Gastrointestinal Nursing

Knowledge and education to inform evidence-based practice in Gastroenterology Nursing: A scoping review

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Abstract:	Abstract: Background: Gastroenterology nursing incorporates a plethora of specialisms and patients suffer with complex pathologies requiring specialist management and nursing care. Gastroenterology nurses work across a range of clinical areas and have differing levels of knowledge and skill. However, there are gaps in knowledge specific to Gastroenterology nursing, and there are barriers to education and evidence-based practice (EBP). New innovative educational strategies and the development of competency frameworks, like those for endoscopy and in hepatology nursing in recent years, have paved the way for other sub-specialisms, yet different approaches to upskill the workforce still requires investigation. Aims: To identify the breadth and depth of research regarding the knowledge and educational needs of Gastroenterology nurses. To understand the best approach to education and EBP. Methods: A scoping review was performed using the Arksey and O'Malley (2005) framework. A search was conducted in two bibliographic databases and across relevant UK organisations. Findings : The database search identified 31 relevant papers published from 2010 to 2021. The studies varied in purpose, methodology, and recommendations, but all reported consistent results, that gastroenterology nurse's knowledge requires attention. Many ways to assess learning needs and educational strategies to improve knowledge

	and EBP were proposed. Conclusion: Gastroenterology nurses' knowledge requires development, to improve both the confidence and clinical practice of nurses, and the experiences and morbidity of patients. The educational and development requirements of Gastroenterology nurses vary across a wide spectrum of needs and draw on a vast range of resources and evidence base. Solutions do not need to be expensive or time consuming and can be practical, utilising existing resources and delivered at local, regional, and national levels. At the same time, to deliver truly EBP nurses must develop the critical analysis skills required to locate, appraise, and organise evidence, interpreting it into the practicalities for decision making. Future researchers should consider exploration of the instruments used to measure EBP and competence of Gastroenterology nurses. To evaluate the effectiveness of different educational models and assist educators in the development and refinement of specialist educational programmes.
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Abstract:

Background: Gastroenterology nursing incorporates a plethora of specialisms and patients suffer with complex pathologies requiring specialist management and nursing care. Gastroenterology nurses work across a range of clinical areas and have differing levels of knowledge and skill. However, there are gaps in knowledge specific to Gastroenterology nursing, and there are barriers to education and evidence-based practice (EBP). New innovative educational strategies and the development of competency frameworks, like those for endoscopy and in hepatology nursing in recent years, have paved the way for

other sub-specialisms, yet different approaches to upskill the workforce still requires investigation.

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Findings: The database search identified 31 relevant papers published from 2010 to 2021. The studies varied in purpose, methodology, and recommendations, but all reported consistent results, that gastroenterology nurse's knowledge requires attention. Many ways to assess learning needs and educational strategies to improve knowledge and EBP were proposed.

Conclusion: Gastroenterology nurses' knowledge requires development, to improve both the confidence and clinical practice of nurses, and the experiences and morbidity of patients. The educational and development requirements of Gastroenterology nurses vary across a wide spectrum of needs and draw on a vast range of resources and evidence base. Solutions do not need to be expensive or time consuming and can be practical, utilising existing resources and delivered at local, regional, and national levels. At the same time, to deliver truly EBP nurses must develop the critical analysis skills required to locate, appraise, and organise evidence, interpreting it into the practicalities for decision making. Future researchers should consider exploration of the instruments used to measure EBP and competence of Gastroenterology nurses. To evaluate the effectiveness of different

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Knowledge and Education to Inform Evidence-based Practice in Gastroenterology Nursing: A scoping review.

Background

Gastroenterology or Gastrointestinal (GI) Nursing is a distinct specialism. Nurses working in GI services will encounter patients suffering from acute, minor GI disorders to severe life-threatening and chronic illness, requiring highly skilled clinical management, including specialist endoscopy, radiological interventions, and surgery for both benign and malignant diseases (Brotherton, Taylor & Keeling, 2013, and Norton, 2012). Patients present with complex physical, psychological, and social needs, due to stigma, body image perceptions, unpleasant, embarrassing symptoms, and the chronicity of some pathologies (Haycock, Matharoo & Thomas-Gibson, 2012, and Joukar, Mansour-Ghanaei, Soati & Meskinkhoda, 2012). GI nurses work across a range of clinical areas and have differing levels of knowledge and skills. From the junior gastroenterology ward nurse, who following initial training, will be expected to have a broad knowledge of the speciality, including Hepatology, Biliary- Pancreatic and Luminal diseases, to experienced nurses working in specialist roles and at advanced levels. Many of whom complete extended clinical skills training, for example nurse endoscopy, and have elevated their academic study to Master's and Doctoral levels. These nurses provide autonomous, expert management, often to vulnerable and 'difficult to reach' patients (Naghdi et al., 2017, and Norton, 2012). Consequently, the educational, development requirements of gastroenterology nurses vary across a wide spectrum of needs and draw on a vast range of resources and evidence base.

An evidence-based culture is aspired to for optimal patient care in the NHS and is a professional standard of practice for nurses, according to the Nursing & Midwifery Council, 'The Code' (NMC, 2018a) and 'Standards of Proficiency for registered nurses' (NMC, 2018b). Evidence based practice (EBP) has been defined many times but is collectively agreed that in healthcare it is the integration of best research evidence with clinical expertise and patient values (NHS England, 2017). To gain

expertise, nurses must develop their professional competence through clinical experience and the acquisition of knowledge; keeping updated on the latest advances in practice, using this knowledge to make decisions regarding the best options for care with their patients. To achieve this, continuous education and reflective practice of the registered nurse is required (Barnwell, 2016 and NMC, 2018b). Processes that are no longer just suggested but mandated by the recent evolution of 'revalidation', whereby nurses are now asked to provide evidence of their continuous professional development to their employers (NMC, 2019 and Taylor, Burch & Black, 2016).

Research surrounding gastroenterology nurses' knowledge and EBP is not immediately apparent on searching the literature. Therefore, a scoping review method was adopted to examine the breadth and depth of publications and to identify gaps in the research. Scoping reviews are useful to map the extent of research in little focused on areas, differing from systematic reviews, where the purpose is to summarise the best quality research findings on a particular question (Davis, Drey & Gould 2009, and Pham et al 2014). This can, however, have drawbacks as the potential for bias is greater in scoping reviews. As typically, they do not include a rigorous assessment of quality, instead using studies based on their existence rather than their design and research methodology (Grant & Booth 2009).

For transparency and replicability, the five-stage methodology proposed by Arksey & O'Malley (2005) is used to structure the review. In addition, a sixth stage involving consultation with stakeholders to seek feedback on the scoping results as proposed by Levac, Colquhoun & O'Brien (2010) will offer a deeper understanding of the findings and enrich the knowledge gained through expert input.

A scoping review

Stage 1: The research question

This review was guided by the question, 'What is the knowledge base and educational needs of Gastroenterology nurses that underpins EBP?'.

Stage 2: Identification of relevant studies

Two databases were searched: British Nursing Index and Medline (Ovid), chosen for their wide-ranging access to relevant publications. A Boolean search method was applied.

Inclusion and exclusion criteria were set,

- Studies published after January 2010 to capture the most up to date research.
- Peer reviewed, to reduce the risk of bias and increase reliability.
- English language, due to the cost and time of translation
- Full text article access only, due to time constraints.
- Relevant to adult gastroenterology nursing practice.

A total of 1854 results were returned. See table 1.

In addition, reputable UK healthcare affiliated organisations were searched for their contribution to the topic.

Stage 3: Study selection

The search strategy returned many irrelevant studies, not specific to gastroenterology nursing. A preliminary review of titles with a deeper dive of abstracts was conducted if the search terms were present. The CRAAP test (Meriam Library, 2019) was then applied to evaluate the currency, relevance, authority, accuracy, and purpose of each publication to increase reliability in the sources. 19 duplicate studies were removed and a total of 31 publications were chosen using the inclusion/ exclusion criteria and based on the 'best fit' to the research question in the abstracts. Each paper

was then read in full to determine its relationship to the topic. Other evidence suggested through stakeholder consultation include publications by The Joint Advisory Group on Gastrointestinal Endoscopy accreditation standards for endoscopy services (JAG 2016) and JETS workforce (JAG, 2019), The Royal College of Nursing; Caring for People with Liver Disease including Liver Transplantation: A Competence Framework for Nursing (RCN 2019), and the Inflammatory Bowel Disease standards (IBD UK, 2019).

Stage 4: charting the data.

Each study was reviewed to understand the population, aims and research methods, and to extract results by key themes about nursing knowledge, education strategies and EBP. Findings are summarised in table 2. There are gaps in the data set where the information was not provided or relevant to the research paper.

Stage 5: Collating, summarising, and reporting the results.

The different types of research include nine descriptive studies, four correlational studies, six quasi-experimental studies, four mixed method studies, five literature reviews, two case studies, one global clinical guideline and four UK clinical guidelines/standards from the stakeholder scope. See table 3.

The main themes identified were;

I. Knowledge base of Gastroenterology Nurses.
II. Educational needs of Gastroenterology Nurses.
III. Solution based approaches to education and EBP.

The results are reported in a literature review.

Stage 6 (optional): Consultation Exercise

Davis et al (2009) acknowledge the valuable contribution that stakeholders can offer to scoping. Feedback on the relevance and meaning of the search results was taken from the researchers' peers who are clinical and academic practitioners in the field of post graduate Gastroenterology Nursing education. This consultation provided insight into professional educational experiences and available resources outside the scope of the database literature.

Professionals/Stakeholders consulted:

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Literature review

i) Knowledge base of Gastroenterology Nurses

Research exploring how gaps in the knowledge of Gastroenterology Nurses can cause barriers to care and detract from patient experience and outcomes is limited. Studies mainly focus on single GI diseases or interventions. However, the available research shows there are common issues affecting the whole patient journey from screening and assessment, through to management of GI disease, and end of life care.

There are a few studies that highlight gaps in knowledge around screening and GI diseases that suggest problems with initial diagnosis. For example, a mixed methods exploration of American nurses' knowledge regarding colorectal cancer (CRC) by Kelly (2015), found nurses rated their knowledge as low and important diagnostic information was omitted from 95% of their assessments. In a recent cross-sectional survey by Lang et al, (2020), nurse practitioner knowledge of CRC screening guidelines and methods of investigation were variable. Suggesting education on screening guidelines and options is required to improve CRC rates. Similarly, a Canadian descriptive design by Naghdi et al (2017) assessed the knowledge and educational needs of healthcare providers in Hepatitis C using a survey. Finding Nurses lacked confidence in screening, suggesting a need for education to improve underdiagnosis of viral hepatitis and open access to therapy for patients.

Considering management of patients with a GI diagnosis'; research finds that poor knowledge of GI disease and treatments causes low nurse confidence and detracts from safety and patient experience. As gastroenterology nurses work in specialist areas, it is surprising to learn that a multi-centre study by Sephton et al., (2013), using the validated Crohn's and Colitis knowledge (CCKNOW) questionnaire to compare UK gastroenterology ward and non-gastroenterology nurses' knowledge of GI tract anatomy and Inflammatory Bowel Disease (IBD), it was concluded that knowledge was,

overall poor. With little difference between either group, other than gastroenterology nurses had better knowledge of treatments. Suggesting more needs to be done to provide specialist education to gastro ward nurses. This extends to the nursing interventions provided in the speciality. For example, a multi-centre study by Groenkjaer (2015) surveyed 94 nurses and found that knowledge of oral care in liver disease was inadequate, putting patients at risk of developing infection, with nurses citing their initial training as suboptimal. A questionnaire by Embleton & Henderson (2020), disseminated via social media, demonstrated nurses had a lack of awareness of the need for digital rectal (DRE) when administering rectal medications. Nurses lacked competence and feared performing DRE, citing training as a problem with only 38% of respondents reporting they had received any formal DRE training. Likewise, in a multi- centre study using convenience sampling that evaluated nurse's risk perception of enteral nutrition (EN), Feng et al (2021) found nurses educational backgrounds influenced EN risk perception. Highlighting the importance of adequate knowledge and training in a potentially dangerous intervention. Furthermore, a UK survey by Aludul et al., (2018) comparing differences in professionals' attitudes and prescribing practices of biosimilar drugs, concluded nurses were less knowledgeable and lacked confidence when compared to their medical and pharmacist colleagues, causing communication issues for patients. But perhaps more concerning, a single centre correlational study by Joukhar et al (2012) performed to understand attitudes of healthcare providers towards patients with Hepatitis C infection, demonstrated that negative stigmatised attitudes were more likely to be conveyed by staff whose knowledge regarding viral hepatitis was weak, and more knowledgeable staff were more likely to show positive attitudes towards patients. Demonstrating a significant impact on patient experience.

End of life care plays an important role in the experiences of dying patients. Unfortunately, a comparative survey by Low et al (2017) of 514 health care professionals, to determine knowledge and practice patterns of palliative care in liver cirrhosis, found professionals felt ill prepared to

provide good care to dying patients. Suggesting further training was needed to manage liver-related symptoms and issues.

ii) Educational needs of Gastroenterology Nurses

Examples of how the educational needs of Gastroenterology nurses can be identified and how support for nurses to improve their knowledge and competence vary widely in methods. Research strategies range from individual case studies, to using multicentre surveys, far-reaching web-questionnaires, and validated tools to help to identify gaps in knowledge and target learning. The evidence base that underpins practice is considered, as well as support required for role transition.

Identifying knowledge gaps is important for addressing learning needs. Hopchirk (2017) take an interesting approach using an online survey to complete a needs analysis of the education required by nurse endoscopists practicing in America. Although the sample size was small (only 7 endoscopists) the survey revealed interest to explore and possibly launch an interactive gastroenterology educational system, such as a community of practice to improve knowledge, technical skills and increase access to CRC screening/surveillance to improve patient outcomes.

There are a handful of quasi -experimental studies that use pre and post testing of knowledge following educational interventions to understand specific learning needs. Studies include those performed by Elkin et al (2018), where participation in a multi-media module on Coeliac disease, improved nurse practitioner knowledge levels and confidence significantly, and led to improved recognition and diagnosis for patients. Kao et al (2012) also compared the effects of two different educational interventions; a pocket booklet and a multimedia CDROM, to assist nurses conveying gastroscopy related information to patients. Finding that knowledge and competence improved and

was significantly higher in the multimedia group. And although limited to a single UK centre, a study by Conley et al (2017) showed a simple teaching session on PEG care successfully identified gaps in knowledge, and improved confidence in nurses and safety for patients. This was useful for training in a specific competency and similar small studies looked at the impact of measurable implementations and/ or specific training and competencies. For example, in a study by Covington et al (2019) an online educational intervention with practical simulation was found to increase and sustain nurses' knowledge and self-efficacy in assessment, recognition, and treatment of airway emergencies in a gastroenterology clinic. Widening the scope beyond a specific task or skill; in a continuous formalised programme of education, Embertson et al (2020) enabled endoscopy staff to standardise care and maintain competency with new equipment and technology in procedures, improving staff satisfaction as a result.

To explore studies specific to EBP; in a replication of research by Pravikoff et al (2005), a questionnaire-based study by Baker, Ellett & Sharon, (2010) performed to ascertain EBP in 225 American Gastroenterology nurses, less than a third of nurses used evidence to support their practice. Results showed that nurses lacked the understanding and skills required to search for literature using databases and would, for instance, prefer to ask colleagues for advice or type into an internet search engine. Most nurses read two-three journal articles annually, grading themselves as 'novice' at critically appraising research. Searching skills to find current evidence was described as essential by Barnwell (2016) in their case study of specialist nurses' approach to practice. Stating competent practitioners must be knowledgeable on the latest advances in the clinical area for decision making. Yet more consideration needs to be given to once evidence is found, how nurses develop the critical analysis skills required to fully understand and use evidence effectively in practice. Critical analysis skills have historically been taught as part of degree pathways. Potentially

setting nurses who have trained before the advent of degree-based nurse training or not had the opportunity of further post graduate study, and their patients at a disadvantage (Taylor et al 2016).

Studies performed by Barnwell (2016), Brotherton et al (2013), Gee et al (2019), Sephton & Kemp (2013) and Norton (2012) explore the transition to advanced nursing roles and highlight the importance of further training and academic education, drawing on evidence and assurance of competency. Norton (2012) suggest specialist GI nursing roles require education comparable to medical knowledge and skill with nurses training at masters and doctoral levels. The Royal College of Nursing (RCN) endorses this, stating Advanced Nurse Practitioners should be educated to Master's level, using expert knowledge and skills with critical analysis of evidence and assessed as clinically competent (RCN, 2018). This goes a long way to ensure EBP but assurance of competency in these roles also needs to be considered in the absence of UK regulation on advanced practice roles (Sephton & Kemp 2013).

iii) Solution based approaches to education and EBP.

There are many remedies to improve the knowledge and skills of Gastroenterology Nurses, however, the best educational approach is yet to be defined (Naghdi et al., 2017). Consideration should be given to how individuals, institutions and organisations can support the development of knowledge, critical analysis skills and competency to deliver evidenced based care (Baker et al., 2010; Haycock et al., 2012; Norton, 2012 and Taylor et al., 2016).

Individual/local level

Examples of individuals' efforts to educate and develop themselves include reading peer reviewed journal articles and using online educational resources (Baker, Ellett & Sharon, 2010). In their standards of practice and competencies for gastroenterology nurses Bocian et al, (2020) highlight

the benefits of experiential bedside teaching and learning from local experienced nurses through informal mentorship, peer guidance and practical support.

Formal preceptorship has been found to improve the experience of new nurses and even decrease staff turnover (Gee et al., 2019; Norton, 2012). Nursing leaders should perhaps consider creating bespoke preceptorship packages in specialist areas when looking at retention for their workforces. To do this healthcare teams can adopt 'in house' approaches, using local resources, providing informal teaching, and developing their own study sessions. A successful example is provided by the quasi-experimental study by Gardner (2016) that found a single-unit pilot education programme could be provided economically, by existing staff, within working hours and improved staff satisfaction.

Simulation training has also been cited as an effective local educational strategy. Haycock et al, (2012) and more recently Dokoutsidhou et al (2020) used simulation to provide 'mock' rehearsal in the workplace, providing opportunities to practice scenarios and skills without affecting real patients. Improving team competencies as a result.

Local Trust librarians are also a valuable resource, providing a learning environment and teaching literature and database search skills; helping nurses to seek out reliable evidence to underpin their practice (Baker et al., 2010).

Regional/ University accredited education

As set out by the NHS Long term plan (NHS England 2019), UK government and healthcare organisations should provide funding for their nurses to attend regional events, such as workshops, study days and conferences. Although, attention must be given to accredited university courses, which provide the academic support required to develop the critical analysis skills vital for nurses to deliver EBP. This is important as we know nurses lack confidence and competence in this area (Elkin

et al.,2018 and Kao et al., 2013). Baker et al., (2010) & Taylor et al., (2016) agree that unless nurses possess the skills required to locate, appraise, and organise evidence, interpreting it into the practicalities for decision making, they will struggle to truly practice in an evidenced based way and directly influence better patient care. At the same time, we must acknowledge how access to university-based education can be difficult, when even the most motivated individuals struggle for varying reasons, including competing clinical demand, a lack of study time and resources, and funding restrictions placed upon organisations and employers (Taylor et al., 2016).

Perhaps blended learning is happy medium, combining academic training with practical experience gained in clinical areas, like the American Nurse Fellowship Programme for EPB by SGNA & The Joanna Briggs Institute (Daniels & Schmelzer 2012), the Australian Graduate Certificate in nurse endoscopy (Fox, Theobald & Yates 2016) and the UK St Mark's Burdett Nurse Scholarship Programme (Taylor et al 2016). These scholarships supported by supernumerary placements are good examples of practice- based learning, yielding improved motivation, clinical and critical skills, delivery of EBP and dissemination of knowledge gained through publications and presentations at professional conferences.

National level

There are a wide range of clinical guidelines from organisations including the National Institute for Health and Care Excellence (NICE) and the British Society of Gastroenterology (BSG). Disease specific guidelines can help to improve the knowledge of individuals and healthcare organisations to achieve high standards of care for patients. Yet, it should be considered that this evidence can be limited. Indeed, it is only useful if it is interpreted and used as intended and may not be updated in timely response to new evidence provided by clinical trials.

Ensuring standards of knowledge and competence in Gastrointestinal Nursing can also be supported in practice by accreditation standards and frameworks (Sephton & Kemp, 2013). The IBD UK standards, statement 6.1 says patients requiring care for IBD should be admitted to specialist ward areas, under the care of a consultant gastroenterologist and/or colorectal surgeon (IBD UK 2019). This however assumes that specialist areas will provide a better standard of care to patients with IBD. We know from Sephton et al's (2013) questionnaire-based study in England that this is not always the case, again suggesting there is a need to target specialist education.

Good examples of frameworks that consider the underpinning development required include The Joint Advisory Group on Gastrointestinal Endoscopy (JAG) Accreditation Standards for Endoscopy Services (JAG, 2016) which promote measurable internal service appraisal, ensuring the competency and professional development of staff is prioritised. This notion is complimented by the 'JETS Workforce', e-portfolio which drives endoscopy specific competencies (JAG, 2019) and standards of practice and competencies, like those for American, Canadian and Chinese gastroenterology nurses (Bocian., et al 2020 and Ren et al 2019). The Royal College of Nursing; Caring for People with Liver Disease including Liver Transplantation: A Competence Framework for Nursing (RCN 2019) supports professional learning and development of individuals, being specific about the level of knowledge and skills required to demonstrate competency in different roles, in a reflective way, highlighting learning needs to the user (Clayton & Greenslade 2014). Sephton & Kemp (2013) echo the idea that more competency frameworks in specific specialist nursing roles would complement any future NMC regulation of ANP roles.

Conclusion

Whilst many of the studies included in this scoping review contain small sample sizes and are limited to single centres, they are consistent in their findings. Gastroenterology nurses' knowledge requires attention. Indicating more support in education is required, to improve both confidence and evidence based clinical practice of nurses, and the experiences and morbidity of patients. As

gastroenterology nurses work across a broad range of pathologies and a diversity of clinical settings, it is difficult to establish a 'one size fits all' approach to education due to the differing levels of need. Solutions do not need to be expensive or time consuming and can be practical, utilising existing resources and delivered at individual, local, regional, and national levels (Baker et al., 2010).

EBP is crucial to foster improvements in nursing care and patient outcomes. Indeed, whilst many nurses are aware of the importance EBP, they lack the resources, skills, and confidence necessary to implement it practically (Baker et al., 2010). Though academic education in specialist areas has been shown to combat this, equipping nurses with the critical analysis skills required, it is important to acknowledge accessing education can be difficult, with individuals struggling for varying organisational reasons (Taylor et al., 2016). Nurse educators must therefore be more creative in their approaches to nurture gastroenterology nurses' education, using a range of resources including reflection, journal clubs, mentorship, bedside teaching, and webinars. Drawing on national clinical guidelines and accreditation standards/ frameworks (Naghdi et al 2017) and by Universities working more cohesively with health care Trusts to deliver accredited blended learning programmes (Fox et al 2016; Gee, et al 2019 and Taylor et al., 2016).

Future researchers should consider further exploration of the instruments used to measure EBP and competence of Gastroenterology nurses, to evaluate the effectiveness of different educational models and assist educators in the development and refinement of content and delivery.

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Table

Table 1 Database search results

Search term	British Nursing Index	MEDLINE (OVID)
Nurse knowledge AND Gastroenterology	600	15
Gastroenterology Nurses AND evidence-based practice AND knowledge	388	12
Gastroenterology Nurses AND knowledge AND education	415	424

Table 2				
Author (year of publication)	**Study populations**	**Aims of the study**	**Methodology**	**Results**
Aladul, Fitzpatrick & Chapman (2018).	234 UK Specialist Consultants, Nurses and Pharmacists.	Investigate factors influencing biosimilar prescribing practice.	Correlational design using an online survey.	Consultants and Pharmacists were well informed, with comparable levels of awareness of biosimilars used. Nurses were less well informed. All differed in opinions regarding factors influencing prescribing.
Baker, Ellett & Sharon (2010).	225 Members of the Society of Gastroenterology Nurses and Associates (SGNA)	Investigate the EBP of Gastroenterology Nurses in the USA.	Descriptive, design using an online survey.	Gastroenterology nurses are aware of EBP yet lack the skills and resources necessary to implement it. Efforts at the national, regional, local, and individual levels are necessary to promote the use of EBP in gastroenterology nursing practice.
Barnwell (2016).	A colorectal and stoma nurse specialist.	A critical evaluation of decision-making theories that inform practice.	A reflective case study	Structured models provide a comprehensive approach to decision making; however, EBP is dependent on the theoretical and clinical knowledge of the nurse specialist, therefore the competent practitioner must be knowledgeable on the latest advances in the clinical area.
Bocian., et al (2020)		Provide standards of practice and competencies for American and Canadian gastroenterology nurses.	Clinical practice guideline	Nurses should attain knowledge and competence that reflects current gastroenterology nursing practice, with a life-long commitment to reflective learning, sharing educational findings, role modelling and mentoring peers. Integrating the findings of peer-reviewed, published scientific evidence and research into practice.
Brotherton Taylor & Keeling (2013).	Nurses specialising in IBD care.	Describe and analyse the development of the role of IBD specialist nurses.	Literature review	Nurses with specialised knowledge and skills help stretch limited resources to meet rising healthcare demands. Nurses practicing in advanced practice roles are increasingly filling the gaps in IBD.

Clayton & Greenslade (2014)		Describe how a national competency framework was developed and can be used by nurses caring for people with liver disease.	Double blind peer reviewed literature review.	The framework can be used to help nurses to identify their own or their teams learning needs, and develop the skills and knowledge required to build a personal portfolio of competencies.
Conley, Povah, Collins, Theis & Fox (2017).	83 nurses (gastroenterology, elderly, and acute medicine) at Whiston Hospital, England.	Determine nursing knowledge and confidence of percutaneous endoscopic gastrostomy (PEG) care. Evaluate the efficacy of a simple teaching programme.	A single centre quasi-experimental design, using a safety screening questionnaire. Re-audited following delivery of a teaching intervention.	Baseline knowledge and confidence was lacking. An education session successfully improved confidence and deterred potentially dangerous behaviours.
Covington, Muckler, Sheldon, Alexander & Morgan (2019)	14 registered nurses and 7 technicians in a gastroenterology outpatient clinic in North Carolina USA.	To increase and sustain nurses' knowledge and self-efficacy in assessment, recognition, and treatment of airway emergencies.	A single centre, quasi experimental design with a pre- and post-knowledge test. Using online education and practical simulation.	Analysis showed statistically significant increases in both knowledge scores and levels of self-efficacy in immediate and post education assessments.
Daniels & Schmelzer (2012)	Dr Susan Weeks Director of the TCU Centre for EBP and Research.	To give SGNA members a better understanding of a 2-year Nurse Fellowship Programme for EPB by SGNA & The Joanna Briggs Institute (JBI).	A case study narrative transcript of a structured peer interview.	Fellows benefit from professional networking and mentorship to develop an evidence-based project addressing a specific gastroenterology nursing problem and disseminate findings through publications and presentations at professional conferences.
Dokoutsidhou. et al (2020)	12 nurses with and 14 nurses without endoscopy unit experience as well as 18 nursing students at a Medical Physics Simulation Centre. University of Athens.	Assess performance of nurses in simulated sigmoidoscopy training and the impact on performance of endoscopy unit experience, professional experience, and practical skills.	Single centre quasi experimental prospective nonrandomised study design. Using endoscope simulation software with performance metrics.	Training nurses in simulated sigmoidoscopy is feasible using a proper training program. Experience in endoscopy unit and skills in manual activities have a positive impact on the training process.

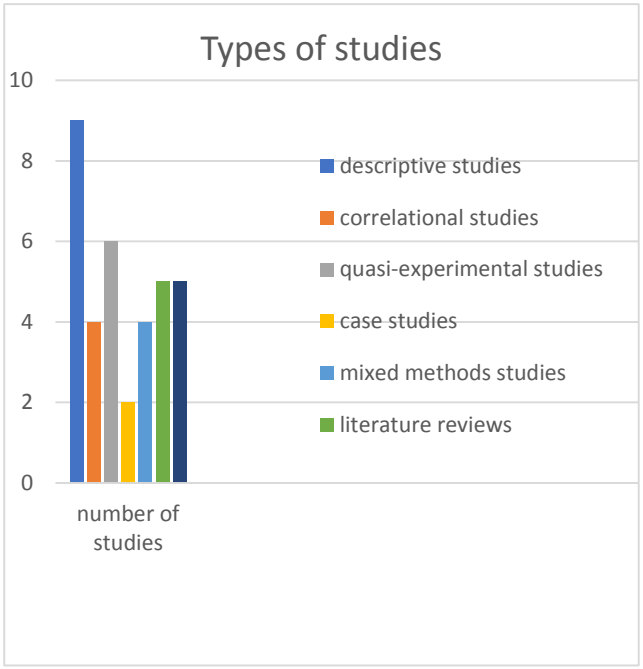
Elkin, Grant, Coleman & Sereika (2018).	13 American Nurse Practitioners.	To investigate the effect of a multi-media education intervention on Nurse Practitioner confidence and knowledge of coeliac disease.	A single group mixed methods design with prospective data collection using an online pre and post learning test, with follow-up surveys	Nurse practitioner confidence and knowledge levels improved after participation in the educational intervention and their clinical practice changed to include recognition and diagnosis.
Embertson, Ernst, Yoder, Monroe & Hess (2020)	39 nurses and 10 supportive personnel at John Hopkins Hospital USA.	Illustrate how an education programme enable's endoscopy staff to standardise care and maintain competency with new equipment and technology and assess satisfaction with support and education provided.	Single centre quasi-experimental design using pre and post education programme surveys to self-evaluate competency, and satisfaction.	Staff did not feel competent or supported and expressed dissatisfaction with the current education provided. The educational programme was introduced using multiple learning resources. Staff's satisfaction of education and resources was improved. Overall communication and collaboration in endoscopy improved and as a result, professional relationships and teamwork was strengthened.
Embleton & Henderson (2020)	182 registered UK nurses who administer rectal medication.	To understand why nurses do not always perform digital rectal examination (DRE) before, and after administering rectal medication.	A descriptive study using a questionnaire via Twitter targeting nurses through hashtags/ retweets to nurse's networks.	The survey demonstrated a lack of awareness of the need for DRE. A lack of competence in and a fear of performing DRE. 38% of respondents said they had not received any formal DRE training.
Feng. et al (2021)	352 nurses from five tertiary hospitals in China	Evaluate risk perception of enteral nutrition (EN).	A multi-centre mixed method study using convenience sampling with a questionnaire.	Nurses' different educational backgrounds had a significant difference of EN risk perception. The questionnaire can be used as a tool to assess nurses' EN risk perception ability, to help to reduce adverse events during EN implementation by targeting education.
Fox, Theobald & Yates (2016)	45 nurse endoscopy students from Queensland Australia	Evaluation of a Graduate certificate course in nurse endoscopy.	A descriptive design using a survey distributed electronically.	Knowledge gained by students on the course was applied in the workplace. Formal education as an asset to improving practice.
Gardner (2016)	20 Registered Nurses in a gastroenterology hospital/clinic in Iowa USA	Explore whether education could be provided economically, by existing staff, within working hours	Single centre quasi-experimental design. Efficacy was measured by	The pilot study demonstrates that peer education can be provided on a unit level, meeting national certification goals for best practices and patient outcomes.

		to meet the requirements of re-certification and improve staff satisfaction.	engagement with the education pilot. Satisfaction was evaluated with pre-pilot/post-pilot surveys.	
Gee, Andreyev, & Mulls (2019).	The first 50 patients assessed by the nurse specialist.	Explore the transition from nurse specialist to advanced clinical practitioner within a GI cancer clinic.	Descriptive, prospective service evaluation, and a reflective journaling.	Reflective journaling allows for identification individual of learning needs. Education in the form of blended learning; formal training, shadowing, using clinical assessment tools/guidelines and personal reflection of practice was essential to transition.
Groenkjaer (2015).	94 gastroenterology nurses in Denmark.	Explore nurses' knowledge and education in the oral care of patients with liver cirrhosis.	A multi-centre descriptive design using a questionnaire.	Respondents had inadequate knowledge on oral care in liver disease, indicating a need for educational updates and the promotion of specific oral assessment guides in liver cirrhosis.
Hopchik (2017)	7 credentialed non-physician endoscopists (five Nurse Practitioners and two Physicians Assistants).	A needs analysis of the education required by endoscopists practicing in America. To understand how knowledge and skills in colorectal cancer screening (CRC) might be improved.	A descriptive design, using an online survey with Likert scale measurement and purposive, snowball sampling technique.	There is interest and motivation to explore and launch a nonphysician gastroenterology, interactive communication, and educational system such as a community of practice to improve knowledge and technical skills and increase access to CRC screening/surveillance.
Haycock, Matharoo & Thomas-Gibson (2012).	Gastroenterology teams.	Explore the importance of team-working in gastroenterology teams and its role in achieving quality care and minimising medical error.	Literature review	Formal analysis of team objectives and identification of essential tasks allowed redesign of team organisation and enabled structured training to strengthen team cohesion, enhance critical team skills and improve clinical outcomes.
Joukar, Mansour-Ghanaei, Soati & Meskinkhoda (2012).	239 Iranian professionals including Doctors, Nurses, and Operating Room Technicians.	To study the knowledge and attitudes of health care providers toward patients with hepatitis C virus infection.	A single centre correlational cross-sectional study using validated questionnaires.	There was a positive correlation between knowledge and attitude scores meaning education would improve the experiences and treatment of patients with Hep C.

Kao, Hsu, Hsieh, & Huang (2012).	65 Gastroenterology Nurses in Taiwan divided into 2 groups	Compare the effects of two educational interventions (a CD-ROM and booklet) on knowledge and competence of nurses in conveying gastroscopy related information to patients.	A quasi-experimental multi-centre study. Pre-test and two post-tests using validated scales.	Both educational interventions improved nurses' knowledge, competence and quality of information given to patients. The CD-ROM had long-term effects on knowledge and short-term and long-term effects on competence.
Kelly (2015).	88 colonoscopy records were surveyed, and 16 nurses were interviewed in the USA.	Examine family history assessment for CRC in outpatient gastroenterology units and nurses' knowledge and attitudes about family history assessments.	A mixed methods multi-centre study. Involving an audit of medical records using a researcher developed tool and convenience sampling interview's	Nurses rated family history as very important but limited history documentation was present in 95% of patients with a family history of CRC. Indicating more education was required.
Lang, Velez, Reiley, & Steinberg (2020)	88 American Nurse Practitioners (NP's) involved in CRC screening including Gastroenterology nurses.	Assess NP knowledge, beliefs, and practice patterns for CRC screening	A descriptive cross-sectional electronic survey.	NPs' knowledge of CRC screening and methods were variable. NPs indicated patients were often unaware of the importance of screening, highlighting an unmet need for NPs to provide education to patients. Targeted education for nurse practitioners on CRC screening guidelines and options is required to improve CRC rates.
Low et al, (2016).	514 respondents including liver teams/nurses, palliative care, and general practice professionals	To determine the knowledge and practice of a UK cohort, delivering palliative care in cirrhosis, and to inform priorities for future research.	A correlational design using on-line questionnaire	Referrals to palliative care teams are low. Many professionals felt ill prepared to provide good care to those facing death. Further training is needed in managing liver-related symptoms, symptom control and end of life issues. Prognostication, symptom management and service configuration were key areas identified for future research.
Naghdi et al, (2017).	163 Canadian GI healthcare practitioners including nurses.	Assess the current knowledge and educational needs of healthcare providers in Hepatitis C management	A descriptive design using a survey designed by an inter-professional steering committee	Nurses and primary physicians reported less confidence in screening and explaining Hep C and treatment to patients and were less aware of medications available. Participants reported inadequate access to funding and resources. National conferences, webinars, lectures, guidelines and reading journal articles were cited as preferred methods of learning.
Norton (2012).	Gastroenterology nurses.	To explore the history, developing practice and the future of gastroenterology nursing.	Literature review	Specialist GI nursing roles require training and education that is comparable to medical knowledge and skill with nurses training at masters and doctoral levels. Research exploring the clinical and cost effectiveness of specialist nurse training is important to safeguard and continue development of roles.
Ren et al (2019)	28 Gastroenterology nurses in China	Proposal of core competencies for	A mixed methods design with literature	Competencies were proposed that enable gastro nurses to acquire knowledge and clinical practices with advanced critical thinking skills that enhance patient safety.

		gastroenterology nursing specialists	review and semi structured interviews	
Sephton et al, (2013).	80 ward nurses sampled from hospital Trusts in the North West UK.	Assess the knowledge base of 40 nurses on a specialist gastroenterology ward in comparison to 40 non-gastro nurses.	A multi-centre correlational design using the validated Crohn's and Colitis knowledge (CCKNOW) questionnaire.	Non gastro nurses had more knowledge of the anatomy of the GI tract than Gastro nurses. Gastro ward nurses were no more knowledgeable about GI diseases than non-gastro ward nurses. More needs to be done to educate gastro ward nurses on the anatomy of the GI tract and IBD.
Sephton & Kemp (2013).	IBD Specialist and Advanced Nurse Practitioners (ANP)	Review evidence for competency frameworks and their contribution to IBD specialist nurse practice in the absence of UK regulation on advanced practice roles.	Literature review	An IBD specialist nurse competency framework would complement any future NMC regulation of ANP roles and would demonstrate applied knowledge and skills, and the increasing accountability and autonomous practice of IBD specialist nurses.
Taylor, Burch, & Black (2016).	6 gastro nurses in London, England	Explore how a GI nursing scholarship can develop general nurses into specialists.	Descriptive design with one-to-one interviews of scholars in a single UK centre.	A funded academic scholarship with a blended academic learning approach combining supernumerary GI clinical placements, supervision, funded study days and masterclasses yields benefits including improved clinical skills, positive professional relationships, heightened motivation, and greater opportunities to network and delivery of EBP.

Table 3.


Types of studies
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number of studies
descriptive studies
correlational studies
quasi-experimental studies
case studies
mixed methods studies
literature reviews