as cord clamps and scissors for cutting the cord. Although this intervention was introduced before the CME was held, observational work revealed that the midwives continued to use the autoclave regularly and with less prompting from K4C volunteers following the CME:

I popped into Elgon today to say hello to the midwife working and see how the weekend shifts were going. She had no women in labour and was doing some admin work. But I also noticed that she had popped the autoclave on to sterilise some delivery packs. It's so good that they are using it independently and not relying on Knowledge for Change volunteers to sterilise equipment on the days that they are working.

Reflective diary – 20th October 2018

Findings from the pilot and context cycles noted that a lack of resources in terms of cleaning equipment and access to clean water restricted the ability of midwives to implement effective IPC practices. This study has not been able to address shortages of cleaning consumables, and so these problems persist. As I write this in October 2018 the government are still not delivering bin liners to healthcare facilities in their quarterly deliveries as there is a national shortage. Additionally, since March 2018 there has been a national shortage of 'Jik' a disinfectant used in healthcare facilities for general cleaning and sterilising of medical equipment. In Moroto health centre where few births take place the shortage of Jik has not yet become a problem as the workload at the facility hasn't required the need for significant amounts of Jik. At the other end of the spectrum Elgon health centre, which receives fewer supplies due to its status as a HCIII, even though it has a birth rate that often quadruples Moroto, has been out of stock of Jik since the shortage took hold. In addition to the other necessities they are asked to bring in labour, women are now asked to bring Jik in order to guarantee any equipment used during their birth will have been appropriately sterilised.

Women's responses

My clinical work has afforded me the opportunity to see women's responses when antibiotics have not been prescribed. This coupled with discussions with midwives both informally and when interviewed during the review cycle revealed that women had mixed responses to changes in the midwives' antibiotic prescribing practices:

"Some they take it (advice). And another will feel like maybe you have not helped them. You know because if someone comes to you expecting an antibiotic and you start preaching "you know you go and do this, the cough will clear, what what.." But I think a big number of them they have responded positively." Hildah

"Of course some take the message, some don't. Because still they will end up, they will continue prescribing for themselves." Hellen

The difficulties of communication between the patient and the healthcare provider as discussed in documented by Ackers, Webster, Mugahi and Namiiro (2018) are a possible contributing factor to the difficulties that have been encountered in passing on knowledge about antibiotic resistance and antibiotic use from midwives to women in this study:

When I was working today I witnessed Laureen advising a woman who had a cough to take plenty of fluids with honey, ginger and lemon if possible. Whilst it was good to see Laureen suggest another treatment, she didn't explain to the woman why she wasn't giving her amoxicillin (the woman had been prescribed amoxicillin in the past for cough so assumed she would get the same this time.) Laureen just said to her "we don't do that anymore."

Reflective diary – 11th June 2018

As we have seen from the findings of this study, even where midwives have been presented with evidence they have found it hard to change their antibiotic prescribing practices and in some cases, personal consumption habits. With this in mind it is curious to see that some of the midwives in this study neglected to give understandable explanations to women about why the treatment they once would have prescribed for a certain condition is now being withheld. This has been compounded by the fact that the posters that I shared with the healthcare facilities that both warn against the dangers of antibiotic resistance as well as the role the individual can play in reducing its development, have been in the English language. This phenomenon is not unique to Uganda. A study that took place in Kenya

surveying two hundred households reported that only 31.9% of those taking part in the initial survey could recall being given information regarding appropriate antibiotic use in the preceding 12 months (Omulu et al., 2017). The study by Omulu et al. (2017) also reported that those who had received information pertaining to appropriate antibiotic use reported improved attitudes towards their use. This suggests a need for the midwives in this study to improve their health education skills so that women and their families are able to improve their knowledge regarding appropriate consumption of antibiotics. These findings are supported by evidence from Ackers, Webster, Mugahi and Namiiro (2018) which suggests that if women experience what they view to be positive communication during their interactions with their healthcare provider then they are more likely to be honest about their health concerns, and perhaps more importantly, are more likely to share messages with their family, friends and members of their community. If the midwives in this study continue to withhold antibiotics without providing an explanation, then the opportunity for information sharing to the wider community is lost. These findings suggest that future studies need an additional focus, namely they need to actively educate those accessing healthcare services about antibiotic resistance and its dangers as well as appropriate antibiotic use.

Outside influences of prescribing practices

Medications dispensed in any of the antenatal clinics in this study are always acquired from a main pharmacy store within the healthcare facility in which the clinic is based. As stocks of commonly dispensed medications in pregnancy run low, midwives will complete a requisition form, attend the main pharmacy store and collect, if available, the medications required. In terms of antenatal clinic medications in Uganda these commonly consist of iron tablets (all women are prescribed iron from the second trimester of their pregnancy), mebendazole (a deworming tablet which is given to women once in the pregnancy), sulfadoxine pyrimethamine (a malaria prophylaxis prescribed monthly in pregnancy after the first trimester), paracetamol, amoxicillin and metronidazole. To my surprise there was one Wednesday in June 2018 that I was working in the Stanley hospital antenatal clinic and noted the midwife who had been to the store brought back a supply of cefixime – an

antibiotic recommended in the Uganda Clinical Guidelines (MoH, 2016) in the syndromic treatment of abnormal vaginal discharge. I was pleased therefore to see that it was in stock, as often when women are prescribed treatments if it is not found in stock in the antenatal clinic or outpatient pharmacy of the healthcare facility they attend they won't receive it unless they have the financial capability and motivation to go and buy it from a local pharmacy or drug store. Analysis of the antenatal register at the end of June 2018 revealed however that the cefixime had not been used for the treatment of abnormal vaginal discharges. Rather, it had become, in that month, the second most popular prescribed treatment for UTI. On discussing this with the midwives as I was giving feedback about their antibiotic prescribing, it transpired that they had been given the stock as it was due to expire and needed to be used. Whilst cefixime can be used in the treatment of severe UTI, the midwives admitted that they had used the drug because it needed using, as opposed to a guideline update recommending the use of cefixime for UTI.

At Stanley hospital where the lead pharmacist has more control over the medications ordered into the hospital on a quarterly basis than at the smaller healthcare facilities, the use of our monthly audits proved useful in influencing the supply of appropriate antibiotics. In the treatment of UTI, nitrofurantoin is the first line antibiotic recommended in the Uganda Clinical Guidelines (MoH, 2016). However, this was rarely in stock prior to March 2018. Armed with the findings from the monthly audits, contact was made with the lead pharmacist who subsequently added nitrofurantoin to the quarterly order. She now ensures it is in stock in the outpatient pharmacy that serves the antenatal clinic. Towards the end of the six month feedback period we noted a rise in the number of syphilis cases presenting in antenatal clinic. Again, as the treatment for syphilis, benzathine, is rarely in stock we approached the pharmacist to ensure stock levels meet rising demand. Furthermore, we requested that supplies of benzathine were distributed directly to the antenatal clinic so that midwives can treat those women presenting with syphilis in a timely fashion.

Observational work has also revealed that pharmaceutical companies have some influence over the prescribing decisions of midwives. I observed the midwives working at Stanley antenatal clinic prescribing branded medication:

Today I noticed that many of the medications that some of the midwives in Stanley antenatal clinic was prescribing were brands. Rather than just write clotrimazole cream they were writing the brand that had been promoted by a pharmaceutical rep yesterday. If a woman takes such a prescription to the pharmacy that particular brand won't be in stock as it is not supplied by the government. The pharmacy may or may not give the woman an alternative, it will depend if it is in stock, and if they even know what they drug is. That means that the woman then has to go and buy the branded medication from a private pharmacy, which she is unlikely to do, and therefore she will not get the treatment that she needs.

Reflective diary – 16th May 2018

This finding isn't new to sub-Saharan Africa, with evidence from Ethiopia reporting that nearly half of all physicians working in one area believed their prescribing decisions were influenced by medical representatives (Workneh et al., 2016). It has been beyond the scope of this study to address the issues arising from the presence of medical representatives in the healthcare facilities taking part in this study. Nonetheless, their presence in some cases seems to be of influence. In tackling antibiotic resistance, it may be beneficial for the Ugandan government to regulate pharmaceutical companies to ensure their activities align with those of the Ugandan action plan on antimicrobial resistance.

Attitude

Findings presented in this chapter have shown that where some midwives have been able to modify their antibiotic prescribing practices to align with evidence, others have not. In the case of Speke health centre even getting staff to document the indication for antibiotics in the antenatal register has proved almost impossible. During follow up interviews with midwives I addressed this phenomenon and asked them to consider why changes in behaviour have differed when all midwives in the study were subject to the same CME and the same follow up in terms of audit and feedback. Attitude was cited by many of the midwives as a barrier to change and given as an explanation for variations in the antibiotic prescribing practices of the midwives in the study:

“The one who is told something and doesn't want to do it. The training was the same, we all were trained, and the information was the same. So it, and all of us were trained. So I

don't see why one health centre is performing well and another one is not performing. It is just the personality. Some individuals they don't want to change." Laureen

"I think even the attitude matters also. Someone's attitude, sometimes it's very hard to change someone's attitude. Because if at all these people have really had the training, eh? And they are not, they have proved like, they are not willing to change. I think I will attribute it to their attitudes." Hildah

"It might be attitude, maybe they are....there are some, like it is not easy to change everyone. There are some health workers who are naturally rigid, like they don't accept change." Irene

Only one midwife offered the alternative explanation that an individual's personal understanding will affect their ability to pass on messages to their colleagues and implement what they have learnt:

"Failure to pass on information from one person to the other and also depending on an individual, the way he grasps something. That's why you find that there is a difference in performance." Joniah

Whilst attitude could well be one of the contributing factors to the differences we have seen in the practices of midwives at different healthcare facilities, it is likely that other factors as outlined in the behaviour change theories discussed in chapter four, may also have influenced outcomes.

Application of knowledge

The findings presented in this chapter suggest that the midwives taking part in this study, and those who attended the CME in particular, have made great efforts to apply the knowledge they have learnt to bring about change. We have seen this in reduced rates of antibiotic prescriptions being made for perceived non-bacterial conditions and the prevalence of self-medication with antibiotics by the midwives themselves. Equally, where midwives have identified infection risks, they have taken steps to reduce these risks by investing in new equipment or changing the cleaning routines found in the health centre. Even where midwives have been seen to teach their colleagues about antibiotic resistance and appropriate antibiotic prescribing practices they have demonstrated their ability to think critically and apply knowledge practically. Observational work has seen this knowledge application demonstrated in other ways that I had not expected. This study has

chosen to focus on antibiotic use and antibiotic stewardship. However as discussed in chapter one, the effects of resistance are felt across a range of antimicrobial drugs. Two weeks after the CMEs I was working with a midwife who had attended one of the CMEs and was encouraged to hear her discuss the effects of antimicrobial resistance in relation to another medication with a colleague:

One of the midwives I worked with today (who had been on the CME) was discussing with one of the nurses who works in the outpatient department about Pre Exposure Prophylaxis (PrEP) use in discordant HIV couples. The idea is that if one member of the couple has been diagnosed as HIV positive and the other is negative, then they both start on antiretroviral drugs. The idea is that the positive person will get their viral load under control and then the negative partner can stop taking them after 6 months. The midwife was saying what happens if the positive person's viral load swings up and down? Does that mean that the negative person will be on and off ARVs, and if so, what are the implications for resistance to antiretroviral drugs developing?

Reflective diary – 27th March 2018

Ackers and Ackers-Johnson (2017) note that many foreign non-government organisations (NGOs) develop training courses, such as the CME that was carried out in the training cycle, to update their counterparts in low- and middle-income countries. Ackers and Ackers-Johnson (2017) note that there are many issues that arise when this happens, but here I would like to mention just two. One is that such training sessions are often based on protocols that have been established in the country from which the NGO originates, thereby overlooking the contextual needs of the setting in which they are conducting the training. The other is that there may be a number of NGOs targeting the same populations of healthcare workers but presenting conflicting advice (Ackers and Ackers-Johnson, 2017). I feel that this study has succeeded in making an effective contribution to a change in practice because it has behaved differently to these NGOs. Using modified action research with a longitudinal approach has allowed us not only to incorporate contextual factors into the design of interventions but has also allowed us to ensure that a consistent message, that it is in line with Ugandan guidelines, has been spread over the course of the past two years.

Perceived changes in practice following CME compared to reality

All the groups that took part in the CME were actively engaged in learning about antibiotic resistance, antibiotic stewardship and appropriate antibiotic prescribing practices. Open and honest discussions took place about current antibiotic prescribing practices, with midwives again admitting to the fact that they self-medicate and rarely complete a course of antibiotics. Questions from the group were forthcoming when clarification or further information was needed. Equally the midwives in each group brought their own scenarios for discussion so they could seek advice on their current practice. All the feedback that was received immediately following the CME was affirmative that the session had been useful and left me feeling optimistic about our potential to embrace antibiotic stewardship in the clinical setting. Feedback suggested that prior to the training midwives had not felt confident to withhold antibiotics for some conditions even though they knew they should:

Today we held the first CME. Everyone was interactive and asking questions. There was a lot of reflection about current practice related to prescribing such as history taking, laboratory testing and use of guidelines. It was also good to hear from Annabelle that Pauline had gone back to the health centre in the afternoon and told her that she knew much of the information that was presented, but she lacked confidence to follow guideline recommendations because she felt her peers lacked the knowledge to support her in what she thought they would view as non-conventional practice.

Reflective dairy – 6th March 2018

Six months following the CME, findings from interviews reaffirmed these initial observations, with midwives reporting that the CME had helped them to change their antibiotic prescribing practices:

“The training had a very big impact on our prescribing practices of antibiotics because I see there is a lot of change. We use antibiotics for the right, for the right diagnosis, for the right purpose. We are no longer...there is really minimum or if at all, there is, there is nothing like misuse of antibiotics. Now we are using them for the right purpose, yes.”

Hildah

“The training was very fantastic. It was good because I think it had all the skills we needed. And even the people who attended seemed to be interested so that is part of the successful thing that has been done. It was reminding us about the antibiotics, the doses, how to use, when to use, when to use. And also giving us feedback on the way how it was

at the beginning and the how now it is at the, at the, by that time. And it was showing that there was an improvement.” Laureen

“We thank you for the feedbacks. It has been nice and good. Because sometimes when you keep on seeing those feedbacks you feel ah, at least I have improved from this step to this step. And you continue changing, changing.” Beatrice

I was reassured as I was leaving Uganda that adopting a modified action research approach to this study had provided the appropriate support for the midwives:

I went for dinner with the midwives from Stanley antenatal clinic last night as a goodbye before I leave Uganda. I felt really touched with some of their comments and reassured that my presence has been welcomed. Irene said “everyone else comes and only looks for fault but you haven’t done that. You have motivated us.” That’s exactly what I was aiming for, and so to hear that is how I have been perceived made my day. In fact I nearly cried when she said that. They also seemed genuinely pleased with the knowledge that has been passed on about antibiotic resistance and keen to share it. Which again has been the whole point of me being here. My work may have been on a small scale but I really believe these midwives will continue it.

Reflective diary – 16th November 2018

As noted in the literature review in chapter four, changing behaviour is a complex process that takes time and further requires behaviour change strategies to be multifaceted in their approach to tackling the issue. The provision of knowledge alone does not guarantee that behaviour change will ensue that correlates with newly acquired knowledge. The significant and sustained reduction in the use of prophylactic antibiotics in the postnatal period at Elgon health centre in the champions cycle is almost unprecedented in the world of behaviour change. Changes in patterns of antibiotic prescribing levels in the antenatal period reflect a more realistic outcome of implementing a change aimed at modifying the behaviour of a group of individuals.

Realistically much of the antibiotic prescribing practice of the midwives in the study continued to be at odds with clinical guideline recommendations. For example, the Uganda Clinical Guidelines (MoH, 2016) give different advice for the treatment of abnormal vaginal discharge dependent on clinical diagnosis. Despite the guideline for this condition being discussed during the CME and also made available to all healthcare facilities in poster form both in text and as a flow diagram, midwives at Elgon and Stanley hospital antenatal clinics

persistently struggled to grasp and implement the correct prescriptions for this condition. Syndromic treatment guidelines for abnormal vaginal discharge indicate the midwives should prescribe a 2g stat dose of metronidazole in addition to clotrimazole pessaries. Prior to the CME midwives prescribed a five day course of metronidazole. Following the CME, variations arose in the dose prescribed. Sometimes the midwives continued to prescribe a five day course, others prescribed a 1g stat dose whilst others prescribed a 2g stat dose. Metronidazole supplied to healthcare facilities in Uganda comes in 200mg tablets. A 2g stat dose therefore requires a woman to take ten tablets at the same time. Midwives in the study viewed taking ten tablets at the same time as difficult for women, thus 'pill burden' was one of the reasons cited by midwives for non-adherence to the prescribing guidelines:

The midwives were talking about a woman who had been prescribed a 2g dose of metronidazole – they really didn't want her to have it in one dose as they felt the 'pill burden' would be too much. So they recommended to her that she take two lots of five tablets one day after the other. Pill burden is definitely an issue here. The midwives have even talked in the past of women being unable to manage to take tablets four times a day which is why they only ever prescribe paracetamol to be taken three times a day even though it can be taken four times a day if needed.

Reflective diary – 4th July 2018

Side effects associated with metronidazole include nausea and dizziness. With these and 'pill burden' in mind, some midwives justified their decision to amend the recommended dose of metronidazole in the treatment of abnormal vaginal discharge. The habit of modifying treatment regimens for abnormal vaginal discharge has been noted in Uganda previously (Tann et al., 2006). Other midwives, those at Moroto health centre, who have aligned their antibiotic prescribing for abnormal vaginal discharge with guidelines, were not so sympathetic when it came to the issue of the 'pill burden'. Instead they held the simple view that if women wish to be cured of their conditions then they have no choice but to adhere to treatment recommendations.

Conclusion

The pilot and context cycles first attempted to learn about the understanding midwives held about antibiotic resistance and further, understand any influencing factors on their antibiotic stewardship activities. Taking these findings, we worked together on the champions, training and review cycles to address knowledge gaps and improve antibiotic stewardship practices with a strong focus on antibiotic prescribing practices. Findings from these three cycles are promising and show that efforts have been made to align antibiotic prescribing practices with evidence-based guidelines. Findings also demonstrate that critical thinking has been used to apply knowledge learned in the CME to individual cases with the intention of improving outcomes for women and their families.

Findings from the pilot and context cycles revealed that a number of operational issues including a lack of human resources and time, as well as lack of access to laboratory equipment and staff that enable diagnostic testing reduced the ability of midwives to prescribe antibiotics appropriately. The intervention of the CME and monthly feedback in this study has been unable to address any of these operational constraints, aside from the provision of easily accessible guidelines. In light of this the midwives in this study should be commended for the efforts they have gone to in aligning antibiotic prescriptions with evidence-based guidelines.

Findings from the training and review cycles are mixed. Although the antibiotic prescribing practices of the midwives in this study are by no means perfect, there has been an overall improvement in antibiotic use, with findings demonstrating a reduction in the use of antibiotics for perceived non-bacterial conditions. This study commenced in February 2017 with mentorship being offered to all the midwives in the study for the whole two-year period that I have lived and worked in Uganda. However, findings show that changes in practice only really occurred following the intervention of a CME and monthly audit and feedback. Given that this element of the study only lasted six months, these findings reflect well on the midwives, demonstrating that they have worked hard to align antibiotic prescribing practices with current evidence and further, offer hope that additional steps can be taken to improve antibiotic use in the maternity setting. However, the authenticity of these findings should be questioned. Throughout this study reference has been made to

falsification of documentation within the Ugandan healthcare setting and has been witnessed by myself and my K4C colleagues in at least one of the healthcare facilities taking part in this study. The fact that midwives at Speke health centre have made no attempt to improve their documentation in relation to antibiotic prescribing practices suggests that they have not felt pressurised to change their behaviours to align with any expectations that I or their senior colleagues may have had as part of this study. Additionally, a number of midwives in the study were keen to share their own testimonies about their own personal practices; they had stopped using antibiotics for the treatment of minor ailments that are non-bacterial in nature. Further, they were happy, and surprised, to report that they had recovered despite the omission of antibiotics from their treatment regimen. These two observations coupled with the assertion from Irene in her interview that antibiotic prescribing practices have not been changed to please me, rather the midwives have changed their practices to ensure women are on the receiving end of safe care, leads me to believe that overall these findings can be taken at face value.

Whilst these findings are promising we must not get carried away with ourselves, and instead consider a number of important issues. Firstly, although changes have been made to the antibiotic prescribing practices of midwives, coverage has not been universal. Most notably, although missing data from antenatal registers limits any conclusions that can be drawn from secondary data analysis, observational work points to little change in the antibiotic prescribing practices of midwives at Speke health centre. Secondly, where improvements have been seen in the antibiotic prescribing practices of midwives, they have been coupled with the continuation of some non-evidence based prescribing practices. Furthermore, the scale of this study has been small, working in only four healthcare facilities in one district of Uganda. The impact therefore that these changes in practice will have on slowing the development of antibiotic resistance will be minimal, if they have any effect at all. That is not to say that this study has been in vain. Indeed, the midwives have worked very hard to change their behaviours so that their antibiotic stewardship practices have become more closely aligned with evidence-based guidelines. I am very proud of everything that they have accomplished and feel happy that they also feel proud of their achievements and have the desire to continue to work towards improved and appropriate antibiotic prescribing practices. What this study has

demonstrated is that incorporating the elements of action research, that is inclusive and respectful working relationships, into initiatives aimed at improving healthcare worker compliance with evidence-based guidelines has the potential to lead to desirable changes in behaviour. As this study ends it is important to consider therefore how this work can be replicated on a larger scale to allow for greater impact. To do this, we need to consider why the same intervention has brought about changes in the practice of some midwives and not others. This chapter has considered the intricacies of each healthcare facility to try and explain why variations in practice have occurred. The following chapter considers the theories of behaviour change presented in chapter four in relation to this study in an attempt to understand why some midwives were able to modify their behaviour whilst others weren't.

Chapter nine – Discussion (Changing behaviours)

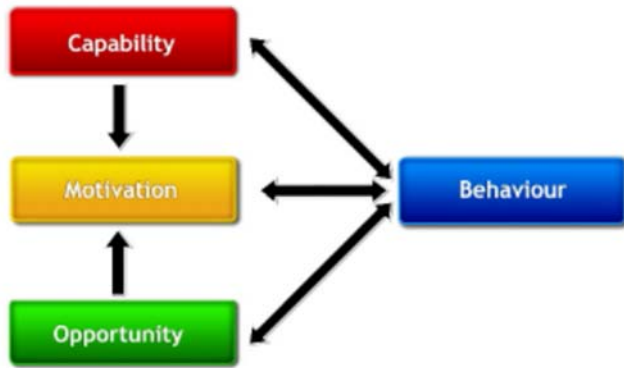
Introduction

Evidence based care forms the cornerstone of effective healthcare provision. Medical journals publish new research findings at a rate that leave the individual struggling to keep up with new developments. Midwives in the UK and Uganda make a commitment to taking part in lifelong learning to ensure that their practice is up to date and evidence based (NMC, 2015; UNMC, 2014). Evidence from Uganda suggests that health policy is not always based on evidence (Orem, Mafigiri, Nabudere and Criel, 2014), and that future improvements in the uptake of evidence in healthcare in Uganda is reliant on a variety of stakeholders at all levels of the system (Orem et al., 2012; Orem et al., 2013). Translating knowledge into practice is not a straightforward process. Equipping individuals with knowledge about evidence-based practice does not always translate to a change in their care provision so that it aligns with new recommendations. Findings presented in the last chapter have demonstrated that differing groups, when armed with the same knowledge and support, follow different trajectories in changing their practice. This chapter seeks to try and understand why the interventions implemented in this study have had varying levels of success between individuals and healthcare facilities. To do this the chapter returns to the three theories of behaviour change that were discussed in chapter four to see if they can explain the experiences of this study.

The behaviour change wheel

To recap, the behaviour change (BCW) wheel devised by Michie et al. (2011) has the COM-B system at its centre. Capability, opportunity and motivation interact with each other to create behaviour which in turn can shape these key components (see figure 9.1).

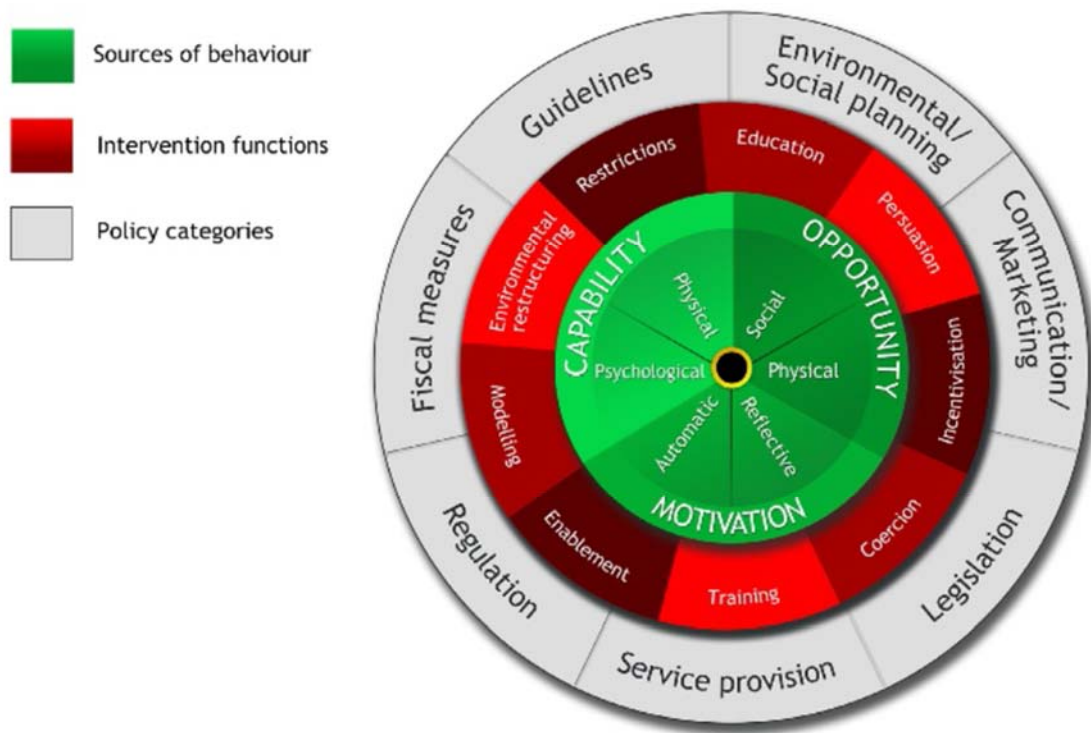
Figure 9.1. – The COM-B System



Source: Michie et al. (2011)

The middle layer of the BCW identifies nine potential intervention functions, with the outer layer of the wheel taking into consideration seven policy categories (see figure 9.2). The BCW theorises that once a problem has been identified and context has been taken into consideration that these intervention functions and policies may be implemented as an intervention to try and change behaviour.

Figure 9.2. – The Behaviour Change Wheel



Source: Michie et al. (2011)

In terms of this study the COM-B model can help to explain why midwives working in different healthcare facilities have in some cases been able to modify their antibiotic prescribing practices, and in other healthcare facilities they have not. The continuous medical education (CME) session held as part of the training cycle had the aim of improving the individual's capability. Feedback from those midwives attending the CME indicated that they felt their knowledge had improved. The midwives in the study also called for the specific guidelines relating to the prescription of antibiotics for maternity related conditions to be provided in their areas, rather than them having to search through the 1,118 page long Uganda Clinical Guidelines (MoH, 2016) to assist them in their prescribing decisions. The provision of maternity specific guidelines to the midwives enhanced their capability to treat common conditions of pregnancy accordingly. At the time of carrying out the CME it was acknowledged by the midwives taking part in the study and myself that the opportunities for being able to diagnose bacterial infections is constrained by current healthcare facility infrastructure. Equally with supplies of antibiotics being restricted by the government, the opportunity for midwives to be able to prescribe and dispense according to evidence-based guidelines is restricted. In part it would appear that the opportunity component of the COM-B model is lacking in the Ugandan setting thereby inhibiting the ability of midwives to change their behaviours in relation to antibiotic prescribing.

Whilst all the midwives that took part in the CME study received the same knowledge and access to guidelines, and ultimately faced the same restrictions in terms of opportunity, the crux of the difference between changes in prescribing practices lies, in the COM-B model, with the motivation component. At the starting point of this study most of the midwives taking part would describe themselves as "demotivated" due to their low salaries and poor working conditions. As the study comes to an end I feel the same still holds; salaries and working conditions remain as they were two years ago.

In considering the differences in motivation between those facilities that aligned their antibiotic prescribing practices with evidence and guidelines compared to those that struggled to do so, there are two main points to highlight. Firstly, the champion cycle saw two midwives being taken to the second Ugandan national conference for antimicrobial resistance. Transport, food and accommodation were provided in addition to the knowledge that they acquired from attending. The opportunity to go was well received by

both midwives and both thanked me multiple times for including them. I feel that this gesture was motivational for them. It is perhaps not a coincidence that the midwives that came to the conference were from Elgon health centre and the antenatal clinic at Stanley hospital. It is clear from the findings in chapter eight that the midwives working in the antenatal clinic at Stanley hospital showed a sustained reduction in inappropriate antibiotic prescribing practices following the CME.

Recent research suggests that UK volunteers working in LMICs are not always welcomed by local healthcare professionals as their presence creates extra work (Osman, 2018). As a volunteer midwife working clinically alongside midwives in all the healthcare facilities I feel my presence has been valued more highly at Elgon health centre and the antenatal clinic at Stanley hospital. Reasons for this were alluded to in chapter two. To recap, my personal relationships with the midwives at Elgon have been much stronger than at any of the other healthcare facilities, partly due to my geographical location, and partly due to the longer standing relationship that Elgon have with K4C. At Stanley hospital the midwifery team working in the antenatal clinic is small and cohesive. Together they see anything from 40 to 100 women per day so, as an additional member of the team assisting them to provide care to these women, I always felt very welcome. In these two settings, contrary to the work of Osman (2018) I felt my presence as a volunteer served as a means of motivation to these midwives, as I not only assisted them with their clinical workload, but also in the translation of their knowledge about antibiotic stewardship into their clinical practice. In contrast, at Speke health centre my presence as a volunteer midwife, whilst appreciated, was done so in a different manner. Primarily the midwives working in this healthcare facility viewed me as substitute labour. Rather than work with me to synergise our knowledge and skills, my presence was usually met with their disappearance from the clinical area. Whilst this could be viewed as motivational as it provided them with a 'rest', it didn't allow for the enablement of continuous mentorship to support the critical application of their new knowledge capability in practice. In the COM-B model therefore, the static levels of antibiotic prescribing following the CME at Speke antenatal clinic could be explained by a lack of appropriate motivation.

Moroto health centre is the anomaly when it comes to explaining the improvements in their antibiotic prescribing practices using the COM-B model. Much like Speke health

centre, the midwives at Moroto viewed myself and other Knowledge for Change (K4C) volunteers from the UK merely as substitute labour; the K4C volunteer would run an antenatal clinic whilst the Moroto midwife would run a child immunisation or prevention of mother to child transmission (PMTCT) of HIV clinic. As mentioned in chapter eight, in November 2017 due to a lack of engagement from the Moroto team K4C decided to withdraw from working there. Although I could have continued to work there clinically for the purposes of this study, I chose not to. The reason I made the decision not to spend time in the antenatal clinic at Moroto was related to the work roster of the midwives. The busiest days in antenatal clinic at Moroto are Monday and Tuesday. On a Monday the midwife on duty runs antenatal clinic and the child immunisation clinic. A Tuesday will see the midwife run the antenatal clinic and the PMTCT for HIV clinic. With Monday and Tuesday being the busiest antenatal clinic days it should follow that the opportunity for me to provide mentorship for these midwives would have been at its highest on these days. However, with additional tasks delegated to the midwives on these days, I would have been used as labour substitution to run the antenatal clinic independently, perhaps with the assistance of a village health technician (VHT) for translation requirements. Whilst I would have followed the Uganda Clinical Guidelines (MoH, 2016) for treatment of common conditions of pregnancy and antibiotic use accordingly, any reduction in antibiotic use during this period would not paint a true picture of changes in the antibiotic prescribing practices of the midwives working at the antenatal clinic.

Despite my withdrawal from clinical work at Moroto the midwives there have shown improvements in their antibiotic prescribing practices. In the months June, July and August 2018 all of the antibiotic prescriptions they made were for perceived bacterial conditions only. They had eliminated the use of antibiotics for cough and lower abdominal pain and they were consistently prescribing the correct combinations and doses of antibiotics for abnormal vaginal discharge. Given that I hypothesised my clinical working presence at Elgon and Stanley hospital antenatal clinics provided the motivation element of the COM-B model, how can I explain the improvements in the antibiotic prescribing practices of midwives at Moroto health centre? Quite simply, I provided motivation in another way. Following K4Cs withdrawal from working in Moroto, although I didn't work there clinically, I maintained professional and personal relationships with the midwives working there. I

continued to visit at least twice a month for data collection and feedback purposes but would always spend time with the midwives getting to know them better whilst also giving feedback about antibiotic prescribing practices and discussing general issues relating to healthcare provision in Uganda. I think it is also important to note that on each of these visits, in the majority of cases, I met the same two midwives every time (there were five midwives working there full time). This wasn't intentional. It just so happened that these midwives worked most of the weekdays whilst the others covered nights and weekends. I was therefore building strong relationships and sharing messages about antibiotic prescribing consistently with the same midwives who just happened to be the ones who ran the majority of the antenatal clinics and therefore had the lead responsibility for antibiotic prescribing. These small, regular meetings have allowed us to effectively share messages and discuss any difficulties in adapting practice. It would seem then that I was able to motivate the midwives at Moroto health centre in a different way to the midwives at Elgon health centre and Stanley hospital. This suggests that individual preferences for motivational support may differ between individuals and groups of individuals. These preferences need to be investigated prior to the implementation of any motivational interventions. This will allow for interventions that can potentially maximise behaviour change to be implemented.

Promoting Action on Research Implementation in Health Services (PARIHS)

The PARIHS framework was developed by Kitson et al. (1998). Bergstrom et al. (2012) used the PARIHS model to guide them in their research exploring Ugandan midwives' experiences of facilitating knowledge translation in their clinical practice. Findings from the study by Bergstrom et al. (2012) identified the PARIHS element of context, as well as the sub-elements of culture, leadership and evaluation as factors contributing to their ability to effectively translate knowledge into behaviour change. As this element and its sub-elements were specifically identified as relating to the Ugandan midwifery context, my study has chosen to use them in an attempt to explain the difference in experiences and outcomes following the CME between healthcare facilities. Table 9.1 depicts the low and high rankings associated with each of these sub-elements. Where a sub-element has a high

ranking the propensity for change is greater than in the case where a sub-element has a low ranking.

Table 9.1. Elements of the Promoting Action on Research Implementation in Health Systems (PARIHS) framework identified in the study by Bergstrom et al. (2012).

CONTEXT	Sub-element	Low	High
	Culture	<ul style="list-style-type: none"> • Task driven • Low regard for individuals • Low morale • Little or no continuing education 	<ul style="list-style-type: none"> • Learning organisation • Patient centred • Valuing people • Continuing education
	Leadership	<ul style="list-style-type: none"> • Diffuse roles • Lack of team roles • Poor organisation or management of services • Poor leadership 	<ul style="list-style-type: none"> • Clear roles • Effective teamwork • Effective organisational structure • Clear leadership
	Evaluation	Absence of: <ul style="list-style-type: none"> • Audit and feedback • Peer review • External audit • Performance review of junior staff 	<ul style="list-style-type: none"> • Audit and feedback used routinely • Peer review • External evaluation

Source: Kitson et al. (1998)

Context

Bergstrom et al. (2012) noted that a lack of resources created frustration amongst midwives when they were taught new skills but were left unable to implement them due to a lack of human resources, equipment, medication, general consumables, space and time. In relation to this study, and as previously discussed in relation to the COM-B model of behaviour change, a lack of resources in terms of diagnostic testing equipment, antibiotics and time were identified in the pilot and context cycles as factors affecting

midwives' antibiotic prescribing decisions. Equipping midwives with knowledge about antibiotic stewardship in the CME had no impact on these contextual factors. Adapting antibiotic prescribing practices without the required resources was not easily achievable and most likely a contributing factor to the difficulties encountered by the midwives in this study as they attempted to modify their antibiotic prescribing behaviours.

Culture

Cultural components supporting the translation of knowledge into practice as identified by the midwives in the study by Bergstrom et al. (2012) included on-the-job learning supported by teamwork and effective communication and cooperation. All the healthcare facilities in this study received on-the-job training in terms of mentorship from myself³⁹ as a means of supporting midwives in developing their antibiotic stewardship skills. On reflection, although mentorship did take place following the CME this mainly took place during the monthly feedback sessions. As I scaled back my clinical work the opportunity for daily mentorship about antibiotic stewardship was minimised. I cannot be certain, but perhaps if the level of clinical mentorship had been maintained across all healthcare facilities following the CMEs then there may have been a greater improvement in antibiotic prescribing practices.

It is also worth noting that Elgon and Stanley antenatal clinics have a stronger sense of team than Moroto and Speke health centres. The midwives at Elgon health centre and the antenatal clinic at Stanley hospital are incredibly supportive of each other. For example, there have been three midwives from Elgon who have been awarded fellowships to attend the UK for 6 months. When each individual has been absent from work to take up this opportunity, the rest of the team, with support from K4C to backfill their position, have pulled together to ensure service provision is maintained. Equally midwives working in the antenatal clinic at Stanley hospital are also prepared to support their colleagues when they are off duty to attend training or are sick. One midwife from Stanley hospital contacted me to tell me that she had had a busy antenatal clinic where she had provided care for 69 women independently because her two colleagues for that day had been called to attend

³⁹ With the exception of Moroto health centre after November 2017.

a meeting. Whilst she admitted that she was undoubtedly tired, she valued the fact that the same two midwives had made up the shortfall in human resources for her the previous week when she was called to attend to family matters for two days.

By contrast teamwork and morale in Moroto and Speke health centres could be viewed as somewhat lacking. For example, one of the midwives at Moroto frequently laments that she feels their birth rate for the facility is below the expected level because midwifery staff frequently turn up late for duty or fail to turn up at all. This midwife in particular feels disappointed that not only do her colleagues not come to relieve her, but that their absence leaves women with no choice but to incur greater costs by having to travel further to reach a healthcare facility that is overcrowded and unable to provide the level of care that could be provided in her facility. Similarly, at Speke although there are times when the midwives pull together to share a heavy workload, it is not uncommon to see the midwife who has been assigned to run the antenatal clinic leave the premises as soon as the clinic is completed; They do not always stay to support the midwife with the heavy workload who is covering the antenatal, labour and postnatal wards. Furthermore, only five midwives out of thirteen from Speke attended the CME on antibiotic stewardship. Whilst I have attempted to support, via the means of mentorship those midwives at Speke who didn't attend the CME, findings presented in chapter eight from the review cycle suggested the midwives who attended the CME failed to share the knowledge they had obtained with the colleagues who hadn't.

Leadership

The need for a leader to be a role model, capable, physically present, and part of the team was identified by the midwives in the study by Bergstrom et al. (2012) as a key requirement to assisting the transition of knowledge into clinical practice. They also pinpointed that an autocratic leadership style had the potential to demotivate clinical staff. The use of a modified action research approach in this study, with its parallels to transformational leadership, has attempted to combat the drawbacks associated with an autocratic leadership style. Nonetheless, differences in leadership between those healthcare facilities

that have successfully managed to implement antibiotic stewardship practices compared to those that have struggled are marked.

The antenatal clinic at Stanley hospital have made sustained changes to their antibiotic prescribing practices since the CME sessions that were held in March 2018. With regard to leadership, this is an interesting finding, as during this period the credibility of the director at Stanley was called into question not just by healthcare staff, but by local government leaders, with calls for her to resign or be transferred rampant in the first half on 2018. The accusations against the director led her to become a leader that was rarely visible to her staff. The leadership with the Stanley antenatal clinic was not harmed by this invisibility. The lead midwife of the antenatal clinic commenced the Bachelor of Midwifery training at the time that this study commenced. Her drive to self-fund her education, and the commitment that she made to working full time during the week whilst undertaking a three year weekend midwifery program, demonstrates her dedication to the midwifery profession. It is unclear if her wish to upgrade her education arose due to her desire to continue to improve maternity care in Uganda or as a stepping stone to increase her income. Regardless, her decision to undertake further education underlines that she has drive and ambition and leads by example.

Equally, the overall in charge of Elgon was a nurse before she made the transition to being a clinical officer and leader. Her attendance at the healthcare facility can be somewhat hit and miss, but on the whole she is a visible leader. It is not unusual to see her at the healthcare facility at the weekend keeping the midwife on duty (who is the only member of staff present at the weekend) company or assisting her in filing reports or updating case records. The in charge of Elgon health centre is predominantly a kind and happy woman who has effective professional and good personal relationships with her team. When I discussed with her my plans for holding the CME for her staff she also requested to attend; partly she wanted to update her own knowledge but she also wanted to attend so that she could support her team in implementing any knowledge obtained. This is not to say that she is perfect. I have certainly witnessed midwifery staff grumbling about her. However, on the whole she is present, and leads by example. Similarly, the senior midwife at Elgon is supportive of her team. Whilst she is sometimes accused of giving herself the most favourable duty roster over periods like Christmas and New Year, she has also

demonstrated her selflessness as a leader in foregoing the opportunity to undertake a commonwealth fellowship in the UK until all of her midwifery colleagues had taken the opportunity. An experienced midwife with a critical mind, the lead midwife at Elgon health centre has played an important leadership role in promoting antibiotic stewardship practices amongst her colleagues not only at Elgon but in the surrounding area.

By comparison the in-charge of Moroto health centre is rarely present. Her attendance at the healthcare facility often coincides with a visit from an NGO or a higher authority, otherwise she is barely visible. As a leader she is aware that Moroto is not performing to the level it should be, yet no action has been taken to address this. Compounding this lack of leadership is the fact that the senior midwife of Moroto has had two babies in the time that this study has been running. Ultimately this means that she has been on maternity leave for almost one year of the study. As a leader other midwives and staff fear her as she has a tendency to be aggressive in her leadership when she is present. Having spent so much time on maternity leave, the midwife in charge has not had the same access to mentorship and did not attend the CME on antibiotic stewardship. However, following her return to work after maternity leave, the lead midwife has demonstrated her leadership skills, which could be a contributing factor in the transformation of antibiotic prescribing practices at Moroto. On returning to work she made great efforts to update her knowledge about antibiotic resistance, antibiotic stewardship and appropriate antibiotic prescribing. Furthermore, her colleagues have taken the time to share the information they learned in the CME with her. When I have attended Moroto to give the monthly feedback she has regularly been present and assured me that she has shared the monthly messages with the rest of her team.

Speke health centre lacks leadership both from the overall in-charge of the healthcare facility, a medical officer, and from the lead midwife. The medical officer rarely attends for duty which results in women being transferred out of a healthcare facility that can and should provide emergency obstetric care, to Stanley hospital, some 15km away. Many of the midwives find this frustrating as they are left unsupported and find themselves caring for women with conditions that are outside their realm of practice. Furthermore, the midwives find the situation distressing knowing that the delay the women face in such situations threatens both the life of the woman and her unborn child. The reputation of

the midwife in charge of the maternity unit is no better. Again, she rarely attends for duty, leaving midwives rostered onto the same shift as her with double the amount of work. Her lack of leadership and support for her team has seen other midwives threaten to report her behaviour to the relevant authorities in the middle of very public staff meetings. From the manner in which she is spoken about by staff it is clear that she is not well respected by her team. As was the case for Moroto, the lead midwife at Speke did not attend the CME about antibiotic stewardship, and her continued absenteeism means that she has not received any mentorship in antibiotic prescribing practices. Evidence from West et al. (2015) indicates that effective leaders who are able to facilitate change are respected by their colleagues, demonstrate personal integrity and are team players who align their leadership actions with their vision. In this situation, a collective lack of leadership, absenteeism and a disinterest in adopting evidence-based practice in the form of antibiotic stewardship from the leaders of Speke health centre may have contributed to stagnant levels of antibiotic prescribing found at the facility.

Evaluation

Evaluation was identified by Bergstrom et al. (2012) as a key factor in the process of translating knowledge into practice. Evaluation was seen to constitute supportive supervision by an individual able to identify where interventions are failing and introduce and monitor the success of alternative interventions. With a continuous cycle of observation, reflection, planning and acting, this modified action research study has addressed the need for evaluation throughout the process of introducing midwives to antibiotic stewardship. Each cycle has looked at the specific needs of the midwives and taken these into consideration when designing interventions to support a change in antibiotic stewardship and antibiotic prescribing practices. Midwives in the study by Bergstrom et al. (2012) felt that positive feedback given to one person was influential in encouraging others to aim higher. In this study, I always kept all the midwives in each healthcare facility informed of both their antibiotic prescribing progress and that of their counterparts in an attempt to encourage them to emulate the success of those healthcare facilities successfully adapting their behaviour. I observed some noticeable differences in

the way in which the monthly feedback was given which could be seen as a contributing factor to the differing levels of success in adapting antibiotic prescribing practices. In particular the working patterns of the midwives at Stanley hospital antenatal clinic means that on any one day three to four of the midwives will be found working. On days where I attended to give monthly feedback and mentorship I was generally met by at least two of the team members. Similarly, at Moroto health centre, following the return of the lead midwife from maternity leave she rostered two midwives to work on the busiest antenatal clinic days. When giving feedback to the midwives working at Moroto I usually found myself encountering two midwives, who were consistently the same two midwives, to discuss and give feedback to. I feel this has assisted the learning process as consistent messages have been reinforced not only on a monthly basis, but to the majority of the team. In contrast, when giving feedback from the monthly audits at Elgon and Speke health centre I rarely encountered more than one midwife at a time. As discussed in chapter seven difficulties then arise when it comes to this midwife disseminating the feedback to her colleagues. Shift patterns mean that sharing feedback verbally with all members of the team proved difficult. Furthermore, despite the fact that I always produced a feedback poster for each healthcare facility, these may not have been looked at by the other midwives, or equally, they may have been incorrectly interpreted. Finally, where feedback was shared, key messages may have been missed.

At the same time the midwives in the study by Bergstrom et al. (2012) noted that well performing individuals were often punished with an increased workload. I have witnessed this attitude during my clinical work in Uganda. In particular the midwives working at Elgon have a long standing working relationship with K4C. As a result of their hard work and dedication to their work and the women in their care, the midwives at Elgon have become involved in providing services, such as cervical screening, in addition to their normal duties. On discussing this with one of the midwives at Elgon she told me that it troubles them to provide the extra services without a congruent increase in remuneration, but they continue to do so as they care about the community they serve. I feel this attitude has supported the midwives at Elgon and Moroto health centres and Stanley hospital to improve their antibiotic prescribing practices.

Community participation as a means of evaluation was also identified by the midwives in the study by Bergstrom et al. (2012) as a driver for healthcare professionals to change their practice. This study has failed to utilise the women receiving care from midwives in the action research cycles. Moving forwards I feel that community participation is crucial to reducing inappropriate antibiotic use. Whilst midwives can explain to women why they are no longer giving them antibiotics for a cough for example, I feel introducing the concept of antibiotic resistance into the wider community could help drive changes in antibiotic consumption.

Evolutionary economics and behaviour change

To recap, the theory of economic evolution (Canibano et al., 2006) describes economic systems as constantly evolving systems which embody continuous endogenous change with the individual agent being at the heart of economic change. Crucially, innovative intentionality defined as “the will to conceive or imagine realities which differ from the perceived realities with the purpose of making them effective” (Canibano et al., 2006, p.319) is key component of theory proposed by Canibano et al. (2006). Simply put this theory proposes the need for those involved in the change process to be able to visualise realities that differ from their current reality. Only those able to envision a different reality will change their behaviours and practices.

Before considering the specifics of this study in relation to the theory of Canibano et al. (2006) I feel it is beneficial to consider the reality of the Ugandan healthcare system as a whole. I read about the theory of intention as outlined by Canibano et al. (2006) on the same day that I attended a Monday morning meeting at Stanley hospital. Every week day morning the Principle Nursing Officer at Stanley hospital chairs a meeting which discusses inpatient admissions, discharges and deaths in the past 24 hours, as well as any issues arising that affect the operationalisation ability of the hospital. On a Monday this meeting reports on admissions, discharges and deaths since the Friday morning. On this Monday morning as we sat and listened to the reports of all the deaths over the past 72 hours, I began to feel a loss of hope that the healthcare setting in Uganda will ever reach the standards found in high income countries. Many of the deaths over the weekend could

have been averted if the patients had received blood transfusions. It was reported that no blood had been available for transfusion on the Friday or Saturday. Blood was delivered to Stanley hospital on the Sunday from a regional referral hospital in a neighbouring district, some three hours away. In the meeting we were informed that the blood had been put to good use on the Sunday with 21 units out of the 100 being transfused to patients. However, we were then informed that the remaining 69 units were due to expire at the end of the day. Whilst it was anticipated that some of these units would be used, it was felt that many of them would be wasted. As a group we were rueful that the blood had not been delivered earlier so that it could have been used to save the lives of those who had passed on before its delivery. As you may imagine the faces and body language of those present at the meeting were disinterested and individuals appeared deflated. They had heard these stories before, probably just last week, and no doubt were expecting to hear them again in the coming days.

At the same meeting a doctor's strike that was underway at the time was also discussed. Lead nurses from departments attending the meeting talked of how they had acutely sick patients on their wards, some of whom had been there for days, who had not yet been reviewed by a doctor. At this point the attitude of those attending the meeting changed, with nursing ward managers becoming dynamic in their pleas to the leaders of the hospital to assist them in resolving the situation. This more dynamic attitude was soon squashed with platitudes from the hospital leaders that left myself, and I imagine the lead nurses, feeling as though the situation wouldn't be resolved any time soon.

Needless to say I walked away from the meeting feeling incredibly subdued and disheartened, unable to imagine a move away from this reality in the future. As I reflected on how I felt, I considered the feelings of my Ugandan co-workers. As a visiting midwife from the UK who at the time had only been in Uganda for 18 months, I felt that my ability to seek out the positive and be hopeful for the future of the Ugandan healthcare system must be somewhat enhanced compared to my counterparts who have been attending the same meetings day in day out for their whole career, whether that be 5 or 25 years. The theory of Canibano et al. (2006) that one must be able to imagine a changed reality in order for it to be realised resonated perfectly with my understanding of why the Ugandan healthcare system is failing to take strides forwards and improve standards of healthcare

provision. This is not to say that the only reason knowledge translation in healthcare in Uganda is failing is because of an inability to imagine a different reality. Indeed, as mentioned previously, a number of intertwining factors influence behaviour change. However, from my point of view this felt like an overarching explanation.

In considering the success of this modified action research study, it is possible to apply the theory of Canibano et al. (2006). When K4C began working with Elgon health centre no births had taken place in the unit for 17 years. Two of the first Ugandan midwives drafted in to work at Elgon alongside a UK volunteer midwife from K4C had been working at Moroto health centre prior to their transfer. Analysis of maternity registers at Moroto prior to and after this transfer occurred is illuminating. Prior to the two midwives being transferred to Elgon, Moroto had birth rates of approximately 30 per month. Following their departure from Moroto birth rates there have fallen, with the greatest number of births in one month being no greater than 16. At the same time, birth rates have steadily increased at Elgon to an average of 35 per month. This demonstrates that the two midwives had the ability to envision a different reality for Elgon health centre than was the norm when they began working there. Subsequently their individual actions and dedication to their role has led to a change in the functional status of Elgon health centre. One of these two midwives is the midwife who attended the conference on antimicrobial resistance with me and drove the change in prophylactic antibiotic prescribing in the postnatal period at Elgon. In applying the theory of Canibano et al. (2006) to this study it is possible to conceive that this midwife has the ability to envision a different antibiotic prescribing reality for her and her team, which may be a contributing factor in their success at improving the quality of their antibiotic prescriptions.

Conversely when Moroto lost these two midwives, one of whom was the lead midwife, the potential for innovative intentionality may have been lost. This is evidenced by the drop in birth rate, and the attitude of the midwives. During the six month period following the CME, the two midwives who have consistently been present at Moroto on the days that I attended to give feedback both applied to the local university to undertake a Bachelor of Nursing course. Similar to the midwife working at Stanley hospital antenatal clinic on the Bachelor of Midwifery course, the need for these two midwives to self-fund their higher education as well as the commitment they have made to undertaking a three year weekend

program whilst maintaining a full time work schedule indicate that they too are dedicated to the midwifery profession and are able to visualise changes to the provision of services in the future. It could be argued that with this vision these two midwives are able to envision a different reality for maternity services, hence their success in modifying their antibiotic prescribing practices to align with evidence-based guidelines.

A lack of accountability in the Ugandan healthcare setting allows absenteeism to persist and care based on habitual practices rather than evidence to dominate in healthcare facilities across the district, as has been seen in Speke health centre. If these midwives are unable to visualise a change in their reality, namely they don't see that accountability will become an established component of the healthcare system, then what need is there for them to align their practice with evidence? I have identified at least one midwife at Speke health centre whose commitment to care outshines that of her managers. Her strong work ethic and desire to change care provision at the health facility is however inhibited by a lack of support from her colleagues who ultimately don't share her vision for a different reality. Although accountability is lacking throughout the Ugandan healthcare system, in facilities where leaders flaunt the lack of accountability and fail to lead by example, there is again little hope that other members of the team are able envisage a different reality.

The application of innovative intentionality to the reduction in antibiotic prescribing rates at Stanley hospital is complex to untangle. In one respect that staff working in Stanley hospital face the least favourable working conditions and witness unnecessary morbidity and mortality on a basis more regular than their counterparts at Elgon, Moroto and Speke. As a result, their ability to imagine an achievable alternative reality is compromised. Where I feel the midwives at Stanley hospital differ, is quite simply related to their physical location. They are tucked away in the corner of the outpatient department, significantly removed from the rest of the maternity department, and are under a different leader to those midwives working on the inpatient wards. Perhaps it is this distance that helps them create their own separate reality in which they are their own leaders and masters of their working reality.

Conclusion

This discussion has focused on three theories of behaviour change, two of which were developed with the healthcare setting in mind. From this short analysis it is possible to see that the COM-B system and the PARIHS framework overlap in their theories of what is required to achieve behaviour change. Whilst the COM-B approach is relatively straightforward and contains fewer elements than the PARIHS framework, it is clear from this study that meeting all the requirements to change behaviour is not easily attainable. Whilst the theory of Canibano et al. (2006) has a basis in economic theory the role of innovative intentionality, the ability of individual agents to imagine a different reality, is deemed to be the key in one's ability to change their behaviour. In some respects, the three theories that have been discussed come to similar conclusions about why changing the antibiotic stewardship practices of midwives in this study has been challenging. In this case, where the study has taken place on a small scale, albeit with the support of local healthcare leaders, changing many of the opportunity (COM-B model) or contextual (PARIHS framework) factors such as access to diagnostic testing facilities and increasing staff motivation to work (wages) is impossible without the support and assistance from stakeholders at higher levels. It follows that because it has been beyond the realms of this study to change the healthcare system as a whole, and because there is no evidence to suggest that the government will take on this task, the individuals in this study are unable to imagine a reality different to the one that they face now.

As a researcher carrying out a modified action research study for the first time I am aware that although this study has led to some changes in antibiotic stewardship practices, it has been limited in achieving behavioural change. Having looked at multiple theories of behaviour change, some complex, some less so, I feel that my personal experiences have led me to make an addition to requirements of a behaviour change theory; to consider your own behaviour in trying to change that of others. As an outsider in a foreign country and a healthcare system that differs so greatly from the one I am used to, there is a need for the individual introducing concepts aimed at changing behaviour to be humble. Taking time to consider, learn about and understand the context in which an intervention is being implemented is key to understanding what mechanisms may work to facilitate change. Most importantly though, and what I consider to have assisted in the small successes of

this study, is that it took a participatory approach and included cycles of reflection. All too often managers and leaders across the globe attempt to enforce change upon their staff without tapping into the expertise that they hold or considering their opinions and needs. This can be demoralising, which itself is not conducive to encouraging behaviour change. Moreover, ignoring the ideas and opinions of those whose behaviour you are trying to change overlooks possibly one of the best resources and insights into why an intervention is or isn't working.

Chapter ten – Conclusion

Introduction

This chapter looks back at the whole study. Firstly, it recaps the aims of the study that were set out in chapter one. It goes on to review the findings of the study whilst assessing if these aims have been met. The chapter then reflects on the contribution to knowledge that this study has made, before considering its strengths and limitations. The chapter proceeds by making recommendations for the way forward and finally presents my own personal reflection of my time living and working as a midwife and researcher in Uganda.

Review of the research aims

The aim of this study was to develop and implement an evidence base about antibiotic stewardship for midwives working in the Kabarole District of Uganda. The study then aimed to assess the midwives' responses to the evidence base provided in training sessions in terms of their adherence to antibiotic stewardship practices.

In order to achieve this, the following objectives were identified:

- To explore Ugandan midwives' understanding of antibiotic resistance and antibiotic stewardship.
- To explore Ugandan midwives' antibiotic prescribing and dispensing practices, including quantifying the volume and type of antibiotics being prescribed.
- To identify existing cultural practices and/or protocols that inform current antibiotic prescribing practices.
- To identify any challenges/barriers that influence the ability of midwives to carry out antibiotic stewardship activities.
- To identify strategies to enhance Ugandan midwives' awareness and practice of antibiotic stewardship activities.

Review of findings

Findings from the pilot and context cycles addressed the initial four aims of this study. The first was to explore Ugandan midwives' understanding of antibiotic resistance and antibiotic stewardship. The second was to explore their antibiotic prescribing and dispensing practices, including quantifying the volume and type of antibiotics being prescribed. The third aim was to identify existing cultural practices and/or protocols that inform current antibiotic prescribing practices. Finally, the fourth aim was to identify challenges and barriers that influence the ability of midwives to carry out antibiotic stewardship activities. Findings indicated that the levels of understanding held by the midwives about antibiotic resistance were limited and differed between midwives. The one consistency amongst them was that they all requested further training about antibiotic resistance and antibiotic stewardship practices. These findings are not unique to the Ugandan midwifery setting and have been noted in other studies across sub-Saharan Africa involving other cadres of healthcare professional (Bulabula et al., 2018; Lyimo et al., 2018; Farley et al., 2018; Wasserman et al., 2017; Abera et al., 2014). Furthermore, none of the midwives had heard of the term 'antibiotic stewardship' even though they were carrying out antibiotic stewardship activities, such as providing vaccinations and carrying out infection and prevention control activities in their daily working lives. The midwives attributed differing levels of knowledge about antibiotic resistance and appropriate antibiotic prescribing practices to differences in the quality of midwifery education that they had received. This finding is consistent with evidence from Uganda which suggests that healthcare professionals are inadequately trained to take on tasks shifted to them including antibiotic prescribing (Baine et al., 2018), and further that midwifery education in Uganda is failing to adequately prepare midwifery students for the role of being a midwife (United Nations Population Fund, 2009). Secondary data analysis of antenatal maternity registers underlined the finding that midwives lack knowledge about appropriate antibiotic use. Monthly analysis revealed that midwives prescribed antibiotics for a variety of conditions, several which are were not bacterial in nature and therefore none responsive to antibiotics. Similar findings have been seen across the globe both in LMICs and HICs with estimates suggesting that up to 50% of all antibiotic prescriptions are inappropriate (CDC, 2013). Findings have revealed that the influences on the antibiotic

prescribing practices of the midwives are similar to those faced by healthcare professionals across continents (Farley et al., 2018; Lyimo et al., 2018; Pearson et al., 2018; Asante et al., 2017; Broom et al., 2014; Garcia et al., 2011; Reynolds and McKee 2009). Many of these influences on antibiotic prescribing practices were identified to be operational constraints, with human resources, diagnostic testing equipment, antibiotics and consumables that enable sound infection control and prevention measures found to be lacking.

The champions, training and review cycles sought to address the overarching aim of this modified action research study by introducing a contextually relevant evidence base for antibiotic stewardship. These cycles also aimed to assess the midwives' responses to the evidence base in terms of their adherence to antibiotic stewardship practices. Findings have demonstrated that a simple intervention of a continuous medical education session combined with monthly feedback sessions that offered the opportunity for mentorship progressively supported the midwives in changing their antibiotic stewardship practices. However, the extent to which antibiotic stewardship practices and in particular the antibiotic prescribing practices of the midwives changed to align with evidence-based guidelines differed between individuals and healthcare facilities. For example, by the end of the six month feedback process the midwives at Moroto health centre were only prescribing antibiotics for conditions that they had classified as bacterial infections. By comparison, over the same time frame and with the same level of support the midwives at Speke health centre were unable to modify their documentation in relation to antibiotic prescribing, let alone their antibiotic prescribing practices. Having reflected on these outcomes for a significant amount of time I have come to believe that these findings underline the significance that context plays in behaviour change. Of the behaviour change theories discussed in chapter nine, I have personally come to identify closely with the theory based on evolutionary economics as presented by Canibano et al. (2006). In particular the role that innovative intentionality plays in changing behaviours has been able to explain the differing trajectories that the antibiotic prescribing practices of the midwives in this study have taken.

Contributions to knowledge

This study makes contributions to the research base pertaining to knowledge held by healthcare workers about antibiotic resistance and influences on antibiotic prescribing practices. To my knowledge this is the first study that has sought to explore the knowledge held by Ugandan health workers about antibiotic resistance and appropriate antibiotic prescribing practices. Furthermore, this study makes a unique contribution to the literature as it has considered the previously overlooked group of healthcare professionals, midwives, and the role that they play in the provision of antibiotics to pregnant women. This study is one of the first that has adopted a modified participatory action research approach to the development and implementation of an antibiotic stewardship evidence base in the Ugandan healthcare setting and sub-Saharan Africa as a whole. Given the escalating threat that antibiotic resistance poses to the health of the global population the findings of this study make a timely contribution to the evidence base that considers the way forward in tackling inappropriate antibiotic prescribing practices.

Strengths and limitations

One of the key strengths of this study has been its longitudinal approach. Being present in Uganda for two years enabled the study to develop naturally over time. In turn this has allowed each cycle of action to be tailored to the requirements of the midwives taking part. My continued presence in Uganda has enabled mentorship to persist following the CME. This concurs in line with findings from the Royal College of Paediatrics and Child Health (2015) as it has worked well to support the midwives in consolidating their knowledge about antibiotic resistance and antibiotic stewardship practices, namely antibiotic prescribing. Whilst this study has focused on a small group of midwives working across just four healthcare facilities in one district, my presence in Uganda has facilitated the spread of awareness about antibiotic resistance and antibiotic stewardship with midwives working across the country. The CME that formed the main intervention of the training cycle has been presented to 63 nursing and midwifery students on the Bachelor of Nursing and Bachelor of Midwifery programmes at Aga Khan University in Kampala. I was also invited to train 61 midwives from the Uganda Private Midwives Association. Conversations with

these midwives in the months following these training sessions revealed that they too have been guiding their colleagues to prescribe antibiotics appropriately to pregnant women. Furthermore, I was invited to present my research findings at the annual Ugandan midwifery symposium in May 2018. This started the conversation about antibiotic resistance and the role midwives play in curbing its development with midwives from across Uganda. These interactions have been instrumental in raising awareness about antibiotic resistance. Although still relatively small numbers of midwives have been reached, the ball has started rolling. This leads to the second key strength of this study; the use of modified action research as a methodology. On the whole, the midwives in this study have demonstrated the personal motivation to bring their antibiotic prescribing practices into line with evidence. Including the midwives in the study design and design of the training interventions has enabled them to take ownership of their own learning and has contributed to their determination to bring their practice into line with evidence. Evidence of this motivation to improve practice has been witnessed in the personal testimonies of the midwives who have happily told me how they have shared the knowledge they gained from the CME with their fellow colleagues and midwifery students.

As with all research there are an equal number of limitations to this study. Although mixed methods in nature, qualitative methods have played a substantial part in informing the findings of this study. Coupling this with the chosen interpretivist epistemological approach and a convenience approach to sampling, it must be acknowledged that these findings are subjective and context bound and therefore cannot be said to represent the voices of all Ugandan midwives. In relation to data collected by secondary data analysis it is important to raise once more the topic of documentation in the Ugandan healthcare setting. Lack of attention to detail in the documentation process combined with the observation that maternity staff have been seen to falsify documentation in a manner that suggests safe and effective care has been provided, raises questions over the quality and reliability of the data collected from maternity registers. Finally, my personal motivations encouraged me to adopt a modified action research approach to this study. Findings have shown that such an approach has been effective in beginning the change process for midwives in relation to antibiotic prescribing. The scale of this study however means that the impact of this study has been limited in the district, leaving much work still to be done in educating

midwives about antibiotic resistance and antibiotic stewardship. Knowledge for Change recognised this. Having seen from my work the potential for behaviour change to be realised in antibiotic stewardship practices in Uganda, Knowledge for Change have successfully applied for a project grant to scale up and extend the work undertaken as part of this PhD.

Recommendations

This study is one of the first of its kind in Uganda; there are no published studies from Uganda that report on the knowledge held by healthcare professionals about antibiotic resistance and antibiotic stewardship or influences on antibiotic prescribing practices. It is imperative that further research is undertaken to address these issues, so that appropriate interventions to tackle the emergence of antibiotic resistance can be tailored to the requirements of Ugandan healthcare workers.

Findings from this study have revealed gaps in the midwifery education system, both in terms of initial formal education and subsequent continuing professional development. Furthermore, gaps have been noted in the regulation of healthcare provision. These professional issues need to be addressed through a three pronged approach:

- Midwifery education in Uganda needs to be strengthened as a whole. As midwives are informally designated the task of antibiotic prescribing this strengthening needs to involve the inclusion of antibiotic resistance and antibiotic stewardship into the midwifery curriculum. Furthermore, all midwifery courses in Uganda, from certificate to degree level, should include a prescribing for midwives course unit that will prepare them for the role of prescribing antibiotics and other medications used in pregnancy.
- The Ugandan government need to develop a formal policy in line with World Health Organisation guidelines relating to the use of task shifting in healthcare. At the very least regulatory bodies need to develop a clear scope of practice for the cadre of healthcare professionals that they represent which in turn needs to be approved by the Ministry of Health. Additionally, all cadres of healthcare worker should be

provided with job descriptions when they commence work which should include an outline of prescribing responsibilities.

- The Ugandan Ministry of Health need to collaborate with healthcare worker regulatory bodies to strengthen human resource management and implement effective accountability systems. Only when accountability systems are in place will Ugandan health workers have a stimulus to abide to practising in an ethical manner.

The pilot and context cycles of this study revealed that midwives lacked knowledge regarding antibiotic resistance and antibiotic stewardship and that their antibiotic prescribing practices frequently failed to adhere to evidence-based guidelines. The champions and training cycles of this study went on to demonstrate that the simple intervention of a CME coupled with monthly feedback have been successful in supporting midwives to increase their knowledge about antibiotic resistance and antibiotic stewardship and further, modify their antibiotic prescribing practices so that they align with evidence-based guidelines. As not all midwives in the Kabarole district were part of this study steps need to be taken to update both midwives and other healthcare professionals about antibiotic resistance and antibiotic stewardship. There is a need therefore for the District Health Officer of the Kabarole District to collaborate with the Medicines Managers and pharmacy leads in the District to ensure that these updates are provided for all healthcare professionals, especially those who have a role in antibiotic prescribing. These updates should consider the role that context plays in behaviour change so that interventions can be tailored to meet the differing learning requirements of each group.

A number of operational issues were identified as impediments to the ability of midwives to correctly diagnose conditions requiring treatment with antibiotics. Addressing shortages of human resources, diagnostic testing equipment and consumables, as well as shortages of antibiotics and infection prevention and control consumables has been beyond the scope of this study. The Ugandan Ministry of Health therefore needs to make a commitment to strengthening healthcare systems as a whole to ensure that:

- Through the use of vaccinations and effective infection prevention and control practices the spread of infection is curbed.

- Resources required to identify and treat bacterial conditions are available in the healthcare setting.
- Surveillance of antibiotic resistance patterns can inform the development of Uganda specific antibiotic prescribing guidelines.

Finally, although the women accessing maternity care from the healthcare facilities in this study were not the subject of this study, it has become clear that the general public lack awareness about antibiotic resistance and appropriate antibiotic use. This needs to be addressed. Sensitising the community about issues related to antibiotic resistance may help to curb the practice of self-medication with antibiotics.

A reflection - my PhD journey

In May 2016 when I embarked on a journey to Uganda to help me decide if I wanted to live there long term I had the opportunity to spend a significant amount of time with the lead of Knowledge for Change. I distinctly remember being at the airport with her in Manchester, where she was discussing her soon to be published book about volunteerism in international development. When she told me that the sub-title was “Killing me softly?” I paused for thought. Throughout the course of this PhD I have continued to think about it. I have also read numerous books about international development and aid, in particular “Dead Aid” by Dambisa Moyo (2009) and “Lords of Poverty” by Graham Hancock (1989). I read these last two books in quick succession as I approached my internal evaluation in my second year. Both discuss the darker side of international development, addressing corruption on the sides of both donor and recipient countries. In a similar vein to the recent findings of Osman (2018) both books cast a critical eye over the role of foreign volunteers, considering their motivation for becoming involved in international development work, as well as the manner in which volunteers treat locals. Reading these books left me spending time reflecting on and questioning my motives for undertaking research about antibiotic stewardship in Uganda. I have over the past two years spent a significant amount of time deliberating the role that I have played in the maternity system in the Kabarole District and how I have been viewed by the healthcare professionals that I have worked with.

Working as a volunteer midwife in a foreign country sometimes leaves one walking a tightrope. Our midwifery education in the UK sets us up to practice in a manner that is often at odds with Ugandan practices. If, as professional volunteers or researchers, we genuinely hope to support our Ugandan counterparts in adopting evidence-based care we need to move slowly. An attitude that indicates that we know best or are better than our Ugandan counterparts is counterproductive to working relationships that facilitate bilateral learning. Hancock (1989) repeatedly refers to examples in his book where the knowledge and expertise of locals is overlooked. Instead decisions are made by well meaning 'professionals' from a foreign country. However, as these foreign professionals hold little knowledge about the context in which they are applying these decisions, the project often fails, when it could have succeeded if local knowledge had been tapped into. My personal experiences of working alongside UK healthcare students on elective placements in the Ugandan healthcare setting have highlighted that some see themselves as the experts and Ugandan healthcare workers as dysfunctional. One UK midwifery student asked me "are they stupid or what?" when reflecting on her day. She had explained to some Ugandan midwifery students the importance of wearing gloves when administering intravenous antibiotics to babies on the neonatal intensive care unit. Having listened to her advice, the students continued to administer the drugs without wearing any gloves. I was shocked to hear a student talk in such manner and spent time with her discussing the importance of context in behaviour change, putting forwards a range of reasons why the Ugandan midwifery students may have chosen to disregard her advice. I felt that her attitude was arrogant and was surprised that she, as a student herself, felt she had the authority to expect Ugandan students to do as she said.

I am aware that readers of this thesis may get the impression that as a researcher I have operated in the same manner: walking into healthcare facilities and dictating how midwives should approach antibiotic prescribing. Personally, I don't feel I have behaved in that way. I have spent many hours working with these midwives to become part of their team. Throughout the course of the study the mentorship I provided always took on the form of open, friendly and professional discussion. I feel that adopting a modified action research approach to this study helped me overcome some of the pitfalls that Hancock (1989) identifies professional volunteers succumb to. Adopting an inclusive approach

which has required agency on the part of the midwives in this study has allowed slow but progressive steps to be taken in introducing midwives to antibiotic stewardship. Whilst I mentored the midwives on appropriate antibiotic prescribing practices from the beginning of my time in Uganda when I was working clinically, it was month 17 of me being here that we ran the continuous medical education training session. This was deliberate. I chose to do this at a point when I had a thorough understanding of the context I was working in and when I felt my relationship with the midwives in this study was strong and at a point where I truly felt part of the team. Conducting a training session in the first six months of this study would have been a mistake. I would not have had the opportunity to fully appreciate the role that context plays in the ability of these midwives to adapt their practices to incorporate an evidence base for antibiotic stewardship into their working lives. Additionally, as a midwife from the UK who has not undertaken any formal training in antibiotic prescribing I feel stepping off a plane and holding a CME within the first six months of my arrival may have been viewed as hasty and perhaps arrogant by my Ugandan midwifery colleagues. Furthermore, the opportunity to take two midwifery leaders to the second national conference for antimicrobial resistance and subsequently involve them in the CME would have been missed. I feel that the inclusion of a Ugandan midwife in leading and presenting the CME had a crucial effect on the messages that were being shared being heard.

Modified action research was used in this study as a means to support the facilitation and adoption of antibiotic stewardship practices in maternity care in the Kabarole District of Uganda. More importantly it was chosen as a means to support midwives to participate in making changes to the manner in which they practice. It's very difficult to say if the latter goal has been achieved. Only the midwives themselves can report on how they feel about my role as a colleague and researcher, or how they feel they have been integrated in the study. I am not sure if I will ever know how they genuinely feel. It is very easy for me to say that I feel I am an accepted member of some of the teams that I have been working in, but I can't say for certain how the midwives feel about me. When you walk down the street in Uganda or go into a shop there is always a genuine exchange of greetings between those that you meet on the walk or those serving in the shop and yourself. Uganda, for fear of making a sweeping generalisation, boasts a friendly population. People in Uganda, on the

whole, don't want to upset you or let you down, which is why they tell you they will be at the meeting you organised for 9am in five minutes, but actually turn up 90 minutes later. If I were to ask for feedback from my Ugandan colleagues about how they view me they would be kind, they would not want to upset me.

The experience of undertaking a PhD in Uganda has afforded me the opportunity to present at a National Conference and the Annual Ugandan midwifery symposium. I have also begun writing for academic journals and even had one article published. Writing a PhD has developed my writing skills as well as my critical thinking and so on and so on. If all goes well I will walk away from this experience with a PhD and potentially new career options. That's not why I did it. I had not even considered doing a PhD when the opportunity to work as a midwife in Uganda presented itself to me. I enjoy learning, I enjoy writing, I enjoy a challenge and the PhD offered me all of these things. As I write this new and exciting opportunities are at my fingertips. The midwives in the study don't fare so well. They are still employed by the government of Uganda earning pitiful salaries for a workload that is not only heavy but physically and emotionally draining. It's all relative. I don't deny that midwives in the UK are underpaid for the work that they undertake, but they don't face seeing death, often avoidable, on a basis anywhere near as regular as midwives in Uganda.

There have been changes in antibiotic stewardship awareness and practices in this study which are tangible. The fact that I feel disappointed when I review an antenatal register and see that a woman has been given amoxicillin for a cough or lower abdominal pain, or that the prescribed dose to treat an abnormal vaginal discharge differs from the recommended dose as outlined in the Uganda Clinical Guidelines, suggests that maybe I have succumbed to the attitude that is often associated with volunteers in sub-Saharan Africa, that we can save Africa. I don't feel that I am that person, and I genuinely never expected to revolutionise the antibiotic prescribing practices of midwives in the Kabarole District. After all, throughout this study I have acknowledged that changing behaviour is a complex process that isn't easily aligned to any one theory. I was discussing the contribution this study has made to these midwives with an old colleague from K4C who knows the teams I have been working with well. As she pointed out change takes time and change has occurred. One of the findings of the pilot and context cycles was that midwives

learn a significant amount 'in the field.' She reminded me of this when I was feeling a little low about my motivations for this study. The study may have only equipped a handful of midwives with an evidence base for antibiotic stewardship, but these midwives are in their own right, influential. The knowledge they hold can be, and is, shared with women accessing their care and with Ugandan midwifery students undergoing their training and learning 'in the field.'

In conclusion, I feel happy and proud that this study has helped midwives in Uganda develop their understanding of antibiotic resistance and antibiotic stewardship and has guided them in aligning their antibiotic prescribing practices with evidence. As I leave Uganda I feel I have developed as a person and gained more from my Ugandan colleagues than they have from me. This feeling is familiar. I felt the same when I left Malawi in 2015. Regardless of who has gained more, I feel that we have worked well together and have taken steps towards improving the provision of healthcare services for women embarking on the childbearing process in the Kabarole District. My hope is that we all take away what we have learnt and use it effectively to continue to provide kind and safe care for women in whatever setting we find ourselves.

Conclusion

This study has learnt that midwives in the Kabarole District of Uganda have been the leading antibiotic prescribers for pregnant women with little formal training to prepare them for the role. The study has identified gaps in their knowledge about antibiotic resistance and antibiotic stewardship as well as appropriate antibiotic prescribing and addressed these. The use of modified action research which is participatory in nature and requires agency on the part of participants has proved effective in updating midwives' knowledge and bringing their antibiotic prescribing practices into line with evidence. Implicit from the findings of this study is that more needs to be done. The study has therefore provided recommendations to tackle the development of antibiotic resistance. This will require sustained commitment from stakeholders working at all levels in the Ugandan healthcare system.

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Appendices

Appendix one – Interview schedule (Pilot cycle)

- Can you tell me about any training that you have had to prepare you for being able to prescribe antibiotics?
- Can you describe to me what informs your decision to prescribe a pregnant woman/woman in labour/postnatal woman antibiotics (local guidelines, national guidelines etc)?
- What do you know about/understand of antimicrobial resistance?
- What do you know about/understand of antibiotic stewardship?
- Can you tell me about your own experiences of using antibiotics? Do you ever buy them directly from a shop?
- Can you tell me about local behaviours surrounding antibiotic consumption?

Appendix two – Interview schedule (Context cycle)

- Can you tell me about any training that you have had to prepare you for being able to prescribe antibiotics?
- How much time have you spent on organised or personal CME updates about the use of antibiotics in midwifery?
- Can you describe to me what informs your decision to prescribe a pregnant woman/woman in labour/postnatal woman antibiotics (local guidelines, national guidelines etc)?
- How frequently do you consult the prescribing guidelines for your health centre when prescribing any medication for a woman?
- I have been reading research that suggests that health care workers prescribe out of habit rather than consciously thinking about the clinical scenario in front of them. How would you describe your prescribing decisions and practices?
- What do you know about/understand of antimicrobial resistance?
- What do you know about/understand of antibiotic stewardship?
- Can you tell me about your own experiences of using antibiotics? Do you ever buy them directly from a shop?
- Can you tell me about local behaviours surrounding antibiotic consumption?

I have been analysing some of the antenatal and postnatal registers at various health centres and have noticed a few things, maybe we could talk about them?

- Metronidazole seems to be frequently used to treat vaginal candida. Can you tell me what you know about metronidazole and why it is used to treat candida, which is a fungal infection?
- There is wide variation in the antibiotics that are used to treat various conditions. For example, over the course of one month I have seen it documented in a register that a UTI has been treated with amoxicillin on one day, metronidazole on another, amoxicillin and metronidazole combined on another day, and on another day erythromycin or ampiclox. Can you tell me why this variation in treatment occurs?
- I have seen lower abdominal pain documented as a condition of pregnancy that has been treated with again, different variations of antibiotics. Can you explain to me why LAP is treated with antibiotics?
- In some of the health centres that I have worked in, it appears to be standard practice to discharge a woman home who has had a normal delivery on amoxicillin and metronidazole for 5 days. Have you seen this or done this in your practice, and can you explain your rationale for doing so, or if you don't do it, can you attempt to explain why others do it. Where does the rationale for this regimen originate from?
- Another element of antibiotic stewardship is about infection prevention. Evidence suggests that health care professionals are notoriously bad at adhering to IPC

practices such as handwashing. What are your thoughts about this? How do you find IPC in Uganda and why?

- There is a lot of research in health care that suggests getting health care workers to change their prescribing practices is very difficult. Why do you think this is? Do you have any ideas about how we can effectively educate midwives on the need to change their antibiotic prescribing behaviours? What do you think would make midwives change their prescribing practices?

Appendix three – Interview schedule (Review cycle)

- Can you tell me how you found the CME training? And about any impact it has had on your antibiotic prescribing practices
- Can you tell me about how the messages taught in the CME have been passed onto others (work colleagues/women/ your community)?
- If practice has changed and antibiotics are being prescribed more appropriately, can you tell me how the women accessing maternity care are reacting to these changes?
- How did the CME affect you individually? For example, can you tell me if it has had any effect on your own personal antibiotic consumption patterns?
- Findings from the monthly audits have found that some healthcare facilities have been better at modifying their antibiotic prescribing practices than others. Can you think of any reasons why this may be the case?
- How sustainable to you think the work that we have done on antibiotic stewardship is?
- Is there anything else that you think we could have done? Or you would like to do in the future?

Appendix four – Ethical approval letters



University of
Salford
MANCHESTER

Research, Innovation and Academic
Engagement Ethical Approval Panel

Research Centres Support Team
G0.3 Joule House
University of Salford
M5 4WT

T +44(0)161 295 2280

www.salford.ac.uk/

30 January 2017

Dear Joanne,

RE: ETHICS APPLICATION–HSR1617-38–‘An exploration of the role of Ugandan midwives in antibiotic stewardship in the Kabarole district of Uganda.’

Based on the information you provided I am pleased to inform you that application HSR1617-38 has been approved.

If there are any changes to the project and/or its methodology, then please inform the Panel as soon as possible by contacting Health-ResearchEthics@salford.ac.uk

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Sue McAndrew'.

Sue McAndrew
Chair of the Research Ethics Panel



MOUNTAINS OF THE MOON UNIVERSITY

DIRECTORATE OF POSTGRADUATE STUDIES AND RESEARCH

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL/NON-MEDICAL)

RE1/01 Welsh

CLEARANCE CERTIFICATE

PROTOCOL NUMBER: MMURECH001

PROJECT:

Introducing antibiotic stewardship guidelines for midwives in the Kabarole District of Uganda: an action research study.

INVESTIGATORS:

Ms. J. Welsh

DEPARTMENT:

Social Science University of Salford UK

DATE CONSIDERED:

20th March 2017

DECISION OF THE COMMITTEE:

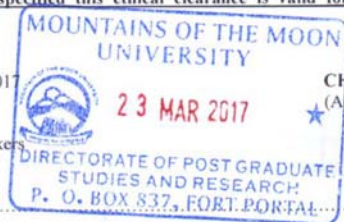
Approved unconditionally


NOTE:

Unless otherwise specified this ethical clearance is valid for 2 years and may be renewed upon application

DATE: 23rd March 2017

cc: Prof. Louise Ackers



CHAIRPERSON: 
(Assoc. Prof. M. Muhumuza)

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and **ONE COPY** returned to the administrator Directorate of Postgraduate Studies and Research.

I/We fully understand the conditions under which I am/we authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved, I/we undertake to resubmit the protocol to the committee. **I agree to a completion of a yearly progress report**

Signature

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL INQUIRIES

Appendix five – Permission letters

Knowledge for Change
Plot 39 Saaka Road
Kagote
PO Box 392
Fort Portal
21st March 2017

Permission letter

Stanley Oculi
DIRECTOR
FORT PORTAL REGIONAL REFERRAL HOSPITAL
★ 21 MAR 2017
Janet
21/3/2017
P.O. BOX 10, FORT PORTAL

Dear Dr. Olaro,

I am writing to inform you that I would like to undertake research at Fort Portal Regional Referral Hospital as part of a PhD with the University of Salford and in collaboration with Knowledge for Change.

My research plans to look at antimicrobial stewardship for midwives in the Kabarole District, providing support for them to improve their prescribing and dispensing practices. The research will involve interviewing midwives at Fort Portal Regional Referral Hospital and your referral health centres. Additionally, I will need to access patient files and antenatal, intrapartum and postnatal registers.

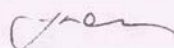
The research has been approved by the University of Salford Ethics Committee and the District Health Officer for the Kabarole District. An ethics application has also been submitted to Mountains of the Moon University, Fort Portal. It was considered at a meeting on 20th March 2017 and was approved subject to minor amendments but does not need to be resubmitted to the ethics committee.

On this basis I am seeking your approval to commence my research at Fort Portal Regional Referral Hospital. I have attached copies of the University of Salford DHO approval letters, and will happily provide you with an approval letter from MMU once I have obtained a copy.

We would like to thank Dr. Olaro for his support and would welcome his involvement in our joint work.

I look forward to working with the team and Fort Port Regional Referral Hospital and sharing my findings with you.

Yours sincerely,



Joanne Welsh
PhD Student
University Salford
0780627580

KNOWLEDGE FOR CHANGE
UGANDA
★ 21 MAR 2017
PLOT 39 SAAKA RD, KAGOTE FORTPORTAL
KABAROLE DISTRICT



KABAROLE DISTRICT LOCAL GOVERNMENT

Tel: +256 483 22575 – District Health Officer (DHO)
Tele-Fax: +256 483 23043 - Secretariat
Email: ddhskabarole@yahoo.com
ddhs.kabarole@health.go.ug

Directorate of Health Services
Kabarole District
P.O.Box 38
FORTPORTAL

Your Ref:

Our Ref: Heath

Date: 22nd February 2017

The Chair of the Ethics Committee,
Mountain of the Moon University,
FORT PORTAL.

APPROVAL FOR RESEARCH

As the District Health Officer responsible for health services in Kabarole District, Uganda I am delighted to support the planned research by Joanne Welsh into antimicrobial stewardship for midwives in Kabarole.

The overall aim of Joanne's research therefore is to improve maternity care and outcomes in the District. Her research will seek to introduce antimicrobial stewardship guidelines into the maternity setting in Kabarole with the intention of improving midwives' antibiotic prescribing practices and refining the processes of infection identification and treatment in the care of septic women. We look forward to active engagement with this project.

Yours Sincerely,

Dr. Mugani, Richard

DISTRICT HEALTH OFFICER - KABAROLE

MIDWIFE PARTICIPANT INFORMATION SHEET

The Role of the Midwife in Antibiotic Stewardship in the Kabarole District of Uganda

You are invited to take part in a research study. In order to decide if you wish to take part, please take time to read over the following information, making sure that you understand it fully.

Purpose of the study

The study aims to identify the professional education and training that midwives in Uganda undertake to become antibiotic prescribers. It aims to explore midwives' understanding of antimicrobial resistance and antibiotic stewardship and how they see their role in antibiotic stewardship.

Why have I been invited to take part?

You have been invited to take part as you are one of the midwives working in one of the health centres or hospitals that are being used for the study.

Do I have to take part?

Your participation in this study is entirely voluntary. You do not have to take part. If you decide to participate in this study you may change your mind and withdraw from it at any time without explanation or negative consequence. Should you choose to withdraw, you can do so for up to one month following your interview, at which point any data collected from yourself will be destroyed and removed from the study.

What will happen to me if I decide to take part?

You will be asked to take part in a one to one interview, lasting 60-90 minutes, with the researcher (Jo Welsh) that will be tape recorded. All recordings will be stored in a locked cabinet, and transcriptions or any published works relating to the study will be anonymised to maintain confidentiality. You may be asked to take part in another interview in 6-12 months time.

Expenses and Payments

Whilst you are participating in the interview you will be offered a free soda.

What are the possible disadvantages and risks of taking part?

There are no known disadvantages or risks associated with taking part in the study. However, if you should feel concerned or upset please inform the researcher.

What are the possible benefits of taking part?

The researcher cannot promise that the study will help you, but the information obtained from the study may help you in prescribing and distributing antibiotics in the future.

What happens to the results of the study?

Results of the research will be presented in a written PhD thesis by the researcher. Results may also be shared at conferences or within peer reviewed journals.

What should I do if I have any complaints?

Should you have any complaints about the researcher or the research being conducted you can in the first instance contact the researcher's supervisor, Louise Ackers (H.L.Ackers@salford.ac.uk). Should you remain unsatisfied following her response, you may contact Anish Kurien, Research and Innovation Manager at the University of Salford, (A.Kurien@salford.ac.uk)

Further information

For any further information please feel free to contact the researcher (Jo Welsh). If you have any concerns regarding the study, you may contact the researcher's supervisor (Louise Ackers).

Jo Welsh J.Welsh3@edu.salford.ac.uk

Louise Ackers H.L.Ackers@salford.ac.uk

ANTIBIOTIC USE IN ELGON ANC JULY 2018

**6% OF ALL WOMEN ATTENDING
ANC IN JULY 2018 RECEIVED
ANTIBIOTICS**

Elgon Antenatal Clinic - what we
prescribed antibiotics for in July 2018



WELL DONE!

You are doing really well with prescribing antibiotics for bacterial infections only.

Remember in the treatment of candida you only need to give clotrimazole pessaries.

You can add a 2g

STAT dose of

metronidazole if the

woman has abnormal

vaginal discharge

Also – when a woman

has a cough we can

advise her on home

remedies and offer

paracetamol. Only if

the cough has lasted

longer than 2 weeks

do we need to

consider giving

antibiotics.