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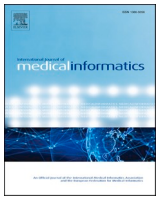

Informing nursing policy: An exploration of digital health research by nurses in England

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ABSTRACT

Aims: Digital health technologies are designed, implemented, and evaluated to support clinical practice, enable patients to self-manage illness, and further public and global health. Nursing and health policies often emphasise the importance of evidence-based digital health services to deliver better care. However, the contribution nurses make to digital health research in many countries is unknown. Hence, this study aims to examine digital health research conducted by nurses in England.
Design: A bibliometric analysis.
Methods: The CINAHL, MEDLINE, and Scopus databases were searched between 2000 and 2022, and supplemented with a hand search of nurses' research profiles. Results were screened by title, abstract, and full text against eligibility criteria. Data were extracted and bibliometric analysis used to summarise the findings.
Results: Mental health nurses produced the most digital health research in England, followed by nurses working in community care, with several disciplines underrepresented or missing. Web/online health services or information was the most researched technology, followed by mobile health and telehealth. Nurses based in the south-east and north-west of England produced the most digital health research, with other regions less well represented.
Conclusion: Nurse leaders should support nurses to conduct more digital health research by providing dedicated time, funding, and professional development opportunities, particularly in under researched clinical areas, technologies, and geographic regions to further evidence-based practice and patient care. More digital nursing data is needed to support nurse led research in areas like artificial intelligence and data science. The findings supported the national Philips Ives Review by identifying areas of digital nursing research that need more investment in England.

1. Introduction

In 2020, the World Health Organization published its long awaited "*State of the World's Nursing*" report which highlighted the contribution of the global nursing workforce to health systems worldwide, and the investment that is needed in nursing education, clinical practice, research, and leadership [1]. This seminal and timely report estimated the global nursing workforce at 27.9 million and emphasised that nurses are the largest occupational group in the health sector, accounting for 59% of all healthcare professionals. Traditionally, nurses have focused on providing direct patient care along with the managerial and administrative functions required to deliver nursing services in hospital and community settings [2]. Over time, nurses have expanded into a range of advanced practice specialities while developing research expertise that enable them to generate scientific evidence to inform professional practice [3]. In tandem, leadership roles in nursing have evolved with Chief Nursing Officers advising government and creating policy in key areas of health and care [4]. Despite these advances, areas within the

Abbreviations: AI, Artificial Intelligence; CP, Computer-aided Psychotherapy; CHD, Coronary Heart Disease; COVID-19, Coronavirus disease / SARS-CoV-2; EPR, Electronic Patient Record; FAME, Falls Management Exercise; IT, Information Technology; ICU, Intensive Care Unit; ICNP, International Classification for Nursing Practice; ISO, International Organization for Standardization; NHS, National Health Service; TLS, Total Link Strength; UK, United Kingdom.

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profession still require attention and investment.

1.1. Health informatics

Rapid technological changes have occurred in recent times with the introduction of desktop computing in the 1980′s, followed by the Internet in the 1990′s, and advances in mobile technologies [5]. The birth of social media in the 2000′s and the rise of wearable devices in subsequent decades facilitated an explosion of digital data which has led to new fields such as data science emerging [6]. More recently, artificial intelligence (AI) has become a hot topic in informatics as machine learning and natural language processing techniques begin to be applied to health and care datasets [7–9]. Although some of these innovations in information technology (IT) have been adopted by nurses over the years such as electronic health records, the pace of change has been slow and, in some cases, not led by nurses but other professional groups. Many barriers such as a lack of informatics education in the profession [10–12], traditional attitudes towards nursing care, concerns around workload and burnout when using IT [13], and the privacy and security of digital health data [14] among others have hampered the development and implementation of digital technologies in nursing practice.

Despite the somewhat slow uptake of digital technologies in areas within the profession, nursing researchers have been examining how to design, test, implement, and evaluate a range of electronic tools across many healthcare settings. The field of nursing informatics began in the 1980′s and was approved as a nursing speciality by the American Nurses Association in 1992. It is defined as "*a specialty that integrates nursing science, computer science, and information science to manage and communicate data, information, and knowledge in nursing practice. Nursing informatics facilitates the integration of data, information, and knowledge to support patients, nurses, and other providers in their decision making in all roles and settings. This support is accomplished through the use of information structures, information processes, and information technology*" [15] (pg. 260). Hence, scientific research into digital technologies that nurses' and their patients use has been ongoing for many years and expanded rapidly in recent times in line with new trends in informatics such as data science and AI [16,17]. However, some countries and regions of the world have invested more in nursing informatics research and practice than others.

1.2. Nursing informatics in England

In England, one country within the United Kingdom (UK), more attention has been given to digital technologies in nursing in recent times. In 2013, the Department of Health and Social Care set up NHS Digital to provide digital health and social care services in England, although it recently merged with the National Health Service (NHS) [18,19]. NHS X saw the introduction of the national Chief Nursing Informatics Officer (CNIO) role in 2019 which led to a national agenda for having a CNIO in every NHS Trust in England. NHS England also produced a national strategy, The NHS Long-term Plan, that includes technology as a key component in delivering high quality patient care [20,21]. In parallel, other initiatives such as the establishment of the UK Faculty for Clinical Informatics in 2017, the development of clinical informatics competencies and frameworks in the UK [22,23], and the creation of the NHS Digital Academy to train digital healthcare leaders among others have ignited more interest in nursing informatics.

In 2021, the Chief Nursing Officer for England launched a new strategic plan for research which emphasised the importance of generating and translating nurse led research to underpin the development of digitally enabled practice environments [24]. The following year, the CNIO for England launched the Philips Ives Review to identify the needs of the nursing and midwifery workforce in relation to digitally enabled practice [25]. This comprehensive review involved a series of expert advisory panels across seven themes to examine the impact of technological advances on the nursing and midwifery workforce, and make a series of recommendations for future education and research to inform clinical practice and workforce development.

2. Methodology

2.1. Aims

This study aimed to quantify, describe, and compare digital health research undertaken by nurses in England to identify areas of nursing informatics research and practice that need more investment. Bibliometric methods were utilised to investigate the volume and scope of this body of scientific literature. Bibliometrics is often described as "*the application of mathematics and statistical methods to books and other media of communication*" [26] with many studies in nursing using this approach to summarise research on topics such as workplace incivility [27], the productive ward [28] or nurses' contribution to universal health coverage [29] among others.

2.2. Study population and data collection

In October 2022, a number of searches were run on the CINAHL (EBSCOhost), MEDLINE (Ovid), and Scopus bibliographic databases. The keywords used encompassed search terms relevant to digital health technologies related to clinical practice, along with relevant MeSH and Emtree terms and subject headings, combined with the term 'nurs*' and the geographic location of interest (Appendix A). Dates were limited between 2000 and 2022. The results were exported to Endnote and duplicates removed. Due to the limitations of database searching, this approach was complemented by a manual search of the top fifteen universities in England based on the 2022 QS World University Rankings for Nursing. The publications listed on the university profile of each member of nursing staff were reviewed in November 2022 to identify relevant research studies on digital health. The online profiles of nurses with relevant published research were searched again in September 2023 to capture any articles up until the end of 2022 that fit the study aims. Experts in the field were also contacted to identify well-known researchers working in nursing informatics at universities in England to ensure their published research was included.

Search results were uploaded to Rayyan software for screening. Only peer-reviewed studies that were empirical in nature or were some type of literature review and published in the English language were included, as these yield the most useful data for bibliometric analysis [30]. Conference proceedings, dissertations and theses, books, and book chapters, editorial or discussion articles, and study protocols were excluded. The following eligibility criteria were adopted: A nurse(s) of any discipline must be a co-author(s) on a published research study and be based at an institution in England. The study must focus on technologies for direct patient care, population health, or nursing administration and management in any environment. The titles, abstracts and full-text articles were reviewed, discarding studies that were not relevant, with any disagreements resolved by consensus discussion.

2.3. Data extraction and analysis

Key study information were extracted to Microsoft Excel to aid bibliometric analysis including the first author, year, nurse author, nurse author institution and region, journal, study country or location, research aims, nursing focus, study design, participants, digital health intervention, and study results. The 2022 impact factor for each publication was searched for on Journal Citation Reports as an indicator of study quality and added to the dataset, although this metric has limitations [31]. A number of measures were used to evaluate the data: 1) distribution of publications by year, 2) distribution of publications by region and institution, 3) distribution of publications by digital health research area, 4) distribution of publications by study location, 5) co-occurrence of keywords by year, 6) co-authorship links, and 7) top ten

most cited articles. The first four measures were produced by analysing data on MS Excel and tables and figures created, and VOSviewer, a software platform for visualisation bibliometric networks, was employed to generate the last three measures. Total link strength (TLS) is a measure of connectivity between elements in a dataset and contains weighted attributes e.g., occurrences, citations [32].

3. Results

3.1. Study characteristics

Two hundred and sixty-nine articles were included, published between 2000 and 2022, with a significant increase in the volume of digital health research by nurses based in England over the last five years (Fig. 1). The majority of studies were conducted in the UK (n = 151, 56%), although some digital health research was undertaken in other parts of the world as nurses were involved in global health research. There were five primary studies based in Bangladesh (1.85%) [33–37], one in Kenya (0.37%) [38], and one in Pakistan (0.37%) [39], with one systematic review focusing on five countries in sub-Saharan Africa [40]. These all focused on mobile health research bar one study which centred on nurses' use of social media. In addition, some nurses had worked in or had collaborations with colleagues in other countries and so some studies hailed from Australia (n = 3, 1.11%), Norway (n = 3, 1.11%), Sweden (n = 4, 1.48%), South Korea (n = 1, 0.37%), the United States (n = 19, 7.06%), and The Netherlands (n = 4, 1.48%). Furthermore, several studies were international incorporating data from multiple countries and there were many literature reviews that were integrative, narrative, scoping, or systematic in nature which included studies from around the world (Appendix B).

The populations involved in the digital health research varied widely and included adult and paediatric patients, informal carers, along with nurses, medical doctors, allied health professions and other stakeholder groups such as health service managers, social workers, housing officers, and employees from the technology industry among others. There were no participants in some studies as they focused on data standards and other technical aspects of designing, developing, or implementing digital health technologies. The settings comprised of acute hospital and primary care settings with care homes, residential facilities, family physician offices, schools, and private residences being included among others. Some studies focusing solely on virtual environments such as social media platforms, web-based services, or online information. The study designs included quantitative, mixed methods and qualitative approaches, with numerous types of literature reviews also being used (Appendix B). The top ten most cited digital health research studies were published from 2009 to 2020 and accumulated between 135 and 341 citations to date (Table 1). The impact factors of the journals ranged from zero, as newer journals may not be allocated this metric, to 168.9, with most studies (n = 53, 19.7%) published in scientific journals with an impact factor between 2.0 and 2.9 indicating a range of low, medium, and high-quality studies (Table 2).

3.2. Digital health research by nurses in England

Nurses in England produced a range of digital health research with the top ten most frequently studied areas being; 1) web-based/online services or information (n = 68, 25%), 2) mobile health (n = 37, 14%), 3) telehealth (n = 33, 12%), 4) a mix of technologies (n = 29, 11%), 5) data standards and data sharing (n = 16, 6%), 6) clinical decision support systems (n = 15, 6%), 7) general digital health (n = 14, 5%), 8) computerised interventions (n = 12, 4%), 9) electronic health records (n = 12, 4%), and 10) artificial intelligence (n = 10, 4%). Exemplar studies of each of these are provided in Table 3. An overlay visualisation of co-occurring terms (five times or more) displayed overtime confirms some of the popular areas of digital health research (Fig. 2). Other less commonly researched areas of digital health were avatars, data visualisation, digital skills, gaming, medical devices, robotics, virtual reality, wearable devices, and ethical or legal aspects related to health IT.

3.3. Digital health research related to areas of clinical nursing practice

Digital health research undertaken by nurses in England also spanned many areas of clinical practice. The top ten most frequently reported areas were; 1) mental health (n = 41, 15%), 2) community care (n = 27, 10%), 3) oncology (n = 25, 9%), 4), informatics (n = 22, 8%), 5) general nursing (n = 22, 8%), 6) children and young people's health (n = 18, 7%), 7) older persons care with several studies focusing on dementia (n = 18, 7%), 8) diabetes (n = 15, 6%), 9) cardiology (n = 7, 3%), and 10) critical care (n = 7, 3%). Exemplar studies of each of these are provided in Table 4. Other less commonly reported areas of nursing related to digital health research were gastroenterology, global health, emergency

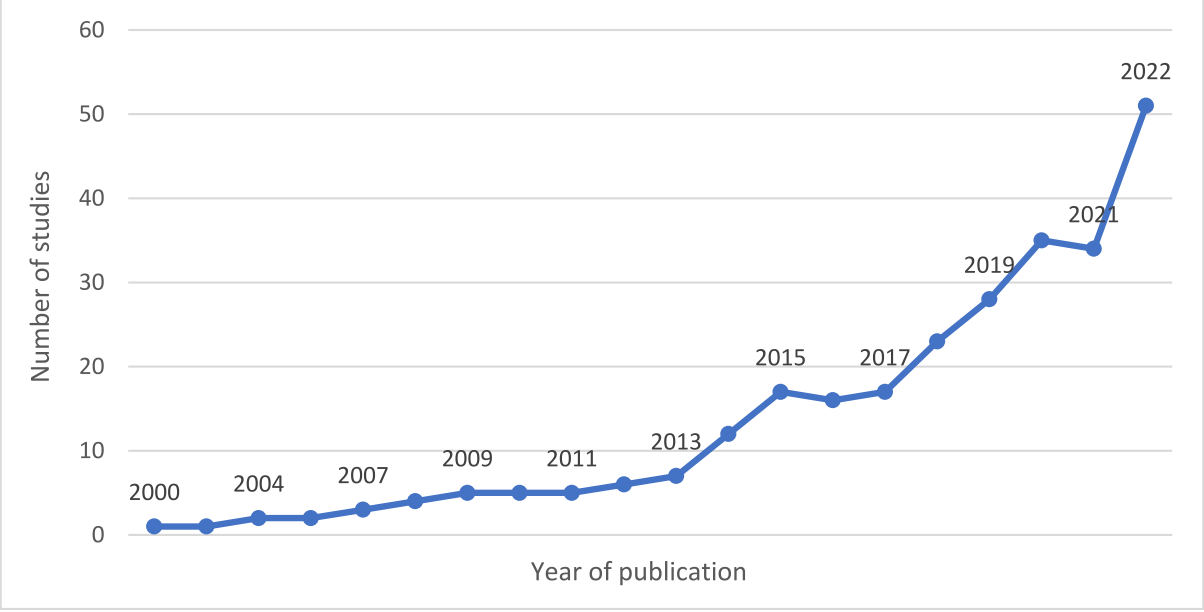

Fig. 1. Digital health research undertaken by nurses in England from 2000 to 2022.

Table 1
Top ten most cited digital health research studies (citations from Scopus).

Year	Author name(s)	Title	Journal	Citation
2009	Cuijpers, P., Marks, I. M., van Straten, A., et al. [41]	Computer-aided psychotherapy for anxiety disorders: a *meta*-analytic review	Cognitive Behaviour Therapy	341
2016	O'Connor, S., Hanlon, P., O'Donnell, C. A., et al. [42]	Understanding factors affecting patient and public engagement and recruitment to digital health interventions: a systematic review of qualitative studies	BMC Medical Informatics and Decision Making	318
2013	Moyle, W., Cooke, M., Beattie, et al. [43]	Exploring the effect of companion robots on emotional expression in older adults with dementia: a pilot randomized controlled trial	Journal of Gerontological Nursing	212
2015	Dowding, D., Randell, R., Gardner, P., et al. [44]	Dashboards for improving patient care: review of the literature	International Journal of Medical Informatics	206
2017	Cox, A., Lucas, G., Marcu, A., et al. [45]	Cancer survivors' experience with telehealth: A systematic review and thematic synthesis	Journal of Medical Internet Research	188
2017	Stanmore, E., Stubbs, B., Vancampfort, D., et al. [46]	The effect of active video games on cognitive functioning in clinical and non-clinical populations: a *meta*-analysis of RCTs	Neuroscience & Biobehavioral Reviews	182
2008	Bee, P. E., Bower, P., Lovell, K., et al. [47]	Psychotherapy mediated by remote communication technologies: a *meta*-analytic review	BMC Psychiatry	152
2020	Lee, J. J., Kang, K. A., Wang, M. P., et al. [48]	Associations Between COVID-19 Misinformation Exposure and Belief With COVID-19 Knowledge and Preventive Behaviors: Cross-Sectional Online Study	Journal of Medical Internet Research	149
2015	Majeed-Ariss, R., Baildam, E., Campbell, M., et al. [49]	Apps and adolescents: A systematic review of adolescents' use of mobile phone and tablet apps that support personal management of their chronic or long-term physical conditions	Journal of Medical Internet Research	147
2011	Hardiker, N. R., & Grant, M. J. [50]	Factors that influence public engagement with eHealth: A literature review	International Journal of Medical Informatics	135

care, genomics, renal, surgery, and sexual health among others, with some clinical specialities absent from the review findings. The overlay visualisation of co-occurring terms displayed over time also shows the emergence of digital health research focusing on technologies for managing aspects of COVID-19 linked to critical care settings (Fig. 2).

Table 2
Impact factor of journals of the digital health research studies.

Impact Factor (2022)	Number and percentage of studies
0	n = 30 (11.15%)
0–0.9	n = 1 (0.37%)
1.0–1.9	n = 28 (10.41%)
2.0–2.9	n = 53 (19.70%)
3.0–3.9	n = 48 (17.84%)
4.0–4.9	n = 43 (15.99%)
5.0–5.9	n = 14 (5.20%)
6.0–6.9	n = 14 (5.20%)
7.0–7.9	n = 21 (7.81%)
8.0–8.9	n = 5 (1.86%)
9.0–9.9	n = 1 (0.37%)
10.0–49.90	n = 10 (3.72%)
50.0–99.90	n = 0 (0%)
>100.0	n = 1 (0.37%)

3.4. Digital health research by region, institution, and co-authorship links

Nurses who conducted digital health research were based in a number of institutions across all regions of England. The south-east of England produced the most research over the 20-year timeframe which included several universities and NHS Trusts such as King's College London (n = 53, 20%), City University of London (n = 19, 7%), the University of Surrey (n = 18, 7%), London South Bank University (n = 1, 0.4%), Guy's and St Thomas' NHS Foundation Trust (n = 1, 0.4%), Imperial College Healthcare NHS Trust (n = 1, 0.4%), and Kingston University (n = 1, 0.4%) (Table 5). The north-west of England also generated a significant volume of digital health research from nurses at institutions such as The University of Manchester (n = 51, 19%), the University of Leeds (n = 22, 8.2%) and the University of Huddersfield (n = 21, 7.8%). In addition, the north-east of England published a range digital health research from nurses at Northumbria University (n = 8, 3%), the University of Hull (n = 5, 2%), and the University of York (n = 20, 7%). While many nurses contributed to digital health research in the included studies in this review as numerous studies comprised of large multidisciplinary teams, only 67 studies (25%) were led by a nurse based at an institution in England. A network visualisation shows that 62 authors were linked by three or more publications with other authors in the dataset (Fig. 3). These are grouped into 9 coloured clusters with 166 links and a total link strength of 428. The size of the points (dots) representing each author denotes their total number of publications in the dataset, and the links between authors are detailed in Appendix C. This suggests that regional clusters, where colleagues worked physically close to each other, led to research collaborations and publications on digital health.

4. Discussion

4.1. Principal findings

This bibliometric study found a range of digital health research undertaken by nurses in England since the turn of the 21st century. Notably, the number of published studies increased over the last decade from 2013 onwards, although there was a slight lull during the 2019 and 2020 period most likely due to the impact of the COVID-19 pandemic on health research [76]. This was followed by a sharp increase probably due to the widespread use of digital technologies in healthcare during and post pandemic, a trend seen internationally [77]. A wide variety of methodologies were utilised to conduct digital health research across a range of acute, community, and virtual settings. While much of the digital health research was conducted in the UK, nurses collaborated with colleagues in many other parts of the world to examine different electronic tools in healthcare and were also involved in technology related research in global health, particularly examining mobile health solutions as they are low cost and easier to implement that other digital

Table 3
Top ten areas of digital health research undertaken by nurses in England.

Area of Digital Health Research	Exemplars from included studies
Web-based/online services or information (n = 68, 28%)	Exemplar 1: To assess the quality, readability and coverage of website information about herbal remedies for menopausal symptoms [51] Exemplar 2: To describe the individual and network characteristics of the personal communities of people using the internet and the role of offline support, network resources and community participation in using the internet for condition management [52]
Mobile health (n = 36, 15%)	Exemplar 1: To explore the views of children with CKD, their parents, and health care professionals to inform future development of a child-focused, care-management app [53] Exemplar 2: To explore the equity of the reach and impact of mHealth and participatory learning and action community mobilisation interventions to prevent and control type 2 diabetes [34]
Telehealth (n = 33, 14%)	Exemplar 1: To determine the clinical effectiveness of remotely communicated, therapist-delivered psychotherapy [47] Exemplar 2: To assess how health care organization setup influences the perceptions and experience of service managers and frontline staff during the development and deployment of integrated care with and without telehealth [54]
Mix of technologies (n = 29, 12%)	Exemplar 1: To examine whether communication technologies (e.g., mobile telephony, forums, email) can be used to transfer digital information between healthcare professionals and young people who live with diabetes [55] Exemplar 2: To describe, assess the feasibility of, and explore the impact of digital clinical communication between families or caregivers and health professionals [56]
Data standards and sharing (n = 16, 7%)	Exemplar 1: To explore the use and impact of standardized terminologies within nursing and midwifery practice [57] Exemplar 2: To assess the relative merits of aspects—labels or informal definitions—of traditional nursing terminology systems as the foundational sources for target formal nursing terminology systems [58]
Clinical decision support systems (n = 14, 6%)	Exemplar 1: To provide a comprehensive overview of the current state of evidence for the use of clinical and quality dashboards in health care environments [44] Exemplar 2: To develop and evaluate a quality dashboard (i.e. QualDash) to support clinical teams' and managers' use of national audit data [59]
Computerised (n = 12, 5%)	Exemplar 1: A meta-analysis of 23 randomised controlled studies that compared computer-aided psychotherapy (CP) with non-CP in anxiety disorders [41] Exemplar 2: To examine providing advice on individual lifestyle habits using kiosks containing an interactive multimedia touch-screen computer program [60]
General (n = 12, 5%)	Exemplar 1: To identify and explore the components, acceptability and effectiveness of eHealth interventions for people with dementia, families and staff to support assessment and decision-making in care homes [61] Exemplar 2: To explore the feasibility of the virtual environment system as a therapy tool when used during a single session halfway through a 12-week cognitive behavioural therapy intervention [62]
Electronic health records (n = 10, 4%)	Exemplar 1: To explore how nurses' use of electronic health records impacts on the quality of nurse–patient interactions and communication [63] Exemplar 2: To understand the experiences and perceptions of all relevant stakeholders using an EPR system in the paediatric hospital setting, including the use of an EPR-linked patient portal [64]
Artificial intelligence (n = 9, 4%)	Exemplar 1: To develop a predictive risk model (PRM) for patient-reported anxiety after treatment completion for early stage breast cancer suitable for use in practice and underpinned by advances in data science and risk prediction [65] Exemplar 2: To synthesise literature on AI in nursing and midwifery [8]

tools making them more suitable for community healthcare workers, patients, and carers in low and middle income countries [78]. The World Health Organization supports this approach, recognising the contribution digital technologies can make towards universal health coverage and recommends that governments worldwide develop, evaluate, implement, and scale up their use [79].

Mental health was the area of nursing practice that produced the most digital health research with many clinical areas within the profession underrepresented or missing. Mental health nurses typically examined ways to deliver computerised or online forms of cognitive behavioural and other therapies, and may have been influenced by colleagues in related fields such as psychiatry and psychology to develop, test, and implement digital health interventions [80,81]. In addition, the populations of people accessing mental health services may also be more interested, actively involved in, and suited to virtual forms of diagnosis and treatment as digital services can provide more privacy and anonymity. Hence, a digital approach to healthcare may be valued more by those who face discrimination and stigma in relation to mental health problems.

Community nursing also produced more digital health research than other areas. The community setting may present opportunities for nurses to explore certain technologies such as mobile health, web-based services, and online information as there can be less barriers to patients engaging in digital tools for self-management at home rather than in hospital settings where organisational issues may complicate the introduction, use, and evaluation of technology [14]. For example, issues of professionalism sometimes arise when nurses wish to use mobile devices in clinical areas [82], and as seen in many countries the introduction of electronic health records and other computing systems in hospitals is expensive and requires a lengthy and complex programme of change management [83]. More investment may be needed to support nurses in other clinical specialities to conduct digital health research to determine if electronic tools can enable professional practice and patient care. For instance, there were only three studies related to palliative care [84–86]. As primary providers of palliative care in most countries, nurses working in this setting may need additional support to utilise digital datasets and explore technologies to care for people who are terminally ill. Furthermore, only a handful of studies centred on global health an area that nurses could contribute more too to address the digital divide in the global South and health inequalities that digital technologies can cause [87]. The United Nations roadmap for digital cooperation encourages governments and communities to address these issues, such as the 3.6 billion people without access to the Internet to help achieve the Sustainable Development Goals [88]. Nurses are well placed to contribute to this and should be facilitated to build partnerships with colleagues in low- and middle-income countries to undertake research that addresses digital inclusion, builds capacity in digital nursing, and develops digital tools to support patient care and population health in these settings.

Informatics also emerged as a distinct area of nursing research and practice but only a handful of nurses in England focused exclusively in

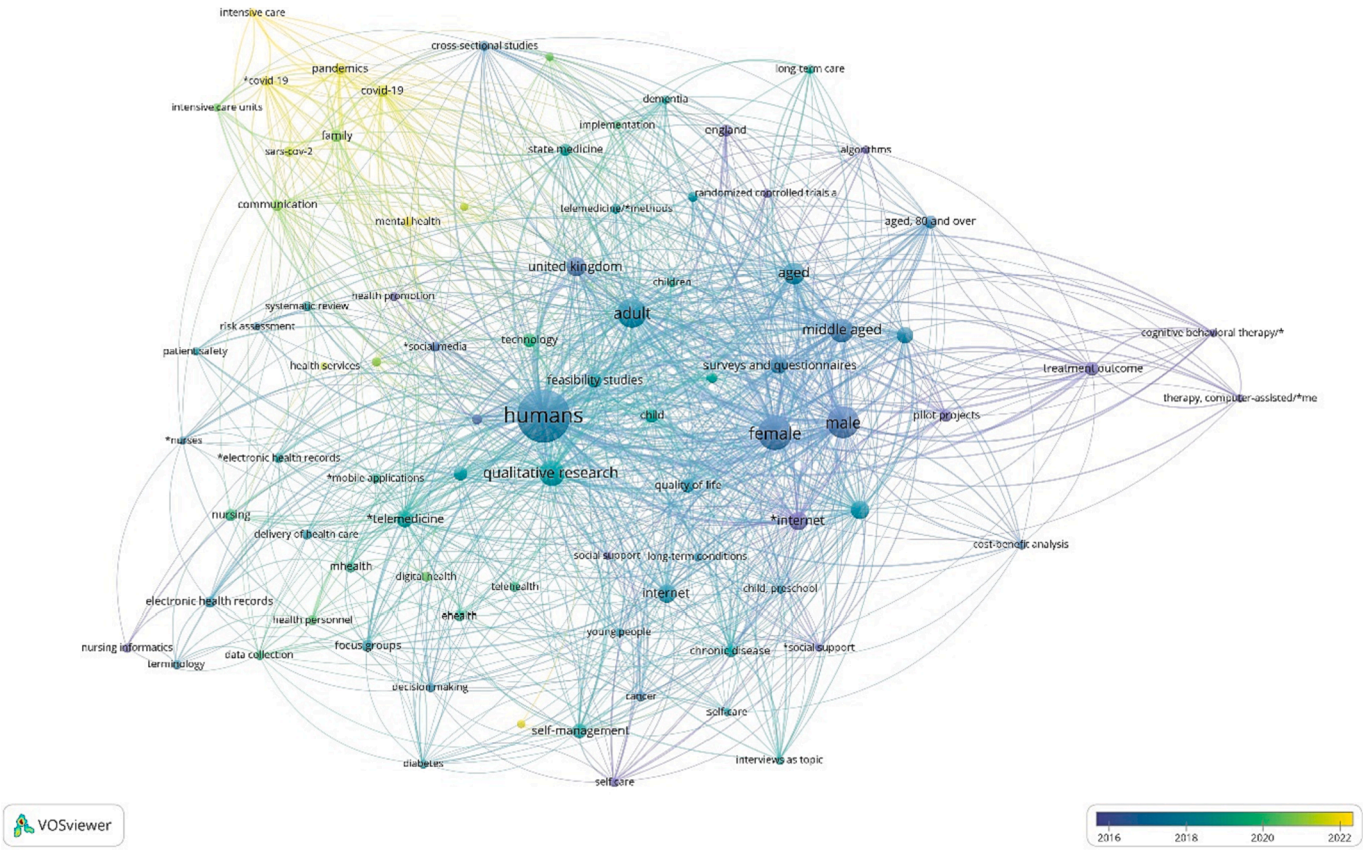

Fig. 2. Co-occurring words (5 or more times) shown overtime based on the titles and included studies.

this niche area, as most concentrated on clinical research and only produced technology related health research periodically. This trend is seen internationally with nursing informatics being a specialist area that fewer nurses work in [89]. Backonja et al. [90] make a number of recommendations to support the leadership pipeline in nursing informatics including mentoring, education/training, and networking opportunities to ensure nurses can engage in this area of research and practice, and become leaders in the field in their own countries and internationally. Professional associations for nursing informatics, such as the American Nursing Informatics Association (https://www.ania.org/), have been established in some countries which could be useful to replicate elsewhere to support nursing research and practice in this area, with a"Digital Nursing Forum" in place at the Royal College of Nursing for nurses based in the UK (https://www.rcn.org.uk/Get-Involved/Forums/Digital-Nursing-Forum). In addition, dedicated scientific conferences such as the International Congress on Nursing Informatics (https://imia-medinfo.org/wp/imia-ni-goals-objectives/) are held regularly which nurses could attend to appreciate the depth and breath of research in this area, and as a professional newtorking and career development opportunity.

A wide range of technologies were investigated by nurses in England, with web/online health services or information being the most common, followed by mobile health and telehealth. This mirrors nursing and health informatics research and practice more widely [89]. Some areas of informatics such as gaming, wearable devices, robotics, virtual reality, and ethical or legal aspects related to health IT were less well represented indicating that nurses may need more education and support with exploring these types of electronic tools and issues in their professional practice. In addition, artificial intelligence (AI) is a hot topic in informatics with government and industry funding available to create sophisticated algorithms, predictive models, and AI-based digital tools in healthcare [91]. Although some nurses in England are beginning to examine these advanced computational techniques, only a handful of studies were related to AI which echoes research studies related to AI in nursing globally [8]. This suggests the nursing profession needs to be educated about this topic so they can assume more leadership roles in AI research and practice to enhance patient care.

Nurses based in a number of institutions in the south-east and north-west of England produced the most digital health research, with other regions less well represented. This may reflect national variations in the location of universities and large hospitals, and funding streams that target certain regions, clinical areas, and NHS Trusts such as the Global Digital Exemplars [92], as well as limitations in how this study was conducted. More investment and support may be needed to encourage nurses in the north-east, south-west and central regions of England to develop and evaluate technologies for professional practice and patient care. This could take the form of targeted funding calls, specialist training, and mentorship programmes in digital health [90], as well as the development of new roles or the expansion of existing roles specific to nursing informatics in education, research, and clinical practice (e.g., CNIO) which may help address the leadership gap in this area [7,93].

4.2. Implications for nursing and health policy

Some key implications for nursing in England emerged from the study findings, many of which are likely relevant to nurses in other countries. First, nurse leaders should strengthen capacity in the workforce to undertake digital health research that underpins practice. Nurses need protected time, funding, and other resources to lead and participate in digital health research to investigate how digital data and information technologies can enhance patient care, population health, and the delivery of health services. Specific clinical specialities within the profession such as palliative care, public health, and global health among others may need additional support in this area. Nurse leaders

Table 4
Top ten areas of nursing related to digital health research.

Area of Clinical Nursing Practice	Exemplars of digital health research
Mental health (n = 41, 15%)	To evaluate the cost effectiveness of digital interventions for generalised anxiety disorder [66]
Community care (n = 27, 10%)	To review of the existing reviews of literature relating to the use of internet videoconferencing for consultations between healthcare professionals and patients with long-term conditions in their own home [67]
Oncology (n = 25, 9%)	To determine feasibility and acceptability of a web-based tool (RESTORE) to enhance self-efficacy to manage cancer-related fatigue and trial processes [68]
Informatics (n = 22, 8%)	To synthesise an information quality framework that could be used to evaluate the extent to which digital health information is fit for clinical purposes [69]
General nursing (n = 22, 8%)	To evaluate the impact of networked computers, with open access to the Internet, on four acute wards in a large UK teaching hospital [70]
Children and young people's health (n = 18, 7%)	To explore the usability and refine the content of a health promotion mobile phone application, "Grow up Safely" [71]
Older persons care (n = 18, 7%)	To determine the effectiveness of a tailored Otago/FaME-based strength and balance Exergame programme for improving balance, maintaining function and reducing falls risk in older people [72]
Diabetes (n = 15, 6%)	To describe and examine the relationship between human factors and adherence with technology for data logging processes in adults with Type 1 Diabetes [73]
Cardiology (n = 7, 3%)	To conduct a systematic review to determine the effectiveness of Internet-delivered coronary heart disease (CHD) self-management support for improving CHD, mood, and self-management related outcomes [74]
Critical care (n = 7, 3%)	To understand the experiences and perceived benefits of virtual visiting from the perspectives of intensive care unit (ICU) -experienced clinicians and non-ICU-experienced family liaison team members [75]

Table 5
Region and institutions in England where digital health research was undertaken by nurses.*

Region	Institutions	Total
South-east	City University of London, Guy's and St Thomas' NHS Foundation Trust, Imperial College Healthcare NHS Trust, Kings College London, Kingston University, London South Bank University, University of Brighton, University of Surrey	n = 95 (35%)
North-west	University of Huddersfield, University of Leeds, and The University of Manchester	n = 94 (35%)
North-east	Northumbria University, University of Hull, University of York	n = 33 (12%)
South central	Oxford Brookes University, Oxford Health NHS Foundation Trust, University of Southampton	n = 28 (10%)
Central	Sheffield Hallam University, University of Birmingham, University of Nottingham, University of Sheffield, University of Wolverhampton	n = 20 (7%)
South-west	Plymouth University, University of Exeter, University of the West of England	n = 10 (4%)
East	University of East Anglia	n = 3 (1%)

* Footnote: Some articles were co-authored by nurses from more than one institution.

may also need to advocate for more technical infrastructure such as electronic patient record systems and mobile and wearable devices to facilitate certain forms of digital health research, along with appropriate training for nurse practitioners to become involved in informatics research that can inform practice. This aligns with the International Council of Nurses (ICN) recent position statement on digital health transformation and nursing practice which emphasises that technology could support equitable and universal access to health services. The ICN call on the nursing profession to keep pace with digital transformation in several ways including evaluating new and emerging technologies, and it also encourages national governments to support nursing informatics specialists and ensure the nursing workforce have the competencies they need to lead and participate in digital health initiatives [94].

Second, nurses in England ought to seek opportunities to develop, test, and if effective implement digital technologies in professional practice which may require collaborating with other clinical, scientific, and technical colleagues in practice, academia, and industry. Collecting nursing data in a digital form is also critical as this can be used in research for secondary analysis to grow certain areas of informatics such as AI and data science expertise in nursing. This is important across all settings such as hospital, primary care, public health, and global health so that nurses in all roles from frontline care to senior management can support digital health research and facilitate new evidence on technologies that can positively impact practice and patient care. The WHO's Global Strategic Directions for Nursing and Midwifery 2021 to 2025 also emphasises the importance of collecting standardised nursing data and using decision support technologies and telehealth services in practice, particularly in response to public health emergencies like COVID-19 [95].

Third, nurse educators should teach informatics in undergraduate and postgraduate nursing programmes in universities in England to ensure the next generation of nurses have the knowledge and skills to undertake digital health research and deliver care in digitally enabled practice environments. The WHO also highlight the importance of educating nurses so they have adequate digital literacy and can adapt to the changing technology landscape and virtual models of care now and in the future [95]. Digital nursing placements within the health service and health technology companies could also be beneficial for students to show them that informatics is an established and valued career path in nursing in the UK and internationally. Additional training opportunities should be created for nurse practitioners to upskill in digital health and gain specialist qualifications such as Masters and PhDs in areas of informatics that will help generate more scientific research and support the profession going forward. Continuing professional development may also be important to invest in so nurses can access ad-hoc training in emerging areas of informatics such as the metaverse, digital twins, and others that will no doubt emerge in the future.

4.3. Strengths and limitations

This study was strengthened by combining database searching with manual searches of nurses' online research profiles, screening studies using independent reviewers, and using robust software for bibliometric analysis. However, a number of limitations are present. For pragmatic reasons, several universities in England and universities in the three other regions of the UK (Northern Ireland, Scotland, and Wales) were not included. In addition, some of the university websites were difficult to navigate and the online profiles of nursing researchers may not have been up to date. Nurses who had worked at institutions in England between 2000 and 2022 may have retired or moved elsewhere, or they could be based in other faculties or areas within a university instead of a nursing faculty. Furthermore, nurses based clinically often have no online research profiles that are easily accessible and searchable, unless they hold a clinical-academic role, meaning some pertinent literature may have been missed. Finally, the review excluded studies on digital forms of nursing education and electronic ways of undertaking nursing research, meaning the review results are only a snapshot of clinically focused digital health research undertaken by nurses in England. Hence, the review results do not represent all areas of nursing informatics research and practice.

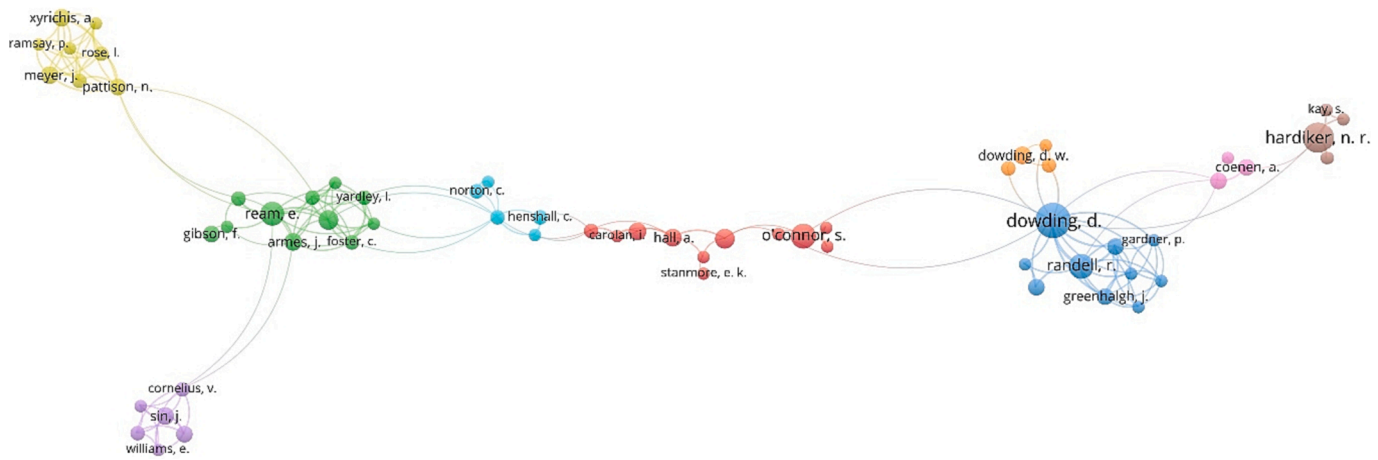

Fig. 3. Co-authors links (3 or more publications).

5. Conclusions

The study's findings highlight the depth and breadth of digital health research produced by nurses in England in recent years, with key informatics trends such as web-based/online services or information, mobile health, and telehealth among others being examined. It is recommended that nurse leaders advocate for and invest in educating and supporting nurses to undertake more digital health research, particularly in under researched clinical areas, technologies, and geographic regions to further patient care. They also need to facilitate the collection of digital nursing data to support nurse led research in AI and data science that could generate evidence to inform professional practice, patient care, and population health. Nurse practitioners should pursue opportunities to examine digital health datasets and develop, test, and if effective implement information technologies that support high quality care. Finally, nurse educators should create curricula in informatics and integrate this into teaching and assessment so nursing students learn key knowledge and skills for digitally enabled practice and research environments. These changes could help the profession utilise digital health research to transform nursing practice, patient care, and the delivery of health services in acute and community settings.

5.1. Summary table

- This bibliometric analysis represents the first study to examine digital health research conducted by nurses in a particular country over a twenty-year timeframe.
- The study highlights key areas of clinical practice, geographic locations, and digital health technologies that need more investment to generate evidence to inform nursing practice and patient care.
- A number of key recommendations are made for nursing informatics research, education, and practice to support nurses to develop, test, and if effective implement new digital tools in healthcare to further population health and service delivery.

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CRediT authorship contribution statement

Siobhan O'Connor: Conceptualization, Data curation, Formal analysis, Methodology, Writing – original draft. **Louise Cave:** Conceptualization, Data curation, Formal analysis, Methodology, Writing – review & editing. **Natasha Philips:** Conceptualization, Formal analysis, Writing – review & editing.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: [Louise Cave was a Digital Fellow who worked on the Philip Ives Review as part of the NHS Transformation Directorate in NHS England. Dr Siobhan O'Connor is a nurse based at a university in England who conducts digital health research and contributed as an expert on the data and science panel as part of the Philips Ives Review. Natasha Philips was the Chief Nursing Informatics Officer at NHS England and led the Philip Ives Review in 2022 and 2023. The authors have no other conflicts of interest to declare.].

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Appendix A. Search strategy on CINAHL

No.	Search terms
S1	(MH "Internet") OR (MH "Cellular phone") OR (MH "Social media") OR (MH "Virtual reality") OR (TI (digital* OR technolog* OR comput* OR "artificial intelligence" OR "clinical decision support" OR CDSS OR "information technolog*" OR "electronic health" OR eHealth OR e-Health OR "mobile health" OR mHealth OR m-Health OR telehealth OR telemedicine OR informatics OR "electronic patient record" OR "electronic health record" OR "electronic medical record" OR EPR OR EHR OR EMR) OR AB (digital* OR technolog* OR comput* OR "artificial intelligence" OR "clinical decision support" OR CDSS OR "information technolog*" OR "electronic health" OR eHealth OR e-Health OR "mobile health" OR mHealth OR m-Health OR telehealth OR telemedicine OR informatics OR "electronic patient record" OR "electronic health record" OR "electronic medical record" OR EPR OR EHR OR EMR)

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No.	Search terms
S2	(MH "Nurses") OR (TI (nurs*) or AB (nurs*))
S3	(TI (England OR "United Kingdom" OR UK OR English OR British) OR AB (England OR "United Kingdom" OR UK OR English OR British)
S4	S1 AND S2 AND S3 AND S4

Appendix B. Study characteristics

No	Authors, Year, DOI	Institution / Region	Study country	Aims	Nursing practice	Study design	Digital health intervention
1	Aldiss et al., 2015, https://doi.org/10.1016/j.pedn.2014.09.014	London South Bank University, Southeast	Multiple (review)	To evaluate and assess the benefit of electronic media technologies in supporting children and young people with long-term conditions	Children and young people's health	Review	Electronic media technologies
2	Allen et al., 2016, https://doi.org/10.2196/jmir.5260	University of Southampton, South central	Multiple (review)	To understand the negotiation of long-term condition illness, work in patient online communities and how such work may assist the self-management of long-term conditions in daily life	Community – self-management of long-term conditions	Review (*meta*-synthesis)	Patient online communities
3	[52], https://doi.org/10.1177/1742395318759588	University of Southampton, South central	United Kingdom	To describe the individual and network characteristics of the personal communities of people using the internet and the role of offline support, network resources and community participation in using the internet for condition management	Community – self-management of long-term conditions	Secondary analysis of survey data using logistic regression	Internet
4	[52], https://doi.org/10.1111/1467–9566.13042	University of Southampton, South central	United Kingdom	To examine the work and relatedness of 30 participants, who used online communities	Community – self-management of long-term conditions	Qualitative in nature (semi-structured interviews)	Online communities to support self-management
5	Allen-Taylor et al., 2022, https://doi.org/10.2196/34650	King's College London, Southeast	United Kingdom	To explore the experiences and perspectives of individuals with Type 2 Diabetes for whom insulin therapy is indicated as expressed on web-based health forums, in order to inform the development of evidence-based structured educational and support strategies and improve health care provider awareness	Diabetes	Qualitative in nature (posts and threads from online forums)	Web-based health forums (Diabetes UK and Diabetes.co.uk forums)
6	Andreyev et al., 2013, https://doi.org/10.1016/S0140-6736(13)61648–7	Kings College London, Southeast	United Kingdom	To assess whether patients after pelvic radiotherapy could be helped if a practitioner followed an investigative and management algorithm, and whether outcomes differed by whether a nurse or a gastroenterologist led this algorithm-based care	Gastroenterology	Three-arm randomised controlled trial	Artificial intelligence (AI) - investigative and management algorithm
7	[56], https://doi.org/10.1016/S0140-6736(13)61648–7	Kings College London, Southeast	Multiple (review)	To describe, assess the feasibility of, and explore the impact of digital clinical communication between	Children and young people's health	Review (rapid)	Digital communication e.g., videoconferencing or video consultation (n = 14), and Web

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No	Authors, Year, DOI	Institution / Region	Study country	Aims	Nursing practice	Study design	Digital health intervention
				families or caregivers and health professionals			messaging or emails (n = 12)
8	Baggott et al, 2012, https://doi.org/10.2196/resprot.2175	University of Surrey, Southeast	USA	To describe the utility of an eDiary designed for young adults with cancer	Children and young people's health	Qualitative design (pilot study with interviews)	Electronic symptom diary based on interviews conducted with young adults with cancer and their clinicians
9	Bailey et al, 2015, https://doi.org/10.1108/HCS-09–2015-0015	Northumbria University, Northeast	United Kingdom	To report on a small telehealth pilot in local authority sheltered housing in Northeast England	Respiratory nursing	Qualitative - case study approach	Telehealth service for sheltered housing tenants with Chronic obstructive pulmonary disease
10	Barrera et al., 2020, https://doi.org/10.1136/ebmental-2019–300136	Oxford Health NHS Foundation Trust, South central	United Kingdom	To establish whether it is safe to conduct nursing observations remotely from the nursing office using the novel digital technology (AI-based sensors)	Mental health	Quantitative - surveys with staff and sensor data	Artificial intelligence based Oxehealth sensors and infrared camera
11	Barazzone et al, 2012, https://doi.org/10.1111/j.2044–8260.2012.02035.x	University of Exeter, Southwest	United Kingdom	To assess whether and to what extent three widely used cCBT programs for depression incorporate and convey key features that serve to establish, develop, and maintain a therapeutic alliance with program users	Mental health	Qualitative approach to develop a thematic framework	Three online Computerized cognitive behavioural therapy (cCBT) programs designed to treat mild-to-moderate depression
12	Barrett, 2016, https://doi.org/10.1111/jocn.13656	University of York, Northeast	United Kingdom	To develop a theory that offered an evidence-based insight into the use of teleconsultation by nurses	Chronic disease management	Qualitative - constructivist grounded theory	Teleconsultation
13	Batchelor et al, 2022, https://www.jmir.org/2022/2/e27781/	City University of London, Southeast	United Kingdom	To explore the experiences of carers and perceived acceptability of the digital mental health intervention and their ideas to improve the provision	Mental health	Qualitative in nature (interviews)	Carers fOr People with Psychosis e-support a psychoeducational intervention delivered via an enriched web-based learning environment
14	[47], https://doi.org/10.1186/1471-244X-8–60	The University of Manchester, Northwest AND University of Exeter, Southwest	Multiple (review)	To determine the clinical effectiveness of remotely communicated, therapist-delivered psychotherapy	Mental health	Review (systematic)	Remote communication technologies (e.g., telephone, internet) for remote psychotherapy
15	Beentjes et al, 2016, https://doi.org/10.1186/s12913-016–1267-z	University of Southampton, South central	The Netherlands	To describe the development of an e-health application for the illness, management, and recovery programme and the design of an early clustered randomized controlled trial	Mental health	Qualitative (six step protocol of intervention mapping)	E-health intervention for consumers with severe mental illness
16	Bennett and Hardiker, 2017, https://doi.org/10.1093/jamia/ocw151	University of Huddersfield, Northwest	Multiple (review)	To review of international literature evaluating the impact of computerized clinical decision support systems (CCDSSs) on the care of emergency department (ED) patients	Emergency care	Review	Computerized clinical decision support systems (CCDSSs)
17	Blake et al, 2020, https://doi.org/10.3390/ijerph17010379	University of Nottingham, Central	United Kingdom	To provide evidence-based guidance and support for employers around health checks and HIV testing in the workplace	Immunology	Mixed methods	Digital toolkit for employers on workplace health checks and opt-in HIV testing
18	Block et al, 2019, https://doi.org/10.2196/12847	University of Huddersfield, Northwest	International	To examine the extent to which International Classification for Nursing Practice (ICNP) community nursing	Informatics – data standards	Qualitative (content mapping approach)	Knowledge representation in standardized clinical terminologies and classifications

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No	Authors, Year, DOI	Institution / Region	Study country	Aims	Nursing practice	Study design	Digital health intervention
				interventions were represented in the ICHI administrative classification system			
19	Blower et al, 2020, https://doi.org/10.1136/archdischild-2020–319103	University of Leeds, Northwest	Multiple (review)	To identify children and young people's reported concerns or needs in relation to using health technologies to self-manage long-term conditions	Paediatrics	Review (scoping)	Health technologies to self-manage long-term conditions
20	Bond & Hewitt-Taylor, 2013, https://doi.org/10.14236/jhi.v21i1.11	University of Wolverhampton, Central	United Kingdom	To explore the self-management approaches of people with diabetes, and how self-testing of blood glucose contributes to self-management strategies	Diabetes	Qualitative	Medical devices and online health information
21	Bond & Worswick, 2015, https://doi.org/10.1007/s40271-014–0091-y	University of Wolverhampton, Central	United Kingdom	To evaluate a local telehealth program for patients with chronic obstructive pulmonary disease or chronic heart failure	Long-term conditions	Qualitative (interviews)	Telehealth
22	Bond and Ahmed, 2016, http://dx.https://doi.org/10.14236/jhi.v23i3.853	University of Wolverhampton, Central	United Kingdom	To explore what information is being shared on health-related discussion boards and identified the approaches people used to signpost their peers to information	Diabetes	Qualitative (content analysis)	Online health-related discussion boards
23	Bradbury et al, 2019, https://doi.org/10.1038/s41746-019–0163-4	University of Southampton, South central	United Kingdom	To illustrate a rigorous approach to developing digital interventions using an evidence-, theory- and person-based approach	Cancer	Qualitative (interviews and focus groups)	Digital intervention (not specified)
24	Brooks et al, 2022, https://doi.org/10.1186/s12913-022–08521-1	The University of Manchester, Northwest	United Kingdom	To co-adapt a web-based social network intervention, GENIE™, for use in secondary mental health services	Mental health	Qualitative (reviews and semi-structured interviews)	Web-based social network intervention, GENIE™, for use in secondary mental health services
25	Brooks et al, 2020, https://doi.org/10.1007/s00127-022–02242-w	The University of Manchester, Northwest	United Kingdom	To identify the current evidence base, assess risk of bias and synthesise findings on the effectiveness of social network interventions for people with mental health problems	Mental health	Review (systematic)	Social network interventions
26	Brown and O'Connor, 2020, https://doi.org/10.1080/17538157.2020.1728536	King's College London, Southeast	Multiple (review)	To review the qualitative literature on mobile health applications for people with dementia	Dementia	Review (systematic)	Mobile health applications
27	Campling et al, 2017, https://doi.org/10.1186/s12913-017–2408-8	University of Southampton, South central	United Kingdom	To explore end users' opinions of telehealthcare devices	Community - primary care	Qualitative (focus groups and interviews)	Telehealth / telecare devices ranging from personal alarms, automated pill dispensers and fall detectors to monitoring devices for blood sugar, blood pressure and heart rate
28	Celik et al, 2020, https://doi.org/10.12968/bjon.2020.29.5.266	Kings College London, Southeast	Multiple (review)	To assess the impact of online self-management interventions with digital consulting on glycated haemoglobin (HbA1c), total cholesterol, blood pressure, diabetes	Diabetes	Review (systematic)	Online self-management education programme

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No	Authors, Year, DOI	Institution / Region	Study country	Aims	Nursing practice	Study design	Digital health intervention
				distress, self-efficacy, and depression in midlife adults			
29	Cerga-Pashoja et al, 2020, https://doi.org/10.1080/10503307.2020.1720932	University of York, Northeast	United Kingdom	To explore the value of adding internet self-help to face-to-face therapy, from the perspective of practitioners who used both	Mental health	Qualitative – (focus groups and interviews)	Internet self-help
30	Cho et al, 2018, https://doi.org/10.1016/j.jbi.2018.08.012	The University of Manchester, Northwest	USA	To report a methodological approach for the development of a usable mHealth application (app)	Nursing informatics - app development	Usability evaluation framework	Mobile HIV symptom self-management app
31	Choi et al, 2021, https://doi.org/10.1177/0733464821991024	The University of Manchester, Northwest	United Kingdom	To describe participants' acceptance of the overall intervention and the KOKU app and their perception of helpfulness of each intervention component as well as overall intervention experience	Older adult care (exercise self-management)	Mixed methods	Mobile health - iPad-based gamified strength and balance exercise app (called KOKU)
32	Cleaver et al., 2020, https://doi.org/10.1016/j.ienj.2020.100875	Imperial College Healthcare NHS Trust, Southeast	United Kingdom	To design a rapid assessment and treatment decision-support app to assist emergency department nurses to select investigations and treatments at initial patient assessment and aid acuity scoring	Emergency care	Observational study	Decision-support touch screen tablet application
33	Clifton et al, 2013, https://nrl.northumbria.ac.uk/28038/	Northumbria University, Northeast	Multiple (review)	To identify the extent, if any, that digital technology can impact on the mental well-being of children and young people	Child health (mental health)	Review	Digital technologies and social media (mixed)
34	Contreras et al, 2021, https://doi.org/10.1017/S1754470X21000337	University of East Anglia, East	United Kingdom	To explore therapists' perceptions and acceptability of providing internet-delivered, therapist-guided, self-help acceptance and commitment therapy for family carers of people with dementia	Older adult care (Dementia)	Qualitative (interviews)	Internet-delivered, therapist-guided, self-help acceptance and commitment therapy
35	Contreras et al, 2022, https://doi.org/10.1080/17482631.2022.2066255	University of East Anglia, East	United Kingdom	To explore carers' views and acceptability of internet-delivered, therapist-guided, self-help Acceptance and Commitment Therapy (ACT) for family carers of people with dementia (iACT4CARERS)	Older adult care (Dementia)	Qualitative (interviews)	Internet-delivered, therapist-guided, self-help acceptance and commitment therapy
36	Cook & Hand, 2022, https://doi.org/10.1108/WWOP-03–2022-0010	Northumbria University, Northeast	United Kingdom	To explore whether older people could use ear Me Now (HMN) and to examine their usage of this application	Older adult care	Mixed methods	Mobile technology
37	Corbett et al, 2018, https://doi.org/10.1002/pon.4566	University of Southampton, South central	Multiple (review)	To summarise existing knowledge to inform the development of an online intervention that aims to improve quality of life after cancer treatment	Cancer	Review	Web-based interventions designed to improve quality of life
38	Cox et al, 2017, https://www.jmir.org/2017/1/e11/	City University of London, Southeast	Multiple (review)	To systematically identify, appraise, and synthesize qualitative research evidence on the	Cancer	Review (systematic)	Telehealth interventions

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No	Authors, Year, DOI	Institution / Region	Study country	Aims	Nursing practice	Study design	Digital health intervention
				experiences of adult cancer survivors participating in telehealth interventions			
39	Cox et al, 2022, https://doi.org/10.3390/nu14204292	King's College London, Southeast	United Kingdom	To investigate the effectiveness and acceptability of a web resource in enhancing FR-QoL in newly diagnosed inflammatory bowel disease	Gastroenterology	Mixed methods (feasibility trial and process evaluation)	Web resource in enhancing food-related quality of life (FR-QoL)
40	[41], https://doi.org/10.1080/16506070802694776	University of York, Northeast	Multiple (review)	A meta-analysis of 23 randomised controlled studies (RCTs) that compared CP with non-CP in anxiety disorders	Mental health	Review (systematic with *meta*-analysis)	Computer-aided psychotherapy (CP)
41	Curtis and Brooks, 2020, https://doi.org/10.7748/nop.2020.e1236	Kingston University, Southeast	United Kingdom	To identify the factors that enable nurses to implement DHT in nursing homes and to co-design a nurse-led stepped process supporting the effective implementation of DHT innovations in nursing homes	Care home	Qualitative (appreciative inquiry)	General health information technologies
42	[54], https://doi.org/10.2196/20282	University of York, Northeast	International (Spain, The Netherlands, Italy, UK - Scotland)	To assess how health care organization setup influences the perceptions and experience of service managers and frontline staff during the development and deployment of integrated care with and without telehealth	Integrated care (chronic disease management)	Quantitative descriptive	Telehealth
43	Deluca et al, 2022, https://doi.org/10.1111/add.15884	University of Hull, East	United Kingdom	To evaluate the effectiveness and cost-effectiveness of alcohol screening and brief intervention (ASBI) compared with screening alone (SA) in high-risk adolescents	Emergency care	Multi-centre, single-blind, individually randomized trial	Personalized feedback and brief advice (PFBA), personalized feedback plus electronic brief intervention (eBI) and screening alone
44	Devlin et al, 2015, https://doi.org/10.1093/jamia/ocv097	King's College London, Southeast	United Kingdom	To identify implementation lessons from a large-scale, national technology program that aims to deliver a broad range of digital services and products to the public to promote health and well-being	Community / primary care	Qualitative longitudinal study	Range of consumer facing digital health interventions
45	Donagh et al, 2022, https://doi.org/10.1332/239868021X16397664798942	University of Birmingham, Central	United Kingdom	To reflect on the use of technology in service delivery (domestic violence and abuse (DVA)) during the COVID-19 pandemic	Children & young people	Qualitative	Remote, digital-enabled support
46	Donoghue et al, 2014, https://doi.org/10.2196/jmir.3193	University of Hull, East	Multiple (review)	To determine the effectiveness of electronic screening and brief intervention (eSBI) over time in nontreatment-seeking hazardous/harmful drinkers	Addictions	Review (systematic with *meta*-analysis)	Electronic screening and brief intervention (eSBI)
47	Dowding et al, 2008, https://doi.org/10.1111/j.1365–2702.2008.02607.x	The University of Manchester, Northwest	United Kingdom	To explore how nurses use computerised clinical decision support systems in clinical practice and the factors that influence use	Informatics	Qualitative - multiple case site study	Computerised clinical decision support systems

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No	Authors, Year, DOI	Institution / Region	Study country	Aims	Nursing practice	Study design	Digital health intervention
48	Dowding et al, 2011, https://doi.org/10.1136/amiajnl-2011–000504	The University of Manchester, Northwest	United Kingdom	To evaluate the impact of electronic health record (EHR) implementation on nursing care processes and outcomes	Informatics	Quantitative - Interrupted time series analysis	Electronic health record (EHR)
49	Dowding et al, 2014, https://doi.org/10.3109/17538157.2014.948169	The University of Manchester, Northwest	United Kingdom	To explore how nurses use an integrated Electronic Health Record (EHR) in practice	Informatics	Qualitative (interviews & observation)	Electronic Health Record (EHR)
50	[44], https://doi.org/10.1016/j.ijmedinf.2014.10.001	The University of Manchester, Northwest	Multiple (review)	To provide a comprehensive overview of the current state of evidence for the use of clinical and quality dashboards in health care environments	Informatics	Literature review	Clinical decision support systems
51	Dowding et al, 2018, https://doi.org/10.1097/JHQ.0000000000000104	The University of Manchester, Northwest	United Kingdom	To explore perceptions among home care clinicians of the barriers they face and the information they need to improve care continuity for patients with heart failure	Informatics	Qualitative (focus groups)	Health information technology (HIT)
52	Dowding et al, 2018, https://doi.org/10.1055/s-0038–1666842	The University of Manchester, Northwest	United Kingdom	To develop a heuristic evaluation checklist that can be used to evaluate systems that produce information visualizations	Informatics	Quantitative (nominal group technique)	Clinical decision support systems (CDSS) - information visualizations
53	Dowding et al, 2019, https://doi.org/10.1097/CIN.0000000000000484	The University of Manchester, Northwest	United Kingdom	To outline a usability evaluation of a dashboard designed for home care nurses	Informatics	Mixed methods	Clinical decision support systems (dashboards)
54	Dowding et al, 2021, https://doi.org/10.1093/jamia/ocaa267	The University of Manchester, Northwest	United Kingdom	To outline how a clinical risk prediction model for identifying patients at risk of infection is perceived by home care nurses	Informatics	Qualitative (interviews)	Artificial intelligence - clinical prediction model/tool
55	Dwyer et al, 2022, https://doi.org/10.3389/fendo.2022.909830	City University of London, Southeast	United Kingdom	To develop and test a mobile health tool (KS Transition Passport) to educate patients about Klinefelter syndrome (KS), encourage self-management and support successful transition to adult-oriented care	Genetics	Quantitative (chart review, patient survey, scoping review)	Mobile health tool (KS Transition Passport)
56	Evans et al, 2016, https://doi.org/10.1186/s12889-016–3278-4	University of Nottingham, Central	United Kingdom	To describe a rigorous approach to developing digital interventions using an evidence-, theory- and person-based approach	Cancer	Qualitative (interviews and focus groups)	Renewed digital intervention for patients
57	Evans et al, 2019, https://doi.org/10.1177/0017896918785928	University of Nottingham, Central	United Kingdom	To use participatory approaches to investigate the use of a text messaging intervention to encourage HIV testing among migrant African communities	Sexual health	Participatory action research	Mobile health - two text messages per week (one on HIV and one on general health) for 12 weeks
58	[69], https://www.jmir.org/2021/5/e23479/	King's College London, Southeast	Multiple (review)	To synthesize an IQ framework that could be used to evaluate the extent to which digital health information is fit for clinical purposes	Informatics - data quality	Review (systematic)	Mix of digital health technologies
59	Fawson et al, 2021, https://doi.org/10.1007/s10620-021–07109-9	King's College London, Southeast	United Kingdom	To understand patients' symptom self-management strategies	Gastroenterology	Qualitative (interviews and focus groups)	Online symptom self-management intervention

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No	Authors, Year, DOI	Institution / Region	Study country	Aims	Nursing practice	Study design	Digital health intervention
				and preferred design for a future online symptom self-management intervention			
60	[57], https://doi.org/10.1016/j.ijmedinf.2021.104431	University of Huddersfield, Northwest	Multiple (review)	To explore the use and impact of standardized terminologies (STs) within nursing and midwifery practice	Informatics	Review (scoping)	Standardized terminologies (STs)
61	Fitzgerald et al, 2011, https://doi.org/10.1001/archsurg.2010.333	King's College London, Southeast	United Kingdom	To evaluate the effect of real-time, computer-prompted, evidence-based decision and action algorithms on error occurrence during initial resuscitation	Emergency care	Quantitative - randomized, controlled interventional study	Computer-aided decision support
62	Forde-Johnson et al, 2022, https://doi.org/10.1111/jan.15484	Oxford Brookes University, South central	Multiple (review)	To explore how nurses' use of electronic health records impacts on the quality of nurse–patient interactions and communication	Informatics	Review (integrative)	Electronic health records
63	Fortune et al, 2017, https://doi.org/10.1093/jamia/ocw173	University of Huddersfield, Northwest	Australia	To test the draft classification's coverage of interventions commonly delivered by nurses, and propose changes to improve the utility and reliability of the classification for aggregating and analyzing data on nursing interventions	Informatics	Quantitative (phase 2 mapping method)	Data standards in nursing
64	Foster et al, 2015, https://doi.org/10.1002/pon.3747	University of Surrey, Southeast AND University of Southampton, South central	United Kingdom	To co-create an evidence-based and theoretically informed web-based intervention designed to enhance self-efficacy to live with cancer-related fatigue (CRF) following primary cancer treatment	Cancer	Mixed methods	Web-based intervention (RESTORE) designed to enhance self-efficacy to live with cancer-related fatigue
65	Foster et al, 2016, https://doi.org/10.1007/s00520-015–3044-7	University of Surrey, Southeast	United Kingdom	To test the proof of concept and inform the design of an effectiveness trial of a web-based resource designed to enhance self-efficacy to manage cancer related fatigue (CRF)	Cancer	Mixed methods – RCT and process evaluation	Web-based resource designed to enhance self-efficacy to manage cancer related fatigue (CRF)
66	Fottrell et al, 2019, https://doi.org/10.1016/S2213-8587(19)30001–4	University of York, Northeast	United Kingdom	To assess the effect of mHealth and community mobilisation on the incidence of type 2 diabetes among people with intermediate hyperglycaemia in Bangladesh	Diabetes	Three-arm, cluster-randomised clinical trial (RCT)	mHealth mobile phone messaging
67	Franklin et al, 2019, https://doi.org/10.1002/nop2.282	Oxford Brookes University, South central	United Kingdom	To explore how mobile technology can support self-management in adults with type 1 diabetes (T1DM)	Diabetes	Qualitative (interviews)	Mobile technology
68	Furlong et al, 2019, https://cancer.jmir.org/2019/1/e10813	University of Surrey, Southeast	International – 13 cancer centres in Austria, Greece, Ireland, Norway, and United Kingdom	To test a mobile phone–based remote symptom monitoring system to enhance management of chemotherapy toxicities among people with cancer receiving adjuvant chemotherapy versus standard cancer center care	Review (scoping)	Quantitative	Mobile phone–based remote symptom monitoring system to enhance management of chemotherapy toxicities

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No	Authors, Year, DOI	Institution / Region	Study country	Aims	Nursing practice	Study design	Digital health intervention
69	Gasteiger et al, 2022, https://doi.org/10.1007/s12687-022–00579-y	The University of Manchester, Northwest	Multiple (review)	To review of patient-facing genetic/genomic mobile apps explores content, function, and quality	Genomics	Review (systematic)	Patient facing genomic mobile apps
70	[62], https://doi.org/10.1089/cyber.2013.1510	University of York, Northeast	United Kingdom	To explore the feasibility of the VE system as a therapy tool when used during a single session halfway through a 12-week CBT intervention	Mental health	Mixed methods	Virtual environment (VE) system (specially scripted and digitally edited filmed environment played in real time on a screen)
71	Gega et al, 2022, https://eprints.whiterose.ac.uk/171555/	University of York, Northeast	Multiple (review)	To evaluate and summarise published economic studies about digital interventions across different technologies, therapies, comparators and mental health conditions	Mental health	Review (systematic)	Digital interventions
72	Gibson et al, 2016, https://doi.org/10.1002/pon.4061	University of Surrey, Southeast	United Kingdom	To determine how young people describe these challenges through a social media site	Cancer	Qualitative - ethnography	Social media
73	Gilbody et al, 2017, https://doi.org/10.1192/bjp.bp.116.192435	University of Exeter, Southwest AND University of Manchester, Northwest	United Kingdom	To test the benefits of adding telephone support to Computerised cognitive–behavioural therapy	Mental health	Quantitative - pragmatic randomised trial	Computerised cognitive–behavioural therapy (cCBT)
74	Griffiths et al, 2017, https://www.jmir.org/2017/4/e102/	Kings College London, South east	United Kingdom	To understand how the use of digital communication between young people with long-term conditions and their NHS specialist clinicians changes engagement of the young people with their health care; and to identify costs and necessary safeguards	Young people	Mixed methods	Mix of technologies - mobile phone calls, text messages, email, and voice over Internet protocol
75	Griffiths et al, 2020, https://doi.org/10.1177/2055207620919594	Kings College London, South east	United Kingdom	To explore whether mConsulting can fill gaps in access to quality healthcare for poor and spatially marginalised populations of low- and middle-income countries	Global health	Realist methods	Mobile health
76	Guo et al, 2016, https://doi.org/10.1002/nop2.37	Kings College London, South east	Multiple (review)	To provide evidence of the impact of mobile technologies among healthcare professionals in education and practice settings	Informatics	Review (integrative)	Mobile health
77	Hall et al, 2017, https://doi.org/10.1016/j.ijnurstu.2017.04.008	The University of Manchester, Northwest	United Kingdom	To explore facilitators and barriers to the implementation of monitoring technologies in care homes	Older adult care (care homes)	Qualitative - case study	Monitoring technologies in care homes
78	Hall et al, 2019, https://doi.org/10.1186/s12877-019–1155-6	The University of Manchester, Northwest	United Kingdom	To explore the extent to which remote monitoring of the workforce, and equality of access to technologies, were seen to influence the implementation of monitoring technologies within long-term care facilities	Older adult care (care homes)	Qualitative - case study	Monitoring technologies (e.g. wearable or environmental sensors)
79	Hall et al, 2019, https://doi.org/10.1080/17483107.2018.1491647	The University of Manchester, Northwest	United Kingdom	To develop research into a new hip protector that aims to overcome some of the acceptance and adherence challenges	Older adult care (care homes)	Qualitative – descriptive	Fall-Safe Assist hip protector (built-in mobile technology to record falls and summon help from caregivers)

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80	Hand et al, 2021, https://doi.org/10.1093/jacamr/dlab111	University of Southampton, South central	United Kingdom	To understand the impact on prescribing behaviour of an antimicrobial therapy guidelines smartphone app	Infection control	Qualitative – descriptive	Mobile health - MicroGuide app
81	[58], https://doi.org/10.1016/j.jbi.2003.09.009	University of Huddersfield, Northwest	United Kingdom	To assess the relative merits of aspects—labels or informal definitions—of traditional nursing terminology systems as the foundational sources for target formal nursing terminology systems	Informatics	Not applicable	Data standards (nursing)
82	[58], https://doi.org/10.1055/s-0038–1634359	University of Huddersfield, Northwest	United Kingdom	To describe the development of a logical ontology for nursing interventions and presents the results of evaluation	Informatics	Not applicable	Data standards (nursing)
83	Hardiker & Coenen, 2007, https://doi.org/10.1016/j.ijmedinf.2007.05.005	University of Huddersfield, Northwest	United Kingdom	To examine how ISO 18104:2003 has been interpreted in the development of ICNP® Version 1.0 by identifying mappings between ICNP® and the ISO standard	Informatics	Not applicable	Data standards (nursing)
84	[50], https://doi.org/10.1016/j.ijmedinf.2010.10.017	University of Huddersfield, Northwest	Multiple (review)	To explore public engagement with eHealth through a review of published international literature	Informatics	Review (qualitative)	Mix of technologies
85	Hardiker et al, 2019, https://doi.org/10.1016/j.ijmedinf.2019.04.021	University of Huddersfield, Northwest AND The University of Manchester, Northwest	Multiple (review)	To identify themes, that might meaningfully contribute to a new approach to nursing record systems development, around four key interrelated areas – standards, decision making, abstraction and summarization, and documenting	Informatics	Review	Electronic health records (EHRs)
86	[60], https://doi-org/10.1177/0017896900059001	City University London, Southeast	United Kingdom	To examine providing advice on individual lifestyle habits using kiosks containing an interactive multimedia touch-screen computer programme	Public health – (health promotion)	Quantitative	Computerised - interactive multimedia touch-screen computer programme
87	[84], https://doi.org/10.1097/SPC.0000000000000362	University of Surrey, Southeast	Multiple (review)	To reviews current evidence, practice and developments, and identifies emerging issues and opportunities in digital health in monitoring	Cancer	Review	Digital health monitoring technologies
88	[65], https://doi.org/10.1186/s41687-020–00267-w	University of Surrey, Southeast	United Kingdom	To develop a predictive risk model (PRM) for patient-reported anxiety after treatment completion for early stage breast cancer suitable for use in practice and underpinned by advances in data science and risk prediction	Cancer	Quantitative – secondary analysis of survey data	Artificial intelligence techniques
89	Hawley-Hague et al, 2022, https://doi.org/10.1080/09638288.2022.2138574	The University of Manchester, Northwest	Multiple (review)	To review the feasibility, acceptability, and effects of physiotherapy when delivered remotely	Rehabilitation	Review	Remote exercise provision

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90	Henshall and Davey, 2019, https://doi.org/10.1002/pon.5252	Oxford Brookes University, South central	United Kingdom	To detail the design, development and testing of an exercise app for lung cancer survivors (iEXHALE), which aims to increase exercise activity and improve symptoms	Cancer	Qualitative (focus groups, app development and usability study)	Mobile app for lung cancer survivors to increase exercise activity and improve symptoms of fatigue, breathlessness and depression
91	Henshall et al, 2017, https://doi.org/10.1186/s12888-017–1406-z	Oxford Brookes University, South central	United Kingdom	To test the feasibility and acceptability of the clinical decision support tool (CDST)	Mental health	Qualitative – descriptive	Web-based computerised clinical decision support tool
92	Henshall et al, 2019, http://dx.https://doi.org/10.1136/ebmental-2019–300086	Oxford Brookes University, South central	United Kingdom	To explore qualitatively the acceptability and usefulness of the decision support tool (DST) from the perspectives of patients and psychiatrists	Mental health	Qualitative – descriptive	Decision support tool
93	Hermaszewska and Sin, 2021, https://doi.org/10.1177/1362361320984895	City University of London, Southeast	United Kingdom	To examine how online interventions can best be designed to meet needs of parents with autistic children	Learning disability	Qualitative (focus groups)	Online intervention for parents of children on the autism spectrum
94	Hernar et al, 2019, https://doi.org/10.1186/s40814-019–0419-4	University of Exeter, South	Norway (Haukeland University Hospital)	To examine the feasibility and acceptability of capturing PROMs electronically on a touchscreen computer in clinical diabetes practice	Diabetes	Quantitative (questionnaire)	Patient Reported Outcome Measures (PROMs) on a touchscreen computer
95	Hewitt-Taylor & Bond, 2012, https://doi.org/10.2196/jmir.2068	University of Wolverhampton, Central	USA and United Kingdom	To ascertain what people with diabetes who use Internet discussion forums want from their doctors	Diabetes	Unclear – qualitative	Internet discussion forums
96	Holmes et al, 2017, https://doi.org/10.1016/j.ctim.2017.06.007	University of Southampton, South central	United Kingdom	To explore breast cancer survivors' use of the internet when making decisions about complementary and alternative medicine (CAM) use	Cancer	Mixed methods	Internet - online information
97	Hong et al, 2021, https://doi.org/10.1136/ebmental-2021–300287	Oxford Brookes University, South central	United Kingdom	To quantify the extent, nature and clinical impact of the use of telepsychiatry during COVID-19	Mental health	Quantitative	Telepsychiatry
98	Hope et al, 2019, https://doi.org/10.1111/jonm.12858	University of Southampton, South central	United Kingdom	To explore the impact of using electronic data in performance management to improve nursing compliance with a protocol	General nursing (acute)	Qualitative	Early warning score (EWS) protocol delivered by a bedside electronic handheld device
99	Hopkins et al, 2022, https://doi.org/10.12968/bjcn.2022.27.10.508	University of Surrey, Southeast	United Kingdom	To understand patients' perspectives on the use of IT and electronic health records (EHR) in their home environment	Community nursing	Qualitative	IT and electronic health records (EHR)
100	Horne et al, 2020, https://doi.org/10.1016/j.invent.2019.100295	University of Leeds, Northwest	Multiple (review)	To assess the quantity and quality of empirical support for the use of avatar technologies in adult weight loss interventions	Obesity	Review (systematic)	Avatar-based interventions for weight loss management
101	Horne et al, 2022, https://doi.org/10.1093/ageing/afac221	University of Leeds, Northwest	United Kingdom	To evaluate the feasibility and acceptability of a co-designed education and training e-resource to help care staff support their residents' sexuality, intimacy and relationship needs	Older adult care	Mixed methods	E-resource to support the sexuality, intimacy and relationship needs of older care home residents

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No	Authors, Year, DOI	Institution / Region	Study country	Aims	Nursing practice	Study design	Digital health intervention
102	Horne et al, 2022, https://doi.org/10.1093/eurpub/ckab164.500	University of Leeds, Northwest	United Kingdom	To evaluate whether a personalized avatar, offered as an adjunct to an established weight loss program, can increase participant motivation, sustain engagement, optimize service delivery, and improve participant health outcomes	Obesity	Mixed methods	Avatar-based interventions for weight loss management
103	Hoy et al, 2009, https://doi.org/10.1016/j.ijmedinf.2008.06.003	University of Huddersfield, Northwest	United Kingdom	To describe the options for developing and implementing a national library of electronic clinical templates for nursing in the community in Scotland and evaluate the benefits to clinical care and secondary information users	Informatics	Feasibility study	Clinical template as a clinical information model, which could be used to define the content of a form in a health record system
104	Huby et al, 2017, https://doi.org/10.1111/cch.12394	University of Leeds, Northwest	United Kingdom	To explore children and young people's views on a proposed web-based application to support personal management of chronic kidney disease at home	Child health	Qualitative (interviews)	Web-based application to support personal management of chronic kidney disease at home
105	Hugh-Jones et al, 2022, https://doi.org/10.1016/j.mhp.2022.200241	University of Leeds, Northwest	United Kingdom	To co-design and feasibility tested a self-help, school hosted, digital intervention for adolescents showing early symptoms of deteriorating mental health	Mental health	Quantitative - randomised, pre-post intervention design with waitlist	MindMate2U a self-help, smartphone-delivered programme targeting risk and protective factors for adolescent mental health
106	Ignatowicz et al, 2018, https://doi.org/10.1186/s12910-018–0250-0	King's College London, Southeast	United Kingdom	To examine, from the patient and clinician perspective, the ethical implications of the use of digital clinical communication in the context of young people living with long-term conditions	Child health	Qualitative (interviews)	Digital clinical communication
107	[67], https://doi.org/10.1177/2055207619845831	King's College London, Southeast	Multiple (review)	To review literature relating to the use of internet videoconferencing for consultations between healthcare professionals and patients with long-term conditions in their own home	Long-term conditions	Review	Internet videoconferencing
108	Jankovic et al, 2021, https://doi.org/10.1007/s40258-020–00607-3	University of York, Northwest	Multiple (review)	To identify all economic evaluations of Digital Mental Health Interventions (DMHIs) published	Mental health	Review	Digital mental health interventions
109	[66], https://doi.org/10.1007/s41669-021–00318-y	University of York, Northwest	United Kingdom	To evaluate the cost effectiveness of digital interventions for generalised anxiety disorder (GAD), in comparison with alternative care options	Mental health	Quantitative (decision analytic cohort model)	Digital health interventions
110	Jeffries et al, 2021, https://doi.org/10.1371/journal.pone.0250946	University of Hull, East	United Kingdom	To understand the factors that influenced the successful implementation and sustained use in primary care of a clinical decision support system	Community nursing	Qualitative (interviews)	Clinical decision support system

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111	[37], https://doi.org/10.1080/16549716.2018.1550736	University of York, Northwest	United Kingdom	To develop a theory-driven contextually relevant mHealth intervention aimed at preventing and managing diabetes	Diabetes	Qualitative (interviews & focus groups)	Mobile health
112	Jennings et al, 2009, https://www.jmir.org/2009/1/e10/	King's College London, Southeast	Bangladesh	To assess the feasibility, acceptability, and effectiveness of an Internet-based virtual clinic designed to facilitate self-management in patients who used insulin pumps to manage their diabetes	Diabetes	Mixed methods	Virtual clinic system
113	Jing et al, 2012, https://doi.org/10.1016/j.jbi.2011.09.001	University of Huddersfield, Northwest	USA	To describe the incorporation, customization and demonstration of molecular genetic data (mainly sequence variants), molecular genetics knowledge and health knowledge into a standards-based electronic health record (EHR) prototype	Informatics	Not applicable – data standards	Data standards (health)
114	Jing et al, 2014, https://doi.org/10.1007/s10916-014–0075-4	University of Huddersfield, Northwest	USA	To describe a method by which an external, formal representation of clinical and molecular genetic knowledge can be integrated into an EHR such that customized knowledge can be delivered to clinicians in a context-appropriate manner	Informatics	Not applicable – ontology development	Web Ontology Language-Description Logic (OWL-DL)
115	Jing et al, 2018, https://doi.org/10.2196/medinform.9979	University of Huddersfield, Northwest	USA	To use cystic fibrosis as an example to build an Ontology-based Knowledge Base prototype on Cystic Fibrobis (OntoKBCF) to supply such information via an EHR prototype	Informatics	Not applicable – ontology development	Ontology-based Knowledge Base prototype on Cystic Fibrobis (OntoKBCF)
116	Jones et al, 2019, https://doi.org/10.1111/cch.12729	University of Surrey, Southeast	United Kingdom	To explore the usability and refine the content of a health promotion mobile phone application, "Grow up Safely" (GUS)	Child health	Qualitative (focus groups)	Mobile phone application
117	Kanagasundaram et al, 2016, https://doi.org/10.1093/ckj/sfv130	Northumbria University, Northeast	United Kingdom	To identify factors promoting or inhibiting use of in-patient acute kidney injury (AKI) clinical decision support system (CCDS)	Renal	Mixed methods	Clinical decision support system (CCDS)
118	Kendal et al, 2017, https://doi.org/10.1111/hex.12439	University of Leeds, Northwest	United Kingdom	To explore how young people used a youth-orientated, moderated, online, eating disorders discussion forum, run by an eating disorders charity	Child health	Qualitative - ethnographic approach	Online discussion forum run by charity YoungMinds
119	Kenny et al, 2020, https://doi.org/10.1080/09593985.2020.1790072	University of Leeds, Northwest	United Kingdom	To investigate the feasibility and acceptability of video guided exercise for facilitating upper-limb exercise after stroke	Stroke	Randomised controlled trial with process evaluation	Video guided exercise (computer tablet with filmed individualised exercises)
120	Kent et al, 2015, https://doi.org/10.1111/jocn.12881	Plymouth University, Southwest	Australia	To explore nurses' reactions to new novel technology for acute health care	General nursing (acute care)	Qualitative descriptive (focus groups)	SmartWardTM technology (no description provided)

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No	Authors, Year, DOI	Institution / Region	Study country	Aims	Nursing practice	Study design	Digital health intervention
121	Kenwright et al, 2004, https://doi.org/10.1192/bjp.184.5.448	University of York, Northwest	United Kingdom	To examine the outcomes of the first 10–17 cases referred for treatment of phobia or panic in which the internet version of FearFighter	Mental health	Quantitative (questionnaire)	Computer-aided self-help clinic (Internet version of FearFighter on a stand-alone computer in the clinic)
122	Kim et al, 2010, https://doi.org/10.1016/j.jbi.2010.08.006	University of Huddersfield, Northwest	International	To formulate a terminology quality improvement model terminologies, to assess the quality of healthcare terminologies and to make improvements to an agreed standard	Informatics (data standards)	Review and case study	Terminology quality improvement (TQI) model
123	Kim et al, 2012, https://doi.org/10.1016/j.jbi.2011.09.002	University of Huddersfield, Northwest	USA	To evaluate Unified Medical Language System (UMLS) semantic mappings by measuring the proportion of concordance between UMLS and human expert mappings	Informatics	NA - ontology mapping	Data standards (nursing)
124	Kim et al, 2014, https://doi.org/10.1016/j.jbi.2014.03.001	University of Huddersfield, Northwest	USA	To determine the degree of overlap between the International Classification for Nursing Practice (ICNPÒ) and the Systematized Nomenclature of Medicine–Clinical Terms (SNOMED–CT), with a specific focus on nursing problem	Informatics	NA - ontology mapping	Data standards (nursing)
125	Kioskli et al, 2020, https://doi.org/10.1093/pm/pnaa110	Kings College London, Southeast	United Kingdom	To assess the feasibility of online Acceptance and Commitment Therapy for painful diabetic neuropathy	Diabetes	Randomised controlled trial (RCT)	Online Acceptance and Commitment Therapy
126	Kioskli et al, 2022, https://doi.org/10.22667/JOWUA.2022.06.30.147	University of Brighton, Southeast	United Kingdom	To identify and model privacy, security and vulnerability issues related to the Living Labs	Informatics	Quantitative - Computer-Aided Software Engineering tool to model the Living Lab	Living lab - user-centred open innovation ecosystem
127	Kirk and Milnes, 2015, https://doi.org/10.1111/hex.12352	The University of Manchester, Northwest	United Kingdom	To explore how online peer support is used by young people and parents to support self-care in relation to cystic fibrosis(CF)	Genetics - Cystic Fibrosis	Qualitative – (online ethnographical approach)	Online peer support
128	Kishita et al, 2022, https://doi.org/10.1080/13607863.2021.1985966	University of East Anglia, East	United Kingdom	To assess the feasibility of internet-delivered guided self-help Acceptance and Commitment Therapy (ACT) for family carers of people with dementia	Older adult care (Dementia carers)	Multi-site, single-arm feasibility study	Internet-delivered guided self-help Acceptance and Commitment Therapy (ACT)
129	Koulaouzidis et al, 2018, https://doi.org/10.1177/1357633X17751	University of York, Northwest	United Kingdom	To determine if telemonitoring in patients with newly diagnosed heart failure and ejection fraction < 40% reduces the risk of readmission or death from any cause	Cardiology	Quantitative (retrospective study)	Motiva Telemonitoring System
130	Kralj & Barriball, 2004, https://doi-org/10.12968/bjcn.2004.9.3.12435	King's College London, Southeast	United Kingdom	To evaluate the information provided online by 16 London primary care trusts on activities underway to meet the needs of the local refugee population and the extent to which	Refugee health	Quantitative (survey)	Online health information

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No	Authors, Year, DOI	Institution / Region	Study country	Aims	Nursing practice	Study design	Digital health intervention
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131	Kulkarni et al, 2019, https://doi.org/10.1177/2049463719859913	The University of Manchester, Northwest	United Kingdom	To evaluate the effects of a virtual reality (VR) activity on phantom limb pain (PLP)	Pain	Quantitative (questionnaire)	Virtual reality (VR) activity on phantom limb pain (PLP)
132	Kumar et al, 2020, https://doi.org/10.1093/rap/rkaa009	University of Birmingham, Central	United Kingdom	To explore how patients of South Asian origin make sense of their disease with written leaflets compared with online information or visualizing real-time Doppler US images of their inflamed joints	Rheumatology	Qualitative (interviews)	Online information
133	[48], https://www.jmir.org/2020/11/e22205/	King's College London, Southeast	South Korea	To assess the prevalence of COVID-19 misinformation exposure and beliefs, associated factors including psychological distress with misinformation exposure, and the associations between COVID-19 knowledge and number of preventive behaviours	Infectious diseases	Quantitative (online survey)	Online misinformation proliferation during the COVID-19 pandemic
134	Lee et al, 2013, https://doi.org/10.1016/j.ienj.2012.01.005	King's College London, Southeast	Australia	To standardise trauma resuscitation, documentation and interventions by developing best practice algorithms (a reduction in management errors)	Emergency care	Quantitative – Randomised clinical trial	Artificial intelligence - real-time computer algorithms
135	Lennon et al, 2017, https://www.jmir.org/2017/2/e42	King's College London, Southeast	United Kingdom	To examine barriers and facilitators to implementation of digital health at scale through the evaluation of a national digital health program	Community nursing	Qualitative – (multi-site case study)	Multiple technologies e.g., apps, personal health records, telecare, telehealth, wearable activity trackers, etc
136	Lezard and Deave, 2021, https://doi.org/10.12968/bjcn.2021.26.12.604	University of the West of England, Southwest	United Kingdom	To explore community nurse's experience of using EHRs in patients' homes	Community nursing	Qualitative (focus groups)	Electronic health records (EHRs) in community nursing
137	Lichtner et al, 2015, https://doi.org/10.1186/s12911-015–0233-8	The University of Manchester, Northwest	United Kingdom	To understand current pain assessment practices, in order to later inform the development of a decision support tool designed to improve the management of pain for people with dementia in hospital	Older adult care (dementia)	Qualitative (interviews, observation & documentary analysis)	Clinical decision support
138	Lindahl & Kirk, 2018, https://doi.org/10.1111/scs.12615	The University of Manchester, Northwest	Multiple (review)	To analyse and synthesise the research that has investigated the experience of home in relation to home mechanical ventilation (HMV)	Community nursing	Review (systematic integrative)	Medical devices - mechanical ventilation
139	Mackintosh et al, 2016, https://doi.org/10.1186/s13643-016–0357-7	King's College London, Southeast	Multiple (review)	To determine the impact of critical care telemedicine (with clinical decision support available 24/7) on intensive care unit (ICU) and hospital mortality and length of stay in adults and children	Critical care	Review (systematic)	Telemedicine – (1) continuous electronic recording of patients' vital signs at the bedside linked to a computer system enabling display of real-time data and (2) use of clinical decision-making algorithms and electronic alerts by (3) a remotely located team of critical care specialists

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No	Authors, Year, DOI	Institution / Region	Study country	Aims	Nursing practice	Study design	Digital health intervention
140	Maguire et al, 2015, https://doi.org/10.1097/NCC.0000000000000150	University of Surrey, Southeast AND University of Southampton, South central	United Kingdom	To (a) explore the feasibility and acceptability of the Advanced Symptom Management System with patients with lung cancer receiving radiotherapy and clinicians involved in their care and (b) assess changes in patient outcomes	Cancer	Mixed methods	Mobile phone based symptom monitoring system
141	Maguire et al, 2021, https://doi.org/10.1136/bmj.n1647	University of Surrey, Southeast	International (12 cancer centres in Austria, Greece, Norway, Republic of Ireland, and UK)	To evaluate effects of remote monitoring of adjuvant chemotherapy related side effects via the Advanced Symptom Management System (ASyMS) on symptom burden, quality of life, supportive care needs, anxiety, self-efficacy, and work limitations	Cancer	Quantitative - randomised controlled trial	Telehealth - Advanced Symptom Management System (ASyMS) - real time, 24 h monitoring and management of chemotherapy toxicity
142	[49], https://www.jmir.org/2015/12/e287/	University of Leeds, Northwest	Multiple (review)	To systematically review the literature on the effectiveness of mobile apps designed to support adolescents' management of their physical chronic or long-term conditions	Child health	Review (systematic)	Mobile apps designed to support adolescents' management of their physical chronic or long-term conditions
143	[39], https://doi.org/10.1111/jonm.12948	The University of Sheffield, East	Pakistan	To investigate the effect of social networking site addiction on task distraction among nurses	Global health (general nursing)	Quantitative (questionnaire)	Social media
144	Marcu et al, 2019, https://www.jmir.org/2019/2/e12400/	University of Surrey, Southeast	United Kingdom	To explore women's symptom attribution and online health information-seeking behaviour, and to establish the feasibility of capturing in real time the online information-seeking process	Cancer	Quantitative (survey)	Online health information
145	Marks et al, 2003, https://doi.org/10.1192/bjp.183.1.57	University of York, Northwest	United Kingdom	To evaluate computer-aided giving immediate computer-aided cognitive behavioural therapy (CBT) self-help plus brief advice from a therapist	Mental health	Quantitative (questionnaire)	Computer-aided cognitive behavioural therapy (CBT)
146	Martin et al, 2020, https://doi.org/10.1177/1744987120915746	King's College London, Southeast	United Kingdom	To investigate the role of digital communications, including smartphone apps, email and text, given the known barriers and facilitators of mental health service transitions reported in the literature	Child health	Qualitative - secondary analysis of qualitative data	Digital communications including smartphone apps, email and text
147	Matney et al, 2008, https://doi.org/10.1197/jamia.M2801	University of Huddersfield, Northwest	USA	To translate and integrate nursing diagnosis concepts from the Clinical Care Classification (CCC) System Version 2.0 to Diagnostic Phenomenon or nursing diagnostic statements in the International Classification for Nursing Practice	Informatics	NA - ontology mapping	Data standards (nursing)

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No	Authors, Year, DOI	Institution / Region	Study country	Aims	Nursing practice	Study design	Digital health intervention
148	Matthias et al, 2021, https://doi.org/10.12968/gasn.2021.19.9.28	King's College London, Southeast	United Kingdom	To explore the perceptions of IBD specialist nurses about the implementation of a proposed nurse-guided online cognitive behavioural self-management intervention to manage symptoms of fatigue, pain and urgency	Gastroenterology	Qualitative (focus groups)	Online cognitive behavioural self-management intervention
149	Mayoh et al, 2011, https://doi.org/10.2989/ipjp.2011.11.2.3.1162	University of Wolverhampton, Central	United Kingdom	To explore how the experience of searching for Online Health Information (OHI) becomes a meaningful activity in the lives of older adults living with chronic health conditions	Older adult care	Qualitative (descriptive phenomenological approach)	Online health information
150	Mayoh et al, 2012, https://doi.org/10.1177/1558689811416942	University of Wolverhampton, Central	United Kingdom	To explore the experiences of U.K. adults with chronic health conditions seeking health information online	Older adult care	Mixed methods	Online health information
151	McCall et al, 2020, https://doi.org/10.1017/S0047279420000525	King's College London, Southeast	United Kingdom	To examine if technology shapes interactions and the use of discretion for front-line housing staff?	Community nursing	Mixed methods (survey and interviews)	Telecare - assisted living
152	McKeown et al, 2022, https://formative.jmir.org/2022/9/e36517/	King's College London, Southeast	United Kingdom	To evaluated a smartphone app with a specific focus on pressure ulcer prevention education for informal carers	Dermatology	Mixed methods	Smartphone app with a specific focus on pressure ulcer prevention education for informal carers
153	Mcvey et al, 2021, https://doi.org/10.1186/s12913-021–06657-0	The University of Manchester, Northwest	United Kingdom	To examine the work involved in repurposing healthcare data for National Clinical Audits.	Informatics	Qualitative (ethnography)	Integrated IT systems within NHS organisations
154	Mebrahtu et al, 2021, http://dx.https://doi.org/10.1136/bmjopen-2021–053886	University of Leeds, Northwest	Multiple (review)	To examine the impact of Computerised clinical decision support systems (CDSS) on these health professionals' performance and patient outcomes	General nursing	Review (systematic)	Computerised clinical decision support systems (CDSS)
155	Meekes & Stanmore, 2017, https://www.jmir.org/2017/7/e238/	The University of Manchester, Northwest	United Kingdom	To determine the factors that may influence the motivation of older people to use exergames to improve their physical function and reduce fall risk	Older adult care	Mixed methods	Exergames (exercise-based videogames) for delivering strength and balance exercise
156	Meekes et al, 2020, https://doi.org/10.1111/hsc.13170	The University of Manchester, Northwest	United Kingdom	To explore barriers and facilitators regarding recruitment and retention of older adults living in Assisted Living Facilities to a randomised controlled trial study that aimed to improve physical function by using technology	Older adult care	Qualitative (case study - part of larger RCT)	Exergames to improve balance and other outcomes in older adults in Assisted Living Facilities
157	Micaux et al, 2022, https://cancer.jmir.org/2022/1/e33239/	City University of London, Southeast	Sweden	To test whether the Fertility and Sexuality following Cancer (Fex-Can) intervention is superior to standard care in reducing fertility-related distress and related psychosocial	Cancer	Quantitative – randomised controlled trial	Web-based, automated self-help intervention for fertility-related distress following cancer—Fex-Can Fertility

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No	Authors, Year, DOI	Institution / Region	Study country	Aims	Nursing practice	Study design	Digital health intervention
				outcomes in young adults with cancer			
158	Micaux Obol et al, 2020, https://doi.org/10.1371/journal.pone.0236180	City University of London, Southeast	Sweden	To describe experiences of participating in a web-based psycho-educational intervention focusing on sexual dysfunction and fertility distress after cancer	Cancer	Qualitative (interviews)	Web-based psycho-educational intervention
159	Middleton et al, 2020, https://doi.org/10.3390/ijerph17217819	University of Nottingham, Central	United Kingdom	To describe the design, delivery and testing of a mobile text messaging SMS intervention for HIV prevention and awareness, aimed at adults in the construction industry and delivered during the COVID-19 pandemic	Global health (HIV)	Mixed methods	Mobile text messaging SMS intervention for HIV prevention and awareness
160	Mitchell et al, 2009, https://doi-org/10.1111/j.1365–2834.2009.00986.x	The University of Manchester, Northwest and University of Leeds, Northwest	United Kingdom	To examine the characteristics of computerized decision support systems (CDSS) currently available to nurses working in the NHS England	General nursing	Quantitative (questionnaire)	Computerized decision support systems (CDSS)
161	Mobini et al, 2014, https://doi.org/10.1016/j.jbtep.2013.12.002	University of York, Northwest	United Kingdom	To examine the effects of a single session of Cognitive Bias Modification to induce positive Interpretative bias (CBM-I) using standard or explicit instructions and an analogue of computer-administered CBT (c-CBT) program on modifying cognitive biases and social anxiety	Mental health	Quantitative (pre- and post-test design)	Computer-administered CBT (c-CBT)
162	Mogharbel et al, 2021, https://medinform.jmir.org/2021/3/e22923	The University of Manchester, Northwest	Multiple (review)	To identify the factors influencing the usage of CPOE systems by physicians for medication prescribing in their clinical practice	General (prescribing)	Review (systematic)	Computerized physician order entry (CPOE) systems
163	Moore et al, 2017, https://mental.jmir.org/2017/1/e6/	City University of London, Southeast	United Kingdom	To test a model that measured the mediating role of stigma between online forum use and disclosure of affective symptoms to health care providers	Mental health	Quantitative (survey)	Online forum use
164	Moore et al, 2020, https://doi.org/10.1007/s00737-019–01002-1	City University of London, Southeast	Multiple (review)	To develop a new theoretical understanding of how forum use may influence the stigma some women with maternal mental illness (MMI) experience	Mental health	Review (*meta*-synthesis)	Online forums
165	[70], https://doi-org/10.1111/j.1365–2648.2004.03183.x	University of Sheffield, Central	United Kingdom	To evaluate the impact of networked computers, with open access to the Internet, on four acute hospital wards	General nursing	Mixed methods	Networked computers, with open access to the Internet
166	Morrison et al, 2019, https://apps.who.int/iris/handle/10665/329371	University of York, Northwest	Bangladesh	To explore the factors affecting physical activity among men and women in rural Bangladesh	Global health (diabetes)	Qualitative (interviews and focus groups)	Mobile health
167	[36], https://doi.org/10.1080/17441692.2021.1923776	University of York, Northwest	Bangladesh	To explore the equity of intervention reach and impact of mHealth and participatory learning and action (PLA)	Global health (diabetes)	Quantitative (survey and RCT)	Mobile health

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No	Authors, Year, DOI	Institution / Region	Study country	Aims	Nursing practice	Study design	Digital health intervention
				community mobilisation interventions for T2DM			
168	[43], https://doi-org/10.3928/00989134–20130313-03	Northumbria University, Northeast	Australia	To compare the effect of companion robots (PARO) to participation in an interactive reading group on emotions in people living with moderate to severe dementia in a residential care setting	Older adult care (dementia)	Quantitative (randomized crossover design)	PARO robot (seal)
169	Murphy et al, 2020, https://doi.org/10.1080/01612840.2019.1666326	City University of London, Southeast	Multiple (review)	To review of the available research evidence was to explore the experiences and perceptions of people with mental health difficulties through the use of blogs	Mental health	Review (scoping)	Blogs
170	Musa et al, 2022, https://doi.org/10.1186/s12877-021–02705-w	City University of London, Southeast	Multiple (review)	To develop a theory-driven understanding of how care home staff can effectively implement and use MDS to plan and deliver care for residents	Informatics	Review (realist)	Minimum data sets (MDS)
171	[68], https://doi.org/10.1186/s12911-015–0214-y	University of Southampton, South central	United Kingdom	To determine feasibility and acceptability of a web-based tool (RESTORE) to enhance self-efficacy to manage cancer-related fatigue and trial processes	Cancer	Qualitative (process evaluation using interviews)	Web-based tool (RESTORE) to enhance self-efficacy to manage cancer-related fatigue
172	Nagy et al, 2019, http://dx.https://doi.org/10.1136/bmjopen-2018–025071	University of Leeds, Northwest	United Kingdom	To investigate factors associated with movement behaviours among White British (WB) and South Asian (SA) children aged 6–8 years during school terms and holidays	Child health	Quantitative (cross sectional)	Wearable devices - accelerometer measured movement
173	Nemlander et al, 2022, https://doi.org/10.1371/journal.pone.0276703	City University of London, Southeast	Sweden	To investigate the predictive ability for lung cancer of symptoms reported in an adaptive e-questionnaire	Cancer	Quantitative (e-questionnaire)	Artificial intelligence (stochastic gradient boosting to train and test AI model)
174	[53], https://www.jmir.org/2017/7/e235/	University of Leeds, Northwest	United Kingdom	To explore the views of children with CKD, their parents, and health care professionals to inform future development of a child-focused, care-management app	Renal	Qualitative (interviews)	Care-management app
175	[85], https://doi.org/10.1186/s12904-020–00694-y	King's College London, Southeast	Sub-Saharan Africa (Nigeria, Uganda and Zimbabwe)	To identify stakeholders' data and information needs and the role of digital technologies to improve access to and delivery of palliative care for people with advanced cancer in Africa	Global health (palliative care)	Qualitative (interviews)	Digital technology in supporting the capture, transfer and use of patient-level data to improve delivery of palliative care
176	[38], https://doi.org/10.3390/socsci11050196	University of Hull, East	Kenya	To assess stakeholders' perspectives on access to and use of mobile phones by adolescents for Sexual Reproductive Health (SRH) education	Global health (sexual health)	Qualitative (interviews and focus groups)	Mobile phone
177	O'Connor et al, 2016, https://doi.org/10.1186/s12911-016–0359-3	King's College London, Southeast	Multiple (review)	To identify and synthesise the qualitative literature on barriers and facilitators to engagement and recruitment to DHIs to	Community nursing	Review (qualitative systematic)	Mix of technologies - telemedicine, mobile applications, personal health record, social networking etc

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No	Authors, Year, DOI	Institution / Region	Study country	Aims	Nursing practice	Study design	Digital health intervention
				inform future implementation efforts.			
178	O'Connor et al, 2022, https://doi.org/10.1016/j.pmn.2022.03.013	King's College London, Southeast	Multiple (review)	To identify and synthesize the scientific literature on virtual reality (VR)-based mindfulness applications for the management of chronic pain in adults	General nursing (pain)	Review (scoping)	Virtual reality (VR)-based mindfulness applications
179	[8], https://doi.org/10.1111/jocn.16478	King's College London, Southeast	Multiple (review)	To synthesise literature on AI in nursing and midwifery	General nursing	Review (systematic)	Artificial intelligence
180	O'Connor et al, 2022, https://doi.org/10.1111/jonm.13853	King's College London, Southeast	Multiple (review)	To synthesize evidence on nurses' involvement in artificial intelligence research for managing falls in older adults	Older adult care (falls)	Review (scoping)	Artificial intelligence
181	O'Leary et al, 2022, https://doi.org/10.1111/phn.12994	King's College London, Southeast	International (multiple countries)	To examine the online interactions, social networks, and perspectives of nursing actors on COVID-19 from conversations on Twitter to understand how the profession responded to this global pandemic	Infectious diseases	Mixed methods	Social media (Twitter)
182	O'Mahen et al, 2013, https://doi.org/10.1016/j.jad.2013.03.005	University of Exeter, Southwest	United Kingdom	To investigate the feasibility (recruitment, trial and treatment adherence) and effectiveness (depression status EPDS 412) of the intervention	Mental health	Quantitative (randomised controlled trial)	Internet Behavioral Activation (iBA) treatment modified to address postnatal specific concerns
183	O'Mahen et al, 2014, https://doi.org/10.1017/S0033291713002092	University of Exeter, Southwest	United Kingdom	To assess feasibility, we measured recruitment and attrition to the trial and examined telephone session support and treatment adherence	Mental health	Quantitative (randomised controlled trial)	Guided Internet behavioural activation (BA) treatment modified to address postnatal-specific concerns
184	O'Mahen et al, 2017, https://doi.org/10.1017/S0033291713002092	University of Exeter, Southwest	United Kingdom	To examine which trajectories of change characterised an internet-based Behavioural Activation (BA) treatment for postpartum depression (PPD)	Mental health	Quantitative (secondary analysis of data collected in the Netmums trial)	Online behavioural activation supported in 30-minute telephone sessions by a mental health worker
185	[40], https://doi.org/10.1371/journal.pone.0261973	University of Hull, East	Kenya, Ghana, South Africa, Uganda, Tanzania	To describe mHealth intervention components, assesses their effectiveness, acceptability, and cost in improving adolescent's uptake of SRH services	Global health (contraception)	Review (systematic)	Short Message Service (SMS), interactive web-based peer support platform, messaging service
186	Onyeaka et al, 2021, https://doi.org/10.1016/j.psychres.2021.114120	The University of Manchester, Northwest	United Kingdom	To examine the potential for using digital tools for health promotion by people with common mental disorders like anxiety or depression	Mental health	Quantitative (data from Health Information National Trends Survey 2019)	Mix of digital health tools
187	Ostensen et al, 2020, https://doi.org/10.1111/jocn.15355	University of Huddersfield, Northwest	Norway	To explore how nurses use standardised care plans as a new recording tool in municipal health care, and to identify their thoughts and opinions	General nursing	Qualitative (descriptive)	Standardised care plans (electronic)
188	Ostensen et al, 2022, https://doi.org/10.1097/CIN.0000000000000798	University of Huddersfield, Northwest	Norway	To identifying success criteria for the adoption and integration of standardized care plans into practice	General nursing	Qualitative (participatory approach)	Standardised care plans (as part of an EHR)

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No	Authors, Year, DOI	Institution / Region	Study country	Aims	Nursing practice	Study design	Digital health intervention
189	Painter et al., 2021, https://doi.org/10.3390/healthcare9050517	Sheffield Hallam University, Central	United Kingdom	To explore what service users would be suited to online video consultations and why	Mental Health	Mixed methods	Video consultations (n = 752) conducted over six weeks
190	Painter et al., 2021, https://doi.org/10.1097/CIN.0000000000000804	Sheffield Hallam University, Central	United Kingdom	To understand the experiences and preferences of a small group of patients and staff in a large (National Health Service) mental health and disability trust	Mental Health	Mixed methods	Video-consultation pilot project
191	[74], https://doi.org/10.1097/JCN.0000000000000392	University of Surrey, Southeast, and King's College London, Southeast	Multiple (review)	To conduct a systematic review to (1) determine the effectiveness of Internet-delivered CHD self-management support for improving CHD, mood, and self-management related outcomes and (2) identify and describe essential components for effectiveness	Cardiology	Review (systematic)	Internet-delivered coronary heart disease (CHD) self-management support
192	Papachristou et al, 2020, https://doi.org/10.1371/journal.pone.0208808	University of Surrey, Southeast	USA	To assist oncology clinicians to personalize the patient's treatment regimen more efficiently and provide more aggressive and timely interventions	Cancer	Quantitative (secondary analysis of existing data)	Artificial intelligence (machine learning techniques and algorithms)
193	Patel et al, 2020, https://www.jmir.org/2020/7/e16228/	University of Nottingham, Central	United Kingdom	To synthesize the literature available on service users' views and experiences regarding the acceptability and usability of DHIs for depression, anxiety, and somatoform disorders	Mental health	Review (*meta*-synthesis)	Digital health interventions (DHIs) e.g., email, telephone calls, or SMS text messages, apps, video therapy, web- and smartphone-based monitoring
194	Pearsons et al, 2021, https://doi.org/10.1093/eurjcn/zvaa014	King's College London, Southeast	United Kingdom	To identify commercially available AF self-management apps and synthesize (i) characteristics, (ii) functions, (iii) privacy/security, (iv) incorporated behaviour change techniques (BCTs), and (v) quality and usability	Cardiology	Review (scoping)	mHealth self-management interventions for those with atrial fibrillation (AF)
195	Peat et al, 2019, https://doi.org/10.1136/bmjspcare-2018–001646	University of Leeds, Northwest	United Kingdom	To summarise empirical research undertaken about how and why social media is used by adolescents and young adults with life-limiting or life-threatening conditions	Child health	Review (integrative)	Social media
196	[34], https://doi.org/10.1136/jech-2021–217293	University of York, Northwest	Bangladesh	To explore the equity of the reach and impact of mHealth and participatory learning and action (PLA) community mobilisation interventions to prevent and control type 2 diabetes	Global health (diabetes)	Quantitative (cluster randomised trial)	mHealth and participatory learning and action (PLA) community mobilisation interventions
197	Preston et al, 2019, https://doi.org/10.1302/0301-620X.101B8.BJJ-2018–1566.R1	University of Leeds, Northwest	United Kingdom	To develop a virtual clinic for the purpose of reducing face-to-face orthopaedic consultations	Orthopaedics	Quantitative (online surveys)	Virtual clinics
198	Ram et al, 2008, https://doi.org/10.1111/j.1369–7625.2007.00464.x	King's College London, Southeast	United Kingdom	To uncover unmet needs of medical device users to translate these into	Wound care	Qualitative (case study)	Medical devices

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No	Authors, Year, DOI	Institution / Region	Study country	Aims	Nursing practice	Study design	Digital health intervention
				design concepts, novel technologies and products.			
199	Randell & Dowding, 2010, https://doi.org/10.1016/j.ijmedinf.2010.02.003	The University of Manchester, Northwest	United Kingdom	To explore what nurses and NHS (National Health Service) managers perceive as the organisational features facilitating the introduction and successful use of clinical decision support systems (CDSS)	General nursing	Qualitative (observations and interviews)	Computerised decision support systems (CDSS)
200	Randell et al, 2007, https://doi-org/10.1258/13558190778210	The University of Manchester, Northwest and University of Leeds, Northwest	Multiple (review)	To examine the effect of computerized decision support systems (CDSSs) on nursing performance and patient outcomes	General nursing	Review (systematic)	Computerised clinical decision support systems (CDSS)
201	Randell et al, 2016, https://doi.org/10.1007/s10111-016–0368-0	The University of Manchester, Northwest	United Kingdom	To examine the introduction robotic surgery to identify how and in what contexts robotic surgery was integrated into practice and how it affects communication and decision making	Surgery	Review (realist)	Robot assisted surgery
202	Randell et al, 2019, http://dx.https://doi.org/10.1136/bmjopen-2018–028635	The University of Manchester, Northwest	United Kingdom	To capture stakeholders' theories concerning how and in what contexts robot-assisted surgery becomes integrated into routine practice	Surgery	Qualitative (realist interview study)	Robot assisted surgery
203	Randell et al, 2021, https://doi.org/10.1177/1363459319874115	The University of Manchester, Northwest	United Kingdom	To examine how introduction of robot-assisted surgery changes the division of labour within surgical teams and impacts teamwork and patient safety	Surgery	Qualitative (realist principles – observation and interviews)	Robot assisted surgery
204	[59]	The University of Manchester, Northwest	United Kingdom	To develop and evaluate a quality dashboard (i.e. QualDash) to support clinical teams' and managers' use of national audit data	General nursing	Qualitative (realist evaluation)	QualDash provides interactive customisable visualisations
205	Randell et al, 2017, https://doi.org/10.3310/hsdr05200	The University of Manchester, Northwest	United Kingdom	To investigating how robot-assisted surgery (RAS) was implemented	Surgery	Qualitative (realist process evaluation alongside a trial)	Robot assisted surgery
206	Ream et al, 2009, https://doi.org/10.1016/j.pec.2008.11.019	University of Surrey, Southeast	United Kingdom	To evaluate the quality of breast cancer information provided by 10 Great Britain voluntary organisations' websites	Cancer	Quantitative (cross sectional design)	Quality of websites
207	Redsell et al, 2017, https://doi.org/10.1136/bmjopen-2017–017694	University of Nottingham, Central	United Kingdom	To assess the feasibility and acceptability of using digital technology for Proactive Assessment of Obesity Risk during Infancy (ProAsk) with the UK health visitors (HVs) and parents	Child health	Mixed methods (pre- and post-intervention feasibility study with process evaluation)	ProAsk on a tablet device (validated risk prediction tool to quantify overweight risk)
208	Reynolds et al, 2017, https://doi.org/10.1111/jpm.12340	City University of London, Southeast	United Kingdom	To develop and test the acceptability and usability of an innovative serious game to support forensic mental health service users' preparation for discharge	Mental health	Mixed methods	Serious game - 'StreetWise' (urban park and allows the player to interact with four different characters, through a first person view)
209	Roberts et al, 2022, https://doi.org/10.12968/bjon.2022.31.10.541	Guy's and St Thomas' NHS Foundation Trust, Southeast	United Kingdom	To assess the impact and significance of a newly structured digitised form from a quality, safety	General nursing (pain)	Quantitative	Electronic health record pain assessment tool (new SNOMED CT-enabled template)

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No	Authors, Year, DOI	Institution / Region	Study country	Aims	Nursing practice	Study design	Digital health intervention
				and efficiency standpoint			
210	Rogers et al, 2022, https://doi.org/10.1177/15248380221090218	University of Sheffield, Central	Multiple (review)	To examine Technology-facilitated abuse (TFA) within intimate partnerships (adults aged 18 +)	Sexual health	Review (Scoping)	Online spaces (on social media and networking platforms)
211	Röhricht et al, 2021, https://doi.org/10.1186/s12888-021–03359-z	City University of London, Southeast	United Kingdom	To assess the feasibility, acceptability, and potential clinical benefits of a mobile technology health management tool to enhance care for people with severe mental illness	Mental health	Mixed methods (randomised-controlled feasibility pilot study)	Mobile health - Short Message Service - SMS) communication system called 'Florence'
212	Rose et al, 2021, https://doi.org/10.1513/AnnalsATS.202012-1500OC	King's College London, Southeast	United Kingdom	To understand how communication among families, patients, and the ICU team was enabled during the pandemic. The secondary objectives were to understand strategies used to facilitate virtual visiting and associated benefits and barriers	Critical care	Quantitative (electronic survey)	Virtual visiting
213	Rose et al, 2022, https://doi.org/10.1007/s00134-022–06824-9	King's College London, Southeast	United Kingdom	To evaluate levels of distress, depression, anxiety, and stress among family members experiencing virtual visits	Critical care	Quantitative (observational study)	Virtual visiting solution (aTouchAway)
214	Rose et al, 2022, https://doi.org/10.1016/j.iccn.2022.103264	King's College London, Southeast	United Kingdom	To gain perspectives from family members about barriers and facilitators to virtual visit set up and conduct across intensive care unit settings in the United Kingdom to inform understanding of best practices	Critical care	Qualitative (descriptive)	Virtual visiting
215	Rostill et al, 2018, https://doi.org/10.12968/bjcn.2018.23.10.502	University of Surrey, Southeast	United Kingdom	To describes the development and testing of a bespoke Internet of Things technologies (IoT) system for dementia care	Older adult care (dementia)	Quantitative – clinical trial	IOT uses machine learning and complex algorithms to detect and predict early signs of ill health
216	Salai et al., 2022, https://doi.org/10.3389/frdem.2022.1049464	Northumbria University, Northeast	United Kingdom	To explore the views and expectations of family carers and professionals who use voice assistants to support people with a cognitive impairment at home AND to identify the views and barriers on using voice assistants by family carers of people with dementia and professionals	Older people (dementia)	Qualitative – (phenomenology)	Voice assistant smart devices
217	San Juan et al, 2021, https://doi.org/10.1371/journal.pone.0257270	King's College London, Southeast	United Kingdom	To explore how service users experience telemental health, and what determines whether they engage and find it acceptable	Mental health	Qualitative (interviews)	Telemental health
218	Saramago et al, 2021, https://doi.org/10.3389/fpsyt.2021.726222	University of York, Northwest	Multiple (review)	To examine the comparative effectiveness of digital interventions for generalized anxiety disorder	Mental health	Review (systematic review with *meta*-analysis)	Software-based systems and technology platforms designed for patient-facing delivery of a mental health intervention

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No	Authors, Year, DOI	Institution / Region	Study country	Aims	Nursing practice	Study design	Digital health intervention
219	Sartain et al, 2015, https://doi.org/10.1111/hex.12240	University of Southampton, South central	Multiple (review)	To synthesise the views of patients on patient-held records (PHR) and to determine from a patient's perspective the effectiveness and any benefits or drawbacks to the PHR	Informatics	Review (systematic)	Patient-held records (PHR)
220	Schlief et al, 2022, https://doi.org/10.2196/38239	King's College London, Southeast	United Kingdom	To develop a theory about which telemental health approaches work (or do not work), for whom, in which contexts, and through what mechanisms	Mental health	Realist review	Telemental health (delivering mental health care via video calls, telephone calls, or SMS text messages)
221	Schutz et al, 2022, https://doi.org/10.1177/20552076221115022	Oxford Brookes University, South central	United Kingdom	To evaluate patients' and clinicians' experiences of moving to remote means of consultation with their health care professionals during the SARS-CoV-2 pandemic	Respiratory (infectious diseases)	Qualitative (interviews)	Remote means of consultation
222	Scott et al, 2019, http://https://doi.org/10.1136/bmjopen-2019–032925	Northumbria University, Northeast	United Kingdom	To identify factors relating to implementation which promote or inhibit use of acute kidney injury e-alerts in secondary care	Renal	Mixed methods	Electronic alerts (e-alerts)
223	Shah et al, 2020, http://dx.https://doi.org/10.1136/bmjopen-2019–032172	University of Birmingham, Central	United Kingdom	To enhance understanding of the bodily and lifestyle effects of ageing with cerebral palsy (CP) for women	Sexual health	Qualitative (digital ethnographies)	Social media - Facebook
224	Sharek et al, 2020, https://doi.org/10.1080/19361653.2020.1712296	City University of London, Southeast	United Kingdom	To describe the design and development process and in particular highlighting the contributions made by professionals, families, and trans young people to the educational resource	Trans health	Mixed methods	Online education programme
225	Sin et al, 2018, https://doi.org/10.1016/j.cpr.2018.01.008	City University of London, Southeast	Multiple (review)	To review the impact of eHealth interventions on carers' wellbeing	Carers	Review (systematic)	Psychoeducational interventions delivered via an enriched online environment
226	Sin et al, 2019, https://doi.org/10.1177/2055207619871148	City University of London, Southeast	United Kingdom	To evaluate usability, system heuristics and perceived acceptability of an eHealth intervention for family carers of individuals affected by psychosis	Mental health	Mixed methods	Web-based virtual learning environment (VLE) called Canvas accessible via desktop or laptop web browsers
227	Sin et al, 2022, https://doi.org/10.1016/S2589-7500(22)00031–0	City University of London, Southeast	United Kingdom	To evaluate the effectiveness of a digital multicomponent intervention—COPe-support—in improving carers' mental wellbeing and caregiving-related outcomes	Mental health	Quantitative (randomised superiority trial)	COPe-support or a passive online information resource using an independent online system
228	Sin et al, 2014, https://doi.org/10.1017/S0266462314000488	King's College London, Southeaset	United Kingdom	To develop and test the feasibility, usability and acceptability of an online intervention for siblings of individuals affected by psychosis	Mental health	Quantitative (non-randomised usability study)	Online intervention comprises four core elements
229	[64], https://doi.org/10.1177/147775092210944	University of Surrey, Southeast	United Kingdom	To explore the ethical and legal considerations of young people and their parents using a patient portal from the perspective of hospital	Child health	Qualitative (focus groups)	Electronic patient record system and patient portal (MyGOSH)

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No	Authors, Year, DOI	Institution / Region	Study country	Aims	Nursing practice	Study design	Digital health intervention
				Ethics Committee members			
230	[64], https://doi.org/10.1016/j.ijmedinf.2022.104691	University of Surrey, Southeast	Multiple (review)	To understand the experiences and perceptions of all relevant stakeholders using an EPR system in the paediatric hospital setting, including the use of an EPR-linked patient portal	Child health	Review (systematic)	Electronic patient record
231	Smith et al, 2022, https://cancer.jmir.org/2022/2/e36364	University of Southampton, South central	United Kingdom	To explore supporters' experiences of providing support to survivors of cancer using Renewed	Cancer	Qualitative (process evaluation nested within a large trial)	Web-based behaviour change advice with brief health care practitioner support from a nurse or health care assistant
232	[51], https://doi.org/10.1016/j.maturitas.2016.02.016	University of Leeds, Northwest	Multiple (commercial and non-commercial websites)	To assess the quality, readability and coverage of website information about herbal remedies for menopausal symptoms.	Maternal health	Quantitative (cross-sectional survey)	Commercial and non-commercial websites
233	Spanakis et al, 2022, https://doi.org/10.1177/17579139221106399	University of Leeds, Northwest	United Kingdom	To understand whether people with severe mental ill health (SMI) have the necessary digital skills to adapt to these changes and avoid digital exclusion	Mental health	Quantitative (survey)	Digital skills
234	[46], https://doi.org/10.1016/j.neubiorev.2017.04.011	The University of Manchester, Northwest	Multiple (review)	To establish effects of exergames on overall cognition and specific cognitive domains in clinical and non-clinical populations	Neurology	Review (systematic and *meta*-analysis)	Physically-active video games ('exergames')
235	[72], https://doi.org/10.1186/s12916-019–1278-9	The University of Manchester, Northwest	United Kingdom	To determine the effectiveness of a tailored OTAGO/FaME-based strength and balance Exergame programme for improving balance, maintaining function and reducing falls risk in older people	Older adult care (physical activity and falls)	Quantitative (cluster randomised controlled trial)	Gaming – 12-week strength and balance Exergame programme
236	Stocker et al, 2021, https://doi.org/10.1136/bmjopen-2020–045469	Northumbria University, Northeast, and South Tyneside and Sunderland NHS Foundation Trust, Northeast	United Kingdom	To understand how a NEWS intervention has been used in care homes in one area of North-East England during the COVID-19 pandemic, and how it has influenced resident care	Older adult care (care home)	Qualitative (interview)	Mobile - Digital tablet for recording the National Early Warning Score (NEWS)
237	Strudwick & Hardiker, 2016, https://doi.org/10.1016/j.ijmedinf.2016.06.012	University of Huddersfield, Northwest	Multiple (review)	To understand the use of standardized nursing terminology and classification systems in published research, using the International Classification for Nursing Practice® as a case study	Informatics	Review (systematic)	Standardized nursing terminology and classification systems
238	Sturt et al, 2020, https://doi.org/10.1177/2055207620942359	King's College London, Southeast	United Kingdom	To generate multidisciplinary reflections and questions around the use of digital consulting and the way it changes the meaning of being a patient and/or a health professional	Long-term conditions	Qualitative (Secondary analysis)	Digital consulting
239	[55], https://doi.org/10.1186/1472–6823-11–1	King's College London, Southeast	United Kingdom	To examine whether communication technologies (e.g. mobile telephony, forums, email) can be	Diabetes	Review (systematic)	Communication technologies e.g., video- and tele-conferencing); mobile telephony; telephone support; novel

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No	Authors, Year, DOI	Institution / Region	Study country	Aims	Nursing practice	Study design	Digital health intervention
				used to transfer digital information between healthcare professionals and young people who live with diabetes			electronic communication devices for transferring clinical information; and web-based discussion boards
240	Swallow et al, 2014, https://doi.org/10.1186/1471–2369-15–34	University of Leeds, Northwest	United Kingdom	To explore the views of parents, patients and professionals on content of the proposed online parent information and support (OPIS) web-application.	Renal	Qualitative	Online parent information and support web-application
241	Swallow et al, 2014, https://doi.org/10.3109/17538157.2014.948174	University of Leeds, Northwest	United Kingdom	To collaboratively develop and test a novel Online Parent Information and Support (OPIS) application	Child health	Quantitative (feasibility RCT)	Online Parent Information and Support (OPIS) application
242	Sweeney et al, 2021, https://doi.org/10.1186/s40814-021–00829-9	King's College London, Southeast	United Kingdom	To test the feasibility and acceptability of a 9-week online facilitator-supported cognitive behavioural therapy (CBT) intervention, tailored for people with chronic IBD-related pain		Mixed methods (pre-post design with nested qualitative interviews)	Online facilitator-supported CBT intervention
243	Sweeney et al, 2022, https://formative.jmir.org/2022/5/e33001	King's College London, Southeast	United Kingdom	To describe the process of developing a supported digital self-management intervention for fatigue, pain, and urgency in Inflammatory bowel disease (IBD)	Gastroenterology (Inflammatory bowel disease)	Mixed methods	Digital self-management intervention (website) for fatigue, pain, and urgency in IBD
244	Taylor et al, 2019, https://doi.org/10.1089/tmj.2019.0231	The University of Manchester, Northwest	Multiple (review)	To explore the role of e-health interventions in the delivery of care for patients with haematological cancers across the illness trajectory	Cancer	Review (systematic narrative)	e-health interventions (e.g., web-based system, web-based psychoeducational and cognitive behavioural therapy, mobile app, telerehabilitation,)
245	Temple et al, 2022, https://doi.org/10.1177/20552076221092536	King's College London, Southeast	United Kingdom	To understand the impact of digital communication using email and text between young people and their health care team on those in close supporting roles	Young people	Qualitative	Digital communication using email and text
246	Terblanche & Rose, 2021, http://dx.https://doi.org/10.1136/bmjinnov-2021–000842	King's College London, Southeast	United Kingdom	To restore continuity of information and healthcare delivery across the two key care transitions—from ICU to the ward and from hospital to home	Critical	Qualitative (service evaluation)	Digital recovery pathway - care platform a TouchAway
247	Thomson et al, 2006, https://doi.org/10.1016/j.ejcnurse.2005.10.003	The University of Manchester, Northwest	United Kingdom	To pilot a computerised decision aid that provides individualised information about hypertension to patients	Cardiology	Quantitative (questionnaire)	Computerised decision aid (decision trees as a way of structuring information)
248	Titov et al, 2015, https://doi.org/10.1176/appi.ps.201400477	University of Exeter, Southwest	United Kingdom	To report the feasibility of delivering online cognitive-behavioural therapy (iCBT) treatments for anxiety and depression in a national public mental health service	Mental health	Quantitative (cohort study)	Online cognitive-behavioural therapy (iCBT)
249	Topaz et al, 2016, https://doi.org/10.1016/j.ijnurstu.2016.09.013	The University of Manchester, Northwest	USA	To develop and validate one of the first automated natural language processing applications to extract wound information (wound type, pressure	Wound care	Unclear	Artificial intelligence – natural language processing

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No	Authors, Year, DOI	Institution / Region	Study country	Aims	Nursing practice	Study design	Digital health intervention
				ulcer stage, wound size, anatomic location, and wound treatment) from free text clinical notes			
250	[61], https://doi.org/10.3389/frdem.2022.977561	King's College London, Southeast	Multiple (review)	To identify and explore the components, acceptability and effectiveness of eHealth interventions for people with dementia, families and staff to support assessment and decision-making in care homes	Older adult care (dementia)	Review (systematic)	General health information technology
251	Unal et al, 2018, https://doi.org/10.1016/j.hrtlng.2018.05.009	King's College London, Southeast	Multiple (review)	To identify, retrieve, critically appraise and synthesize information regarding existing mobile phone text messaging interventions that have been done for secondary prevention of cardiovascular disease	Cardiology	Review (systematic)	Mobile phone text messaging interventions that have been done for secondary prevention of cardiovascular disease
252	Van de Belt et al, 2013, https://doi.org/10.2196/jmir.2607	University of Southampton, South central	The Netherlands	To determine the preferences of the general population in the Netherlands regarding the use of the Internet and social media in health care	General healthcare	Quantitative (cross-sectional survey)	Online social network
253	van de Belt et al, 2015, https://https://doi.org/10.2196/jmir.3906	University of Southampton, South central	The Netherlands	To identify the added value of social media for two types of supervision by the Dutch Healthcare Inspectorate (DHI) - (1) supervision in response to incidents reported by individuals, and (2) risk-based supervision	General healthcare	Qualitative	Social media sources such as Twitter, Facebook and healthcare rating sites
254	Vereenooghe et al, 2015, https://doi.org/10.1016/j.brat.2015.05.007	University of York, Northwest	United Kingdom	To examine whether specific skills required for cognitive behavioural therapy (CBT) could be taught using a computerised training paradigm with people who have intellectual disabilities	Intellectual disabilities	Quantitative (mixed experimental design)	Computerised training for CBT
255	Vereenooghe et al, 2016, https://doi.org/10.1016/j.brat.2015.11.002	University of York, Northwest	United Kingdom	To improve the ability of people with IDs to: a) discriminate between behaviours, thoughts and feelings, and b) link situations, thoughts and feelings	Intellectual disabilities	Quantitative (mixed experimental design)	Computerised training
256	Verhoef et al, 2014, https://www.jmir.org/2014/2/e56/	University of Southampton, South central	Multiple (review)	To systematically analyse the relation between information shared on social media and quality of care	General healthcare	Review (Scoping)	Social media
257	Waite et al, 2017, https://humanfactors.jmir.org/2018/1/e11	Oxford Brookes University, South central	Multiple (review)	To describe and examine the relationship between human factors and adherence with technology for data logging processes in adults with T1D	Diabetes	Review (systematic)	Medical devices (continuous glucose monitoring) and a mobile app
258	Waite-Jones et al, 2018, https://mhealth.jmir.org/2018/1/e25/	University of Leeds, Northwest	United Kingdom	To seek the views of young people with Juvenile Arthritis, their parents or carers, and health care professionals as to what should be included in a mobile app to facilitate self-	Rheumatology - (juvenile arthritis)	Qualitative (focus group and interviews)	Mobile app to facilitate young people's self-management of chronic Juvenile Arthritis

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No	Authors, Year, DOI	Institution / Region	Study country	Aims	Nursing practice	Study design	Digital health intervention
				management of chronic Juvenile Arthritis			
259	Wiklander et al, 2017, https://doi.org/10.1007/s00520-017–3793-6	City University of London, Southeast	Sweden	To evaluate the feasibility of a self-help web-based intervention to alleviate sexual problems and fertility distress in adolescents and young adults with cancer	Cancer	Mixed methods	Self-help web-based intervention
260	Wilson et al, 2021, https://doi.org/10.1111/inm.12954	Kings College London, Southeast	Multiple (review)	To examine/review research on the uses of BWCs in public sector services including healthcare, public transportation, and law enforcement	Mental health	Review	Wearables - Body Worn Cameras (BWCs)
261	Woo & Dowding, 2018, https://doi.org/10.1089/tmj.2017.0080	The University of Manchester, Northwest	Multiple (review)	To synthesize evidence on the factors affecting heart failure patients' decision making to accept telehealth services in a home setting	Cardiology	Review (integrative)	Telehealth
262	Woo & Dowding, 2020, https://doi.org/10.1097/CIN.0000000000000589	The University of Manchester, Northwest	USA	To explore factors associated with patients' decisions to adopt telehealth at home	Community nursing	Qualitative (descriptive)	Telehealth
263	Woo et al, 2018, https://doi.org/10.1080/01621424.2018.1523767	The University of Manchester, Northwest	USA	To explore factors associated with the initiation of telehealth among home care patients with heart failure	Cardiology	Quantitative (cohort study)	Telehealth
264	Woo et al, 2019, https://doi.org/10.1097/NHH.0000000000000811	The University of Manchester, Northwest	Multiple (review)	To map evidence on decision making factors associated with technology adoption and use by caregivers of patients receiving care at home	Carers	Review (scoping)	Telehealth or telemedicine, information communication technology, emails or web based communication, motion sensor–based monitoring technologies
265	Wu et al, 2019, https://doi.org/10.1093/jamia/ocy190	The University of Manchester, Northwest	Multiple (review)	To (1) characterize the variety of evaluation methods used within the health informatics community and (2) identify best practices	Informatics	Review (systematic)	Data visualizations and visual analytics technologies within the health informatics domain
266	Xyrichis et al, 2021, https://doi.org/10.1002/14651858.CD012876.pub2	King's College London, Southeast	Multiple (review)	To identify, appraise and synthesise qualitative research evidence on healthcare stakeholders' perceptions and experiences of factors affecting the implementation of Critical care telemedicine (CCT)	Critical care	Review	Critical care telemedicine
267	[75], http://dx.https://doi.org/10.1136/bmjopen-2021–055679	King's College London, Southeast	United Kingdom	To understand the experiences and perceived benefits of virtual visiting from the perspectives of intensive care unit (ICU)-experienced clinicians and non-ICU-experienced family liaison team members	Critical care	Qualitative (telephone/video interviews)	Virtual visiting
268	Zhang et al, 2014, https://doi.org/10.1111/jocn.12601	King's College London, Southeast	Multiple (review)	To describe nurses' attitudes towards medical devices and the factors influencing these attitudes	General nursing	Review (systematic)	Medical devices e.g., intravenous devices, clinical monitoring equipment, lifting devices and patient self-care devices

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No	Authors, Year, DOI	Institution / Region	Study country	Aims	Nursing practice	Study design	Digital health intervention
269	Zuidema et al, 2015, https://doi.org/10.2196/resprot.4571	University of Southampton, South central	The Netherlands	To develop an online, computer-tailored, self-management program integrated with the nursing care	Rheumatology (rheumatoid arthritis)	Unclear (intervention mapping framework)	Online, computer-tailored, self-management programme

Appendix C. Links between co-authors with three or more publications

Cluster	Colour	Items	Authors	Links	Total link score	Publications
Cluster 1	Red	11	Carolan, I.	3	6	3
			Finch, T.	2	4	3
			Hall, A.	5	10	6
			Lee, J. J.	3	5	3
			Mair, F. S.	2	5	3
			O'Connor, S.	5	10	11
			Smith, T.	6	9	4
			Stanmore, E.	4	7	7
			Stanmore, E. K.	1	1	3
			Swallow, V.	3	7	6
			Todd, C.	3	5	3
Cluster 2	Green	11	Armes, J.	10	19	6
			Calman, I.	7	16	4
			Foster, C.	8	20	4
			Gibson, F.	1	1	5
			Grimmet, C.	7	16	3
			Maguire, R.	5	9	4
			Miaskowski, C.	4	6	3
			Ream, E.	11	26	10
			Richardson, A	10	26	7
			Turner, L.	8	18	3
			Yardley, L.	8	20	4
Cluster 3	Blue	10	Alvardo, N.	7	26	5
			Dowding, D.	16	49	23
			Gardner, P.	8	17	3
			Greenhalgh, J.	7	26	5
			Hindmarsh, J.	7	20	3
			Honey, S.	7	20	3
			Mitchell, N.	3	9	3
			Pearman, A.	7	20	3
			Randell, R.	10	40	11
			Thompson, C.	3	10	5
Cluster 4	Yellow	8	Cook, A.	7	18	3
			Metaxa, V.	7	24	4
			Meyer, J.	7	24	6
			Pattison, N.	10	27	5
			Ramsay, P.	7	20	3
			Rose, L.	7	24	4
			Saha, S.	7	20	3
			Xyrichis, A.	7	20	5
Cluster 5	Purple	6	Cornelius, V.	7	15	4
			Gillard, S.	5	17	4
			Henderson, C.	5	18	5
			Sin, J.	5	18	6
			Williams, E.	5	14	3
			Woodham, L. A.	5	14	3
Cluster 6	Turquoise	5	Ciprani, A.	3	6	3
			Henshall, C.	3	6	4
			Moss-morris, R.	2	4	3
			Norton, C.	2	4	4
			Smith, K.	9	11	4
Cluster 7	Orange	4	Dowding, D. W.	3	4	6
			Merrill, J. A.	3	6	4
			Russell, D.	3	5	3
			Woo, K.	2	4	4
Cluster 8	Brown	4	Hardiker, N.	5	11	16
			Jing, X.	2	6	3
			Kay, S.	2	6	3
			Strudwick, G.	1	3	3
Cluster 9	Pink	3	Coenen, A.	3	8	5
			Hardiker, N.	5	10	5
			Kim, T. Y.	2	6	3

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