During sudden onset critical and major incidents affecting NHS hospitals, what decisions are made by hospital tactical commanders, and how are they made? A constructivist grounded theory approach

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ABSTRACT

Aim of the Research:

The research used a constructivist grounded theory approach to work with tactical commanders in hospitals to develop a substantive theory that helps to understand how these commanders sought to manage the immediate organisational response to a sudden onset critical or major incident.

Methodology:

Semi-structured interviews were undertaken with 13 participants who had been tactical commanders during hospital incidents. These interviews were coded and subject to constant comparison to draw out themes and construct a higher-level theory

Findings:

Hospital tactical command needs to be viewed in the context of hospitals as complex adaptive systems. Faced with high levels of uncertainty and a significant potential for jeopardy during critical and major incidents, commanders adopted a role of being the conscience of the organisation and holding responsibility for patient, staff, hospital and public safety. Tactical command undertook three key functions of boundary identification, interface management and consequence mitigation. Their response incorporated the following experiences: Navigating an unfamiliar landscape, (managing a major incident is very different from what tactical commanders are used to within their usual role); Effecting cultural change (the requirement to respond to and implement significant cultural shifts within the environment created by the major incident); Seeking Reassurance (operating on a reassurance-seeking basis initially rather than assurance-seeking model); Absorbing accountability (assuming accountability for the organisation's response in both passive and proactive ways);

Constructing a single version of the 'truth' (stepping into a sense-making role for the organisation); Emerging from the pack (taking charge of the organisation to a degree that was beyond ordinary expectations regarding their substantive accountability and role); and Challenging prior assumptions (regarding organisational preparedness and response, and faced with unexpected exacerbating events).

The research considers implications for the training of tactical commanders, as well as approaches to understanding the effectiveness of tactical command during an incident.

Conclusions

This emergent theory of response places tactical commanders within the context of hospitals as complex adaptive systems and highlights the range of demands presented and differential responses required. It offers an insight into the application of the model for major incident planning within the NHS. The current normative decision-making framework for low incidence high impact events in hospitals aspires to a highly structured response but the tactical commanders were frequently experiencing ill-structured and highly dynamic events. Adopting a model of response that is aligned with the actual, rather than mandated behaviours of hospital tactical commanders could support this group of staff dealing with extreme ambiguity and high levels of risk, by emphasising the legitimacy of their instinctual and intellectual responses.

Outline of the Thesis Chapters

Chapter One	**Background to the Research** Outline of tactical command and impact of an incident on a hospital
Chapter Two	**Systematic Review** Understanding Hospital Tactical Command during sudden onset incidents
Chapter Three	**Research Methodology** Critical Appraisal and Justification of the Research Methodology adopted
Chapter Four	**Field work** Presentation and Discussion of Findings
Chapter Five	**Theoretical Sensitisation** Systematic review around hospitals as complex adaptive systems responding to crisis
Chapter Six	**Theory Construction** Hospital Tactical Command during sudden onset critical and major incidents
Chapter Seven	**Researcher Reflexivity** Personal learning about the research process

Chapter One: Introduction to the Research

1.0   Overview of the Thesis

This research was inspired by my own experience of being a tactical commander during critical and major incidents in NHS hospitals. My observation was that there was a disconnect between what is communicated about incident response compared with the actual experience of command. Tactical commanders are taught the mechanics of response such as battle rhythm, note taking, and command & control. This is supported by research which identifies how this impacts on people's view of preparedness. The training may not convey the full experience of command during an incident, or the range of responses required by those leading the response.

The research was undertaken as part of a Professional Doctorate qualification. The thesis outlines my learning pathway throughout the programme and provides a record of the justification and rationale for the steps taken, as much as a focus on the product of the study. There are two systematic reviews within the thesis, the second of which arose from a desire to understand themes that were emerging from the fieldwork and was part of the iterative nature of the construction of theory.

The thesis provides a descriptive analysis of the lived experienced of tactical commanders during sudden onset incidents. It constructs a theory about what they were doing, how they were doing it and what they encountered during this process. It grounds the response of commanders within the context of hospitals as complex systems in crisis. As such it provides a challenge to assumptions about what commanders may hope to achieve and offers a complementary approach to current understanding of and preparation for response to sudden onset incidents.

1.1   Introduction

This chapter outlines my motivation for the research and how my personal experience of dealing with major incidents has led me to seek to understand more about the experience of tactical commanders. The chapter describes the planning structures and expectations for NHS hospitals regarding critical and major incidents. It explains what happens within a hospital during a major incident and depicts the context within which the tactical commanders are required to operate.

1.2   Research Motivation

This research process was planned and commenced prior to the emergence of Covid-19 and its impact on hospitals within the United Kingdom. At that time the focus of the researcher was on the threats posed by sudden onset major incidents which had been affecting hospitals with greater frequency than an, as then, unknown pandemic.

In 2017 the NHS in England had faced an unprecedented number of major incidents, each of which posed new challenges in differing environments, with multiple threats resulting in different injuries (Moran et al, 2017). The Civil Contingencies Act 2004 sets out clear expectations and responsibilities for front line NHS responders to ensure they are prepared to deal effectively with localised incidents and catastrophic situations (Walker & Broderick, 2009). Acute hospitals are classified as Category 1 responders and must have emergency plans and business continuity management arrangements in place (NHSE, 2022). In order to enact these responsibilities, hospitals need senior managers who have the abilities to take effective command and control decisions during emergencies (Boyd et al, 2014).

This research seeks to understand more about managers operating in a tactical command role during the response to a sudden onset crisis. In researching the decisions that hospital tactical commanders make and how they make them, this study will seek to understand their perceptions and responses in order to support organisations to prepare for any future major incident.

I am a senior operational manager within an acute & community trust and have been involved in Emergency Preparedness, Resilience & Response (EPRR) for over 20 years. In 2002 I was the tactical commander for an internal major incident where the hospital's A&E Department burnt down. I have led hospital responses to SARS, Ebola, H1N1, chemical decontamination and inner-city riots as well as loss of premises and utilities, industrial action and severe weather. This research is motivated by my observations around incident response in hospitals. There may often be a wide variation in the skills and experience of managers who are designated as occupying the tactical commander role in an incident, while there is inconsistency in the amount of relevant training they may have received. In table-top exercises and live casualty simulations I have observed a range of decision-making styles and approaches by tactical commanders. My personal experience is that during actual incidents, I have rarely used the organisation's Major Incident Plan or decision-support tools. Training exercises are made with events in a linear chronology where prescribed tasks are undertaken quickly and thoroughly, whereas actual events involve considerable uncertainty where actions are being undertaken without agreement with the tactical commanders and events unfurl in a non-linear fashion. One is rarely in a situation where an incident is announced in advance and there is some time to prepare for its impact; rather an incident has occurred, and operational teams have initiated a response by the time tactical command has been established.

The research was motivated by a desire to understand the experience of hospital tactical commanders during a critical or major incident and how they responded. It started out as a piece of work aimed at learning from their experience in order to create a guide or manual to support commanders who may be involved in a major incident in the future. As I continued on my research journey, the aims of the research changed to focus on an understanding of the lived experience of commanders and using this to support the construction of a theory around how they responded in situations of high ambiguity and significant risk. The remit of the research was expanded to cover critical incidents as in the initial stages they were often indistinguishable from major incidents while they also represented a closely aligned part of the continuum of response to a sudden onset incident.

1.3   Research Context

The starting point for this research is to gain an understanding of the context within which hospital tactical commanders operate. This has been split into two themes. First, an understanding of critical and major incidents and the role that the NHS deems for the hospital tactical commander during these events. This will identify some aspects to be considered in the research on commanders in NHS hospitals. The second theme explores the impact that a major incident has upon an NHS hospital and the responses that hospitals implement. In this section, the focus was on major rather than critical incidents as there was more literature about the former and they may be viewed as a more extreme example of the demands and pressures created. From an analysis of the actions described in the literature as being realised, this section outlines some of the issues that may be presented to tactical commanders and the decisions that they may be required to take.

1.4   Critical / major incidents and hospital tactical commanders

In the UK, the NHS needs to be able to plan for and respond to a wide range of incidents and emergencies that could affect health or patient care. This work is referred to as 'emergency preparedness, resilience and response' and has six underpinning principles: Preparedness and Anticipation; Continuity; Subsidiarity; Communication; Cooperation and Integration; Direction (NHSE, 2022). The management of any emergency comprises three main phases: preparation, response and recovery, and within the response phase there are two separate challenges of crisis management and consequence management (Cabinet Office, 2013). In addition to stabilising and containing the crisis, organisations need to anticipate what the crisis may look like at specified points in the future and consider how that how that may affect plans, risks, priorities and resources (Leigh, 2019).

In healthcare an incident is described as any event which cannot be managed within the existing capacity of the service (Bennett, 2015, 2018). The NHS classes incidents as either Business Continuity, Critical or Major Incident, where each will impact upon service delivery within the NHS, may undermine public confidence and will require contingency plans to be implemented (NHSE, 2022). A critical incident is any localised incident where the level of disruption results in the organisation temporarily or permanently losing its ability to deliver

critical services, patients may have been harmed or the environment is not safe, requiring special measures and support from other agencies to restore normal operating functions (NHSE, 2022).   The next level up is a major incident, which is a specific, unusual and extraordinary event that places a large demand in multiple organisations for a relatively short time period (Lax & Nesbitt, 2018).   It overwhelms capacity (Hardy, 2015b) and presents a serious threat to the health of the community or causes such numbers or types of casualties, as to require special arrangements to be implemented (NHSE, 2022).   In the early stages of an incident there may be doubt as to whether this constitutes a critical or major incident due to the uncertainty and assessment of impact(s), and the initial response may be identical.

There are different types of incidents ranging from business continuity to mass casualty incidents (NHSE, 2022)[1]. For all these the nature and scale of the incident will determine the appropriate incident level.   By focusing on critical and major incidents, this research will consider situations where capacity is overwhelmed and risks, options and consequences are unclear to the hospital tactical command. It is concerned with the response phase and how hospital commanders seek to implement both crisis management through actions taken to address the immediate, direct effects of an incident, and consequence management by actions taken to prevent the impact of an incident escalating (Cabinet Office, 2013). It will consider responses to sudden onset critical and major incidents which will predominantly be those of the 'big bang', 'Chemical, Biological, Radiological, Nuclear and Explosives' (CBRNE) and 'mass casualty' type (NHSE, 2022).

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[1] These include:
- Business Continuity (fire, breakdown of utilities, significant equipment failure, hospital acquired infections);
- Big Bang (a serious transport accident, explosion, or series of smaller incidents);
- Rising Tide (a developing infectious disease epidemic, or a capacity/staffing crisis or industrial action),
- Cloud on the horizon (a serious threat such as a significant chemical or nuclear release developing elsewhere and needing preparatory action);
- Headline News (public or media alarm about an impending situation, reputation management issues);
- Chemical, biological, radiological, nuclear and explosives (CBRNE terrorism is the actual or threatened dispersal of CBRN material (either on their own or in combination with each other or with explosives), with deliberate criminal, malicious or murderous intent);
- Hazardous materials (HAZMAT – accidental incident involving hazardous materials);
- Cyber attacks (attacks on systems to cause disruption and reputational and financial damage);
- Mass casualty (typically events with casualties in the 100s where the normal major incident response must be augmented with extraordinary measures)

NHSE, 2022

1.5 What the NHS prescribes as the role for hospital tactical commanders

The NHS uses the terminology of Incident Coordination Centre (ICC) and Incident Management Team (IMT). The management of emergency response and recovery is undertaken at one or more of three ascending levels: Operational, Tactical and Strategic and is based on the principles of command, control and coordination[2] (NHSE, 2022).

NHS tactical command purpose and function is defined as:

> *The purpose of the tactical level is to ensure that the actions taken by the operational level are coordinated, coherent and integrated in order to achieve maximum effectiveness, efficiency and desired outcomes.*
>
> *Tactical commanders will:*

- *Determine priorities for allocating available resources*
- *Plan and coordinate how and when tasks will be undertaken*
- *Obtain additional resources if required*
- *Assess significant risks and use this to inform tasking of operational commanders*
- *Ensure the health and safety of the public and personnel*

> *The tactical commanders must ensure that the operational commanders have the means, direction and coordination to deliver successful outcomes*
>
> (NHSE, 2022)

The NHS Minimum Occupational Standards for EPRR (NHSE, 2022a) outline 13 performance criteria and 10 points of knowledge and understanding for NHS tactical commanders (Appendix 1). Training should be linked to these standards to ensure that all staff are competent for the role that they are undertaking (Makin et al, 2020). It must be noted however, that while this constitutes the formal justification and definition of the role, it may not describe the actual practice of the commanders themselves. Reconciling the lived experience with the aspiration of the role would provide valuable insight into NHS tactical command.

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[2] **Command** is the exercise of vested authority that is associated with a role or rank within an organisation (the NHS), to give direction in order to achieve defined objectives; **Control** is the application of authority, combined with the capability to manage resources, in order to achieve defined objectives; **Coordination** is the integration of multi-agency efforts and available capabilities, which may be interdependent, in order to achieve defined objectives.

(NHSE, 2022)

Identifying the NHS hospital tactical commanders

Tactical commanders are those staff within an organisation whose seniority means that they are able to make general management decisions on behalf of the organisation. By virtue of their responsibility to interpret strategic direction and develop the tactical plan to achieve the objectives set by strategic command (NHSE, 2022a), the tactical commander role is essentially a non-clinical function. It does not seek to oversee or make judgements on the clinical treatment of individual patients but is concerned with the organisational response. Each hospital is different, but tactical commanders tend to be senior managers (predominantly general management and nursing) and when on call, they cover all aspects of a hospital rather than just their professional role. The individuals that are included in this may range from general managers, site managers, clinical leads and matrons (NHSE, 2022a) and include staff from a range of disciplines such as operations, human resource and finance.

Joint Decision Model (JDM) and Decision Support Tools

The Joint Decision Model (JESIP, 2016; NHSE, 2022) is the normative decision-making framework that is used to guide the response to major incidents in the UK and decision-makers within the NHS are advised to use it (NHSE, 2022). Agencies expected to use the Joint Decision Model (JDM) include Category 1 responders under the Civil Contingencies Act 2004, of which acute NHS Trusts are a part (Wilkinson et al, 2019). The Joint Decision Model has five categories of decision-making which are: (1) Gather information and intelligence; (2) Assess risks and develop a working strategy; (3) Consider powers, policies and procedures; (4) Identify options and contingencies; (5) Take action and review what happened (JESIP, 2016). These types of models can be applied across the full range of decisions within a hospital incident, from immediate front-line decisions to longer term implications (Leigh, 2015). They bring value by virtue of the deliberative processes they involve and provide reassurance to teams facing critical decisions with imperfect knowledge but may engender an 'illusion of control' (Leigh, 2015) since they do not automatically bring rigour, objectivity and critical reflection to the decision-making process (Leigh, 2019).

There are a range of decision tools to support managers in dealing with an incident, such as standard operating procedures, decision-making models, aide-memoires and checklists.

These aim to help managers impose a sense of order and purpose on chaos, make the right choices and begin to exert a degree of effective control over the response to the crisis (Brooks et al., 2019; Leigh, 2015). Checklists improve accuracy and minimise psychological strain but at a cost of reduced speed (Brooks et al., 2019). Checklists and action cards often require the user to sequentially complete tasks, but in emergency management situations, the complexity, dynamisms and uncertainty associated with operating in this environment means that those making decisions cannot always follow a prescribed process (Brooks et al., 2019).

The Joint Doctrine (JESIP, 2016) outlines decision controls that it expects NHS commanders to use to ensure that the proposed action is the most appropriate (Appendix 2). Within the NHS, there is an expectation that decision makers will be supported in all instances where they can demonstrate that their decisions were assessed and managed reasonably in the circumstances existing at a particular point in time. The use of decision support models and processes will assist in providing this evidence, particularly in conjunction with decision logs (NHSE, 2022). It has been suggested that decision-makers use aide memoires which are flexible and designed to be used at any stage in the decision-making cycle to ensure attention to mitigating bias when making decisions (Brooks et al., 2019). Prior to making any key decisions the team would recall key biases and be challenged to identify the efforts taken to mitigate the effect of these biases. A potential additional function of the aide memoire and decision control process is to provide an opportunity for interruption of the status quo, thus providing an opportunity to alter dysfunctional momentum towards an undesired outcome. Individuals and groups are more likely to redirect ongoing activities if they have an opportunity to stop and make sense of their situation and operations, particularly in real time. Sensemaking is unlikely to occur unless individuals are in some way interrupted (Barton & Sutcliffe, 2009)

1.6   Anticipation & Preparedness

This section considers how prepared hospitals are to deal with a major incident. It looks at the role of the hospital incident plan and preparedness for an incident from the perspective of tactical command.

Hospital Incident Plan

All NHS acute hospitals should have a Major Incident Plan (MIP) that outlines actions and roles for hospital staff to adopt (NHSE, 2022). Creating an emergency plan and preparing in advance can reduce property damage, help prevent injuries and may even save lives (Renschler et al, 2016). Studies in the NHS and at international level assessing disaster preparedness emphasise the importance of the existence and awareness of hospital disaster plans (Alzahrani & Yiannis, 2017; Baack & Alfred, 2013; Barnes, 2014; Hodge et al, 2017; Johnson & Cosgrove, 2016). Additionally, in the aftermath of a major incident or disaster response, the significance of the emergency plan that staff are aware of and trained in, is frequently identified in both UK and international reviews as enhancing the organisational response (Allen, 2019; Brandrud et al., 2017; Côté & Hearn, 2016; Dean, 2017; Gauss & Cook, 2017; Glasofer & Laskowski-Jones, 2018; Rhoads & Clayman, 2008). The role and function of tactical commanders should be outlined in the MIP and this may be accompanied in the document by action cards or checklists. Tactical commanders are expected to be aware of these and follow them during an incident.

It has been argued however, that having an emergency plan does not necessarily mean that an organisation is prepared. There may be a difference between theoretical and actual resilience, since it is unusual in an incident for all policies and procedures contained in the emergency plan to be enacted (Penadés et al, 2017). A plan that fulfils regulatory requirements may be inaccurate, incomplete, rely on the presence of specific people for implementation and fail to fulfil the requirements of the disaster (Hammad et al., 2012). Tactical commanders therefore may have to draw on their experience and initiative in carrying out this role, which may lead to flexibility and risk-taking on the part of some of them. Finally, acknowledging that incidents create uncertainty and stress, there is a need to plan for how people are likely to react rather than expecting them to change behaviour to conform to the plan (Auf der Heide, 2006). It has been suggested that willingness on the part of lower status staff to take 'responsible risks' in trying to find solutions must be matched by an acceptance higher up that this will inevitably involve making some mistakes (Smith et al, 2005). In this respect the major incident plan could be seen as an 'aide memoire' rather than something to be followed rigidly (Smith et al, 2005). What may be required is something

structured enough to remind staff of their role in the incident, yet flexible enough to enable them to release their creativity to improvise (Brandrud et al, 2017).

Preparedness

Research indicates partial knowledge by staff of plans and limited confidence in their ability to respond to disasters, with evidence suggesting a lack of awareness among some Emergency Department (ED) nurses in other countries of the likelihood of a disaster occurring and the realities of disaster response (Hammad et al, 2012; Hammad et al, 2017; Hammad et al, 2018). It is suggested that preparedness training should be focused on the aspects of response that are different from the everyday. Where planning and training has taken place prior to a major incident, there is evidence of the positive role it has had in augmenting the response of hospitals to the real event (Brandrud, 2017; Dean, 2017; Gauss & Cook, 2017; Hirsch et al, 2015; Longhurst, 2017). Functional exercises represent the critical bridge between education and response (Ingrassia et al, 2009) and health emergency preparedness exercises have been found to be effective in improving participants' knowledge of emergency activities, policies and procedures and improving overall competence and confidence (Skyrabina et al, 2017). There may be uneven participation within an organisation, meaning that only a few staff in each organisation get trained compared to the number of people potentially dealing with an incident (Donahue & Tuohy, 2006). A Trust may have an illusion of preparedness and measurement of outcomes needs to be carefully calibrated, as briefing staff around the emergency plan may not increase knowledge of the procedures but perceptions of the preparedness of the organisation may increase (Renschler et al, 2016).

In conclusion, while hospitals may have developed incident plans and run the requisite training programmes and exercises, there is evidence that staff may not be fully aware of plans nor adequately trained. Hospitals may have theoretical resilience and preparedness, but actual resilience is harder to define and is only revealed in the light of a true incident. During a major incident, tactical commanders will encounter their own preparedness and will also have to respond to the actual resilience of the organisation.

1.7   Hospital response to sudden onset critical and major incidents

The predominant theme from literature covering incidents such as the Paddington train crash 1999, and the Westminster Bridge, Manchester Arena, London Bridge and Finsbury Park Mosque responses in 2017, is that major incidents are well managed by hospitals (Allen, 2019; Belle-Fortune, 2008; Dobson, 1999; Duffin, 2011; Gulland, 2017a & 2017b; Horsfall & Slowie, 1999; Moran et al, 2017; Wass et al., 1994). Within the hospital, after the initial element of chaos (Hart et al, 1975), everything 'swings into action' (Allen, 2019, p38), staff coalesce around a common task and the organisation goes into 'surreal overdrive' (Belle-Fortune, 2008, p12). Hospitals are seen as making their own luck and should be proud of their response (Gulland, 2017a), particularly as major incidents are not ordinary; hence it is appropriate that staff should feel energised and good about what they are doing (Gulland, 2017b). Staff report pride in the exemplary response, with colleagues seen as giving support / advice and that excellent communication and leadership is demonstrated (Longhurst, 2017).

Where there were low numbers of casualties, receiving hospitals may report that they would have been able to have taken larger numbers than they actually did (Dobson, 1999; Duffin, 2011). There is recognition however, that even in the best prepared units, a mass casualty incident will pose significant challenges due to the unpredictable nature of these events, with respect to timing and number of casualties (Craigie et al, 2018). Although the hospital may be deemed inadequate to deal with an incident of significant proportion, such as the Bradford Royal Infirmary receiving over 250 casualties in an hour (Anonymous, 1989), the staff response is seen as doing the best under adverse circumstances and it is reported that on the whole, people in these situations have been dealt with in an efficient and humane way (Hart et al., 1975).

In preparing this section providing context and background to the research, only one internal hospital report from an incident has been used. This type of record may be more critical about a hospital's performance. External reporting on major incident response may be nuanced due to organisational or political sensitivities, especially if the response is deemed inadequate (Hardy, 2015b). Notwithstanding this note of caution, in the face of a significant

crisis, it appears that hospitals rapidly enhance their treatment capacity and look back on this with pride.

1.8   What happens in an NHS hospital during a major incident

All major incidents bring their own unique challenges (Allen, 2019) and casualty profile (Howells et al 2006). The initial focus of any major incident is on resourcing the ED with additional staff to cope with the large numbers of casualties that will arrive in quick succession (Calder & Bland, 2018). Clinical response for mass casualty events on the first day is focused around resuscitation and damage control surgery with secondary procedures undertaken over subsequent days (Moran et al., 2017).

Notification

Hospitals should be notified in advance of receiving casualties from a major incident which allows them to start preparing for the injured. Not all hospitals involved will be notified formally and patients may present before an incident has been declared (Anonymous, 1989; Evans et al., 1990; Gulland, 2017a, 2017b; London Assembly, 2006; Sharpe et al., 1985; Wass et al., 1994), or they may hear about it on the news (Allen, 1989) or from staff ringing in (Horsfall & Slowie, 1999). To a large extent, hospital major incident plans rely on a period of delay between the initial alert and the arrival of casualties at the hospital (Evans et al., 1990). Even when hospitals are informed, there may be very little time before notification and arrival of casualties (Hart et al., 1975) which means there may not be time to prepare adequately for the surge (Brown & Marshall, 1988). Similarly, a major incident created by factors internal to the Trust such as a fire, could mean that there is no time gap between notification and presentation of casualties and / or the need for action. Tactical commanders could find that a response has been initiated by a department before an incident has been declared and the command structure has been established.

Declaration of a major incident

A major incident may be declared either by the ambulance service notifying the hospital concerned or by the hospital itself, based on casualties arriving or information that they have in advance of definitive triggering information being received (Lavery & Horan, 2005). The

declaration of a major incident acts as an enabler to the rapid creation of capacity within the hospital and to elicit enhanced responses from partner health and social care organisations (Johnson & Cosgrove, 2016), which would not have occurred on an ordinarily busy day. A cascade occurs, with additional resources being allocated (Dean, 2017; Johnson & Cosgrove, 2016), while the Emergency Department is emptied (Dean, 2017; Duffin, 2011) and the hospital is locked down. There is a switch from elective to emergency work (Holmes et al, 2005), whereby theatres are cleared of routine work and prepared for major trauma (Allen, 2019), elective procedures are cancelled (Evans et al., 1990), patients are discharged from wards to create bed space (Craigie et al, 2018; Dean, 2017; Johnson & Cosgrove, 2016) and other areas such as the Intensive Care Unit and blood bank alerted (Evans et al., 1990).

Creating capacity is not without challenge. For critical care, moving existing critically ill patients out as 'non-clinical' transfers is an uncomfortable aspect of increasing capacity for the injured, which creates an ethical dilemma during the management of the incident (Shirley & Mandersloot, 2008). The incident may impact adversely on the overall ability of the hospital to discharge patients, either because there are no ambulances available as a result of the incident itself, or because the ED itself may be seen as a safe place for patients during an incident if the nearby environs are affected (Duffin, 2011). Tactical commanders need to ensure that a response is being enacted not only by the part of the hospital that is affected directly by the incident at that point in time, but also by the other parts of the hospital in order to meet current or projected needs.

Switchboard and Hospital Communication

Hospital call-out systems should notify and mobilise key staff, however a Trust's switchboard may soon be overwhelmed with calls from staff and the public (Anonymous, 1989; Brown & Marshall, 1988; Craigie et al, 2018; Evans et al., 1990; Gulland, 2017a; Lavery & Horan, 2005; Mohammed et al, 2006; Williams & Squires, 2000). When the switchboard is still functioning, there may be further complications in that staff lists may be out of date (Gulland, 2017a; 2017b; Williams & Squires, 2000) and people not able to be contacted (Gulland, 2017b; Shirley & Mandersloot, 2008; Wass et al., 1994) thus impinging on the organisation's ability to communicate. Added to this will be the tendency for telephones to be unanswered in local departments as clinical staff are actively engaged in dealing with the incident.

Gaining information from the incident scene has been reported as creating difficulty (Howells et al, 2006). Consequently, in the absence of accurate information regarding types and volumes of injuries, hospitals may have to plan for the worst (Evans et al., 1990). This may lead to flowing patients through the ED too rapidly and having patients deteriorate in other parts of the hospital system such as radiology (Allen, 1989), or stepping patients down from critical care beds without knowing the true demand (Shirley & Mandersloot, 2008). Problems with internal communications may mean that hospital teams have to resort to runners across the hospital or walkie-talkies (Allen, 1989; Holmes et al., 2005; Johnson & Cosgrove, 2016; Mohammed et al, 2006; Shirley & Mandersloot, 2008) while some departments could be missed out of the information loop.

A commander may find that it is difficult to get clear information regarding the nature of the incident, what the predicted response rate from staff will be or immediate requirements from departments in the early stages of the incident. This may be exacerbated when the Incident Coordination Centre where they are based is located away from the departments affected. There may be more information about an incident available via external media than through the established communication routes.

Arrival of Casualties: Surge Capacity

The type, volume and timing of casualties received by a hospital will depend not only on the nature of the injuries themselves, but also the nature of the pre-hospital emergency response. The two fundamental aims of a disaster response are rapid evacuation of all casualties from a hazardous incident scene and to reduce the mortality of critically injured patients. These can be conflicting priorities as rapid evacuation puts pressure on the receiving EDs (Allen, 1989) and may lead to non-critically injured patients being over-triaged to a higher priority for transfer and treatment, or they may simply occupy space and use resource that impairs the management of the critically injured (Aylwin et al, 2006). A functioning pre-hospital system should deliver the most seriously ill casualties to the most appropriate hospital soonest and transfer the least injured to this location later. Conversely the failure of the system may simply result in a single hospital being overwhelmed by many undifferentiated casualties and then being unable to direct care appropriately (Nesbitt, 2018).

Difficulties in communicating with external agencies due to the pressures on the switchboard and mobile phone systems may lead to uncertainty for hospital commanders at all levels within the organisation about the detail of the pre-hospital care and consequently the volume of casualties and type of injuries that may be presenting. A tactical commander deciding on a proportionate hospital response such as how many beds to clear, may have to make this decision based on minimal or conflicting information.

As well as being conveyed by ambulance, patients may arrive by bus (Lavery & Horan, 2005; Mohammed et al, 2006) taxi, private vehicle or on foot (Sharpe et al, 1985), which presents a surge of 'walking wounded'. Crowd control is essential during a mass casualty incident and is exacerbated by people arriving in pursuit of family and friends (Mohammed et al, 2006). There are examples of large numbers of casualties attending ED following an incident[3] and they had the effect of temporarily paralysing the department with comparatively minor injuries until they could be triaged effectively and fed into the management system (Lax & Nesbitt, 2018), thereby impeding the ability of the limited medical resource to provide timely and adequate care for critically injured victims (Fryberg & Tepas, 1988). Drugs and supplies may run low (Anonymous, 1989) and patients may have to be treated in other areas or on the floor of ED (Brown & Marshall, 1988).

The ability to provide high-level trauma care during a surge of casualties is deemed the surge capacity (Aylwin et al, 2006). This can be improved by increasing resource availability or by reducing resource use. Disaster plans usually focus on increasing the availability of resources, but this only has a small effect on surge capacity. To effectively reduce resource use, every section of the system dealing with the trauma must move to a damage control mode of operation, keeping investigations to a minimum and transferring patients rapidly to definitive care (Aylwin et al, 2006). Monitoring the degree to which the hospital clinicians have moved towards a damage control approach will be difficult for tactical commanders to gauge during

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[3]

Bradford City Football Club 1985: Bradford Royal Infirmary received 190 patients within 30 minutes (Sharpe et al, 1985)
Omagh Bombing 1998: Tyrone County Hospital received 209 casualties (Lavery & Horan, 2005)
London Bombing 2005**:** Royal London Hospital received 194 casualties in under 4 hours (Mohammed et al, 2006)

an incident (all the more so if they are not clinicians) and they will be heavily dependent on the reported approach from the operational teams.

Triage of casualties

Triage is the rapid assessment and allocation of casualties based on their physiological signs into treatment groups based on the urgency of their need for treatment (Lax & Nesbitt, 2018). The goal of triage in a major incident is to identify that minority of critically injured casualties who require immediate treatment, in order to render that treatment as soon as possible (Fryberg & Tepas, 1988). In a mass casualty incident, triage of patients can be difficult with a tendency to over-triage and label patients as Priority 1 (P1: very sick) when they are Priority 2 or Priority 3 (less sick). This may then divert attention away from the true Priority 1 patients and in some incidents may have contributed to avoidable mortality (Bennett, 2015, 2018). It is reported that the use of experienced medical staff in controlling access to the resuscitation room, radiology, blood bank, theatres and critical care, has been able to reduce the effects of over-triage, protect against or corrected under-triage and optimise resource use (Aylwin et al, 2006; Turegano-Fuentes & Perez-Diaz, 2006).

Triage systems may vary between hospitals (Hardy, 2015a) but hospitals all report senior clinicians undertaking triage of casualties at a reception point in the hospital (Allen, 1989; Brown & Marshall, 1988; Hart et al, 2003; Howells et al, 2006; Mohammed et al, 2006; Wass et al., 1994). Hospitals will designate areas for treatment of urgent cases, for those injured but not requiring immediate intensive management and for the less injured (Brown & Marshall, 1988; Wass et al., 1994). Temporary mortuary space will be identified (Brown & Marshall, 1988), while other areas may be used to dealing with the large numbers and overspill from the ED. While the establishment of triage systems would sit within the realm of the operational command for the Emergency Department, coordinating the use of resources outside of the department and converting areas to other uses will require coordination by the tactical command.

Staffing

Large numbers of staff are reported as supporting a response to a major incident (Allen, 1989, Horsfall & Slowie, 1999; Williams & Squires, 2000). These are not only doctors but also

nursing, pharmacy, portering and management teams (Horsfall & Slowie, 1999). Hospital staff should be notified by the hospital switchboard, but often make their own way to their hospital once they hear about the incident from the media (Bennett, 2018; Sharpe et al., 1985) or actually hear / witness the event (Lavery & Horan, 2005). Indeed, they may also support other hospitals if their own is not directly affected (Lavery & Horan, 2005)

Having large numbers of staff supporting ED is a positive aspect, but people working outside of their normal environment can be counterproductive (Lavery & Horan, 2005). Lack of familiarity with the department, documentation and equipment may increase the general level of confusion (Evans et al., 1990), while many members of staff would have had little or no experience in dealing with acute trauma cases (Wass et al., 1994). Efficient leadership is required in this situation (Mohammed et al, 2006) to have the right people with the right skills to be able to make the right decisions (Allen, 2019). In crisis situations such as a major incident, evidence-based medical practice can all too easily be replaced by panic, chaos and emotionally-based responses (Shirley & Mandersloot, 2008). Clinical staff will be drafted in from all areas of the hospital to work in and potentially lead resuscitation teams (Calder & Bland, 2018), while the need for damage control interventions will change the thresholds for investigations or for palliative care (Lax & Nesbitt, 2018; Nesbitt, 2019). Having middle grade doctors running the trauma teams and consultants making the major management decisions such as primary amputation (Hart et al, 2003) has worked, while having a senior medical presence to oversee the holistic and ongoing management of major trauma patients is advocated (Craigie et al, 2018). Recognition must also be given to the fact that the role of intensive care specialists extends well beyond the intensive care unit and non-intensive care personnel must have the ability to provide basic critical care if the nature and volume of the injuries demand it (Shirley & Mandersloot, 2008).

Controlling the flow of staff into the Emergency Department and other clinical areas is a role for the tactical command in conjunction with the departments affected. There is a need to ensure that the immediate staffing requirements have been considered alongside the necessity for staff to be relieved and subsequent shifts covered.

Duration of a major incident

Different parts of the trauma system experience the major incident surge at different times, and each part of the system reduces surge for the next stage of the process (Aylwin et al, 2006). Following the initial surge, many hospitals report that the Emergency Department is cleared of casualties from the incident within a few hours[4] (Evans et al., 1990; Sharpe et al., 1985) with the maximum being at 9 hours post-incident (Howells et al, 2006). The surge pressure moves to theatres, Critical Care and the wards (Lax & Nesbitt, 2018) and as identified at the Royal London Hospital in 2005, becomes the start of a prolonged care phase that greatly increases the surgical, anaesthetic and critical care workload (Shirley & Mandersloot, 2008). The declaration that a major incident has been stood down at the off-site scene does not mean that the hospital major incident is over (Gulland, 2017a), just as the clearing of the ED of all casualties from the incident does not mean that the role of tactical command has ceased, as the hospital may still be acutely affected by the surge in demand.

Return to Business as Usual

In a major incident while one aspect of response is the provision of clinical care (this would be considered operational command function), the organisational response required (tactical function) is wide-reaching and the impact of receiving even a relatively small number of critically injured casualties has implications for an acute NHS Trust lasting for weeks and months after the incident (Johnson & Cosgrove, 2016).

Despite the major incident and the potential for some activity to be deflected away from a hospital by the ambulance service, 'normal' emergencies continue both within the hospital and presenting at it (Carley & Mackway-Jones, 1997; Craigie et al, 2018; Lavery & Horan, 2005; Shirley & Mandersloot, 2008; Williams & Squires, 2000). Those coordinating the hospital incident response need to ensure that as near normal a service as possible is maintained for

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[4] Bradford Royal Infirmary (1985): 250 casualties with 85 patients admitted and 165 discharged within 3 hours of onset of the incident

Peterborough District Hospital (1989): 80 casualties with 12 admitted, 1 RIP & 67 discharged within 3 hours of the onset of the incident

Royal Berkshire Hospital (2004): 61 casualties with ED cleared of all major incident casualties within 8 hours of arrival of first casualty

the rest of the hospital in addition to dealing with the extraordinary increase in demand created by the major incident (Lax & Nesbitt, 2018).

The continuation of emergency demand from within the community means that there is a pressure for hospitals dealing with a major incident to return to 'normal'. This is due to the additional workload that the other hospitals are subsequently facing, plus the logistical difficulties it creates for ambulance services to have to transfer patients further distances to hospitals out of the area. The impact of the longer term effects upon a hospital around resources and staff should be considered when evaluating the capacity to return to business as usual (Moran et al., 2017). This could even extend to keeping restrictions on activity for up to 10 days (Gulland, 2017b). Hospitals reported however, that they were reopened to ambulance casualties within a few hours and a maximum of 12 hours after the initial incident (Howells et al, 2006; Shirley & Mandersloot, 2008). Tactical commanders may find their role is extended to deal with pressures created by business as usual, requiring access to resources now being used for the incident casualties.

Timing of an incident

The time and size of an incident will affect how easily the hospital is able to enact some of its response measures, as well as the infrastructure of the hospital. Small incidents during daylight hours are likely to be easier to manage than large incidents out of hours (Nesbitt, 2018). An incident occurring in the morning may have many staff at the hospital site since it is the start of the working day (Dobson, 1999); one that occurs in the late afternoon may find that many staff are present in the hospital and that theatres are relatively free (Wass et al., 1994), while an incident just before a weekend may mean that ICU has greater ability to create capacity (Williams & Squires, 2000). The M1 aircraft crash in 1989 happened on a Sunday evening which was a peak time for people to watch television and catch the news bulletins, thus prompting attendance from most of the staff who came into the hospitals rather than via the call out procedure (Allen, 1989).

For a small hospital, an incident out of hours means theatre and bed availability as there is no surgery taking place but also there are far less staff around; for a big hospital, out of hours means that there are more beds freed up and available and a critical core of staff still available

(Lavery & Horan, 2005). For tactical command, an incident out of hours may mean that the designated senior managers are off site and that junior managers assume this role until the arrival on site of more senior staff.

Documentation & Identification of patients

Recording patient details is essential as the failure to correctly identify patients during an incident can result in a serious risk to their safety (Craigie et al, 2018; Lavery & Horan, 2005). Patient identification after a mass casualty incident is difficult and it was noted in the response to the Manchester Arena bombing that paediatric casualties posed a significant challenge, as children tend not to carry forms of identification and often dress the same (Craigie et al, 2018). Large numbers of patients create problems with the ability to register them correctly onto the patient administration system (whether this is an electronic or manual major incident version) and can lead to delayed access to test results (Mohammed et al, 2006), and lack of detail about where patients have been admitted to. In addition to the clinical aspects, there is a demand for numbers and details of casualties from external sources such as the police which may be directed to the tactical command.

Chemical, Biological, Radiological, Nuclear and Explosives (CBRNE) incidents:

CBRNE issues significantly complicate clinical management and have a disproportionate effect on the healthcare response, even with a small number of patients (Calder & Bland, 2018). They can cause trauma on a large scale and demand complex responses that may include triage (or reverse triage), decontamination and multiple injuries (Linney et al, 2011). There is the need to provide decontamination for those affected while staff have to undertake procedures in personal protective equipment (PPE), which involves its own difficulties (Stacey et al, 2004).   A further consideration is the potential for hospital areas to become contaminated, which may compromise the provision of some hospital services (Stacey et al, 2004) or for hazards to be brought in, particularly if dealing with terrorist incidents. There should be awareness of potential unexploded devices being carried into the hospital, either accidentally or on purpose (Mohammed et al, 2006). For tactical commanders, the additional complications related to CBRNE incidents may involve mobilisation of greater or different hospital resource, liaison with external agencies (such as police, fire service, environment agencies) as well as the potential for loss of facilities if they become contaminated.

Leadership during an incident

There are many aspects of response that are predominantly controlled by clinical requirements and medical management, with operational commanders often being lead clinicians in the Emergency Department (Allen, 1989; Dean, 2017; Hardy, 2015a; Lavery & Horan, 2005), surgical teams (Lavery & Horan, 2005), trauma teams (Aylwin et al., 2006; Craigie et al., 2018; Hart et al., 2003; Horsfall, 1999) and in the ICU (Shirley, 2008). The role of management in a crisis situation such as a major incident is essentially that of coordinating the complex response situation (Brandrud et al, 2017). The provision of support, advice, communication and leadership (Longhurst, 2017) by managers involves dealing with supply of staff, beds and resources, managing elective demand, partnership working with external agencies (Smith et al, 2005), tracking patients and obtaining valid information (Brandrud et al, 2017; Smith et al, 2005). A focused, delimited intervention by tactical commanders may also be required. Reviews of the response by the Ringerike hospital in Norway to the multiple killings on the island of Utøya in 2011, identified that hospital management provided doctrine, mission, objectives and necessary means during the response, but refrained from micromanagement and a top-down approach (Brandrud et al, 2017; Gauss & Cook, 2017).

1.9   The impact of a major incident on an NHS hospital

There is debate as to whether a major incident should be seen as requiring an extraordinary response or, since often the incident is over within a few hours, it may be more akin to business as usual but on a larger and faster scale. Research from Australia indicates that a disaster event leads to a chain reaction of changes in process, space and practice for staff working within ED (Hammad et al, 2018). Staff may experience disbelief as assumptions that this couldn't happen to them are shattered, while staff may be required to operate outside of their scope of practice and in an environment where use of space has been changed from the familiar. In this way, responding to a disaster is different from the everyday experience of working in ED and so should not be considered as normal business 'ramped up' (Hammad et al., 2018). Even for those accounts that stress the continuity and familiarity with the major trauma cases that EDs may deal with regularly, there is acknowledgement that the response may be emotive for staff, since they are dealing with the aftermath of a significant event,

whether accidental or deliberate (Dean, 2017). Although the nature and number of casualties may be outside of their usual practice, many clinical staff will have the requisite clinical skills to manage adequately. Much more challenging are the demands on the leadership and control of the overall hospital responses (Lax & Nesbitt, 2018) which are wide-reaching, as the impact of even a small number of critically injured casualties has implications for an acute trust lasting for weeks/months after the incident (Johnson & Cosgrove, 2016) with patients requiring follow up surgery, critical care support, therapy, rehabilitation and out-patient care. While longer term organisational recovery is a function of strategic command (NHSE, 2022), the tactical commander needs to think ahead to consider impacts for the first 12 hours, in terms of matters such as ensuring adequate staff and materials for the next shift.

1.10   Summary:

The literature detailing actions and factors influencing a hospital's response, identifies that a sudden onset (critical) major incident affecting an NHS hospital is typified by high risk and significant levels of ambiguity and uncertainty for the organisation. The impact may be multi-faceted and the major incident represents a dynamic situation whereby risks and hazards may change rapidly, leading to sudden escalation or de-escalation of organisational response.

This research is focused on the role played by tactical commanders during a critical / major incident and how they made their decisions. Having clarified the context within which tactical commanders are operating, the next stage of the process was to understand the research that has been undertaken to date with those operating in this role and to identify any gaps in knowledge.

Chapter Two:

Understanding tactical command during sudden onset incidents: A systematic review

2.0   Introduction

This chapter outlines the systematic review that was undertaken around hospital command during a sudden onset incident and describes the tools and procedures that were used to give rigour to the approach. The analysis of the material is then undertaken in two parts, a descriptive analysis outlining the characteristics of the papers and the scenarios they cover, then content analysis looking at themes and concepts that emerged. The chapter then describes how this shaped the focus of the research and the implications for the research design.

2.1   Review of Current Evidence

It was important to consider the literature using a process that would contextualise the research, reduce bias and enable assessment of how the review had been compiled (Brettle, 2010). Knowledge synthesis is an umbrella term for different types of literature reviews that use transparent and reproducible methods to gather and synthesise studies within a larger body of knowledge on a topic (Zaccagnini & Li, 2023). There are multiple review types[5] which may have objectivist or subjectivist orientations to knowledge (Varpio et al, 2024), but which have overlaps of definitions and methodologies (Gough et al, 2012; Grant & Booth, 2009; Kastner et al, 2012; Shang et al, 2023). Consequently, there are some general methods which are applicable to most reviews (Tricco et al, 2011). The approach adopted was a systematic

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[5] For example:
Grant & Booth (2009) consider 14 review types: Critical review; Literature review; Mapping review / systematic map; Meta-Analysis; Mixed studies review / mixed methods review; Overview; Qualitative systematic review / qualitative evidence synthesis; Rapid review; Scoping review; State-of-the-art review; Systematic review; Systematic search and review; Systematized review; Umbrella review

Sutton et al (2019) identified 48 review types which they categorised into 7 'families': traditional reviews; systematic reviews; review of reviews; rapid reviews; qualitative reviews; mixed method reviews; purpose specific reviews

review, which sought to systematically search for, appraise and synthesise research evidence and which was transparent in its methods to facilitate others to replicate the process (Grant & Booth, 2009). This choice was influenced by an understanding that systematic reviews aim to answer a narrowly focused question with a clearly defined population (Tricco et al, 2011), which reflected the desire in this research to understand what was already known about hospital decision making during a sudden onset incident.

Systematic reviews are the gold standard to search for, collate, critique and summarise the best available evidence regarding a clinical question (Munn & Stern et al, 2018). They do not seek to create new knowledge but to synthesise and summarise existing knowledge (Aromataris & Pearson, 2014). Systematic reviews may be used to produce statements to guide clinical decision-making, the delivery of care, as well as policy development (Munn & Peters et al, 2018). How they are conducted may vary (Aromataris & Pearson, 2014), but they have common features which include clear aims with predetermined eligibility and relevance criteria for studies; transparent, reproducible methods; assessment of the validity of the findings of the included studies; and a systematic presentation and synthesis of the included studies (Aromataris & Pearson, 2014; Clarke, 2011). There are different typologies of systematic review (Grant & Booth, 2009; Munn & Peters et al, 2018) and the approach adopted in this piece of work was that of a qualitative systematic review. This enabled the focus of the review to be on presenting a comprehensive understanding of participant experiences and perceptions rather than assessing the effectiveness of interventions (Butler et al, 2016). Consideration was given to undertaking a scoping review, but the focus of the information search was more on seeking evidence to inform practice than in identifying characteristics or concepts in papers (Munn & Peters et al, 2018).

2.2 Systematic Review: During sudden onset incidents affecting hospitals, what decisions are made by the hospital commands?

Focus of the review:

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Statement (Moher et al, 2009) offers guidelines which support transparent and complete

reporting, allowing judgements to be made on the trustworthiness of research (Sarkis-Onofre et al, 2021). For the literature search, this review adhered to the principles within the checklist developed by Rethlefsen et al (2021), which was intended to complement the PRISMA Statement.

The search strategy was an iterative process and reflected the author's learning pathway within this research, as reflections and learning from initial attempts at searches for material were used to shape the final strategy. At the start of this process, the search strategy was aimed at understanding decisions taken by tactical commanders in NHS hospitals during sudden onset incidents. As Appendix 3 outlines, this approach was too narrow and did not provide a robust evidence base regarding decision-making within hospital tactical command. The dearth of literature regarding specific work around tactical command in NHS hospitals could indicate a gap in the existing evidence base and suggest that research in this area would provide new knowledge. This may have validated the rationale behind the research, however the search strategy did not provide insight into what was known about hospital tactical command during sudden onset incidents. The focus on the review was revised and an extended search strategy developed, using the framework of Patient / Intervention / Comparison / Outcome (PICO) (Richardson et al, 1995) as formatted into a checklist by Walsall Healthcare NHS Trust (2019). This is included in Appendix 4. Following reflection on the limitations of the initial review, the inclusion criteria were extended to all hospitals, both at a national and international level. It included the response within exercises as well as those within an actual incident and looked for anything related to incident command within a hospital. It did not differentiate between tactical or strategic decisions or issues.

The review coalesced around what decisions were made by the hospital commands rather than including how these decisions were taken. As the initial scoping exercise had identified that there were few articles on hospital command during incidents, it was felt that the inclusion of how the decisions were made could narrow down the search too much, as had been the case in the first attempt at a systematic review.

Information Sources & Methods:

This review was undertaken in December 2019 to February 2020 and updated in March 2023. A search was made using Open Athens and the search options available through the NHS Knowledge and Library Hub. This required further training as the initial HDAS database was no longer in commission (Appendix 5). The primary databases used were AMED, BNI, CINAHL, EMBASE, EMCARE, HMIC, Medline, PsycINFO and Pubmed. This approach was supplemented by using Google Scholar and tracking back citations and references to identify any further articles. No study registries or contacts were used in this search.

Search Strategies

Full search strategies: For this literature search, keywords included 'incident*', 'disaster*', 'crisis', 'hospital*', 'command*', 'incident command', 'sudden onset', 'surge', 'mass casualt*', 'management', 'manager*', 'training', 'exercis*', 'tactical', 'strategic', with Boolean operators and thesaurus / explode functions being used. Further details of terminology are included in Appendix 4 with an example of the search process outlined in Appendix 6[6].

Units and restrictions: The eligibility criteria used in this search was cognisant of the limitations of the initial search strategy and was amended to include organisational issues that the papers raised, and which would have come into the domain of hospital command. The first literature search had excluded these and focused solely on articles which specifically mentioned tactical command. Articles were included for review if they met the following criteria:

(1) published in English;

(2) published during the period January 2018 to February 2023;

(3) had been subject to peer review;

(4) described the impact of sudden onset incidents (actual or exercises) affecting hospitals;

(5) described the command-and-control challenges and/or decisions within the hospital during the incident.

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[6] This relates to the earlier search on the HDAS system but illustrates the techniques used and displays it in a better format than able to be downloaded from the databases that were used latterly.

The exclusion criteria applied were:

(1) Slow onset incidents (such as Covid for example);

(2) papers that focused on preparedness for incident response, such as pre- and post-intervention assessments of preparedness, but not about the actual response;

(3) papers relating to response structures that weren't grounded in an actual response to a real or simulated incident;

(4) grey literature.

Critical Appraisal: Critical appraisal focuses on research design and the validity of a study's findings (Aromataris & Pearson, 2014). The review was undertaken by the researcher without using any peer reviewers. As a single-handed researcher, I was conscious of the need to mitigate the potential for systematic error involving bias around selection, performance, attrition and detection (Aromataris & Pearson, 2014). To aid the transparency and reproducibility of this process in the systematic review (Aromataris & Pearson, 2014), the articles were assessed using the evaluation tool for qualitative studies (Long, 2018). This served to give rigour and standardisation to my approach. It did not provide a scoring system, however this is a feature identified in other qualitative checklists used for critical appraisal (Butler et al, 2016), hence the reason for me to have 'subject to peer review' as one of the inclusion criteria for the search.

Managing records

There were 286 articles originally identified. The list of articles was screened manually (Figure 1) using abstracts and then full articles as outlined in Figure 2, until the final selection of 28 articles was made.

Figure 1: Screening snapshot

Article Title	Author	Journal Title
Umemoto, M., Kadono, S., Kanno, T., Kajiyama, K., Sharikura, S., Ikari, R., ... &	Chuang, S. (2023). Modeling and Simulation of In-Hospital Disaster Medicine in a N	
Using an Incident Command System Model for Initial Response to an Admini	Chesser M; Abbaszadegan H; Rehman S	Federal practitioner : for the
Using Hospital Incident Command Systems to Respond to the Pediatric Men	Westley L; Manworren RCB; Griffith DM; Hoffmann JA; Janssen A; Routburg S; Richey K	The Journal of nursing admi
Using Hospital Incident Command Systems to Respond to the Pediatric Men	Westley, Laura; Manworren, Renee C.B.; Griffith, Debrea M.; Hoffmann, Jennifer A.; Janssen, Aron; Routburg, Susan; Richey, Karen	JONA: The Journal of Nursin
Using the National Incident Management System to Prepare Physicians for R	Bar J; Symonds S; Du Pont D; South E; Conlon L	Disaster medicine and publi
van der Wal, W., Barten, D., Ketelings, L., van Osch, F., Rao, M., Mortelmans,	L., & Bierens, J. (2023). Addressing a climate emergency amidst the COVID-19 pand	
Wennman, I., Jacobson, C., Carlström, E., Hyltander, A., & Khorram-Manesh,	A. (2022). Organizational Changes Needed in Disasters and Public Health Emergenci	
What we learned from the Oklahoma City bombing.	Anteau CM; Williams LA	Nursing
When measles struck, this children's hospital sprang into action.	Johnson, Steven Ross	Modern Healthcare
Widya, S., Hewitson, R., Patel, T., Roland, D., & Dadnam, C. (2022). Fifteen-minute consultation: An overview of major incidents. Archives of Disease in Childhoo		
Yaghoubi, T., & Araghian Mojarad, F. (2022). Lessons Learned from Emergenc	y Evacuation of Hemodialysis Department. Journal of Critical Care Nursing, 15(1), 1	
Yaghoubi, T., Ardalan, A., Ebadi, A., Nejati, A., & Khorasani-Zavareh, D. (2021)	Exploring factors affecting the decision of emergency hospital evacuation in disas	
	Not English	
	No access	
	Not actual health response or exercise, or sudden onset	
	Duplicate	
	Not Tactical Command	
	TC	
	Before 2018	
	Not subject to peer review	
	Already included in an article	

Figure 2: PRISMA Flow diagram for 'Sudden Onset Incidents affecting Hospitals'

PRISMA 2020 flow diagram for new systematic reviews which included searches of databases, registers and other sources

Identification of studies via databases and registers

Records identified from:
Databases (n = 274)
Registers (n = 0)

Records removed *before screening*:
Duplicate records removed (n = 34)
Records marked as ineligible by automation tools (n = 0)
Records removed for other reasons (n = 0)

Records screened (n = 240)

Records excluded (n = 99)
Not Peer Reviewed (n = 1)
Not in English (n = 1)
Pre-2018 (n = 97)

Reports sought for retrieval (n = 141)

Reports not retrieved (n = 15)

Reports assessed for eligibility (n = 126)

Reports excluded (n = 108)
Not sudden onset health incident or exercise (n =67)
Not Tactical or Strategic Command (n = 40)
Referenced existing article (n = 1)

Identification of studies via other methods

Records identified from:
Websites (n = 0)
Organisations (n = 0)
Citation searching (n = 12)

Reports sought for retrieval (n = 12)

Reports not retrieved (n = 0)

Reports assessed for eligibility (n = 12)

Reports excluded (n = 2)
Not sudden onset health incident or exercise (n =1)
Not Tactical or Strategic Command (n = 1)

Studies included in review (n = 28)
Reports of included studies (n = 0)

From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71.

2.3   Descriptive Analysis

Methodology and Research Methods

The nomenclature used in the papers about methodology provided limited scope to understand the research paradigm used by the authors (Table 1). Six papers did not identify any research design (Chuang et al, 2018; Hojman et al, 2019; Phattharapornjaroen et al, 2020; Schumacher et al, 2022; Tallach & Brohi, 2022; Zarka et al, 2021). Four articles outlined a systematic literature review (Barten et al, 2022; Hugelius et al, 2020; Melnychuk et al, 2022; Sahebi et al, 2021) but describing a paper as having a qualitative research design (Al-Hajj et al, 2023; Mohtady Ali et al, 2023; Moitinho de Almeida, 2021; Murphy et al, 2022; Wennman et al, 2022; Yaghoubi et al, 2021) or being a case study (Barten et al, 2019; Barten et al, 2021; El Sayed et al, 2018; Giri et al, 2018; Idrose et al, 2022; Moitinho de Almeida, 2022; Murphy et al, 2020;   Zarka et al, 2021) did not provide adequate indication as to whether the researchers had adopted a phenomenological, grounded theory or ethnographic approach for example. Consequently, there was lower confidence about the methodological rigour of the work being presented.

The papers focused on methods which involved interviews with staff, literature reviews and use of hospital data.

Table 1: Methodology and Methods

		Number
Methodology (Self-Reported)	Not identified	6
	Qualitative Research design	5
	Case Study (Retrospective Descriptive / Prospective Observational)	8
	Systematic Scoping / Literature Review	4
	Critical incident technique	2
	Conventional content analysis	1
	Mixed Methods (Parallel / Two-stage)	2
	Total	**28**
		Number
Methods	Individual Interviews	11
	Focus Group	1
	Literature Review (Including grey literature; government reports)	11
	Use of hospital data (Patient Records; activity reporting)	5
	Observational evaluation	2
	Self-reported preparedness	1
	Online survey	2

An overview of the 28 articles included in this review, is outlined in Table 2.

Table 2: Systematic Review – Summary of Articles

Authors	Incident / Exercise	Methodology & Methods as defined in the paper	Country	Phenomena under study	Aims & Objectives	Key focus on hospital tactical or strategic command	Tactical / Strategic considerations	Tactical / Strategic actions & decisions
Al-Hajj et al, 2023	I	**Methodology:** Qualitative research design method **Methods:** Semi-structured interviews with healthcare workers	Lebanon	Impact of Beirut blast in 2020 on acute care hospitals in the surrounding area	To provide a comprehensive understanding of the impact of the Beirut blast on acute care hospitals, with a focus on understanding healthcare professionals' responses and encountered challenges	N	• Hospitals unable to fully implement their disaster plans due to severe infrastructure damage, and casualty surge • External chaos hindered optimal communication and coordination among hospitals' staff • Heavy influx of casualties to local hospitals and the inability to establish entry control for hospitals • Significant number of undocumented casualties due to inability of Electronic Medical Records to register many patients • Hospitals not aware of expected number of casualties, and unable to anticipate the types and severity of injury • High level of internal support received • Lack of specialty physicians to perform specialized procedures • Reduced access for hospital staff coming in from outside • Access to sufficient levels of hospital supplies and equipment • Coincided with the peak period of the Covid pandemic	• Mass hospital evacuation was performed at these hospitals, and patients transferred to nearby hospitals. • Incoming wounded victims were denied admission and were redirected to nearby acute care hospitals • Continuation of healthcare provision despite partial damages to hospital infrastructure
Barten et al, 2019	I	**Methodology:** Case study **Methods:** Narrative overview of the current literature	Netherlands	Internal hospital disaster resilience	Share learning around focus of hospital disaster plans to include internal as well as external threats To get health care organisations to consider the incorporation of Acute Medical Units into disaster plans	N	• Loss of ED (due to ceiling collapse) • Temporary cessation of clinical services & resumption of capability to treat all patient categories	• Activation of hospital disaster plan • Closure and evaluation of ED • Blocking of ICU beds as contingency • Decision made to use the AMU as the temporary ED • Transfer of patients from wards • Initiation of building works • Decisions about reinstating activity

Authors	Incident / Exercise	Methodology & Methods as defined in the paper	Country	Phenomena under study	Aims & Objectives	Key focus on hospital tactical or strategic command	Tactical / Strategic considerations	Tactical / Strategic actions & decisions
Barten et al, 2021	I	**Methodology:** Case study of 3 disasters within EDs. **Methods:** Narrative overview of the current literature	Netherlands	Internal hospital crises and disasters (IHCD)	Provide a blueprint to achieve better ED preparedness for IHCDs	N	• Disaster types: ED ceiling collapse; ED internal fire; computer system failure • Temporary cessation of clinical services & resumption of capability to treat all patient categories	• Closure and evacuation of ED • Diversion of ambulances • Conversion of ICU to receive unstable patients • Creation of temporary ED • Impact on theatre activity • Assessment of impact of IT failure on ability to provide safe care
Barten et al, 2022	I	**Methodology:** A systematic scoping review of news articles **Methods:** Bespoke appraisal tool	Netherlands	Hospital evacuations in crisis and disaster situations	Provide data on the prevalence and causes of evacuations to support realistic hospital evacuation planning	N	Cascading events were frequently observed prior to evacuation decisions, and the Primary Incident was not necessarily the Final Incident that resulted in evacuation.	

Authors	Incident / Exercise	Methodology & Methods as defined in the paper	Country	Phenomena under study	Aims & Objectives	Key focus on hospital tactical or strategic command	Tactical / Strategic considerations	Tactical / Strategic actions & decisions
Chuang et al, 2018	I	**Methodology:** N/A **Methods:** Data collection via review of government reports and journal publications plus in-depth individual interviews	Taiwan	Response to the Formosa Fun Coast Dust Explosion (FFCDE) on 27 June 2015	To explore how participating actors dealt with the rescue of 499 burn victims from the scene and provide care for mass burn casualties in hospitals	N	• Anticipatory and reactive required adaptations to extend care capacity for mass casualties • Most adaptations were different from the practices in conventional drills to cope with the uncertainty and overload over time	• An anticipatory attempt to use highly irregular resources in hospitals to extend the treatment area i.e. utilizing hospital lobby for burn patients in one hospital, or for non-burn patients in another hospital • Opening meeting, storage & staff rooms in ED for the burn patients who were less injured to flush wound areas by themselves • Reactive break of standard operation procedures to "borrow" medical materials promptly from pharmacy inventory in several hospitals, or from an ICU in a hospital.
Chuang et al, 2019	I	**Methodology:** Critical incident technique **Methods:** In-depth interviews combined with patient records for ED Process tracing analysis	Taiwan	Response by a hospital to the Formosa Fun Coast Dust Explosion (FFCDE) on 27 June 2015	To help hospitals develop more realistic and comprehensive plans for mass burn casualty events in disaster planning	N	The overload manifested into three axial challenges: (a) workload saturation and shortage of clinicians; (b) ED space approaching gridlock and shortage of ICU beds; (c) shortage of critical medical materials, stretchers, and ambulances for burn care Timely anticipatory action requires recognition that its adaptive capacity is becoming inadequate to meet the demands it will or could encounter	Adaptations made: • Workload saturation & clinician shortage • ED space approaching gridlock and shortage of ICU beds • Exhaustion of critical medical supplies, stretchers, and ambulances

Authors	Incident / Exercise	Methodology & Methods as defined in the paper	Country	Phenomena under study	Aims & Objectives	Key focus on hospital tactical or strategic command	Tactical / Strategic considerations	Tactical / Strategic actions & decisions
Chuang et al, 2020	I	**Methodology:** Critical incident method **Methods:** In-depth interviews combined with patient records and admission logs from the ED	Taiwan	Response by a lower-level receiving hospital to the Formosa Fun Coast Dust Explosion (FFCDE) on 27 June 2015	To provide a comprehensive insight into how an initial receiving hospital without adequate capacity adapted to coping with a mass casualty incident	Y	The overload manifested in 3 ways: • Saturation of ED space and ICU beds • Workload saturation or near saturation of clinicians • Exhaustion of critical medical materials Lack of information meant that overcoming the challenge of uncertainty was dependent on staff's anticipatory ability	• Dealing with demand for ICU beds: adaptations around reconfiguring space, giving personnel additional authority, encouraging them to act independently, reducing the workload from the admitted non-incident patients • Commander initiated clearing beds in the ICU and general wards; mobilized post-ED resources in anticipation of the arrival of additional victims • Liaison with external command systems • Alerting additional staff • Securing additional resources • Supporting effective coordination and integration across roles and units
El Sayed et al, 2018	I	**Methodology:** In-depth case-study **Methods:** A summary of the debriefings following the event was developed and an analysis was performed	Lebanon	Experience of a hospital in dealing with a mass casualty incident involving a car bomb in an urban area of downtown Beirut	To modify the hospital's existing disaster preparedness plan.	N	**Challenges:** • Inefficient patient registration • Loss of coordination during patient movement from one area to another • Inadequate relay of the disaster code to essential staff • Delay in plan activation due to slow information relay from the EMS agencies • Inadequacy of paper-based information systems • Delay in deployment of medical supplies • Large influx of non-essential personnel to ED • Demand from family members checking on condition of patients • Large patient surge to other hospital departments (blood bank, radiology, lab) • Managing patient flow inside the ED • Managing existing patients • Media at ED entrance	• Declaration of incident status • Direct communication was established with responding EMS agencies regarding patient transport and distribution of casualties • Resuming normal ED activity

Authors	Incident / Exercise	Methodology & Methods as defined in the paper	Country	Phenomena under study	Aims & Objectives	Key focus on hospital tactical or strategic command		Tactical / Strategic considerations	Tactical / Strategic actions & decisions
Giri et al, 2018	I	**Methodology:** Prospective observational study In-depth case-study **Methods:** Quantitative data from hospital records & qualitative data from semi-structured interviews with patients	Nepal	Hospital caseload following an earthquake	Describe the burden and distribution of emergency cases to a local hospital	N	• Dealing with surge in demand • Loss of power and telecommunications		• Establishment of immediate medical direction, 24-hour surgical services, infection control teams, and logistical management teams to manage unexpected workloads

Authors	Incident / Exercise	Methodology & Methods as defined in the paper	Country	Phenomena under study	Aims & Objectives	Key focus on hospital tactical or strategic command		Tactical / Strategic considerations	Tactical / Strategic actions & decisions
Hojman et al, 2019	I	**Methodology:** N/A **Methods:** Summary of the events that led to the evacuation of the ED Review of the response and description of evidence-based policy changes	USA	Impact on hospital involved in the response to the Boston Marathon bombings in 2013 with receiving casualties and simultaneously evacuating ED due to a linked bomb threat	To present the experience with the evacuation itself and the protocols that were proposed afterward to prevent similar incidents in the future.	N	Dealing with impact of • Policy instruction to evacuate ED • Hospital lockdown • Overflow of personnel in the ED • Breakdown of incident chain of command with local decisions being made which were not in line with a mass casualty response • Communications difficulties due to overloading of telephony systems (mobile and landlines)	
Hugelius et al, 2020	I	**Methodology:** Structured literature search **Methods:** Management review of 20 cases	Europe, USA, Asia and the Middle East	Response to natural disasters, man-made events, and accidents	To identify and describe common challenges to managing mass casualty or disaster incidents	N	Five common challenges identified: • To identify the situation and deal with uncertainty • To balance the mismatch between the contingency plan and the reality • To establish a functional crisis organization • To adapt the medical response to the actual and overall situation • To ensure a resilient response	

Authors	Incident / Exercise	Methodology & Methods as defined in the paper	Country	Phenomena under study	Aims & Objectives	Key focus on hospital tactical or strategic command	Tactical / Strategic considerations	Tactical / Strategic actions & decisions
Hugelius et al, 2021	I	**Methodology:** Conventional content analysis **Methods:** 16 individual interviews	Sweden	Medical doctors who had been deployed as Medical Officer in Charge (MOCs) at Swedish hospitals during major incidents	To describe factors influencing decision-making of MOCs	Y	Decision-making & re-evaluation process influenced by three categories of factors: • Event factors, including consequences from the type of event, levels of uncertainty and the circumstances • Organizational factors, including the doctor's role, information management and the response to the event • Personal factors, such as competence, personality and mental preparedness	• Managing a complex and dynamic situation, such as a major incident, requires adjusting organizational and medical procedures • MOCs used a form of triangulation to interpret the information and estimate the consequences • Some MOCs made both operational and strategic decisions at the same time • MOCs were required to be open-minded to take in the manifest information as reports and to listen to & understand the latent information given • MOC could not only rely on contingency plans and checklists but needed to be able to improvise • MOC made decisions on their own, but, sometimes had collaborative discussions with senior physicians before definitive decisions were made
Idrose et al, 2022	I	**Methodology:** Retrospective descriptive study **Methods:** Information on incident site and hospital management response were analysed. Data on demography, triaging & injuries	Malaysia	Hospital response following a train crash	To evaluate the management of this mass casualty incident highlighting the lessons learned to be used in preparedness for similar incidents that may occur in other major cities worldwide.	Y	• Impact of the incident onto pre-existing measures in place to deal with Covid • Critical care capacity	• Deciding on the incident level • Establishment of command structure • Escalating to staff within the organisation • Creation of additional (critical care) capacity • Cessation of elective surgery • Stand down decision

Authors	Incident / Exercise	Methodology & Methods as defined in the paper	Country	Phenomena under study	Aims & Objectives	Key focus on hospital tactical or strategic command	Tactical / Strategic considerations	Tactical / Strategic actions & decisions
Melnychuk et al, 2022	I	**Methodology:** A structured and scoping literature review **Methods:** Review of peer-reviewed literature, grey literature, and news reports related to hospitals as disaster victims	Worldwide	Hospitals as victims of a disaster, whereby their operations are interrupted, displaced, or halted	To evaluate the existing literature on hospitals as disaster victims To identify and analyse themes and lessons observed from disasters in which hospitals are victims, To aid in future emergency operations planning and disaster response.	N	**Themes encountered** • Loss of power • Loss of water • Loss of heating, ventilation, air conditioning: temperature and air quality • Loss of communications • Loss of health information and technology • Loss of staff • Loss of supplies: disruptions of logistics and supply chain management • Loss of safety and security • Structural and non-structural damage **Other considerations:** Hospitals need to consider how to protect resources from further damage when a disaster strikes, for example, the protection of biospecimens and research materials.	
Mohtady Ali et al, 2023	I	**Methodology:** Qualitative case-study **Methods:** In-depth and semi-structured interviews	Australia	Leaders in two hospitals with experience of anticipating, responding to, monitoring and learning from climate change impacts and disasters	To identify key competencies of transformational leadership in hospitals, for dealing with disasters	Y	• Challenges of change management: flexibility; chain of command • Demands on governance structure • Keping regular communication with the teams • Confusing and improperly directed information • Overwhelming tasks • Sharing and discussing the information	

Authors	Incident / Exercise	Methodology & Methods as defined in the paper	Country	Phenomena under study	Aims & Objectives	Key focus on hospital tactical or strategic command	Tactical / Strategic considerations	Tactical / Strategic actions & decisions
Moitinho de Almeida, 2021	I	**Methodology:** Qualitative study **Methods:** 18 semi-structured interviews undertaken with hospital staff	Nepal	Impact of a large-scale sudden onset disaster in a tertiary hospital in Nepal, and explored its resilience mechanisms	To study a tertiary hospital's resilience after the 2015 earthquake in Nepal, as experienced by its staff	N	Three stages of rapidity: • Critical rapidity to address immediate needs • Stabilizing rapidity until the hospital re-started routine activities • Recovery rapidity Importance of emerging adaptations in redundancy and resourcefulness.	
Moitinho de Almeida, 2022	I	**Methodology:** In-depth case-study **Methods:** Combined quantitative data from hospital records & qualitative data from semi-structured interviews with hospital staff	Nepal	Impact of a large-scale sudden onset disaster in a tertiary hospital in Nepal, and explored its resilience mechanisms	To investigate the impact of an earthquake on the functioning of a tertiary hospital in Nepal, and explore hospital resilience mechanisms	N	Hospital experienced: • material challenge • challenges to health service provision • challenges to management and coordination • emotional and physical impact on individuals Identified the importance of emerging adaptations even when a disaster plan exists Resourcefulness: the pre-existing disaster plan and trainings were important, but many adaptations were spontaneous, compensating for a perceived lack of coordination	• Establishment of suitable alternatives to many disrupted elements • Established linkages with 'step-down centres' to refer patients no longer requiring advanced hospital care, which liberated beds to accommodate severe cases • Established new partnerships with external organizations; rearranged health services; change of staff task / roles to adapt to emerging situations

Authors	Incident / Exercise	Methodology & Methods as defined in the paper	Country	Phenomena under study	Aims & Objectives	Key focus on hospital tactical or strategic command		Tactical / Strategic considerations	Tactical / Strategic actions & decisions
Murphy et al, 2020	E	**Methodology:** Prospective observational study **Methods:** Use of performance indicators to assess hospital command groups' decision-making and performance	Sweden	Hospital incident command groups' (HICG) performance in hospital response to major incidents	**Aim:** To assess associations between decision-making skills and staff procedure skills of hospital incident command groups during major incident simulations **Objective:** To assess associations between decision-making and staff procedure skills of the hospital incident command group	Y	• There is a significant correlation between decision-making skills and staff procedural skills • Hospital incident command groups' proactive decision-making abilities tended to be less developed than reactive decision-making abilities • These proactive decision-making skills may be a predictive factor for overall hospital incident command group performance • A lack of proactive decision-making ability may hamper efforts to mitigate the effects of a major incident		
Murphy et al, 2022	I	**Methodology:** Qualitative study **Methods:** Focus groups & individual interviews.	Sweden	Experiences of member of part of a hospital incident command group during a major incident Participants were registered nurses in their capacity as disaster preparedness coordinators	To explore registered nurses' experiences as disaster preparedness coordinators of hospital incident command groups' during a major incident	Y	Things that affect hospital incident command group response during a Major Incident: • Expectations, previous experience and uncertainty Factors: • Gaining situational awareness (deciphering the flow of information; activating the incident command group) • Transitioning to management (Managing the staff overflow; struggling with staff briefings; managing the information vacuum) • Actions taken during uncertainty (an excessive response due to uncertainty; experience of balancing staff)		• Activating and forming the HIC • Establishing other forms of contact to aid in incident management and enlisting the aid of law enforcement for security • Assigning runners between the command and the emergency department (ED) and use of information from other unofficial sources, such as ambulance personnel, police officers, and social media • Formulation of plans for staff manageability and retention by scheduling staff and providing sleeping arrangements • Frequent staff briefings • Decision about the level of response directly after alarm

Authors	Incident / Exercise	Methodology & Methods as defined in the paper	Country	Phenomena under study	Aims & Objectives	Key focus on hospital tactical or strategic command		Tactical / Strategic considerations	Tactical / Strategic actions & decisions
Phattharapor njaroen et al, 2020	E	**Methodology:** N/A **Methods:** Observational evaluation of exercises and pre- and post-course tests on knowledge and self-reported preparedness	Thailand	Capability of Emergency Physicians to manage a major incident	Support the presence of alternative leadership which is skilled and knowledgeable to manage major incidents	Y	Identifies three leadership styles: • Consensus leadership • Passive leadership • Active Leadership		
Sahebi et al, 2021	I	**Methodology:** Systematic review **Methods:** Thematic Content analysis	Worldwide	Hospital emergency evacuations during a fire	To identify the factors affecting hospital emergency evacuation during fire	N	• Coordinating intra-organizational communications • Notification (internally and externally) • Complex process requiring a command system through inter & intra organisational communications • Prioritise patients for translocation		

Authors	Incident / Exercise	Methodology & Methods as defined in the paper	Country	Phenomena under study	Aims & Objectives	Key focus on hospital tactical or strategic command	Tactical / Strategic considerations	Tactical / Strategic actions & decisions
Schumacher et al, 2022	E	**Methodology:** N/A **Methods:** Evaluation of participants' actions and responses during simulation exercises	Switzerland	Hospital Pharmacies response to simulated major incident	To assess whether full-scale simulation exercises improved hospital pharmacies' disaster preparedness	N	The main challenges were communication and crisis management Issues identified around: • Disaster standard operating procedures • Allocation of roles • Management structures in response to the incident • Responses by different hospital pharmacies • No structured communication both up and down the hierarchy	• The leader, must quickly identify the problem and its healthcare implications and then make adequate decisions, implement management tools, and communicate effectively • Following up on and monitoring the missions and tasks that staff have carried out or still have to carry out within a specific timeframe
Skryabina et al, 2021	I	**Methodology:** Parallel mixed methods study **Methods:** Data from online survey and individual interviews with healthcare staff	UK	Healthcare staff involved in the responses to three terrorist incidents in the UK in 2017 (Westminster Bridge, Manchester Arena and London Bridge)	To understand limitations in the response and share good practices	N	• Factors contributing to effective team behaviours during an MI response included clear communication, role clarity, strong leadership, between-team and within-team coordination, and collaboration • Promoting multiteam cooperation can be facilitated through regular multiteam meetings during a response, to optimise utilisation of recourses and care of trauma patients across different teams.	Appointing a senior liaison person to coordinate multiteam activities proved an effective solution

Authors	Incident / Exercise	Methodology & Methods as defined in the paper	Country	Phenomena under study	Aims & Objectives	Key focus on hospital tactical or strategic command	Tactical / Strategic considerations	Tactical / Strategic actions & decisions
Tallach & Brohi, 2022	I	**Methodology:** N/A **Methods:** Editorial based on experience of incidents and literature review	UK	Uncertainty during mass casualty incidents	To discuss a range of solutions that allow responders to deal with uncertainty	N	• Uncertainty is the defining state of the start of a mass casualty event • Incidents are sudden in onset, undetermined in scale, substantial in their impact, and dynamic. • Decisions must be taken, actions must happen, before the picture is complete • The information vacuum is not acknowledged in major incident protocols. This leads to unrealistic expectations of ordered triage, experienced leadership, clear decisions, sufficient staff, resources, and communications. • Simultaneous, parallel facets of response must form • There is an inherent appearance of chaos and loss of control, even if constituent parts are operating optimally • Decision-making in the context of what is known and unknown is likely to be more effective than delayed decisions made with the complete picture • The discomfort of taking action in uncertainty can be alleviated by sharing the load, forming a command huddle • 'Viable clumsy solutions' enables forward momentum created from decisions despite the inherent uncertainty	
Tallach et al, 2022	I	**Methodology:** Two-staged mixed methods study **Methods:** Open response survey Quantitative survey to measure response within each theme	Worldwide	Physicians' experiences regarding service provision during a terrorist mass casualty incident	To identify where to focus improvement for future responses to terrorist mass casualty incidents	N	• Reported sufficient (sometimes abundant) human resource, although coordination of staff was a challenge • Difficulties highlighted were communication, security, and management of blast injuries	

Authors	Incident / Exercise	Methodology & Methods as defined in the paper	Country	Phenomena under study	Aims & Objectives	Key focus on hospital tactical or strategic command	Tactical / Strategic considerations	Tactical / Strategic actions & decisions
Wennman et al, 2022	I	**Methodology:** Qualitative study **Methods:** Semi structured interviews with managers with tactical and strategic experience in disaster and emergency management	Sweden	Review of hospital contingency plan	Exploration of the elements of surge capacity: command & control, safety, communication, assessment, triage, treatment, and transport.	Y	• *Roles and responsibilities:* participants have been involved in situations during an incident that not only exceeded their qualifications but also necessitated assuming diverse roles and responsibilities in a dynamic process • *Design of a contingency plan / tools:* Significant issues may arise if these are not adjusted to the actual situation • *Line of hierarchy:* Leaders need to respect and implement decisions made by the command incident committee • *Information and Communication:* collaboration, cooperation, and coordination require good communication	
Yaghoubi et al, 2021	I	**Methodology:** Qualitative study **Methods:** In-depth semi-structured interviews with 25 key participants.	Iran	Emergency Hospital Evacuation (EHE)	To explore the factors behind the decision for Emergency Hospital Evacuation in disasters	Y	Categories for evacuation decision: • Danger of life and death (with three subcategories including population density, hospital characteristics, and incident characteristics) • Feasibility of continuing service provision (vulnerability of the hospital & capacity assessment of the hospital) • Prerequisites for EHE (administrative adjustments & feasibility of safe patient transfer).	

Authors	Incident / Exercise	Methodology & Methods as defined in the paper	Country	Phenomena under study	Aims & Objectives	Key focus on hospital tactical or strategic command	Tactical / Strategic considerations	Tactical / Strategic actions & decisions
Zarka et al, 2021	E	**Methodology:** N/A **Methods:** Case study of hospital command structure	Israel	Hospital command structure for dealing with major incidents or disasters	To describe the principles and the methods for hospital operation in case of a disaster-level event.	Y	• Provision of medical support to those currently hospitalized within the hospital, as well as to all new casualties • Collection of information concerning the nature of the crisis, the estimated number of casualties, the severity of their condition, and the exact time and location of the event • Evaluate the new demands, prepare the hospital, and estimate the time necessary to transport the casualties to the hospital • Continually reassess and adjust the allocation of resources	• Collect data about the number, medical status, hospitalization necessities of the casualties • Monitor the status (staff, number of patients, available beds, supply of medications, and so on) of the medical departments in the hospital • Update on the status of the hospital's emergency departments and operating theatres • Set the hospital admission and discharge criteria • Prioritise clinical and operational interventions, according to available treatment capacity and severity of the patient conditions • Maintain infrastructure, establish shelters, and distribute equipment and supplies to support the disaster relief efforts • Sourcing of professional (clinical) advisory support

Location and Types of Incident / Exercise

The papers covered predominantly incidents rather than exercises and included hospitals from across the world (Table 3).

Table 3: Coverage of articles

Geographical Zone	Papers		Exercise	Incident
Australia	1			1
Europe, USA, Asia and the Middle East	1			1
Iran	1			1
Israel	1		1	
Lebanon	2			2
Malaysia	1			1
Nepal	3			3
Netherlands	3			3
Sweden	4		1	3
Switzerland	1		1	
Taiwan	3			3
Thailand	1		1	
UK	2			2
USA	1			1
Worldwide	3			3
Total	**28**		**4**	**24**

These have been split by incident type and incident actualisation, where the former describes what constituted the incident and the latter describes how it manifested within a hospital (Table 4)

Table 4: Type of Incident and Impact on the Hospital

Incident Type		• Explosion • ED ceiling collapse • ED internal fire • Computer system failure
How the Incident impacted the Hospital		• Loss of power • Loss of water • Loss of heating, ventilation, air conditioning: temperature and air quality • Loss of communications • Loss of health information and technology • Loss of staff • Loss of supplies: disruptions of logistics and supply chain management • Loss of safety and security • Loss of premises: structural and non-structural damageCasualty surge at the hospital

2.4   Content Analysis

The data was synthesised around three key themes: the issues that sudden onset incidents raised for a hospital; those that they raised for strategic and tactical command; and the decisions made / actions undertaken by those who were operating within hospital commands.

The implications of a sudden onset incident for a hospital

Space: Incidents could precipitate a heavy influx of casualties to hospitals (Al-Hajj et al, 2023) leading to a rapid filling of the Emergency Department (Chuang et al, 2019; Chuang et al, 2020) and difficulties in managing patient flow within the department (El Sayed et al, 2018). This pressure would also extend to critical care (Chuang et al, 2019; Chuang et al, 2020; Idrose et al, 2022). Hospitals may be required to lockdown (Hojman et al, 2019), but there may be an inability to establish entry control for hospitals (Al-Hajj et al, 2023; Tallach et al, 2022) due to the volume of arrivals.

Staff: Staff who were outside the hospital may encounter difficulties getting onto the site due to the impact of the incident (Al-Hajj et al, 2023). Despite this, it was reported that Emergency Departments would receive a large influx of personnel in response to an incident (Al-Hajj et al, 2023; El Sayed et al, 2018; Hojman et al, 2019; Tallach et al, 2022). This meant that coordination of staff could present a problem to the command teams (Tallach et al, 2022). The staff coming into ED may have neither the full skills or experience required there may still be a lack of specialty physicians to perform specialized procedures (Al-Hajj et al, 2023). In turn staff could find themselves in situations during an incident that not only exceeded their qualifications but also necessitated assuming diverse roles and responsibilities in a dynamic process (Wennman et al, 2022). The emotional and physical impact on individuals (Moitinho de Almeida, 2022) would also have to be taken into account.

Workload: Dealing with surge in demand was a challenge (Giri et al, 2018) in terms of management and coordination (Moitinho de Almeida, 2022). The impact affected a wide range of hospital departments in addition to ED and critical care (El Sayed et al, 2018) and this workload saturation could exceed the capacity of available clinicians (Chuang et al, 2019; Chuang et al, 2020). Access to critical hospital supplies could be delayed (Al-Hajj et al, 2023; Chuang et al, 2019; Chuang et al, 2020; El Sayed et al, 2018; Moitinho de Almeida, 2022) which could be compounded by other factors such as loss of power and telecommunications (Giri et al, 2018) or the requirement to move patients away from affected areas (El Sayed et al, 2018; Sahebi et al, 2021).

Response capability: Hospitals reported difficulty in some cases in being able to fully implement their disaster plans due to severe infrastructure damage, and casualty surge (Al-Hajj et al, 2023). Despite disaster standard operating procedures (Schumacher et al, 2022) and chain of command / response roles being enacted (Mohtady Ali et al, 2023; Schumacher et al, 2022), hospitals may encounter overwhelming tasks and demands on the governance structure (Mohtady Ali et al, 2023). An example was the (in)adequacy and resilience of patient registration systems under the emergent pressures (Al-Hajj et al, 2023; El Sayed et al, 2018).

Communications: Difficulties were highlighted with communications during an incident (Al-Hajj et al, 2023; El Sayed et al, 2018; Hojman et al, 2019; Mohtady Ali et al, 2023; Sahebi et al, 2021; Schumacher et al, 2022; Tallach & Brohi, 2022; Tallach et al, 2022; Wennman et al, 2022). This could be due to the chaos at the scene of the incident (Al-Hajj et al, 2023), the overloading of telephony systems (Hojman et al, 2019) demand from families looking for updates on casualties (El Sayed et al, 2018) or the absence of any structured process for communicating within the organisation (Schumacher et al, 2022). Communication was important in that it impacted on how the organisation was able to plan for the incoming casualties (Al-Hajj et al, 2023), enabled staff to be alerted and the disaster plan to be implemented (El Sayed et al, 2018; Sahebi et al, 2021) and for the chain of command to operate without local decisions being made which were not in line with a mass casualty response (Hojman et al, 2019). It was recognised that collaboration, cooperation, and coordination require good communication (Mohtady Ali et al, 2023; Wennman et al, 2022) but the information vacuum identified is not acknowledged in major incident protocols. This leads to unrealistic expectations of ordered triage, experienced leadership, clear decisions, sufficient staff, resources, and communications (Tallach & Brohi, 2022).

Implications for strategic and tactical command within a hospital

Commanders had to deal with the immediate impact of the incident and this could involve a temporary cessation of some clinical services along with an implementation of capability to treat all patient categories (Barten et al, 2019; Barten et al, 2021). This meant providing medical support to those currently hospitalized within the hospital, as well as to all new casualties (El Sayed et al, 2018; Zarka et al, 2021) while being cognisant of pre-existing extraordinary measures which may already be in place, such as dealing with Covid (Al-Hajj et al, 2023; Idrose et al, 2022).

This had to be done under conditions of significant uncertainty, since incidents were seen as being sudden in onset, undetermined in scale, substantial in their impact, and dynamic (Tallach & Brohi, 2022). The inherent dynamic nature of incidents was illustrated in the case of hospital evacuations, where cascading events were frequently observed prior to evacuation decisions, and the primary incident was not necessarily the final incident that resulted in evacuation (Barten et al, 2022). Even if constituent parts of the organisation are

operating optimally there is an inherent appearance of chaos and loss of control (Tallach & Brohi, 2022). Hospital response teams were required to evaluate the new demands, prepare the hospital and continually reassess and adjust the allocation of resources (Zarka et al, 2021) and in so doing, were expected to deal with the uncertainty (Hugelius et al, 2020). Overcoming the challenge of uncertainty was dependent on staff's anticipatory ability (Chuang et al, 2020) and ability to balance the emerging mismatch between the contingency plan and the reality (Hugelius et al, 2020). It involved recognition that organisation's capacity was becoming inadequate to meet the demands it will or could encounter (Chuang et al, 2019) and an awareness of how to protect resources from further damage when a disaster strikes, for example, the protection of biospecimens and research materials (Melnychuk et al, 2022). Anticipatory and reactive adaptations were required in incidents (Chuang et al, 2018a) and it was important to adjust pre-existing contingency plans to the actual situation (Hugelius et al, 2020; Moitinho de Almeida, 2022; Wennman et al, 2022).

Against this background the implications for hospital decision-making and command structures were that decisions must be taken, and actions must happen before the picture is complete (Tallach & Brohi, 2022). Conversely, a lack of proactive decision-making ability may hamper efforts to mitigate the effects of a major incident (Murphy et al, 2020). Categories of factors which influenced decision-making included: event factors (consequences from the type of event, levels of uncertainty and the circumstances); organisational factors (roles, information management and the response to the event); and personal factors (such as competence, personality and mental preparedness) (Hugelius et al, 2021; Murphy et al, 2022). Hospital incident command groups' proactive decision-making abilities tended to be less developed than reactive decision-making abilities (Murphy et al, 2020) however, and 'viable clumsy solutions' in the context of what is known and unknown enables forward momentum created from decisions despite the inherent uncertainty. This is likely to be more effective than delayed decisions made with the complete picture (Tallach & Brohi, 2022).

Managing an incident was a complex process requiring a command system (Sahebi et al, 2021) with clear communication, role clarity, strong leadership, between-team and within-team coordination, and collaboration (Skryabina et al, 2021). It also required a line of hierarchy where decisions made by the command team were respected by leaders within the

organisation (Wennman et al, 2022). Commanders may be called upon to operate different leadership styles such as consensus, passive and active (Phattharapornjaroen et al, 2020) and operate with critical rapidity to address immediate needs and stabilising rapidity until the hospital gets in a position to re-start routine activities (Moitinho de Almeida, 2021).

Decisions taken

Table 5 outlines the actions taken and the decisions made by hospital commanders. The literature identified that commanders made decisions / took action in six areas: determining the hospital status; establishing a hospital command and leadership role; assessment; implementing initial (reactive) stabilising actions; anticipation; and adaptation.

Table 5: Actions Taken and Decisions Made by Hospital Commanders

Area	Action / Decisions	Source
Hospital Status		
	Activation of hospital disaster plan / Declaration of incident status	Barten et al, 2019; El Sayed et al, 2018; Idrose et al, 2022; Murphy et al, 2022
	Stand down decision	Idrose et al, 2022
	Decisions about reinstating activity	Barten et al, 2019; El Sayed et al, 2018
Command / Leadership		
	Establishment of command structure	Giri et al, 2018; Idrose et al, 2022; Murphy et al, 2022; Schumacher et al, 2022
	Following up on and monitoring the missions and tasks that staff have carried out or still have to carry out within a specific timeframe	Schumacher et al, 2022
	Appointing a senior liaison person to coordinate multiteam activities	Skryabina et al, 2021
	Prioritise clinical and operational interventions, according to available treatment capacity and severity of the patient conditions	Zarka et al, 2021
	Supporting effective coordination and integration across roles and units	Chuang et al, 2020

	Some commanders made both operational and strategic decisions at the same time	Hugelius et al, 2021
Communication	Alerting additional staff	Chuang et al, 2020
	Escalating to staff within the organisation	Idrose et al, 2022
	Assigning runners between the command and the emergency department (ED)	Murphy et al, 2022
	Frequent staff briefings	Murphy et al, 2022
Liaison	Liaison with external command systems	Chuang et al, 2020; El Sayed et al, 2018
	Commanders made decisions on their own, but, sometimes had collaborative discussions with senior physicians before definitive decisions were made	Hugelius et al, 2021
	Established new partnerships with external organizations	Moitinho de Almeida, 2022
	Sourcing of professional (clinical) advisory support	Zarka et al, 2021
Empowerment	Giving personnel additional authority & ability to act independently	Chuang et al, 2020
Assessment		
	Assessment of impact of IT failure on ability to provide safe care	Barten et al, 2021
	Assessment of impact on theatre activity	Barten et al, 2021
	Use of a form of triangulation to interpret the information and estimate the consequences	Hugelius et al, 2021
	Take in the manifest information as reports and to listen to & understand the latent information given	Hugelius et al, 2021
	Use of information from other unofficial sources, such as ambulance personnel, police officers, and social media	Murphy et al, 2022
	Quick identification of the problem and its healthcare implications	Schumacher et al, 2022
	Collect data about the number, medical status, hospitalization necessities of the casualties	Zarka et al, 2021

	Monitor the status (staff, number of patients, available beds, supply of medications, and so on) of the medical departments in the hospital	Zarka et al, 2021
	Update on the status of the hospital's emergency departments and operating theatres	Zarka et al, 2021
Non-Incident Activity	Continuation of healthcare provision to existing patients	Al-Hajj et al, 2023; El Sayed et al, 2018; Zarka et al, 2021
	Dealing with admitted non-incident patients	Chuang et al, 2020
Initial Stabilising Actions		
Access	Closure of ED	Barten et al, 2019; Barten et al, 2021
	Incoming wounded victims were denied admission	Al-Hajj et al, 2023
	Diversion of ambulances	Barten et al, 2021
	Set the hospital admission and discharge criteria	Zarka et al, 2021
Evacuation	Mass hospital evacuation decision	Al-Hajj et al, 2023
	Evacuation of ED	Barten et al, 2019; Barten et al, 2021
Patient Flow	Existing patients transferred to nearby hospitals	Al-Hajj et al, 2023; Moitinho de Almeida, 2022
	Incoming patients redirected to nearby acute care hospitals	Al-Hajj et al, 2023
	Transfer of patients from wards	Barten et al, 2019
Staffing	Formulation of plans for staff manageability and retention by scheduling staff and providing sleeping arrangements	Murphy et al, 2022
Resources	Securing additional resources	Chuang et al, 2020
	Maintain infrastructure, establish shelters, and distribute equipment and supplies	Zarka et al, 2021

Anticipation		
	Blocking of ICU beds as contingency	Barten et al, 2019
	Initiated clearing of beds in ICU	Chuang et al, 2020; Idrose et al, 2022
	Initiation of building works	Barten et al, 2019
	Conversion of ICU to receive unstable patients	Barten et al, 2021
	Mobilization of post-ED resources in anticipation of the arrival of additional victims	Chuang et al, 2020; Idrose et al, 2022
Adaptation		
	Decision made to use the AMU as the temporary ED	Barten et al, 2019; Barten et al, 2021
	Use of highly irregular resources to extend the treatment area [e.g. hospital lobby for patients from the incident]	Chuang et al, 2018a
	Use of meeting, storage & staff rooms in ED for burn patients who were less injured to flush wound areas by themselves	Chuang et al, 2018a
	Reactive break of standard operation procedures to "borrow" medical materials promptly from pharmacy inventory in several hospitals, or from an ICU in a hospital	Chuang et al, 2018a
	Reconfiguring space to deal with demand for ICU beds	Chuang et al, 2020
	Not only rely on contingency plans and checklists but needed to be able to improvise	Hugelius et al, 2021
	Change of staff task / roles to adapt to emerging situations	Moitinho de Almeida, 2022
	Enlisting the aid of law enforcement for security	Murphy et al, 2022

Hospital Status: Declaration of the status of the incident and activation (or not) of the hospital incident plan was frequently cited. The command team would also decide on whether to stand the incident down and consider a return to other non-incident related activity.

Command / Leadership: Establishing a command structure created an organisational framework to coalesce actions aimed at incident response. The hospital leadership team would seek to coordinate activity across the organisation. This involved liaising with other individuals / agencies both internally and externally, as well as communicating with and informing those involved in the response. Giving staff the information and authority to act independently was also undertaken by command teams.

Assessment: In addition to collating information from the areas affected, the command team would triangulate this data and interpret the impact and significance of events. The command teams reported actions related to existing patients and non-incident activity as well as the direct impacts of the incident itself.

Stabilising actions: Command teams made decisions around access to the organisation, patient flow within and away from the hospital, staffing and resource allocation.

Anticipation: Creating capacity within units to deal with potential demand.

Adaptation: These decisions focused on conversion of facilities to alternative uses, stepping outside of organisational norms and reorganising staff to deal with the new arrangements.

2.5   Discussion

The literature review was unable to find anything which specifically focused on decision-making by NHS tactical commanders during sudden onset incidents. The international literature reviewed, identified that commanders are faced with the need to take immediate stabilising action while dealing with discrepancies between a response plan developed in advance versus the reality on the ground. This has to be done under conditions of extreme uncertainty. They may be presented with a surplus of staff in key areas without the requisite skills or experience, a mismatch between resource requirements and availability and loss of normal functions due to patient surge or utility failures / decommissioning of premises. They are required to adapt standard operating procedures to address the new challenges. Whilst having a natural predisposition to reactive measures, they are required to anticipate future requirements or pressures in equal measure.

The evidence base however serves to give an 'outsider's' view of what issues the tactical commanders were facing and how they responded to them. Apart from the article on Medical Officers in Charge in Sweden, the literature was focused on broader aspects of organisations' responses and this review had to extract those elements relevant to the search topic. Consequently, there is an account of the types of issues that commanders were faced with, some of the decisions that they made but nothing regarding how they perceived the challenges and arrived at the actions that they did. The review did not provide any material as to how the commands made decisions nor how a diverse workforce with multiple versions of reality, arrived at the actions that they did. The use of international examples provides the opportunity for isomorphic learning but is limited in that it does not furnish the context of NHS command and control structures and doctrines, nor does it specifically distinguish between tactical and strategic command issues.

2.6   Limitations

This systematic review was undertaken by a single-handed researcher, and despite the mitigation of using a structured format for identifying and appraising papers combined with researcher reflexivity, there remains a risk of bias in the process. Articles may have been underpinned by a robust methodology and they may have been constrained in that the requirements of the publishing journal may have led to this being omitted. The expansion of the search to hospitals worldwide increased the number of articles but may have underplayed the role of hospital command due to a lack of awareness of international structures and terminology. Including both tactical and strategic aspects of hospital command may also have served to dilute understanding of the unique position of tactical commanders, however this serves to emphasise the limited body of evidence around tactical command in particular.

2.7   Conclusions:

The literature review offers valuable insight into how hospital teams respond to a major, sudden onset incident, but was limited in terms of the research rigour of the articles reviewed. Within the context of NHS emergency preparedness there remains no peer reviewed

evidence base around the issues that tactical commanders perceived they were presented with and how they sought to address them.

Studies of emergency planning and management in healthcare have identified that behaviours in emergencies (Lee, Phillips, Challen, & Goodacre, 2012) and decision-making processes during crises in healthcare are not fully understood, due to the dynamic complexity of incidents and the nature of the evolving and uncertain risks that are present (Boyd et al., 2014). The literature searches identified that there is no substantive body of research on decision-making by tactical commanders in NHS hospitals during major incidents. The broader evidence reviewed about hospital response suggests that regardless of differing levels of preparedness and variable integration of lessons identified into organisational practice, hospital staff respond to major incidents through changes in practice and switching of resources to deal with the presenting pressures.

Areas that required further investigation included:

(1) How the hospital tactical commanders, who may have a range of backgrounds and experience, perceived and implemented their command functions;

(2) How role clarity was obtained for commanders, who were faced with high levels of uncertainty and a significant potential for jeopardy. The impact of prior experience, training, or use of action cards on the day was unclear;

(3) The degree to which commanders implemented reactive and intuitive responses, or followed the normative models prescribed was also unclear;

(4) The strategic intent of decisions that the tactical commanders made, and whether they were seeking to actively manage the crisis by controlling the actions at operational level, or rather perceived themselves to be operating in a supervisory / advisory capacity and responding to actions taken by operational teams;

(5) The extent to which the tactical commanders sought to correct any actions taken by operational teams or accepted them 'uncritically' and dealt with the consequences;

(6) The perceptions of commanders on whether they were reacting to or directing events;

(7) The utilisation of structured assessments and the mitigation of any identified risks with operational commanders.

In view of the frequency with which it is reported that hospitals are required to deal with an event before it has been officially notified or declared as a major incident, in many cases it may be the case that the organisation has commenced its response to the incident by the time that tactical command has been established. Thus, rather than identifying and implementing a response to a defined threat, the challenge for a tactical commander may be one of understanding both the nature of the threat but also how the organisation has responded to that point, then deciding the best course of action in the light of both these factors and the tactical commander's understanding of what they are actually able to control within this situation.

Implications for the Research Design

There was no academic research work specifically on NHS hospital tactical commanders and their decision making. This gap in knowledge meant that there was no bespoke theory to support deductive research in this area. My research design sought to accommodate this and include some key lines of enquiry that were beginning to emerge from the general and systematic literature reviews that I had undertaken, and which are outlined above. The gaps in knowledge from the review that were explored in my research focused on two aspects. Firstly, the extent to which the six typologies of decisions / actions that had been identified were undertaken by tactical command rather than by other commands (if at all). Secondly the absence of knowledge about how decisions were taken by tactical command would be considered as part of the research.

Against the knowledge gaps within the literature, the essence of this research was to understand the lived experience of individuals in NHS tactical commander roles, the concerns that they had and how they sought to address them. This in turn framed the question for the research: During sudden onset critical and major incidents affecting NHS hospitals, what decisions are made by hospital tactical commanders, and how are they made? The aim was to use this information to construct a theory around NHS hospital tactical command.

Chapter Three: Research Methodology

Critical Appraisal and Justification of the Research Methodology Adopted

3.0   Introduction

This section seeks to explain how I selected my research methodology and then describe how I implemented this methodology within my research. It will provide a framework to describe the steps that I took to reach a decision around an appropriate methodology. This was a journey which started with ethnography, explored phenomenology, orientated towards grounded theory, and then, after a sojourn back in the realm of ontology and epistemology, finally coalesced around constructivist grounded theory. The process that I went through commenced with a 'toolkit' approach where I was searching for techniques that would deliver what I felt I wanted to understand. It evolved into a focus onto my own ontological and epistemological assumptions and a greater understanding of their effect on what and how I was seeking to understand the phenomenon being researched.

3.1   Nature of the Phenomenon being Researched

The literature review identified that decision-making by hospital tactical commanders during a sudden onset incident was a complex phenomenon and that little was known about it. A research methodology which would enable exploration in its natural setting, of why events occurred, what happened and what those events meant to the participants studied (Teherani et al, 2015) was required. These considerations shaped the identification of the methodology and methods used in the research.

Since this was a doctoral-level research programme, I felt that it was important to site this within the context of my own learning. This process of inquiry, reflection and reflexivity afforded me the opportunity to gain a new insight into what I was seeking to research and how my values and perceptions shaped the nature of the research. It is important for researchers to understand the key underpinning ontological and epistemological assumptions behind their work, and to further understand how the given assumptions determine their selection of an appropriate methodology and methods (Alharahsheh & Pius, 2020). A strong

methodological self-consciousness pierces taken for granted worldviews about unearned privileges such as those deriving from race, gender, social class and / or health (Charmaz, 2017). I was cognisant that the differing expectations regarding reality and knowledge that underpin a researcher's particular research approach, will be reflected in their methodology and methods (Scotland, 2012) and impact on the nature of data collection and analysis (Simpson et al., 2017). It was incumbent on me to examine data and data collection practices, in addition to what was done and how it was done, when analysing the data. Without this reflexivity there was the danger of methodological self-righteousness and 'methodolatry' whereby the method could be adhered to with unquestioning dedication (Charmaz, 2017) and could supersede all other facets of the research.

3.2   Ontology & Epistemology: Researcher's worldview and implications for the design of this research

Since ontological and epistemological positions directly impact the nature of data collection and analysis (Simpson et al., 2017), it is important to examine these within the context of my own values and assumptions. An ontology describes the researcher's view of reality, while an epistemology describes how researchers come to know that reality (Groen et al, 2017). Ontology is mainly concerned with the phenomenon in terms of its nature of existence (Alharahsheh & Pius, 2020). Ontological assumptions are concerned with the form and nature of reality (Annells, 1996), in other words, what is (Scotland, 2012). Epistemology is the philosophy of knowledge, or of how we come to know (Trochim, 2020). It is concerned with how a researcher is aiming to uncover knowledge to reach reality (Alharahsheh & Pius, 2020) and is concerned with how knowledge can be created, acquired and communicated, in other words what it means to know (Scotland, 2012).

From a personal perspective, I have an extensive background in operational management within the NHS and of responding to hospital incidents. My observations about what happens during a major incident inspired this research and a design was sought that privileged the participants but enabled these insights and experience to be explicit within the study. The opportunity to construct theory with participants had more resonance to me than an approach which sought to suppress or bracket this knowledge. Another factor influencing the

research design was my perception as an operational manager, that people interpret things differently and that there is never 'one version of the truth'. An institutional / managerial craving for compliance and conformity is frequently contrasted in practice with the reality of how staff legitimately interpret the nature of a request / instruction. As a manager, I feel my role is to be cognisant of what staff may need to hear about an issue rather than what a management team may perceive as the message. Linked to this is the view that flexibility rather than rigidity of approach is fundamental and a research design that emphasised this was implicit within this set of values.

Personal reflection about my own practice in the work environment has meant that I identify with a relativist ontology and a subjectivist epistemology. I recognise that I have oriented my professional modus operandi based upon fundamental assumptions that in dealing with a diverse workforce, one must accept that there are multiple versions of reality and that each person will view and interpret things in their own way. It was through the prism of this worldview that the research design was evaluated and chosen.

3.3   Structured Approach to the Research Process

There are different frameworks for approaching the design of any study. The research process has been described as consisting of four elements: methods, methodology, theoretical perspective and epistemology[7] (Crotty, 1998), while others focus on the concept of a research paradigm to define an approach or design (Ochieng, 2009) which is made up of ontology, epistemology, methodology and methods (Alharahsheh & Pius, 2020; Scotland, 2012). I found that the framework offered by research paradigms resonated with me, as the subcategories outlined above reflected the approach that I had taken through my reading and rationalising about an approach.

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[7] *Methods:* the techniques or procedures used to gather and analyse data related to some research question or hypothesis

Methodology: the strategy, plan of action, process or design lying behind the choice and use of particular methods and linking the choice and use of methods to the desired outcomes

Theoretical perspective: the philosophical stance informing the methodology and thus providing a context for the process and grounding its logic and criteria

Epistemology: The theory of knowledge embedded in the theoretical perspective and thereby in the methodology

(Crotty, 1998) p3

A paradigm, or worldview (Annells, 1996), is a basic belief system that a researcher holds to describe their ontological, epistemological and methodological assumptions (Groen et al., 2017). There are different paradigms and these range from four inquiry paradigms of Positivism, Post-Positivism, Cultural Theory and Constructivism (Annells, 1996) to the Scientific paradigm (Ochieng, 2009; Scotland, 2012), Interpretive / Phenomenological (Al-Ababneh, 2020; Scotland, 2012), Socio-Anthropological (Ochieng, 2009) and Quantitative research paradigms (Ochieng, 2009). Some observers have simplified the categories of paradigms into definitions such as Scientific and Interpretivist (Scotland, 2012) or Positivistic and Phenomenological (Interpretivist) (Collis & Hussey, 2003 in Al-Ababneh, 2020). This chapter will consider the Positivistic and Interpretivist paradigms to highlight some underlying assumptions and differences between epistemologies and will provide further context for understanding and appraising the research design that I adopted.

Paradigm Selection

The positivist research paradigm holds that reality as a true state of affairs can be ascertained by research and that the researched 'object' is independent from the researcher (Annells, 1996). It is a position that maintains that the goal of knowledge is simply to describe the phenomena that we experience. It is an empirical approach based on what can be observed and measured with the laws of cause and effect, discernible with the deployment of the scientific method (Trochim 2020) and seeks predictions and generalisations (Scotland, 2012). A deductive approach is used to postulate theories that may be tested (Trochim 2020). Positivism refers to something that is posited (i.e. something that is given) and knowledge is grounded firmly in that which is posited and is not arrived at speculatively (Al-Ababneh, 2020).

The ontological position of positivism is one of realism, whereby objects have an existence independent of the knower and a discoverable reality exists independently of the researcher (Scotland, 2012). Objects in the world from the positivist viewpoint, have meaning prior to, and independently of, any consciousness of them (Al-Ababneh, 2020). The positivist epistemology is one of objectivism (Al-Ababneh, 2020; Scotland, 2012). Meaning solely resides in objects, not in the conscience of the researcher, and it is the aim of the researcher to obtain this meaning (Scotland, 2012). Positivist research can be generalised to other

populations and it is replicable and reliable, since different researchers can record the same data in the same way and arrive at the same conclusions (Scotland, 2012). Criticism of positivism focuses on the ability to reduce complexity to simplicity through control of the given variables and generalisations in the research which ignore the intentions of individual players (Alharahsheh, 2020). Positivist research is not value free, as the research process is punctuated with value-laden judgments (consider the selection of variables, actions to be observed) while knowledge production is political, and refusing to consider the political connections of produced knowledge is in itself political (Scotland, 2012).

Interpretivism emerged in contradistinction to positivism, to understand and explain human and social reality (Al-Ababneh, 2020). It is more concerned with in-depth variables and factors related within a context, aiming to include richness in the insights gathered rather than attempting to provide definite and universal laws that can be generalised and applied to everyone (Alharahsheh, 2020). It focuses on a subjective and descriptive method to deal with complicated situations rather than an objective and statistical method (Al-Ababneh, 2020) and considers differences such as cultures, circumstances, as well as times leading to development of different social realities (Alharahsheh, 2020; Al-Ababneh, 2020).

The ontological position of interpretivism is relativism (Alharahsheh, 2020; Scotland, 2012), whereby reality is subjective and differs from person to person. The interpretive epistemology is one of subjectivism which is based on real world phenomena (Alharahsheh, 2020; Scotland, 2012). Reality is individually constructed and there are as many realities as individuals (Scotland, 2012). There are variations of interpretivism such as Hermeneutics, Phenomenology and Symbolic Interactionism with common qualities in research focusing on the consideration of the whole experience rather than certain parts of it, recognition of the influence of the researcher in the development of the research, exploration of humans' experiences in depth rather than considering generalised measurements or expectations as in the positivist paradigm (Alharahsheh, 2020). Interpretive methods yield insight and understandings of behaviour, explain actions from the participants' perspective, and do not dominate the participants (Scotland, 2012)

Implications for this research

Based on my ontological and epistemological preferences as well as the impact they had upon the nature of the research, I aligned with an interpretivist research paradigm rather than a positivist one. The positivist paradigm of inquiry represented an empirical and deductive approach whereas the interpretive paradigm aligned more to the relativist, inductive approach that I was identifying as being most appropriate to my research. I was seeking to undertake research in an area where there had not been any previous work to develop a theory of response by tactical commanders. I required a research paradigm which would enable an understanding of the lived experience of these commanders during an incident, the concerns that they had and how they sought to resolve them. I felt that an interpretive paradigm would offer greater ability to research these areas in a way to generate new understanding and theory. In turn this shaped the approach to the choice of research methodology that I adopted.

3.4   Selecting my Research Methodology

Methodology is the general research strategy that outlines the way in which a research project is to be undertaken (Allharahsheh, 2020) and should include the chosen approach, area of interest, population, sampling procedures, researcher's role and the process of generating, recording and analysing data (Achora & Matua, 2016).

From the systematic review and the questions that I sought to understand, the research was oriented towards understanding how people responded to a situation and why they acted as they did. It considered how they made sense of their reality in a particular set of circumstances, what their concerns were and how they reacted. An inductive approach was deemed appropriate for this research as it relates to the interpretivist philosophy and should be used when the aim is to collect data and develop a theory as a finding of the data analysis (Al-Ababneh, 2020). A deductive approach on the other hand was considered less applicable to my research. This is more linked to the positivist philosophy and designs a research strategy to test hypotheses (Al-Ababneh, 2020). As the literature search had demonstrated, there was no a priori hypothesis relating to hospital tactical commanders which would have allowed for a deductive approach.

In turn this influenced whether a quantitative or qualitative methodology was used. There are some fundamental differences between qualitative and quantitative research which lie primarily at the level of assumptions about research (epistemological and ontological assumptions) rather than at the level of the data (Ochieng, 2009).

Quantitative methodology generates knowledge by investigating things which can be measured in some way (Al-Ababneh, 2020) and these methods facilitate the testing of prior theory rather than constructing new frameworks (Ochieng, 2009). A lot of quantitative research tends to be confirmatory and deductive, whereas much qualitative research has the approach that the best way to understand any phenomenon is to view it in its context, and is inductive in nature, building abstractions, concepts, hypotheses, and theories from the data (Ochieng, 2009). Qualitative research involves the collection, analysis, and interpretation of data that are not easily reduced to numbers and which relate to the social world and the concepts and behaviours of people within it (Anderson, 2010). It aims to provide specific understanding to a phenomenon based on the ones experiencing it with less generalization (Allharahsheh, 2020), thereby increasing understanding of why things are and the way they are in the social world, and why people act the ways they do (Al-Ababneh, 2020).

Within qualitative research, the researcher is seen as the primary instrument for data collection and analysis (Ochieng, 2009), and the underlying approach requires detailed observation, explanation and an attempt to study the whole situation. This is in order to evaluate the complexity and ensure that their conclusions take account of both unique and general factors (Ochieng, 2009). It has been argued that whereas quantitative research might offer some idea of the extent of a problem or issue, it is only qualitative research that will offer the kind of insights that might indicate what needs to be done (Bryant, 2021).

I decided upon a qualitative research methodology for this project, as it is well suited to understanding phenomena within their context (Bradley et al, 2007) and focusing on understanding the behaviour, values and beliefs of people from the perspective of the people themselves (Bryman & Becker, 2012). Qualitative research affords flexibility to uncover participants' meaning and interpretations rather than imposing the researcher's own

understandings, while the inductive nature of its approach enables theory and concepts to be generated and refined during the process of data collection rather than at the outset (Bryman & Becker, 2012). Qualitative methods enable subtleties and complexities about the research subjects and / or topic to be discovered that are often missed by more positivistic enquiries (Anderson, 2010). In view of my motivation for the research and the recognition that I had experience in the research area, a more active role for the researcher was sought. A key factor in the selection of the research methodology was the degree to which it incorporated the role of the researcher, their interpretation of data and construction of theory with participants' contribution to data analysis and the development of theory.

3.5   Choice of Methodology

Having decided that qualitative research afforded 'best fit' with the purpose of my research, several methodologies were considered before the final choice. Discourse analysis was discounted as its focus on how individuals accomplish personal, social and political projects through language (Starks & Brown Trinidad, 2007) did not match the key aim of the research, which was to understand the concerns of individuals and how they addressed them. Phenomenology and grounded theory afforded opportunities to understand participants' stories within the environment in which they take place. A review of outcomes of studies using each methodology identified that I was seeking to inquire about how social structures and processes influence how things are accomplished through a given set of social interactions, rather than the meaning and common features of an experience (Starks & Brown Trinidad, 2007). Grounded theory afforded the opportunity to use a flexible and systematic method of simultaneous data collection and analysis to inductively generate theory that is grounded in the data and which provides a description of the phenomenon being studied (Achora 2016; Groen et al, 2017). The grounded theory approach is well suited when little is already known about the area being researched (Simpson et al., 2017). It differs from descriptive qualitative research in that researchers do not begin with preconceived assumptions but seek to systematically generate theory from the data through an overarching framework that enables researchers to explain why things happen, by collecting data for comparative analysis, developing conceptual categories and properties from the data, and then generating a theory (McCann, 2018).

3.6   Grounded Theory

Grounded theory is a systematic method of conducting research that shapes collecting data and provides explicit strategies for analysing them (Charmaz, 2020). It is a largely inductive method of developing theory (Higginbottom & Lauridsen, 2014) that seeks to distil issues of importance for specific groups of peoples, creating meaning about those issues through analysis and the modelling of theory (Mills et al, 2006). The overriding stated objective of using grounded theory is to generate emergent theories from the data that account for the data (Charmaz, 2008b; Conlon et al, 2020) and which identify and explain what is happening in a social setting (Roberts, 2008).   It investigates the process of a phenomenon and seeks to show potential explanations and underlying mechanisms to identify why the phenomenon may be occurring (Groen et al., 2017).   In making processes explicit, grounded theorists study actions as well as meanings and show how they are connected (Charmaz, 2020). It enables researchers to generate conceptual categories about poorly understood phenomena and present findings in a manner that has scientific merits, ensuring that the developed theory is acceptable to and resonates with readers, leading to a better understanding of the phenomenon investigated (Achora, 2016). It does not aim to provide full individual accounts as evidence; rather, it seeks to move a theoretically sensitive analysis of participants' stories onto a higher plane while still retaining a clear connection to the data from which it was derived (Mills et al, 2006).

Common Features of Grounded Theory

An outline of the common themes and research practices in grounded theory is included in Appendix 7. This outlines the four strategies of coding, memo writing, theoretical sampling, and theoretical saturation, which form the defining features of the method (Charmaz, 2008a; Charmaz, 2008b).

Different Types of Grounded Theory

There are different types of grounded theory, and three main types were considered for use in this research: classic grounded theory influenced by Glaser and Strauss, evolved grounded theory under Corbin & Strauss and constructivist grounded theory advocated by Charmaz (Achora, 2016; Hunter, 2011; McCann, 2018). Appendix 8 outlines a selection of views of the key differences between these approaches. While there are idiosyncrasies between the approaches including philosophical perspectives, paradigm of inquiry, intended product, theoretical underpinnings, procedural stages and claims of rigour (Annells, 1997), the differences are not so much in the methods, but rather in their overarching goals and their perspectives of the nature of reality (Higginbottom, 2014). The understanding of grounded theory method is partly dependent on an awareness of the method's ontological, epistemological, and methodological perspectives; the traditional symbolic interactionist theoretical underpinnings; and the identification of the relevant paradigm of inquiry within which the method resides (Annells, 1996). Grounded theorists who adhere to different versions of the method can use the strategies of coding data, memo-writing, theoretical sampling, and sorting, but how they use these strategies differs according to their epistemological assumptions (Charmaz, 2017; Charmaz, 2020).

Consequently, when selecting an approach to grounded theory, I was aware of the need to consider my own worldview and ensure there was congruence between it and the chosen methodology (Higginbottom, 2014). This involved reviewing the key methodological components underpinning each approach and considering which grounded theory approach supported my research aims; how I saw myself interacting with participants and the data; what my values were as a researcher, and how they influenced my work (Groen et al., 2017)

In deciding on which variant of grounded theory to use, I found that the process of decision-making as outlined in the flowchart in Figure 3 was helpful. I had undertaken a preliminary review of literature, saw myself as taking an active role in data collation and analysis and preferred a less structured approach to data analysis. This oriented me towards a constructivist grounded theory approach. I still wanted to understand the ontological and epistemological foundations of the different types of approach before making a final choice.

Figure 3: Flowchart to guide the choice of grounded theory approach

If you choose grounded theory, consider which approach to use. Main options include:

- Glaser's classical or traditional approach
- Corbin and Strauss's more structured approach
- Charmaz's constructivist approach

Methodological considerations to guide your decision:

Do you have a specific research question?

Yes
The research question arose from personal experience, literature, or may emerge from the data

→ Consider Corbin and Strauss or Charmaz

No
The research question will emerge from the data

→ Consider Glaser

Will a preliminary review of literature be conducted before collecting data?

Yes
To enhance theoretical sensitivity, conduct a preliminary review of literature before collecting data

→ Consider Corbin and Strauss or Charmaz

No
Delay the literature review until after data collection and analysis

→ Consider Glaser

Will you have a passive role in data collection and analysis?

Active
Adopt an open and questioning mind, but retain a rational stance

→ Consider Corbin and Strauss

Active
Co-construct the data with the participant

→ Consider Charmaz

Passive
Be independent and restrained in the research process

→ Consider Glaser

Do you prefer a more or less structured approach to data analysis?

More structured: open, axial and selective coding, using a systematic matrix to develop a theory

→ Consider Corbin and Strauss

Less structured: flexible coding guidelines highlight the influence of the researcher

→ Consider Charmaz

Least structured: substantive and theoretical coding to develop a theory

→ Consider Glaser

Follow the guidelines of your selected approach, conduct the study and publish the results

(Polacsek et al, 2018)

Understanding the differences between grounded theory methods

Glaser and Strauss, while challenging accepted views around objectivity, validity, reliability and replicability (Charmaz, 2020), maintained a positivist worldview with a realist ontology and an objectivist epistemology (Groen et al., 2017). Objectivist versions of grounded theory assume a single reality that a passive, neutral observer discovers through objective (Groen et al., 2017), value-free inquiry (Charmaz, 2008a). The role of the researcher is discounted as the knowledge is not mediated by their interpretations (Mahé, 2019) and theories are 'discovered' rather than 'constructed' by the researcher and participants (Bryant, 2021). The positivist perspective emphasizes the importance of maintaining strict, systematic adherence to the methodological process which will produce a generalized, explanatory theory of a process, action, or interaction that intends to transcend time and context (Groen et al., 2017). Assumptions of objectivity and neutrality make data selection, collection, and representation unproblematic and a 'naive empiricism' (Charmaz, 2008a) results, whereby possibilities of partial, limited, or missing data and multiple readings of them remain unseen (Charmaz, 2008a).

Corbin and Strauss took a flexible approach to grounded theory (Charmaz, 2020) and moved to a relativist ontology, whereby 'truth' was isolated to be the prevailing consensus at any time regarding multiple perspectives of a phenomenon (Annells, 1996). In addition, they prescribed procedures as a path to qualitative success (Charmaz, 2020). For both this approach and that of classic grounded theory it has been claimed however that the residues of an epistemology of positivism are evident since both share basic premises about an external reality, the discovery of provisional truths in this reality, the neutral role of the observer, and an unproblematic representation of research participants (Charmaz, 2020). Approaches to quality have many similarities in all grounded theory study (Appendix 9) however positivist definitions of good research would look for theories that seek causes and that stress explanation, prediction, generality and universality. This would contrast with criteria for constructivist grounded theory which focuses on credibility, originality, resonance and usefulness (Groen et al, 2017; Charmaz, 2020; Giles, 2016)

Constructivist grounded theory is underpinned by a relativist ontology with a subjective and interpretivist epistemology and reality is perceived as constructed by individuals and exists in

multiple forms (Groen et al, 2017). Rather than assuming that theory emerges from data, researchers construct categories of the data and aim for an interpretive understanding of the studied phenomenon that accounts for context (Charmaz, 2008a). Constructivist grounded theory positions the researcher as an active participant in the research, as opposed to an objective observer (Simpson et al., 2017) and their positions, privileges, perspectives and interactions affect it (Charmaz, 2008a) and need to be made explicit (Charmaz, 2008b). This approach sees participants' views and voices as integral to the analysis and the researcher and researched co-construct the data (Charmaz, 2008a; Simpson et al, 2017). The result of this research is a theory that sophisticatedly describes an explanation of a process, action, or interaction as situated within time and context (Groen et al., 2017), and increases our awareness of the relativity of the empirical world with its multiple realities and multiple views of our analyses and of our methods (Charmaz, 2017).

3.7   Methodology Selected

I felt that constructivist grounded theory was most appropriate variant for this study. The aim was to focus attention on the underlying social process that might be occurring during a major incident which may not be immediately apparent, but which emerges over time as the data is analysed and theorising begins (Gardner, 2012). This methodology acknowledged that researchers cannot separate themselves and their experiences from their research and that the findings are interpretations of multiple realities co-constructed by the researcher and the participants (Higginbottom, 2014). The application of constructivist approaches enables researchers to ensure reciprocity between themselves and participants, which means the theory generated is grounded in their and participants' experiences, while the ability to address power imbalances between participants and researchers, results in theory that reflects participants' experiences (Hunter, 2011). This methodology does not support the original intention of lessons learnt that could be deemed universal and generalised to all hospitals, however reflection on the ontology and epistemology underpinning the approach identifies that the value comes from resonance and usefulness that the research would have for other hospitals.

3.8   Research Methodology: From Theory into Practice

This section outlines how the fieldwork and analysis was undertaken within the context of constructivist grounded theory methodology. It demonstrates the process used towards constructing and refining the emergent theory.   It describes how an initial literature review and theoretical sensitisation was undertaken, followed by purposive sampling and data collection via semi-structured interviews. Coding and categorising of data using initial and focused coding then led to theoretical sampling and further data collection. Throughout this process, memos were written to capture conceptual ideas (Elliott & Higgins, 2012) and provide an audit trail of the intellectual journey (Achora & Matua, 2016). In the final step of this analysis, the focus shifted from exploring to summarising (McCann & Polacsek, 2018; Polacsek et al, 2018) and the construction of a well-integrated and comprehensive grounded theory to enable explanation (Achora & Matua, 2016) of the concerns of tactical commanders and how they addressed them.

3.9   Systematic Review and Theoretical Sensitisation

At an early stage of the research pathway, as outlined in Chapter 2, a structured literature review was undertaken with a primary focus of identifying whether this area had been subject to any (published) research. This revealed a dearth of published material on the role of tactical commanders during critical and major incidents. A further structured review was undertaken later in the research as part of the theoretical sensitisation phase which is included in Chapter 5. This explored themes around complexity and complex adaptive systems that were coming through in the field work and focused coding, and it was important for the theoretical development to understand how hospitals as complex adaptive system would respond to sudden unexpected pressure.

Differing views on the role and timing of the literature review in grounded theory are well documented (McCann & Polacsek, 2018). A review undertaken before the research may lead to contamination of the theory with conceptual ideas being conjectured from the literature and superimposed, as opposed to emerging from the data (Elliott & Higgins, 2012).   My research methodology justified this on the basis that constructivist grounded theory accepts that researchers will have knowledge and experience before they enter the field and in order

to minimise the potential for these to influence the research, it is recommended that a stepped approach is adopted. This involves a preliminary review of the literature to contextualise the area of investigation and support the rationale for research, which is followed by a later, focused review of literature concerning unpredicted concepts that have emerged from data analysis (McCann & Polacsek, 2018; Straughair, 2019). In this research, once the construction of theory had started it was felt appropriate to undertake a further systematic review to support the emerging themes.

3.10   Ethics Approval

As part of the ethics approval, any hospitals where the incident was terrorist-related were excluded, as my planning assumption was that these would have been investigated thoroughly by multiple authorities and be sensitive areas for hospital staff. The research proposal was approved by the University Research Ethics panel in November 2020. In order to undertake research in the NHS using staff as participants it was necessary to obtain approval from the Health Research Authority, Health and Care Research Wales and NHS Scotland (Appendices 10, 11 & 12). The NHS process was undertaken using the IRAS system and required hospital sponsorship as well as additional training around governance practice. Several amendments were requested, particularly around the wording in the Participant Information Sheet linked to data protection and contact details. These changes were then confirmed with the Chair of the University Research Ethics Panel to ensure that this did not invalidate the University approval.

The initial application had to provide a list of hospitals that would be contacted. As the research progressed and additional hospitals were identified, an extension submission had to be made to the HRA to amend the original proposal (Appendix 13). This was processed quickly using the e-system and did not lead to any delay. Three further amendments were made to the HRA (and one to the University Ethics group) which extended the number of hospitals to be included and expanded the remit of the research to include 'Critical' as well as Major Incidents. This latter was because many tactical commanders reported that at the start of the incident, they were unaware as to whether it was a critical or a major incident hence their initial actions were valid for either type of incident.

3.11   Profile of participants and incidents

Purposive and Theoretical sampling: Initially Grounded Theory starts with recruitment of participants using purposive sampling with predetermined criteria (McCann & Polacsek, 2018; Polacsek et al, 2018). For this research I undertook purposive sampling as there was only a small number of hospitals who had experienced a major incident and an even smaller number where I was able to gain access to the tactical commander during the incident concerned. Theoretical sampling refers to sampling focused on recruiting participants with differing experiences of the phenomenon, so as to explore multiple dimensions of the social processes under study (Achora & Matua, 2016; Starks & Brown Trinidad, 2007). The object of theoretical sampling in this research was to access further instances of where themes identified in initial data, whereby any new instances should be compared and contrasted with existing examples to enable these themes to be explored and elaborated fully (Hodkinson, 2008). It was an iterative process with decisions regarding the number and attributes of participants based on categories that were developed from the data (McCann & Polacsek, 2016). This approach continued until saturation was reached, when no new categories were identified (Polacsek et al, 2018) and the complete range of constructs that made up the theory were fully represented by the data (Starks & Brown Trinidad, 2007). This category-driven approach to sampling was particularly important when studying an area where little research had been undertaken, as it enabled the research to explore issues from different angles (McCann & Polacsek, 2018]

Sample sizes are reported as being between 10-60 participants (Starks & Brown Trinidad, 2007) with a narrower band of 20-35 participants also being cited (Polacsek et al, 2018). It is important to remember that theoretical sampling does not mean representative, but that it is an exploration of themes identified in earlier data analysis (Hodkinson, 2008). In this respect, while grounded theory is primarily an inductive methodology, in that it commences with the data and builds a theory based on the systematic analysis of the data, there is a deductive element as one theoretically samples, with deduction primarily in the service of induction (Elliott & Higgins 2012).

3.12   Recruitment of Participants

Hospitals were identified by a variety of routes which included direct experience by the researcher, Emergency Planning Resilience & Response reports and news accounts. Initial contact with the hospitals was made via each Trust's Research & Development Department. As part of this dialogue, contact details of the organisations EPRR manager would be requested, and they would be used as the point of access. The EPRR managers would be asked about the incident and invariably would offer to circulate material to people who had been involved in a command function, to see if they would be willing to be consider being involved in the research. Where these names were shared, a formal request would be sent by email which contained a participant information sheet and a consent form (Appendices 14 & 15).   Potential participants were then asked to confirm their willingness to participate and to provide some dates for interview.

Participant recruitment was an area of difficulty in this research. This was less about organisations refusing access but reflected responsiveness and willingness to engage at individual level. For the 13 interviews in this thesis there were a further 24 contacts made at other hospitals where the contacts did not participate in the research. Factors in this could include concern by tactical commanders about implicit criticism of their actions and the implications of restrictions imposed by the Covid pandemic. The research had to be undertaken remotely due to infection control measures, whereas the original intention had been to visit research sites and have a greater presence, which may have supported participant recruitment. Against this background, in terms of future research design, I would review the 'marketing strategy' for the research. The publicity used at research sites was quite low key in that I would contact key people within each organisation and work with them to identify and recruit participants. In future, I would plan for a greater emphasis on the use of a range of media in each hospital to publicise the research and invite people to participate. This would be by liaison with each organisation's staff communications function and seeking to access the range of media that each organisation uses. This would serve the purpose of creating a permission culture whereby the work would be seen to have organisational endorsement while still emphasising the confidentiality for participants.

3.13   Data Collection:

Several forms of data collection are acceptable in grounded theory research (Polacsek et al, 2018). These may be qualitative or quantitative, and can include interviews, written log entries, inventories, participant observations and surveys (Achora & Matua, 2016). Throughout, the underlying assumption is that the interaction between the researcher and participants produces the data and, as a result, the meanings that the researcher observes and defines (Cooke, 2014).

For this research interviews were used as the primary method of data collection. Interviews are a flexible and useful method of data collection and are especially appropriate for collecting information on participants' experiences, beliefs and behaviours (Ryan et al, 2009), although there must be attention paid to the potential for interview bias in the interview itself. The interviews were conducted by the researcher and were recorded (with the agreement of the participant). They were undertaken remotely via Microsoft Teams due to restrictions on face to face contacts imposed as a result of dealing with Covid-19. When participants were interviewed, they would be in their offices or rooms at the hospital concerned. Taking people outside of their natural setting for the purposes of interviewing may lead to bias due to the artificiality of the setting, which breaks the connections between natural environment and impacts on cognitive and attitudinal behaviour. There is a counterbalance to this however, in that removal of participants from their natural environment may be useful in subjecting them to verbal stimuli which are different from those in their normal settings (Hammersley & Atkinson, 2007). In this case, it was felt that using MS Teams was in some respects a normalised behaviour in exceptional circumstances, but one with which participants would have been distinctly familiar.

The individual interviews were semi-structured in that there was a list of issues to cover but a reflexive approach was used in that the researcher was an active listener, allowing the discussion to flow in a more natural way than a structured interview (Hammersley & Atkinson, 2007). The interview style included directive and non-directive interventions (Appendix 16). Interviews commenced with relatively unstructured, neutral interview questions which

permitted participants to talk freely about their issues and concerns, thereby enabling an inductive approach to the research (Elliott & Higgins, 2012).

Constructivist research requires a transformation of the participant / researcher relationship, and for the researcher to prioritize and analyse the interaction that occurs between the two. Interviews are not considered neutral, context-free tools for data collection, rather, they provide the site for active interactions between two people leading to results that are both mutually negotiated and contextual (Mills et al, 2006). Strategies to support the researcher and participants to a more equal sharing of power include one to one interviews (Polacsek et al, 2018), using a relatively flexible and unstructured approach to questioning so that participants assume more power over the direction of the conversation, sharing the researcher's understanding of the key issues arising and assuming an open stance towards the participant (Mills et al, 2006).

As the study progressed and categories began to be developed, questions aimed at identifying properties of categories were identified and explored in subsequent interviews. In this way, the interviews gradually became more focused as the emerging concepts determined both the questions asked and the development of a theoretical sample (Elliott & Higgins 2012). I moved from an approach which focused heavily on the questions that had been written in advance, to a style that enabled me to focus more on the participant and pursue themes as the emerged in the interviews. This shift in emphasis from a researcher-centric stance to a more participant-centric one was iterative and reflected my development from seeking to 'transact' an interview to that of engaging with participants.

Other Methods to gather data that were considered / used:

Focus Groups Interviews: As part of the research design and approval process, it was intended that should the opportunity arise to gather several members of the tactical command from the same site, then focus groups would be considered. These would seek to have 6-8 participants, since if too small, there might be less interaction and challenge, and if too big, the involvement of quieter members could be deterred and management of the discussion and transcription of the data could be difficult (Plummer, 2017).

Focus groups create different dynamics and involve a combination of interviewing, group interaction and participant observation. This has the potential to generate new insight into participants' concerns by allowing challenges and interplay on ideas from within the group as well as enabling staff who may be reticent to contribute on an individual basis to take part (Brandrud et al, 2017; Plummer, 2017; Jayeskara, 2012). Focus group interviews would be used as a test of congruence with other data sources and would constitute part of the process of validation (Fielding, 2009). They would not be designed to achieve consensus, however, but rather to elicit a range of experiences, views, ideas and attitudes on a defined topic (Plummer, 2017; Jayeskara, 2012). In view of the difficulty experienced in recruiting participants to the research and the perceived concerns about hospitals and individuals being identified, I decided that this could potentially alienate the research participants. The intention is to send them any articles which may be developed from this research and seek to engage them in any follow up studies which may be undertaken.

Document Analysis:

I included analysis of four documents as part of the field work. Two of these were hospital debrief reports written after the incident for the purposes of enabling the hospital concerned to review the incident and identify any lessons, with the other two sets of documents relating to contemporaneous notes from the incident log. There was no privileging of documentation based on provenance, particularly as to whether it had 'official' status, or was in the public domain. All classes of data have their problems and all are produced in a social context so they had to be considered with a view as to who has produced them, how they were meant to be read and for what purpose (Hammersley & Atkinson, 2007).

3.14 Transcription:

I transcribed the interviews, initially using the transcription facility on MS Word. I quickly reverted to direct transcription however, since the phonetic interpretation of the spoken words represented more editing time than directly inputting the wording. This process took approximately 1 hour of transcription for every 10 minutes of interview dialogue. Although it was labour intensive, the process of transcription afforded an opportunity to revisit the

interview word by word and reflect on issues such as tone, intonation, emphasis, pauses and what meaning could be constructed.

Thirteen interviews were undertaken with all of them coded and included in this thesis. The process of data collection ran alongside that of analysis and became gradually more focused as the project progressed. Initially data was collected in relatively open and non-prescriptive manner avoiding the imposition of a preconceived theoretical framework. Analysis was started at a very early stage and the process of data collection shifted from its initial exploratory focus toward something deliberately designed to investigate emerging theoretical concepts or possibilities (Hodkinson, 2008). The aim of generating data in grounded theory is to provide an analytical framework, rather than obtain a detailed description (Achora & Matua, 2016), and in many respects, the approach taken is one of data generation as opposed to data collection (Mills et al, 2006).

3.15   Coding & Categorising Data: Initial & Focused Coding

The conceptualisation of data is the foundation of a grounded theory and it is through coding that theory is developed (McCann & Polacsek, 2018) and built up from the ground (Hodkinson, 2008). Coding is the fundamental way in which researchers identify and name concepts, before reducing them to develop categories (McCann & Polacsek, 2018). In grounded theory, coding is a cyclical process during which the researcher moves back and forth between different phases of coding throughout data collection and analysis (Polacsek et al, 2018). Each line of data is given as many classifications as possible (Hodkinson, 2008), with modification and verification throughout the data collection and analysis phase (Elliott & Higgins, 2012). In this way, conceptually similar incidents are grouped together to form categories and sub-categories (McCann & Polacsek, 2018), with further reduction of categories into broader, more theoretical concepts (Hodkinson, 2008).

I stated the initial coding using the NVivo system to record findings. Despite feeling confident in using the system after online training, I had concerns about the ability of the IT system to back up the work that I was doing on the NVivo system. Consequently, I constructed a bespoke qualitative database on Excel, using many of the principles identified within NVivo.

This process enabled the codes to be set against data and aggregated into focused and theoretical coding. Whilst the use of Excel removed many of the in-depth features for analysis that were in a dedicated qualitative analysis system, to me it represented a more secure vehicle to undertake the initial analysis of the transcriptions.

Once the initial coding had been completed on the interviews and the hospital incident notes, there were 1,113 lines of coded data. Figure 4 gives an example of the coding layout.
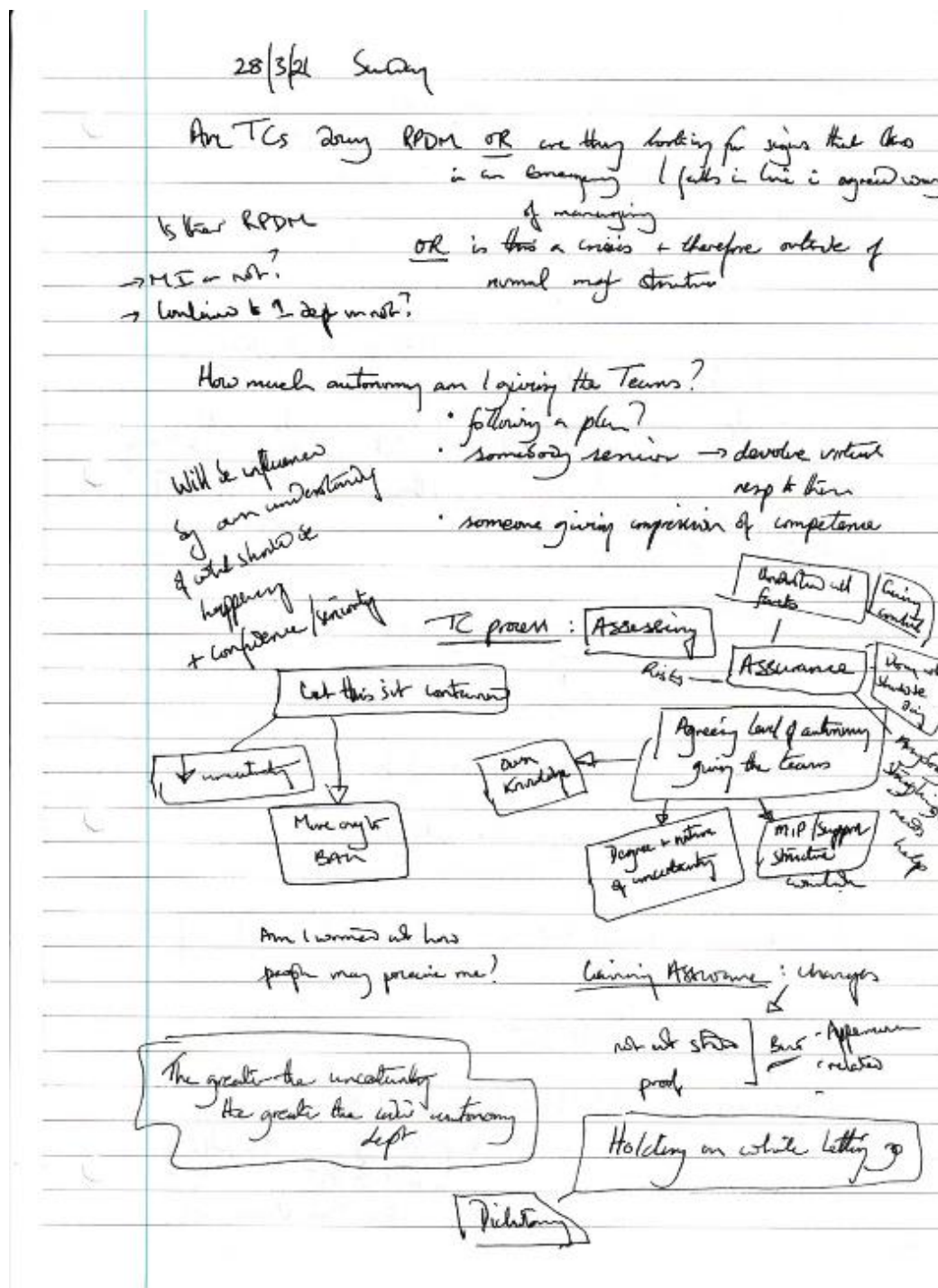
Figure 4: Example of coding

Focused Coding	Particip	Initial Coding	Quote
1	PN1	Hearing after the event	I didn't get a call until 7:30 which is 45 minutes after the event and the Ops Centre were calling me, just as information really, that the...this gent had been injured, the police were on site, everybody knew on the wards to, to lockdown and that everything was in order.
1	PN1	Informing for information only	I didn't get a call until 7:30 which is 45 minutes after the event and the Ops Centre were calling me, just as information really, that the...this gent had been injured, the police were on site, everybody knew on the wards to, to lockdown and that everything was in order.
1	PN1	Hearing after the on-call director	The director on call just happened to be acting up for N**, the COO on the day. She was already on her way into work she'd been alerted before myself, just because of like she just happened to be the COO for that day as well.
3	PN1	Thinking of risks	And then I was saying like, from manager on call but also from community kind of thinking, ok the wards are in lockdown but what about our staff teams that will be coming into empty offices that this intruder might be hiding now.
3	PN1	Reflecting on broader issues, next steps	So I spoke to various team leads just to say can you put some communication out as discreetly as you can, to kind of like say be vigilant as to like people going into the office areas that this knife man might be hiding in.
5	PN1	Informing teams	So I spoke to various team leads just to say can you put some communication out as discreetly as you can, to kind of like say be vigilant as to like people going into the office areas that this knife man might be hiding in.
5	PN1	Advising discretion	So I spoke to various team leads just to say can you put some communication out as discreetly as you can, to kind of like say be vigilant as to like people going into the office areas that this knife man might be hiding in.
9	PN1	Hearing 2nd hand that the incident had been stood down	And then about, that took about half an hour calling people but probably about 10 past 8, something like that, one of the team leads called me to say the alert been stood down because it was no longer a threat to anybody, that the person, you know there wasn't an intruder on site, it was a self-harm incident.
9	PN1	Reflecting later on information cascade	So the failure in the decision-making was how did this information go out as 222 but also there was no...the lockdown policy of stopping people going in and stopping people going out wasn't activated.
5	PN1	Identifying assumptions	So, in the debrief we were trying to say obviously it's a no blame situation, but at the same time because we thought at that moment in time there was an intruder on site, we should have activated the lockdown policy
16	PN1	Not thinking things through	So the Ops Centre didn't know really why that hadn't happened.
16	PN1	Ops room going into panic	I think it was just going into panic and I think M*** H***'s trying to look now as to how we might test a similar scenario out in the future.
16	PN1	Omitting things	So no, it doesn't happen very often but staff teams on site didn't think about this, so yeah, so that was another incident where really security should have been on the front door saying go back to your cars and we'll call you in when it's safe, rather than coming in.
17	PN1	Dealing with uncertainty	Cos we didn't know what the threat was at that time, we could have put somebody else in danger.
9	PN1	Being unaware of actual next steps / being out of the loop	There was a decision then later in the day not to communicate internally or externally. I don't know whether that was the acting COO on that day, but the Express & Star were contacting the communication team by mid-morning to say they understood that there had been a knife man on site
9	PN1	Dealing with calls relating to the incident way after the event	When I've got calls later in the day to say that there was three knifemen on site and they were hovering outside Ward 17 and was that correct? No.
16	PN1	(Rapid) escalation into over-exaggerated / over-embellished	so I think like, that, that the rumours start, the jungle drums start beating and it kind of like gets turned into something that isn't. So yeah, communication wasn't great from a switchboard point of view, or like how that information management or that communication later in the day, yeah there wasn't anything.
18	PN1	Thinking of the staff involved	And then the only other thing, like to wrap up was kind of like, that we need to debrief the staff team that know this member of staff and how it would affect them around his well-being and also the housekeeper that he approached, because then knowing that he was self-harm rather than being attacked put her in quite a vulnerable position coz she was trying to help;
16	PN1	Being told 'for information'	So, they're just telling me is information, so, so yeah, they called me and just to say, just to let you know because you were the on call manager at the moment in time
12	PN1	Just by chance – due to time and on call rota	Again, is it me, does it end at eight o'clock in the morning? At the weekend we know its eight o'clock but at the moment in time when this incident occurred I was manager on call,
16	PN1	Matter of fact briefing	so at the point of ringing me they were ringing me for information: this has happened and you were manager on call, director has been informed she's on her way in, police are here, security are on the case, that the gentleman who's been stabbed is in A&E, he's been treated, it's not life threatening, just a matter of fact kind of scenario rather than yeah any decision-making.
12	PN1	Not perceiving request(s) for help from the Ops Centre	so at the point of ringing me they were ringing me for information: this has happened and you were manager on call, director has been informed she's on her way in, police are here, security are on the case, that the gentleman who's been stabbed is in A&E, he's been treated, it's not life threatening, just a matter of fact kind of scenario rather than yeah any decision-making.
9	PN1	Communicating with the hospital site	yeah it was S***, so it was the manager, the night practitioner from the Ops Centre
12	PN1	Becoming aware of the involvement of other managers	she'd been the one on the night, yeah yeah. M***** was on for the day and M***** had contacted R******. So R****** was in the ops centre, so I was told as well that R****** was in there as well; so when we did the debrief, so I said to R******, why did they call you, why were you in the op centre?
16	PN1	Dealing with local initiatives on site regarding escalation an	said, so I decided to go to the Ops centre as the safest place for her to be, so yes she was in the room where I don't know where I was an afterthought, I don't know but, erm, so yeah, so I didn't make any decisions

Constant Comparison: Throughout this work, there was constant comparison with earlier interviews and the construction of codes and ascribing of transcript to these enabled the refinement of the initial coding into focused codes. The simultaneous collection and analysis of data is fundamental to grounded theory (Cooke, 2014; Polacsek et al, 2018). Constant comparison involved constantly comparing units of data to their predecessors to determine if they were similar or different in meaning (Achora & Matua, 2016; McCann & Polacsek, 2018; Polacsek et al, 2018). There were four stages of this analysis which required me to compare incidents that apply to each category; integrate categories and their properties; delimit the theory; and write the theory (McCann & Polacsek, 2018). The constant comparison drove the theoretical sampling and the ongoing data collection (Achora & Matua, 2016; Higginbottom & Lauridsen, 2014; McCann & Polacsek, 2018; Polacsek et al, 2018) in that

interview themes with new participants were shaped by the emergent categories from the data analysis. This in turn enabled the development of focused coding whereby I sought to find a way of interpreting the inductive data in ways which felt credible to the experience of participants and useful in understanding their lived experience. This process continued until the data were saturated (Achora & Matua, 2016).

Theoretical Memos: While this was in progress, I created memos which identified the thinking and ideas that I was generating (Figure 5). I used the memos as the opportunity to explore emergent themes and be reflexive in that I could challenge my observations and ideas with the insights gained from each interview. The process of creating memos allowed exploration of emergent insights and supported the construction of focused codes and emergent theory. Memos are notes made by researchers to record and explicate the theory as it is developed (McCann & Polacsek, 2018) and 'memoing' is fundamental to the development of grounded theory (Hunter et al, 2011; McCann & Polacsek, 2018). It is an ongoing activity that captures conceptual ideas (Elliott & Higgins, 2012) and tracks the development of the substantive grounded theory from start to finish, and the more consistently a researcher produces memos, the easier it is for others to follow their intellectual journey (Achora & Matua, 2016). Memo writing makes clear the multiplicity of influences in the reconstruction of theory and is essentially a reflective process that also provides the researcher with an opportunity to remember, question, analyse and make meaning about the time spent with participants and the data that were generated together (Mills et al, 2006).

Figure 5: Examples of Memos

08/06/21

P1

Capacity   Capability

Have I got the time   Do I have the   Do I have the   Do I have
to micro manage   Knowledge   certainty   the discipline
you?   not to
                                                  manage you

↓   ↓   ↓

[Sense maker for the org (initially)]   [Coordinator function based on exception reporting]   Direct/Indirect permission-giver

                                                  [Direct request | Approval | Letting them run but not reporting]

[Role of comms in sense-making + reassurance]

Hard + Soft intelligence
     |
     visual   ≠ micro manage
STREPS   cues

                                 (≠ have training / Prior experience @ID)

TC: Is there a role to mitigate some of more
over-zealous responses rather than dusting
them

                                            (If not really train
                                             people or allow
                                             any ses
                                             ∴ ≠ expect

(H) = In a complex org is response to m_I to devolve
     resp to lowest tiers + then track to manage
     the consequences
         mitigating excess + facilitating response
Org sense maker

                                                  them to respond
                                                  in some
                                                  way
                                                  = more devolved

                                                  response
                                          = v. different

3.16 Literature Review and Theory Construction

The focused coding led to the formation of categories that I sought to explore further by considering literature from sectors other than health. The discussion part of the next chapter on research findings outlines these codes and demonstrates how they contributed to the construction of theory. Theory construction was based on abductive reasoning whereby the insight from the latter literature review, my own insights and the participants' own views were used to explain the processes within their time and context.

3.17 Conclusion:

The selection of constructivist grounded theory as the research methodology can be traced through a series of methodical steps based around ontology, epistemology, research paradigm, methodology and choice of methods. It involved an understanding of what was already 'known' about the phenomenon being researched as well as clarity around what knowledge the research was seeking to provide. I have felt that it is important to focus on the theoretical aspects of the methodology as much as the practical application, since it reflects my own thought processes and why I feel able to critically evaluate and justify the selection and use of constructivist grounded theory in this research.

Chapter Four: Presentation and Discussion of Findings

4.0   Introduction

This chapter considers the initial coding undertaken from the interviews. It shows how the focused coding coalesced around eight themes which were then explored in reading about non-NHS contexts. The impact of Covid-19 on leadership in crisis was considered as the research took place during the pandemic. Covid-19 operated as the prism through which many participants viewed their actions in the major incident that was the subject of the research, and they often compared the experiences of the two types of incidents.

4.1   Incidents and Participants

In this research, ten incidents involving seven hospital trusts were considered. Where a trust had more than one incident included in the research, the tactical commanders and response teams were different for each case considered. Thirteen participants were interviewed by the researcher, while four sets of notes from hospital incidents were subject to analysis. Table 6 gives a breakdown of incidents and participants relating to each incident, however it omits details of incidents relating to the same hospital trust in order to maintain anonymity for the organisations concerned. Tables 7 and 8 provide some further details relating to the participants and hospital incident notes respectively.

Interviews were undertaken via MS Teams and recorded both on Teams and on a digital recorder. On three occasions there were incomplete recordings due to equipment failure and interviewer (my) incompetence. In these cases, contemporaneous notes were used, supplemented by comments written immediately after the interview. At the start of each interview, participants were asked to confirm their consent to participate and that they understood the Participant Information Sheet.

Table 6: Incidents and Participants included in the research

Incident	Number of Interviews	Participant	Hospital Incident Notes	In Hours (Mon-Fri 09.00-17.00 hrs) or Out of Hours	Incident Declared Internally or Externally	Commander on-site at start of incident	Critical / Major Incident
Suspected stabbing of member of staff on hospital site	1	PN1		Out of Hours	Internally	No	C
Decontamination incident on hospital site involving unknown substance with no notification	1	PN2		Out of Hours	Internally	Yes	M
Hospital response to Road Traffic Collision involving multiple casualties, with major incident declared by Emergency Services on scene	2	PN3 PN5		Out of Hours	Externally	No	M
Stabbing of member of staff on hospital site	1	PN4		Out of Hours	Internally	No	C
Hospital lockdown due to threat	1	PN6		In hours	Externally	Yes	C
Loss of water supply to hospital site	2	PN7 PN9	HIN4	In Hours	Internally	Yes	C
Loss of Imaging function	1	PN8		In Hours	Internally	Yes	C
Loss of Lifts in clinical area	2	PN10 PN11	HIN2	Out of Hours	Internally	Yes	C
Fire leading to loss of facility / function	2	PN12 PN13	HIN1	Out of Hours	Internally	No	M
Fire leading to loss of facility / function	0		HIN3	Out of Hours	Internally	Yes	M

Table 7: Details of Participants

Participant number	Role	Incident
PN1	On call manager	Suspected stabbing of member of staff on hospital site
PN2	On call manager	Decontamination incident on hospital site involving unknown substance with no notification
PN3	Trust Director (not on call)	Hospital response to Road Traffic Collision involving multiple casualties, with major incident declared by Emergency Services on scene
PN4	On call manager	Stabbing of member of staff on hospital site
PN5	Trust Director (On call)	Hospital response to Road Traffic Collision involving multiple casualties, with major incident declared by Emergency Services on scene
PN6	Tactical Commander (Head of EPRR)	Hospital lockdown due to threat
PN7	Tactical Advisor (Head of EPRR)	Loss of water supply to hospital site
PN8	Tactical Advisor (Head of EPRR)	Loss of Imaging function
PN9	Member of Tactical Command	Loss of water supply to hospital site
PN10	Tactical Advisor (Head of EPRR)	Loss of Lifts in clinical area
PN11	Trust Director (On call)	Loss of Lifts in clinical area
PN12	Tactical Advisor	Fire leading to loss of facility / function
PN13	Head of EPRR	Fire leading to loss of facility / function

Table 8: Hospital Incident Notes

Reference number	Document Type	Incident
HIN1	Hospital debrief report	Fire leading to loss of facility / function
HIN2	Contemporaneous notes	Loss of Lifts in clinical area
HIN3	Hospital debrief report	Fire leading to loss of facility / function
HIN4	Contemporaneous notes	Loss of water supply to hospital site

4.2   Initial Coding

The initial coding was undertaken following a line-by-line review of the interview transcripts.
A summary of the key codes and their descriptions is included in Table 9, with further details
in Appendix 17.

Table 9: Summary of Themes from the Interviews

Code	Description
Initial Notification	Notification about an incident came from a variety of sources and commanders may receive one or several notification calls. These included: • direct messages from the hospital switchboard to individuals identified as being the on call manager (which could relay notifications from the police or fire service) • calls from managers on site to the manager on call either notifying or reporting actions that they had already undertaken • by chance: somebody else received a call, but the person who acted in a command role, was with them and participated in the response Notification could be made informally or through recognition that a 'low level' matter was actually a critical issue The information that commanders received from these initial contacts ranged from patchy or scant to specific and directive. In one case a commander was called in but unaware that it was for a critical incident
Use of Cues to Gauge the Nature & Scale of the Incident	Commanders reported using a variety of cues to assess the nature of the incident concerned. Where the commander was off-site: • they may have contacted colleagues to find out more details, • witnessed the scale of the response by other emergency services (vehicles responding to the scene of the incident, road blocks) • they may have used media or even family to get more information. Arrival at the hospital was also an opportunity to gauge the magnitude of the incident and the response to it. Commanders had to assess a dynamic situation and identify where the boundaries were around the incident There was a requirement to quality assure the information and requests coming through to the tactical commanders and to understand the facts compared to the requests, or lack of them
Digesting the news and preparing oneself	Once the initial call had been received, commanders started to prepare themselves to respond to the incident itself and the anticipated duration of the incident. This involved meeting their own physical and well-being needs (clothing and food to do the task) as well as reflecting and starting to prepare an outline plan.

Frame of Reference that Commanders used to Respond to the Incident	Commanders were all experienced managers but had a variety of acute operational and command experience. This ranged from first time on call in this senior management role, to Director-level with experience of multiple operational incidents. *Major Incident Plan:* All participants had received training / instruction in the hospital's major incident plan prior to the incident, however some participants still felt that they were not prepared. Initially in incidents, the agreed communication tools within the plans, such as METHANE, were not used when notifying or communicating about the incident, despite one participant (PN8) requesting this. There was recognition that a plan couldn't encompass every situation (PN6), however what guidelines existed were perceived at times as not dealing with some of the basics, hadn't been followed (PN8) or were out of date *Reliance on First Principles* In response to these demands, commanders tended to coalesce around the themes of Patient Safety, Staff Safety, Site Safety and Public safety
Initial Response by Commanders	Commanders described a tension between finding more out about the incident and the nature of the response, versus starting to put some actions into train. For those off site, there was the desire to get to the hospital site, but it was tempered by putting some essential actions into place before they went / arrived Commanders were often reacting to decisions that had been made by local teams based on their interpretation of the information that they had received from a variety of sources. Overall, commanders reported being impressed by the scale of the response by local teams and sought to augment the actions taken to date
Decisions Taken	Commanders described themselves as taking very few decisions, but that they saw it more as a process, particularly with regards to communication across the organisation and external partners. The key decisions made related to: • Decision to attend the site • Declaration of a major / critical incident • Implementing an action with an immediate impact (locking down ED; getting a divert of ambulance activity away from the hospital) • Agreeing an assessment of how long the response to the incident would affect the hospital • Agreeing how the communications would be handled • Agreeing the stand down for the hospital

	The act of making a decision by the commanders served the function of creating certainty when there was a lot that was unknown. It would also determine the level of resource able to be mobilised or the degree of subsequent liaison with other agencies which may be required
Reassurance or Assurance?	They used a variety of heuristics to gain reassurance which were linked to: • Whether the command centre appeared busy and in control / calm • Whether the operational teams appeared in control / calm • What support the operational staff were raising as being required (or not raising, which in itself could be seen as reassuring) • The seniority of staff supporting the organisation's response • The presence of staff who were used to undertaking the granular level of work around hospital operational delivery • Direct contact with more experienced / senior staff • Soundings from senior clinical staff • Feedback from staff who had scoped the site Tactical commanders were reported as focusing in meetings and huddles on facts rather than conjecture
Tactical or Operational role for Commanders?	Commanders reported that for the most part they adopted a tactical role rather than getting involved in the operational response, and in most cases, this was a conscious decision. For some this was from previous experience, for others it reflected an awareness of how this role was perceived. Commanders were reported as giving permission to staff to do what they needed to do to keep people safe, and that indeed there was an expectation that the area affected would lead its own response and recovery
Communications	Communications, both internal and external operated as a significant focus for commanders during the respective incidents. There was a requirement to inform the rest of the organisation about the incident, but commanders were mindful about the potential for unintended consequences through passing on information amid uncertainty. Version control of messages, in a dynamic environment was also cited as a consideration / consequence Huddles both within each organisation and between partners on site were used as a vehicle to gain and disseminate information. Communication with external such as commissioners or other providers would occur through formal, prescribed routes and through unofficial ones.

Changes in Environment & Personal Role / Accountability	*Loss of Familiar Environment* The everyday work environment & rendered unfamiliar through changes in use of certain areas or constraints in accessing around the site that a lockdown brought, all of which impacted on the way that the commander was able to operate. *Increased Accountability* Commanders may be experiencing a change in accountability and where they may previously have been operating in a direct hierarchical command structure, they were now assuming a greater level of accountability, with perhaps less / significantly altered infrastructure to support than in-hours
Role of the Tactical Commander	The elements raised by commanders about their role: **Adopting a leadership role:** • Quality assuring the organisation's response • Adopting a differential approach to teams based on the level of assurance / reassurance being received from that team • Imposing structure onto the response • Ensuring a group focus by recording actions for the response team **Establishing Priorities & Parameters:** • Responding to decisions already taken and enacted by others • Focusing on patient safety and balancing this against the requirements of and threat to the rest of the hospital which was operating in business-as-usual mode • Setting the expectations for the response • Basing the response around the actual impacts, rather than following a pre-determined plan • Setting the boundaries of the incident based on the impact upon health functions and reporting from local areas • Prioritising based on knowledge and experience of risk, not just on reports of problems **Gathering information to inform action:** • Acting as a point of contact for the hospital response • Focusing on the facts and not the process • Operating on exception reporting rather than being directive about local actions • Proactively searching for issues / assurance / reassurance **Supporting staff and validating their actions** • Acting as a catalyst for the organisational response • Adopting a differential approach within the team and being responsive to the needs of others • Working with areas to facilitate them to get a response

	• Remaining calm and actin focused • Providing structure and framework for the tactical command response • Using experience to support the process • Managing a scratch team • Providing operational support initially if required **Use of the Huddle** • Building a collective picture of the incident (co-constructing meaning) • Creating the vehicle to manage the incident • Developing a shared understanding of the issues but also a forum to agree the areas of responsibility in a dynamic environment • Facilitates collective prioritisation and agreement over high-risk areas (shared risk assessments) • Collective identification & assessment of risks • Battle rhythm established early on after the initial response phase • Focus on consequences **Ability to step back** • Defer to the site team • Lead role in the quality assurance of the response • Importance of structure in the response **Thinking of wider aspects of Hospital Management** • Dimensions of the response: time & space • Forward planning and return to business as usual **Appearance of control** • Supporting innovation • Creative approach where solutions are not readily available • TC supporting the local area - working with them to develop a solution
Control in a dynamic environment	**Dynamic environment** Commanders described a situation which was dynamic, with escalating risks, information and understanding of impacts. The incident may have been resolved quickly or local areas may have already acted. Often, most of the response was felt to have been undertaken early in the incident, however commanders reported having to deal with the consequences of (unexpected) issues arising from the incident, or deficits in the way local areas had effected a response.

| | Within this environment the lead roles could change depending on the key risks identified and the shifting priorities. Once the police had resolved any security concerns then would then disengage from the response, for example.

What did control mean?

Under these circumstances, commanders described 'control' in a variety of ways:

- Feeling that the situation was under control
- Having responsibility for the management of the incident but not operationally managing it
- Understanding the situation as it evolved regarding the use/deployment of resources and organisational response
- Getting focused information which would inform local decisions
- Accepting uncertainty
- Taking decisions and initiating actions
- Having a framework to work within, but scope for initiative
- Working with an experienced team who 'understood' their areas and knew what to look for
- The ability to improvise or innovate a response to extraordinary demands

Some commanders reflected on their perceptions of an absence of control during these situations:
- Recognising that they could not control everything
- Feeling that they were outstripped by local actions
- No clarity as who was in formally charge, particularly with multi-agency meetings
- Lack of clarity regarding decision-making processes during the incident |
|---|---|
| | |
| **Dealing with Uncertainty** | Importance of Liaison function to gain clarity

Responses in the face of uncertainty: Gather resources; Make early decision where can but try not to worsen the situation; focus on impact; start from the worst-case scenario and work up |
| | |
| **Other Organisations** | At times commanders worked closely with other organisations such as other emergency services or utilities, with these organisations actively setting the boundaries for the incident (such as advising on evacuation). Commanders felt that there was a difference between how the hospital teams and the other emergency services operated, in both terminology and approach to response [with emergency services appearing more prepared for these types of situations] |

	The commanders felt that there was a marked difference in that they had to focus on the whole of the organisation and how this would impact on business as usual, whereas the other services were focused on the immediate impact of the incident itself
Humanitarian Concerns	Commanders were not immune to the human cost behind any hospital incident and were mindful of the casualties and the impact on staff
Reflections after the incident	Commanders' reflections • Self-confidence having gone through this • Desire to share learning with others • The more severe the incident, the more binary the decisions required (and with less disagreement) • All incidents are unique; they all have different starting points and set of environmental pressures within the hospital • Collapse of assumptions in that things that they thought should happen, didn't happen • The random nature of being in tactical command, in that although people knew why they were in the command, they were not expecting to be What went well • The value and richness of different perspectives within the control room • A good silver [tactical] response means there is a better focus on recovery • On site and face to face meetings worked better than virtual ones • It was felt important to notify the rest of the hospital about the incident • Treating the organisation as mature units enabled the local teams to focus on their own areas • Early escalation and notification to commanders and the organisation of the incident enabled the opportunity to minimise the impact of the incident • Prior training around evacuation was cited as having benefit in the actual situation • The benefit of peer challenge within tactical command when deciding on the reported incident level Areas for improvement • The learning identified was about improving processes rather than addressing any clinical practice • Staff felt need for support • Managers not prepared for managing incidents
Empowerment	It was reported that tactical command supported the empowerment of staff through:

	• Enabling / expecting managers to resolve local issues and only bring back to tactical command, those issues which couldn't be resolved • Working on the basis of trusting staff responses rather than querying or validating them Paradoxically, a directive approach from tactical command could still be perceived as empowering. This related to situations where an operational command was unable to develop an adequate response and leadership and priority-setting by tactical command was required to get them functioning effectively
Unexpected Matters	**Collapse of Assumptions** Whilst one respondent reported that there had been 'no surprises' (PN9), the world view of the hospital that was held by commanders prior to the incident was often challenged. Examples cited included: • Operational teams not aware of their local business continuity plans or critical components / interactions • (Lack of) willingness of staff to address an acknowledged, emergent problem • Requirement for tactical command to have to intervene in a local response which was deemed inadequate • Plans, call lists and wall charts were not kept up to date • Changes had occurred since plans were made which impacted on the ability to carry out the Trust plan • Staff unaware of basic requirements (evacuation plans) • Equipment not in place (evacuation equipment) • Unexpected behaviours (staff using rooms unofficially to sleep in overnight) • An expectation that people know how to run a tactical command and that senior managers will step into the tactical role and get it right

4.3   Focused Coding

Rather than solely reporting directly back on the experience of the tactical commanders, this research seeks to construct a theory which outlines how they defined the issues that they perceived during a major incident and how they sought to address them.

Constant comparison of data and the dynamic use of theoretical memos supported my reflexive approach to construct coding that facilitated a credible understanding of the lived experience of participants. The focused coding coalesced around the themes in Table 10, and these will be collated into an outline theoretical model.

Table 10: Focused Coding: Key Themes

	Key Theme	**Sub-Headings**
1.	Navigating an unfamiliar landscape	Random nature of holding command The familiar becomes unfamiliar
2.	Emerging from the Pack	Change in levels of accountability for some commanders
3.	Effecting Cultural Change	Change in Self Change in the Work Environment • Encountering a Devolved Response • Working with other organisations in a high impact / high consequence situation • Operating with a heightened awareness / sense of uncertainty
4.	Seeking Reassurance	Reassurance rather than Assurance
5.	Absorbing Accountability	Adopting a leadership role Supporting Staff Simplifying the 'ask' Dealing with Uncertainty Appearance of Control
6.	Constructing a single version of the 'truth'	Acting as a Point of Contact for other organisations and their own

		Use of the Huddle
		Shared Risk Assessments
		Communications
		Establishing the Boundaries of the Incident Response
		Frame of Reference Used by Hospital Commanders
7.	Challenging Prior Assumptions	Why are there gaps in organisational preparedness?
		Changing nature of the command and support framework
		Why is this (not) happening?
		Unexpected Exacerbating Events Arising from the Incident
8.	Being the Conscience of the Organisation	Thinking about the whole

4.4   Themes from Focused Coding

Navigating an unfamiliar landscape

There was a strong sense that dealing with a major / critical incident is very different from what the Commanders are used to managing within their usual role. These incidents are extraordinary events, being outside the commanders' normal span of control, often out of hours, with multiple functions of the hospital estate and operating processes radically altered. Commanders were faced with an environment where there had been fundamental and rapid changes in structure, roles, functions, communication and simply moving about the hospital could be problematic.

Random nature of holding command: Commanders all felt that it was appropriate for them to operate as a hospital commander, however this was often a role by default (due to being

on call or with other staff at the point of escalation) rather than being something actively sought.

> *They called me and just to say, just to let you know because you were the on call manager at the moment in time. Again, is it me, does it end at eight o'clock in the morning? At the weekend we know it's eight o'clock but at the moment in time when this incident occurred, I was manager on call (PN1)*
>
> *They told him in the lunch queue in the front of the hospital because they wanted….so in many ways that initial formal ETHANE wasn't done, the initial formal notification wasn't done even if it was without ETHANE and I was then told… but at the same time I started to get those reports that I mentioned about people saying can't get inpatients to have their scans, this is now a problem and that's when I went back to try and get some more details about what's actually going on, what's the impact and then somebody said, yeah, it's a much bigger problem, we've got no solution to it, we think it will last for days, so ….yeah…we haven't told anybody. So that's where we were, and it was at that point that I called the meeting (PN8)*
>
> *So, I do think we need to have some training. I mean I was called: 'oh please can you attend tactical', oblivious to what was going on, but to represent the division; so it did kind of worry me a little thinking what is going on and what is going to be expected of me because I was oblivious to….the fact it was a bit kind of relaxed, oh can you all check your areas as water is now coming back but it could have been a lot worse (PN9)*

The managers may not have had operational experience within the areas affected, which served as a further point of dislocation.

> *'Cause it was just again a matter of fact that I was the manager on call, just happens to belong to the community division…(PN1)*
>
> *I think that was my second weekend on call as well or third weekend on call, I hadn't been on very often at all… …so for me I did and still to certain extent feel very unsupported in terms of being a manager on call who's not working directly in operations so obviously because I work from a professional point of view and a professional leadership point of view, I've got much better feel for Ops now in terms of patient flow in the organisation that I did two years ago…but I did feel that actually that was a case in point where there was nothing at all to refer back to absolutely, nothing at all to refer back to (PN2)*
>
> *So we were going to ask… is there another system, another way to do this and how is done in the past, how have you done it when you've had planned activity downtime? That sort of thing, trying to explore what can be done what's the size of the request, what's the size of the demand? (PN8)*
>
> *What value did I add? Very little as I had no operational experience or advice to give to the incident… I couldn't offer practical advice and…was unsure of the role I was playing…apart from asking: 'Do you know what the risks are? What's the risk assessment?' (PN11)*

The familiar becomes unfamiliar: Hospital commanders identified the changes in the hospital brought on by the incident itself, which rendered the environment unfamiliar. Examples of this include seeing the premises full of emergency response vehicles, having to implement a

lockdown, being unable to move around the hospital to talk to staff, areas converted to alternative functions. The language used when talking to other emergency services used different terminology and assumptions than they would be used to within an NHS setting and further contributed to a sense of dislocation.

> *I walked out of the end entrance, and it was just like insanity, just like insanity. There was police, there were fire engines on site I mean I it was just like I mean a huge incident going off and they'd started to cordon off where the car had been abandoned at the front of the hospital (PN2)*
>
> *So when we went to the first room, I said I'll find us a room. And it was me. I'd I left them where they were because they were, they got good phone signal. And like I said, I went to second room and can't get into that went to third room. Couldn't get into that (PN12)*
>
> *O2 and Nitrous Oxygen was leaking – staff did not have access to information of the location of all isolation points are and where the zones are. Estates colleagues were unaware how far it would affect the hospital if the gas was isolated (HIN1)*
>
> *There were no clear routes out of the hospital, lifts were out of action, no ski sheets on beds (HIN3)*

Emerging from the Pack

Commanders reported that they were in charge of the organisation to a degree that was beyond ordinary expectations regarding their accountability and role. They were now expected to 'fly solo' to a considerable extent.

Change in levels of accountability for some commanders: The random nature of incidents occurring and a person being the one on call at that time was something which served to highlight the sense of the extraordinary. Commanders may be experiencing a change in accountability and where they may previously have been operating in a direct hierarchical command structure, they were now assuming a greater level of accountability, with perhaps less / significantly altered infrastructure to support, than they were used to

> *But it's also kind of a bit scary that morning it was alright but because I was the boss, but in the past… the few incidents…there would be people around, similar peers kind of thing…I was the most senior person there you know so that was quite scary, so when you realise that kind of thing you know. You didn't have anybody to...you just really had to…yeah …sort of hold your nerve (PN4)*
>
> *To be fair it was quite interesting as it was probably the first that I've attended at XXX, so I think I'd previously been in the background but not actually representing the division of Medicine at the Tactical for this particular incident (PN9)*

Effecting Cultural Change

Commanders were required to respond to and implement significant cultural shifts both in terms of how they saw themselves operating in this environment and how they interacted with others.

Change in Self:

Commanders acknowledged that in most cases they didn't have operational knowledge of the areas concerned or necessarily felt that they needed to

You're expected…..you can't, you're all things to all people…surely the role of an on call manager, and actually if you think about it more widely leadership is about understanding where the limits of your role are, and knowing where to get what you need, to move things forward…that's how things work, I mean nobody in an organisation knows everything about everything, but the trick to it is knowing how to pull information and get that expertise in, almost within your rounded waggons, so that actually you get the best outcome for everybody…(PN2)

But I think the Trust needs to do more training because I know when I attended…I've never really had to attend [before]…we've been actually feeding into like directors but not actually representing…so I think there needs to be more training because if there was a major incident at hand, colleagues need to know what is expected of them the level of information to be fed back and actually what do they need to do locally in terms of reaching up to escalation within the division or actually escalating back higher up to say we need some urgent support now and response. So, I do think we need to have some training (PN9)

For some commanders, being the tactical commander involved a change in the way that they normally operated where they may have a more direct hands-on role

Because your first tendency is to go, just that like today I thought nip down to ED because it was a busy day yesterday, we had so many ambulances; I'll go and see the ambulance crews and that's the best part of the job isn't it, you want to go and talk to the teams and the people that are around you. But we resisted that and we were very busy managing our external communication, so it wasn't difficult (PN3)

Yeah… to me it was one of those things where I had to stop being like more sort of a 'doer' manager….so I had to take that, that…. I started going into that mould initially, I didn't…I just cottoned myself on and said no you have to, no, that is for somebody else to do then you've got to direct them to do that coz you've got role that really is to make sure it's happening as well sort of thing, you know…so there was..you do have to have the trust that things are happening you know (PN4)

In other cases, the tactical commander focused in immediate operational issues as their first action on scene

> *So it helped this particular Silver Commander…she used to be a site duty manager, which helped a lot. So, she's got a really good handle on the operational running of the…system…she in her past life really used to…moving patients around at short notice, and then she just went through. She was really good. She went through to ask the reception started to take… details of patients that…didn't deem themselves as require an immediate…access to the service and were going to go home, just so as we …weren't missing, we weren't looking for missing patients [PN12]*

Change in the Work Environment

Encountering a Devolved Response: Most commanders reported that their hospital had already initiated an incident response based on assessment of intelligence by local teams and that the commanders were responding to rather than directly instigating these initiatives.

> *Yeah, so she was saying that this incident had happened, where it had happened. The fact that the gent was in ED now, he wasn't critical. He'd got injuries to his hands and his ear, he was being treated, he was ok there was this understanding that there was an intruder on site so the wards had gone into lockdown, not lockdown just lock the doors more than locked down, as people were still coming into work (PN1)*
>
> *All the signage up around the hospital was being utilised, so the rest centre was being set up for relatives, the relatives' receiving unit was being set up…for police to be present, if necessary…we had way-finders positioned to ensure that as people started to arrive…they didn't for a few hours…that we were ready to receive. We had…the Emergency Department was emptied faster than I've ever seen it emptied, it was amazing, essentially, the right formation was created around every majors cubicle and space available…the right formation of staff was there and so we were staffed appropriately to receive…our…at our maximum capacity (PN3)*
>
> *You arrive on scene… you suddenly pick it up there, so you're really rapidly learning what's going on…and the site team have already taken a load of measures. So by the time you get there they've already done a response (PN4)*
>
> *Full, divert immediately. It was put on and again that went through, 'cos site can do that…So full divert as soon as we evacuated [PN12]*
>
> *Upon confirmation of the fire, the following actions were undertaken:*
> * *The XXX Emergency Department, UTC and X-ray departments were evacuated.*
> * *The evacuated patients either returned home voluntarily, were rehoused in appropriate wards or were sent to the outpatients waiting area.*
> * *The fire was extinguished.*
> * *A divert was put in place for all patients away from XXX ED to our other sites and other receiving Trusts with YYY Ambulance Service support (HIN1)*

Working with other organisations in a high impact / high consequence situation: In some instances, the commanders worked alongside partner agencies often for the first time, in order to manage the incident. In these situations, they had to adapt to working in multiagency huddles and using terminology that was new to them. They reflected on the value of the huddles and the degree to which they felt the Emergency Services (Police, Fire & Rescue and Ambulance) appeared to be more in control of these types of situations. The fact that organisations had different objectives in dealing with each incident, meant that the dynamics within the huddle and coordination of the incident could change rapidly (for example, as the police decided to step down their response as it was no longer a public order issue but other agencies would have to continue the response).

So there was a huddle that was gathered together and at that point, he [Fire Commander] then asked who is everybody so we all knew who everybody was, so he introduced himself and said I am kind of the tactical commander, I am the lead for this, this is what's happened [PN2]

I imagine the police are coming from…right public order offence here, what's the issues of terrorism, fire are coming from…so you're looking at it…everybody is coming from a slightly different perspective but still trying to manage the same incident collectively…I represent this aspect, rather than… (PN2)

I found the police and our ambulance service very good, very helpful …I found them…they were good communicators, regular communicators… I knew what was happening, I didn't feel that ….it did feel like checking forever, but you know it was what they had to do (PN4)

I think that their approach is different, their training is very different you know what I mean. They have a very command structure, a very….some of the language that morning and there's something and I can't think what it was now , there was some language that morning that the police used that I did cotton on to but it was a bit, it took me a time to I can't remember now, but it's a slightly different process really and that they were using it as if you knew it very well…(PN4)

***Interview Note:** The Fire Service was asked for support if the Trust needed help – this request went up through their command chain but at the same time the local relationships with the local commander kicked in 'informed people were empowered to help with the response' (PN10)*

The…largest uncertainty was exactly what had been taken out…So by…volume and because at that time like I say we the Fire and Rescue quite rightly wouldn't let anybody even go near the scene….So and Fire and Rescue don't really know the implications of…if you've lost room X. I've got a scanner in it, or hasn't it got scanner in it? What's the…? So that it was it was for probably about an hour or so trying to work out exactly what had been lost in Toto (PN12)

We've had a couple of couple of fires…before…and every… time fire have taken control and told us what we can't do (PN13)

Operating with a heightened awareness / sense of uncertainty: Commanders reported that information was scant or incomplete regarding the nature, impact and duration of an incident. Requirements changed with time as new information came through and there were issues with 'version control' within an organisation, as outdated information could still be cascading through departments despite updated knowledge or plans being put into place. The multiple dimensions of an incident extended from patients and staff directly affected, the impact on premises and the hospital estate, and the needs of other patient and staff across the rest of the hospital as well as dealing with the public and external organisations. Consequently, commanders recognised that they could never have a full picture of the organisation at any point in time.

> *So, you know it could be quite a dynamic well it was absolutely dynamic situation that kind of you know ebbed and flowed and changed pretty much on a 15 minute, half hourly basis really for the time that it did (PN2)*
>
> *Because you have multiple spinning plates haven't you, if you think about it, because there were all sorts of different things that were going on at the same time and actually the situation was changing on a regular basis you know, so then you are finding out more, the police are finding out more about the individual, so they'd then be feeding back about (PN2)*
>
> *Yeah… so you start to gather resources at that point, because you don't yet know what you're responding to, you don't know the scale of it is, you don't know whether it is going to be major incident stood down, stand by or whatever…at that point you don't know the scale of the response is that's going to be required…(PN3)*
>
> *I think we had all the resources in that we needed, and my sense is that we were in control of the situation. I felt like we were in control of the situation…there were gaps in information sometimes, but I just normalised that, I just rationalised that as an inevitable consequence of an emerging picture that we weren't clear about, we couldn't be clear about…there were gaps in information all the day as we went through the whole day (PN3)*
>
> *There was uncertainty…understanding the implications of what was happening…but the first focus was on impact regardless of cause…it turned out that there was no actual loss of water which made it easier to manage and moved it from high uncertainty (PN7)*

The certainty that they may achieve in their usual area of work may be radically different from that within a major incident.

Seeking Reassurance

Reassurance rather than Assurance: It is useful to make a distinction between whether the tactical commander was seeking assurance or reassurance. The latter is when one is told that all is well, whereas the former is when one is told what is happening and is evidenced (Avon and Wiltshire Mental Health Partnership Trust, 2013). Commanders appeared to operate on a reassurance-seeking model rather than an assurance-seeking one.

> *Yeah, sure, yeah, we're telling you and you don't need to do anything because we've got it all in hand, we're doing this that and the other, XXX knows, YYY is here…. that's what I thought, yeah. It's happened and everything that needs to be in place is in place and it's under control (PN1)*
>
> *The way that I tend to work in a lot of those circumstances, I will absolutely take on board what people say to me. So they are the practitioners in those areas, so actually and certainly when it comes to for example …so I remember speaking to the lead in A&E, the consultant in A&E should I say, it was absolutely around how they are managing their patients in the context, so maybe I've got leadership completely wrong, this is leadership 101 about to....could be completely blown up, but for me it was about making sure that they didn't need any additional support over and above what they were able to do to make sure that there was nobody going to drop down dead as a result of this, that there was nobody going to have an adverse outcome as a result of that. (PN2)*
>
> *XXX organised the meetings so that they responded to the facts on the ground…they used the command structure to talk through the issues and also considered the initial BCP around water loss. They didn't have time for assurance (PN7)*
>
> *So it was more about going out to relevant areas, assuring that the risk had either been mitigated, or if it hadn't been, what were we…how were we going to mitigate and who were we going to escalate to (PN9)*

If the tactical command was not reassured, then there would be a greater focus and probing of the area concerned.

> *They did a lot of detail through the tactical command because the department could not galvanise the response because XXX was new and couldn't lead the response. We were gauging the level of the response…normally we would do an assessment of the ability to respond but it was like asking them to bake a cake and they had no understanding of what the ingredients were (PN8)*

They used a variety of heuristics to gain reassurance which were linked to whether the command centre and the operational teams appeared busy and in control / calm; what support the operational staff were asking for; the experience and seniority of staff supporting the organisation's response; and the presence of staff who were used to undertaking the granular level of work around hospital operational delivery

> *Staff-wise are you still able to manage? Because it was quite a busy day you know in terms of the number of people that we had in there, plus the number of waiters that we had in there, it was a*

busy Sunday…are we able to manage this? And when they're nodding sagely and saying yes we are, this is happening…great... (PN2)

But I did go down there just to see how people were. Not to interfere, not to start to get involved in Silver processes, but just to check in, to get a sense and my immediate sense was of calm, purposeful work that was occurring and actually a sense of …real team spirit was starting to be engendered and we hadn't received any patients at this point, it was just the amount of resourcing and coordination that was happening was feeding off each other, so you got you could see the bronze ED team, the bronze medical team and others coming in checking in and just, there was so much activity happening, it was really reassuring; but importantly the silver commander of the day was really confident in her position. So that was no more than a couple of minutes (PN3)

Where I say Bronze, tactical, overseen by very senior consultants; so we had 3 or 4 acute physicians making the clinical judgement call about what areas were safe to cohort patients away from ED to enable ED to be ready to receive…Whilst making sure that you had eyes on that clinical risk while having senior clinicians for those clinical spaces (PN3)

The site manager, I'd worked with a lot, she was quite able and know what she was doing and you know that sort of helped. And she and I did liaise a lot that morning in terms of… that felt...I had that support… she was good, you know I did think afterwards if I had had more, a less experienced site manager some of those necessary steps wouldn't have been taken by time I got there…. you know…she knew what to start doing, you know (PN4)

Not about checking every aspect of their response: good assurance came from having a live action log going throughout on a PC and also a live video link, so that they could see what was happening in the command centre. They were doing things competently so that meant he had 'assurance' through their actions. (PN5 – Field Notes)

We gauged the answer [from the Imaging Department]. We did a list of priorities from the clinical staff in the meeting and did a priority list. We asked the Imaging clinicians and they understood their activity. The managers had not engaged with the clinicians or spoken to them during the incident…with the clinicians involved it felt safe (PN8)

XXX was calm, she 'wore the responsibility', she was leading the response on site, asking for help as she required but was on it (PN11)

Absorbing Accountability

Commanders assumed accountability for the organisation's response in both passive and proactive ways. By virtue of creating the command function it meant that people were able to discharge their accountability by asking for advice, signing off decisions or via a presumption around the degree of oversight that the command was operating (that they would be informed if they were acting out of line). Commanders also acted proactively offering a presence and support, often responding to a perceived need for a leadership role to be established across the organisation.

Adopting a leadership role: They were aware that they had to operate as a focal point around which people could coalesce to enable them to use their initiative. Commanders reported that they would sign off decisions often uncritically / without judgement to satisfy the perceived needs of staff, whether this was to make the staff feel better or to give them protection.

And I was like, I don't think you need to do that, but if it makes you feel better then OK do that, But then that caused chaos later on in the day because of rumours that were happening there, that they thought that there was an immediate threat there and there wasn't (PN1)

But you still…there's a leadership role…you are the person who they look to, to basically sort of say, almost validate sometimes the decision making, that they're going through if that makes sense, you know, they're, they're making the decisions but they are, you're there to validate it and actually you could argue, going back, I'm almost talking against here…maybe that is part of it where they feel they gotta validate or…they feel they need to make sure that other people know what's going on so they feel protected (PN2)

So is it then about that conversation that plays out where there's a validation there, there is a…you're not on your own, I am here if you need that support but actually if you feel safe, carry on doing what you're doing and making sure that everybody is being treated (PN2)

You've just got to create…it's about letting people know that you've got their backs so that the accountability fundamentally and ultimately always resides in that Gold room doesn't it, you've discharged the accountability, but you've set a set of parameters for Silver to work within with your strategic objectives (PN3)

There was some challenge by the tactical commander about some of the information coming back but this was more about getting more … understanding. There was no time for quality assurance about everything that was being said…managers knew with XXX that they needed to focus on the facts not conjecture (PN7)

XXX wasn't directive about what each manager needed to do but gave the big picture and things they had to look at…he gave a bit more detail on what he expected to some people at the meeting who were less experienced (PN7)

The role is 20% direction and 80% empowerment (PN7)

She [tactical commander] was solo for the first…part of the response. She was solo. So I mean, by the time myself and the gold had got there, she decanted every patient. There was no patients or staff in the car park other than the interested…They managed to find the space like I say, for the resus patients in, in the theatre recovery. They managed to find space for the patients in XXX ward and she'd take it into account. (PN12)

She [tactical commander]…did a fabulous job, I have to say. That was one of the real positives of it. There is some dirty washing I can give you later, but the one of the real positives was the ED and the silver response….A really early call of everybody's accounted for and a really early evacuation of all the staff and patients and then from our side moving all the staff and patients to areas of safety and was… was really good so that that bit the the initial response was we couldn't actually fault anybody on it. (PN12)

> *There's no battle for power, and…I didn't witness any sort of of miscommunication or any table thumping of 'we need to get in now'. There was literally a… we've got patients that have been dispersed. We definitely aren't gonna have ED open tomorrow…What outpatients are we gonna need to bring down? How do we let the people know that we've gonna have to cancel out patients? (PN12)*

Supporting Staff: Commanders felt that it was important to support the staff involved in the response. In many respects, the fact that there was a command structure could be seen as enabling the staff to continue whether or not they were in direct contact with it.

> *So first and foremost they knew I was there…so from the point of view of…I'd had no interaction particularly with A&E that day and in fact you can be infrequent when you're manager on call but it was about them knowing there is somebody who's responsible for site and here he is, this is me from that point of view, I'm not a police officer, not a member of the fire service but actually I am responsible for what is going on, on site so yeah, there's issues that you need support with let me know, what is going on, how is this playing out for you? Let me know is everybody ok? (PN2)*
>
> *I'd put that down in large part to the interconnectedness that people could see, because although the Emergency Department couldn't see us, they didn't see us until the end of the day, they know that we were there and we were there at the end of the day, I think that was important (PN3)*
>
> *I think they were relieved to see me…I get on well… I work well with them and I think….the site manager, she was quite junior. She definitely needed more direction…. and she was very good but she needed direction, quite a lot of direction, you know some what I mean, the site manager…the manager on call, she was quite junior, she hadn't been long doing manager on call (PN4)*
>
> *And our job is to liaise with the rest of the organisation for them. Our job is to enable them to get on with looking after their bit and we'll do the liaison with the external agencies and all the rest of the hospital about what is going on, you just carry on with what you are doing (PN6)*
>
> *At the start they were floating in the wind and they were happy with us suggesting things – this was empowering them. They were owning their plan and by the end they were owning it more. We were empowering, guiding and coordinating. They were lost, rudderless (PN8)*
>
> *The last thing I wanted to do was to be a 'back seat driver'….XXX was composed, she was talking to YYY and was better placed to understand things (PN10)*

Simplifying the 'ask': Commanders also had a role in filtering the information coming in and out of the organisation with the aim of controlling (by putting boundaries around) what they and staff were being asked to do. In doing this they tended to avoid micro-management.

> *Because actually, you've got a lot of people who suddenly look to you as the name in the frame, and say what do we do here, what do we do here, what's the plan? Not everybody because everybody kind of has their own roles within the incident itself. The staff in A&E is a very good example of that, what they did and how they approached it (PN2)*

> *We weren't having decisions being made with wider consequences than our own organisation within Silver, and any consequences that were standing outside of our organisation were referenced through Gold. But the management of the incident and the coordination of bronze was absolutely down to Silver…So ensuring that there was enough bedside resource or treatment resource or majors bay resource in the emergency department, and where that was cleared to and how the patients that were cleared to create that space were kept safe in other places…that was all Bronze, Silver…very tactical (PN3)*
>
> *I felt it was a joint thing but this incident would probably be led by the police because they're, having to….the ambulance turned more to me I think because it was our hospital where it was happening but I suppose I in turn would have turned to the police as well because they were in charge of the…but I suppose from my perspective I had to understand how that affected the…how the hospital was running how we were doing and diverting services etc and like I spoke to the neighbouring trusts to explain to them what was happening so that they understood as far as (PN4)*
>
> *That's all they needed. And then security and the whole plan kicked in and they locked down…they have a process for which door you lock down and because it is a new building it can be done centrally, so once they'd kicked that in, what ED were saying was do we do it just because the police say so; so we said yes if the police are saying do it then do it. I'll ask the questions about why, you just do it; and then they did it; they didn't have any qualms about doing it. I think it was almost like giving them permission to react to that message which is the bit that we have changed in the new lockdown plan: it clearly says you don't need anyone's permission to do this, just do it and then we'll investigate (PN6)*
>
> *XXX was not micro-managing…he was clear that he expected managers to assess the situation and deal with problems locally…he was there if they needed him but wasn't insistent that everything had to go through him (PN7)*
>
> *Leads were…sent off to basically look for their own area, so gold devolved down and …silver was quite happy with that. So, it was go and assess your area. You're the experts, let us know what you can and can't do, and at the same time they would desperately looking round for portable solutions for things and there was an awful lot of horse trading that went on to get mobile scanners in because it was a a very early realization that we'd lost two MRI scanners that weren't coming back (PN12)*

Dealing with Uncertainty: Control was not perceived as being the sole person in charge making the decisions, but instead was about having a shared sense of responsibility within a dynamic situation and accepting the uncertainty involved. Control required an understanding of what was happening and the organisational response and resource requirements, it involved getting information to inform local decisions and it was about keeping extraneous information to a minimum. The ability of the command team to take decisions and initiate action was seen as a manifestation of control.

> *There's a lot of uncertainty so you can't direct in uncertainty… you have to have a different style …I've got to be able to respond flexibly rather than directing…so now I'm checking and assuring rather than directing... I'm just thinking… because there are so many variables…how am I going to direct those variables….(PN2)*

> *So it was definitely a team effort and at no point where I felt it was, it was out of control, no. I didn't feel that there were any gaps where I was….at no point was I standing there thinking such and such should be here, or even in the hospital sense I should be pulling somebody from the hospital, I never thought that, I thought I should be here, I need to be here, I'm here (PN2)*
>
> *So…so…that we have a good awareness of the situation as its evolving, that we have an awareness of the resources that we have deployed and how our…the organisations around us are responding to that as well, and having…its like being at the middle of a spiders web (PN3)*
>
> *At this stage we still didn't know what we would be asked to respond to, how many we would be asked to respond to, so in the absence of that knowledge, and in the knowledge that we would be the major receiving centre, we immediately asked for a hard divert of any medically inbound patients from GPs to XXX (PN3)*
>
> *I think I did I tell you why…when I spoke to the gold in the morning, I said OK I've done this, this and this. This is what's happening up, I've done this, this and this, I'm gonna do this, you know, and he said well you seem like you've got it under control and he didn't come in (PN4)*
>
> *Interview Note: Participant felt that one can never be in total control as too many unknown & variables plus new rumours constantly coming through, but within that, getting key actions achieved was the role (PN5)*
>
> *Start from the worst case and work up (PN7)*
>
> *Interview Note: PN10 was thinking about implications in multiple dimensions: current implications and future implications (PN7)*

Appearance of Control: As well as 'exercising control', commanders felt that they had a role in emitting a sense of control in order to reassure the broader staff within the organisation

> *If you're asking me did I feel as if I was in charge? I felt I knew where my responsibility lay, but I did not feel that I was managing that incident….So I never at any point…felt that it was out of control…it never felt at any point where I didn't know what was going on, that there was any uncertainty...does that make sense? Did I make any decisions...? I don't know, I don't think I did that I can think of…key decisions…I don't think that I did (PN2)*
>
> *I spoke to the A&E Consultants you know about how we would get started again, so I think they wanted that and I suppose think they wanted you to appear calm you know as well to a certain degree, a certain level of reassurance you know which was a little…..I did my best that morning to appear…I did drop my phone on the floor in A&E at one stage, so yeah, yeah…..you know ok it's under control…that sort of reassurance, OK, this is where we're at, we'll have another decision in half an hour you know, we'll know what's happening then…hold tight a minute, you know we're not doing anything else…. it's communication really I think in those incidents….(PN4)*
>
> *We sent the agenda and it was literally to try and understand what exactly happened, when did it happen, what mitigations were put in place, what mitigations can be put in place? (PN8)*
>
> *Tactical command was not assured… but then the tactical commander stepped in with you to work with them but they had to go back and work on the solution. We will do it with you, you need to be more structured. We facilitated their response (PN8)*

> *So the first discussions were around the high…critical risk areas so obviously ICU, the wards about clean water and theatres…. I think it was a collective discussion… It was held, the meeting was held by the [tactical commander] (PN9)*

Constructing a single version of the 'truth'

Commanders found themselves stepping into a sense-making role for the organisation. They did this through a variety of means.

Acting as a Point of Contact for other organisations and their own: By directing all communication through them (via meetings or a more formal Incident Command Centre) they were able to control the information coming in and out of the organisation.

> *I went over to see first and funny enough at that point he was just pulling together the first of what turned out to be maybe every 15 minutes, they were really regular, incident huddles. So that was where we had myself, the lead for the police, the lead for fire brigade, the lead for...somebody from estates…no it was security...and also a couple of representatives from A&E (PN2)*
>
> *It was symbiotic. It was really symbiotic by that… because we got gold, silver and then we've got the Fire and Rescue incident commander in there, we've got HART team were in there with us and also the [Ambulance Service] controller was in there as well (PN12)*
>
> *Our regulatory colleagues assisted when required but did not interfere or make untimely requests for information. This allowed more focus to be placed on the response and recovery (HIN1)*

Use of the Huddle: The site huddle could include internal players only or a mixture of external agencies predominantly the police and ambulance. This provided the ability to co-construct meaning about the incident, its impact and the response. This shared understanding of the issues afforded a means to jointly manage the incident by agreeing the areas of responsibility in a dynamic environment (consider for example the point a suspected terrorist is now considered to be a patient with mental health needs and the locus of responsibility shifts between partners).

> *So that team was the response huddle that was the team that I felt we were working in, so I felt I was working with other experts in their field if I can almost overplay… that's what I do, but you understand, people who had specific roles in the management of that incident, and I was part of that team (PN2)*
>
> *There were odd queries that were coming, but by and large, the decision-making was done in that huddle, so the queries by and large were coming into that group, information was coming out and then people would be saying right, in this circumstance we would be doing this, the fire service we would do this and then I potentially would ask another question, so when they said about the*

> *powder and said what they felt it was, so I said so are you now saying to me that we can now de-escalate the risk assessment and that actually there is no risk of harm to people and they said yes that is what were saying, 90% validity and just waiting for other bits to come back, so yeah, by and large…right, what's the next steps here then. So what are the next steps for us to be able to get back to a position that I have an A&E that's able to function as an A&E in XXX and that was kind of how the conversation then played out (PN2)*
>
> *It was me, the manager and the site manager. The three of us are kind of together really and we got a link person… we're talking to the…we've got the police liaison person and we're talking to [ambulance] service leads and person so I suppose we had a little group that was liaising with each other really… (PN4)*
>
> *We had the whiteboard; so the actions were assigned by division – who was going to be responsible for checking which areas and then it was like can we feed back in the next 40 minutes and that's where the escalation about eh washers was brought, we knew it wasn't an easy yes, we're all running now', the burst pipe issue had been resolved, it was actually then an internal problem with the air bubble. So it was all just tasks assigned to Estates, to divisions, just to go out have a look, walk the areas and then to update. So it was just literally on a whiteboard (PN9)*
>
> *So there was a battle rhythm of…people to come back as they were coming on site and for fire and certainly in the early part silver had set up a rhythm of trying to, desperately trying to find this information of what we've lost and where we'd lost it (PN12)*

Shared Risk Assessments: Using the pooled knowledge of different agencies allowed the Commanders to establish quickly a shared understanding of risks directly linked to the incident. Commanders treated other agencies as being 'trusted assessors' of risk in these incidents, but would quality assure internal requests and actions .

> *So I asked and I remember this distinctly, how much risk is there in terms of the people that are in there in terms of exposure? Are we certain that the people in there have not been exposed? And by and large they were certain of that and a risk assessment had been completed at the same time by the fire people. So they had completed a risk assessment that was talking about those aspects of how the situation had been managed and they were kind of scoring that as they were going along (PN2).*
>
> *The police had when they were doing the sweep did say to us that they were reasonably comfortable there was nobody else involved but they felt that they couldn't take the chance to take, so there was a bit of reassurance going on there but they still had to go through the process kind of thing (PN4)*
>
> *I was being asked was to declare a major incident and I said no as it doesn't fit the criteria for major incident and ship all patients out to another hospital which I knew that was not going to be a very palatable or even feasible situation when other hospitals were at…level 4 and I think that would be very difficult to do (PN8)*

Communications: Communications, both internal and external operated as a significant focus for commanders during the respective incidents. Commanders experienced a requirement to inform the rest of the organisation about the incident, particularly in response to version

control of messages, whereby staff might be working on information or assumptions that had since been revised and amended. Huddles both within each organisation and between partners on site were used as a vehicle to gain and disseminate information. Communication with external players such as commissioners or other providers would occur through formal, prescribed routes and through unofficial ones. The former were the vehicle for the organisation to project the hospitals needs and wants to external partners, while the latter would often involve other hospitals who had heard about the incident and were seeking to assess the impact on them (rather than necessarily offering mutual assistance).

> *Somebody had been on the phone and said is there a major incident…I'll tell you who it was, it was one of the managers on call at [another hospital Trust] who asked is there an incident escalating at XXX as we've seen it on Facebook and we understand that there's going to be ambulance diverts to [the other hospital trust], so they said is something going on? And I said there is something going on at the moment, but it is being managed (PN2)*
>
> *Our role was trying to get communication to our teams, in terms of all the wards and departments, because we had to have a method of putting one thing out to say this is happening or you know how we can do that, so I liaised with our press officer in terms of they were certain to get interest from the media as well as the morning went on, in terms of giving statements to what was happening (PN3)*
>
> *It's communication really, I think in those incidents…. I have been involved in fire incidents mainly where communication is poor, you're just getting that information. We didn't get too much feedback on that morning but people felt…they did feel that they had been communicated with but its sort of …. I think the team on level X, you know where it happened…I think they would have liked to have…seeing people sooner than they did, but they did understood why we couldn't go up there that kind of thing, yeah….(PN4)*
>
> *How do you get the message out without scaring them but getting them to take the message seriously enough…and how do you work out how can I tell them what they can and can't do….cos some of that is kind of in your head you know what you would do if you were down there but it's hard to be specific with people if you're not the one facing the person at the front door, isn't it. So that for me I think was the hardest bit (PN6)*
>
> *We had internal comms and desktop alerts saying to consider which patients need imaging – only refer for urgent cases – then we sent out further comms as we got access back to the system (PN8)*
>
> *I think it's about those comms going out and again it's not about alarm bells or panicking people but just making people aware that there is an issue externally, what do we need to do locally first to mitigate any risk and obviously if locally then….because the experts are going to be the people in that area of actually this is a higher risk area for example respiratory so if they were going to do a drainage on a patient but using clean water from a tap could it been an effect (PN9)*
>
> *At times communication did not flow downwards in the correct pathways and some staff felt that they were not informed of discussion or decisions (HIN1)*

> *The result was that communication at the time of the incident was virtually impossible and therefore leadership appeared to be impossible. In order for things to work better we would need to establish hierarchies of communications and ensure that communication equipment worked throughout the hospital areas (HIN3)*

Establishing the Boundaries of the Incident Response: Commanders described themselves as taking very few decisions, but that they saw it more as a process, particularly with regards to communication across the organisation and external partners. The key decisions made (predominantly early in the incident) related to whether they should attend the site (which was governed by the assessment of the time to get in and the response already enacted as well as the management resource on site or coming in); deciding and declaring whether it was a major / critical incident (commanders wanted to gather information before making this call but saw it as a key role if an incident had not already been declared); getting a divert of ambulance activity away from the hospital; gaining an understanding of how long the response to the incident would affect the hospital, whether the hospital / incident should be stood down and how the communications would be handled.

> *So, so, yeah, I didn't think to go or perhaps I just made a decision not to go because there was probably enough people gonna be on it. If it had been in the middle of the night then that would have been different and I would have gone, but I suppose like with people and other managers coming in at that time I didn't feel it was necessary for me to be on site (PN1)*
>
> *So I never at any point…felt that it was out of control…it never felt at any point where I didn't know what was going on, that there was any uncertainty...does that make sense? Did I make any decisions...? I don't know, I don't think I did that I can think of…key decisions…I don't think that I did… I never felt in that incident that I was in overall charge, and if you think it through logically, why would I? I have no …knowledge of how to manage a chemical spillage…I absolutely have no knowledge in terms of how to manage query an terrorist incident…that's not…that's not what I do… (PN2)*
>
> *It's really interesting, and yet…now I'm just thinking, bloody hell I don't do any management at all, but it's a completely different scenario from what I would do in any other context, I'm just thinking about a set of meetings I was in yesterday, and it is about you are a little bit more…directing, you have a very clear idea of some circumstances around what I want people to be doing this was very different to that, really different to that (PN2)*
>
> *You know the decisions were about when to communicate, how we communicated to the staff, and externally, so it was the thinking and decision process about how we managed our communications to give the organisation and the public that sense of control and management. That was important (PN3)*
>
> *Yeah, yeah…Not an awful lot really. I mean to be honest I thought I was really what I was that day was communication really, that was most communication going through me and just making sure*

> *that our teams are okay, they were aware of what was happening. We had to tell everybody to stay within the wards, not to go, and you know keep yours locked etc it was all that kinda communication that going out over the bleep system as well, making sure that was happening and making sure the communication up and out was happening, so it was mainly…I don't think I had to take, you know…like I've been involved in a fire or you know, you start getting ready to…to..to…get out of wards, where perhaps more decisions have to be made…. I don't feel I made an awful lot of decisions, I felt I had a lot of communicating that morning actually…instead of decisions around what was happening with the….. the…. Police (PN4)*
>
> *You can take what the police tell you at face value in that situation, you act and then investigate, don't investigate and then act…and so it was...once it got here and we said we act and then we investigate so we'll lockdown and then we'll enquire…don't wait to find out more details before you lock down as we don't know how close that threat is …so that was one learning point for us and one of the things that we have put into the new lockdown plan is an immediate escalation procedure that clearly tells them that if that instruction or advice comes from a reliable source, as in one of our emergency services, then response to that, activated it and then we'll investigate what exactly is going on...so we've kind of turned it around a bit as a result of that, so there was some learning out of it…(PN6)*
>
> *Can't think of any [key decisions]…Whether it was a major incident…? The discussion at Tactical was about things that they needed to cover (PN8)*
>
> ***Interview Note***: *PN10 had discussions with the Fire Service, but the discussions were about keeping it at a level of incident to avoid escalating it too high externally, as this would run the requirement to inform the ICB and then have to escalate and report to them and PN10 felt that he didn't have the time to do so (PN10)*
>
> ***Interview Note***: *So in terms of decisions through thinking through the silver decisions that were made in that initial stage, there would have been, they didn't make the decision to evacuate 'cause that had already taken place. But they were then dealing with the we can't go back in. So they're confirming that decision and then saying, right, this is where we'll decamp to (PN12)*
>
> *Key decisions made at tactical command:*
> - *List the water supply dependent treatments*
> - *Comms out across the organisation about flushing water taps – who and when to flush*
> - *Water pumps – check the pressure*
> - *Recommence water flow*
> - *Check with the water suppliers*
> - *Check any issues with XXX*
> - *Social media: get some positive external statements agreed as there were already messages on social media about the water supply at the hospital being down (HIN4)*

The act of making a decision by the commanders served the function of creating certainty when there was a lot that was unknown. In addition, they were also able to respond to specific queries from departments and individual staff helping to create certainty for them as well.

> *At this stage we still didn't know what we would be asked to respond to, how many we would be asked to respond to, so in the absence of that knowledge, and in the knowledge that we would be*

> *the major receiving centre, we immediately asked for a hard divert of any medically inbound patients from GPs to XXX (PN3)*
>
> *Stand down…we probably kept the incident going for too long, but we didn't know what was happening on scene or the full dispersal arrangements (PN5)*

Frame of Reference Used by Hospital Commanders: Commanders were all aware of the respective organisation's Major Incident Plan, but they did not all use it in a structured way during the incident. Where the incident was declared as a major incident then people would refer to the Major Incident Plan and the action cards; where it was an evolving, emergent one, people would initially use neither the plan nor the action cards.

> *The discussion then was about the impact on patient harm...they were looking at the implications for patient care. This gave 2 areas of concern: HSDU and Endoscopy washers. There were no staff or patient care impacts, but the team were checking this out (PN7)*
>
> *We used the command structure to talk through the issues and also considered the initial BCP around water loss…but it was more about the generic command and control process driving things than the BCP (PN7)*
>
> *Yes, there was nothing in terms of script saying this needs to be checked, go out and check….it was more of assurance; go out to your wards, is there a problem, if there's a problem scope the risk, what can we do to mitigate it, and then obviously feedback and escalate if further support is required (PN9)*
>
> *So, these were the areas I kind of prioritised knowing the environment and knowing the calibre of high risk patients on which medical wards, so I based it on that, but again it was kind of an individual knowledge and experience rather than being told you need to go to, target, Ward XXX first….(PN9)*
>
> ***Interview Note:*** *PN11 knew he could talk to the COO if he had a problem, and he did initially during the incident. PN11 had received a basic briefing when he started on call 12 months ago but he felt his knowledge hadn't improved since then despite being on call several times (PN11)*

Even where the Major Incident Plan was being used, it did not respond to all eventualities and formed the basis of a checklist to clarify omissions rather than a prescribed set of universal actions.

> *But those decisions were largely not entirely decisions either, because it's all set out in the plan. So the day surgery unit next to ED is always going to be minors and you are going to divert minors into there…some elements we haven't set out in the plan actually because we've recently changed some of the clinical architecture, you know the clinical services have changed recently, so it meant we had new capacity that gave us a bit more safety and stability in terms of our response, probably enabling us to clear the emergency department more quickly than we would have been able to do… because God knows we didn't have enough beds on a Saturday morning to do it. So it was clearing two other assessment units where patients could be held safely (PN3)*

> *And there's always a bit of paper to pick up to say have I done this, have I done this and tick it all off, yeah…It's almost like a checklist really your action card, it's just a checklist later on of did I do everything (PN6)*
>
> *I think it's like when we're teaching HMIMs around the country and around the world, we spend a lot of time saying you know, nobody can write you a plan that is fit for all hospitals, cause every hospital is different, every scenario is different…it depends whether it happens at 3 o'clock in the morning or 3 o'clock in the afternoon , it depends whether you're full when you start or empty when you start. You can write the best plan in the world but it can't be fit for every single set of circumstances that might be the starting point for that incident. The starting point when you're already full in ED with ambulances queuing and no free beds, is very different from starting at 3 in the morning is very different from starting at 2 in the afternoon when you've got a fair few empty beds and ED is ticking along nicely…it's completely different starting points, aren't they…. (PN6)*
>
> *We got them to use the documents and BCPs that they already had…People were giving a narrative without enough understanding. We got them to check the documents to work out a plan and priorities. They underplayed it…they didn't judge it correctly. Thinking that this wouldn't have an impact on pathways of care was a little naïve…We had to oversee the minor details of their response as there were no details of what they wanted to do (PN8)*

Challenging Prior Assumptions

Commanders found themselves having to implement a response in a context which had seen a collapse of many of their assumptions about how they perceived the preparedness of the hospital and its staff to deal with the incident as well as their understanding of what should be happening.

Why are there gaps in organisational preparedness? At times there was a sense that tactical command was having to pick up problems that should have been addressed by the organisation as part of its approach to business as usual

> *The learning is around identifying when there are issues with the water…the alarms weren't working and also XXX [Water Company] didn't realise that the mains were feeding a hospital. (PN7)*
>
> *We did not know where all the water issues were across the hospital – there were no maps – it was only when they looked at the BCP for water that they saw some maps that they used (PN7)*
>
> *I was surprised by the lack of knowledge that you can run a service but not know the BCPs. If you are looking at operations you should be looking at your BCPs side by side. The [manager] recognised that he had recently started in the service and had dived into solving problems (PN8)*
>
> *The 3rd party stored records in backup but there wasn't any monitoring tool. In that meeting we identified a load of pre-existing problems. The learning is links with IT routinely and understanding the BCP (PN8)*
>
> *Where is the manual for basic incidents like this? If it has happened before then why didn't the organisation write the contingency plan? (PN11)*

> *Training for on call is not good...people don't know what they should be doing, whether they are the manager or director on call (PN11)*
>
> *Some plans on walls were slightly out of date because we've had this certain urgent treatment centre put on the front of our emergency department (PN12)*
>
> *And so the first room that we went to, which was gonna be designated as a gold control room, that was full of office equipment. And the door was locked. So it had been turned into an office. We then moved down to our major room, which we would use. And not only was it locked, somebody changed the combination, but it was being used for COVID vaccines (PN12)*
>
> *The evacuation plan did not reflect the current building works which caused issues regarding moving patients (HIN1)*
>
> *O2 and Nitrous Oxygen was leaking – staff did not have access to information of the location of all isolation points are and where the zones are. Estates colleagues were unaware how far it would affect the hospital if the gas was isolated (HIN1)*
>
> *There were no clear routes out of the hospital, lifts were out of action, no ski sheets on beds (HIN3)*

Changing nature of the command and support framework: Each organisation involved in the incident played out its own logic with regards to participation and would vary its input accordingly. This meant that the composition of the response infrastructure was dynamic.

> *The police knew that at the moment it was an unknown and potentially escalating situation they had to contain that within the context of what they knew and as the information changed, so their response to it changes...and so the numbers changed at one point we were left with just 2, the 2 officers that were left on site who were basically keeping an eye on this individual in A&E (PN2)*
>
> *Nobody actually truly understood just how devastating that fire was. Everybody assumed it was a bit of wiring or something. We've had a.... in the past... that trust has had some of the fluorescent lights, the ballast in the present lights go so that the ED staff are quite used to evacuating and the fire service saying, right, everything's good. You can go back in 20 minutes later, but...So the call was made on the fire service when the fire service said...You're not going back in (PN12)*

Why is this (not) happening? In direct response to the incident, things were happening (or not happening) that surprised the commanders.

> *I was surprised that people in other services with experience in incidents did not offer up their services or advice from their past. The person that had seen XXX in the queue had lots of experience but just seemed to be a bit removed from it. It made me think what are the relationships in that department? They had some information but didn't use it (PN8)*
>
> *The evacuations and to some extent the repatriation appeared chaotic and it seemed that this may have been happening without central instruction and wards were making their own decisions (HIN3)*

> *Child Health advised they received notification to evacuate via a porter that came into child health. XXX advised she would need to re-interview some of the portering staff, as none of them had said they had given any areas the order to evacuate (HIN3)*

Unexpected Exacerbating Events Arising from the Incident: Commanders reported being struck by the unexpected, such as media appearing on site at a very early stage of an incident, staff posting messages on social media provoking responses external to the trust while personal experience of dealing with an incident in one part of a hospital has led to cancellation of surgery or evacuation of clinical areas in other unconnected parts of the Trust concerned, due to local interpretation of information coming from a variety of sources

> *I don't know why but up until that point I hadn't even considered that the media would be interested at all, and blow me down, we've actually got media on site, crawling all over the site then suddenly and that kind of aspect management forgetting about the incident for a second, there's all of the other, the peripheral stuff as well that actually sort of shakes out of it (PN2)*
>
> *So they said OK we're gonna have to do a sweep, but they weren't… they weren't willing to do the sweep and I think that was probably the scariest first…. that first 45 minutes, coz they…nobody was absolutely sure that he had left the hospital and wasn't still on site and they wouldn't go any further in terms of looking for him, because they didn't have the armed response units there on site kind of thing you know (PN4)*
>
> *So the biggest kind of lessons learnt from my perspective was…it wasn't just about the flowing of water….when I actually went to Endoscopy, the risk we had there was there was flowing water, but what we found there was that there was an air block in the pipes which was still reducing the water coming through and we had scopes in the Endoscopy stacker so it wasn't just a matter of tick box there's water flowing, it was actually looking deeper then….in that area now what's going to happen? We need the scopes cleaning. We've got patients we've got emergencies, we've got sessions going on (PN9)*
>
> *There was an incident with a patient on XXX with chest pain and couldn't use the lift; but it was resolved by the medical team on site, however they were looking for a contingency plan involving the HART service within [the ambulance service] to get a stretcher up there (PN10)*
>
> *But we do have and I'm sure every site is the same we have certain people who will just go and put their head down in an empty room somewhere. We'd never considered that….but that was one big thing we [were] giving a big tick to the fire service saying it's completely empty, everybody's accounted for, but actually one of the other…departments turn[ed] around said well actually we could have had somebody sleeping in there. We could have had a lone worker in [PN12]*
>
> *The fact that the lifts couldn't be used although that action was overridden because…I'd realized the lifts right in the centre of the hospital, which way is probably it might be 1/4 of a mile away. So …I'd asked the fire service and said, hey, can we still use them? And the fire service said yes. So that made life a bit easier as well for decanting patients (PN12)*
>
> *There were some lone workers on site but their exact numbers and locations were not known – they could have been incapacitated by smoke or flames and not accounted for (HIN1)*

> *The passage of smoke through ducts rendered the parallel horizontal evacuation system which has been discussed in fire briefings non-viable because adjacent areas were all filled with smoke. We either need to have a solution to stop smoke travelling through ducts systems or we need to rethink our evacuation plan (HIN3)*
>
> *We have to assume that the decision to move patients out of the building was a result of the lack of clarity in decision making alongside the inability to communicate effectively to all areas. Where plans are in place for operational areas they detail highlighted internal holding area according to the XXX Fire Officer. These were either not part of evacuation plans or were not used in this incident for reasons unknown (HIN3)*

Being the Conscience of the Organisation

Thinking about the whole: Commanders were clear where their responsibility lay, and this was around the principles of ensuring the safety of patients, staff, the hospital and the wider public, as well as providing leadership for the staff. They felt that they did not have to oversee every huddle to achieve this.

> *Staff safety, patient safety, site safety. That's where I felt it lay. So whether that be patients coming onto site, whether that be patients that we had in A&E, or whether it be the staff within A&E or elsewhere (PN2)*
>
> *I felt it was a joint thing but this incident would probably be led by the police because they're, having to….the ambulance turned more to me I think because it was our hospital where it was happening but I suppose I in turn would have turned to the police as well because they were in charge of the…but I suppose from my perspective I had to understand how that affected the…how the hospital was running how we were doing and diverting services etc and like I spoke to the neighbouring trusts to explain to them what was happening so that they understood as far as (PN4)*
>
> *My first instinct was get that ED front door locked and get somebody there so the patients that need to come in can get in and the one that we don't want in, can't (PN6)*
>
> *We drum into people: are the patients safe, is the site safe, are the staff safe? If it's not safe, you've got to do something now. You can go and grab your bit of paper later, but your instinct will tell you what to do with patient and staff and site safety (PN6)*

Commanders also reported having to consider the impact of this incident on the needs of patients in the rest of the hospital and about when the organisation would start returning to business as usual in order to deal with potential patients.

> *and it then becomes a how quickly can we get back to normal given the fact that we don't need to completely decontaminate the entire area although we did have a cleaning team who were asked to come in anyway. But we're not in a situation now where we're having to get people coming in in hazmat suits to completely strip down the whole place that could take hours, we could get back to some normality relatively quickly now…and then you start, is relaxing the right word? (PN2)*

> *I suppose the step down bit is when it becomes business as usual, so you have the changeover (PN2)*
>
> *and we then started to do some thinking about the closure of the event before, as the patients were starting to arrive, what's the likely consequence of this overnight and tomorrow morning about continued de-escalation of ED as we roll through Sunday and into Monday and that formed some planning as well (PN3)*
>
> *So how we would get back to business as normal then, you know that sort of side of things end, you know so that was just discussions with [ambulance service] so in some ways it sorted out our bed situation that morning as all our patients were sent off elsewhere (PN4)*
>
> *And then our next step would have been to declare critical internal so that we could enhance that command & control structure so that we could get the individuals involved and look at what are we doing about the next set of patients to turn up, what are we going to do…what if there's visitors. Because we've still got some visiting, we've got end of life visiting, patients with disabilities and maternity still going on and so we would l have then declared to enable us to manage those ongoing processes, but before we got to that point, they were able to ring and say we've accosted the assailant, you can stand down (PN6)*
>
> *So, what we had to do was prioritise walk through the areas so obviously I took the Division of Medicine to make sure first from Endoscopy and for Cath Lab where they needed clean water were they in the middle of procedures was that still happening, if not what was the contingency, have we got bottled water in the remote area. So that was more of a high priority, what have we got, what was the contingency. Second to that was the wards. Are the wards aware, have they got clean water functioning, is there an issue there? (PN9)*
>
> *We need the scopes cleaning. We've got patients we've got emergencies, we've got sessions going on (PN9)*
>
> ***Interview Note:*** *PN10 was thinking about the credible worse case and the next 12 hours, but at the same time there was a lot of assurance about the impact and the duration of the incident from the site team (PN10)*

4.5   Discussion

The findings focused on what the tactical commanders were doing during the incidents concerned, but there was less emphasis on how they were doing it. This may have reflected availability heuristics in that what they did was often present in the outcome of events, whereas how this was done may have been more complex and challenging for participants to consider. This led to an interesting tension between understanding the complexity of how decisions were made, compared to the linearity and positivistic approach inherent in identifying what the commanders did. The research provides a level of analysis about how commanders perceived decisions to be made, but it recognises the limitations within this. Future research design looking at how decisions were made, may need to focus on different means of addressing the aspects of complexity that this research has identified.

4.6   Conclusions

The field work identified a set of task-based requirements for tactical commanders. Participants described a series of challenges and requirements as part of the role of tactical command.   The continual comparison of data, use of memos and research interviews highlighted the position of commanders, who were faced with high levels of uncertainty and were expected to pick up a leadership role with significantly raised levels of personal accountability while operating with a scratch team composed of internal and external staff. Commanders were not highly trained in responding to these types of situations but were aware of requisite structures and processes and they had a keen sense of core role responsibility which acted as a dominant frame of reference.   In these circumstances they were aware that they were not in a position to influence micro-operational decisions across the organisation and had to function in a coordination and support mode.

The key requirements that were constructed with participants are outlined in Table 11.

Table 11: Key requirements for commanders during an incident

Tactical commanders had to:
Adjust to a new set of working arrangements which completely change the environment they are used to working within
Assume a greater degree of personal responsibility
Adapt to the cultural impacts of: • Locally initiated responses   • Expectations of others about their role   • Operating in a realm of uncertainty   • Embracing normal chaos   • Working with other organisations, .4accommodating their needs and learning to speak their language
Accept that greater uncertainty requires greater emphasis on a 'Reassurance' model
Give the organisation the means to operate in the midst of uncertainty, by absorbing accountability for others: • Being available if required

- Symbolising the existence of order and creating the framework within which people are operating, whether they use this structure directly or indirectly (by taking reassurance form its presence)
- Facilitating decision-making
- Clarifying the 'ask'

Create a single version of the 'truth' around which the organisation and partners can orientate their response
- This sense-making is for the benefit of the internal organisation initially but then focused on the external audience
- This involves setting the boundaries for the incident response

Operate as the conscience of the organisation
- Ensure safety for patients, staff, wider organisation, public
- Constantly check the boundaries for the incident response

This started to shape the development of a theory of tactical commanders' response. The focus on safety as one of the first principles of response suffused commanders' response. It was more apparent when there was less certainty about the nature and impact of the incident but nonetheless was implicit in more structured events. This was represented in the coding as being the conscience of the organisation. It was the core of their response and the other themes identified earlier appeared to be directed towards this end. Figure 6 illustrates the emergent theoretical categorisation at this stage of the research. As the next chapter outlines however, there was a requirement to contextualise this within what was already known about decision-making, in order to support the construction of a theory around tactical command.

Figure 6: Core Components of the tactical commander role

Tactical Commander

- Navigating an unfamiliar landscape
- Effecting a cultural change
- Seeking reassurance
- Challenging prior assumptions
- Being the conscience of the organisation
- Absorbing accountability
- Emerging from the pack
- Constructing a single version of the 'truth'
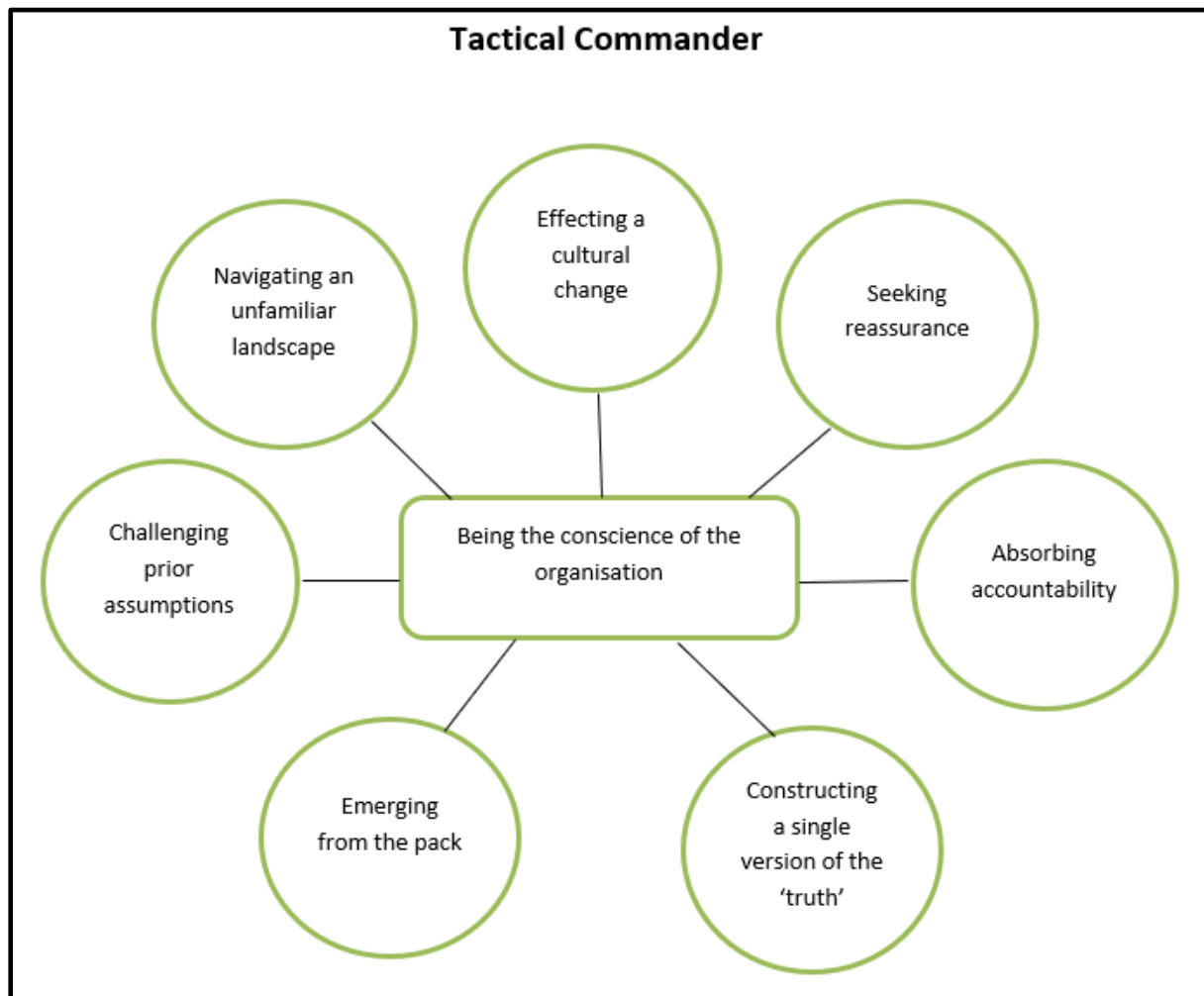
Chapter Five: Theoretical Sensitisation

5.0   Discussion of Findings

In order to advance the construction of theory, a broader range of literature around incident command and decision-making in a crisis was considered. The themes arising from the research were reviewed critically, whereby the literature was not used to verify the new theory, but to enrich the research and demonstrate how it added a new dimension to existing knowledge (McCann & Polacsek, 2018).

One of the key impressions gained from the coding was the complexity of the environment within which the tactical commanders were operating during an incident. This manifested itself in the theme of 'Challenging Prior Assumptions'. I felt that it was important to understand the context of tactical command, as this grounded the actions of the commanders themselves. The theoretical sensitisation thus focused on understanding complexity and in particular the way that hospitals as complex systems responded to a crisis. Against this background I then sought to consider the themes arising from the coding as well as the emergent learning about leadership during Covid. This research was undertaken during the first and subsequent waves of Covid-19 in 2020-21. Although Covid did not manifest itself as a sudden onset major incident, participants in this research often reflected on their experience of managing through Covid and it operated as the prism though which they viewed the major incident that was included in the research. As such it is important to identify some of the key challenges to leadership within health services that Covid was perceived as raising and to consider their relationship with sudden onset incidents.

5.1   Understanding Complexity

Charles Perrow in 'Normal Accidents' stressed the complexity of many organisations whereby the degree of tight coupling and interactions between components could lead to unintended and unpredicted consequences (Perrow, 1984). This view cautioned against an oversimplistic approach to cause and effect within complex organisations.   As part of this research, the analysis of the interviews and incident documentation combined with the construction of

theory, led to an insight that the tactical commanders were operating within a very complex environment. They were often responding to ill-structured events and dealing with large amounts of uncertainty, where individual units within the hospital were acting (semi-) autonomously in response to threats that they perceived. The commanders were dealing with a multi-layered situation where they were confronted with a multiplicity of impacts and responses across the same organisation.

I sought to understand more about theoretical interpretations of this level of heterogeneity and complexity within an organisation, and how it could impact on the response to an incident. The following section reviews complexity within the context of hospitals.

Hospitals as Complex Adaptive Systems

Healthcare is a complex adaptive system (Boustani et al, 2010; Kuziemsky, 2016; Jordon et al, 2010; Lane et al, 2021) within which hospitals operate as complex organisations / systems (Khalil et al, 2022; Therrien et al, 2017). Hospitals are made up of agents or teams which may be viewed as complex adaptive systems themselves (Gear et al, 2018; Jordon et al, 2010; Plsek & Greenhalgh, 2001; Pype et al, 2018; Sibthorpe et al, 2004; Sturmberg & Bircher, 2019; Wilson & Holt 2001). A complex adaptive system displays properties such as emergent behaviours[8], non-linear processes[9], co-evolution[10] and simple rules (Kuziemsky, 2016). It is a dynamic and flexible network collection of semi-autonomous, competing and collaborating (Boustani et al, 2010) agents with freedom to act in ways that are not always totally predictable, and whose actions are interconnected, so that one agent's actions change the context for other agents (Plsek & Greenhalgh, 2021; Wilson, 2001). In healthcare, agents may include clinicians, patients and administrators, as well as medical processes, functional units such as nursing (Sibthorpe et al, 2004) or collectives such as a healthcare organisation (Gear et al, 2018). Agents' actions are based on internalised rules which need not be shared,

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[8] System-level properties, characteristics and patterns emerge from interaction between individual elements at a micro level, even though the individual elements bare no similarity to the final wider system characteristics (Coetzee et al, 2016)

[9] The size of inputs into a system might not be proportional to expected outputs; small variables in a system might fundamentally change the operation of a system whilst major variables might have no impact in changing the system (Coetzee et al, 2016)

[10] Systems are embedded within other systems and co-evolve in that the evaluation of one system influences and is influenced by that of other systems (Plsek & Greenhalgh, 2001)

explicit, or logical when viewed by another agent and do not need to be fixed (Plsek & Greenhalgh, 2001). Agents interact and co-evolve in non-linear ways with their environment (Boustani et al, 2010), with patterns emerging as they deploy simple rules from the bottom-up without external control (Martin, 2018).

Further features include aggregation, whereby individuals in complex systems arrange themselves into sub-groups that have similar interests, needs and practices, and which interact at multiple levels with different sub-groups (Coetzee et al, 2016). The interconnected components are highly interactive and interdependent and generate unexpected and unpredictable effects (Therrien et al, 2017). Small changes may lead to big effects when the initial change is reinforced by other agents and equally, big changes may have little or no effect when change is undone by other agents (Gear et al, 2018).

Complex systems typically have fuzzy boundaries (Plsek & Greenhalgh, 2001; Sibthorpe et al, 2004; Sturmberg & Bircher, 2019). The boundaries between agents within systems and between systems are open and complex (Sibthorpe et al, 2004) where membership may change, and agents may simultaneously be members of several systems (Plsek & Greenhalgh, 2001).   As a system becomes more complex, the number of components and interactions between each component increases both within the system and between the system and its environment (Kuziemsky, 2016).   Feedback loops between agents and between systems generate both change and stability in a complex adaptive system (Sibthorpe et al, 2004) by either enhancing, stimulating, detracting or inhibiting elements within the existing system (Coetzee et al, 2016).   A central outcome of relationships among diverse agents in these systems is that the agents learn (Jordon et al, 2010), thus the agents and the system can adapt behaviour over time (Plsek & Greenhalgh, 2001).

Implications for Hospitals

If hospitals are considered as complex adaptive systems, this in turn will influence appreciation of the challenges of leadership and perceptions of the (collective) actions of an organisation. Examples of how the complex adaptive system framework could be used within healthcare leadership include approaches to the implementation of change in health care delivery (Boustani et al, 2010), undertaking research within healthcare (Gear et al, 2018;

Jordon et al, 2010), understanding different levels of system complexity (Hallo et al, 2020), understanding healthcare organisations (Kuziemsky, 2016; Plsek & Greenhalgh, 2001), working with and understanding healthcare teams (Martin, 2018; Pype et al, 2018), and policy development (Sturmberg & Bircher, 2019).

Traditional conceptual models of the health care delivery system often portray the health care system as a machine with replaceable parts and predictable behaviours (Boustani et al, 2010). This view assumes that stability is the natural state of these organizations (Boustani et al, 2010) and warrants mechanistic management theories to drive them. In this context, a focus on hierarchical command and control mechanisms (Funderburk, 2004), considering parts of the organisation in isolation, specifying changes in detail, battling resistance to change, and reducing variation will lead to better performance (Plsek & Wilson 2021). In contrast to this 'reductionist' perspective (Plsek & Greenhalgh, 2021; Sibthorpe, 2004), complexity thinking suggests that relationships between parts are more important than the parts themselves, and that minimum specifications yield more creativity than detailed plans (Plsek & Wilson 2021). This leads to a focus on local critical nonlinear relationships that produce unpredictable behavioural patterns (Boustani, 2010). Treating organisations as complex adaptive systems would stress decentralized flexibility and continuous learning (Funderburk, 2004) and allow a more productive management style to emerge in health care (Plsek & Wilson 2001).

Thinking in terms of complexity means that there is less focus on resolving all the unresolved issues but an acceptance of counter-intuitive impacts (Funderburk, 2004), inherent non-linearity, unpredictability and patterns as well as recognition of inherent self-organisation through simple locally applied rules (Plsek & Greenhalgh, 2001). In comparison, the inability to account for surprise, creativity, and emergent phenomena is the major shortcoming of reductionist thinking (Plsek & Greenhalgh, 2001). Leadership in a hierarchical system relies on power, command and control, whereas leadership in a heterarchical system is based on collaboration, respect, learning from each other and measuring of outcomes (Sturmberg & Bircher, 2019).

In order to understand the specific responses of a hospital with regards to a sudden onset incident, a qualitative systematic review was undertaken as outlined below.

5.2 Systematic Review: How does a hospital (as a complex adaptive system) respond to sudden unexpected pressure?

Focus of the Review:

This second systematic review was undertaken as part of the iterative process of the research. It sought to explore ideas that were emerging from the fieldwork about the context of complex organisations, and to understand the level of or gaps within existing knowledge that could support theory development. With hindsight, one might question the rigour of the initial systematic review, however Constructivist Grounded Theory has a pragmatic orientation, and this was part of the process of gaining a greater understanding in order to construct theory.

The systematic review was concerned with how hospitals as complex adaptive systems responded to a sudden incident / significant event. The initial systematic review in this thesis had focused on how hospital tactical command(ers) responded to an incident. On this occasion the emphasis was on understanding the environment within which tactical commanders were operating during a critical or major incident. The field work and theory construction gave an insight into how the commanders were operating but it only gave inferences into the context that they were facing. This systematic review sought to comprehend the types of reactions and responses of a complex system to a significant sudden (internal or external) threat.

As outlined for the systematic review outlined in Chapter Two, this analysis used the framework of Patient / Intervention / Comparison / Outcome (PICO) (Richardson et al, 1995) as formatted into a checklist by Walsall Healthcare NHS Trust (2019). This is included in Appendix 18. The focus of the literature search was to identify articles that firmly placed hospital response to a critical or major incident in the context of complex systems.

Information sources:

The review was undertaken in November 2022. The search was made using Open Athens and the search options available through the NHS Knowledge and Library Hub. It used the following databases: AMED, British Nursing Index, CINAHL, EMBASE, Ovid Emcare, HMIC, MEDLINE and Google Scholar. In addition, the use of citation indices enabled more recent articles to be explored for relevance.

Search Strategies

Full search strategies: The keywords used included 'complex organisation*', 'complex organization*', 'complexity', 'crisis', 'crises', 'threat*', 'danger', 'incident*', instability*', 'risk*', 'reaction*', 'hospital*', 'health*'. Boolean operators, thesaurus and explode functions were used.

Units and restrictions: The eligibility criteria in this search meant that the following reports were considered:

(1) published in English;

(2) published during the period January 2010 to February 2023;

(3) had been subject to peer review or prepared for academic presentation;

(4) described hospitals as complex (adaptive) systems

(5) described the impact of sudden onset crises (actual or exercises) affecting hospitals;

The exclusion criteria applied were:

(1) Slow onset incidents;

(2) grey literature

Critical Appraisal:

As identified in the systematic review in Chapter Two, this review was undertaken by a single-handed researcher which presented risk of bias. To mitigate this risk sources had to have been peer reviewed or prepared for academic presentation. Articles were assessed using the evaluation tool for qualitative studies (Long, 2018).

Managing records

There were 136 articles originally identified. These were screened using the same methodology as outlined in Chapter Two. The inclusion / exclusion criteria meant that slow onset incidents (such as Covid) would be excluded, however within the response to these types of incidents there may have been sudden exacerbations or acute crises, which meant that they did meet the inclusion criteria. There were 6 articles that were considered as part of this literature review (Figure 7).

Figure 7: PRISMA: Hospitals as complex organisations responding to sudden unexpected pressure

PRISMA 2020 flow diagram for new systematic reviews which included searches of databases, registers and other sources

Identification of studies via databases and registers

Records identified from:
Databases (n = 124)
Registers (n = 0)

Records removed *before screening*:
Duplicate records removed (n = 5)

Records screened (n =119)

Records excluded (n = 46)
Not Hospital (n = 46)

Reports sought for retrieval. (n = 73)

Reports not retrieved. (n = 1)

Reports assessed for eligibility (n = 72)

Reports excluded (n = 68)
Not sudden onset health incident or exercise (n = 23)
Not Complex Adaptive System (n =19)
Not response / exercise (n = 26)

Identification of studies via other methods

Records identified from:
Citation searching (n = 12)

Reports sought for retrieval. (n = 12)

Reports not retrieved (n = 0)

Reports assessed for eligibility (n = 12)

Reports excluded (n = 10)
Not sudden onset health incident or exercise (n = 5)
Not Complex Adaptive System (n =2)
Not response (n = 3)

Studies included in review (n = 6)

From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71.

Descriptive Analysis

Research Methods: The papers identified for inclusion in this systematic review did not outline a research paradigm, although the methods were described (Table 12). Reviews of literature were most common, however there were two case studies which used interviews with staff and document analysis as part of the methods being adopted.

Table 12: Research Methods

Methods outlined in the 6 papers	
	Number
Literature Review	4
Document Reviews	2
Interviews	2
Case Study	2

Location and types of incident

There were no UK hospitals which were specifically identified, however some of the reviews considered aggregated data on a worldwide basis (Table 13)

Table 13: Coverage of articles

Geographical Zone	Papers		Types of Incident
Israel	1		Service disruptions
Netherlands	1		Covid
New Zealand	1		Covid Earthquake
Worldwide	3		Covid Earthquakes SARS H1N1
Total	**6**		

An overview of the articles is included in Table 14

Table 14: Overview of Articles used in the review

Article	Title	Type of Source	Research design	Focus	Key themes
Branlat & Woods, 2010	How do Systems Manage Their Adaptive Capacity to Successfully Handle Disruptions? A Resilience Engineering Perspective	Symposium paper	Literature review of hospital response in the context of CAS	Includes a section on responses within the Israeli healthcare system	Adaptability and adaptive behaviour
Gifford et al, 2022	To Uncertainty and Beyond: Identifying the Capabilities Needed by Hospitals to Function in Dynamic Environments	Research paper	Document review & interviews in hospitals	Case study of five hospitals in the Netherlands during Covid-19	Highlights the need for hospitals to become more flexible in a crisis without sacrificing efficiency
Khalil et al, 2022	What is "hospital resilience"? A scoping review on conceptualization, operationalization, and evaluation	Peer reviewed paper	Systematic literature review	Hospital resilience in the face of Covid and Earthquakes	Rapid Adaptive Capacity: How hospitals adapt to maintain operations and functionality
Lloyd-Smith, 2020	The Covid-19 pandemic: resilient organisational response to a low-chance, high-impact event	Peer reviewed paper	Case study drawing on earthquake response	Hospital response to earthquake in New Zealand	The quality of response depends on healthcare systems' capacity to loosen control and, subsequently, enhance improvisation
Therrien et al, 2017	Bridging complexity theory and resilience to develop surge capacity in health systems (SARS, H1N1)	Peer reviewed paper	Paper relates insights from resilience research to complex health systems	Lessons from SARS and H1N1	Dual objective of activating surge capacity and maintaining other essential services
Wiedner 2020	Improvisation during a crisis: hidden innovation in healthcare systems	Peer reviewed paper	Paper explores key drivers of improvised innovation in response to a crisis	Focus on the context of healthcare during initial response to Covid-19	Crises often compel organisations to develop improvisation capabilities, which may entail incremental innovation.

Content Analysis

Hospitals operate in increasingly complex and dynamically uncertain environments (Gifford et al, 2022). Within healthcare, in response to a significant impact, there is the dual objective of activating surge capacity / response and maintaining other essential services (Therrien et al, 2017). Despite having contingency plans in place, health care organizations may have been unable to imagine (and thus be prepared for) the scale or magnitude of a crisis (Gifford et al, 2022). Managing a crisis within this environment requires detailed complex activity in a dynamic complex system (Therrien et al, 2017). The type of incident impacts on the way

that an organisation responds (Lloyd-Smith, 2020). In routine emergencies, rapid response benefits from hierarchical decision-making and formal coordination with clear lines of authority and command (Lloyd-Smith, 2020). In low chance, high-impact events, conditions change from routine to novel and represent a fundamental shift to an organisation's environment, whereby the context in which decisions are being made is often changing, unexpected and unforeseen. Under these circumstances, the response requires flexibility, on-the-spot decision-making and informal coordination (Lloyd-Smith, 2001)

Adaptability

The process by which hospitals adapt to maintain operations and functionality has been described as rapid (Khalil et al, 2022) adaptive capacity (Branlat & Woods, 2010; Khalil et al, 2022), or dynamic capability (Gifford et al, 2022). Two patterns of behaviour are identified within this: first, how systems sense (Gifford et al, 2022) or detect signs that they are running out of capacity to adapt to disturbances and that they need to mobilize new resources; second, the capacity of the system to seize (Gifford et al, 2022) the situation and engage more resources in order to handle the unusual demands (Branlat & Woods, 2010). In a crisis, hospitals are required to become more flexible without sacrificing efficiency (Gifford et al, 2022). Response activities should be multifaceted in utilising the various components in a manner characterized by agility, flexibility, rapidity and adaptability of the immediate and ongoing activities and operations, especially in responding to surges (Khalil et al, 2022). This involves hospitals' rapid adaptive capacity in increasing staffing to accommodate surges, redistributing, referring, and transferring patients to other facilities (Khalil et al, 2022). Surge capacity requires space (Khalil et al, 2022) to provide rooms in which to treat patients, staff (Khalil et al, 2022; Therrien et al, 2017), stuff in terms of supplies and equipment (Khalil et al, 2022; Therrien et al, 2017), and structure (Therrien et al, 2017) to provide the policies and procedures for those responding.

Improvisation

Crises often compel organisations to develop improvisation capabilities (Wiedner et al, 2020), which involves adjustments to, and recombination of already existing resources (Lloyd-Smith, 2020). A study of a response to an earthquake, identified that hospital teams abandoned traditional order, rapidly constituted a new situation, and improvised solutions to ensure the

safety and uninterrupted care of patients (Lloyd-Smith, 2020). In the beginning of the crisis, informal networks between hospitals and health care providers played a big role in signalling what organisations needed to do and prompted motivation for action internally (Gifford et al, 2022). Wiedner et al (2020) assert that improvised innovation may be driven by a range of factors: a sense of urgency which encourages stakeholders to develop and implement new ideas quickly, while limiting resistance due to widespread acceptance that 'normal' rules no longer apply; resource scarcity; and a sense of collective identity arising from the co-existence of urgency and resource scarcity. This sense of identity is important, as resilient response to low-chance, high-impact events requires collective behaviour rather than solo acts (Lloyd-Smith, 2020).

Three factors are critical to enhancing an organisation's capacity for improvisation: increasing autonomy, maintaining structure and creating a shared understanding (Lloyd-Smith, 2020). Maintaining structure supports collective behaviour by enabling coordination via communication and it provides a 'common frame' around which adjustments can occur (Lloyd-Smith, 2020). Maintaining coordination while increasing autonomy actively enables front-line staff to improvise, by allowing individuals to integrate their behaviours effectively and continuously with others (Lloyd-Smith, 2020).

An incident in one part of the organisation may set off the conditions for innovation in other parts of the same organisation.   Where there are altered workforce characteristics in areas as staff are redirected to priority response zones, junior staff may assume greater responsibilities which may enable the introduction of innovative ideas that challenge existing ways of doing things (Wiedner et al, 2020). Furthermore, less scrutiny for those practitioners in non-prioritised areas means they may be able to experiment with novel improvisations, leading to (incremental) innovation which develops below the radar (Wiedner et al, 2020).

Implications for leadership within complex organisations:
Therrien et al (2017) identify that in order to cope with a crisis, healthcare managers need to innovate by adapting their practices, rules and structures (preferably before the event). A learning mind-set may need to be adopted enable leaders to respond effectively to the emergent situation and to be willing to "course correct" as needed (Gifford et al, 2022).

Leaders also need to recognise that simply by successfully defining a situation as a crisis, they can set in motion developments that create favourable conditions for improvised innovation (Wiedner et al, 2020).

Leaders should also be aware of the downsides of incident response in complex organisations and seek to anticipate them. Forcing healthcare professionals to make do with less may stimulate improvisation in some cases but in others may simply undermine the quality of care. Leaders therefore need to maintain productive improvisation by providing healthcare professionals with support, encouragement and opportunities to discuss the challenges they face (Wiedner et al, 2020). By adopting improvisation, an organisation is unable to centrally control the use of resources, and therefore deploy them optimally, potentially leading to their inefficient or ineffective use. This can lead to the creation of a 'spiral of complexity' in which an improvisation to overcome one problem creates another unexpected problem, requiring further improvisation and leading to an escalating lack of control (Lloyd-Smith, 2020). Consequently, for a clinical setting, improvisations should only be undertaken on the condition that they fit with the organisational goals and are unlikely to cause harm to patients or staff (Lloyd-Smith, 2020)

5.3   Consideration of the other themes from the focused coding

Against a background of the narrative of hospitals as Complex Adaptive Systems, I explored the other themes that had been developed during the focused coding.

Navigating an Unfamiliar Landscape

Tactical commanders reported on the major incident being substantively different from management challenges in their usual roles. This emanated from two streams. First, Commanders noted the change in the hospital environment as it assumed unfamiliar features and characteristics (full of emergency services personnel, disrupted access and egress, facilities unavailable). This process of loss of familiarisation and subsequent dislocation has been identified in other research concerning clinical areas (Hammad et al, 2018). The second stream relates to the ad hoc nature of incident command and the level of individual accountability and (exposed) leadership role that commanders were required to take. It can

be quite circumstantial who becomes a commander during an incident and what managerial background and experience they possess to make appropriate decisions (Rake & Njå, 2009). In addition, the commanders will deal with a new team that has rapidly assembled but who may not have worked together before and will also bring their own a range of skills and experience. Under these circumstances, responding to major incidents is different from dealing with teams who frequently work together on high-risk tasks (Wilkinson et al, 2019).

Emerging from the Pack

Individual Characteristics of Incident Commanders: Important characteristics of disaster responders and leaders would include skills and experience, but also innate attributes and characteristics not easily developed through training (King et al, 2016). Research with incident responders and commanders report that the most frequently mentioned characteristics of good incident commanders were related to incident command/disaster knowledge, teamwork/interpersonal skills, performing one's role, and cognitive abilities. Other identified characteristics were related to autonomy, positive attitudes, communication skills, adaptability/flexibility, problem solving/decision-making, staying calm and cool under stress, personal character, and overall knowledge (King et al., 2016; Rake & Njå, 2009; Veenema et al, 2017). There is no evidence of any personality type associated with good incident command and this is less a matter of what kind of person an incident commander is, than what they do while in command (Groenendaal & Helsloot, 2016). Tactical commanders in the research appeared to accept this responsibility as an integral part of their role within the organisation rather than because they saw themselves as individuals being the best person to lead the hospital's tactical response.

Other factors to be considered relate to intelligence and locus of control. People of above average intelligence are not better at decision-making, but they are better at rationalising and defending their decisions after the event (Novella, 2012 in Leigh, 2015; Leigh, 2019). Hence flawed decisions may appear highly plausible and these individuals may be prone to error but inhibited in their ability to accept that an error has been made (Leigh, 2015; 2019). On the other hand, less competent individuals tend to be less aware of their limitations and often demonstrate false confidence in their choices as a result (Leigh, 2015).

Individuals with a high internal locus of control would tend to believe crises are controllable predominantly as result of choices that they make, while those with a high external locus of control would have a more fatalistic perspective and consider that there is little they can do to moderate the influence of external factors (Leigh, 2019). While the former may be portrayed as decisive, optimistic and confident leaders, being better reflectors and learners, excessive self-belief may lead to protecting the illusion of control by blaming failure on others rather than examining critically their own judgement and may lead to discounting information that challenges their assessments and decisions (Leigh, 2019). Combining staff with different styles into command groups such as 'explorers' and 'exploiters' (Wilkinson et al., 2019) could be considered but remains to be evaluated. What is recommended is that there should be as much rigour as possible put into crisis decision-making and that this is better done collectively and placed on record (Leigh, 2015). Leaders need to be aware of 'argument from authority' where the fact that they are senior leaders means their views may acquire extra force / legitimacy. This may be necessary at some stages in an incident, but incident commanders need to be aware of the impact (Alison et al., 2015).

Commanders in this research saw themselves less as being in direct control and very much responding to events. There was the space for 'argument from authority', particularly with external agencies who were perceived as knowing more about managing these types of incidents but there was a co-construction of reality via huddles and hospital commanders were very aware of their area of responsibility and would reflect on the impact on the rest of the hospital community.

Experts versus novices: There are differences in how the level of experience affects the decision-making process. Experience & training can influence a person's behaviour so that it becomes more automatic and can also improve the cognitive process and increase quality of decisions (Rake & Njå, 2009). Novices will use effortful and time-consuming knowledge-based behaviours, while experts will be able to aggregate more of these behaviours into schemes which can then be enacted at a skill-based level (Walker et al., 2010). Competent performers see a situation as a set of facts and they have learned that when a situation has a constellation

of particular elements, a certain conclusion should be made (Rake & Njå, 2009). Experts are also able to reflect 'in-action' during the decision-making process to reduce situation uncertainty and ensure that their actions remain consistent with the changing environment (Alison et al., 2015). By contrast, inexperience has been associated with filling in missing information with biased heuristic processing (Tversky & Kahneman, 1974). In dealing with mass casualty incidents, research has identified that those incident commanders with previous experience in dealing with these events found it helpful in the situation assessment and in making sense of the situation. Those with no experience or interest in mass casualty incidents expressed difficulties in coming to terms with what was going on (Rimstad & Sollid, 2015). It must be noted however that this could lead to experienced incident commanders anticipating that they would be encountering a 'normal' situation, as in one they had personally experienced on previous occasions, rather than one which may be of a greater or qualitatively different magnitude (Rake & Njå, 2009).

Commanders participating in this research were not experienced in critical and major incident management. They had different levels of experience around hospital operational management and operating at a more senior, strategic level. The hesitancy that was noted was around the initial decision to declare an incident and the desire to seek more data / establish a clear point of 'no return'.

Effecting Cultural Change

Teamwork: Decision-making and incident command may take place in the context of an incident team rather than individual controllers. Team-working is fundamental to effective crisis management as the team has more information than any one individual and it allows for assumptions to be exposed and tested, and different interpretations developed (Leigh, 2015). There is a danger that the more humans involved in the decision-making process, the more complex the situation becomes, and where differing views are held strongly, the outcome becomes even less predictable (Lauder & Marynissen, 2018). Leaders are recruited based on how well they perform their job in their own organisation, which is not always what is necessary for collaboration (Brandebo, 2020). Teams may struggle to make decisions due to conflict of interest, high demand for timely information, and disruption of infrastructure

support for coordination (Chen et al, 2008). The incident may be overseen by a scratch team who are not used to working on these types of issues and thus require good leadership. Major emergencies are extreme team decision-making environments whereby teams are required to operate at the intra-team level within an organisation and also at the inter-team level between different (emergency) services (Power, 2018). In situations where teams are made up of people who do not know their co-workers to a great extent, swift trust (Yu & Khanzanchi, 2019) may occur, facilitated by pre-existing local coordination work (Davidson et al, 2022) and the team members are able to interact productively because they have a reasonable sense of how the other group members will think and behave given their role (Baran & Scott, 2010). This non-disclosive intimacy among specialists is reinforced by formal policies and guidelines, as well as role positions to alleviate some of the ambiguity inherent in dangerous contexts (Baran & Scott, 2010).

It may be that it is a cohesive team where the danger is that of 'Groupthink' (Janis, 1982 in Leigh, 2015) where the views may coalesce around whichever point of view was initially dominant in that group. This leads to a requirement to challenge any conclusions that seem to reflect early, premature consensus (Leigh, 2015). It is important that in high-risk areas there is the ability to challenge colleagues who are in authority when something does not seem right (Green et al, 2017). It has been found that accountability-related decision factors (Alison et al. 2010), such as fear of the long-term consequences, can impact upon team processes associated with trust and conflict (van Den Heuvel et al., 2014).

The commanders in the research operated within a team structure rather than favouring individual decision-making. They used huddles involving scratch teams as a key mechanism and did not appear to be territorial with other agencies about their being involved and / or leading specific sections of the combined response. The focus was on enabling, facilitating and sense-making rather than establishing an individual voice of control.

Emergency Versus Crisis: An emergency is a situation requiring a rapid and highly structured response, where the key risks can be identified (Institute of Lifelong Learning, 2008: Module 1: 2-13). By contrast, an organisational crisis is an ambiguous situation where cause and

effect are not known, the viability of the organisation is threatened and little time available to respond (Kuipers & Wolbers, 2021). Boin and 't Hart (2010) define a crisis as a situation where a threat is perceived against the core values or life-sustaining functions of a social system, which requires urgent remedial action under conditions of deep uncertainty. The crisis management context involves high stress levels and time constraints (Brandebo, 2020). In crisis, situational awareness is often diffuse, the time horizon shorter and there are several potential outcomes (Brandebo, 2015).

In these circumstances, what other services may consider to be an emergency situation (suspected terrorist attack, chemical decontamination, assault) represents a crisis for hospitals. This is because the teams have not received the same degree of training for these specific circumstances, and they are concerned with a multitude of issues relating to the hospital beyond the direct incident itself. In this respect there may be multiple (organisational) perspectives regarding the same incident, while the tendency that was noted in the field work for hospital commanders to defer to emergency services in some aspects of incident management may reflect the degree to which the hospital commander considers this to be a crisis, outside of their sphere of experience or capability, rather than an emergency.

Seeking Reassurance

Tactical commanders did not have time to always gain assurance and used a series of heuristics to reassure themselves.

Cognitive Biases and Heuristics: Cognitive biases are decision-making traps (Leigh, 2015), constituting mental behaviours that prejudice decision quality and are inherent in human reasoning (Arnott, 2006). Heuristics are used as cognitive shortcuts (Brooks et al., 2019) for reducing complex decision-making problems, whereby there is reliance on simple adaptable rules to speed up and economise decision-making (Leigh, 2015; van Den Heuvel et al, 2014). Heuristics represent a trade-off between speed & efficiency against missing the nuances that make each case different (Leigh, 2015). They are especially adaptive under time and resource limitations, but occasionally they fail and may lead to costly but highly preventable cognitive

errors (Croskerry, 2002)[11].   Mitigating their potential impact is helped by getting a good situation awareness, which is dependent on effective pattern recognition (Leigh, 2015). When people are in stressful situations where decisions have high stake outcomes or the situation appears out of control, their recognition ability may be temporarily degraded. This impacts on their pattern recognition which is fundamental for reflexive decision-making and can lead to over-simplification of complex situations (Leigh, 2015).   It has been posited that the greater the level of uncertainty, the more decision-makers are prone to the influence of cognitive biases (Leigh, 2015) and this can subtly lead decision-makers to downplay the risks associated with their preferred options (Leigh, 2019).

Maladaptive strategies in response to persistent uncertainty (Leigh, 2019) have been identified in relation to the Situation Assessment and the Plan Formulation phases of decision-making. In the Situation Assessment phase, these are centred around suppression, through denial (ignoring uncertainty) and rationalisation (symbolically acknowledging uncertainty but not reducing it). Suppression can harm the decision-making process and block the development of strong rationales for selection of action at a later stage (Leigh, 2019). During Plan Formulation, the seeking of more information may result in redundant deliberation (Leigh, 2019) and decision inertia (Alison et al., 2015), if it doesn't actively reduce uncertainty. Limited consideration of alternative options is also a potential concern at this stage (Wilkinson et al., 2019).

Decision derailers are human factors that can adversely affect decision-making. These include things such as: escalating commitment, anchoring, loss aversion and information pathologies such as confirmation bias, information bias and failure to communicate (Higgins & Freedman, 2013). Teams may get overwhelmed (Ash & Smallman, 2010) or decision inertia may occur, whereby teams loop between situational assessment, option generation and option evaluation. This is not decision avoidance, rather an awareness of the consequences of any actions to be taken (Power & Alison, 2018). Strategies to address these revolve around critical thinking which asks hard questions, demands supporting data for decisions and tests the logic

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[11] Descriptions of a range of cognitive biases, heuristics and cognitive dispositions to respond are outlined in (Arnott, 2006) and (Croskerry, 2002)

and rationality of any decisions. Benefit also derives from cognitive diversity and challenge within response groups (Higgins & Freedman, 2013).

Commanders participating in the research used heuristics to gain reassurance that the hospital was responding appropriately, and these could have downplayed the risks associated with preferred options. This implies however a greater degree of control than the commanders themselves perceived. Action cards linked to major incident plans were used to give assurance that key areas and actions had been considered. An emergent theme was the correlation between reassurance / assurance and the level of uncertainty inherent within an incident. The more certainty and clarity of response around an incident, the greater the demand for assurance from commanders.

Absorbing Accountability

There is an early requirement for managers to impose a sense of order and purpose on the apparent chaos of a crisis (Leigh, 2015). There are high expectations of an early and highly visible demonstration of calmness, authority and control by the leader which can inspire confidence in the team, stakeholders and the community (Leigh, 2015). In this regard, it may be the case that an appearance of control may be as important as the reality of it, and it is advised that making decisions is better than no decision at all (Leigh, 2019). This is particularly relevant for leaders in clinical situations where the leitmotif 'do no harm' may tend to override the view that 'more is missed by not doing than not knowing' (Byrnes, 2011). This analysis resonates with the research participants' narrative of filling the role and seeing themselves as demonstrating leadership in order to enable the organisation to undertake its response.

Uncertainty may be viewed as a sense of doubt that blocks or delays action and has been conceptualised as inadequate understanding, incomplete information or undifferentiated alternatives (Lipshitz & Strauss, 1997). Incident commanders seldom possess a clear picture of all that is going on and it is not immediately clear what the consequences will be from choosing one form of action over another (Rimstad & Sollid, 2015). The level of uncertainty may be exacerbated by the dynamic nature of a large-scale disaster (Scrymgeour et al, 2016), with the magnitude and importance of different uncertainties changing over time (Rimstad &

Sollid, 2015). While high at the time of notification these uncertainties will gradually decrease as incident commanders receive more reliable information (Rake & Njå, 2009).

Dealing with uncertainty was a distinct theme from research participants. They reported that the level of certainty was dynamic throughout each incident. The extent to which differing zones of certainty require different strategies and mechanisms is considered below.

Constructing a single version of the 'truth'

In a complex adaptive system dealing with a sudden shock, commanders are required to establish agreement around the causes, impact and responses required to deal with the incident. It has been argued that meaning-making is the single, most significant determinant of leadership perceptions during flash crises, while visibility of leaders is important in terms of perceptions of a wider audience about how effectively the crisis is being managed (Helsloot & Groenendaal, 2017). There is extensive literature offering insight into how this may be undertaken. Examples which I came across that resonated with the experience of tactical commanders included 'organising ambiguity'[12] (Baran & Scott, 2010), the RAWFS heuristic[13] (Lipshitz & Strauss, 1997; van Den Heuvel et al., 2014), abandonment of rigid protocols (Plsek & Greenhalgh, 2001) and operating based on plausibility, rather than accuracy when making decisions (Wolbers, 2022). These offered valuable insights but only partially described the response by tactical command within a dynamic environment. Commanders may have followed a checklist for aspects of the response which incorporated some of these elements, while their actions based on prior experience and learning may also have reflected these, but they were not constrained by these, nor operating in a structured way using these as a set of expressed principles.

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[12] This has three categories of framing (gauging the level of risk present in the environment), heedful interrelating (how the group members come to conclusions about what is plausible in their environment) and adjusting (maintaining awareness of the surroundings through continual interaction, while remaining poised for a shift of action should assumptions prove to be erroneous)

[13] Reduction of uncertainty through information search; Assumption-based reasoning to fill in missing information; Weighing pros and cons in order to derive subjective expected utility of options; Forestalling to prepare for worst-case scenarios; and Suppressing uncertainty in order to ignore doubts and/or conflicting information

Interpretation based on analysis of complexity, afforded an insight that resonated with the experience of the commanders. Both the challenges faced by hospitals and the healthcare system have been described as volatile, uncertain, complex and ambiguous (VUCA) (Billiones, 2019; Gifford et al, 2022; Hallo et al, 2020; Nembhard, 2020; Pandit, 2020). Each element presents different challenges and requires different responses[14] (Bennett & Lemoine, 2019). Operating in this environment requires systems thinking that recognises the importance of unheralded internal operations, surfacing problems and analysing processes, creating teams that focus internally and externally to expand knowledge sources for developing ideas, and experimenting rapidly using Plan-Do-Study-Act cycles (Nembhard, 2020). Critical success factors that underpin and enable successful leadership during VUCA events include (1) organisational culture, (2) working in partnership and (3) clarity of strategic intent (Pandit, 2020). A model of 'shock leadership' has been proposed to deal with these VUCA environments which requires situational, agile, flexible and adaptive leadership styles (Shufutinsky et al, 2021) which may also include mindfulness (Waller & Uitdewillien, 2008). This involves the purposeful use of attention and awareness in leadership processes and provides the ability to assess and make meaning of situations and respond appropriately using analytical in-the-moment decisions (Shufutinsky et al, 2020).

Decision-Making: The most critical activity during a crisis is that of making decisions about what to do next (Higgins, & Freedman, 2013)[15]. Decision-making refers to the entire process of choosing a course of action where there are three essential components: alternative actions, consequences, and uncertain events (Hastie, 2001). Decision making, especially

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[14] **Volatility:** unstable or unpredictable – does not necessarily involve complex structure (relatively unstable change). *How to effectively address it:* Agility

Uncertainty: lack of knowledge (not re cause & effect) but whether the event is significant enough to constitute a meaningful change. *How to effectively address it:* Information

Complexity: Characterised by so many inter-connected parts – collect / digest / understand relevant information in its entirety – get structure to realign with environmental complexity. *How to effectively address it:* Restructuring

Ambiguity: doubt about nature of cause & effect relationship – no precedent form making predictions as to what to expect. *How to effectively address it:* Experimentation

(Bennett & Lemoine, 2019)

[15] A decision is a commitment to an action that is intended to yield satisfying states of affairs for particular parties (Rake & Njå, 2009). The action is distinguished from the decision itself, but the intention emphasises the deliberate commitment of the decision maker to the achievement of important goals for targeted beneficiaries (Rake & Njå, 2009).   Making a decision means committing oneself to a course of action where plausible alternatives exist, even if the person does not identify or compare these alternatives (Klein, 2008).

during an incident, is often complex and decisions are open to challenge (NHSE, 2022), while the dynamic nature of the event and the uncertainty involved means it is therefore prone to human error (Brooks et al, 2019). In a crisis the need for prompt decisions and action within an ever-changing environment means that there will uncertainties in the factual basis for decisions (Rake & Njå, 2009; Rimstad & Sollid, 2015).

The research offers some insight into understanding the way that tactical commanders made decisions and whether this process adhered to that recommended by NHS planning guidance.

(Normative) Reflective models of operational decision making: Normative models of decision making have been adopted in the guidance and training for emergency services (Cohen-Hatton et al, 2015). Decision makers within the NHS are advised to use the Joint Decision Model (JDM) which is organised around the three primary considerations: situation, direction, action (NHSE, 2022). It is expected that decision makers will use their judgment and experience in deciding what additional questions to ask and considerations to reach a decision. The JDM is to support the decision-making process in achieving the desired outcomes (NHSE, 2022).   These types of models can be applied across the full range of decisions within a hospital incident, from immediate front-line decisions to longer term implications (Leigh, 2015). By virtue of the deliberative processes they involve, they bring value, but do not automatically bring rigour, objectivity and critical reflection to the decision-making process, since this is reliant on the behaviour and choices of people working their way through it (Leigh, 2019). In this way the JDM become a process rather than a tool to initiate critical thinking (Leigh, 2019). This can give compelling reassurance to teams facing critical decisions with imperfect knowledge and engender an 'illusion of control', since the outputs are subject to the biases and cognitive errors of the people who apply them and provide the inputs (Leigh, 2015). It must be noted however, that a paradoxical consequence of the illusion of control is that it can build confidence and self-belief and encourages members within the incident team (Leigh, 2019).

Naturalistic Decision Making: Reflexive practice: Naturalistic decision-making is concerned with decision making in real world situations characterised by dynamic environments, high

stakes, time pressures, and contexts of uncertainty with ill-structured problems (Klein, 2008; Rake & Njå, 2009; Rimstad & Sollid, 2015; Wilkinson et al., 2019). There is evidence to suggest that experienced practitioners do not follow normative models of decision-making and that practitioner decision making often reflects past experience, where reflexive processes operate alongside more reflective ones (Cohen-Hatton et al., 2015; Rimstad & Sollid, 2015; Wilkinson et al., 2019). The Recognition-Primed Decision Model is based around the observation that when people need to make a decision, they quickly match the situation to patterns they have learned. This allows people to successfully make extremely rapid decisions (Klein, 2008). It blends analysis with the intuitive pattern matching aspect since the latter on its own could generate flawed options, while the former in the shape of a deliberative and analytical strategy would be too slow (Klein, 2008). Analogous reasoning is fundamental to naturalistic decision making, but there needs to be judicious scepticism about analogies drawn from comparison with experience and previous events (Leigh, 2015). Assumptions are required in dealing with uncertainty, but they can be wrong and require rigour and critical thinking (Leigh, 2019).

An emergent concept within this research is that there are different types of decision-making processes used both between and within incidents and that they are linked to the perceived level of uncertainty. Where a commander was involved in an incident which was relatively well structured (Road Traffic Collision with numbers of trauma victims), they would move towards a normative decision-making model. For those incidents which were less structured and had higher levels of uncertainty about impact, casualties and the event itself, commanders would gravitate towards a naturalistic decision-making model with greater focus on first principles such as those of patient, staff and hospital safety.

Role of decision tools: There are a range of tools to support managers in dealing with an incident. These aim to help managers impose a sense of order and purpose on chaos, make the right choices and begin to exert a degree of effective control over the response to the crisis (Brooks et al., 2019; Leigh, 2015) and include standard operating procedures, decision-making models, aide-memoires and checklists. Within the NHS, expectations are that decision makers will be supported in all instances where they can demonstrate that their decisions were assessed and managed reasonably in the circumstances existing at a particular

point in time. The use of decision support models and processes will assist in providing this evidence, particularly in conjunction with decision logs (NHSE, 2022).

Checklists improve accuracy and minimise psychological strain but at a cost of reduced speed (Brooks et al., 2019). Checklists and action cards often require the user to sequentially complete tasks, but in emergency management situations, the complexity, dynamisms and uncertainty associated with operating in this environment means that those making decisions cannot always follow a prescribed process (Brooks et al., 2019). Commanders participating in this research used the checklists in plans to give them assurance that they hadn't missed anything. In this way they were obliged to think outside of their immediate frame of reference.

The confidence that commanders reported in this research was linked to a self-reinforcing mechanism whereby their perceptions of the quality of the hospital response influenced their behaviour and in turn reinforced and grew their confidence in managing the incident. In these circumstances, the 'illusion of control' would refer to the creation of an air of control by the commanders that emanated to others, rather than focused upon one's own actions.

Being the Conscience of the Organisation

Incident Command: A core task for commanders in charge of an emergency response situation is to make decisions (Rimstad & Sollid, 2015). In practical terms commanders are responsible for directing, prioritising and controlling available personnel and resources within the context of the situation and the formalised operational plan (Rake & Njå, 2009). In addition to ensuring a high standard of care for patients, there is also a duty to consider the safety of healthcare professionals (Considine & Mitchell, 2009). The tactical commanders participating in the research saw themselves less as making decisions than supporting and coordinating resources linked to responses which were locally determined. They were focused on safety with regards to patients, staff, hospital, and the public.

There is debate around the importance of the incident commander for the emergency response performance and the outcome of the crisis, since this presupposes that decision-

making is centralised and that front-line response teams lack autonomy (Rake & Njå, 2009). Within organisations, individuals and groups may act as self-organised entities as they adjust to an environment that does not match their original expectations and routines (Lauder & Marynissen, 2018). In this context managers need to consider how best to keep these activities aligned and should be proactively scanning the environment for anomalies and focus on those actions that responding teams may overlook or forget (Groenendaal & Helsloot, 2016) or be ready to intervene if the formal rules and procedures were insufficient on scene (Rake & Njå, 2009). This resonates with the participants' view and their focus in the initial stages of the incidents on boundary setting and management by exception.

Leadership in a Crisis: Lessons from Covid-19

The challenges for leadership that were identified by Covid-19: Covid-19 was seen as an unprecedented challenge and represented a situation of ambiguity and crisis (Antonakis, 2021), where the volatility, uncertainty, complexity and ambiguity meant that what once felt impossible had become conceivable (Baruch et al, 2021). The opportunities to prepare for Covid-19 and for mitigation to be put in place were limited and leaders were faced with the need to move into the response and recovery phases (Jankelová et al, 2021; Middaugh, 2020) and had to deal with non-standard and complex conditions (Joniaková et al, 2021), with an emphasis on prevent, protect and control (Trepanier, 2020). Challenges faced included surge planning, care inequities, personal protective equipment, communicating and implementing policy changes (Raso et al, 2021) as well as the fear and anxiety of those working within health services (Paixão et al, 2020) and the potential adverse impact on their mental health (Cubitt et al, 2021; Willan et al, 2020). Staff were looking for safety within their working environments and conditions, they wanted support and a reduction of stress as well as being recognised as key stakeholders in the management of the crisis (Jankelová et al, 2021). Concern was raised about the potential for problems generated by clinicians' discomfort with shifting roles and obligations which could pose operational barriers for crisis standards of care, whereby implementation of these may be inadequate or delayed if the clinicians experienced role conflict (Chuang et al, 2020).

The principles of response during Covid: Factors that emerged in the literature regarding the requirements for leadership during Covid emphasised the importance of effective

communications (Baruch et al, 2021; Jankelová et al, 2021; Maka et al, 2021; Paixão et al, 2020; Raso et al, 2021), the creation of effective crisis teams and the need for cognitive diversity as part of the decision-making process (Jankelová et al, 2021; Joniaková et al, 2021). Good leadership got staff involved and was bold in its decision-making (Paixão et al, 2020). It was seen as helping people believe in themselves and contribute to an achievement that they thought would not be possible if they were acting alone (Forster et al, 2020). Leadership needed to be charismatic (Antonakis, 2021), and involved transparency (Raso et al, 2021; Al Saidi et al, 2020). An authentic and ethical leadership was required which focused on ethical behaviour, the needs of staff and patient outcomes, which was based on fairness and honesty, preventing inappropriate acts and enabling people to do the right thing (Keselman & Saxe-Braithwaite, 2021). It needed to demonstrate honesty and sincerity with credible and transparent explanations and guidelines for managing the spread of the virus alongside empathy, encouragement and hope (Baruch et al, 2021; Forster et al, 2020; Joniaková et al, 2021). There was a need for leaders to provide unambiguous and exact information to reduce uncertainty within healthcare populations (Jankelová et al, 2021; Al Saidi et al, 2020). Finally, leadership during this crisis involved quick and considered decisions with short and longer term focus which were developed for the worst scenarios and ready with alternatives if required (Joniaková et al, 2021).

Covid-19 presented a diverse and complex clinical situation which required an agile and dynamic command and control system with effective communication mechanisms (Hutchings et al, 2021). This had the potential to challenge the existing concept of command and control within the NHS (Bricknell, 2021), and it was suggested that there could be benefit in the adoption of the military principles of 'mission command', whereby there was decentralisation and empowerment of subordinates held together by unity of effort, freedom of action, trust, mutual understanding and rapid decision-making (Pearce et al, 2021). Within this, commanders would offer clear direction and guidance, with advice, encouragement and admonishment as appropriate (Hutchings et al, 2021). It has been suggested that military planning may be better suited to conditions of surges since that is the nature of their challenges, whereas the health service planning tends to take place over months or years and although they have major incident plans, this is not their stock in trade as compared with the military (Watts & Wilkinson, 2020). Military leadership is designed to mitigate the impacts of

an environment where crises are a regular part of daily operations, and a culture is developed to ensure effective command leads to rapid enactment of a plan or set of actions (Hutchings et al, 2021).

The implications for sudden onset major incidents: A key difference between Covid-19 and sudden onset incidents relates to the temporal nature of each incident. By its very nature, a sudden onset incident involves less planning in the immediate face of the actual crisis, however there was resonance in factors involved in leadership under conditions of uncertainty. Predominant themes within the literature around Covid response were about dealing with the environment of uncertainty and ambiguity, the need for clear and consistent communications, and decision-making that was timely, bold, inclusive and which took the needs of staff into account. The expectations by staff of their leaders were a major refrain. Subordinates expected leaders to take responsibility and make decisions, be clear and allow subordinates to exercise their responsibilities and roles. The opposite of this, or any behaviour that contradicts it, would have been considered destructive (Brandebo, 2020)

The debate about the advisability of mission command principles driving the response to Covid is worth considering with regards to sudden onset major incidents. During incidents, leaders make decisions, develop plans and direct actions under varying degrees of uncertainty (Flynn & Schrankel, 2013). Mission command seeks to counter the uncertainty of operations (Flynn & Schrankel, 2013) by focusing on human relationships and emphasising that those subordinate to the commander are qualified to make decisions and take initiatives (Granåsen, 2018). The principles of mission command[16] create conditions that empower followers, which means that the problem of maintaining control in a dynamic operating environment can be overcome (Kalimuddin, 2017) and it is able to achieve effects in a communication-degraded environment (Granåsen, 2018).

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[16] Principles of Mission Command:
- Build cohesive teams through mutual trust
- Provide a clear commander's intent
- Exercise disciplined initiative
- Use mission orders
- Accept prudent risk

(Flynn & Schrankel, 2013)

In a mission command environment, the commander is seen as an enabler or catalyst rather than the view of a brilliant commander (Granåsen, 2018). S/he has a critical role in creating understanding, providing intent, using mission orders and accepting risk, but followers play a big part in influencing the dynamics of the team (Kalimuddin, 2017). For mission command to be effective, not only are effective leaders required, but also there should be equally effective followers (Kalimuddin, 2017). In the military, mission command does not negate the requirements for control, but it is about determining the appropriate level of control to impose on subordinates (Flynn & Schrankel, 2013). Clarifying the commander's intent lets subordinates understand the larger context of their actions which allows them to adapt in a way which is consistent with the aims of the commander, thereby strengthening resilience by giving room for creativity and improvisation (Wolbers, 2021). Hospital tactical commanders described how they relied on their teams being effective and they worked in a way that created an environment which supported and empowered the operational response without tactical command having to be directive.

5.4 Discussion: The implications for tactical command during a critical or major incident

Understanding Complexity

Tactical commanders within hospitals may encounter well-structured problems where the uncertainties are understood, as well as ill-structured problems that present more ambiguity and uncertainty (Jordon et al, 2010). The response capability needs to encompass different management approaches rather than a "one size fits all" approach (Lane et al, 2021). Reducing variation with regards to well-structured problems may be appropriate; however, reducing variation in the face of ill-structured problems may stifle innovation and the capacity to respond (Plsek & Wilson, 2001). In complex environments, managers may have less control than outsiders think or expect (Lauder & Marynissen, 2018). In a crisis, leaders need to understand the complexity of their organisation and be wary of simple interpretations of events, rather they should be seeking diversity to create a complete view of the environment and adopting a leadership style that values expertise and allows expert staff to make decisions

(Bradley & Alamo-Pastrana, 2022). Translating this into action requires a focus on minimum specifications built on flexible, simple rules which provide wide space for innovation and encourage shared action (Plsek & Wilson 2001). Thinking in terms of complexity removes any ambiguity over managerial control from the very start or from the business-as-usual scenario and primes the mind to the prospect of disorder, thereby countering any optimism bias or downplaying of potential hazards (Lauder & Marynissen, 2018).

The experience of tactical commanders as constructed through this research resonates with the perception of hospitals as complex rather than complicated organisations. In this environment, tactical commanders appeared to have had no alternative but to 'ride the wave' of the organisation's response rather than trying to control every aspect of it, particularly in the initial stages where uncertainty was high. The influence of this on the theory construction is outlined in Chapter Six.

5.5 Conclusions

Tactical commanders operate within complex adaptive systems. This environment and how it responds under conditions of crisis, constitutes the commanders' reality and shapes their lived experience. The theory of response by tactical commanders outlined in the next chapter was constructed on the premise that they do not operate as independent actors. Their actions can only be understood against the background of the complex environment within which they were operating.

Chapter Six: Towards a theory of hospital tactical command during critical and major incidents

6.0   Introduction

The previous chapters have outlined how the field work and data collection was undertaken, the initial and focused coding, the theoretical memos that were developed and a summary of literature relevant to the emergency themes. In this chapter, I demonstrate how I went about co-constructing theory with the research participants. I will show the initial stages of the theory to enable understanding of the methodology and how early attempts at theory construction were subsequently shaped by constant comparison and return to the data.

6.1   Constructing Theory: Early Iterations

Initial ideas revolved around boundary setting, sense-making, leadership / control and decision-making. These are outlined below

Boundary Setting: The commander was responsible for establishing the boundaries that the organisation was working within during an incident. Where an incident had occurred but the status had not been declared, commanders reported spending time gathering data about the incident and deciding whether this should be declared as a major or critical incident. This involved consideration of the nature of the threat, the scale of the response perceived and the potential impact on the other operational functions of the hospital. Based on their own background and experience, commanders sought to alert areas of the organisation that were perceived as potentially being overlooked by the organisational cascade and update them about the status of the incident and response. Commanders had to decide on the levels and extent of any extraordinary response within the organisation and had to deal with the impact on the other elective and non-elective workload of the hospital and the wider Trust or partners.

Sense-Making: Within the boundaries that were established, the commanders sought to provide as much structure to the incident response as possible and to move it towards business as usual, while minimising the impact on the rest of the organisation. This was achieved by maximising certainty within the organisation over the incident and the response

required. The sense-making function was delivered by controlling the flow of information into and out of the organisation, co-constructing the site 'version of the truth' with the incident response team / huddle and by operating a reassurance-based approach as to the nature and quality of the hospital response. Sense-making appeared to be aimed internally at the start of an incident, but the volume and emphasis would change so that it shifted to becoming focused on providing this function for external bodies through reporting on impact and response.

Leadership and Control: In the midst of potentially significant levels of uncertainty and although commanders may have felt they were dealing with circumstances beyond their previous levels of knowledge or experience, they sought to provide reassurance to staff. They did this through communication and through being a point of escalation for their needs, be it physical resource, direction or approval / approbation.   The fact that the commander had been alerted and a command function activated may have served to provide that framework as much as the direct action that was taken. The interventions by the commanders varied depending on the degree of certainty and structure to an event. Where uncertainty was high, the commanders sought reassurance that the area was aware and responding; where there were greater levels of certainty, the commanders were seeking assurance regarding the nature and type of the response.   There appeared to be cycles of reinforcement taking place whereby commanders receiving reassurance from the organisation's response, would in turn seek to act in a servant capacity to the constituent parts of the organisation, which would increase the sense of confidence by the local teams.

Decision-making: Decisions tended to serve two main purposes: creating certainty for the organisation (is this a major / critical incident and should it be declared as such?; should a divert be put in place to relieve future demand on non-elective services?; is the incident able to be stepped down and business as usual resumed?) or empowering staff by signing off decisions that they wanted approval for.

Emergent Theory

Early iterations of a theory of response to a major incident focused on the need to manage both the zone of uncertainty which had been created by the impact of the incident, and the business as usual of the rest of the hospital. Figure 8 sought to detail the actions required for each aspect of the incident. In the 'Zone of Uncertainty' the tactical commander was seeking to create as much certainty as possible and move the situation back towards business as usual, while at the same time being mindful of the routine needs of the rest of the hospital and the potential for the incident to impact on this as well. This early theory encompassed different aspects of tactical commander behaviour (supporting, empowering, directing) and addressed the observation that the greater the level of certainty about an incident, the greater the degree of control and requests for assurance that commanders sought to have over it (Figure 9).

The initial theory construction, while a useful first step, still felt more of a descriptive account of what they were doing however, rather than a theoretical analysis which outlined what they were seeking to achieve overall and how they were going about this.

Figure 8: Incident Response at a Hospital
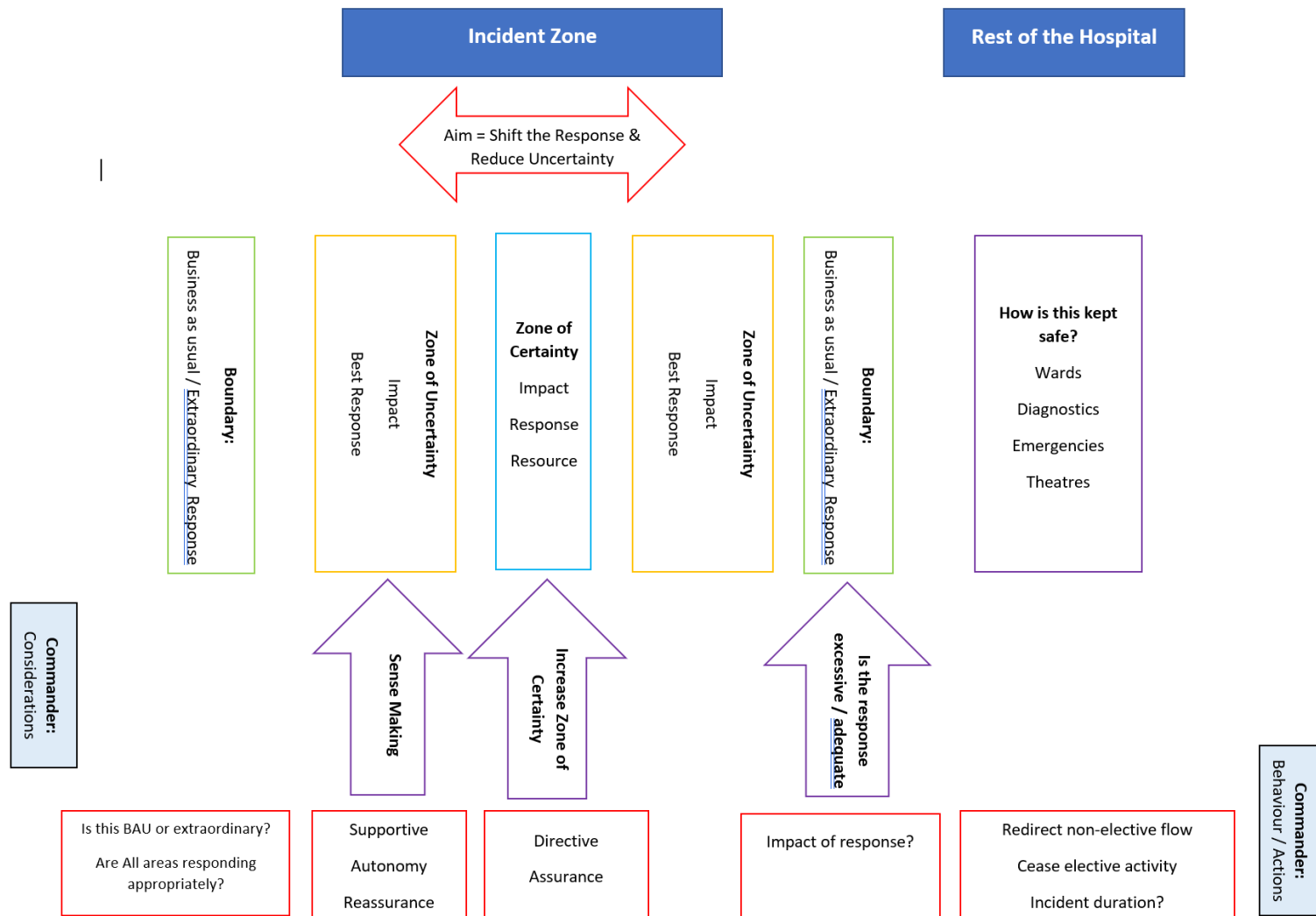
Figure 9: Cycle of positive reinforcement and consolidation
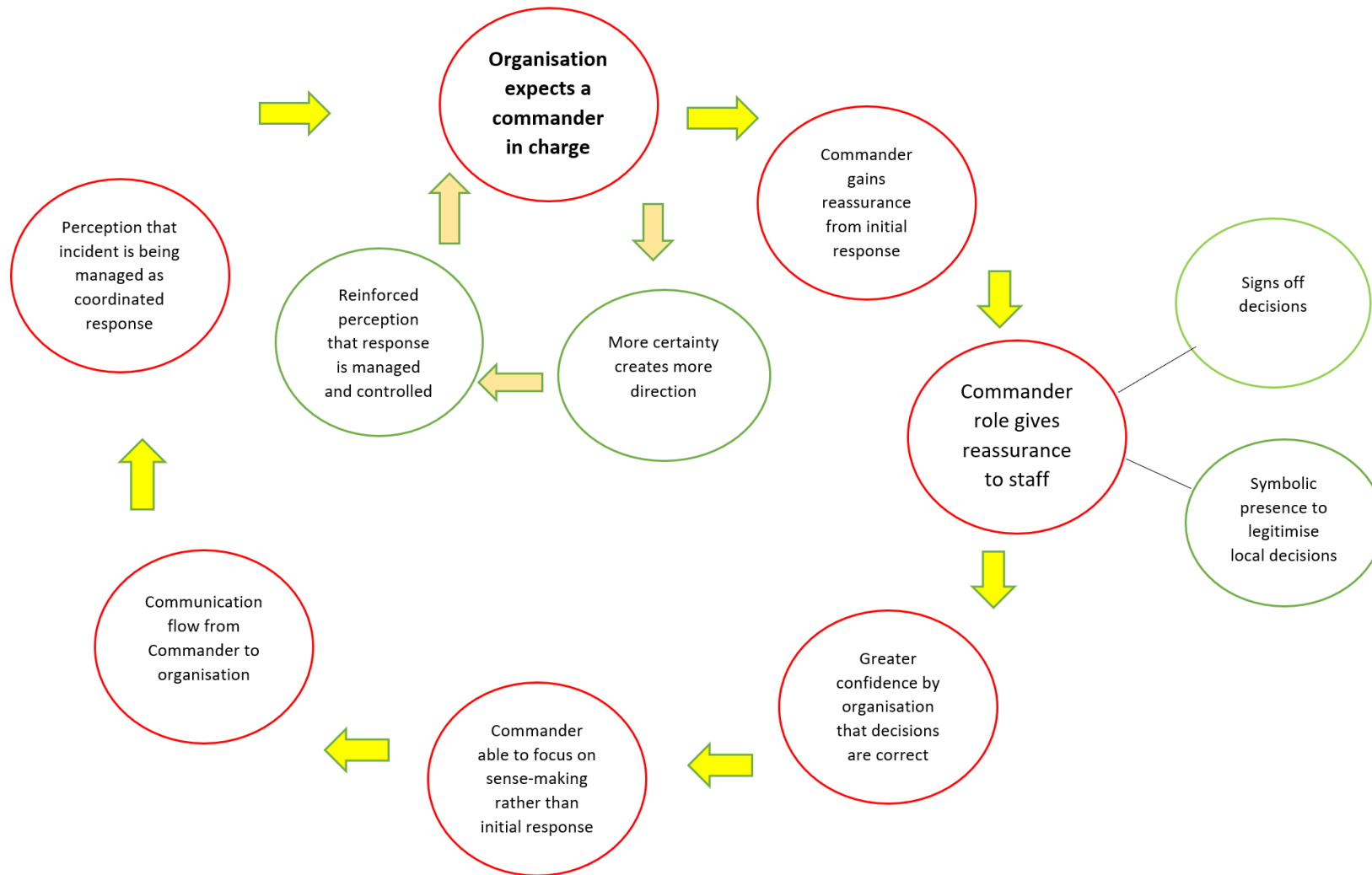
6.2   Evolution of the Theoretical Model

As the field work and theoretical sampling continued, an understanding started to emerge of the complex environment within which the tactical commanders were operating. This enabled me to juxtapose the earlier models with the insights into complexity, the VUCA framework of analysis and the understanding of hospitals as complex adaptive systems.

The hospital environment is complicated and complex, with multiple units interacting within the boundaries of the hospital and externally.   Even during business as usual there are multiple interactions taking place at numerous levels. Figure 10 illustrates the relationships between different units across internal and external boundaries.

Figure 10: Hospital operating in 'business as usual' mode
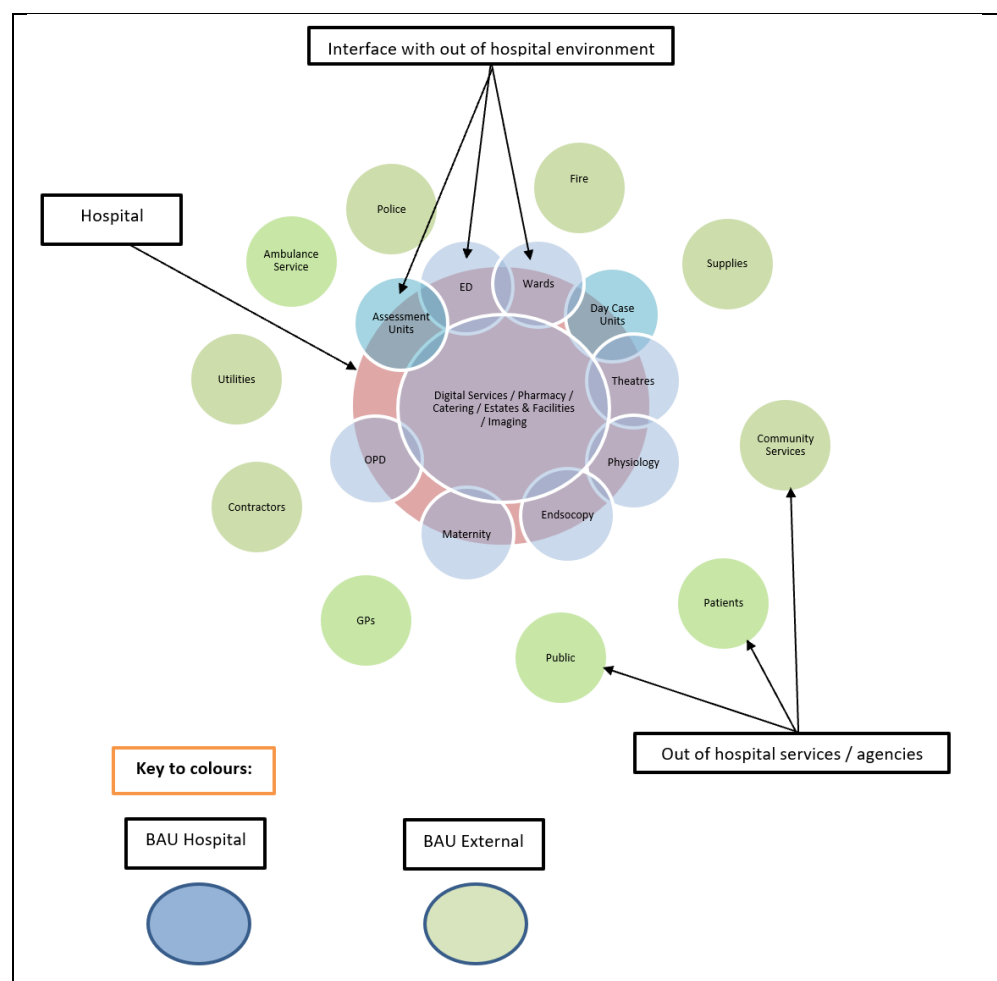
An incident impacting on the hospital will have a differential effect across the organisation. Within each sub-unit or system there will be a unique impact. I sought to represent these

into 3 categories: Business As Usual, where the system is able to function within 'tolerable' levels of disruption; Low VUCA, where they are dealing with an impact but the effects are being controlled; High VUCA where there is significant degree of factors directly affecting the ability of that unit to continue without implementing a significantly enhanced response.

This is illustrated in Figure 11 where there is a conceptual view of an incident impacting on a hospital. This shows the environment that a tactical commander may be presented with during a critical or major incident, with multiple pockets of uncertainty and sub-systems displaying varying degrees of VUCA. What it doesn't show, however, is the dynamic nature of this environment which will be in constant (linear and non-linear) flux.

Figure 11: Illustrative example of differential impact of an incident on a hospital
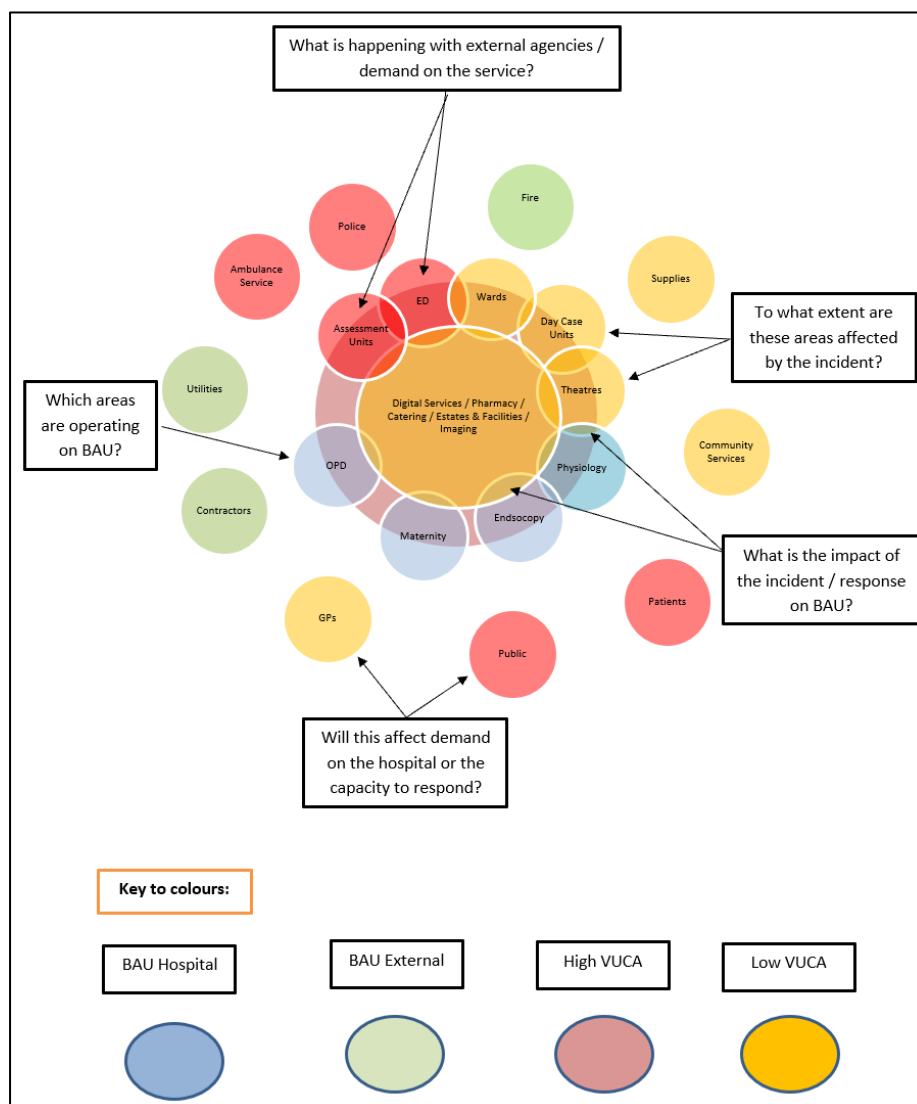
6.3   Constructing a Theoretical Framework:

What the tactical commanders were seeking to achieve

Figure 11 illustrates the complexity of the situation facing tactical commanders. It sites this firmly within the context of hospitals as complex adaptive systems responding to a crisis. In dealing with this situation, their fundamental role and function within the organisational response was to mitigate the impact, minimise further risk and oversee the quality and effectiveness of the response. This I have termed 'Being the Conscience of the Organisation'. It was driven by the four dimensions of safety that commanders frequently alluded to (and I would argue in a descending order of priority), that of Patient, Staff, Hospital and Public Safety.

What the tactical commanders were doing

The actions by tactical commanders consisted of three key themes: Boundary identification; Interface Management; and Consequence Mitigation (Figure 12).

Boundary identification: The boundaries represented here are both physical (which departments are affected) but also conceptual, in terms of how far the incident had moved the organisation (and its sub-systems) away from business as usual. Commanders needed to assess what was the nature of the impact on local systems and what was the aggregated impact for the organisation; the extent to which this was affecting the hospital only or impacting on a wider set of interfaces; and whether a major or critical incident should be declared. Classifying the impact on the organisation's sub-systems into High VUCA, Low VUCA or Business as Usual, served to determine key areas of focus in a dynamic situation.

Figure 12: What the tactical commanders were doing
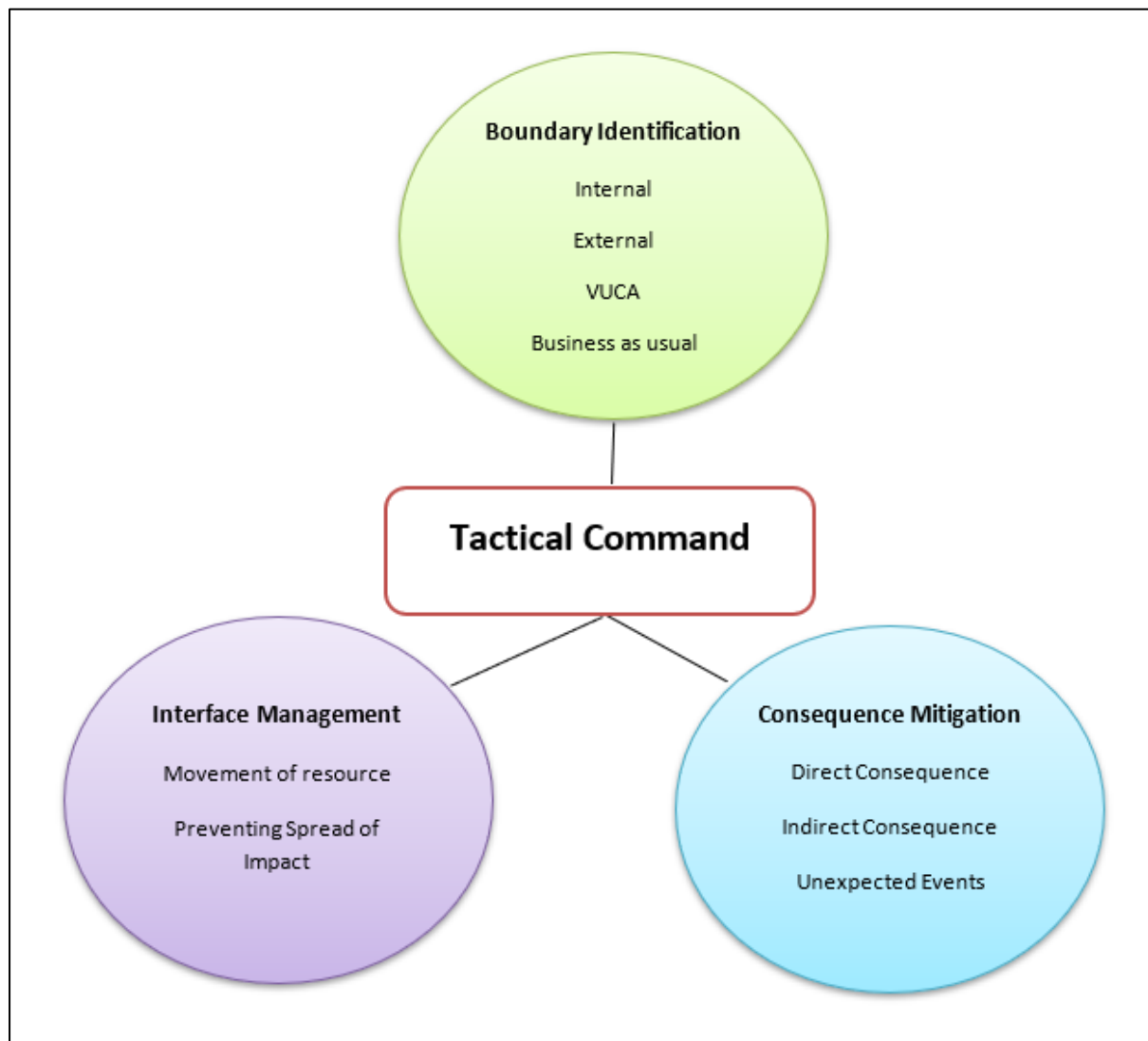
Interface management: There were two dimensions to interface management. One aspect was concerned with how to deal with the spread of the impact across the organisation as sub-systems start to show signs of low and then potentially high VUCA. The second aspect was how to manage resources across boundaries, whether this was physically moving people, equipment and supplies, or changing / repurposing their function and behaviour in view of the exceptional circumstances (Anaesthetists being asked to help manage work in ED, for example).

Consequence mitigation: There were three dimensions to this: direct, where the impact of the incident meant that a response was required (consider evacuation, creation of emergency triage function); indirect, whereby the actions in dealing with the direct impact of the incident were having consequences elsewhere (locking down a hospital for crowd management, safety purposes could prevent food and medicines being distributed around the hospital or access for emergency teams to wards).   The unexpected events that impacted on the ability of the hospital to deal with direct and indirect consequences (staff not being trained in evacuation equipment, hence unable to evacuate; control rooms being decommissioned, hence unable to implement command structure as per the plan).

How the tactical commanders were doing this

The remaining seven categories of commander-related experiences outlined in Chapter Four, identify how the tactical commanders responded to the challenges: Navigating an unfamiliar landscape; Emerging from the pack; Effecting a cultural change; Seeking Reassurance; Absorbing Accountability; Constructing a single version of the 'truth'; and Challenging Prior Assumptions. These described the experience of the commanders as they sought to make sense of the changing environment and effect a dynamic response within a complex system.

Tactics that the tactical commanders were employing to undertake their function

Within the seven dimensions of response outlined above, the commanders employed a range of tactics linked to sense-making, decision taking, and leadership. These all serve to give partial insight into tactical command. The research suggests however, that there was a range of tactics being employed in a complex and dynamic environment, and that no one model could provide a coherent picture of what was actually happening.

In Appendix 19 there is an analysis of two models, that resonated with the early stages of the theory development, that of 'Organising Ambiguity' (Baran & Scott, 2010) and 'Mission Command' (Pearce et al, 2021).   I argue that while they go some way to giving an understanding of hospital tactical command, they do not address the complexity and range of response and challenges presented in a hospital as a complex adaptive system undergoing an existential shock.

6.4   Theory Generation

The research identified that tactical commanders were operating within a complex adaptive system which in responding to a crisis, presented a dynamic picture of simple, complicated, complex and chaotic issues (Snowden & Boone, 2007) operating simultaneously. As identified in Chapter 5, hospitals responded to the crisis by implementing rapid adaptive capacity and developing improvisation capability. This involved factors such as increasing autonomy, maintaining structure and creating a shared understanding (Lloyd-Smith, 2020).

The tactical commanders were not trained in emergency response to the same degree as colleagues in other emergency services, and there was variation in the skills and experience of the individual commanders. The theoretical model (Figure 13) identifies that maintaining or restoring safety was the key driver for the tactical commanders, regardless of their background or experience and that this underpinned the actions that they made. They adopted a descending hierarchy of priorities, that of Patients, Staff, the Hospital and the Public. This, I have defined as operating as the Conscience of the Organisation. Commanders undertook the functions of Boundary Identification, Interface Management and Consequence Mitigation. This was done within the context of experiencing multiple challenges, both intrinsic to themselves and the organisation, and extraneous. Commanders used a variety of tools and tactics to respond to the competing demands of the incident. Hospital command structures and response plans provided a framework and point of reference but did not drive the response. The tools and tactics used would relate to the degree of structure of the problem, with a positive correlation between the degree to which an incident was well-structured and the use of existing plans.

Figure 13: Tactical Command: Being the Conscience of the Organisation
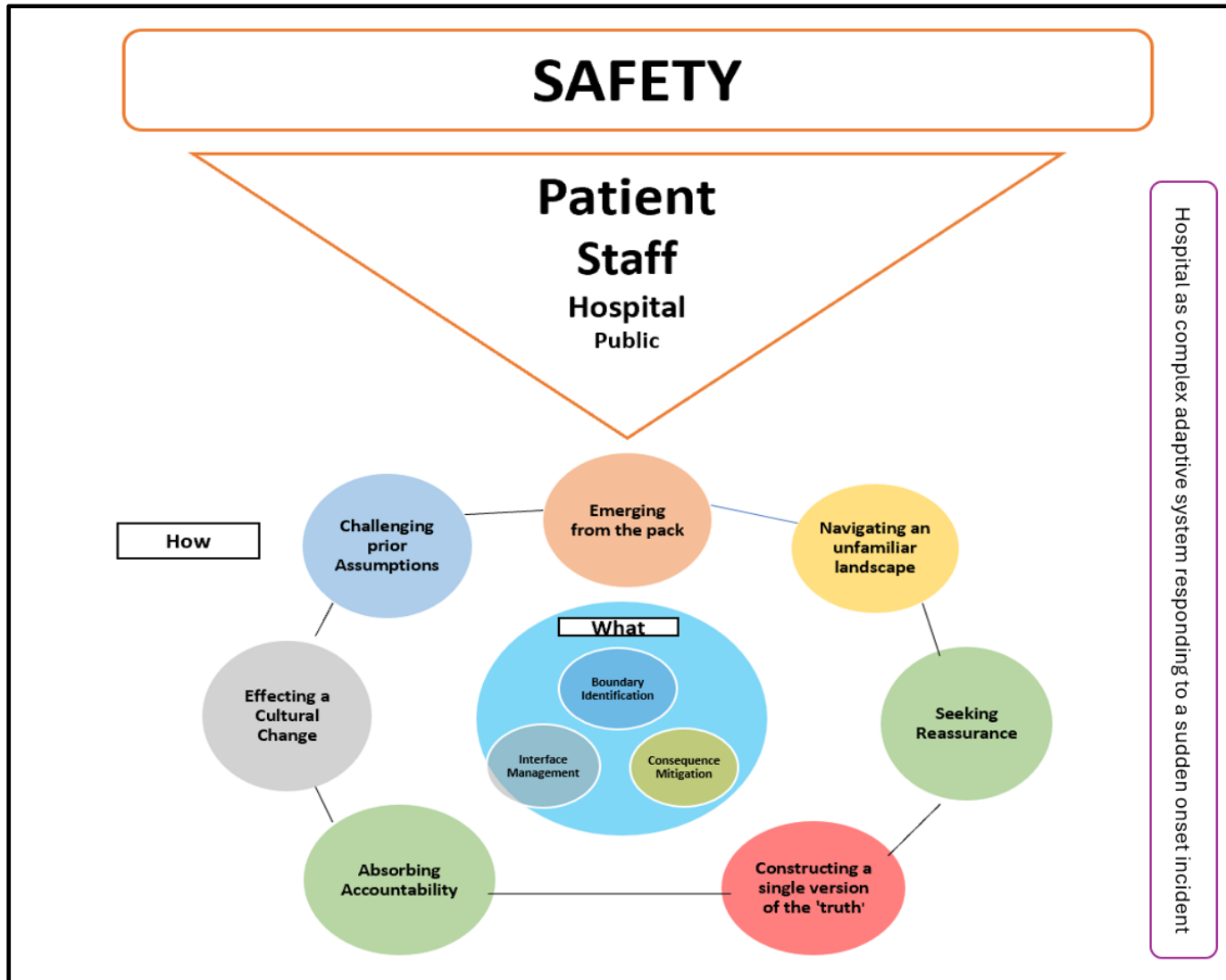
6.5   Novelty and Contribution of the Research:

The literature review identified that no systematic research had been undertaken into the role of hospital tactical commanders in the NHS during sudden onset critical and major incidents. This research offers an evidence base for how tactical commanders respond during actual situations.

The research accepted the decisions and responses of tactical commanders uncritically and it did not seek to evaluate their impact on the outcome of the incident. Where this research provides insight is around what people do and how they do it. Hospitals have plans and guidelines for this type of event, but incidents create uncertainty and stress which impacts on the capacity of the individuals involved.

The fieldwork identified that hospital tactical commanders found themselves in a complex adaptive system responding dynamically to a sudden onset crisis, and that within this they operated as the conscience of the organisation. This leads to reflection around the best way of preparing tactical commanders to oversee a critical or major incident, when these occur infrequently. It also raises questions about what type of incident, commanders are being prepared to deal with. As identified in the previous chapter, the response to 'routine' emergencies may benefit from hierarchical decision-making and formal coordination (Lloyd-Smith, 2020), whereas in low chance, high-impact events, conditions change from routine to novel and the response requires flexibility, on-the-spot decision-making and informal coordination (Lloyd-Smith, 2020). Training for the different types of incidents may need to reflect this distinction, while a model which calls for commanders to adopt a new set of behaviours in the face of novel circumstances may be less effective than a model which reflects what their de facto response is. There is a need to plan for how people are likely to react rather than expecting them to change their behaviour to conform to the plan (Der Heide, 2006). On that basis the hospital response should build on the actual behaviour of tactical commanders during an incident.

The theory constructed in the research, provides a further layer of analysis which grounds the response of commanders in the context of hospitals as complex systems in crisis. This offers

a challenge to assumptions about what the commanders can hope to achieve. Their greatest impacts may be threefold: firstly on that part of the hospital which is not directly affected by the incident; through checking for unintended consequences within the organisation in response to the incident; and on defining the incident as a crisis which creates the conditions for change within a complex organisation.

6.6 Further Study from this Research

It is hoped that this research will act as a catalyst for further work aimed at providing insight into how individuals within hospitals 'emerge from the pack' to hold a leadership role in a low probability high impact situation, and for which they may have received minimal training.

Some suggested lines of enquiry are outlined in Figure 14 and Table 15, which coalesce around three themes: Understanding tactical command in the context of complex adaptive systems during an incident; how the insights from this research can be used to support future tactical commanders; and how commanders can be supported to operate within complex adaptive systems, where incident response is seen as one aspect of the whole suite of challenges.

Table 15: Further Areas of Research

Constructing a Theory of hospital command [as a complex adaptive system] during a sudden onset critical or major incident:
What is the experience from the perspective of operational and strategic commands?   • What are the issues that operational & strategic commanders encounter and how do they address them? This could provide an embracing theory of how hospital tactical & operational commands respond to sudden onset major or critical incidents
Critical appraisal:
How do you gauge the effectiveness of the response by a hospital to a sudden onset major or critical incident?   • What are the quantitative or qualitative indicators by which to measure the impact of the response?
How effective are the current measures in hospitals for debriefing and learning from incident response?   • To what extent do they identify intrinsic issues?   • To what extent are they shaped by 'othering', i.e., that which requires action by others?

- What heuristics are used as part of debriefs?

Lessons Learnt from incident response:

Understanding preparedness:

- How do hospitals move from identifying lessons from response to incidents to implementing these lessons?
- How do the insights from this research get translated into measures of gauging preparedness within a hospital for dealing with a sudden onset major or critical incident?
- How appropriate are the existing tools?

Training in incident response:

How may this understanding of actual response within complex adaptive systems be used to shape the training provided to the commanders of the future?

- How is the effectiveness of existing training to be evaluated? To what extent were peoples' responses shaped by their past training?
- To what extent should it focus on what we want people to do or what people may do?
- What are the expectations regarding training around major incident response in NHS hospitals? Is it seeking to give people new skills which are markedly different from that which they may employ during their daily work?

Human factors:

How does 'doing the right thing' become the default option?
- What skills do we want managers to have to deal with incident response, and are the trade-offs understood between the skills desired against the time available to impart this knowledge

Assimilating skills

- To what extent are managers being asked to undertake something which requires different skills and practices from that which they normally employ, and have they been given the ability to assimilate this into their practice?
- How do we ensure that managers access the training that we have deemed they require?
- To what extent can training be developed to provide the skills that can be used within complex adaptive systems for both major incident management and daily incident response [consider the use of Cynefin, for example]

Figure 14: Further Study from this Research
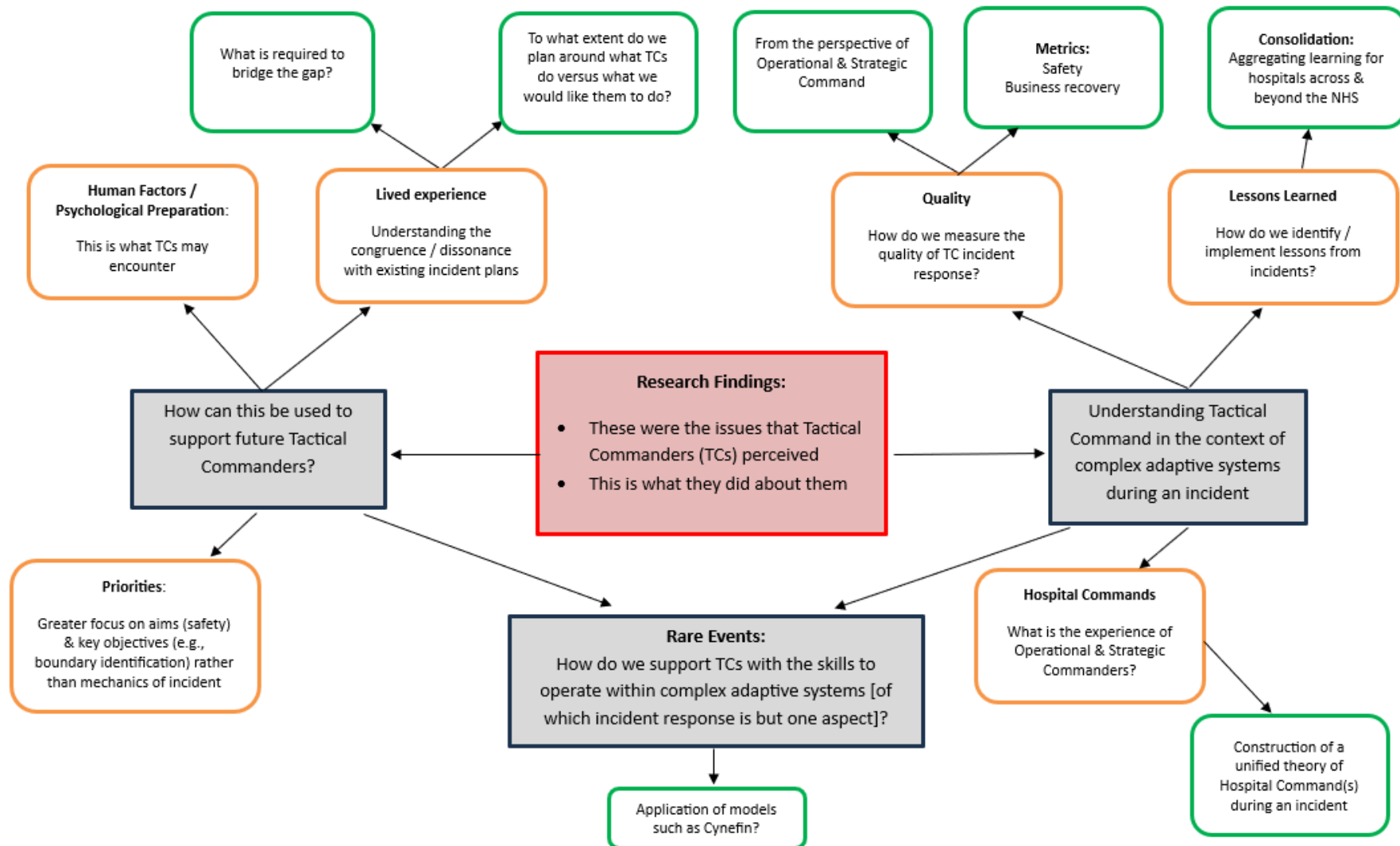
As identified in Chapter 4, there is more work to be done in understanding how the tactical commanders make decisions. The research constructed a theory about what the commanders were doing and offered insights into how they did this, within the context of complex systems. It acknowledged but did not focus on broader principles and complexity regarding decision-making under crisis conditions and this could be an area of future focus.

6.7   Suggested Applications of the Insights

More immediate applications of the insights from this research could be around three areas. These focus on training for commanders and equipping them with the skills for working within complex systems (in crisis), building a model of response which considers what other commands want from tactical command, and developing thinking around how to evaluate the effectiveness of a hospital response.

Training for Commanders: Training and preparedness work for those who may be tactical commanders should be reviewed and needs to cover more than the major incident structure and procedures within a hospital (Figure 15). Providing an understanding of how complex adaptive systems react to a crisis would help prepare commanders for the dynamic nature of the organisational response. This could be supported by awareness of what other tactical commanders have experienced during sudden onset incidents. Commanders could be provided with the skills for working within complex adaptive systems in both business-as-usual and crisis modes. Training which can be used regularly and applied to everyday work would appear to have a greater chance of being embedded and implemented during a crisis. The insight presented by the Cynefin framework is a valuable start in this process (Appendix 20). It explores organisational issues from a perspective of complex systems and provides an approach which can be used for a wide range of phenomena within these types of systems. Such an approach could be used to support hospital tactical commanders by providing them with the skills for everyday situations as well as sudden onset incidents, thereby enabling retention and embedding of these skills.

In this way, training and response protocols could be aligned closer to the actual behaviours of commanders than how the plans state they should be. This offers an alternative approach

Figure 15: Suggested Training for Tactical Commanders
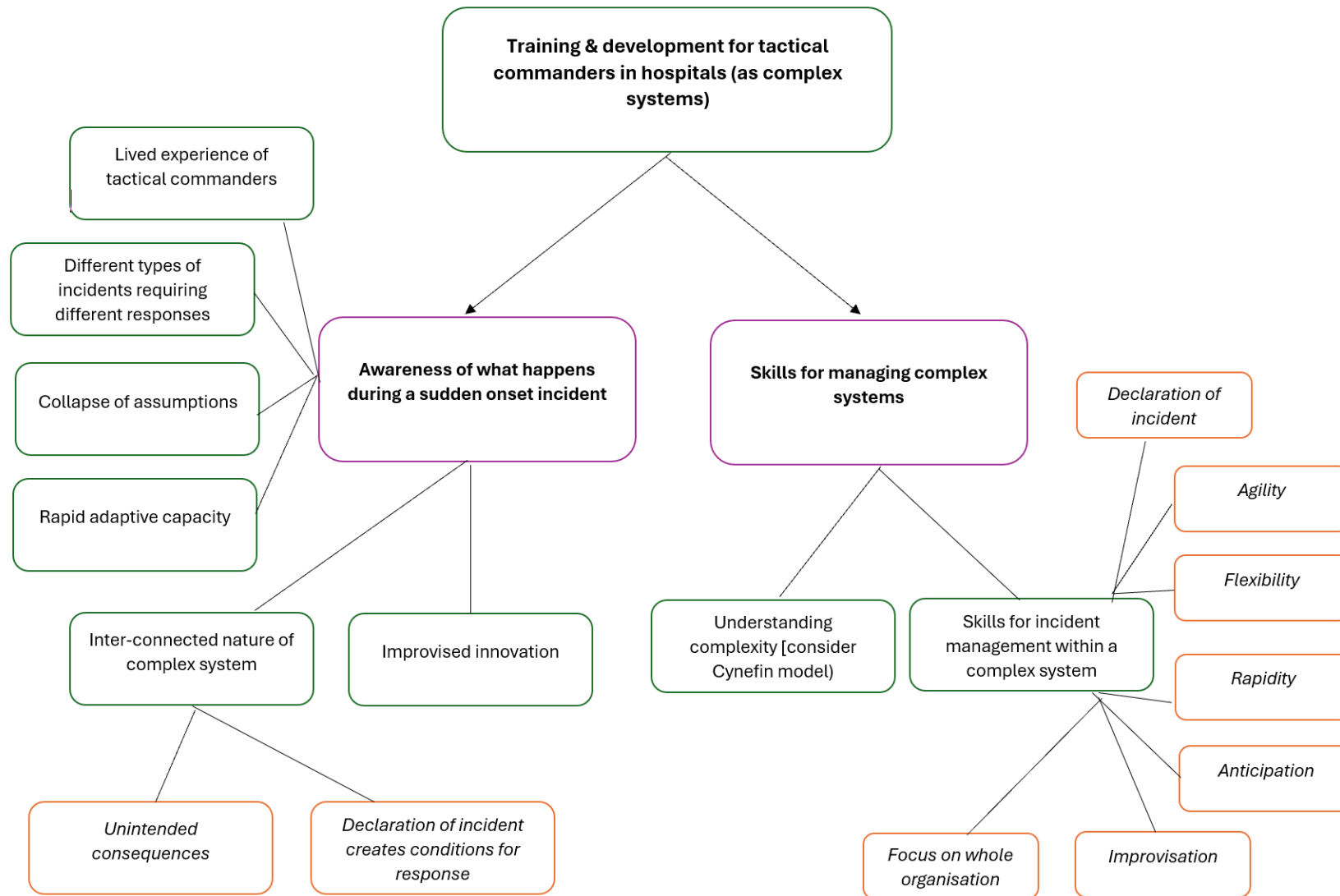
to the current model for major incident planning within the NHS, which aspires to a tightly structured response regardless of the type of incident and which gives little training or practice in how to implement it. Emphasising the requirement for commanders to consider the whole of the hospital and to be aware of boundaries and unintended consequences within the rest of the organisation could also help commanders in discharging their roles.

By alleviating concerns about the nature of the task involved for those who may be called upon to effect this role, and by simplifying and standardising key messages for a group of people who would be operating under extreme stress, it could encourage the commanders to trust and build on their instinctual and intellectual responses rather than feel constrained by a belief that there is a single solution that they need to conform to. It also prepares commanders (and staff in general) for encountering and dealing with unexpected events during an incident. It could support resilience of individual response if these are seen as part of an incident rather than something extraneous which may call into question the legitimacy or effectiveness of other aspects of preparedness or response.

What others require from tactical command: The research focused on the lived experience of those within tactical command. This gave insight into their actions and what they may need to improve this. It did not explicitly consider this from the needs of other commands within the hospital. Taking account of the perspectives of those external to tactical command around what they required during an incident, could enhance the responsiveness of tactcail commanders. Figure 16 illustrates how an approach which considers partner commands' needs and wants could be used to inform policies and operating procedures for hospital command.

Figure 16: Model of Tactical Command based on perceived needs and wants from Tactical Commanders and key partners
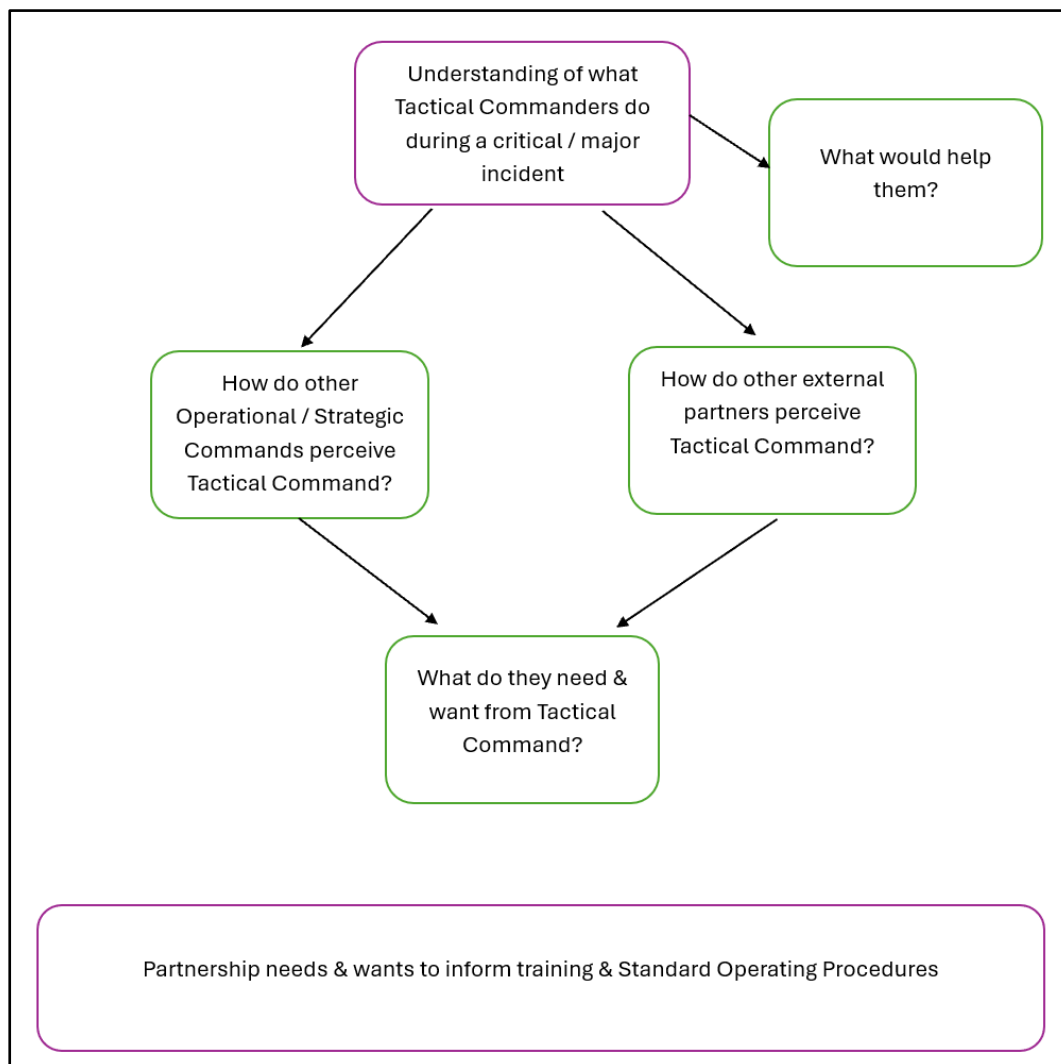
Insights into the effectiveness of a hospital response: This approach combines the understanding of the needs and wants of others around tactical command, with insights into how complex adaptive systems respond under conditions of crisis (Figure 17). This provides a clearer focus on what is within the scope of direct influence of different sections of the hospital response commands. From this perspective the emphasis on unexpected events moves from one of how to prevent this from happening again, to include an understanding how resilient were the staff in being able to deal with it. This could provide a new perspective for hospital debriefing after an incident.

Figure 17: Complex Adaptive Systems - Development of methodology for assessing the effectiveness of Tactical Command & hospital response during an incident

To what extent does Tactical Command satisfy the needs & wants of other Commands?

To what extent did staff operate in an empowered way to address Safety (Patient, Staff, Hospital, Public) during the incident?

Communications

Do not focus on 'who gave the message?'

BUT

Were you satisfied that the action was in the best interests of 4 x Safety?

Gaps / Failures

Do not focus on 'why did this (not) happen?'

BUT

Did participants understand their function & were they flexible enough to implement it?

Insight & Awareness

Do not focus on 'why wasn't the problem spotted?'

BUT

How relevant to staff were the organisational indicators & remedies?

Responding to patient harm

Direct injury from incident

Clinical Review

Direct consequence of incident response

(e.g. ED closure; ITU evacuation)

Were you satisfied that the action was in the best interests of 4 x Safety?

Indirect consequence of incident response

(e.g. EMRT in rest of hospital)

How did tactical command identify and / or respond?

6.8   Conclusions

The thesis provides a descriptive analysis of the lived experience of tactical commanders. It constructs a theory about what they were doing, how they were doing it and what they encountered when they did it.

This thesis offers a complementary approach to understanding of and preparation for response to critical and major incidents. It offers insights into how to prepare for a major incident in that it places emphasis on what commanders actually do and how to enhance this. Simultaneously the research conceptualises critical and major incidents as being part of a continuum of challenges posed by complex systems and argues that people should be trained in all aspects of working in complex environments. This would provide a set of skills which they could adapt in a crisis, rather than being expected to adopt a new set of skills and behaviours.

The research offers further insight into how to assess the impact or effectiveness of a hospital response to a critical or major incident. It suggests that in addition to looking at how unexpected events within an incident can be avoided, there could be merit in looking at resilience in terms of how people respond to unexpected events within an incident.

Chapter Seven: Researcher Reflexivity

7.0   Researcher Reflexivity:

Interruptions due to Covid-19

I interrupted the research twice due to the impact of different waves of Covid-19. This was due to both a need to focus on operational responses in my professional capacity and a recognition that potential research participants (those tactical commanders in other hospitals) would also be preoccupied with the operational response. This had a negative impact in that field work and analysis was suspended and it meant that I felt detached from the data when I resumed study. The sense of being one step removed from the data had a positive aspect. I was able to view the work with a fresh pair of eyes rather than being caught up in the momentum of actions associated with fieldwork and assessment submission. It also enabled the lessons of Covid to be incorporated into the research, which was important as Covid response was often the prism through which people considered the sudden onset critical or major incident concerned.

Ethics

Staying within the boundaries of ethical research proved a challenge at the early stage of the research in so far as there was a temptation driven by the desire for expediency, to step outside of the framework that had been developed to receive ethics approval from both the University and the Health Research Authority. Examples of these 'temptations' would include contacting individuals and hospitals outside of the list of approved sites agreed with the HRA; and, contacting key individuals directly within organisations rather than going via the local trust Research & Development office.

The root cause of this lay in the way that ethical submissions had been made which did not reflect the actual conditions / environment that I would face. Considering I had 35 years of experience within the NHS, this could reflect a degree of personal arrogance about understanding the context within which I was conducting the research, and a lack of detailed planning which could have considered a wider range of circumstances than was the case. In any further research, more attention would be paid to understanding the research

environment from the point of view of a researcher rather than somebody working within the NHS.

In order to resolve some of these pressures, I adopted a set of principles which encompassed the principles of the ethics applications and stayed within the boundaries of any approvals. Individuals would be contacted at hospitals where HRA approval had not been obtained and asked about the incident to see if it met the inclusion criteria and whether they would be prepared for their organisation to take part and then HRA approval would be sought. Where an individual within a Trust identified tactical commanders who were willing to take part in the research, this would be accepted, even though the original recruitment methodology was based on participants responding to a general request. The principle behind this was that the researcher would not be directly contacting individuals or breaching their confidentiality in recruitment. Where the person operating as the point of contact within an organisation volunteered to participate in the research (as they had been within the tactical command and met the inclusion criteria), this would be accepted, as the prior interaction with them had been around a signposting role rather than asking them directly to participate.

Differences in approach to the research design

Participant recruitment was raised as an issue in Chapter Three, where alternative approaches to recruiting tactical commanders to the research were considered.

Research Approval: The request for ethics and research approval had to be amended and the remit of the areas to be researched expanded (in this case moving to include 'critical' as well as 'major' incidents). In future I would seek to work through potential directions for the research to avoid getting caught in situations where the permissions obtained were too narrow in the light of what I had found. In addition, I would be prepared to go back to the HRA earlier than I did. I delayed contacting them to increase the remit of the research as I was concerned that there would be a significant approval process, which didn't materialise. This meant I spent some time pursuing an approach even when a change should have been implemented.

Rigour of documentation classification and data storage systems: The preparation of the final thesis has made me appreciate the limitations of the data storage systems that I used. Retrieving details of the systematic reviews took longer than anticipated and this demonstrates the flaws in the way I classified and stored this on my data drives. What appeared logical at the time of saving no longer chimed when reappraised several months later with a view to retrieving details. For future research I would use a more systematic saving and recording system. I would dedicate some time to looking at pre-existing software to give me greater support in holding the data generated as part of the research, rather than developing bespoke systems which may have little rigour or resilience.

Knowledge Synthesis: Two systematic reviews were included and there may be criticism that the original systematic review was too narrow. The latter review was felt to be justified as an iterative phase in the construction of theory, since it explored emerging themes around complexity. For future research, however, with this learning in mind, there would a greater emphasis on exploring different kinds of knowledge synthesis for the types of understanding required.

Limitations of the Research

The research is context specific and does not set out to create universal rules. The aspiration is that this resonates with other hospitals and that they can reflect on the lived experiences of the tactical commanders in this research. Using a healthcare variant of Cynefin could be something which could be available to all healthcare organisations to support them in developing plans and training which build on how people are likely to respond rather than how we think they should.

This research focused on the lived experience of commanders and people within tactical command. It did not rigorously explore how other people perceived the response by tactical command nor did it consider the interactions between command levels, from the perspective of strategic and operational commands. There was also no attempt to evaluate the effectiveness or efficiency of the tactical command. In these respects, the research stayed true to its brief, which was to understand the lived experience of a group of people from their perspective and to co-construct theory which was grounded within this. It would be

interesting to undertake research which considers the experience of operational and strategic commanders and construct an integrated theory of hospital operational, tactical and strategic command during critical and major incidents.

Relevance of the Research

The research process for this thesis was initiated in 2018. As this research demonstrated, since then sudden onset incidents have continued within the UK, and this has been while dealing with the impact of the Covid pandemic. NHS hospitals have themselves been the target of attack[17] while conflicts across the globe have demonstrated that hospitals are not exempt from the worst extremes of events unfolding around them[18]. There remains a need for hospitals to have a robust incident response capability and the role of the tactical commander within this is critical. Understanding how commanders perceive the challenges they encounter provides an opportunity to support and enhance their response.

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[17] Terrorist Incident at Liverpool Women's Hospital – Hansard 16 Nov 2021
[18] Ukraine: Over 700 recorded attacks on health facilities and workers in year since Russia invasion (Mahase, 2023)
Gaza: World Health Organization says Gaza's main hospital no longer functioning (BBC News, 2023)

Minimum Occupational Standards for Emergency Preparedness, Resilience and Response (EPRR)

Version 1.0, June 2022

6 Respond to incidents and emergencies at the Tactical level

The NHS Tactical Commander is responsible for directly managing their organisation's response to an incident. They will interpret strategic direction and develop the tactical plan to achieve the objectives set by strategic command.

6.1 Performance criteria The NHS Tactical Commander must be able to:

1. work in co-operation with and communicate effectively with other health and multiagency partners at the tactical level

2. gather and share information and intelligence to inform effective decision-making

3. make effective decisions (e.g. through use of the Joint Decision Model)

4. undertake an ongoing assessment of the risks to the health of the community and to the delivery of healthcare to the community

5. develop tactical plans, aligned to the strategic plan, based upon available information, incident and emergency plans and the assessed risks

6. implement and brief tactical plans, reviewing them on an ongoing basis, in consultation with key staff and partners

7. determine and prioritise the resources required for the response in both the short and longer term

8. provide accurate and timely information to inform and protect the community, working with the media where relevant, and within the agreed organisational communication strategy

9. coordinate responses from the operational level

10. identify where circumstances warrant a strategic level of management and ensure fully briefed as required

11. ensure effective and timely handover of command

12. maintain the health, safety and welfare of individuals during the response

13. fully record decisions, actions, options and rationale in accordance with current guidance, policy and legislation.

6.2 Knowledge and understanding The NHS Tactical Commander must know and understand:

1. the legal basis of their authority and the powers that derive from this (e.g. statute, contract, policy etc)

2. the principles of 'Emergency Response and Recovery' and the 'NHS Emergency Preparedness Resilience and Response Framework'

3. the command-and-control structures for health and multi-agency emergency response

4. how to undertake an ongoing risk assessment

5. the roles and responsibilities of key emergency response partners (i.e. emergency services, local authorities and other health partners)

6. the key elements of organisational and multi-agency emergency plans (i.e. aim & objectives, activation process and roles and responsibilities of responding agencies)

7. the range of tactical options available and how they should be communicated

8. how to assess the short- and long-term human impact of the incident or emergency and identify the most vulnerable groups

9. the information needs of the various organisations involved in the response

10. the Joint Services Interoperability Principles (JESIP) joint doctrine

(NHSE, 2022a)

JESIP Decision Controls

These are outlined in Table 1, with points A to D intended to structure a joint consideration of the issues and E being for individual reflection:

Table 1: JESIP Decision Controls

A) Why are we doing this?	• What goals are linked to this decision? • What is the rationale, and is that jointly agreed? • Does it support working together, saving lives and reducing harm?
B) What do we think will happen?	• What is the likely outcome of the action; in particular, what is the impact on the objective and other activities? • How will the incident change as a result of these actions, what outcomes do we expect?
C) In light of these considerations, is the benefit proportional to the risk?	• Do the benefits of proposed actions justify the risks that would be accepted?
D) Do we have a common understanding and position on:	• The situation, its likely consequences and potential outcomes? • The available information, critical uncertainties and key assumptions? • Terminology and measures being used by all those involved in the response? • Individual agency working practices related to a joint response? • Conclusions drawn and communications made?
E) As an individual:	• Is the collective decision in line with my professional judgement and experience? • Have we (as individuals and as a team) reviewed the decision with critical rigour? • Are we (as individuals and as a team) content that this decision is the best practicable solution?

(Source: JESIP, 2016: 21)

Initial Search Strategy: Decisions taken by tactical commanders in NHS hospitals during sudden onset incidents

An initial search strategy was developed using the framework of Patient / Intervention / Comparison / Outcome (PICO) (Richardson et al, 1995) as formatted into a checklist by Walsall Healthcare NHS Trust (2019). This is outlined in Appendix A. Keywords that were combined with Boolean operators included 'disaster', 'major incident', 'NHS hospitals', 'decision-making', 'response', 'tactical/operational commanders' and 'preparedness'. The Thesaurus function was used to find the subject headings used for indexing articles in each database and the Explode function was activated to search for documents where both the subject heading and narrower subject headings were used.

A search was undertaken using primarily the Healthcare Databases Advanced Search (HDAS) functionality.   Databases searched were those that covered health and social care matters. The primary databases used were CINAHL, MEDLINE, EMCARE, HMIC, BNI, AMED, PubMed, PsycInfo, EMBASE. This methodology was supplemented by articles that the researcher had identified through other sources such as nationally published reports and inquiries, government and NHS websites, policy documents and hospital debrief notes, plus the use of citation tracking to identify more recent articles from those already selected.

Articles were to be included for review if they met the following criteria: (1) published in English; (2) were linked to major incidents affecting hospitals within the NHS (or 'NHS-derivatives' such as the Isle of Man); (3) described/mentioned the command-and-control arrangements within the hospital during the incident. The time range was left open once attempts to restrict searches to articles within 5 years (December 2019 as the start point) yielded little material. Using this strategy, the earliest article identified was published in 1975. The review was refreshed in June 2022 and there was only 1 additional article identified for initial review.

Study Selection

Refining the list of articles to be included was done in several stages which included removal of duplicates, screening via the published abstract, and then review of the full text. Figure 1 shows a sample of the stages and coding used.

Figure 1: Sample of First Cut of Screening of Articles

To get access to articles identified, the Salford University access was used, combined with OpenAthens and Google Scholar. There were 14 articles (3% of those identified), where the article was not able to be accessed (in most cases they were in the news section of journals and not stored on databases, as opposed to more in-depth articles in the same edition of the journal) and they were excluded from the review. The structure for reporting on systematic literature reviews outlined by PRISMA (Moher et al, 2009) was adopted to support this work (Figure 2).

Figure 2: Screening Process: PRISMA

PRISMA 2009 Flow Diagram

Records identified through database searching
(n = 692)

Additional records identified through other sources
(n = 11)

Records after duplicates removed
(n =519)

Records screened
(n = 519)

Records excluded
(n = 366)

Not UK = 334
UK not relevant = 18
Articles not found = 14

Full-text articles assessed for eligibility
(n = 153)

Full-text articles excluded, with reasons
(n = 149)

Not acute NHS / sudden onset MI = 34
Literature Review / Modelling = 25
Preparedness / Training = 42
NHS MI but no mention of Operational / Tactical Command = 31
Mentions Operational / Tactical Command but no details of decisions made = 17

Studies included in qualitative synthesis
(n = 4)

Studies included in quantitative synthesis (meta-analysis)
(n = 0)

Identifying articles to be included in the Review

Of the 52 articles that covered NHS hospitals responding to a major incident, only 21 directly mentioned the role of tactical / operational commanders (Appendix B). Furthermore, out of these 21, only four articles outlined how tactical decisions are made and / or identified who made tactical decisions (Duffin, 2009; Duffin 2011; Mohammed et al, 2006; Wilkinson 2017).

These four articles recognised an individual who identified a location for evacuation & shelter during a hospital fire (Duffin, 2009), named the roles of staff establishing a tactical command centre (Duffin, 2011) and identified that having senior members of the speciality medical teams playing an active role in decision-making allowed management decisions to be streamlined (Mohammed et al, 2006). They did not clarify the exact nature of tactical concerns, decisions made nor how this was done. Two were articles (Duffin, 2009; Duffin, 2011) located in the news sections of nursing journals and were in the style of journalistic reporting based on interviews with staff involved in named incidents, rather than constituting a study. One was a hospital debrief report following an incident (Wilkinson, 2017) and was intended for internal use and circulation within the local health emergency planning community. The fourth information source (Mohammed et al, 2006) was an article within a journal which had the objective to analyse the terrorist suicide bombings in London in July 2005 and the resulting hospital emergency response. It was intended for the professional clinical community involved in pre-hospital and disaster medicine.

None of the articles could be categorised as robust research studies. The two pieces of journalism (Duffin, 2009; Duffin, 2011) did not outline the aims or objectives of the work nor seek to describe their methodology. The other two documents (Mohammed et al, 2006; Wilkinson, 2017) did do this and outlined their data sources, however, they did not seek to place their work within any theoretical framework nor outline the existing knowledge base. Both these latter two were focused on analysing what happened during a specific incident relating to each hospital involved and there was no attempt to frame the work in the context of a research theory and to adopt an inductive or deductive research approach. None of the documents made any reference to ethical considerations in terms of ethical committee approval and informed consent for participants. In the case of the debrief paper (Wilkinson, 2017) it was clear that this was a document prepared by a senior operational manager looking at the response of the organisation. Participants would have been engaged on the basis that they were obliged to do so by the management structure within the organisation. This introduced bias in that people may not have had the ability to be candid in their observations about the incident since this was a management report and it may have been perceived that there was the potential for sanction should errors by employees have been. For the paper by Mohammed et al (2006), all the authors were surgeons at the hospital which was the subject

of the article and the methodology included material from formal debriefs, audits and open-source documents. This could introduce bias in that the authors were making observations about the organisation within which they worked, and may have been guarded in any critique. In addition, the data used came from official debriefs and external sources and did not seek to gain the views of individuals under conditions of confidentiality, the potential consequences of which were outlined earlier.

The sole record of decisions made by tactical commanders during an incident was from a Trust's internal debrief report following a fire and evacuation at an acute trust (Wilkinson, 2017). This identified confusion between the Trust and the fire service about who made key decisions (such as the order to evacuate), and the level of local operational initiative in evacuating shown by clinical teams, neither of which were effected under the direct mandate of the tactical commander. By the time the designated tactical commander was at the scene and appraised of the situation, they found themselves dealing with the aftermath of a response that had already evacuated several buildings on the site. The report identifies that a command point was established but provided no further details regarding decision-making by the tactical commanders from this point on. This meant that only a small segment of the commander's involvement within the incident was highlighted.

Value of the articles for this research

Within the literature reviewed, there was limited reference to and minimal exploration of considerations for tactical commanders in NHS hospitals during major incidents. Most articles were concerned with clinical and medical (operational) management. The contribution as research studies of those four articles which did focus more on tactical commanders was extremely limited due to both their subjects and the lack of research rigour in methodology and design.

The literature identified did not constitute a robust evidence base regarding decision-making within hospital tactical command. While the absence of evidence may be seen as justifying the basis for this research, it did little to inform understanding of how hospital command responded to significant sudden onset incidents. Consequently, the search strategy was amended to focus beyond the NHS.

APPENDIX A

Walsall Healthcare **NHS**

NHS Trust

Plan Your Research Question!

You can use **PICO** to create a healthcare question and develop your search strategy

P	Patient or problem
I	Intervention
C	Comparison
O	Outcome

What information do I need?

NHS Hospital response to major incident Decision-making Tactical commanders

What are my PICO elements?

Patient or problem *Be very specific*	**NHS Hospital** **General & Acute hospitals; not mental health or community trusts**
Intervention *Think of alternative and similar keywords*	**Decision-making** **Crisis management** **Emergency response**
Comparison *Think of alternative and similar keywords*	**Hospital; Big bang; Major incident; Emergency Department; Incident Chemical hazard; Chemical incident; Sudden onset; Incident; Adverse effects; Emergency treatment; Fire; Accidents; Disasters; Emergency planning; Accident and emergency; Hospital emergency services; Hospital Departments; CBRN; Biological; Radiological; Nuclear; Explosive**
Outcome *Be very specific*	**Decision-making**

What is my research question?

In [**P**] Major incident

does [I] Tactical Command control the incident
compared to [C] Or does it react to it and is led by other actors
result in [O] Optimal outcomes for casualties   ?

What limits can I use to focus my search?

Date range **Any time range**
Age group **Incidents affecting all ages**
Language **English language**
Document type: **All document types – research articles, literature reviews, news articles, grey literature**
Other **NHS – UK only**

Contact Liz Askew, Information and Knowledge Specialist for assistance:
Email: Liz.Askew@walsallhealthcare.nhs.uk **Telephone:** 01922 656628

APPENDIX B

Classification of Articles

Articles highlighted in Green were included in the review of Tactical Command(ers)

Article	Major incident	Hospital	Clinical presentation & treatment	Key actions in plan	Key actions on the day	Identifies Hospital Operational / Tactical Commanders	Identifies how tactical decisions are made	Identifies who made tactical decisions
Allen, M.J. (1989)	M1 Plane Crash, 1989	Derbyshire Royal Infirmary Leicester Royal Infirmary Queen's Medical Centre, Nottingham	Y		Y	Y		
Allen, S (2019)	Westminster Bridge attack, 2017 London Bridge attack, 2017 Grenfell Tower, 2017 Manchester Arena Bomb 2017	Kings College Hospital, London Royal Manchester Children's Hospital		Y	Y			

Author	Event	Location						
Anonymous (1989)	Bradford Stadium fire, 1989	Bradford Royal Infirmary			Y			
Anonymous (2013)	Fire & Evacuation of ICU, 2011	Royal United Hospital, Bath			Y			
Aylwin, C.J., Konig, T.C, Brennan, N.W., Shirley, P.J., Davies, G., Walsh, M.S., Brohi, K. (2006)	London Bombings, 2005	Royal London Hospital	Y	Y	Y	Y		
Belle-Fortune (2008)	Fire & Evacuation of ward, 2008	Great Ormond Street Hospital, London			Y			
Bennett, S.R. (2015)	General overview			Y	Y			
Bennett, S.R. (2018)	General overview Manchester Arena Bomb, 2017			Y	Y			
Brown, M.G., Marshall, S.G. (1989)	Enniskillen Bomb, 1987	Erne Hospital	Y	Y	Y			
Calder, A., Bland, S. (2018)	CBRN considerations			Y	Y			
Carley, S.D., Mackway-	Manchester Bomb, 1996		Y	Y	Y			

Author (Year)	Event	Hospital						
Jones, K. (1997)								
Craigie, R.J., Farrelly, P.J., Smith, S.R., Pollard, J.S., Jones, D.J. (2018)	Manchester Arena Bomb, 2017		Y	Y	Y	Y		
Dean, E. (2017)	Westminster Bridge attack, 2017 Manchester Arena Bomb 2017	St Mary's Hospital, London Wythenshawe Hospital		Y	Y	Y		
Dobson, R. (1999)	Paddington Train Crash, 1999	Chelsea & Westminster Hospital			Y			
Duffin, C (2009)	Fire & Evacuation of specialist hospital, 2008	Royal Marsden Hospital, London			Y			Y
Duffin, C (2011)	Riots in Croydon, 2011	Croydon University Hospital			Y	Y		Y
Evans, G.W., Isgar, B., Bruins, W. et al (1990)	Peterborough lorry explosion, 1989	Peterborough District Hospital	Y	Y	Y			
Frykberg, E.R., Tepas, J.J. (1988)	Terrorist Bombings including Belfast, 1969-72 Birmingham, 1974		Y	Y				

	Guildford, 1974 London, 1973, 1975							
Gulland, A. (2017a)	Westminster Bridge attack, 2017 London Bridge attack, 2017 Grenfell Tower, 2017 Finsbury Park Mosque, 2017 Manchester Arena Bomb 2017	Kings College Hospital, London University Hospital of South Mancheste r NHSFT	Y	Y	Y			
Gulland, A. (2017b)	Westminster Bridge attack, 2017 London Bridge attack, 2017 Parsons Green, 2017 Finsbury Park Mosque, 2017 Manchester Arena Bomb 2017		Y	Y	Y			

Author	Event	Hospital						
Guthrie et al (1999)	Manchester Bomb, 1996			Y	Y			
Hardy, S.E.J. (2015)	Road Traffic Collision in Kent, 2013	Medway Maritime Hospital William Harvey Hospital	Y	Y	Y	Y		
Hardy, S. (2015)	Learning from Major incidents			Y	Y			
Hart, R.J., Lee, J.O., Boyles, D.J., Batey, N.R. (1975)	Summerland fire, Isle of Man, 1973	Noble's Hospital	Y		Y			
Hart, A.J., Mannion, S., Earnshaw, P., Ward, A. (2003)	London Nail Bomb, Soho, 1999	St Thomas' Hospital, London	Y	Y	Y	Y		
Holmes, S., Coombes, A., Rice, S., Wilson, A. (2005)	London Bombings, 2005	Royal London Hospital	Y		Y			
Horsfall, K., Slowie, A. (1999)	Paddington Rail Disaster, 1999	St Mary's NHS Trust, London	Y	Y	Y	Y		
Howells, N.R., Dunne, N., Reddy, S. (2006)	Reading train crash, 2004	Royal Berkshire Hospital, Reading	Y	Y	Y			
London Assembly – 7 July Review	London Bombings, 2005			Y	Y			

Committe e (2006)								
Johnson, C., Cosgrove, J.F. (2016)	Learning from Major incidents		Y	Y	Y	Y		
Lavery, G.G., Horan, E. (2005)	Omagh Bombing, 1998	Royal Group Hospitals Trust, Belfast	Y	Y	Y	Y		
Lax, P., Nesbitt, I. (2018)	Overview of major incidents			Y		Y		
Linney, A.C.S., Kernohan, G., Higginson, R. (2011)	CBRN considerations		Y	Y				
Lipp, M., Paschen, H., Daublande r, M., Bickel-Pttrup, R., Dick, W. (1998)	Disaster management in hospitals			Y	Y			
Longhurst, C. (2017)	Manchester Arena Bomb 2017	Stepping Hill Hospital, Stockport			Y	Y		
Mohamme d, A.B., Mann, H.A., Nawabi, D.H., Goodier, D.W., Ang, S.C. (2006)	London Bombings, 2005	Royal London Hospital	Y	Y	Y	Y		Y

Author	Event	Location						
Moran, C. (2017a)	Westminster Bridge attack, 2017		Y	Y	Y	Y		
Moran, C. (2017b)	London Bridge attack, 2017		Y	Y	Y	Y		
Moran, C. (2017c)	Manchester Arena Bomb 2017		Y	Y	Y	Y		
Moran, C.G., Webb, C., Brohi, K., Smith, M., Willett, K. (2017)	Westminster Bridge attack, 2017 London Bridge attack, 2017 Grenfell Tower, 2017 Finsbury Park Mosque, 2017 Manchester Arena Bomb 2017		Y	Y	Y			
Nesbitt, I. (2018)	Mass casualties and major incidents			Y	Y	Y		
Sharpe, D.T. et al (1985)	Bradford City Football Club fire, 1985	Bradford Royal Infirmary	Y		Y			
Shirley, P.J., Mandersloot, G. (2008)	London Bombings, 2005	Royal London Hospital	Y	Y	Y	Y		
Skryabina, E. et al (2021)	Westminster Bridge 2017; Manchester		Y	Y	Y			

	Arena 2017; London Bridge 2017							
Stacey, R., Morfey, D., Payne, S. (2004)	Organophosphate poisoning, 2001		Y		Y			
Turegano-Fuentes, F., Perez-Diaz, D. (2006)	London Bombings, 2005		Y					
Wass, A.R., Williams, M.J., Gibson, M.F. (1994)	Bus crash involving school children, Yorkshire, 1993	York District Hospital	Y	Y	Y			
Wilkinson, P. (2017)	Fire and evacuation of hospital block, Stoke, 2017	Royal Stoke University Hospital		Y	Y	Y	Y	Y
Williams, K.N., Squires, S. (2000)	London Nail Bomb, Soho, 1999	St Thomas' Hospital, London		Y	Y			

Walsall Healthcare **NHS**

NHS Trust

Plan Your Research Question!

You can use **PICO** to create a healthcare question and develop your search strategy

P	Patient or problem
I	Intervention
C	Comparison
O	Outcome

What information do I need?

Hospital response to a sudden onset incident

Decision-making

Tactical Commanders

What are my PICO elements?

Patient or problem *Be very specific*	**Hospital response** **Sudden onset incident** **Hospitals worldwide** **Incidents / Exercises**
Intervention *Think of alternative and similar keywords*	**Decision-making** **Crisis management** **Emergency/disaster/incident/mass casualty/surge response**
Comparison *Think of alternative and similar keywords*	**Hospital; Big bang; Major incident; Immediate impact; mass casualty incident; Emergency Department; Incident Chemical hazard; Chemical incident; Sudden onset; Incident; Adverse effects; Emergency treatment; Fire; Accidents; Disasters; Emergency planning; Accident and emergency; Hospital emergency services; Hospital Departments; CBRN; Biological; Radiological; Nuclear; Explosive; hospital lockdown; surge capacity; hospital incident command;**
Outcome *Be very specific*	**Decision-making** **Decisions** **Concerns**

	Pressures
	Problems

What is my research question?

In [P] a sudden onset incident
does [I] Hospital Command made decisions
compared to [C] individual (sub) units within the hospital
result in [O] dealing with the surge of casualties   ?

What limits can I use to focus my search?

Date range **5 full calendar years – 2018 to 2022 plus articles up to February 2023**
Age group **Incidents affecting all ages**
Language **English language**
Document type: **Research articles and peer reviewed literature**
Other **Worldwide**

Contact Liz Askew, Information and Knowledge Specialist for assistance:
Email: Liz.Askew@walsallhealthcare.nhs.uk **Telephone:** 01922 656628

Certificate of Training

Update Your
Knowledge

Walsall Healthcare NHS
NHS Trust

This is to certify that: Matthew Dodd

Attended

Finding Evidence for Beginners
Information Skills Training

On: 23/11/2022

Total CPD Hours 1.5

Delivered by:
Liz Askew
Information and Knowledge Specialist

Walsall Healthcare NHS Trust
Library & Knowledge Services
Manor Learning & Conference Centre

Jacqui Watkeys
Head of Library & Knowledge Services

Example of a literature search

HDAS Export
Strategy Other Major Incidents

See full search strategy

Strategy 766589/saved

Contents 100 of 489 results on Saved Results

Strategy 766589

#	Database	Search term	Results
1	CINAHL	(hospital*).ti,ab	385428
2	CINAHL	("big bang").ti,ab	136
3	CINAHL	exp "CRISIS INTERVENTION"/	3282
4	CINAHL	exp "CHEMICAL HAZARD RELEASE"/	202
5	CINAHL	exp "MASS CASUALTY INCIDENTS"/	1828
6	CINAHL	exp "CRISIS INTERVENTION"/	3282
7	CINAHL	(1 AND 2)	6
8	CINAHL	(1 AND 3)	301
9	CINAHL	(1 AND 4)	11
10	CINAHL	(1 AND 5)	333
11	CINAHL	(1 AND 6)	301
12	Medline	(Hospital*).ti,ab	1131771

13	Medline	("big bang").ti,ab	517
14	Medline	exp "CHEMICAL HAZARD RELEASE"/	535
15	Medline	("sudden onset").ti,ab	8342
16	Medline	(12 AND 13)	14
17	Medline	(12 AND 14)	29
18	Medline	(12 AND 15)	1099
19	Medline	(incident*).ti,ab	132738
20	Medline	(12 AND 15 AND 19)	18
21	CINAHL	("sudden onset").ti,ab	1680
22	CINAHL	(1 AND 21)	222
23	CINAHL	(incident*).ti,ab	37492
24	CINAHL	(22 AND 23)	6
25	AMED	(hospital*).ti,ab	12837
26	AMED	("big bang").ti,ab	2
27	AMED	exp "ADVERSE EFFECTS"/	5882
28	AMED	exp "EMERGENCY TREATMENT"/	576
29	AMED	("sudden onset").ti,ab	65
30	AMED	(incident*).ti,ab	842
31	AMED	(25 AND 26)	0
32	AMED	(25 AND 27)	220
33	AMED	(25 AND 28)	150

34	AMED	(25 AND 29 AND 30)	0
35	AMED	(25 AND 29)	4
36	BNI	(hospital*).ti,ab	92402
37	BNI	("big bang").ti,ab	13
38	BNI	(chemical incident).ti,ab	36
39	BNI	("sudden onset").ti,ab	172
40	BNI	(incident*).ti,ab	5633
41	BNI	(36 AND 37)	0
42	BNI	(36 AND 38)	6
43	BNI	(36 AND 39)	27
44	BNI	(36 AND 39 AND 40)	1
45	BNI	(fire*).ti,ab	1910
46	BNI	(36 AND 45)	300
47	CINAHL	(fire*).ti,ab	14995
48	CINAHL	(1 AND 47)	1164
49	CINAHL	(23 AND 48)	122
50	Medline	(fire*).ti,ab	42459
51	Medline	(12 AND 50)	2691
52	Medline	(19 AND 51)	214
53	HMIC	(hospital*).ti,ab	49653
54	HMIC	("big bang").ti,ab	26
55	HMIC	exp ACCIDENTS/	3037

56	HMIC	exp DISASTERS/	2323
57	HMIC	exp "EMERGENCY PLANNING"/	661
58	HMIC	exp "EMERGENCY PRACTICES"/	107
59	HMIC	exp "ACCIDENT & EMERGENCY DEPARTMENTS"/	792
60	HMIC	exp "HOSPITAL EMERGENCY SERVICES"/	1961
61	HMIC	exp "ACCIDENT & EMERGENCY SERVICES"/	2270
62	HMIC	exp "HOSPITAL DEPARTMENTS"/	5699
63	HMIC	("sudden onset").ti,ab	9
64	HMIC	(incident*).ti,ab	3273
65	HMIC	(fire*).ti,ab	1401
66	HMIC	(53 AND 54)	5
67	HMIC	(53 AND 55)	742
68	HMIC	(53 AND 56)	293
69	HMIC	(53 AND 57)	91
70	HMIC	(53 AND 58)	31
71	HMIC	(53 AND 59)	286
72	HMIC	(53 AND 60)	539
73	HMIC	(53 AND 61)	574
74	HMIC	(53 AND 62)	2109
75	HMIC	(53 AND 63 AND 64)	0

76	HMIC	(53 AND 62 AND 64)	31
77	HMIC	(53 AND 61 AND 64)	21
78	HMIC	(53 AND 65)	295
79	HMIC	(53 AND 64 AND 65)	11
80	HMIC	(53 AND 60 AND 64)	23
81	EMCARE	(hospital*).ti,ab	444389
82	EMCARE	("big bang").ti,ab	206
83	EMCARE	exp "CHEMICAL ACCIDENT"/	133
84	EMCARE	exp EMERGENCY/	25218
85	EMCARE	exp ACCIDENT/	64902
86	EMCARE	("sudden onset").ti,ab	2273
87	EMCARE	(incident*).ti,ab	49413
88	EMCARE	(fire*).ti,ab	12731
89	EMCARE	(81 AND 82)	8
90	EMCARE	(81 AND 83)	17
91	EMCARE	(81 AND 84)	6150
92	EMCARE	(81 AND 84 AND 87)	259
93	EMCARE	(81 AND 85)	10361
94	EMCARE	(81 AND 85 AND 87)	883
95	EMCARE	(81 AND 86 AND 87)	12
96	EMCARE	(81 AND 86)	321
97	EMCARE	(81 AND 87 AND 88)	155

98	EMBASE	(hospital*).ti,ab	1851327
99	EMBASE	("big bang").ti,ab	467
100	EMBASE	exp "CHEMICAL ACCIDENT"/	577
101	EMBASE	exp "EMERGENCY HEALTH SERVICE"/	97177
102	EMBASE	exp "CHEMICAL INJURY"/	6973
103	EMBASE	("sudden onset").ti,ab	12833
104	EMBASE	(incident*).ti,ab	179939
105	EMBASE	(fire*).ti,ab	55648
106	EMBASE	(CBRN*).ti,ab	257
107	EMBASE	(biological).ti,ab	855160
108	EMBASE	(radiological).ti,ab	158798
109	EMBASE	(nuclear).ti,ab	527417
110	EMBASE	(explosive*).ti,ab	13196
111	EMBASE	(98 AND 99)	19
112	EMBASE	(98 AND 100)	55
113	EMBASE	(98 AND 101)	33812
114	EMBASE	(98 AND 102)	718
115	EMBASE	(98 AND 103 AND 104)	54
116	EMBASE	(98 AND 104 AND 105)	330
117	EMBASE	(98 AND 104 AND 107)	369
118	EMBASE	(98 AND 104 AND 106)	25
119	EMBASE	(98 AND 104 AND 108)	546

120	EMBASE	(98 AND 104 AND 109)	248
121	EMBASE	(98 AND 104 AND 110)	50
122	PsycINFO	(hospital*).ti,ab	134784
123	PsycINFO	(chemical incident).ti,ab	66
124	PsycINFO	("big bang").ti,ab	88
125	PsycINFO	("sudden onset").ti,ab	902
126	PsycINFO	(incident*).ti,ab	30360
127	PsycINFO	(fire*).ti,ab	10341
128	PsycINFO	(biological*).ti,ab	77758
129	PsycINFO	(nuclear*).ti,ab	13565
130	PsycINFO	(radiological).ti,ab	2184
131	PsycINFO	(explosive*).ti,ab	2326
132	PsycINFO	(122 AND 123)	5
133	PsycINFO	(122 AND 124)	3
134	PsycINFO	(122 AND 125)	117
135	PsycINFO	(122 AND 125 AND 126)	1
136	PsycINFO	(122 AND 126 AND 127)	27
137	PsycINFO	(122 AND 126 AND 128)	24
138	PsycINFO	(122 AND 126 AND 129)	5
139	PsycINFO	(122 AND 126 AND 130)	8
140	PsycINFO	(122 AND 126 AND 131)	3
141	PubMed	(hospital*).ti,ab	4610717

142	PubMed	("big bang").ti,ab	502
143	PubMed	(chemical incident).ti,ab	3849
144	PubMed	("sudden onset").ti,ab	8394
145	PubMed	(incident*).ti,ab	138863
146	PubMed	(fire*).ti,ab	70672
147	PubMed	(biological).ti,ab	3159908
148	PubMed	(radiological).ti,ab	143614
149	PubMed	(nuclear).ti,ab	670924
150	PubMed	(explosive*).ti,ab	13081
151	PubMed	(141 AND 142)	24
152	PubMed	(141 AND 143)	401
153	PubMed	(141 AND 144 AND 145)	64
154	PubMed	(141 AND 145 AND 146)	447
155	PubMed	(141 AND 145 AND 147)	1626
156	PubMed	(141 AND 145 AND 148)	1159
157	PubMed	(141 AND 145 AND 149)	1291
158	PubMed	(141 AND 145 AND 150)	85
159	AMED	(biological).ti,ab	2676
160	AMED	(radiological).ti,ab	677
161	AMED	(nuclear).ti,ab	911
162	AMED	(explosive*).ti,ab	140
163	BNI	(biological).ti,ab	3456

164 BNI	(radiological).ti,ab	697
165 BNI	(nuclear).ti,ab	1248
166 BNI	(explosive*).ti,ab	179
167 CINAHL	(biological).ti,ab	41419
168 CINAHL	(radiological).ti,ab	17170
169 CINAHL	(nuclear).ti,ab	20727
170 CINAHL	(explosive*).ti,ab	1807
171 Medline	(biological).ti,ab	691484
172 Medline	(radiological).ti,ab	113083
173 Medline	(nuclear).ti,ab	442840
174 Medline	(explosive*).ti,ab	12340
175 HMIC	(radiological).ti,ab	453
176 HMIC	(nuclear).ti,ab	487
177 HMIC	(biological).ti,ab	1263
178 HMIC	(explosive*).ti,ab	57
179 EMCARE	(biological).ti,ab	99865
180 EMCARE	(radiological).ti,ab	36280
181 EMCARE	(nuclear).ti,ab	49960
182 EMCARE	(explosive*).ti,ab	3324
187 AMED	(25 AND 30)	84
188 AMED	(159 AND 187)	0
189 AMED	(160 AND 187)	0

190 AMED	(161 AND 187)	0
191 AMED	(162 AND 187)	0
192 BNI	(36 AND 40)	1293
193 BNI	(163 AND 192)	8
194 BNI	(164 AND 192)	1
195 BNI	(165 AND 192)	2
196 BNI	(166 AND 192)	1
197 CINAHL	(1 AND 23)	5725
198 CINAHL	(167 AND 197)	56
199 CINAHL	(168 AND 197)	48
200 CINAHL	(169 AND 197)	29
201 CINAHL	(170 AND 197)	12
202 Medline	(12 AND 19)	14067
203 Medline	(171 AND 202)	186
204 Medline	(172 AND 202)	255
205 Medline	(173 AND 202)	120
206 Medline	(174 AND 202)	37
207 HMIC	(53 AND 64)	748
208 HMIC	(175 AND 207)	5
209 HMIC	(176 AND 207)	6
210 HMIC	(177 AND 207)	7
211 HMIC	(178 AND 207)	1

212	EMCARE	(81 AND 87)	7253
213	EMCARE	(179 AND 212)	98
214	EMCARE	(180 AND 212)	99
215	EMCARE	(181 AND 212)	58
216	EMCARE	(182 AND 212)	25
217	Medline	(15 AND 202)	18
218	CINAHL	(1 AND 21 AND 23)	6
219	EMCARE	(81 AND 86 AND 87)	12

Outline of the common themes and research practices in grounded theory

Grounded Theory research examines the "six Cs" of social processes (causes, contexts, contingencies, consequences, covariances, and conditions) to understand the patterns and relationships among these elements (Starks, 2007). It is a research methodology whereby the researcher has an area of research interest and is led by the research data to explain what is happening, thereby providing a framework for interesting and innovative research (Roberts, 2008). The comparative and interactive nature of grounded theory at every stage of analysis distinguishes grounded theory from other approaches and makes it an explicitly emergent method (Charmaz 2008b). Grounded theorists value theory construction over description, patterns in the data over individual stories, developing fresh concepts and theories over applying received theory, and theorizing processes over assuming stable structures (Charmaz, 2017).

The Grounded Theory Method may be 'radically innovative' (Bryant, 2021) but attracts criticism due in part to differing views around the paradigm of enquiry including the notion that adhering to canons of objectivity, validity, reliability and replicability would inhibit theorizing (Charmaz, 2020). These 'continual permutations of misunderstanding' (Bryant, 2021) reflect not only differences between positivist and interpretive paradigms, but also how the method has been adopted by practitioners and also different trends within grounded theory itself. This type of research does not produce a set of definitive findings or a description (Hunter et al, 2011) which has led to the criticism that it may restrict the richness and depth offered by qualitative data as the data is extracted and taken out of context (Hodkinson, 2008). Instead, it produces an ongoing conceptual theory which will be recognisable to people familiar with the instance and will be modifiable to similar settings (Hunter, 2011).

What it involves

The grounded theory method begins with inductive strategies for collecting and analysing qualitative data for the purpose of developing middle-range theories. (Charmaz, 2008a). Fundamental tenets of the grounded theory method include: (1) minimizing preconceived ideas about the research problem and the data, (2) using simultaneous data collection and analysis to inform each other, (3) remaining open to varied explanations and/ or understandings of the data, and (4) focusing data analysis to construct middle-range theories (Charmaz 2008b). It does this by using four strategies of coding, memo writing, theoretical sampling, and theoretical saturation, which form the defining features of the method (Charmaz, 2008a; Charmaz, 2008b). The meticulous methodological guidelines of iterative rounds of coding and memo writing facilitate theory construction through processes of revisiting, defamiliarizing, and alternative casing (Timmermans 2012). The underlying assumption is that the interaction between the researcher and participants produces the data and, as a result, the meanings that the researcher observes and defines (Cooke, 2014). In grounded theory studies, the researcher's analytic focus emerges during the research process, rather than being determined before empirical inquiry begins (Charmaz, 2020). At every stage of the research process grounded theorists make comparisons beginning with data and ending with comparisons between their categories. Subsequently, they compare their final category or categories with the existing literature (Charmaz, 2020). This approach, unlike other research traditions, explicitly encourages persistent interaction and continuous involvement with emergent findings via simultaneously-performed data collection and analyses (Groen et al., 2017).

For an overview of common themes within grounded theory, see Figures 1 & 2

Figure 1: Common Themes in Grounded Theory Method

1. Coding-cum-analysis-cum-memoing
2. Memoing
3. Substantive and formal theory generation
4. Purposive/convenience sampling followed by theoretical sampling

5. Theoretical saturation

6. Use of the relevant and appropriate literature

7. Openness to serendipity

8. Quality Criteria (Glaser & Strauss: fit, grab, work, modifiability; Charmaz: credibility, originality, resonance, usefulness)

9. Pragmatism

(Bryant, 2021)

Figure 2: Common Research Practices in Grounded Theory

1. Going back and forth between collecting and analysing data

2. Focusing on what is happening

3. Making comparisons throughout the research process is known as the constant comparative method.

4. Through making comparisons, grounded theorists tease out the properties, dimensions, and boundaries of their categories and illuminate both visible and hidden processes.

5. Using data (e.g., narratives, descriptions, cases, and numbers) to create original conceptual categories.

6. Creating inductive categories through systematic coding and memo writing.

7. Concentrating on defining and elaborating a category or categories rather than addressing a specific empirical topic.

8. Constructing new theory rather than rely on applying existing theories.

9. Developing and checking theoretical ideas with later data.

10.   Stating the implications for professional practice and public policy.

(Charmaz, 2017)

Grounded theory is both an inductive and abductive method (Charmaz, 2008a). The inductive logic is a defining characteristic in that patterns and themes can emerge from the data rather than imposing codes and utilising deductive research approaches (Groen et al, 2017). Grounded theory begins with inductive data and adopts key strategies for doing research (Charmaz, 2017), but while induction may have an important place in this field, its strength does not lie in generating new theories (Timmermans, 2012). Grounded theory moves into abductive reasoning as the researcher seeks to understand emergent empirical findings, particularly where these involve surprises, anomalies or puzzles (Charmaz, 2008b).

Differences between schools / types of grounded theory

TABLE 1. The major differences between the various schools of grounded theory			
Key concept	Classic grounded theory (Glaserian)	Evolved grounded theory (Straussian)	Constructivist grounded theory (Charmazian)
Philosophical root	Post-positivism	Post-positivism with symbolic interaction foundations	Constructivism
Use of literature	Delayed	Preliminary review	Preliminary review
Coding stages	Substantive and theoretical	Open, axial and selective	Initial, focused and theoretical
Role of researcher	Passive, exhibiting disciplined restraint	Active	Active
Coding	Less prescriptive with inductive-deductive mix	Rigid coding structure for analysis, emphasising deduction, verification and validation	Less prescriptive
Resultant theory	Emergent (discovery)	Conceptual description	Construction

(Achora, 2016)

Table 1 Comparison of the three types of grounded theory			
	Classic	Straussian	Constructivist
Identifying the problem area	■ Emergent. ■ No initial literature review.	Experience, pragmatism and literature.	■ Sensitising concepts. ■ Discipline-specific.
Conduct of research and developing theory	Laissez-faire theory generation.	Paradigm model theory verification.	Co-construction and reconstruction of data into theory.
Relationship to participants	Independent.	Active.	Co-construction.
Evaluating theory	Fit, work, relevance and modifiability.	Validity, reliability, efficiency and sensitivity.	■ Situating theory in time place, culture and context. ■ Reflexive rendering of the researcher's position.
Coding	■ Open coding. ■ Selective coding. ■ Theoretical coding.	■ Open coding. ■ Axial coding. ■ Selective coding.	Line-by-line conceptual coding and focused coding to synthesise large amounts of data.

(Hunter, 2011)

Table 1. Main elements of the three main approaches to grounded theory

	Glaser (1998)	Corbin and Strauss (2015)	Charmaz (2014)
Epistemology	» Critical realist ontology » Postpositivist paradigm » More positivistic	» Social constructivist and poststructuralist or postmodern paradigm » Less positivistic	» Relativist ontology » Pragmatist philosophy » Constructivist
Researcher's role	» Independent	» Dialectic and active	» Active
Theory	» Emphasis on theory generation	» Emphasis on verification and validation of theory and hypotheses	» Emphasis on co-construction of a theory
Focus in the field	» Main emphasis on symbols, interactions and context » Emphasis on socially constructed world of participants (micro)	» Emphasis on structural, contextual, symbolic and interactional influences » Emphasis on describing cultural scene (macro) and socially constructed world of participants (micro)	» Emphasis on constructing a conceptual interpretation of the phenomenon
Referral to existing literature	» Main review to support emerging theory	» Preliminary review to enhance theoretical sensitivity » Main review to support emerging theory	» Preliminary review to enhance theoretical sensitivity » Main review to support emerging theory
Research problem	» Emerges in study	» Personal experience » Suggestion by others » Literature » Emerges from the data	» Personal experience » Suggestion by others » Literature » Emerges from the data
Data collection and analysis	» Principles and practices of qualitative research » Guided by participants and socially constructed reality	» Rules and procedures » Rigorous coding framework	» Flexible coding guidelines » Less structured, impressionistic coding
Evaluation	» Fit, work, relevance and modifiability	» Deference to canons of qualitative research outlined by other qualitative researchers	» Credibility, originality, resonance and usefulness

(McCann, 2018)

Flexible Guidelines for conducting qualitative inquiry in general or constructing a grounded theory study in particular

(1) Strive to achieve methodological self-consciousness. Why have you chosen the specific topic, methodology and methods, and how do these fit with who you are and your research objectives and questions? What version of grounded theory have you adopted and why? What are the ontological and epistemological assumptions, and what do these mean for the research process, researcher position, findings, and quality issues, including transferability?

(2) Learn everything you can about the type of qualitative inquiry you adopt, whether it's narrative inquiry, discourse analysis, or a version of grounded theory. If possible, work with a mentor who is knowledgeable about your approach.

(3) Take an open, non-committal, critical, analytic view of the existing literature in the field. In contrast to Glaserian grounded theory but in line with Straussian and constructivist grounded theory, we recommend that you review the literature to establish a defensible rationale for the study, to avoid re-inventing the wheel, and to increase theoretical sensitivity. Treat the literature as provisional and fallible, not as the Truth.

(4) Gather rich data. Rich data means an openness to the empirical world and a willingness to try to understand the experiences of people who may be far different from you.

(5) Be transparent. Describe how you conducted your study, obtained your sample and state how and why you have included the participants, and how you have used grounded theory and data collection methods. Include justifications of your choices.

(6) Go back and forth between data and your developing analysis to focus your subsequent data collection and to fill out your emerging analytic categories.

(7) Tolerate ambiguity while you struggle to gain intimate familiarity with the empirical world and to create an analytic handle to understand it.

(8) As you proceed, ask progressively focused questions about the data that help you develop your emerging analysis.

(9) Play with your data and your ideas about it. Look for all possible theoretical explanations of the data and check them.

(10) Collect sufficient data to (a) make useful comparisons, (b) create robust analytic categories, and (c) convince readers of the significance of your categories.

(11) Ask questions about your categories: What are their properties? In which ways do they subsume minor categories? How are your main categories connected? How do they make a theoretical statement? What is the significance of this statement?

(12) Always treat your codes, categories and theoretical outlines as provisional and open for revision and even rejection in the light of new data and further analysis.

(13) After you have completed your analysis, compare it with relevant material from the literature, which may well include case studies and perspectives that you did not address during your earlier review. At this time, your review will be focused on the ideas that you have developed. This review gives you the opportunity to show how your analysis fits, extends, or challenges leading ideas in your field.

(Charmaz, 2020)

**Research, Enterprise and Engagement
Ethical Approval Panel**

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University of
Salford
MANCHESTER

26 November 2020

Dear Matthew,

**RE: ETHICS APPLICATION–Ref. 303 – During sudden onset major incidents affecting NHS acute
hospitals, what decisions are made by hospital tactical commanders, and how are they made?**

Based on the information that you have provided I am pleased to inform you that application Ref.
303 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 Ethics@salford.ac.uk

Yours sincerely,

Professor Andrew Clark
Chair of the Research Ethics Panel

Ymchwil Iechyd a Gofal Cymru
Health and Care Research Wales

NHS Health Research Authority

Mr Matthew Dodd
Director of Operations, Community Services
Walsall Healthcare NHS Trust
Walsall Manor Hospital
Moat Road
Walsall
WS2 9PS

Email: approvals@hra.nhs.uk
HCRW.approvals@wales.nhs.uk

05 January 2021

Dear Mr Dodd

HRA and Health and Care Research Wales (HCRW) Approval Letter

Study title:	During sudden onset major incidents affecting NHS acute hospitals, what decisions are made by hospital tactical commanders, and how are they made?
IRAS project ID:	291361
Protocol number:	N/A
REC reference:	20/HRA/6165
Sponsor	Walsall Healthcare NHS Trust

I am pleased to confirm that **HRA and Health and Care Research Wales (HCRW) Approval** has been given for the above referenced study, on the basis described in the application form, protocol, supporting documentation and any clarifications received. You should not expect to receive anything further relating to this application.

Please now work with participating NHS organisations to confirm capacity and capability, in line with the instructions provided in the "Information to support study set up" section towards the end of this letter.

How should I work with participating NHS/HSC organisations in Northern Ireland and Scotland?
HRA and HCRW Approval does not apply to NHS/HSC organisations within Northern Ireland and Scotland.

If you indicated in your IRAS form that you do have participating organisations in either of these devolved administrations, the final document set and the study wide governance report

(including this letter) have been sent to the coordinating centre of each participating nation. The relevant national coordinating function/s will contact you as appropriate.

Please see IRAS Help for information on working with NHS/HSC organisations in Northern Ireland and Scotland.

How should I work with participating non-NHS organisations?
HRA and HCRW Approval does not apply to non-NHS organisations. You should work with your non-NHS organisations to obtain local agreement in accordance with their procedures.

What are my notification responsibilities during the study?

The *"After HRA Approval – guidance for sponsors and investigators"* document on the HRA website gives detailed guidance on reporting expectations for studies with HRA and HCRW Approval, including:
- Registration of Research
- Notifying amendments
- Notifying the end of the study

The HRA website also provides guidance on these topics and is updated in the light of changes in reporting expectations or procedures.

Who should I contact for further information?
Please do not hesitate to contact me for assistance with this application. My contact details are below.

Your IRAS project ID is **291361**. Please quote this on all correspondence.

Yours sincerely,

Hayley Henderson

Approvals Manager

Email: approvals@hra.nhs.uk

Copy to: *Catherine Dexter, Sponsor Contact*

Scottish Research Ethics approval

From: GRAM Genericreviews <gram.genericreviews@nhs.scot>
Sent: 19 January 2021 14:01
To: Matthew Dodd <M.Dodd3@edu.salford.ac.uk>
Subject: Re: IRAS: 291361 - Tactical Commanders in major incidents affecting NHS acute hospitals

Hi Matthew,

Many thanks for this. I have now completed the Scottish Governance checks and issued the Scottish Governance report. Please note that R&D approval will not be required for this study at Scottish sites and you can commence your study in Scotland now.

In the meantime, if you have a minute and would like to give us some feedback to improve our service, the link is https://wh.snapsurveys.com/s.asp?k=154720785667 .

Good luck with the study!

Sincere regards,
Khyati

Dr Khyati Parikh
NRS Generic Review Manager
Research and Development
NHS Grampian
Foresterhill House Annexe
Foresterhill
Aberdeen
AB25 2ZB

Tel: 01224 551119
Email: Khyati.Parikh@nhs.scot
Generic email: Gram.genericreviews@nhs.scot

Amendment Approval

From: New IRAS Dev <no-reply-iras@hra.nhs.uk>
Sent: 06 March 2021 12:10
To: Matthew Dodd <M.Dodd3@edu.salford.ac.uk>
Subject: IRAS 291361. Amendment

IRAS Project ID: 291361
Sponsor amendment reference: amendment_tool_v1_4_30Nov20 06.03.21

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University of Salford MANCHESTER

Participant Information Sheet (PIS)

During sudden onset major incidents affecting NHS acute hospitals, what decisions are made by hospital tactical commanders, and how are they made?

You are being invited to take part in a research project aimed at finding out how hospital commanders make decisions during a major incident. Before you decide on whether to take part, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully before you decide whether or not you wish to take part. You are welcome to discuss this project with others if you wish before you make your decision. Please ask the research lead if there is anything that is not clear or if you would like more information.

Contact Details:
Matthew Dodd
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What is the purpose of the study?
Major incidents affecting hospitals are relatively low frequency events but invariably have a high impact on the hospitals concerned. Those staff acting as tactical commanders during an incident are required to make decisions that may be complex, based on incomplete information and open to challenge after the event.

This research seeks to understand more about managers operating in a tactical command role during a crisis response. In researching the decisions that hospital tactical commanders make and how they make them, this study will seek to understand their perceptions and responses in order to support organisations to prepare for any future major incident.

I have been a senior operational manager within acute trusts for 20 years and have been involved in Emergency Preparedness, Resilience & Response (EPRR) throughout this time. This research is motivated by my observations around incident response in hospitals and my desire to find ways of helping Tactical Commanders in their incident role. The research does not make any assessment of whether tactical decisions during an incident were 'right' or 'wrong', instead it considers why and how decisions were made.

Why have I been chosen?
You have been chosen due to the role you played during the major incident at XXXX Hospital on YYYY. You have identified yourself as having been involved in the incident in a leadership capacity. The research seeks to interview a range of incident commanders from this and other hospitals who have

also been subject to a major incident. It is the intention to interview you about your experience during the major incident.

Do I have to take part?
It is up to you to decide whether or not to take part. If you do decide to take part, you should keep this information sheet for reference. In addition, you will be asked to sign a consent form prior to actively participating in the study.

What are my choices about how my information is used?
You can stop being part of the study at any time, without giving a reason, but we may keep information about you that we already have. For focus groups you will not be able to withdraw once the group has taken place. For individual interviews, you can still withdraw at any time without giving a reason, however if you do so more than 7 days after the interview, the University will continue to process the information that you have already provided. It will only do this for research purposes and in an anonymised way, so that you cannot be identified.

What do I have to do?
The researcher will interview you via Microsoft Teams or (Covid-permitting) at your hospital about your experience. This will focus on how you gathered information and made your decisions during the major incident and will cover the start of your involvement through to the end of your involvement during the acute phase of the response.   The interview will be semi-structured with some fixed questions and flexibility to explore and follow up any themes that develop. It will last up to 60 minutes, so there will be plenty of opportunity to cover your experience in-depth.

You may be asked to participate in a focus group, which may be composed of people within and / or outside of your organisation. This will also be semi-structured with flexibility to explore any theme that develops, and may last up to 90 minutes.

For individual interviews and focus groups, the interview will be recorded and transcribed to allow detailed analysis.   Direct quotes from your interview may be used, but the information that is gained from you is anonymised and may be published as part of the research and subsequent papers.

Expenses and payments
There will be no expenses given or payments made for undertaking this research as they will be done at your place of work.

Risks of taking part
You may find that recalling memories from the major incident could cause you distress. If you need any further support after the interview, please contact your line manager or the Trust's staff support service [DETAILS TO BE GIVEN]. Alternatively the NHS free wellbeing support helpline on 0800 069 6222, operated by the Samaritans and available from 7.00am – 11.00pm seven days a week, providing confidential listening from trained professionals.

Benefits of taking part
There will be no direct benefit to you, but you will be contributing to research aimed at learning from staff experience in order to better prepare hospitals to deal with future major incidents.

What if there is a problem?

If you have a concern about any aspect of this study, you should ask to speak to the researcher by email (m.dodd3@edu.salford.ac.uk) who will do their best to answer your questions. Following this, if you have any issues or complaints, you may contact the research supervisor, Jeanette Roddy by email (j.k.roddy@salford.ac.uk) or by telephone (0161 295 3806). If you still have concerns you can contact the Chair of the University of Salford Research and Enterprise Ethics Panel Prof Andrew Clark (a.clark@Salford.ac.uk).

How will we use information about you?

We will need to use information from you for this research project. This information will include your name and contact details. People will use this information to do the research or to check your records to make sure that the research is being done properly. The only people who will be authorised to view the data will be the researcher and supervisors as well as those in regulatory positions who have responsibility for ensuring data quality and research rigour.

People who do not need to know who you are will not be able to see your name or contact details. Your data will have a code number instead. We will keep all information about you safe and secure.

Once we have finished the study, we will keep some of the data so we can check the results. We will write our reports in a way that no-one can work out that you took part in the study.

Will my taking part in the study be kept confidential? / What will happen to the results of the research project?

Your confidentiality will be safeguarded during and after the study. The procedures for handling, processing, storage and destruction of your data are aligned with the Caldicott principles and the General Data Protection Regulation (GDPR).

The recordings of the interviews will be stored in a secure environment on the University's secure IT information system. The data collected from your interview will be stored on the University secure IT information system. Your data will be anonymised, with a participant research code allocated which is known only to the researcher. A master list identifying participants to the research codes data will be held on a password protected computer accessed only by the researcher. Hard paper/taped data will be stored in a locked cabinet, within a secure environment which will be accessed only by the researcher. Electronic data will be stored on a password protected computer known only by researcher

What will happen to the results of the research study?

The research will form part of a Professional Doctorate Thesis. Other academic and professional papers may be written using the results of this research. You will not be identified in any report/publication.

The University of Salford may keep the data and use it in future studies. If this is done, it will only be in a completely anonymised fashion.

Where can I find out more about how my information is used?

You can find out more about how we use your information:
- by asking the researcher, Matthew Dodd
- by sending an email to m.dodd3@edu.salford.ac.uk, or j.k.roddy@salford.ac.uk
- by ringing us on 07704 324007

Who is sponsoring the research?
This research is being undertaken by a member of NHS staff and is overseen by the University of Salford School of Health & Society. You will be given a copy of the information sheet and a signed consent form to keep.

Thank you for taking the time to read this information sheet.

Version 3.0
 25.11.20

INFORMED CONSENT FORM

INDIVIDUAL

RESEARCH TITLE:

During sudden onset major incidents affecting NHS acute hospitals, what decisions are made by tactical commanders, and how are they made?

		Yes	**No**
1.	I confirm that I have read and understood the information sheet dated 04/01/21 version 5.0 for the above study and have had an opportunity to ask questions		
2.	I understand my participation is voluntary and that I am free to withdraw at any point without explanation and without my medical care or legal rights being affected		
3.	I agree to have the interview recorded (Dictaphone and MS Teams), so it can be transcribed after the interview is held. I am aware that I have the right to edit the transcript of the interview once it has been completed. I will be sent a recording of the interview and will review this to alert the researcher of any changes to the transcript		
4.	I understand that my personal details will be kept confidential and not revealed to people outside the research team [However, I am aware that if I reveal anything related to criminal activity and/or something that is harmful to self or other, the researcher will have to share that information with the appropriate authorities]		
5.	I understand that my anonymised data will be used in the research report, other academic publications and conferences presentations		
6.	If I do decide to withdraw, I have up to 7 days after the interview to do so. I understand that after 7 days the University will continue to process the information I have already provided. It will only do this for research purposes and in an anonymised way, so that I cannot be identified.		
7.	I agree to take part in the above study		

Participant Name: **Signature**   **Date**

Researcher Name   **Signature**   **Date:**

Consent taker Name: …………………………**Signature**:……………………**Date**:…………………..

On completion one copy to be given to participant, original to be kept in researcher site file

Interview Schedule

RESEARCH PROJECT

Semi-Structured Interviews

Interview Schedule

During sudden onset major incidents affecting NHS hospitals, what decisions are made by hospital tactical commanders, and how are they made?

Q1

I would like to start by asking you to tell me a bit about your role in the hospital
Prompts:

- what is your professional / clinical background?

Q2

Getting a bit more specific now, how were you involved in the major incident?

Prompts:

- How did you hear about it?
- When did you hear about it?
- What did you think when you heard about it?
- What did you do when you heard about it?
- What role(s) did you occupy during the incident?
- What did you have to do?

Q3

Where were you based during the incident?

Prompts:

- ICC?
- Elsewhere in the hospital?
- Off-site?
- With whom?

Q4

What concerns did you have?

Prompts:

- How did you address them?

Q5

Can you remember what decisions you had to take?

Prompts:

- How did each issue get raised?
- Was there any discussion about it?
- Were there any choices involved?
- Did you use any decision-support tools? [Major Incident Plan; action cards; JESIP JDM; METHANE; Risk assessments]
- How did you feel when you made the decision?

Q6

What did you find difficult during the incident? What did you find easy?

Prompts:

- Why was it hard/easy?

Q7

Who did you communicate with inside / outside the hospital?

Prompts:

- What information did you have about what was happening inside / outside the hospital?
- Were you asked for information by anyone? What information and by whom?

Q8

Looking back on the incident, what would you do differently?

Prompts:

- Why?

Q9

Is there anything else you want me to know about the major incident?

Field Work: Focused Coding

Code	Description	Evidence
Initial Notification	Notification about an incident came from a variety of sources. These included direct messages from the Hospital switchboard to individuals identified as being the on call manager, calls from managers on site to the manager on call either notifying or reporting actions that they had already undertaken, or it may have been by chance that somebody else received a call, but the person who acted in a command role, was with them and participated in the response. Some commanders reported being called by multiple sources within a short space of time, while in another case the commander was called approximately 45 minutes after the initial incident, by which time a response had been implemented on the site. The information that commanders received from these initial contacts was described as patchy (PN3) or scant (PN2). In some cases they were informed that an incident had occurred or been called, but no further details on types and numbers of casualties. In one case the manager was requested to attend site but no indication that an incident had occurred, leading to the	*I didn't get a call until 7:30 (am) which is 45 minutes after the event and the Ops Centre were calling me, just as information really, that the…this gent had been injured, the police were on site, everybody knew on the wards to…to lockdown and that everything was in order (PN1)* *And it was three phone calls in quick succession that I had, so two I took pretty much in this room and in that corridor, the third one I took as I was walking between here and the front of the hospital….The first phone call that I got comes from XXXX and she basically said, she said are you aware that there's an escalating situation going on ED, did you know? And I said no, I did not know, nobody had called me, I did not know that, and I sort of said, you know, give me a bit of context and she had some scant information (PN2)* *So the first information was really patchy, We'd understood that there had been a bus crash, that we were unclear about fatalities…and that we were unclear about the scale, but then it was a double decker bus and it had gone off the road… (PN3)* *So this was a Sunday morning, I had a phone call from our switchboard, I'd had the handover at 8 0'clock in the morning, no incidents no sort of bad management crisis…and so come on at 8 o'clock, took the handover no problems …I'd taken a phone call at 08.53 from switchboard to say the clinical site manager needed me on site urgently and could I*

	impression that they were being asked to deal with a 'routine' or less significant matter such as bed flow problems within the organisation.	*attend and meet her in A&E… and so…I wasn't aware at this stage what the incident was…. (PN4)*
	Notification could come through the police or the fire brigade. This information could be quite specific or directive or it could underplay the serious nature of the phenomenon	*But obviously that notification comes in through the ICC now…so on that day we were in the ICC and we had a call from…because we have a hot line that staff can escalate anything Covid-wise to us and they used that line to escalate to us from ED to say that they had had a request from the police to lockdown (PN6)*
		We locked a couple of entrances that are fairly close to ED because the specific advice that we were given was that the threat was making its way to the Emergency Department (PN6)
		So she (tactical commander) received her call at three at 7 minutes past three…And she was advised as well by the Fire brigade to evacuate the emergency department…(PN12)
		[Tactical commander] advised originally this was not a major incident as only a small fire. The travel of the smoke caused the major incident to be declared; this decision was made by [strategic commander] (HIN3)
	Notification could be made informally; it could come from individuals investigating 'low level' concerns about an operational flow issue. There could be a time lag between the incident occurring and notification being made and on occasion the area concerned was unaware either or the scale of the impact or the need to escalate within the rest of the organisation	*So, I had unsubstantiated claims that Imaging had gone down, but we didn't know what had happened… I said have we done a METHANE?; so I went back to the Group Director of Ops and said I'm being told that Imaging has gone back down and it's going to come back up but the organisation is telling my team…that they can't get their imaging done they can't get their discharges done and I'm also having people saying images that we need pre-op or post-op we also can't get those done so you can see how it's affecting both emergency and elective activity (PN8)*
		So asked them to do an ETHANE and that never really materialised, but that's going to be picked up in a cold debrief …. but what did happen was, yes there is a problem, the size of the problem is a lot bigger than we think but we don't know what it is (PN8)

| | | So, I think for me my first experience was how long and delayed before it got Tactical to understand it was actually a major incident when we had no water coming into the hospital…. I think it was when ICU escalated a problem that's when XXX looked back on the track of calls that they had, and by then it's evident that there is a problem with the water pressure coming into the hospital and I think they only took on board that there was a major incident with the water flow was when ICU reported it (PN9)

Yes, that was the biggest area; everywhere else was okay with water. One of the areas said do you know you've got cold water tanks now where staff could drink water, some people noticed that water wasn't coming through – some people just left it to a degree it was quite worrying that people didn't escalate more calls, that did worry me a little bit, but a lot of them were just taking it in their stride or oblivious to what had happened, yeah there was no water coming in….Endoscopy, if I hadn't gone to Endoscopy then probably the washers wouldn't have gone through and they would have thought it was a bigger issues with the machines rather than the water flow…(PN9) |
|---|---|---|
| | | |
| **Use of Cues to Gauge the Nature & Scale of the Incident** | Commanders reported using a variety of cues to assess the nature of the incident concerned. Where the commander was off-site, they may have contacted colleagues to find out more details, witnessed the scale of the response by other emergency services (vehicles responding to the scene of the incident, roadblocks) or they may have used media or even family to get more information. Arrival at the hospital was also an opportunity to gauge the magnitude of the incident and the response to it. | So … I walked out of the end entrance, and it was just like insanity, just like insanity. There was police, there were fire engines on site. I mean, I…it was just like, I mean a huge incident going off and they'd started to cordon off where the car had been abandoned at the front of the hospital and there was all sorts of activity going on around the entrance to the A&E, and as I say there was just…and I seem to remember they called a…an incident response vehicle was just pulling onto site. I was thinking…oh thinking role…I knew it was big, I knew it was big when I walked out…the police and the fire brigade are here, when there's three appliances, and there is a load of police and of course they're armed, then you start thinking, oh hang on a second here… and then you ….for me at that point I then knew, and then I started to think, and this is the scientist in me, what on earth could the powder be? (PN2) |

	Tactical commanders were assessing a dynamic situation and trying to work out how far the boundaries were around the incident	*As we drove past what is called XXX, we realised what had happened, or something had happened. It was coming in on the news, the traffic lights were also closed on the left, which is how you would have got to XXX, so they'd clearly shut the road and there were multiple emergency vehicles attending on scene…significant number of emergency vehicles (PN3)*
		I get on site and … it's…as I'm arriving on site, I notice a few police vehicles parked in front of our A&E department. I park quite close to that. I notice a helicopter up in the air and I think…. that didn't go through my head for a second, think what's that about? It's not unusual to see armed police in front of A&E but you know there were a few, not as many as there were later….it became something else, but at that stage it was a couple of cars and so I walked… as I said I walked into our A&E and immediately met by somebody a policeman with a gun and so I thought oh, this is not a bed crisis (PN4)
		And by the time I arrived exactly the same time as gold, essentially the fire was out…But it was the damage was just unbelievable, and we knew we weren't gonna get back into ED anytime soon…You could smell it from outside the emergency department and the X-ray Department sits behind the emergency department (PN12)
	There was also a requirement to quality assure the information and requests coming through to the tactical commanders and understand the facts compared to requests (or lack of requests)	*But that was our thought process, you know one of those questions, you know…how big is this threat? do we need to divert ambulances away from the department. So our risk, I suppose...my biggest fear was not only what the threat was but how do I stop people who do need to get into ED from getting into ED and you know I can't stop them getting into ED so we had security there to escort them round to the ambulance entrance if a*

			compromised patient turned up who needed to be seen quickly, we could still get them in (PN6)
			So that's the routes that the information came to me through…and once I realised hold on a minute, we can't actually size this up but we're hearing that this is impacting patients, we need to set up a meeting…(PN8)
			They [team affected]…said this a major incident we need to start diverting and I said lets have the meeting and look at your BCP is first because it doesn't fit the criteria of a major incident under the emergency planning act and regulations, so let's try and work out what it actually is and then we can decide whether…we can work out whether …do we need other organisations to be involved and what's your arrangements (PN8)
			The shocking thing is that a couple of staff said was, when they went to the staff room they realised the water was trickling so the pressure wasn't there. A couple of areas said we called XXX and XXX said oh yeah we knew…a couple of areas have reported this issue but I think it took at least half a dozen calls for XXX to think, 'oh, what's going on here?'. Some areas were oblivious to be fair, some had not noticed to be honest with you, and that was more the ward areas. I think Cath lab was the area that said 'oh, when we went to make a drink, the pressure was really low' (PN9)
			The overall impact on normal patient services was extreme and resulted in the cancellation of 5 cancer patients. Additionally, most of our urgent care pathways…were compromised, including:
			• *No availability of ED, Resus and Majors.*
			• *No availability of X-ray.*
			• *No availability of CT scanners.*

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		• *No availability of MRI scanner.* • *No ability to provide a hyper-acute stroke pathway (HIN1)*
Digesting the news and Preparing oneself	Once the initial call had been received, commanders started to prepare themselves to respond to the incident itself and the anticipated duration of the incident. This involved meeting their own physical and well being needs (clothing and food to do the task) as well as seeking further information about the incident to start preparing an outline plan.	*So then I remember going downstairs and then thinking what do I need to do? XXX knows, but I still need to ring XXX and have a conversation (PN1)* *Not concern, I wasn't worried, that's not kind of how I am really. I wasn't worried about it, I was intrigued and kind of in my head, I guess I was thinking around what does this mean, what do I need to be thinking about in terms of what's going on in the trust? (PN2)* *so we were already kind of tuned into the fact that it was significant and so calls home were already being made to get a supply of clothes being brought to the hospital and food brought in and stuff like this so that we were able to continue operating……. I suppose you're…if you want to know on an emotional level what's running through your mind, yeah…so I guess what I was trying to do in those moments and I've practiced again since…is just how you steady and clear yourself for the job in hand, you know….And then you step back and there's something quite refreshing about that moment, there's quite.. anxiety as well, you do feel it, you do feel the adrenaline going… that's the wrong word, you feel the adrenaline start to go… (PN3)* *But essentially, just having that clarity of purpose and just checking off a little checklist….in my head: did I have the right clothes, did I have the right food, could I actually operate?…So basic necessities to start with and then thinking about the resources that I would need, so the medical director, I might need on site, the director of estates I might need on site…and so running through my head before I got to the checklist in the*

		control room what, given the context of the response that we were likely to need to make, would we need to need to have on the scene at the hospital…and you're sort of preparing yourself both emotionally and practically for what you might experience when you arrive (PN3)
		The operator didn't know what it was about no, so I said okay, so in my head I was thinking you know… it's… it's… because the bed situation hadn't sounded good at about 8 o'clock…so I think it had fallen over, kind of hit a bit of a… so I though OK, let's get in there and see what's happening kind of thing…. (PN4)
		Tactical commander took the opportunity to reflect for 15 mins before the tactical command meeting – got hold of the plan for loss of water (PN7)
		The first thing I do when I get called out and go in and get a coffee and take a coffee to the gold or silver and say you have a coffee … Yes, you have… a drink of that and just tell me what you think. What you feeling, what you're thinking and that 5 minutes have been having a coffee in carrying down does what you've just said there that takes away that they realize they can't control everything. And I found that take a breath and pause makes a massive difference to any incident really because we all just run around don't we (PN13)
Frame of Reference that commanders	Commanders were all experienced managers but had a variety of acute operational and command experience. This ranged from first time on call in	

used to Respond to the Incident	this senior management role, to Director-level with experience of multiple operational incidents.	
Major Incident Plan:	All participants had received training / instruction in the Hospital's major incident plan prior to the incident.	*We have done major incident training, we've all done our major incident training, but to be honest…. they (METHANE) are useful mnemonics when you've got them in front of you…so I couldn't tell you what they are now… but you know… it's also…when you look at them, it's largely they are, they are…you know, what's the word I'm looking for…common-sensical, they are very…it is what you would naturally think of as you start to prepare your early responses (PN3)*
		I said hold up…what's your BCP. XXX is new in post and obviously doesn't know the BCP, none of them, so my role was to pull a tactical meeting together with all key stakeholders including the COO to try and get an ETHANE and then how we were going to respond and what the recovery looked like as well (PN8)
		PN11's own personal level of experience in these environments? He knew he could talk to the COO if he had a problem, and he did initially during the incident. PN11 had received a basic briefing when he started on call 12 months ago but he felt his knowledge hadn't improved since then despite being on call several times (PN11)
		Training for on call is not good; people don't know what they should be doing, whether they are the manager or director on call (PN11)
	In the case of the incident which was external to the hospital and which was declared by the Ambulance Service, the commanders reported using the Major Incident Plan as their point of reference. Arriving on site they were quick to establish the command centres and work through the guidelines in the plan. This involved using the action cards to help them work out what resources	*We followed the plan and we allocated roles, if there are any roles that aren't noted in the plan or are missing, no it's….I guess, I… we were very diligent in following the plan…. (PN3)*

	they required to deal with the hospital response to the incident.	
	Even then, the Major Incident Plan did not encompass everything, as some planning assumptions had changed but not been incorporated into the document itself. In these cases, commanders were required to use local initiative to adjust the response.	*But those decisions were largely not entirely decisions either, because it's all set out in the plan. So the day surgery unit next to ED is always going to be minors and you are going to divert minors into there…some elements we haven't set out in the plan actually because we've recently changed some of the clinical architecture, you know the clinical services have changed recently, so it meant we had new capacity that gave us a bit more safety and stability in terms of our response, probably enabling us to clear the emergency department more quickly than we would have been able to do… because God knows we didn't have enough beds on a Saturday morning to do it. So it was clearing two other assessment units where patients could be held safely (PN3)*
	For some this represented a collapse of culture certainty	*Where is the manual for basic incidents like this? If it has happened before then why didn't the organisation write the contingency plan? (PN11)*
	In the other cases the Major Incident Plan was used in a less direct manner, in that commanders were aware of its existence and the command structures it involved but chose not to activate it (immediately). The common factors about the three incidents that this encompassed were that they were sudden events impacting directly on the hospital concerned, there was no declaration of major incident from either an external or internal source and commanders were faced with casualties already on scene. In these cases, the commanders appeared to be dealing with the immediate requirements to assess a situation that was outside of their normal experience or area of	*We never expect this kind of incident and yes there's a lock down policy, we should have followed it, but nobody thought at the time that that's what we should have done. So yes, as a manager on call there is some papers around, I can't even tell you what they're about actually at the moment…But I didn't think to look at anything to reference anything to think about whether there was anything else that should have been done…I didn't think to challenge XXX, she was just…I suppose like, it took me quite a few minutes to kind of like absorb what she was saying, cos it's not a phone call you expect, but it could happen… (PN1)* *Oh, I knew that there wasn't a plan, I knew that there was a potential major incident, so I knew the major incident plan because that was the one scant piece of training that we had all been given by [Trust EPRR manager] (PN2)*

	specialist knowledge and which hadn't been called as a major incident.	*Now what I'm not suggesting one for one second, is that you can have a kind of a war & peace tome that includes right, if this happens do this, if this happens do this, but there were certainly elements of what went on that day that I didn't realise was going to happen and actually there was a lot of things that kind of I was quite pleased came into my mind that actually could have been written down (PN2)*
		I hadn't really got through the lockdown scenario in my head you know when I thought about what I'd have to do different. That wasn't one of the things that I'd kind of envisaged, because you do envisage all the different….kind of major incidents you have to deal with…I hadn't gone through a lockdown would involve… (PN3)
		it does make you think how you deal with other scenarios, that you could be faced with because that's always the thing when you're on call, you know, you do have those dreadful nights where you're in A&E at 2 am because it's all falling over but you're kind of used to doing those but it's those one where they're left field or unusual or you know like the major incidents in whatever, you know, it's different types of major incidents ones with immediate response as well, it's quite different. (PN3)
	One commander reported that they declared a major incident 90 minutes later and then started using the checklists to see if there was anything that had been omitted. In another event, the tactical commander decided with the Chief Executive that a formal major incident did not need to be declared as it was contained within a section of the hospital	*And there's always a bit of paper to pick up to say have I done this, have I done this and tick it all off, yeah…It's almost like a checklist really your action card, it's just a checklist later on of did I do everything (PN6)*

	and the Trust would deal with it as an internal critical incident.	
	No two incidents are the same but there are patterns	*nobody can write you a plan that is fit for all hospitals, cause every hospital is different, every scenario is different…it depends whether it happens at 3 o'clock in the morning or 3 o'clock in the afternoon , it depends whether you're full when you start or empty when you start. You can write the best plan in the world but it can't be fit for every single set of circumstances that might be the starting point for that incident. The starting point when you're already full in ED with ambulances queuing and no free beds, is very different from starting at 3 in the morning is very different from starting at 2 in the afternoon when you've got a fair few empty beds and ED is ticking along nicely…it's completely different starting points, aren't they…. (PN6)* *What mitigation had they used in the past? They had planned downtime of equipment and had used mitigations for this; I know some of that was out of hours working… We got them to use the documents and BCPs that they already had. People were giving a narrative without enough understanding. We got them to check the documents to work out a plan and priorities. They underplayed it, they didn't judge it correctly. Thinking that this wouldn't have an impact on pathways of care was a little naïve. The people… did not know their BCP. We had to oversee the minor details of their response as there were no details of what they wanted to do (PN8)*
Reliance on First Principles	Where commanders had experiences that were compatible, this was seen as a source of strength. Having been involved in smaller scale operational incidents where command structures had been invoked meant that the commander served to	*I suppose that as community manager I didn't know, or didn't think about whether, until XXX spoke to me, about whether there was a policy around stopping staff going in, cos that seems a really silly thing, that we think there's a knife man… (PN1)*

	reduce the sense of the extraordinary. For others however, they focused on the discontinuity and that which was different (for example dealing with a hospital lockdown or wet decontamination response; working on their own rather than as part of a wider team), and for which they had no prior experience.	*They've got a decontamination hut thing outside A&E so they deployed all of that stuff as well, so there's people wandering round in full hazmat suits, so pre-covid as well so pretty unusual....(PN2)* *But basically, this was in fact my first director on call. I suppose, a bit of a baptism under fire for doing the on-call director. I've been a previous manager on call...There are things...and I've done a fire previously, as a manager sort of thing .... yeah and I've been involved in incidents where we had a lot more casualties... but not... it was the day job with lots of people (PN4)* *Yes, there was nothing in terms of script saying this needs to be checked, go out and check....it was more of assurance; go out to your wards, is there a problem, if there's a problem scope the risk, what can we do to mitigate it, and then obviously feedback and escalate if further support is required (PN9)* *Prior to this, the ED Department done fire evacuation training with the our fire team and that was part of the training that they did that would, if he needed to, escalate out, that would use that so that the they probably had that in the back of the mind they could use that because they had prior training on this particular scenario to be fair (PN13)*
	In response to these demands, commanders tended to coalesce around the themes of Patient Safety, Staff Safety, Site Safety and Public safety	*Yeah, so I was kind of like saying, if they're all pulling up at the same time, getting them to wait for each other, kind of like, don't, go in, don't go into areas that would have been empty overnight... So why would we want to add more staff into the area....we wouldn't, so yeah, she's the only one that got me thinking about should I have directed, cos SD was the last one I managed to speak to, should I now ring them all back to say don't go in (PN1)*

this is the situation you are confronted with, right how's your brain working at this point, what is the step wise process, what instructions to give your worth, what instructions are you then issuing to ensure whatever it is within your role, to ensure patient safety, staff safety, service continuity whatever it might be (PN2)

We drum into people: are the patients safe, is the site safe, are the staff safe? If it's not safe, you've got to do something now. You can go and grab your bit of paper later, but your instinct will tell you what to do with patient and staff and site safety (PN6)

The discussion then was about the impact on patient harm – they were looking at the implications for patient care. This gave 2 areas of concern – HSDU and Endoscopy washers. There were no staff or patient care impacts but the team were checking this out (PN7)

Key themes were comms and harm to patients (PN7)

We gauged the answer. We did a list of priorities from the clinical staff in the meeting and did a priority list. We asked the Imaging clinicians and they understood their activity, with the clinicians involved it felt safe (PN8)

I think it's about those comms going out and again it's not about alarm bells or panicking people but just making people aware that there is an issue externally, what do we need to do locally first to mitigate any risk and obviously if locally then….because the experts are going to be the people in that area of actually this is a higher risk area for example respiratory so if they were going to do a drainage on a patient but using clean water from a tap could it been an effect (PN9)

So, these were the areas I kind of prioritised knowing the environment and knowing the calibre of high risk patients on which medical wards, so I based it on that, but again it

		was kind of an individual knowledge and experience rather than being told you need to go to, target, Ward YYY first….(PN9)
		She's [tactical commander] coordinated with the fire incident command of the gas and electrical…the plans. So she was making sure that when the isolated the oxygen and the medical gases that it wouldn't affect the rest of the site. So she based herself there (PN12)
Initial Response by commanders	Commanders described a tension between finding more out about the incident and the nature of the response, versus starting to put some actions into train. For those off site, there was the desire to get to the hospital site but it was tempered by putting some essential actions into place before they went (or on the way)	*So you know yeah I was at home, so I was just on my way out. But then I spent another half an hour at home phoning people…Cos I have like a 3…40 minute drive and I knew that am I going to waste, not waste my time, but am I gonna drive there that takes 40 minutes and I can't make a phone call cause my work number, my work phone isn't connected to my Bluetooth in the car but my personal phone is, so I thought I'm not gonna drive to work yet, I'm gonna contact people who I need to contact and then drive on my way. (PN1)*
		And I said what have you done about it, and they said we've called the police and I said well that's absolutely the right thing to do in the first instance, I said are the patients safe? They said we're going through a process now to make sure that the patients are safe, I said right that's absolutely fine, carry on with that and I will come to the front of the trust now, I'll come to A&E now…I just wanted to get to the front to gather more information because of course you've only got a scant thing, you know that basically it is going tits up but you don't know what the extent of that is really and for me, I… certainly not wanting to be on the phone for very long really with anyone to ascertain that. I need to get to the front. I need to be where this has happened so that I can start to work out what needs to be done, if that makes sense (PN2)

		And we happened to have one of the EPRR…emergency planners with us partaking in the [social event off site], and she took the call first and we both headed in…into the hospital, into the mother ship and you know… making calls as we went (PN3)
		Yeah… so you start to gather resources at that point, because you don't yet know what you're responding to, you don't know the scale of it is, you don't know whether it is going to be major incident stood down, stand by or whatever…at that point you don't know the scale of the response is that's going to be required… (PN3)
	One of the considerations for the commanders was who else was on scene or on their way to support. Commanders described contacting key people such as the Chief Executive and the Medical Director to ensure that they were informed (former) and able to participate (latter). They were acutely aware of the need not to cause confusion or duplication and would operate in a zone that they felt would be a unique focus and not likely to be picked up by others. The actions of commanders were also informed by perceptions of the capacity of the organisation to respond. Where senior staff were perceived to be attending, the commander was able to spend more time off site and seek to add value through their own unique contribution.	*But yeah, but I don't know whether we didn't agree a plan because the day leaders were coming on and I'm not on site and apart from me phoning team leaders for like ICS, therapy, palliative care and yeah there wasn't a plan of what I needed to do….I said the only thing I can think of is alerting the community teams that are due on site this morning cause I'm worried that they're gonna potentially coming to in contact with this person and I'm gonna ring round now and then just alert people. And XXX said I think that's a reasonable thing to do (PN1)* *so in my head, this was my space to get my thoughts together but also to make some early connections that I know wouldn't necessarily be made by my colleague on the ground, and then make sure that we ….had a complementary set of actions as we were constantly in the same space; so that's relatively straightforward to do….(PN3)* *But as I say, it wasn't really...I think I used the time driving in to…the half an hour driving in, knowing that there was already an on call director that was inbound who was our on call director, I didn't want to be too active in that space until we were sitting next to each*

		other 'cause I was concerned that we would end up duplicating or confusing the picture until we were both…(PN4)
	Emphasis on precautionary principle & act first based on initial instincts around safety	*you can take what the police tell you at face value in that situation, you act and then investigate, don't investigate and then act…and so it was...once it got here and we said we act and then we investigate so we'll lockdown and then we'll enquire…don't wait to find out more details before you lock down as we don't know how close that threat is …so that was one learning point for us and one of the things that we have put into the new lockdown plan is an immediate escalation procedure that clearly tells them that if that instruction or advice comes from a reliable source, as in one of our emergency services, then response to that, activated it and then we'll investigate what exactly is going on...so we've kind of turned it around a bit as a result of that, so there was some learning out of it…(PN6)* *they do and that's what I say to people when we've got plans for lots of different scenarios and we've got action cards in those plans , but experienced people nine times out of ten will declare what they need to declare, do a load of actions and then say I better look at the card and see if I have done everything and then they'll go to their card to cross check that they've done everything but actually, most of what it says on their action cards for them to do is what their instinct would tell them to do anyway. The action card is just there for you to go 'hang on a minute have I done everything?' (PN6)* *We drum into people: are the patients safe, is the site safe, are the staff safe? If it's not safe, you've got to do something now. You can go and grab your bit of paper later, but your instinct will tell you what to do with patient and staff and site safety (PN6)*
	Information seeking	*Tactical command structure was about information gathering in the first hour…XXX [tactical commander] had delegated some decisions down and Estates were dealing with YYY [External Company]*

	Thinking broader around the incident and enhancing the response	*After receiving notification, PN10 contacted Switchboard and they altered catering and laundry; PN10 alerted local fire bridge to let them know they had a potential problem should they need to evacuate patients (PN10)*
	Actions already undertaken on site	*Uh, she [tactical commander] arrived on site to find the department had been evacuated. And confirmed by the fire crew. So our…ED staff did a fabulous job. Every single person, patient and staff member was accounted for almost immediately. They did a really good job, the Ed Department. So by the time she arrived on the site the ED department had been evacuated and it was confirmed that there were no people were missing and everybody been accounted for (PN12)*
		Full, divert immediately. It was put on and again that went through. Cos site can do that. So we she got hold of the wrong… So full divert as soon as we evacuated…That was… and we have ambulance staff actually in as part of our ED teams as well. So it got pushed quite quickly up to them that we were a no go (PN12)
Decisions Taken	Commanders described themselves as taking very few decisions, but that they saw it more as a process, particularly with regards to communication across the organisation and external partners. The key decisions made related to: • Decision to attend the site • Declaration of a major / critical incident • Getting a divert of ambulance activity away from the hospital • Agreeing an assessment of how long the response to the incident would affect the hospital	*So, so, yeah, I didn't think to go or perhaps I just made a decision not to go because there was probably enough people gonna be on it. If it had been in the middle of the night then that would have been different and I would have gone, but I suppose like with people and other managers coming in at that time I didn't feel it was necessary for me to be on site (PN1)* *So I never at any point…felt that it was out of control…it never felt at any point where I didn't know what was going on, that there was any uncertainty…does that make sense? Did I make any decisions…? I don't know, I don't think I did that I can think of…key decisions…I don't think that I did (PN2)*

		Agreeing how the communications would be handled • Agreeing the stand down for the hospital	*It's really interesting, and yet…now I'm just thinking, bloody hell I don't do any management at all, but it's a completely different scenario from what I would do in any other context, I'm just thinking about a set of meetings I was in yesterday, and it is about you are a little bit more…directing, you have a very clear idea of some circumstances around what I want people to be doing this was very different to that, really different to that (PN2)*
			You know the decisions were about when to communicate, how we communicated to the staff, and externally, so it was the thinking and decision process about how we managed our communications to give the organisation and the public that sense of control and management. That was important (PN3)
			Yeah, yeah…Not an awful lot really. I mean to be honest I thought I was really what I was that day was communication really, that was most communication going through me and just making sure that our teams are okay, they were aware of what was happening. We had to tell everybody to stay within the wards, not to go, and you know keep yours locked etc it was all that kinda communication that going out over the bleep system as well, making sure that was happening and making sure the communication up and out was happening, so it was mainly…I don't think I had to take, you know…like I've been involved in a fire or you know, you start getting ready to…to..to…get out of wards, where perhaps more decisions have to be made…. I don't feel I made an awful lot of decisions, I felt I had a lot of communicating that morning actually…instead of decisions around what was happening with the….. the…. Police (PN4)
			My first instinct was get that ED front door locked and get somebody there so the patients that need to come in can get in and the one that we don't want in, can't…. I think the decision making didn't bother me, so if the police are saying this is our advice, well I'm going to take your advice and then I'm going to…I'll ask you some questions…(PN6)

		Spoke to XXX as COO and decided this was a business continuity incident level 3 / critical incident (PN7) *Immediate actions:* • *List the water supply dependent treatments* • *Comms out across the organisation about flushing water taps – who and when to flush* • *Water pumps – check the pressure* • *Recommence water flow* • *Check with the water suppliers* • *Check any issues with YYY* • *Social media – get some positive external statements agreed as there were already messages on social media about the water supply at the hospital being down (PN7)* *It was scan and report back to be fair, and obviously if there was a risk to an area, what did we need to do urgently to make sure that there's mitigating plans. (PN9)* *Again, her being a clinical site manager is site duty manager. She…in her past life really used to…moving patients around at short notice. And then she just went through. She was really good. She went through to ask the reception started to take notice of to take details of patients that do not, didn't deem themselves as require an immediate…access to the service and were going to go home just so as we …weren't missing, we weren't looking for missing patients and a lot did go home to be fair (PN12)*

	Boundary setting	*The fact that the lifts couldn't be used although that action was overridden because I I I'd realized the list right in the center of the hospital, which way is probably it might be 1/4 of a mile away. So I'd I'd asked the fire service and said, hey, can we still use them? And the fire service said yes. So that made life a bit easier as well for decanting patients, (PN12)*
		Silver on call was theatre matron who understandably was dealing with theatre issues as this was the site of the incident – in similar situations in future it would be better for someone to formally relieve the individual of the silver role (HIN3)
	The act of making a decision by the commanders served the function of creating certainty when there was a lot that was unknown. In addition, they were also able to respond to specific queries from departments and individual staff helping to create certainty for them as well.	*At this stage we still didn't know what we would be asked to respond to, how many we would be asked to respond to, so in the absence of that knowledge, and in the knowledge that we would be the major receiving centre, we immediately asked for a hard divert of any medically inbound patients from GPs to XXX (PN3)*
		Stand down…we probably kept the incident going for too long, but we didn't know what was happening on scene or the full dispersal arrangements (PN5)
		There was some challenge by the tactical commander about some of the information coming back but this was more about getting more information / understanding - there was no time for quality assurance about everything that was being said – managers knew with XXX that they needed to focus on the facts not conjecture (PN7)
		To be fair, it was a bit unclear if I'm honest with you…, because everyone going to their relevant areas …..but there was no direction of check there's a checklist, you need to go to all medical wards is there free water flowing? Are there any areas on the wards where there might have been free flowing taps or drains where actually a patient could have been at risk, so actually we didn't go into….it was literally an oversee, overview of what the problem was externally, this is how it has impacted on the Trust internally how is this impacting on the wards, how is this impacting on the procedural areas and then feed back (PN9)

	Factors influencing decision-making	*PN10 had discussions with the Fire Service- but the discussions were about keeping it at a level of incident to avoid escalating it too high externally as this would bring on a whole host of other reporting responsibilities (PN10)*
		This led to a discussion about the level of the incident enabling the mobilisation of different types of support (levers for getting additional staff to the scene) (PN10)
Reassurance or Assurance?	Commanders all reported that they were pleased with the response of the organisation.	*Actually, thinking about it, it was remarkable from that point of view…. there was no area that I went to, even the A&E reception staff who were completely having their hair off, sort of saying oh my God, there was nobody and I don't know whether that because we're working in the NHS and you kind of face crises every five minutes or whether they just knew what to do. Certainly, the people with, in terms of the decontamination kit, they knew what to do, they were brilliant, absolutely brilliant I remember they were sort of talking about all the training that had been rolled out and kind of you know they knew exactly what to do they were brilliant (PN2)*
		Our team are amazing. So, we had more senior nursing staff and consultants in the hospital on a Saturday than we would ever have on a working day, it was…people were everywhere It was like a well-oiled machine, genuinely….All the signage up around the hospital was being utilised, so the rest centre was being set up for relatives, the relatives' receiving unit was being set up…for police to be present, if necessary…we had way-finders positioned to ensure that as people started to arrive…that we were ready to receive. We had…the Emergency Department was emptied faster than I've ever seen it emptied, it was amazing, essentially, the right formation was created around every majors cubicle and

		space available…the right formation of staff was there and so we were staffed appropriately to receive…our…at our maximum capacity (PN3)
	It is useful to make a distinction between whether the tactical commander was seeking assurance or reassurance. The latter is when one is told that all is well, whereas the former is when one is told what is happening and is evidenced (Avon and Wiltshire Mental Health Partnership Trust: Board Assurance Framework (BAF) 2013/14; 16/07/2013). Commanders appeared to operate on a reassurance-seeking model rather than an assurance-seeking one.	*yeah, sure, yeah, we're telling you and you don't need to do anything because we've got it all in hand, we're doing this that and the other, XXX knows, YYY is here…. that's what I thought, yeah. It's happened and everything that needs to be in place is in place and it's under control (PN1)*
		The way that I tend to work in a lot of those circumstances, I will absolutely take on board what people say to me. So they are the practitioners in those areas, so actually and certainly when it comes to for example …so I remember speaking to the lead in A&E, the consultant in A&E should I say, it was absolutely around how they are managing their patients in the context, so maybe I've got leadership completely wrong, this is leadership 101 about to....could be completely blown up, but for me it was about making sure that they didn't need any additional support over and above what they were able to do to make sure that there was nobody going to drop down dead as a result of this, that there was nobody going to have an adverse outcome as a result of that. (PN2)
		XXX organised the meetings so that they responded to the facts on the ground - they used the command structure to talk through the issues and also considered the initial BCP around water loss (PN7)
	Seeking reassurance from other managers	*so it was more about going out to relevant areas, assuring that the risk had either been mitigated, or if it hadn't been, what were we…how were we going to mitigate and who were we going to escalate to (PN9)*
		Tactical commander was talking to XXX (COO) during the incident who agreed with actions (PN10)

	They used a variety of heuristics to gain reassurance which were linked to:	*Staff wise are you still able to manage? Because it was quite a busy day you know in terms of the number of people that we had in there, plus the number of waiters that we had in there, it was a busy Sunday…are we able to manage this? And when they're nodding sagely and saying yes we are, this is happening…great... (PN2)*
	• Whether the command centre appeared busy and in control / calm • Whether the operational teams appeared in control / calm • What support the operational staff were raising as being required • The seniority of staff supporting the organisation's response • The presence of staff who were used to undertaking the granular level of work around hospital operational delivery	*But I did go down there just to see how people were. Not to interfere, not to start to get involved in Silver processes, but just to check in, to get a sense and my immediate sense was of calm, purposeful work that was occurring and actually a sense of …real team spirit was starting to be engendered and we hadn't received any patients at this point, it was just the amount of resourcing and coordination that was happening was feeding off each other, so you got you could see the bronze ED team, the bronze medical team and others coming in checking in and just, there was so much activity happening, it was really reassuring; but importantly the silver commander of the day was really confident in her position. So that was no more than a couple of minutes (PN3)* *The medical director would go off and do a reccy on the front line, just checking with the medical teams…he'd come back and check in. So as well as Silver holding accountability for putting in SITREPs, you're getting that softer intelligence that's providing you with some assurance anyway and the Director of Nursing was there as well (PN3)* *Where I say Bronze, tactical, overseen by very senior consultants; so we had 3 or 4 acute physicians making the clinical judgement call about what areas were safe to cohort patients away from ED to enable ED to be ready to receive…Whilst making sure that you had eyes on that clinical risk while having senior clinicians for those clinical spaces (PN3)*

		The site manager, I'd worked with a lot, she was quite able and know what she was doing and you know that sort of helped. And she and I did laise a lot that morning in terms of… that felt...I had that support… she was good, you know I did think afterwards if I had had more, a less experienced site manager some of those necessary steps wouldn't have been taken by time I got there…. you know…she knew what to start doing, you know (PN4)
		Not about checking every aspect of their response: good assurance came from having a live action log going throughout on a PC and also a live video link, so that they could see what was happening in the command centre. They were doing things competently so that meant he had 'assurance' through their actions. (PN5)
		They did a lot of detail through the tactical command because the department could not galvanise the response because the Group Director was new and couldn't lead the response. They were gauging the level of the response – normally they would do an assessment of the ability to respond but 'it was like asking them to bake a cake and they had no understanding of what the ingredients were'. Imaging asked for a major incident to be declared but they had no understanding of what it would deliver (PN8)
		We gauged the answer. We did a list of priorities from the clinical staff in the meeting and did a priority list. We asked the Imaging clinicians and they understood their activity. The managers had not engaged with the clinicians or spoken to them during the incident – 'with the clinicians involved it felt safe' (PN8)
	Reassurance from TC not seeking help	*The tactical commander on site was XXX and she was getting on with it – she didn't refer to YYY for guidance and only really caught up at 16.00 hrs once the incident was over and both lifts were back working (PN11)*

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| Tactical or Operational role for commanders | Commanders reported that for the most part they adopted a tactical role rather than getting involved in the operational response, and in most cases this was a conscious decision. For some this was from previous experience, for others it reflected an awareness of how this role was perceived. | *And there is a process, so clearly if a white powder man was to turn up today there is a process, that's a standing operating procedure…when a 999 comes in it says chemical incident that's how it plays out, there are processes, they have a structure built in, the same as we do and if you go back to what I was just saying about the major incident, there is a process there is an absolute process in terms of the communication, the train of events that fall out of that (PN2)*

I guess that what we've learnt from other incidents, we had a fire where a computer room was taken out and everybody, every Exec piled into the control room trying to make those decisions and it doesn't work, it becomes a real mess (PN3)

you've discharged the accountability, but you've set a set of parameters for Silver to work within with your strategic objectives. Silver are reporting back about their strategic objectives, apart from that that's all they have to go, get on and manage the situation, because you're the experts in that …and you've got the bronze teams all reporting in…(PN3)

I always believe no one's coming in today to do a bad job, they all want to do their best. It's the context they bring with them. I think if you've got a sense of trust with people and a clear set of expectations in terms of outcomes, and you hold us to those expectations, then that is a much more reasonable way. It's the only way really to manage a large organisation as chief operating officer. (PN3) |

			Yeah… to me it was one of those things where I had to stop being like more sort of a 'doer' manager….so I had to take that, that…. I started going into that mould initially, I didn't…I just cottoned myself on and said no you have to, no, that is for somebody else to do then you've got to direct them to do that coz you've got role that really is to make sure it's happening as well sort of thing, you know…so there was..you do have to have the trust that things are happening you know (PN4)
			TC was not micro-managing but was gathering the overall picture – TC wanted to get less information but the right information – narrow down the problems and focus the energy. (PN7)
	Staff know what to do in order to keep people safe		*I remember many years ago at our old hospital….when we had a power failure in ED and we had to evacuate ED and move it to a new area that had power and we'd got resus's going on and it was 11 o'clock at night and we had a celebrity in the building so media were everywhere and somebody complained to me afterwards that the ED charge nurse didn't have his business continuity plan in his hand, so had he referred to it? And I'm like tell me what he hasn't done that was in his business continuity plan then? And she said h, no he'd done everything – and I said exactly, he'd known what to do, he would have gone to that later to cross check that he did everything, but he knew what to do, he didn't need to go and pick it up to know what to do to keep his patients and staff safe; he knew what to do (PN6)*
	Giving permission		*I think it was almost like permission. It was confidence in ED to react to that message as given. I think that was what they needed. I think they needed somebody to say yes, if the police say do that, do it. That's all they needed. (PN6)*
	Staff empowerment		*The tactical command worked by giving the big picture and then empowering the staff. XXX wasn't directive about what each manager needed to do but gave the big picture and things they had to look at. XXX gave a bit more detail on what he expected to some people at the meeting who were less experienced. (PN7)*

		So, yeah….I didn't go back with a problem I kind of actioned it immediately, the response seemed to colleagues in YYY. Estates joined me in Endoscopy so between the 3 teams working collectively we resolved….the problem seemed to be an air bubble and it could have been worse. But we went back with this was the problem this is what we found this is what we did and that was the output (PN9)
	Expectation that the area affected will lead its own response & recovery	*so we were going to ask is there another system, another way to do this and how is done in the past, how have you done it when you've had planned activity downtime? That sort of thing, trying to explore what can be done what's the size of the request, what's the size of the demand (PN8)*
	TC not specific directions but allocation of functions & assessment – no specific checklist/plan for this event	*To be fair, it was a bit unclear if I'm honest with you …, because everyone going to their relevant areas …..but there was no direction of check there's a checklist, you need to go to all medical wards is there free water flowing? Are there any areas on the wards where there might have been free flowing taps or drains where actually a patient could have been at risk, so actually we didn't go into….it was literally an oversee, overview of what the problem was externally, this is how it has impacted on the Trust internally how is this impacting on the wards, how is this impacting on the procedural areas and then feed back (PN9)*
Communications	Communications, both internal and external operated as a significant focus for commanders during the respective incidents. Commanders experienced a requirement to inform the rest of the organisation about the incident, particularly in response to version control of messages, whereby staff might be working on information or assumptions that had since been revised and amended. Huddles both within each organisation and between partners on site were used as a	*Somebody had been on the phone and said is there a major incident…I'll tell you who it was, it was one of the managers on call at [another hospital Trust] who asked is there an incident escalating at Walsall as we've seen it on Facebook and we understand that there's going to be ambulance diverts to [the other hospital trust], so they said is something going on? And I said there is something going on at the moment but it is being managed (PN2)* *There were calls constantly coming in, fantastic support actually from the regional office who, when there was push coming back from other providers locally about the state of*

	vehicle to gain and disseminate information. Communication with external such as commissioners or other providers would occur through formal, prescribed routes and through unofficial ones. The former were the vehicle for the organisation to project the hospitals needs and wants to external partners, while the latter would often involve other hosptials who had heard about the incident and were seeking to assess the impact on them (rather than necessarily offering mutual assistance).	*escalation and the fact that they were approaching major incident…I recall the medical director at the regional office or whoever the director was, I think she was a GP, but said something along the lines of that is your normal operational pressures you're managing, it is not a major incident… this hospital, I won't name it... but the fact that you have had 2 or 3 patients to manage after this major incident ..the scale of this other hospital…(PN3)* *our role was trying to get communication to our teams, in terms of all the wards and departments, because we had to have a method of putting one thing out to say this is happening or you know how we can do that, so I liaised with our press officer in terms of they were certain to get interest from the media as well as the morning went on, in terms of giving statements to what was happening (PN3)* *it's communication really, I think in those incidents…. I have been involved in fire incidents mainly where communication is poor, you're just getting that information. We didn't get too much feedback on that morning but people felt…they did feel that they had been communicated with but its sort of …. I think the team on level 11 you know where it happened, I think they would have liked to have…seeing people sooner than they did, but they did understood why we couldn't go up there that kind of thing, yeah….(PN4)* *The result was that communication at the time of the incident was virtually impossible and therefore leadership appeared to be impossible. In order for things to work better we would need to establish hierarchies of communications and ensure that communication equipment worked throughout the hospital areas. (HIN3)*
	Importance of Comms and what to say to staff in an incident without creating unintended consequences (uncertainty)	*Because it was so quick…If it had gone on any longer I think we would have hit problems. The hardest thing was and this had never entered my head I'm ashamed to say was what to put in the comms. How did we get the Comms right so that people didn't suddenly find*

		Balance to be had in comms re passing on information in midst of uncertainty	*a locked door and not understand why… and staff understand what they can and can't do without scaring the life out of everybody (PN6)*
		Purpose of Comms - alert but don't scare staff	*Especially when you can't give them much information. You can't say this is what is happening and so we're doing this when the police can't tell you and we then couldn't say to the staff exactly what the threat was even once we knew what it was…so it was that balance really on how to get the comms right to be able to give enough information safely and securely. It was that…that was hard (PN6)* *Yes, it's a….how do you get the message out without scaring them but getting them to take the message seriously enough…and how do you work out how can I tell them what they can and can't do….cos some of that is kind of in your head you know what you would do if you were down there but it's hard to be specific with people if you're not the one facing the person at the front door, isn't it. So that for me I think was the hardest bit. (PN6)*
		Unintended consequence - had stepped down the incident but still getting questions raised about it	*Yes, yeah….there was ongoing, for a few hours there were questions, what happened and why did it happen, and why wasn't I informed personally and those sort of things….yeah. There was a little bit of that but again not too much cos I think it was over so quickly (PN6)*
		Relationship with Gold = informing NOT seeking direction	*Oh no, we just told them what was going on. My first point of contact was the director of estates and facilities because we're a PFI, he's our link with the PFI. You've got to tell the people that own the building…that you're about to lock their building down…or their staff are about to lock their building down at our instruction…so he's our link with them so it would have been wrong for him not to know what was going on because that's who they would have gone to with their questions which is why are you locking our doors? So my first point of call was XXX and that was fine and then I went to make sure our Gold Commander knew what was going on who was as she usually is, OK fine, tell me what you want me to do…and did I need her to do anything and I said no… that's fine just keep me informed and I'll shout if I need you (PN6)*
		Treating the organisation as mature units	*…I think it's about those comms going out and again it's not about alarm bells or panicking people but just making people aware that there is an issue externally, what do*

			we need to do locally first to mitigate any risk and obviously if locally then….because the experts are going to be the people in that area of actually this is a higher risk area for example respiratory so if they were going to do a drainage on a patient but using clean water from a tap could it been an effect. (PN9)
		TC seeking to escalate externally	*She's so she's on the phone with gold the whole time because gold was hands free in her car. So she was talking to gold the whole time. Just looking at her messages. She tried to contact the CCG Silver, but we can only contact, I'm sure it's the same as you now via pager. The world of insanity. So she left a pager message. And then she's dealing directly herself at the time with our our site duty manager, the clinical site manager. That was her focus. So she's she was updating gold continually about where we were at and what our plan was and but she was dealing directly with the clinical site manager who obviously deals with the actual operational flow across the sites. And just dealt with essentially the clinical site manager. In person and on the phone, dealt with, and then it was all face to face with a ambulance and with the fire scene commander, Ambulance and sent a an ambulance commander to the scene as well. (PN12)*
Signing Off Decisions for Others		Commanders reported that they would sign off decisions often uncritically / without judgement in order to satisfy the perceived needs of staff, whether this was to make them feel better or to give them protection.	*and I was like I don't think you need to do that, but if it makes you feel better then OK do that, But then that caused chaos later on in the day because of rumours that were happening there, that they thought that there was an immediate threat there and there wasn't (PN1)* *but you still there a leadership role you are the person who they look to, to basically sort of say, almost validate sometimes the decision making, that they're going through if that makes sense, you know, they're, they're making the decisions but they are, you're there to validate it and actually you could argue, going back, I'm almost talking against here…maybe that is part of it where they feel they gotta validate or…they feel they need to make sure that other people know what's going on so they feel protected (PN2)*

Changes in Environment & Personal Role / Accountability	The incident creates a set of conditions that changes the everyday environment within which commanders were used to working and rendered it unfamiliar. This may have been due to changes in use of certain areas or constraints in accessing around the site that a lockdown brought, all of which impacted on the way that the commander was able to operate.	*I think that….it was more the concern for… it was labour intensive. It's a big hospital you know, numerous wards and you had to ring around everybody, you know what I mean, that's sort of how the communication…we still haven't really resolved how you do that any better our communications team said we could put something on the screen to computers but not everybody knows….it wouldn't necessarily have given you that sort of reassurance that everyone knows what is happening and that felt quite labour intensive, kind of thing, how you do something differently…. so I think as I said earlier, not being able to go to the wards was affected… yeah I think that did feel… in some ways it made me have to set up just communicate… not do….but in other ways it made you just feel a bit…yeah….you weren't sort of doing the right thing but… (PN4)*
	The random nature of incidents occurring and a person being the one on call at that time was something which served to highlight the sense of the extraordinary. Commanders may be experiencing a change in accountability and where they may previously have been operating in a direct hierarchical command structure, they were now assuming a greater level of accountability, with perhaps less / significantly altered infrastructure to support than in-hours	*Again, is it me, does it end at eight o'clock in the morning? At the weekend we know its eight o'clock but at the moment in time when this incident occurred I was manager on call (PN1)* *Yeah, so we also talked about in future how we might let community know that there's an incident, cause it was just again a matter of fact that I was the manager on call, just happens to belong to the community division, so whether there was gonna be any investment around apps or texting people which communications thought might be a good idea to kind of like de-escalate anxiety quite quickly if everybody gets the same message at the same time (PN1)* *Oh well this fellow's driven absolutely bloody miles, to come off at junction XXX and driven, there's a million and one hospitals that he could have stopped off at on the way but he decided to stop off with us (PN2)*

but I think for me personally because it was my first… I had to switch from, you know…I'd had up to nearly ten years of manager on call, you know…. so I sort of… I had to switch from that sort of mindset of being a manager on call to being the director on call and I realised that means quite a different role you know. So that took me a little bit initially…I didn't need to get involved in the doing…it's that mindset as well, it took a while to think about it…yeah…it was I suppose my thoughts were just communication initially; how we do it, what we need to do (PN4)

so there's that nervousness you know…the known unknowns, whatever, that something you don't know, you know. You're very conscious that afterwards, not so much at the time but around things like that which makes me think, I know I didn't have to make any major decisions as such, but you know there was a lot in the media about what was happening at Grenfell and the fire officers, and the enquiry that was going on afterwards and how they were having to stand up in court and talk about the split second decisions they had made and the different decisions they hadn't made and after this Manchester as well you know after what happened there there was a lot of discussions about people in charge and what decisions they had made. Now thankfully it wasn't anywhere at the level of those incidents but it does make you think you know, what, what you could potentially be up against and the expectation of you is as a director on call (PN4)

but it's also kind of a bit scary that morning it was alright but because I was the boss but in the past the few incidents…there would be people around, similar peers kind of thing…I was the most senior person there you know so that was quite scary, so when you realise that kind of thing you know. You didn't have anybody to...you just really had to…yeah …sort of hold your nerve (PN4)

	Aware that they had to operate differently and change their practice form how they might normally manage things	*because your first tendency is to go, just that like today I thought nip down to ED because it was a busy day yesterday, we had so many ambulances; I'll go and see the ambulance crews and that's the best part of the job isn't it, you want to go and talk to the teams and the people that are around you. But we resisted that and we were very busy managing our external communication, so it wasn't difficult (PN3)*
	Collapse of assumptions / certainty	*it was also stated in that first meeting by XXX for Imaging that basically said I recognise that we don't know the BCPs, and I think that where he said 'we' he meant him (PN8)* *Key impression is about understanding vulnerabilities in the organisation and how to deal with them - Where is the manual for dealing with this? – it is not a new problem – why hadn't it been dealt with before incident (PN11)*
	Transition from incident response to Recovery / BAU functions	*So that was one big thing. The other big thing for us was so we moved into the daytime running. So come 8:00 o'clock in the morning, gold and silver went. It's been a long day. We'll hand over now to our regular goals and silver our COO and the Director of Nursing took over this between them for gold. And we passed over to silver, which is our deputy coo. (PN12)*
Role of the tactical commander	Responding to decisions already taken and enacted by others leaving the on call manager to carve out their own role. In one case the incident was stepped down without the commander being informed	*So at the point of ringing me they were ringing me for information: this has happened and you were manager on call, director has been informed she's on her way in, police are here, security are on the case, that the gentleman who's been stabbed is in A&E, he's been treated, it's not life threatening, just a matter of fact kind of scenario rather than yeah any decision-making (PN1)*

		but I didn't get any communication that day around how we want you know yeah any kind of like debrief on the day or any actions on the day. I was kinda like stood down from XXX nobody else rung me (PN1)
	Adopting a leadership role	*Because actually, you've got a lot of people who suddenly look to you as the name in the frame, and say what do we do here, what do we do here, what's the plan? Not everybody because everybody kind of has their own roles within the incident itself. The staff in A&E is a very good example of that, what they did and how they approached it (PN2)*
		So they [staff] knew if need be, if there was a hospital type conversation to be had they knew that it would be myself and then it would be myself and Anna when she came onto the site, that was how it would kind of play out, they knew where those responsibilities were. The fire service absolutely knew where there responsibility was, found out the substances, contain that substance, mop that substance up if need be. The police knew that at the moment it was an unknown and potentially escalating situation they had to contain that within the context of what they knew and as the information changed, so their response to it changes…(PN2)
		The role is 20% direction and 80% empowerment (PN7)
	TC had agenda focused on the impact and prioritisation of patients	*XXX was the TC for the meeting and I set the agenda for the meeting so it was literally getting an ETHANE, understanding the impact, understanding any prioritisation of patients and a clinical (PN8)*
	TC assuming more direct control over the local area following lack of assurance / reassurance	*They did a lot of detail through the tactical command because the department could not galvanise the response because the Group Director was new and couldn't lead the response. They were gauging the level of the response – normally they would do an assessment of the ability to respond but 'it was like asking them to bake a cake and they had no understanding of what the ingredients were'. Imaging asked for a major incident to be declared but they had no understanding of what it would deliver (PN8)*

	TC role in QA of response	*We got them to use the documents and BCPs that they already had. People were giving a narrative without enough understanding. We got them to check the documents to work out a plan and priorities. They underplayed it – they didn't judge it correctly. Thinking that this wouldn't have an impact on pathways of care was a little naïve. The people left after a swathe of resignations did not know their BCP. We had to oversee the minor details of their response as there were no details of what they wanted to do. (PN8)*
	TC use of whiteboard to record actions	*We had the whiteboard; so the actions were assigned by division – who was going to be responsible for checking which areas and then it was like can we feed back in the next 40 minutes and that's where the escalation about eh washers was brought, we knew it wasn't an easy yes, we're all running now', the burst pipe issue had been resolved, it was actually then an internal problem with the air bubble. So it was all just tasks assigned to Estates, to divisions, just to go out have a look, walk the areas and then to update. So it was just literally on a whiteboard (PN9)*
	Role within TC	*What value did I add? Very little as had no operational experience or advice to impart to TC (PN11)*
	Difference btw gold and silver roles	*So it was quite symbiotic. It was, everybody got obviously could hear what everybody else was saying. So it was it was quite committee...Committee fired at that point, but gold was was definitely setting the strategy of where we needed to be. But silver again a very experienced CSM, was able to make things happen and understood the implications as well, quite quite well where the more that was coming in that we lost, she got a very good understanding of what implications that had.(PN12)*
	Good TC response to the fire	*Yeah, yeah, the initial response, we were either we were lucky or we weren't depending which way you look at it. But the response went really well. We were lucky. We had a very experienced silver on who's been a clinical site manager. So he's used to, like I say, patient moves used to finding finding spaces for people at short notice because things have gone wrong and the gold is very senior in a nursing capacity. So she knew the implications of what happened. We were lucky on that responsibility. That respect for the response might*

		have been a different story if he had a very inexperienced silver or a very inexperienced gold on. (PN12)
	Establishing Priorities & Parameters	*Staff safety, patient safety, site safety. That's where I felt it lay. So whether that be patients coming onto site, whether that be patients that we had in A&E, or whether it be the staff within A&E or elsewhere (PN2)*
		so it was definitely a team effort and at no point where I felt it was, it was out of control, no. I didn't feel that there were any gaps where I was….at no point was I standing there thinking such and such should be here, or even in the hospital sense I should be pulling somebody from the hospital, I never thought that, I thought I should be here, I need to be here, I'm here (PN2)
		]….I suppose putting it in a slightly different way thinking it through, I absolutely…you asked me this question right at the very beginning early on at the beginning as to who I felt was leading and actually being in overall charge even….I never felt in that incident that I was in overall charge, and if you think it through logically, why would I? I have no …knowledge of how to manage a chemical spillage…I absolutely have no knowledge in terms of how to manage query an terrorist incident…that's not…that's not what I do…if I'm on call (doing that then we're in trouble now aren't we, you know what I means…its not just bed flow now (PN2)
		We weren't having decisions being made with wider consequences than our own organisation within Silver, and any consequences that were standing outside of our organisation were referenced through Gold. But the management of the incident and the coordination of bronze was absolutely down to Silver…So ensuring that there was enough bedside resource or treatment resource or majors bay resource in the emergency department, and where that was cleared to and how the patients that were cleared to

		create that space were kept safe in other places…that was all Bronze, Silver…very tactical (PN3)
		I felt it was a joint thing but this incident would probably be led by the police because they're, having to….the ambulance turned more to me I think because it was our hospital where it was happening but I suppose I in turn would have turned to the police as well because they were in charge of the…but I suppose from my perspective I had to understand how that affected the…how the hospital was running how we were doing and diverting services etc and like I spoke to the neighbouring trusts to explain to them what was happening so that they understood as far as (PN4)
		They were doing things competently so that meant he had assurance through their actions. Silver does the heavy lifting – Gold is about standing back (PN5)
	Focus on patient safety and BAU demands	*my biggest fear was not only what the threat was but how do I stop people who do need to get into ED from getting into ED and you know I can't stop them getting into ED so we had security there to escort them round to the ambulance entrance if a compromised patient turned up who needed to be seen quickly, we could still get them in (PN6)*
		Because what we needed to know was is this a threat against us and anybody who happens to be there, or is it somebody looking for a particular individual who would largely ignore everyone else to get to that one individual, which is what it turned out to be so then we were a bit more reassured about being able to let people out, so that the public were able to leave if they wanted to leave and we could let our staff in and out without too much worry about …I think it would have been a different scenario if it had been a general threat about the organisation or against the department or whatever, but

	Balancing the threat against BAU (as have more certainty about the incident)	*this turned out to be as we got more information, about somebody looking for a particular individual (PN6)*
		and then our next step would have been to declare critical internal so that we could enhance that command & control structure so that we could get the individuals involved and look at what are we doing about the next set of patients to turn up, what are we going to do…what if there's visitors. Because we've still got some visiting, we've got end of life visiting, patients with disabilities and maternity still going on and so we would l have then declared to enable us to manage those ongoing processes, but before we got to that point, they were able to ring and say we've accosted the assailant, you can stand down (PN6)
	Safety: key underpinning thought	
		It is….it's the first thought that runs through your mind isn't it – are the patients safe, are the staff safe, is the site safe? If you can't say yes to all of those then you've got to do something (PN6)
	Expectations set by TC	
		XXX [tactical commander] wasn't directive about what each manager needed to do but gave the big picture and things they had to look at. XXX gave a bit more detail on what he expected to some people at the meeting who were less experienced (PN7)
		The TC had an expectation that each person was empowered to do their actions – there was a subset of actions but mostly about setting a common picture then create a framework to address it (PN7)
	Based the response on reacting to impacts not following a pre-determined plan	
		Should managers be following a plan – felt it was better that they responded to the facts on the ground rather than being driven by any process, particularly in the early stage of the incident (PN7)
	TC setting the boundaries of the incident	
		I said lets have the meeting and look at your BCP is first because it doesn't fit the criteria of a major incident under the emergency planning act and regulations, so let's try and work out what it actually is and then we can decide whether…we can work out whether …do we need other organisations to be involved and what's your arrangements. It was

		clear that he didn't know the arrangements, so I think his go to point was it's a major incident... (PN8)
	TC imposing structure onto the response	*Tactical was giving it a bit of structure and basing it on the facts around the number of patients waiting but if there was no solution then they would have to look for mutual aid. They knew that their equipment was down but there was no technical assessment from the 3rd party. (PN8)*
		Factors for optimal competence – they do not have the structure and they don't know about the different functionality: You need some structure for tactical command. There are core things to cover and to avoid blind spots. You can't be so rigid that you can't add things to the agenda – need a structure that permits the meeting to be open, a semi-structured meeting that allows a rolling agenda to be formed – workforce was one (PN8)
	Priorities based on knowledge and experience of risk not on reports of problems	*So what we had to do was prioritise walk through the areas so obviously I took the Division of Medicine to make sure first from Endoscopy and for Cath Lab where they needed clean water were they in the middle of procedures was that still happening, if not what was the contingency, have we got bottled water in the remote area. So that was more of a high priority, what have we got, what was the contingency. Second to that was the wards. Are the wards aware, have they got clean water functioning, is there an issue there? (PN9)*
		The initial response by Gold and Silver in bringing everyone together on site was key in enabling the Comms Team to be able to keep colleagues, partners and the public informed from the outset. Staff respected leadership and awaited commands, with no panic. (HIN1)
	Gathering information to inform action	*So there was uncertainty I think, when you're faced with that you see just how big the incident potentially is at that point you think right, in my head, it's almost who's in charge here. I need to understand who's coordinating this from the point of view of the response units. I knew that was responsible for the site, site safety, I obviously understood what my role was but it was absolutely about finding out what's going on first and foremost, and then we can start making some decisions (PN2)*
	TCs should be focused on the facts and not the process	

		PN7 feels that people should be trained for evidence and not process driven – they were working with unknowns and they had a sense of the potential worst case outcome (PN7)
		There were gaps in knowledge but XXX focused on facts – we didn't know what we didn't know – so we could only deal with facts. (PN7)
		Tactical command needs to know the broad details – think about the credible worst case and assess the impact of facts and things that they were doing (PN7)
		We had…XXX chaired it...we sent the agenda and it was literally to try and understand what exactly happened, when did it happen, what mitigations were put in place, what mitigations can be put in place? (PN8)
	Scope impact – identify boundaries & impact	*To be fair, it was a bit unclear if I'm honest with you Matthew, because everyone going to their relevant areas …..but there was no direction of check there's a checklist, you need to go to all medical wards is there free water flowing? Are there any areas on the wards where there might have been free flowing taps or drains where actually a patient could have been at risk, so actually we didn't go into….it was literally an oversee, overview of what the problem was externally, this is how it has impacted on the Trust internally how is this impacting on the wards, how is this impacting on the procedural areas and then feed back (PN9)*
	TC running on exception reporting - not directive about local actions	*Yeah, that's right, he didn't go into any extensive detail at all I think it was more the key areas to feed back, so no there wasn't any form of minute detail, there wasn't like I want you to go onto the ward to check patients from the staff rooms from housekeeping, were they taking jugs of water out…we didn't go into that level of detail if I'm honest with you (PN9)*
	Info gathering – assessing the impact on health functions	*The the largest uncertainty was exactly what had been taken out…So by by volume and because at that time like I say we the Fire and Rescue quite rightly wouldn't let anybody even go near the scene. So and Fire and Rescue don't really know the implications of of, you know, if you've lost room X.Is I've got a scanner in it, or hasn't it got scanner in it?*

	Info gathering – reactive to alerts from areas; proactive via going & checking	*What's the so that it was it was for probably about an hour or so trying to work out exactly what had been lost in Toto (PN12)* *It was uh. It was a little bit of both, a little bit of osmosis, a little bit of we just had to wait until fire would would let us in. That was the big stopper. It was at the huge stopper. And then once people got back in there, there was this gradual realization that and a lot of it came when we got our day staff in that, you know, for certain areas of imaging. There's no such damage at all. You couldn't tell there's been a fire, but you couldn't bear the the smell of the smoke. It gone so fast. (PN12)*
	Supporting staff and validating their actions	*and I said what have you done about it, and they said we've called the police and I said well that's absolutely the right thing to do in the first instance, I said are the patients safe? They said we're going through a process now to make sure that the patients are safe, I said right that's absolutely fine, carry on with that and I will come to the front of the trust now, I'll come to A&E now (PN2)* *Don't get in the way, yeah….And equally, making sure that they know what you as an individual, what your role is so they can know what your responsibilities are, what your cog is, how your cog fits into the overall wheel, do you know what I mean , so they knew if need be, if there was a hospital type conversation to be had they knew that it would be myself and then it would be myself and Anna when she came onto the site, that was how it would kind of play out, they knew where those responsibilities were (PN2)* *there's comms and then pull the security back. We did leave some security down in ED…we left that enhanced for a little while as there was a bit of nervousness in ED about hang on, are you sure? So just to reassure the ED team we left them there a little bit longer so...yeah...it was over fairly quickly …but I'm glad…it's weird to say...I'm glad but it did highlight some of the changes that we needed to make to the lockdown, yeah..(PN6)*

		Yes, it's a….how do you get the message out without scaring them but getting them to take the message seriously enough…and how do you work out how can I tell them what they can and can't do….cos some of that is kind of in your head you know what you would do if you were down there but it's hard to be specific with people if you're not the one facing the person at the front door, isn't it. So that for me I think was the hardest bit.(PN6)
	TC as catalyst for organisational response	*That's all they needed. And then security and the whole plan kicked in and they locked down…they have a process for which door you lock down and because it is a new building it can be done centrally, so once they'd kicked that in, what ED were saying was do we do it just because the police say so; so we said yes if the police are saying do it then do it. I'll ask the questions about why, you just do it; and then they did it; they didn't have any qualms about doing it. I think it was almost like giving them permission to react to that message which is the bit that we have changed in the new lockdown plan: it clearly says you don't need anyone's permission to do this, just do it and then we'll investigate (PN6)*
	Leadership: differential approach – responsive to needs of others	*XXX [tactical commander] gave a bit more detail on what he expected to some people at the meeting who were less experienced. A good leader knows the individuals and how to get the most out of them. XXX had a different approach / focus for different people (PN7)*
	Work with the area to facilitate them to get a response	*Tactical command was not assured but TC then stepped in with you to work with them but they had to go back and work on the solution. We will do it with you, you need to be more structured. We facilitated their response (PN8)*
	Calm – action focused – focused on info gathering	*…it didn't alarm me or make me think oh gosh what have I to do. So it was quite calm, it wasn't scripted in a way it was just actions around on the whiteboard, making lists to do that , women and children's, can you check that area, theatres, surgery, can you check that. Yeah, we did an hour and were back at step down (PN9)*

	Importance of structure in TC response	*The tactical command was helped a lot by having Mark Hart the EPRR lead on call that day – he did much of the background work and put in a structure for the incident (PN11)*
	Positive impact of experienced personnel	*It's, I mean I it in all honesty we we dropped so lucky and if we had a different silver on at night and a different gold on we could have had a very different outcome to this. They were both just like ocean liners of calm because they just you know they're people who've dealt with OPS or their life or in in medicine or their life but we have different solvers who some are quite nervous to individuals some who and and the same with golds to be fair. And it could have been, and I don't know how, and they would have both received exactly the same training, but if we'd had a nervous silver on that night, it it might have been a complete different ball game that (PN12)*
	Acting as a Point of Contact	*I went over to see first and funny enough at that point he was just pulling together the first of what turned out to be maybe every 15 minutes, they were really regular, incident huddles. So that was where we had myself, the lead for the police, the lead for fire brigade, the lead for...somebody from estates…no it was security...and also a couple of representatives from A&E (PN2)*
	Taking action and reporting back to TC	*I actually reported back, because knowing the risks, the importance of these washers I actually contacted XXX directly from Endoscopy, I didn't wait to go back to Tactical so escalated, got some immediate response back…and then we did get the teams looking at the problem there, so by the time I'd gone back to report back, I'd explained what the risks were, what I did to mitigate it immediately, the response I got from XXX (PN9)*
	TC forms scratch team	*She's so she's on the phone with gold the whole time because gold was hands free in her car. So she was talking to gold the whole time. Just looking at her messages. She tried to contact the CCG Silver, but we can only contact, I'm sure it's the same as you now via pager. The world of insanity. So she left a pager message.And then she's dealing directly herself at the time with our our site duty manager, the clinical site manager. That was her focus. So she's she was updating gold continually about where we were at and what our plan was and but she was dealing directly with the clinical site manager who obviously deals with the actual operational flow across the sites. (PN12)*

		TC involved in initial operational response	*Significant command and control issues resulted from Silver not being dedicated to the role and understandably assisting in the evacuation of their own clinical area. Silver was not replaced leaving Gold as the only level of command and control. Bronze commands were not initiated due to the nature of the incident. Communications internally and externally were severely impinged as a result of these failings in Command and Control (HIN3)*
		Use of the Huddle • co-construct meaning • manage the incident Shared understanding of the issues but also a forum to agree the areas of responsibility in a dynamic environment (consider for example the point a suspected terrorist is now considered to be a patient with mental health needs and the locus of responsibility shifts between partners)	*so he introduced himself and said I am kind of the tactical commander, I am the lead for this, this is what's happened. He then said from his point of view what was going on then the police then said yes that's right and this is what's going on and then they all explained exactly what they'd done up to that point. So I was kind of making notes…Of course it was when we had the debrief, that first debrief there was talk around, context around what happened, so somebody's basically driven on site, has abandoned the car basically walked into the A&E reception area covered in white powder and all hell has gone, broken loose from that point of view, he talked about his wife trying to murder him and all of that sort of concerns and then of course the A&E colleague who'd managed the situation was trying to explain what he'd tried to do to reduce his own exposure, he'd ferried this individual out into a side room (PN2)* *Because you have multiple spinning plates haven't you, if you think about it, because there were all sorts of different things that were going on at the same time and actually the situation was changing on a regular basis you know, so then you are finding out more, the police are finding out more about the individual so they'd then be feeding back about (PN2)* *How does that conversation play out? So then I was starting to think that's an area that will need managing and that is our responsibility as an organisation to at least do the first*

steps of it. So then that was how that part of the conversation then starts to play out (PN2)

There were odd queries that were coming, but by and large, the decision-making was done in that huddle, so the queries by and large were coming into that group, information was coming out and then people would be saying right, in this circumstance we would be doing this, the fire service we would do this and then I potentially would ask another question, so when they said about the powder and said what they felt it was, so I said so are you now saying to me that we can now de-escalate the risk assessment and that actually there is no risk of harm to people and they said yes that is what were saying, 90% validity and just waiting for other bits to come back, so yeah, by and large…right, what's the next steps here then. So what are the next steps for us to be able to get back to a position that I have an A&E that's able to function as an A&E in Walsall and that was kind of how the conversation then played out (PN2)

So that team was the response huddle that was the team that I felt we were working in, so I felt I was working with other experts in their field if I can almost overplay that's what I do, but you understand people who had specific roles in the management of that incident, and I was part of that team (PN2)

No, nobody came and offered any help, there was never any conversation like that. There was lots of information flows, lots of people coming, telling me what was going on, particularly around the decontamination, around the patient around what was going on within A&E at that point no, nobody came up and said, well I'm here if you need any help (PN2)

		you're expected…..you can't, you're all things to all people…surely the role of an on call manager, and actually if you think about it more widely leadership is about understanding where the limits of your role are, and knowing where to get what you need, to move things forward…that's how things work, I mean nobody in an organisation knows everything about everything, but the trick to it is knowing how to pull information and get that expertise in, almost within your rounded waggons, so that actually you get the best outcome for everybody…(PN2)
	TC picture-building – collective communication	*It was me, the manager and the site manager. The three of us are kind of together really and we got a link person… we're talking to the…we've got the police liaison person and we're talking to SECAM service leads and person so I suppose we had a little group that was liaising with each other really and erm…yeah (PN4)*
	Initial focus on high risk areas – collective prioritisation	*The mood was about empowering individuals to go off and find the information. The TC did picture building and collectively gained understanding. They were assessing the risks (PN7)*
		It gives an opportunity to consider the management of the issue, the impact, the ability of the people and consider a timeline – will it go on into out of hours?. At the second meeting we brought in IT to discuss more things (PN8)
	Focus on service impacts	*So the first discussions were around the high…critical risk areas so obviously ICU, the wards about clean water and theatres. (PN9)*
	Collective identification & assessment of risks	*We need the scopes cleaning. We've got patients we've got emergencies, we've got sessions going on (PN9)*
		The TC gave the opportunity for a collective view of risks at the time - Incident level determines the amount of support that you can get – if it is a major incident then you can get more staff (PN10)

		Battle rhythm established early on after the initial response phase	*That was done by the the day, so there was a battle rhythm of of, of people to come back as they were coming on site and for fire and certainly in the early part silver was had set up a rhythm of trying to, desperately trying to find this information of what we've lost and where we'd lost it. (PN12)*
		Focus on consequences	*There's no battle for power, and there was there there. I didn't witness any sort of of miscommunication or any table thumping of 'we need to get in now'. There was literally a we've got patients that have been dispersed. We've definitely aren't gonna have Ed open tomorrow. How do we let that know our our place is full. What outpatients are we gonna need to bring down? How do we let the people know that we've gonna have to cancel out patients? There was there was a lot of so much to do from a medical side of things that the the actual. (PN12)*
		Shared Risk Assessments	*So I asked and I remember this distinctly, how much risk si there in terms of the people that are in there in terms of exposure? Are we certain that the people in there have not been exposed? And by and large they were certain of that and a risk assessment had been completed at the same time by the fire people. So they had completed a risk assessment that was talking about those aspects of how the situation had been managed and they were kind of scoring that as they were going along (PN2).*
			But it was the damage was just unbelievable, and we knew we weren't gonna get back into Ed anytime soon..You could smell it from outside the emergency department and the X-ray Department sits behind the emergency department (PN12)
		Escalation function within the organisation	*But I knew at that point that I had my…had to escalate to XXX who was on call that day, so once I had got all that information I had a list of things that I knew and that I did not know. So then I rang XXX, I said XXX, don't panic because things are under control I feel, but look you absolutely need to be aware of this, I need to understand from you whether this needs to be escalated as a major incident I absolutely feel that we ned to escalate this to YYY [CEO] (PN2)*
			And our job is to liaise with the rest of the organisation for them. Our job is to enable them to get on with looking after their bit and we'll do the liaison with the external

		agencies and all the rest of the hospital about what is going on, you just carry on with what you are doing. (PN6)
	Supporting staff response	*I went into A&E. So I manged to get into A&E reception around the back and I went in and spoke to the staff in there and said is everybody ok hows everybody feeling and also had a conversation with a couple of them about how it happened and they reiterated exactly as it had been described as well (PN2)*
		So is it then about that conversation that plays out where there's a validation there, there is a ;you're not on your own', I am here if you need that support but actually if you feel safe, carry on doing what you're doing and making sure that everybody is being treated (PN2)
		I'd put that down in large part to the interconnectedness that people could see, because although the Emergency Department couldn't see us, they didn't see us until the end of the day, they know that we were there and we were there at the end of the day, I think that was important (PN3)
		You've just got to create…it's about letting people know that you've got their backs so that the accountability fundamentally and ultimately always resides in that Gold room doesn't it, you've discharged the accountability, but you've set a set of parameters for Silver to work within with your strategic objectives (PN3)
	Focus of role	*So in my mind, the 2 elements of safety were around exposure or potential exposure to a substance that nobody know what it was at that point and whether business as usual could still carry on within the A&E facility in terms of those poor unfortunates who were already being seen, when the incident, the whole thing was kicking off. In terms of the staffing, pastorally, it was absolutely around how those staff were, whether they were*

		distressed, concerned, whether there were any issues actually that were potentially building within that facility around the uncertainty (PN2)
	Return to Business As Usual	*and it then becomes a how quickly can we get back to normal given the fact that we don't need to completely decontaminate the entire area although we did have a cleaning team who were asked to come in anyway. But we're not in a situation now where we're having to get people coming in in hazmat suits to completely strip down the whole place that could take hours, we could get back to some normality relatively quickly now…and then you start, is relaxing the right word? (PN2)*
		I suppose the step down bit is when it becomes business as usual, so you have the changeover (PN2)
		head yeah so how we would get back to business as normal then you know that sort of side of things end you know so that was just discussions with [ambulance service] so in some ways it sorted out our bed situation that morning as all our patients were sent off elsewhere (PN4)
	Forward planning	*and we then started to do some thinking about the closure of the event before, as the patients were starting to arrive, what's the likely consequence of this overnight and tomorrow morning about continued de-escalation of ED as we roll through Sunday and into Monday and that formed some planning as well (PN3)*
	Need for Commanders to step back	*I guess…I guess on a human level, you're constantly…it felt to me like there was always sufficient time in the day during those hours to take a moment and step back. To leave the room sometimes and step back and just think how am I right now, have I got the things I need to have in and that, but also how am I emotionally responding to this and*

	Defer to the site team	*what have we forgotten if anything?; and it's useful having two of us mostly constantly in the room, as we could check that out with each other (PN3)*
		PN10 felt that the last thing he wanted to do was to be a 'back seat driver'. SP was composed, she was talking to Marcia Gardner and was better placed to understand things (PN10)
	Role in QA of response	*I'm not sure that I could offer much but I could ask about the thought process for making decisions by staff on the ground…Quite honestly, I did very little. Suzanne was getting on with it, Mark was contacting people. (PN11)*
	Importance of structure in the response	*I don't know about XXX, but if YYY hadn't been there and it was one of his assistants, then I don't think the response would have been as good (PN11)*
	Thinking of wider aspects of Hospital Management	*It was Sunday morning maybe I don't know, but thankfully it wasn't a major issue… yeah we had to have porters help security team to guard doors iinto the hospital because the various different ones so that was deploying them to go to different areas.. had somebody…speaking to the head of portering saying sorry this you know we're not gonna be asking you moving any patients what we need now is this…(PN4)*
	Dimensions of the response: time & space	*PN10 was thinking about the credible worse case and the next 12 hours, but at the same time there was a lot of assurance about the impact and the duration of the incident from the site team. PN10 was thinking about implications in multiple dimensions: current implications and future implications (PN10)*
	Appearance of control	*I spoke to the A&E Consultants you know about how we would get started again, so I think they wanted that and I suppose think they wanted you to appear calm you know as well to a certain degree, a certain level of reassurance you know which was a little…..I did my best that morning to appear…I did drop my phone on the floor in A&E at one stage, so yeah, yeah…..you know ok it's under control…that sort of reassurance, OK, this is where we're at, we'll have another decision in half an hour you know, we'll know what's*

it's		*happening then…hold tight a minute, you know we're not doing anything else…. it's communication really I think in those incidents….(PN4)*
	Supporting innovation Creative approach where not solutions already available	*what mitigations were put in place, what mitigations can be put in place? We had somebody from IT because one of the mitigations that we did put in place was an IT system….What mitigation had they used in the past? (PN8)* *so they had a solution where the referring doctors couldn't see the images but the radiographers would see the images make a report and tell the referring clinicians so that was what was put in place as opposed to making a referral and being able to see it, they would be able to see it. So they were given a shared access code for this system so that was made live within about 15 – 20 minutes of having our meeting (PN8)*
	TC supporting the local area - working with them to develop a solution	*so in our mind so if they had done the notification and preparation of ETHANE earlier on this would have stopped the backlog that built up. We worked out the hours that would be needed to clear the backlog…the radiographers had already worked out the prioritisation of patients which was agreed by the groups and so they were able to put that mitigation in place...(PN8)* *Any innovation or new ways of working that you came up with? PN8: Giving clinicians across the organisation different clinical criteria for imaging - the imaging consultants gave suggestions to other staff (PN8)*
	Initial Actions Silver = coord'd evacuation of ED	*So she did a fabulous job of coordinating a the basically the entire evacuation of our emergency department was because that sits right next to it. So the entire A&E was evacuated along with we have a…Urgent treatment centre, which sits at the front now of our department. So that was all evacuated into our outpatient area and it was a relatively warm night. Luckily for us. And it wasn't raining. So she liaised with that….And by the time I arrived exactly the same time as gold, essentially the fire was out. (PN12)*
	TC = operationally focused	*Again, her being a a clinical site manager is site duty manager. She she in her past life really used to to moving patients around at short notice.*

	TC solo initially on site	*And then she just went through. She was really good. She went through to ask the reception started to take notice of to take details of patients that do not, didn't deem themselves as require an immediate…access to the service and were going to go home just so as we we weren't missing, we weren't looking for missing patients and a lot did go home to be fair (PN12)* *She she was solo for the first…part of the response. She was solo. So I mean, by the time myself and the gold had got there, she decanted every patient. There was no patients or staff in the car park other than the interested. And…they would. They managed to find the space like I say, for the resus patients in, in the theatre recovery. They managed to find space for the patients in Navenby ward and she'd take it into account. (PN12)*
Other Organisations	Commanders felt that there was a difference between how they operated and how other emergency services operated, in both terminology and perceived competence of response	*the observation I would make myself is the training that the ambulance service and the police do… terms of this kind of management of incidents…they have a lot more training due to the nature of their business and they have this hierarchical military nature of their training as well which I think is… is quite useful in those circumstances…. not say that this particular incident… it was ???????, but I do think we could do more scenarios running through more training you know what I mean is the difference …..(PN4)* *I think that their approach is different, their training is very different you know what I means. They have a very command structure, a very….some of the language that morning and there's something and I can't think what it was now , there was some language that morning that the police used that I did cotton on to but it was a bit, it took me a time to I can't remember now, but it's a slightly different process really and that they were using it as if you knew it very well…(PN4)*
	Control via other agencies – dealing with unusual request	*The Fire Service then had to escalate the request for potential support with moving people, up through its control structure – the questions were why the Fire Service was*

	TC OK at working in multi-agency teams	*being requested to do something that should be the ambulance service's responsibility (PN10)*
	Experienced leaders in both the health and FRS side meant that comms was easier	*They were. They were very comfortable. They it was I. I don't know whether that's again because it the the we got two quite senior we got senior gold and the senior silver on or whether the fact that the fire instant commander was very pragmatic. (PN12)*
	Emergency services are not focused on interaction with BAU to same extent as hospital TC	*Well, it's a fireman in it, they turn up for a fire, they put the fire out. Then you go and play a game of volleyball.(PN13)*
	Comms externally	*The fire service teams liaising with the ward managers – could have been better, there was no named fire officer, ED advised they had a fire assessor with them throughout although they did not have up to date floor plans (HIN3)*
	Establishment of incident management hierarchy based on perceptions of the incident rather than the location (hospital)	*probably not the best situation maybe in terms of sort of looking specifically at the on call managers' role because as I say, because of its very nature it was much more in the wheelhouse of the fire brigade and the police than it was for us, although notwithstanding the responsibilities we have…it may have been a different conversation if we had been talking about, I don't know…a patient who's threatened to jump off the building, I mean those sorts of conversations…(PN2)*
		I felt it was a joint thing but this incident would probably be led by the police because they're, having to….the ambulance turned more to me I think because it was our hospital where it was happening but I suppose I in turn would have turned to the police as well because they were in charge of the…but I suppose from my perspective I had to understand how that affected the…how the hospital was running how we were doing and diverting services etc and like I spoke to the neighbouring trusts to explain to them what was happening so that they understood as far as (PN4)

	TC liaison with FRS in huddle	*So she she wasn't running around quite. She was really quite good. She stayed on scene, actually at the site, so she could liaise with the fire commander. I'm just looking. Fire commander. Confirmed folks and we should remain.Like fire.That's when she moved to look. (PN12)*
	Limitations in involving partners in the response	*One of the things I wished I'd done differently. So I established the the gold and Silver Command together for the the in the initial. I just completely forgot to to go down and find the emas people. So I told them where we were gonna go initially. And which was gonna be room number one for our our command and control and then obviously we moved twice because it we couldn't find it at an empty room and I just forgot them and I wish it in hindsight what I've put down for me to know is that I take the phone numbers. Of all of the the important people in inverted commas, whilst I'm at the scene and I could have just given them a quick call and said I'll meet you at the front entrance because our hospital is a maze (PN12)*
	Trust experts were able to talk to external agencies at their level	*And then our uh, fire safety officer turned up and he's an ex fireman and he knows them all inside out because he's been in Lincs, Fire and Rescue. So it was it was very there was no. (PN12)*
	Other organisations were crucial in boundary setting for the Hospital response	*The police knew that at the moment it was an unknown and potentially escalating situation they had to contain that within the context of what they knew and as the information changed, so their response to it changes…and so the numbers changed at one point we were left with just 2, the 2 officers that were left on site who were basically keeping an eye on this individual in A&E (PN2)*
		I felt I had a lot of communicating that morning actually…instead of decisions around what was happening with the….. the…. Police, I felt they were in charge of making sure…. they were saying they had to do this and I felt that they had responsibility there… I just have to make sure that my teams, the hospital knew what was happening that they were safe and okay and that we had a process in place to divert patients that would be coming to the hospital you know so that was that was, I think, I felt I had a role in making sure

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		that you know what was happening media wise as well how that was going on you know…(PN4)
	Multi-agency working	*XXX were very responsive, we did unblock it but on the service interval it was more of an exercise process is it flowing, yes it's safe, but I think because of working in Endoscopy then going back and checking the washers it was actually no there are still issues there. (PN9)*
	Local relationships	*The Fire Service was asked for support if the Trust needed help – this request went up through their command chain but at the same time the local relationships with the local commander kicked in 'informed people were empowered to help with the response' (PN10)*
	FRS advising on the evacuation of ED	*So she received her call at three at 7 minutes past three. And she was advised as well by the Fire brigade to evacuate the emergency department..at 3:07. (PN12)*
	FRS setting boundaries	*The the only reason they were all doing the car park was because at that time they didn't know if they could go straight back in. They nobody. Nobody knew the the actual true extent of that fire because it was essentially it must be 200 hundred feet away from the accident and emergency. Nobody actually truly understood just how how devastating that fire was. Everybody assumed it was a bit of wiring or something. We've had a in the past. That trust has had some of the fluorescent lights, the ballast in the present lights go so that the Ed staff are quite used to evacuating and the fire service saying, right, everything's good. You can go back in 20 minutes later, but.So the the call was made on the fire service when the fire service said...You're not going back in. (PN12)*
	Interface with Ambulance Service	*Full, divert immediately. It was put on and again that went through. Cos site can do that. So we she got hold of the wrong. So full divert as soon as we evacuated. That was and we have ambulance staff actually in as part of our ED teams as well. So it got pushed quite quickly up to them that we were a no go. (PN12)*
	Multi-agency response	

	Initial actions = multiagency working	*It was symbiotic. It was really symbiotic by that because we got gold, silver and then we've got the Fire and Rescue incident commander in there, we've got Hart team were in there with us and also the [ambulance] controller was in there as well. (PN12)*
		XXX Fire and Rescue service had initially denied giving the order to evacuate to outside locations, via the debrief process this was subsequently clarified. FRS did confirm / concur with our incident record that they did issue the order to evacuate which [hospital] staff acted upon (HIN3)
	FRS making the call for evacuation	*GOC advised that the Chief Fire Officer instigated that critical care be evacuated first, and then advised the site manager that it should be the whole building, advised not that easy as would need to be based on clear clinical risk of moving the patients – SOC linked to the Chief Fire Officer - the Chief Fire Officer was adamant that all patients would have to be evacuated as the smoke that was present could be being caused by an additional behind the riser units (HIN3)*
Self-Reinforcing Dynamics	Team mutually supportive	*There's the kind of things that's going through….You think afterwards….yeah…it's helpful…one of the other site team that day went up and got me the tabard so I had that, you know….but again wouldn't have gone straight to my head, you know I need to bet the tabard…. so that was helpful… (PN4)*
	Operational control grew into the role	*At the start they were floating in the wind and they were happy with us suggesting things – this was empowering them. They were owning their plan and by the end they were owning it more. We were empowering, guiding and coordinating. They were lost, rudderless (PN8)*
Control in a dynamic environment	The situation was constantly changing and the commanders had to respond to / work within this framework	*so you know it could be quite a dynamic well it was absolutely dynamic situation that kind of you know ebbed and flowed and changed pretty much on a 15 minute, half hourly basis really for the time that it did (PN2)*

		…. so we..that morning…we were… so what transpired went on, they did find the perpetrator about an hour and a quarter later I think but because when they found him… he had said that he had accomplices… it turned out he hadn't but initially he had said that, they wanted to do a full sweep of the hospital and they wouldn't allow us to go further into the hospital and we had a…the hospital at this stage was on full divert and full lockdown and I had to declare the critical incident about 10:30, quarter to eleven I think with the region (PN4)
		the police had when they were doing the sweep did say to us that they were reasonably comfortable there was nobody else involved but they felt that they couldn't take the chance to take, so there was a bit of reassurance going on there but they still had to go through the process kind of thing (PN4)
		while the team were doing that we contacted the police and got a bit more information from our perspective about what was going on and what that threat was…and while that communication was taking place…the threat was neutralised…so the threat was removed from coming this far...so at that point we stood down and unlocked and then looked at how did it go, did it work did we need to rejig anything…(PN6)
	Unintended consequence - had stepped down the incident but still getting questions raised about it	*Yes, yeah….there was ongoing, for a few hours there were questions, what happened and why did it happen, and why wasn't I informed personally and those sort of things….yeah. There was a little bit of that but again not too much cos I think it was over so quickly (PN6)*
	TC dynamic – based on view that the local area was not giving a full response	*The tactical command identified that there were significant gaps in their response. They picked up the BCP after they had tried to deal with the incident (PN8)*
	Within this environment the lead roles could change depending on the key risks identified and the shifting priorities. Once the police had resolved	*Yeah, he'd taken charge from the incident point of view, he was sort of leading on that yeah, and I think as I say, thinking back and reflecting on it I think it was probably because it was kind of a chemical, it was a powder, that sort of thing, that's where their remit*

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	any security concerns then would disengage from the scene fairly quickly, for example.	*came from otherwise as I say, I now understand where the police came from and why they turned up with an armed response unit as opposed to just turned up. (PN2)*
		They were analysing the powder. It wasn't in as high a volume as they'd first been alerted because at one point they were told the car was full of this white powder and it wasn't as great as that but they still needed to analyse it. And then the police officer turned around and said that we are treating this query as a terrorist incident cos there could be fertiliser, it could actually be bomb-making equipment that this individual was transporting in the boot of their car, we've got to protect everybody, because at that point in the UK we were quite high around our sort of terrorism level really (PN2)
		it was not toxic and it wasn't something that was flammable or explosive, and then at that point, my brain is then thinking, well thank fuck for that, that's great news, so then you start to think well okay then, that does change things significantly because now we have a patient on site and everything else can start to be de-escalated because it does then become a communication situation and it then becomes a how quickly can we get back to normal given the fact that we don't need to completely decontaminate the entire area although we did have a cleaning team who were asked to come in anyway (PN2)
	Incident run virtually to a large extent (dynamic and didn't have time to enact control before incident stood down)	*It would have been a joint enterprise if it had gone on any longer. We have a really good strong relationship with our local police and they are very good at...they are very supportive in any type of incident and I have no doubt they would, they'd have been here supporting us with that if it had gone on any longer. I just think there just wasn't time for them to get resources here as well as resources to where the threat was coming from. So they were running the show externally and then we took command internally and then activated as I say the lockdown….(PN6)*
	Ability to innovate = limited	*The Fire Service then had to escalate the request for potential support with moving people, up through its control structure – the questions were why the Fire Service was*

		being requested to do something that should be the ambulance service's responsibility. However, the local commander did come onto the hospital site later on his own volition to assess the situation which shows the importance of local relationships built up through the LRF (PN10)
	What did control mean? • Did not feel was managing the incident – had responsibility but was not managing it • Felt that the situation was in control • understanding situation as it evolves re use of resources and organisational response • Getting information back and able to inform local decisions • keeping extraneous information to a minimum • Accepting uncertainty • Taking decisions and initiating actions	*....if you're asking me did I feel as if I was in charge? I felt I knew where my responsibility lay, but I did not feel that I was managing that incident (PN2)* *I never felt...I'll put it another way...I never felt the situation was getting out of control...I had confidence that the right people were there....and I guess, when you talk about decision-making its interesting that you put it like that, so in a different context, if I'd rocked up...so imagine I was in A&E and a guy walked into reception while I'm talking about something else, I don't know, some site related matter and somebody walks in covered in white powder...if there's a mass panic there I absolutely know that I would know first thing would be right police somebody would ring the police (PN2)* *So I never at any point...felt that it was out of control...it never felt at any point where I didn't know what was going on, that there was any uncertainty...does that make sense? Did I make any decisions...? I don't know, I don't think I did that I can think of...key decisions...I don't think that I did (PN2)* *so it was definitely a team effort and at no point where I felt it was, it was out of control, no. I didn't feel that there were any gaps where I was....at no point was I standing there thinking such and such should be here, or even in the hospital sense I should be pulling somebody from the hospital, I never thought that, I thought I should be here, I need to be here, I'm here (PN2)*

		So…so…that we have a good awareness of the situation as its evolving, that we have an awareness of the resources that we have deployed and how our…the organisations around us are responding to that as well, and having…its like being at the middle of a spiders web and so that you get a real sense that the communications with your external parties are going as you would want them to in terms of your regional colleagues (PN3)
		Being in control was about understanding that they had a sense of what our ask of them was and that we know how they were responding externally, as well as regular check in points with Silver, so that we were getting that situation awareness back from our Silver command immediately, and able to feed in anything that was coming in externally to Silver where they needed to know, and filter out absolutely everything that they didn't need to know; and getting the information they needed to instruct Bronze in the execution of the process (PN3)
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		I'm not sure, I'm not sure…I think we had all the resources in that we needed and my sense is that we were in control of the situation. I felt like we were in control of the situation…there were gaps in information sometimes, but I just normalised that, I just rationalised that as an inevitable consequence of an emerging picture that we weren't

		clear about, we couldn't be clear about…there were gaps in information all the day as we went through the whole day. (PN3)
		I think I did I tell you why…when I spoke to the gold in the morning, I said OK I've done this, this and this. This is what's happening up, I've done this, this and this, I'm gonna do this, you know, and he said well you seem like you've got it under control and he didn't come in (PN4)
		Felt that can never be in total control as too many unknown & variables plus new rumours constantly coming through, but within that, getting key actions achieved was the role (PN5)
	TC cannot control everything	*That's because we've had so many incidents over the last 10 years. I mean, 5-6 major incidents and countless. And critical instance. The first thing I do when I get called out and go in and get a coffee and take a coffee to the gold or silver and say you have a coffee hang got time to have a coffee. Yes, you have have a drink of that and just tell me what you think. What you feeling, what you're thinking and that 5 minutes have been having a coffee in carrying down does what you've just said there that takes away that they realize they can't control everything. And I found that take a breath and pause makes a massive difference to any incident really because we all just run around don't we go…(PN13)*
	Clarity re decision-making process required	*Mitigation: Measures will be implemented to ensure clear decision making is in place between agencies on site and the [hospital] team and to ensure methods and structures will be in place to provide clear cascade of information to all areas and personnel. (HIN3)*
	TC not in charge – outstripped by local action	*XXX informed the group that the evacuation procedure will require a complete and full review following the incident, this will also need to include who calls for a full evacuation, who will call this, how this will be instigated (HIN3)*

		No clarity as who is in charge	*It was clear from the night that there was no clear understanding of who was in charge, muster points internally need to be agreed and again externally as well (HIN3)*
			The evacuations and to some extent the repatriation appeared chaotic and it seemed that this may have been happening without central instruction and wards were making their own decisions (HIN3)
		Having a framework to work within, but scope for initiative	*But those decisions were largely not entirely decisions either, because it's all set out in the plan. So the day surgery unit next to ED is always going to be minors and you are going to divert minors into there…some elements we haven't set out in the plan actually because we've recently changed some of the clinical architecture, you know the clinical services have changed recently, so it meant we had new capacity that gave us a bit more safety and stability in terms of our response, probably enabling us to clear the emergency department more quickly than we would have been able to do… because God knows we didn't have enough beds on a Saturday morning to do it. So it was clearing 2 other assessment units where patients could be held safely (PN3)*
		Happened quickly but TC already in place due to Covid	*I think it resolved itself quicker than we could do that so because we… our initial command was already set up, tactical and strategic commands are already set up and happening as frequently as they need to during the things…and we are already in the room, we're already in the ICC, so that kind of mid-step was already taken out for us because it was already there…and then our next step would have been to declare critical internal so that we could enhance that command & control structure so that we could get the individuals involved and look at what are we doing about the next set of patients to turn up, what are we going to do…what if there's visitors. (PN6)*
		Experienced team who knew what to look for in their respective areas	*I've got to be honest with you…for the team that were around Tactical that day were people who worked for the organisation who knew who the go to person was so I think Endoscopy was the only area that there was a bigger issue around*
		Risk management requires an understanding of the area	

		They [experienced commanders] would have known a lot more about the risks. PN11 was not in a position to offer practical advice and was unsure of the role he was playing, apart from asking: 'Do you know what the risks are? What's the risk assessment?' (PN11)
	Improvisation around meeting space for Tactical / Strategic Command	*Then, so that had gone to us. So we had to ended up decanting until day staff came in and then we went down to ICC, but that was locked in the combination of in changed. So we ended up going to the secretary's office and until the day staff arrived. So that was all of the gold and silver. And then the incident commanders from Fire and Rescue and EMAS ended up in in one large office. (PN12)*
	Improvisation	*Right. OK. So there's so there's an element of, there's the unexpected, which is, you know you you you think right we've got this sort of laid out and it's not it's not not as you planned. And then there's a bit of improvisation innovation because you think rather gonna have to go after move somewhere, right? We'll just do that. OK. And it was that in a sense at that stage was there a deferral to you as the emergency planning guys to say right actually your sorting out the logistics together structure up, we're still focused on the consequences of the incident or? (PN12)*
	Innovation – horse-trading	*It was leads were were sent off to basically look for their own area, so gold devolved down and essentially and silver was quite happy with that. So it was go and assess your area. You're the experts, let us know What you can and can't do and at the same time they would desperately looking round for portable solutions for for things and there was an awful lot of horse trading that went on to get mobile scanners in because it was a a very early realization that we'd lost two MRI scanners that weren't coming back. So there was a a good work done on that, but that level and that was actually done to be fair by one of the guys. I said we had two golds. The coo put, I think, pulled in quite a lot of favours. (PN12)*

Response already initiated at the Hospital	Commanders were often reacting to decisions that had been made by local teams based on their interpretation of the information that they had received from a variety of sources	*so I think like, that, that the rumours start, the jungle drums start beating and it kind of like gets turned into something that isn't. So yeah, communication wasn't great from a switchboard point of view, or like how that information management or that communication later in the day, yeah there wasn't anything (PN1)*
		So, they're just telling me is information, so, so yeah, they called me and just to say, just to let you know because you were the on call manager at the moment in time…. so at the point of ringing me they were ringing me for information: this has happened and you were manager on call, director has been informed she's on her way in, police are here, security are on the case, that the gentleman who's been stabbed is in A&E, he's been treated, it's not life threatening, just a matter of fact kind of scenario rather than yeah any decision-making (PN1)
		…. so we..that morning…we were… so what transpired went on, they did find the perpetrator about an hour and a quarter later I think but because when they found him… he had said that he had accomplices… it turned out he hadn't but initially he had said that, they wanted to do a full sweep of the hospital and they wouldn't allow us to go further into the hospital and we had a…the hospital at this stage was on full divert and full lockdown and I had to declare the critical incident about 10:30, quarter to eleven I think with the region (PN4)
		PN10 was informed that things were happening with the on-site teams – catering, linen were all operating (PN10)
		Upon confirmation of the fire, the following actions were undertaken:
		• *The Emergency Department (ED), UTC and X-ray departments were evacuated.* • *The evacuated patients either returned home voluntarily, were rehoused in appropriate wards or were sent to the outpatients waiting area.* • *The fire was extinguished.*

	Evacuation decision made by Fire & Rescue Service	• *A divert was put in place for all patients away from XXX ED to our other sites and other receiving Trusts with YYY Ambulance Service support.* • *111 was informed to divert patients to other centres (HIN1).* *The evacuations and to some extent the repatriation appeared chaotic, and it seemed that this may have been happening without central instruction and wards were making their own decisions (HIN3)* *The initial decision to evacuate Critical Care was made by the senior fire officer on scene at the time. This decision has been reviewed internally by [the fire service] and it is concluded that the correct decision was made due to the nature of the fire alarm activation and the widespread presence of smoke within the building (HIN3)* *XXX helpdesk advised they were receiving calls from a number of wards asking them to give permission for them to evacuate – the helpdesk advised they couldn't provide that permission (HIN3)*
	On the whole, commanders reported being impressed by the scale of the response by local teams	*Actually, thinking about it, it was remarkable from that point of view…. there was no area that I went to, even the A&E reception staff who were completely having their hair off, sort of saying oh my God, there was nobody and I don't know whether that because we're working in the NHS and you kind of face crises every five minutes or whether they just knew what to do. Certainly, the people with, in terms of the decontamination kit, they knew what to do, they were brilliant, absolutely brilliant I remember they were sort of talking about all the training that had been rolled out and kind of you know they knew exactly what to do they were brilliant. So I never at any point…felt that it was out of control…it never felt at any point where I didn't know what was going on, that there was any uncertainty...does that make sense? (PN2)* *All the signage up around the hospital was being utilised, so the rest centre was being set up for relatives, the relatives' receiving unit was being set up…for police to be present, if necessary…we had way-finders positioned to ensure that as people started to arrive…they didn't for a few hours…that we were ready to receive. We had…the Emergency*

		Department was emptied faster than I've ever seen it emptied, it was amazing, essentially, the right formation was created around every majors cubicle and space available…the right formation of staff was there and so we were staffed appropriately to receive…our…at our maximum capacity (PN3)
	Lack of local response Lack of awareness of own BCP by area affected	*I said hold up…what's your BCP. The [manager] is new in post and obviously doesn't know the BCP, none of them, so my role was to pull a tactical meeting together with all key stakeholders including the COO to try and get an ETHANE and then how we were going to respond and what the recovery looked like as well. (PN8)*
	Failure in local operational response - collapse of assumptions	*We gauged the answer. We did a list of priorities from the clinical staff in the meeting and did a priority list. We asked the Imaging clinicians and they understood their activity. The managers had not engaged with the clinicians or spoken to them during the incident – 'with the clinicians involved it felt safe' (PN8)*
	Local signs did not indicate that an incident was happening	*Yes, that was the biggest area; everywhere else was okay with water. One of the areas said do you know you've got cold water tanks now where staff could drink water, some people noticed that water wasn't coming through – some people just left it to a degree it was quite worrying that people didn't escalate more calls, that did worry me a little bit, but a lot of them were just taking it in their stride or oblivious to what had happened, yeah there was no water coming in….Endoscopy, if I hadn't gone to Endoscopy then probably the washers wouldn't have gone through and they would have thought it was a bigger issues with the machines rather than the water flow… (PN9)*
Dealing with Uncertainty	Importance of Liaison function to gain clarity	*Guess about 12:00 o'clock we had a tactical meeting with the police liaison person again and that's in our incident room and the ambulance service and at that stage the search had been ongoing for 40 minutes or so…. we put further communication… we think we did about three different communications that day in terms of to wards, outlining the problems that morning (PN4)*

	Unexpected things happening on top of this • Things happening in parallel • Change in case mix • Staff actions determining what is happening on the ground	*I don't know why but up until that point I hadn't even considered that the media would be interested at all, and blow me down, we've actually got media on site, crawling all over the site then suddenly and that kind of aspect management forgetting about the incident for a second, there's all of the other, the peripheral stuff as well that actually sort of shakes out of it, (PN2)* *It was interesting, a lot of very old and very young on that bus. A lot of retired people and then…because I met some of them…I couldn't resist entirely to go down to the receiving centre for relatives…(PN3)* *so they said OK we're gonna have to do a sweep, but they weren't… they weren't willing to do the sweep and I think that was probably the scariest first…. that first 45 minutes, coz they…nobody was absolutely sure that he had left the hospital and wasn't still on site and they wouldn't go any further in terms of looking for him, because they didn't have the armed response units there onsite kind of thing you know (PN4)*
	Responses in the face of uncertainty: • Gather resources • Make early decision where can but try not to worsen the situation • Focus on impact	*Cos we didn't know what the threat was at that time, we could have put somebody else in danger (PN1)* *Yeah… so you start to gather resources at that point, because you don't yet know what you're responding to, you don't know the scale of it is, you don't know whether it is going to be major incident stood down, stand by or whatever…at that point you don't know the scale of the response is that's going to be required… (PN3)* *At this stage we still didn't know what we would be asked to respond to, how many we would be asked to respond to, so in the absence of that knowledge, and in the knowledge*

		that we would be the major receiving centre, we immediately asked for a hard divert of any medically inbound patients from GPs to XXX (PN3)
		There was uncertainty – understanding the implications of what was happening – but the first focus was on impact regardless of cause – it turned out that there was no actual loss of water which made it easier to manage and moved it from high uncertainty (PN7)
	Start from worst case and work up	*I thought of the potential worst case scenario to focus thoughts (PN7)*
Humanitarian Concerns	Commanders are not immune to the human cost behind any hospital incident • Thinking of the casualties • Thinking of the impact on staff	*So I suppose it's kinda like, Oh my God this is an awful thing to be happening, but just got visions of this person doing this to a member of staff but then hiding somewhere (PN1)* *there weren't any fatalities on the day thank God but, there was certainly the possibility given the severity of people's injuries, so you don't know that when you're inbound (PN3)* *and oh, the other thing that was going through my head was you know the member of staff, how they were, had the family been contacted, who was liaising with them and the other big thing that was concerning me and probably was quite difficult that morning was the staff on the Ward where the stabbing happened, just outside the ward (PN4)* *it was what the biggest thing is concerning me thinking of the poor Ward where this has happened you know in fact it's one of my wards actually, as Head of Nursing it's one of my areas where it's happening, yeah… so thinking you know, how they're coping and you know… sort of pretty grim and also second biggest thing was thinking about the poor patient, the poor member of staff who had been stabbed (PN4)*

		Drove in thinking about return to BAU and humanitarian aspects of the incident – how many people injured, what types of casualties (PN5)
Reflections post incident	• Self-confidence having gone through this • Desire to share learning with others	*you do realise that there can be nothing worse than that, you feel…worse than that would be when there is a threat to life, you know A&E's on fire…but actually a situation like that and an unknown hitting you, I certainly, I don't think there could be anything that would be more complex in a lot of ways or more difficult to manage than that if that makes sense, and I'm using manage with a small 'm' now you now, given the conversation that we've just had and I did nothing really (PN2)* *No, to be honest…the Covid thing took over again… and you know there is… for me… I would like to have spoken about it more. I did speak to quite a few colleagues about who were kind of new, going onto the rota and said look, come and talk to me about that because I do think you know you can never fully you know, work out in your head rehearse the scenarios of everything, but it did make me think of what your responsibilities are… of the kind of fast decisions to be thinking about and …faced with a different scenario, because you know every scenario is different, you sort of… what you do, what you have to do and I think having the training (PN4)* *There was an immediate debrief and there have been some more meetings afterwards where PN10 has been involved to shape the future actions. There is a need to push with the evacuation training and equipment (evacuation chairs) for the XXX block (PN10)*
	All TCs have an applicable set of skills for this role	*For me, people don't get to be silver and gold commanders if they're totally inept. Anyway, the the you know, the they must have a bit of experience around them and they got some about them anyway. So yeah, you can get the nervous ones and the not so good. I'm not very good at operational stuff, but you still good at what you do because you want to got to Silver Commander. So I think that helps. (PN13)*

	What worked well	*Benefits of multiple perspectives in the command centre meant that people were able to have things raised that they may not have considered*
	Richness of different perspectives within control room	*- PN7 felt that the ability to have a wide range of perspectives in the command centre was important as it allowed different perspectives on the incident to be gained and angles considered that people may not have thought about otherwise (PN7)*
	Good silver response means better focus on recovery	*And and trying to work out how we stopped like electives the next day, how we moved, what we could do to to replace it if we could get mobile scanners, they started that even in the, you know maybe 5:00 o'clock in the morning, they were looking at how can we move forward. So they moved into recovery phase quite quickly because Silver had had actually done the response really well. (PN12)*
	On site & F2F meetings worked best	*Just just the dynamic, every that was one of the big things to come out from people that and that came from a previous one. I should say that a previous one. So we did those face to face but a previous one where we tried to do everything via teams which is why I was so intent on stat establishing a command center people felt that the remote just she said that face to face the nuances you get and things you know even overhearing somebody else's conversation because you're totally focused you've seen on teams people will get a message on their phone and they'll. They'll just quickly check that message on their phone. They won't do that if they stood in front of a gold or a silver commander that they'll pay attention. (PN12)*
	More severe the incident = more binary decisions required – hence less disagreement	*There was a clear understanding. We weren't gonna get it. Get it back. So I think that made it a lot easier because it was so devastating. I think a worse one would have been if it had just been that one room had been completely isolated and we could, you know, we've we need those scanners back. Can we get back in? But the we it was just so devastating that it was a clear understanding that we weren't going in. (PN12)*
	Potential differences in approach between TCs	*It's, I mean I it in all honesty we we dropped so lucky and if we had a different silver on at night and a different gold on we could have had a very different outcome to this. They were both just like ocean liners of calm because they just you know they're people who've dealt with OPS or their life or in in medicine or their life but we have different solvers who*

			some are quite nervous to individuals some who and and the same with golds to be fair. And it could have been, and I don't know how, and they would have both received exactly the same training, but if we'd had a nervous silver on that night, it it might have been a complete different ball game (PN12)
		Things could have been done better	*cos hindsight's a wonderful thing but what should have happened was we should have gone into lockdown, of stopping everybody going out and coming in and security should have been on the main doors asking people to go back to their cars….(PN1)*
		Learning from the incident	*nothing totally prepares you, I mean, you know, I hadn't really got through the lockdown scenario in my head you know when I thought about what I'd have to do different. (PN4)* *so at that point we stood down and unlocked and then looked at how did it go, did it work did we need to rejig anything…because we do practice lockdown on this site especially but obviously it was very different from how they had rehearsed it obviously as Covid had already locked…kind of affected our lockdown plans without us realising it really ….and we have redesigned the lockdown plan not just as a result of that but some of the learning from that meant that we are about to publish a new lockdown plan which has revised it slightly (PN6)* *so that was one learning point for us and one of the things that we have put into the new lockdown plan is an immediate escalation procedure that clearly tells them that if that instruction or advice comes from a reliable source, as in one of our emergency services, then response to that, activated it and then we'll investigate what exactly is going on...so we've kind of turned it around a bit as a result of that, so there was some learning out of it…(PN6)*
		All incidents are unique - all have different starting points & pressures in the hospital etc	*I think it's like when we're teaching HMIMs around the country and around the world, we spend a lot of time saying you know, nobody can write you a plan that is fit for all hospitals, cause every hospital is different, every scenario is different…it depends whether it happens at 3 o'clock in the morning or 3 o'clock in the afternoon , it depends whether*

		you're full when you start or empty when you start. You can write the best plan in the world but it can't be fit for every single set of circumstances that might be the starting point for that incident. The starting point when you're already full in ED with ambulances queuing and no free beds, is very different from starting at 3 in the morning is very different from starting at 2 in the afternoon when you've got a fair few empty beds and ED is ticking along nicely…it's completely different starting points, aren't they….(PN6)
	Learning about improving processes – not addressing any clinical practice	*Learning? We haven't done the cold debrief but:* · *Imaging increasing their meetings with IT* · *Awareness of the BCPs* · *IT will get a monitoring system* · *3rd party provider will put measures in place to give IT access* · *There could be a table top to pick up the learning (PN8)*
	Collapse of assumptions	*Assumed that people know how to run a tactical command but they don't – it's clear that people think that senior managers will step into the tactical role and get it right but they won't. (PN8)*
	Importance of notifying areas	*I think, for me personally, we should have been able to get comms out sooner to all the areas …it's how we communicate, so if there's a problem, not to cause alarm bells but just to say there's been an issue with water flow coming into the hospital wards, can you just make sure your areas are safe (PN9)*
	Treating the organisation as mature units	*…I think its about those comms going out and again it's not about alarm bells or panicking people but just making people aware that there is an issue externally, what do we need to do locally first to mitigate any risk and obviously if locally then….because the experts are going to be the people in that area of actually this is a higher risk area for example respiratory so if they were going to do a drainage on a patient but using clean water from a tap could it been an effect. (PN9)*

	Early escalation and notification	*And I think …calling colleagues to attend Tactical for the major incident is for us to know and understand at what for a is expected and the degree of information. On that day, for me it was pretty relaxed because by the time we hit Tactical, the incident was at hand 2 and a half hours ago was more or less resolved (PN9)*
	Training What managers feel they need Managers not prepared for managing incidents	*But I think the Trust needs to do more training because I know when I attended, and I said to XXX, since I've been at YYY, I've never really had to attend – we've been actually feeding into like directors but not actually representing…so I think there needs to be more training because if there was a major incident at hand, colleagues need to know what is expected of them the level of information t be fed back and actually what do they need to do locally in terms of reaching up to escalation within the division or actually escalating back higher up to say we need some urgent support now and response. So, I do think we need to have some training. (PN9)*
	Random nature of being in tactical command	*So, I do think we need to have some training. I mean I was called: oh please can you attend tactical, oblivious to what was going on, but to represent the division; so it did kind of worry me a little thinking what is going on and what is going to be expected of me because I was oblivious to….the fact it was a bit kind of relaxed, oh can you all check your areas as water is now coming back but it could have been a lot worse (PN9)*
	Learning	*The learning from this is that a SOP is being developed with YYY from Estates to deal with this in the future including maternity lifts which are only the only means of access / egress to some of the bedded areas (PN10)*
	Benefit of peer challenge around incident level	*Comment made about the benefit of having 2 people to decide on the level of incident to get some challenge and reflection – in this case the team defaulted to PN10 as the subject matter expert and so went with whatever declaration he advised (PN10)*
	Staff felt need for support	*Massive, massive, and that comes up in the report. You'll see it was, you know, as always, number one of the thing that that that people will say is communication, poor community. We weren't told about, told about it. We've had we had letters from patients who you*

		didn't tell me my outpatients was cancelled and I travelled 45 minutes to get there and I'm outraged and and equally in the aftermath, like those you'll see in the report, some of the things that came out were staff felt they've been abandoned once, once gold, because gold would stood down. Within 24 hours, gold was stood down because there was as much as could be done for the incident, but they felt about people felt abandoned after that. And perhaps gold should have stayed, stayed up longer to actually respond to it, and that that's the in that report that should be on its way to you now. (PN12)
		I said some of the maps were out of date and actually what they're doing now is sharing via SharePoint the digital maps with the fire service so that they don't have to rely on find something on the wall that is probably out of date because our building work is so, so rapid at the moment. (PN12)
		Consider updating the MI plan action cards to ensure that:
		• *Key [Trust], Police and Ambulance Service mobile numbers are taken before leaving the scene to establish ICCs.*
		• *A formal Gold meeting is held to declare stand down.*
		• *The Gold commander considers the need to establish a recovery cell, prior to declaring stand down.*
		• *Emphasise that a separate Silver cell is established. (HIN1)*
		[Trust] Major Incident Plan Requires Review
		EPRR Training requires review and refresh both in the interim and prior to release of revised MIP

		Review of current evacuation plans and development of detailed whole building evacuation plans
		Review of internal and multiagency communication methods for both Major Incidents and other emergency situations
		Review of Fire Safety Infrastructure at [Trust] sites including implementation of any recommendations from XXX Fire and Rescue Service (HIN3)
Views on Hospital staff: **How to support them and concerns about their needs**	Identifying a proportionate response – being honest but not seeking to inflame a situation	*it was really difficult to choose the words, what to say, because you want to be honest, but at the same time you don't want to escalate this anxiety really high… But like, XXX was probably like the most sensible one who said, well should you be saying to staff well, don't go in. So yeah, yeah, absolutely that should have been the direction mainly that it should have been, the site should have gone into lockdown, thinking at that time that there was an intruder on site, so it should have been (PN1)*
	Feeling concern for the staff involved in the incident	*And so, I felt even though I'm like 12 miles away, I felt quite anxious for the staff that are on site in terms of what this person may or may not be capable of (PN1)*
		You know I think, reflecting back on it, and we did after-actions reviews at the time… I'm not sure we did enough pastoral care for people after the event. We did the after-action review about how things went and there was a little bit of that about how did you feel, how was it for you, but there was a sense of …strong team following that event (PN3)
		So we couldn't go to that side so there was telephone calls you know, reassuring them and then trying to… but you know they were for three hours without anybody coming near

		them, then you know, they would just have to get on after seeing something fairly horrific (PN4)
		So it was fairly horrific…we were concerned for their welfare and we did a hot debrief with them on the day and you know you know we could do that but they were the kind of things going through my head (PN4)
	Reassuring & Supporting staff	*In terms of the staffing, pastorally, it was absolutely around how those staff were, whether they were distressed, concerned, whether there were any issues actually that were potentially building within that facility around the uncertainty because of course the communication aspect of things was difficult (PN2)*
		So first and foremost they knew I was there for me, so from the point of view of…I'd had no interaction particularly with A&E that day and in fact you can be infrequent when you're manager on call but it was about them knowing there is somebody who's responsible for site and here he is, this is me from that point of view, I'm not a police officer, not a member of the fire service but actually I am responsible for what is going on, on site so yeah, there's issues that you need support with let me know, what is going on, how is this playing out for you? Let me know is everybody ok? (PN2)
	Focus on getting more staff	*I did remember that site could we send somebody with the police person to the floor where that had happened, because I event thought you know, evidence, you know or just… just to see the staff and make sure, you know, but we weren't allowed to do that. We did ring them, we kept in touch with them all morning, kind of thing, and sort of started the communication then, I said okay we need to make sure Wards and Departments know what's going on (PN4)*

		There were discussions about planning ahead, thinking about the need for more staff (porters) and they considered redeploying staff from across the wards (PN10)
	Creation of team spirit amongst staff • Pride of organisation was reflected to external organisations post-incident	*but there was a sense of …strong team following that event. In fact, in fact…we had a CQC visit after that event a week later and the positivity was much more than you would ever…from the Emergency Department, with whom we'd had a fairly rocky relationship was certainly not fed back to the CQC; we got a very strong sense of team from the CQC, (PN3)*
Impact of Covid	Covid impact: meant already had ICC established and limited footfall	*Yes, so it made it easier because the ICC was already set up and it made it easier because as I say, all the doors weren't open, cos we were in that phase where we still had limited services, so some doors were still shut and we'd got less footfall on site because of the lack of visitors, the lack of face to face outpatients so that all made it easier if anything*
Empowerment	Leadership style empowering staff	*The managers were empowering the staff to do what they needed to do – this wasn't driven by direct instruction by XXX… The TC was seeking clarity on some points and articulating the big picture – he was empowering people through the information being given to them (PN7)*
	Managers enabled to resolve issues not report back on them	*The approach by the TC was for managers to get on with it and sort out any issues they encountered – empowerments – they could come back with any problems or things that they hadn't been able to sort out (PN7)*
	Empowerment of staff = trust in them	*Key theme of empowerment – Ned was not micro-managing – he was clear that he expected managers to assess the situation and deal with problems locally – he was there if they needed him but wasn't insistent that everything had to go through him (PN7)* *It was leads were were sent off to basically look for their own area, so gold devolved down and essentially and silver was quite happy with that. So it was go and assess your area. You're the experts, let us know What you can and can't do and at the same time they*

	Leads responsible for their own areas	*would desperately looking round for portable solutions for for things and there was an awful lot of horse trading that went on to get mobile scanners in because it was a a very early realization that we'd lost two MRI scanners that weren't coming back. So there was a a good work done on that, but that level and that was actually done to be fair by one of the guys. I said we had two golds. The coo put, I think, pulled in quite a lot of favors. (PN12)* *One of the divisions pre-emptively stood staff down so that they would be well rested when the recovery began – this should be noted as good practice. (HIN1)*
	Directive approach still empowering as only intervened once operational command was unable to resolve and effectively required help	*At the start they were floating in the wind and they were happy with us suggesting things – this was empowering them. They were owning their plan and by the end they were owning it more. We were empowering, guiding and coordinating. They were lost, rudderless… They didn't know their BCPs. Tactical was giving it a bit of structure and basing it on the facts around the number of patients waiting but if there was no solution then they would have to look for mutual aid (PN8)*
Unexpected Matters	Collapse of Assumptions Assumptions within planning being unearthed – surprises	*The learning is around identifying when there are issues with the water – the alarms weren't working and also [the water company] didn't realise that the mains were feeding a hospital. These issues are being picked up via the water safety meetings. (PN7)* *We did not know where all the water issues were across the hospital – there were no maps – it was only when they looked at the BCP for water that they saw some maps that they used (PN7)*
	Collapse of assumptions about operational knowledge locally	*I was surprised by the lack of knowledge that you can run a service but not know the BCPs. If you are looking at operations you should be looking at your BCPs side by side. The GDO recognised that he had recently started in the service and had dived into solving problems (PN8)* *I was surprised that people in other services with experience in incidents did not offer up their services or advice from their past. The person that had seen XXX in the queue had*

	Collapse of assumptions about willingness of staff to address an acknowledged problem	*lots of experience but just seemed to be a bit removed from it. It made me think what are the relationships in that department? They had some information but didn't use it (PN8)*
	Collapse of assumptions – other areas noted the problem but did not do anything	*We checked the calls to the IT helpdesk to see how the incident had affected the organisation. Only a few calls were made about imaging delays. People seemed to absorb the delay, they seemed to accept it. The wards should have had big numbers but they were not mentioning it. There was an incident occurring. The BAU was impacted but they did not think this mattered to then and changed their plans (PN8)*
		Assumed that people know how to run a tactical command but they don't – it's clear that people think that senior managers will step into the tactical role and get it right but they won't. (PN8)
	Collapse of culture / expectations	*Training for on call is not good – people don't know what they should be doing, whether they are the manager or director on call (PN11)*
		Where is the manual for basic incidents like this? If it has happened before then why didn't the organisation write the contingency plan? (PN11)
	Things not kept up to date	*Apart from Niff Naff and trivia. Some plans on walls were slightly out of date because we've had this certain urgent treatment center put on the front of our emergency department. But it's still ongoing. Some of the fire plans were slightly out of date and that that went into our final report. (PN12)*
	Unexpected impacts	*So the biggest kind of lessons learnt from my perspective was…it wasn't just about the flowing of water….when I actually went to Endoscopy, the risk we had there was there was flowing water, but what we found there was that there was an air block in the pipes which was still reducing the water coming through and we had scopes in the Endoscopy stacker so it wasn't just a matter of tick box there's water flowing, it was actually looking deeper then….in that area now what's going to happen? We need the scopes cleaning. We've got patients we've got emergencies, we've got sessions going on (PN9)*

	Unexpected consequence of earlier actions (pre-dating the incident)	*So this is where we we we kept. So this is more dirty washing. This was something that came out at the time. So throughout COVID more and more empty rooms were being taken up because we had to disperse staff. And so the first room that we went to, which was was gonna be designated as a a gold control room that was full of office equipment. And the door was locked. So it had been turned into an office. We then moved down to our major room, which we would use. And not only was it locked, somebody change the combination, but it was being used for COVID vaccines.(PN12)*
	Complex organisation – rooms checks – interactions	*because of COVID we haven't we, me and Andy selves haven't been doing our normal, we do checks, we go around and check our rooms and we can get in and and cause the COVID we weren't allowed to do that and that's a big factor in why we couldn't have access to these rooms because we found that on the other side we had. (PN12)*
		It never happen again, but it did stop us doing them checks, which proved to us that we still need to do them checks moving forward(PN12)
	Collpase of certainty – people using rooms unofficially to sleep in	*But we do have and I'm sure every site is the same we have.*
		Certain people who will just go and put their head down in an empty room somewhere. We'd never considered that we so, and luckily there weren't. But that was a big thing for us to come out and we still have it happening. And in fact, we had a meeting yesterday where one of our other sites, it's been found that anaesthetists are using one of the empty wards to sleep in.
		And it's. I don't know how you square that circle. We've asked for risk assessments to be made of likely areas that people may put their head down, but that was one big thing we we given a big tick to the fire service saying it's completely empty, everybody's accounted for. But actually one of the other one we had our debrief one of the other departments turn around said well actually we could have had somebody sleeping in there. We could have had a lone worker in (PN12)

	Evacuation policy was not known	*The evacuation plan did not reflect the current building works which caused issues regarding moving patients etc. O2 and Nitrous Oxygen was leaking – staff did not have access to information of the location of all isolation points are and where the zones are. Estates colleagues were unaware how far it would affect the hospital if the gas was isolated. (HIN1)* *We have to assume that the decision to move patients out of the building was a result of the lack of clarity in decision making alongside the inability to communicate effectively to all areas. Where plans are in place for operational areas they detail highlighted internal holding area according to the XXX Fire Officer. These were either not part of evacuation plans or were not used in this incident for reasons unknown. (HIN3)* *Training and exercising will follow this redevelopment. In addition a more prescriptive evacuation policy will provide egress routes to both internal and external holding areas with clear instructions of how to enact and who will oversee (HIN3)* *XXX Major Incident Plan Requires Review. EPRR Training requires review and refresh both in the interim and prior to release of revised MIP. Review of current evacuation plans and development of detailed whole building evacuation plans. Review of internal and multiagency communication methods for both Major Incidents and other emergency situations* *Review of Fire Safety Infrastructure at XXX sites including implementation of any recommendations from YYY Fire and Rescue Service (HIN3)* *Child Health advised they received notification to evacuate via a porter that came into child health…XXX advised she would need to re-interview some of the portering staff as none of them had said they had given any areas the order to evacuate (HIN3)* *In usual circumstances then horizontal evacuation would have taken place - this was unable to take place during this incident… There were no clear routes out of the hospital, lifts were out of action, no ski sheets on beds….(HIN3)*

		A number of people had mentioned the inability to contact staff quickly and in 1 go, on the wards at the same time, if this could be carried out would save a lot of concern and the same information would be given at the same time….
		The rate of spread of smoke needs to be investigated – limiting the spread of smoke would have contained the situation better and avoided the number of evacuations.
		The trained fire escape plan only considered one route out - on this night this was not possible therefore we had to evacuate via the back doors - however there is no ramp and beds & equipment had to be lifted manually. This is not ideal…
		We did not appear to have a clear structure for how to run communications between multiple ward areas and site command system. This was difficult because the scene of the fire was geographically separate from the areas with smoke contamination due to spread of smoke through ducts. Also I'm not sure that we had a clear system of leadership for castigating information down. Furthermore mobile phone/radios did not work in many parts of the buildings. (HIN3)
		Despite Site linking in with the Major Incident Room and ED, senior hospital managers who were onsite were taking over the chain of command again slowing down egress out of evacuation areas as extra phone calls were insisted on (HIN3)
		The passage of smoke through ducts rendered the parallel horizontal evacuation system ……non-viable because adjacent areas were all filled with smoke. We either need to have a solution to stop smoke travelling through ducts systems or we need to rethink our evacuation plan. (HIN3)
	No surprises	*No, it was pretty straightforward if I'm honest with you…; nobody was kind of shocked, alarmed and there was nobody around the table who panicked to say I don't know what to do…*
	Being inventive	*There was an incident with a patient on Modular with chest pain and couldn't use the lift; but it was resolved by the medical team on site, however they were looking for a*

	Innovation – horse trading	*contingency plan involving the [Hazardous Response service] within [the ambulance service] to get a stretcher up there (PN10)* *I said, right. I'll find us. So when we went to the first room, I said I'll find us a room. And it was me. I'd I left them where they were because they were, they got good phone signal. And like I said, I went to second room and can't get into that went to third room. Couldn't get into that. But I knew that the secretary's office was open and it's a large office with about 8 tables in it. So we could socially separate but equally everybody could see each other and it had got phone lines in if we need it as well. (PN12)* *It was leads were were sent off to basically look for their own area, so gold devolved down and essentially and silver was quite happy with that. So it was go and assess your area. You're the experts, let us know What you can and can't do and at the same time they would desperately looking round for portable solutions for for things and there was an awful lot of horse trading that went on to get mobile scanners in because it was a a very early realization that we'd lost two MRI scanners that weren't coming back. So there was a a good work done on that, but that level and that was actually done to be fair by one of the guys. I said we had two golds. The coo put, I think, pulled in quite a lot of favours.(PN12)*
Dynamic nature of the incident	Quickly resolved	*The water was brought back on quickly – 'there was a high level of anxiety at the beginning but we focused on evidence and facts. (PN9)* *So there wasn't a form of panic in any way, for me it was this has come to light, it is a problem, we need assurance more than anything, ICU had escalated it but by the time that we got to Tactical in the afternoon, the water was back up and running, so it was quite strange to a degree.(PN9)*
	Dynamic situation	*There was an incident with a patient on XXX with chest pain and couldn't use the lift; but it was resolved by the medical team on site, however they were looking for a contingency plan … to get a stretcher up there (PN10)*

	Dynamic nature of risk and the required response	*The [fire] commander came onto the site to assess the situation, but by that time the lifts were back working again (PN10)*
	Escalating nature of risk / boundaries	*The… the only reason they were all doing the car park was because at that time they didn't know if they could go straight back in. They nobody. Nobody knew the…the actual true extent of that fire because it was essentially it must be 200 hundred feet away from the accident and emergency.*
	Assessing growing risk / serious nature of the incident	*Nobody actually truly understood just how…how devastating that fire was. Everybody assumed it was a bit of wiring or something. We've had a in the past. That trust has had some of the fluorescent lights, the ballast in the present lights go so that the Ed staff are quite used to evacuating and the fire service saying, right, everything's good. You can go back in 20 minutes later, but. So the…the call was made on the fire service when the fire service said...You're not going back in (PN12)*
	Dynamic picture – majority of the response done early in the incident	*So we moved into the uh, because I mean it. It changed the dynamic purely because by the time we got there she…she done the majority of the response. (PN12)*
		that makes a lot more sense, to be honest than the decision making. Wheel that we're given.
	Dynamic picture – unexpected issues and interactions	*That that it just doesn't work if you if you're brutally honest, because it it assumes the land of everything's exactly as it should be (PN12)*
		Bronze commands were not initiated due to the nature of the incident. Communications internally and externally were severely impinged as a result of these failings in Command and Control.
	Dynamic nature of the incident – local areas taking action	*There also not a view that we established command and control arrangements too late, which also contributed to communication difficulties both internally and externally. (HIN3)*

Walsall Healthcare **NHS**
NHS Trust

Matthew Dodd – 23-11-2022

Plan Your Research Question!

You can use **PICO** to create a healthcare question and develop your search strategy

P	Patient or problem
I	Intervention
C	Comparison
O	Outcome

What information do I need?

How do Hospitals, as complex organisations, respond to crisis

What are my PICO elements?

Patient or problem *Be very specific*	**Hospitals [from the aspect of complex organisation]**
Intervention *Think of alternative and similar keywords*	**Response to a crisis; crisis management; reaction; stimuli; threats; danger; instability; risks; incidents; crises**
Comparison *Think of alternative and similar keywords*	**Systems; sub-systems; complex organisations; healthcare organisations; self-organisation; leadership; clinicians**
Outcome *Be very specific*	**Business as usual; adjustment**

What is my research question?

In [**P**] Complex organisations (Specifically hospitals)
does [**I**] a threat to business as usual
compared to [**C**] planned change
result in [**O**] Sub-systems self-organising and non-linear change   ?

What limits can I use to focus my search?

Date range **Last 5 years**
Age group **Incidents affecting all ages**
Language **English / French language**

Document type: **All document types – research articles, literature reviews, news articles, grey literature**
Other **Hospitals only**

NHS Knowledge and Library Hub

https://www.walsallhealthcare.nhs.uk/professionals/library/find-evidence/nhs-knowledge-and-library-hub/

"complex organisation*" OR "complex organization*"

AND

crisis OR threat* OR danger OR crises OR incident* OR instability OR risk* OR reaction*

"complex organisation*" OR "complex organization*"

AND

sector* OR hospital* OR health* OR NHS

Search ID#	Search Terms	Last Run Via	Results
S1	"complex organisation*" OR "complex organization*"	Interface - EBSCO Discovery Service Search Screen - Basic Search Database - Health and care evidence, from Health Education England	71,346
S2	crisis OR threat* OR danger OR crises OR incident* OR instability OR risk* OR reaction*	Interface - EBSCO Discovery Service Search Screen - Basic Search Database - Health and care evidence, from Health Education England	60,257,852

S3	(crisis OR threat* OR danger OR crises OR incident* OR instability OR risk* OR reaction*) AND (S1 AND S2)	Interface - EBSCO Discovery Service Search Screen - Basic Search Database - Health and care evidence, from Health Education England	49,719
S4	TI "complex organisation*" OR "complex organization*"	Interface - EBSCO Discovery Service Search Screen - Basic Search Database - Health and care evidence, from Health Education England	1,296
S5	TI sector* OR hospital* OR health* OR NHS	Interface - EBSCO Discovery Service Search Screen - Basic Search Database - Health and care evidence, from Health Education England	11,179,618
S6	sector* OR hospital* OR health* OR NHS	Interface - EBSCO Discovery Service Search Screen - Basic Search Database - Health and care evidence, from Health Education England	85,271,867
S7	(sector* OR hospital* OR health* OR NHS) AND (S4 AND S6)	Interface - EBSCO Discovery Service Search Screen - Basic Search Database - Health and care evidence, from Health Education England	350

Organising Ambiguity

With their focus on assessing the nature of the threat, the scale of the response perceived and the potential impact on the other operational functions of the hospital, the hospital commanders were seeking to deal with and organise the uncertainty created by the major incident. The categories developed in this research through theoretical coding resonated with the framework developed by Baran & Scott (2010) in their grounded research undertaken with firefighters during incidents. They developed the concept of 'Organising Ambiguity' which was made up of Framing, Heedful Interrelating and Adjusting (Figure 1).

Figure 1: Model representing leadership within dangerous contexts characterised by high levels of ambiguity (Baran & Scott, 2010)
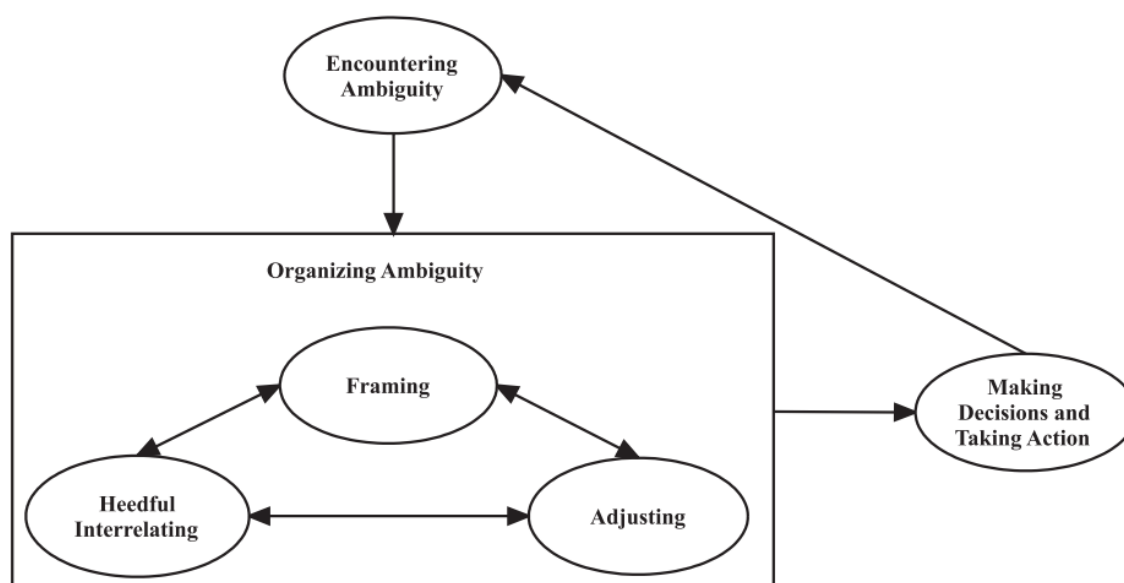
The general principles of response that my research had identified in tactical commanders, where they sought to assess the risk, make regular assessments and update plans within a dynamic environment and in particular their willingness to work in teams and seek to create a collective understanding and response, all appeared to be accommodated within Organising Ambiguity.

In order to explore the appropriateness of 'Organising Ambiguity' within a hospital context, I sought to align my theoretical codes to this (Figure 2) and also the observations that I had outlined in my first attempt at theory (Table 1).

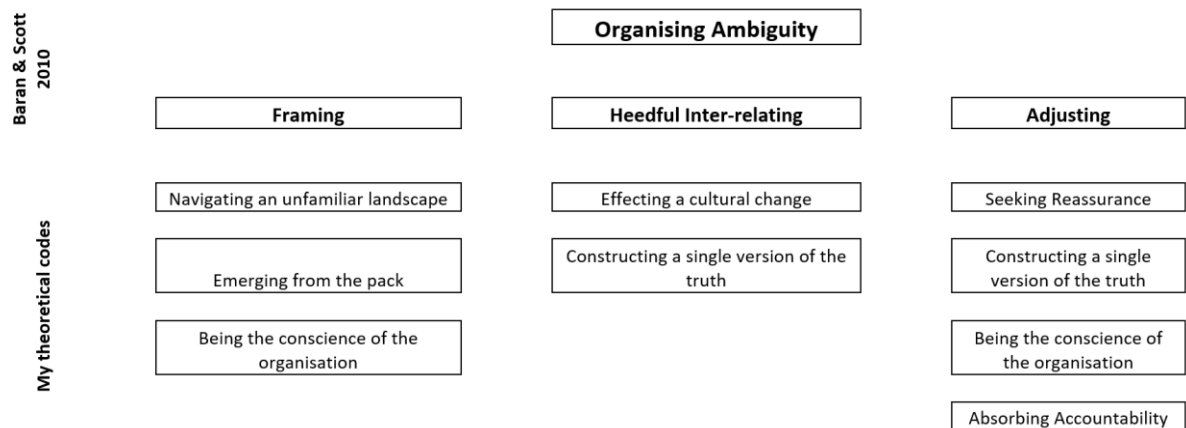**Figure 2: Alignment of Theoretical Codes to 'Organising Ambiguity'**

Table 1: Components of my initial theoretical framework aligned to 'Organising Ambiguity'

Aspect of Response	Considerations	Reconciliation with 'Organising Ambiguity'
Boundary Setting	Is this Business As Usual or an extraordinary response?	Framing
	Is the response excessive?	Framing
	Impact of the response on incident and the rest of the hospital	Heedful Inter-relating
	Temporal aspects	Adjusting
Incident: Zone of Uncertainty	Sense-making	Heedful inter-relating
	Information on: • Numbers • Impact • Time • Resource • Risk	Framing Heedful Inter-relating Adjusting
Incident: Zone of certainty	Increase zone of certainty	Framing / Adjusting
	Adopt more directive approach the greater the area of certainty	Heedful Inter-relating
Rest of the Hospital	How is this kept safe / protected	Heedful Inter-relating
	Non-Elective flow to / within rest of hospital	Framing / Adjusting
	Elective activity	Framing / Adjusting
	Duration of incident	Framing / Adjusting

A further step in the alignment of the research findings to the theory of 'Organising Ambiguity' involved comparison with further observations from the experience of hospital commanders, as outlined below in Table 2:

Table 2: Further reconciliation with 'Organising Ambiguity'

Research Observation	Reconciliation with 'Organising Ambiguity'
Focus on the crisis and the non-crisis elements of the organisation at the same time	The concept of 'Being the Conscience of the Organisation' fits in with the Adjusting principle
Same Team dealing with the incident and the return to BAU:	The concepts of 'Being the Conscience of the Organisation' and 'Absorbing Accountability' (during the crisis) fit in with the Adjusting principle
Seeking Reassurance not Assurance:	This aligns to 'Framing' where the response is being assessed in terms of its impact on the risks
No training or background:	Commanders felt they were Navigating an Unfamiliar Landscape which contributed to the process of Framing
Establishing Boundaries around the incident:	This was reported by many commanders and accords with the process of Adjusting (and Framing)
Cycles of positive reinforcement and consolidation	This describes the processes of Adjusting, whereby the response is refined recurrently

Organising Ambiguity applied equally to the range of incidents covered in the field work, as regardless of cause and level of the sudden onset ambiguity, the commanders' responses accorded with the elements of the theory. However, as research around VUCA environments has demonstrated, crisis situations such as this present more than just ambiguity. A range of different interventions are required and rarely is a situation just ambiguous by itself.

Hospital Mission Command

The principles of Mission Command (Pearce, 2021) identified in the previous chapter, resonated with the actions and behaviours of the tactical commanders.   The commanders appeared to default to the informal, intuitive principles of a hospital mission command rather than adopting a command and control approach. The commanders operated on the basis that the staff involved in the response shared a set of objectives focused upon safety, which underpinned their actions. They were prepared to allow freedom of action to staff and had significant trust in the judgement and actions of those involved in the incident.   The preparedness of commanders to work in conjunction with other (external and internal) staff

and jointly construct a single version of events to enable responses to be assembled, reflected the context of mutual understanding within mission command. Commanders were prepared to take decisions and were expected (and saw themselves as facilitating others) to take decisions. These elements of commanders' response align to the concept of mission command as outlined below (Table 3):

Table 3: Hospital Mission Command

Dimension	Categories developed in this Research	Description
	Clear set of objectives	Safety: • Patient • Staff • Site
Unity of Effort		
	Emerging from the pack	Commanders saw selves as less in direct control and very much responding to events
		Co-construction of reality via huddles
	Effecting a cultural change	Working as a response team rather than individual decision-making
		Working with other agencies
		Focus on enabling, facilitating and sense-making
		Less exposure to emergency (crisis) situations than other agencies
Freedom of Action	Absorbing Accountability	Adopting a leadership role
		Reassuring and supporting staff
		Simplifying the 'ask'
		Dealing with uncertainty by taking decisions and initiate actions
Trust	Seeking Reassurance	Use of heuristics to gain reassurance
		Perception by commanders of less control than perceived by others
		Correlation between reassurance / assurance and the level of uncertainty within an incident
Mutual Understanding	Constructing a single version of the truth	Acting as a point of contact for other organisations and their own
		Use of the huddle

		Shared risk assessments
		Focus on communications
		Establishing the boundaries of the incident response
	Navigating an unfamiliar landscape	
		Ad hoc nature of command team
	Being the conscience of the organisation	
		Thinking about the whole
Rapid Decision-making	Navigating an unfamiliar landscape	Decision to declare major incident or not
	Absorbing Accountability	Reassuring and supporting staff to make the decisions they needed to
		Dealing with uncertainty by taking decisions and initiate actions

Again, there was resonance with hospital tactical command, however a key distinction is that it does not encompass the dynamics of a complex adaptive system, whereby there is significant interaction between sub-systems and agents at multiple levels which the commander is unable to influence. It may not be a conscious decision as much of this may have been internalised already or quite simply the commander may be unaware

Mission Command

Implications for learning:

In the military there is a view that mission command is a learned behaviour and needs to be institutionalised and operationalised into education and training (Frankel & Schrankel, 2013). This is incorporated into the key messages as outlined in Table 4.

Table 4: Mission Command suggested training for the military context

- Leaders must be taught how to receive and give mission orders and how to clearly express intent. Students must be placed in situations of uncertainty where critical and creative thinking and effective rapid decision making are stressed
- Training must replicate the chaotic and uncertain nature of military operations. It must place leaders in situations where fleeting opportunities present themselves and those that see and act appropriately to those opportunities are rewarded.

- Training must force leaders to become skilled in rapid decision making
- Training must reinforce in commanders that they demonstrate trust by exercising restraint in their close supervision of subordinates

(Flynn & Schrankel, 2013)

Principles for Commanders:

Hospital tactical commanders in hospitals do not receive the same amount of training around crises and the need to rapid decision-making. Their routine workload does not expose them to emergency or crisis situations to the extent as members of other emergency services. In addition, due to the random background and experience of the actual tactical commander on the ground during an incident, it may be of benefit for the organisation to implement a generic set of principles which reinforce the concept of Hospital Mission Command. A potential set of principles are outlined in Table 5 below:

Table 5: Principles of Hospital Mission Command for Tactical Commanders

<div style="border:1px solid">

Hospital Mission Command

Unity of Effort: The focus is on Patient, Staff & Site safety

Freedom of Action: All staff are empowered to enact that which achieves the central purpose of safety during an incident

Trust: That hospital staff will initiate a response based around safety

Mutual Understanding: Letting staff know what other internal & external players will be doing and the concept of joint decision making

Rapid Decision-making: Creating a group to support decision-making to be done using early declaration of Internal Critical Incident before 'Framing' allows the incident to be assessed

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This could translate into training for tactical commanders as outlined in Table 6:

Table 6: Key learning points for tactical commanders:

<div style="border:1px solid">

What are the lessons for the tactical commanders?

- They do not need to know all the answers

- Focus on the principles of Patient / Staff / Site Safety

- They will gain benefit from working as a command team rather than the heroic individual

</div>

- Trust the responses of everyone else

- Be prepared to look for reassurance using a variety of cues

- Do not seek to over-manage the operational minutiae as one has neither the time nor the capacity

- Go into it on the basis of trust and mutual understanding with colleagues based on the fact that they will respond according to the established principles

Cynefin Framework

The Cynefin Framework is informed by the study of Complex Adaptive Systems (Van Beurden et al, 2011) and is a concept of knowledge management, which is applicable to situations, in which complexity challenges the quality of insight, prediction, and decision (Kempermann, 2017).

It is a sense-making framework, where value is provided by its effect on the sense-making and decision-making capabilities of those who use it (Kurtz & Snowden 2003). It outlines a consistent cognitive approach that offers the leader and leadership team an ability to urgently apply the correct actions to a given situation (Lane et al, 2021). This is achieved through consideration of the dynamics of situations, decisions, perspectives, conflicts, and changes in order to come to a consensus for decision-making under uncertainty (Kurtz & Snowden, 2003), thereby avoiding the pitfalls of applying reductionist approaches to complex situations (Van Beurden et al 2011) and the problems that arise when a leader's preferred management style causes them to make mistakes (Snowden & Boone, 2007).

With a set of clear criteria Cynefin helps to set apart complex problems from "simple/obvious," "complicated," "chaotic," and "disordered" contexts in order to avoid misinterpreting the relevant causality structures. The distinction comes with the insight, which specific kind of knowledge is possible in each of these categories and what are the consequences for resulting decisions and actions (Kempermann, 2017).

Domains

There are five domains within the Cynefin model: simple, complicated, complex, chaotic and disorder. The model also distinguishes between 'order' and 'unorder' (**Figure 1**) where unorder is emergent order and is a different kind of order, rather than the lack of order (Kurtz & Snowden, 2003).

Figure 1: Cynefin Domains (Snowden & Boone, 2007)
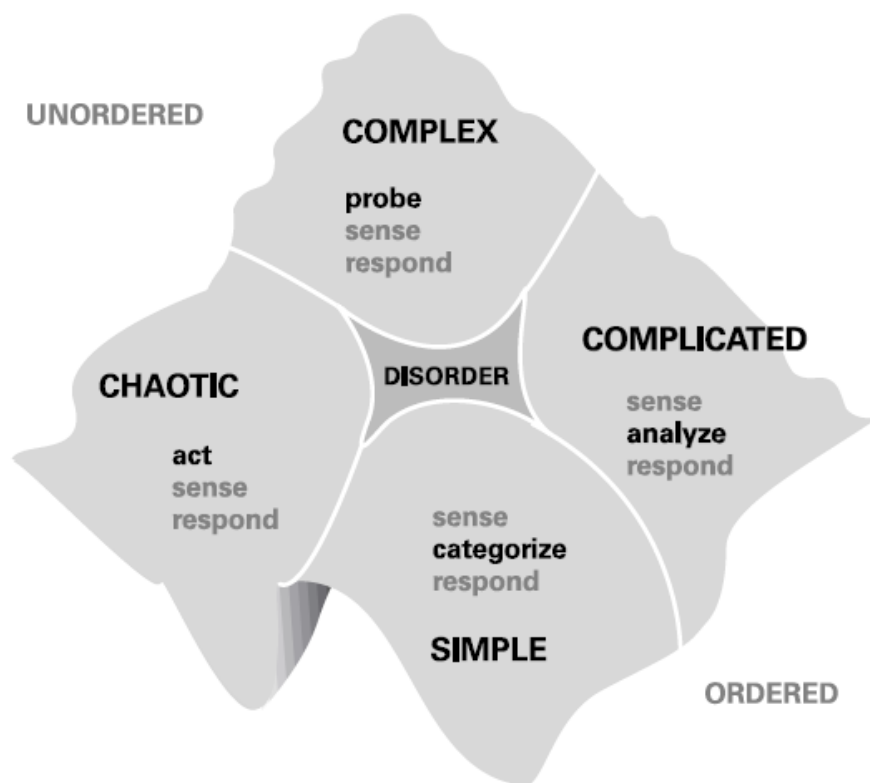
Simple Domain[19]: Within this domain, cause and effect relationships are mostly linear, empirical and agreed upon (Kurtz & Snowden, 2003; Van Beurden et al, 2011). The appropriate decision-making model is to 'sense' incoming information, 'categorise' it and then 'respond' (Kempermann, 2017; Snowden & Boone, 2007; Van Beurden et al, 2011). This is the realm of 'known, knowns' (Snowden & Boone, 2007) and best practice (Snowden & Boone, 2007; Kempermann, 2017) where the resulting action can adhere to fixed routines or standard operating procedures (Kempermann, 2017). An appropriate management model for the simple domain is top-down control by a central manager (Van Beurden et al, 2011).

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[19] The simple domain is also described as 'known' (Van Beurden et al, 2011), 'obvious' (Kempermann, 2017), 'domain of best practice' (Snowden & Boone, 2007) and 'ordered domain: known causes and effects' (Kurtz & Snowden, 2003).

Complicated Domain[20]: In this domain, stable, ordered relationships exist between cause and effect, but they are not fully known (Kurtz & Snowden, 2003; Van Beurden et al, 2011; Kempermann, 2017). This is the realm of 'known unknowns' (Snowden & Boone, 2007) and the domain of experts (Snowden & Boone, 2007), where expert opinion (Kempermann, 2017; Kurtz & Snowden, 2003) and 'good' rather than best practice (Van Beurden et al, 2011; Kempermann, 2017) is required. Leaders are required to sense, analyse and respond within this context (Snowden & Boone, 2007).

Complex Domain: This is the domain of emergence (Snowden & Boone, 2007) and within this 'un-ordered' context, there are cause/effect relationships, but their non-linear nature and the multiplicity of agents defy conventional analysis (Kurtz & Snowden, 2003; Van Beurden et al, 2011). Emergent patterns can be perceived but not predicted (Kurtz & Snowden, 2003). The complex contexts are those of the "unknown unknowns," (Snowden & Boone, 2007), in which neither "best" nor "good" practice can be used, but "emergent practice" is needed (Kempermann, 2017). The decision model in this space is to create probes to make the patterns or potential patterns more visible before action is taken (Kurtz & Snowden, 2003; Van Beurden et al, 2011). There is a requirement to gain multiple perspectives on the nature of the system (Kurtz & Snowden, 2003) and leaders who try to impose order in a complex context will fail, but those who set the stage, step back a bit, allow patterns to emerge, and determine which ones are desirable will succeed (Snowden & Boone, 2007).

Domain of Chaos: Unlike the simple, complicated, or complex domains, the turbulent, unordered domain of chaos has no visible cause/effect relationships (Kurtz & Snowden, 2003; Van Beurden et al, 2011).   There are no data to analyse, and no time to wait for emerging patterns, so novel responses are required along with a decision model to take 'action' to establish order, 'sense' the influence of that action and then 'respond' appropriately (Kempermann, 2017; Kurtz & Snowden, 2003; Snowden & Boone, 2007; Van Beurden et al, 2011). It is the domain of rapid response (Snowden & Boone, 2007).

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[20] This domain is also known as 'knowable' (Van Beurden et al, 2011), or 'ordered domain: knowable causes and effects' (Kurtz & Snowden, 2003).

Domain of Disorder: This is where this is a lack of decision around which of the four other domains, the presenting situation represents (Van Beurden et al, 2011) and a 'wait and see' approach may be required (Kempermann, 2017). This domain is critical to understanding conflict among decisionmakers looking at the same situation from different points of view (Kurtz & Snowden, 2003)

Application to Critical & Major Incident Management

The Cynefin model provides an insight into the context within which the tactical commanders are required to operate. In a complex adaptive system subject to a sudden shock, it is indicated that best practice is applicable only to obvious problems, good practice to complicated problems and emergent practice to complex problems (Gray, 2017) and immediate stabilising action is required in chaotic situations. A summary of types of problems and responses based on the Cynefin model is shown in **Table 1** with a more detailed overview in **Figure 2**.

Table 1: Summary of the Cynefin Framework and implications for leadership (Gray, 2017)

Type of problem	Predictability	Cause and effect?	Type of practice	Strategy
Obvious	Stable and predictable by all	Clear cause and effect	One right answer **Best Practice** Protocols essential	Sense Categorise Respond
Complicated	Stable and predictable by experts	Cause and effect discernible with analysis	Several right answers **Good Practice** Protocols helpful	Sense Analyse Respond
Complex	In flux and unpredictable	Cause and effect may be there but only understood in retrospect	No right answers **Emergent practice** Protocol unlikely to work	Probe Sense Respond
Chaotic	Turbulent	Situation too turbulent and changing to consider cause and effect	No time to search for answer **Act to gain control** Protocol no help	Act Sense Respond

Figure 2: Cynefin – Leadership Responses (Snowden & Boone, 2007)

Decisions in Multiple Contexts: A Leader's Guide

Effective leaders learn to shift their decision-making styles to match changing business environments. Simple, complicated, complex, and chaotic contexts each call for different managerial responses. By correctly identifying the governing context, staying aware of danger signals, and avoiding inappropriate reactions, managers can lead effectively in a variety of situations.

	THE CONTEXT'S CHARACTERISTICS	THE LEADER'S JOB	DANGER SIGNALS	RESPONSE TO DANGER SIGNALS
SIMPLE	Repeating patterns and consistent events Clear cause-and-effect relationships evident to everyone; right answer exists Known knowns Fact-based management	Sense, categorize, respond Ensure that proper processes are in place Delegate Use best practices Communicate in clear, direct ways Understand that extensive interactive communication may not be necessary	Complacency and comfort Desire to make complex problems simple Entrained thinking No challenge of received wisdom Overreliance on best practice if context shifts	Create communication channels to challenge orthodoxy Stay connected without micromanaging Don't assume things are simple Recognize both the value and the limitations of best practice
COMPLICATED	Expert diagnosis required Cause-and-effect relationships discoverable but not immediately apparent to everyone; more than one right answer possible Known unknowns Fact-based management	Sense, analyze, respond Create panels of experts Listen to conflicting advice	Experts overconfident in their own solutions or in the efficacy of past solutions Analysis paralysis Expert panels Viewpoints of nonexperts excluded	Encourage external and internal stakeholders to challenge expert opinions to combat entrained thinking Use experiments and games to force people to think outside the familiar
COMPLEX	Flux and unpredictability No right answers; emergent instructive patterns Unknown unknowns Many competing ideas A need for creative and innovative approaches Pattern-based leadership	Probe, sense, respond Create environments and experiments that allow patterns to emerge Increase levels of interaction and communication Use methods that can help generate ideas: Open up discussion (as through large group methods); set barriers; stimulate attractors; encourage dissent and diversity; and manage starting conditions and monitor for emergence	Temptation to fall back into habitual, command-and-control mode Temptation to look for facts rather than allowing patterns to emerge Desire for accelerated resolution of problems or exploitation of opportunities	Be patient and allow time for reflection Use approaches that encourage interaction so patterns can emerge
CHAOTIC	High turbulence No clear cause-and-effect relationships, so no point in looking for right answers Unknowables Many decisions to make and no time to think High tension Pattern-based leadership	Act, sense, respond Look for what works instead of seeking right answers Take immediate action to reestablish order (command and control) Provide clear, direct communication	Applying a command-and-control approach longer than needed "Cult of the leader" Missed opportunity for innovation Chaos unabated	Set up mechanisms (such as parallel teams) to take advantage of opportunities afforded by a chaotic environment Encourage advisers to challenge your point of view once the crisis has abated Work to shift the context from chaotic to complex

A healthcare variant of the Cynefin model has been proposed which blends the content of the complex and chaos domains to offer the health leader a sound decision-making framework for problem-solving in whatever context may apply (Lane, 2021). This variation leads to an Act-Probe-Sense-Response approach which allows the health leader to default to the chaos domain to render the situation safe and initiate actions to deal with the co-existent complexity of the underpinning problems (Lane et al, 2021).

The healthcare variant of the Cynefin model reflects the dynamic environment that confronted tactical commanders and resonates with their responses. At times commanders acted immediately to stabilise chaotic situations, they were dealing with the incident and the implications on business as usual which presented a simultaneous range of simple, complicated complex and chaotic situations. The approach of Act-Probe-Sense-Response and consideration of the different domains of situation provides a powerful modus operandi for commanders and reflects the requirement for a dynamic set of responses in the face of dynamic environment, where the stakes are extremely high.

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