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SYSTEMATIC REVIEW

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How clinicians make decisions for patient management plans in telehealth

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Abstract

Aim: This systematic integrative literature review explores how clinicians make decisions for patient management plans in telehealth.

Background: Telehealth is a modality of care that has gained popularity due to the development of digital technology and the COVID-19 pandemic. It is recognized that telehealth, compared to traditional clinical settings, carries a higher risk to patients due to its virtual characteristics. Even though the landscape of healthcare service is increasingly moving towards virtual systems, the decision-making process in telehealth remains not fully understood.

Design: A systematic integrative review.

Data Sources: Databases include CINAHL, APA PsycInfo, Academic Search Complete, PubMed, Web of Science and Google Scholar.

Review Methods: This systematic integrative review method was informed by Whittemore and Knafl (2005). The databases were initially searched with keywords in November 2022 and then repeated in October 2023. Thematic synthesis was conducted to analyse and synthesize the data.

Results: The search identified 382 articles. After screening, only 10 articles met the eligibility criteria and were included. Five studies were qualitative, one quantitative and four were mixed methods. Five main themes relevant to decision-making processes in telehealth were identified: characteristics of decision-making *in telehealth, patient factor, clinician factor, CDSS factor and external influencing factor.*

Conclusions: The decision-making process in telehealth is a complicated cognitive process influenced by multi-faceted components, including patient factors, clinician factors, external influencing factors and technological factors.

Impact: Telehealth carries higher risk and uncertainty than face-to-face encounters. CDSS, rather than bringing unification and clarity, seems to bring more divergence and ambiguity. Some of the clinical reasoning processes in telehealth remain unknown and need to be verbalized and made transparent, to prepare junior clinicians with skills to minimize risks associated with telehealth.

Patient or Public Contribution: Not applicable.

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KEYWORDS
decision-making, patient management plan, telehealth

1 | INTRODUCTION

Telehealth and telemedicine are innovative approaches that deliver treatments and therapies via telecommunication. These include the use of video, telephone or mobile, online platforms and remote monitoring devices (Ozanne et al., 2020). Telemedicine is defined as delivering medical care by a physician from a distance, whereas telehealth is an umbrella term covering medicine, therapy and care, including approaches such as telenursing and telepharmacy (Weinstein et al., 2014). Telehealth can be further divided into synchronous and asynchronous modalities. Synchronous models entail live communication in a virtual setting, whereas asynchronous models often include delayed processing of patient information, such as text, images, audio or video (Hah & Goldin, 2022).

There is some evidence, suggesting that telehealth is effective in managing a vast array of health conditions in various settings, reducing health resource costs, improving diagnostic accuracy whilst avoiding unnecessary diagnosis and optimizing clinical decisions (Dehours et al., 2022; Lee et al., 2022; Olayiwola et al., 2019; Zanaboni & Lettieri, 2011). Despite the popularity of telehealth, which increased during the COVID-19 pandemic, this care delivery model is not without its limitations. Due to the lack of face-to-face physical assessment, potential misdiagnoses and safety issues such as medication abuse could arise (Baumes et al., 2020; GMC, 2022; Lerman et al., 2020; Lim et al., 2021). Joyce et al. (2020) reported that physicians' prescribing patterns changed when using telehealth and reported increased prescription of opioids, neuropathic pain medications and muscle relaxants. To mitigate the associated risks in telehealth, regulatory bodies have published guidelines on how to conduct remote consultation and prescribe safely (General Pharmaceutical Council, 2019; GMC, 2022; NHS England, 2022; NMC, 2019; Royal College of Nursing, 2022; Royal Pharmaceutical Society, 2021).

Decision-making aids, algorithms, artificial intelligence (AI) or clinical decision support systems (CDSS) are software applications designed to aid clinical decision-making by combining knowledge base and patient-specific information (Sutton et al., 2020). CDSS has been utilized to aid clinicians' decision-making in situations of remote consultation (Barken et al., 2017). Despite the wide use of CDSS, the effect on the quality of service is uncertain, and its benefits on clinicians' decision-making are not always clear (Adepoju et al., 2017; Amoakoh et al., 2019). Holmström (2007) reported that some nurses using telehealth platforms reported that they often overrode the CDSS by using their own clinical judgement, as they felt it limited their autonomy and only allowed exploration of one patient complaint at a time. Hence, it seems that artificial intelligence is not mature or reliable enough to completely replace a clinician's decision-making process.

Early studies (Edwards, 1994, 1998) exploring the use of telephone triage suggested that telenurses made clinical decisions solely based on oral communication by listening and interactive skills. Telenurses reported that whilst picking up verbal or non-verbal cues, they built a 'mental imaging' of the care seeker (Edwards, 1994). More recent studies reported that telenurses used similar methods to gather clinical information about their patients (Holmström, 2007). Whilst this 'mental imaging' could be a valuable source of information, it could also be a form of cognitive bias leading to inappropriate judgement, or sometimes overtreatment due to fear of litigation (Holmström, 2007; Röing et al., 2013). Holmström (2007) reported that the accuracy of the clinical judgement was positively linked with telenurses' length of experience, and nurses with more experience were more likely to make the CDSS congruent with their own decision. Final decisions were also influenced by non-clinical concerns, such as conflicting and competing demands both from carers and gatekeepers (employers) to keep healthcare costs low (Purc-stephenson & Thrasher, 2010).

Acute patients are increasingly managed at home by the modality of telehealth in the NHS instead of being admitted to a hospital. Clinicians might need further training and preparation to embrace virtual health for safety and better patient outcomes (Edirippulige & Armfield, 2017). Moving away from traditional, physical modes of care into virtual modes of care represents a major paradigm shift in healthcare deliveries in recent years. Yet, the clinical decision-making processes involved in telehealth are not fully understood. Given the importance of this matter, it is essential for clinicians to have a deeper understanding of their decision-making processes in telehealth.

Patient management plans are treatment plans for patients based on their medical conditions, preferences and clinicians' recommendations (Farias et al., 2015). Decision-making is described as a contextual and continuous process of gathering, interpreting and evaluating data to inform the choice of action (Tiffen et al., 2014). Clinical decision-making is a dynamic process that calls for further reflection and research (Johansen & O'Brien, 2016), which can be influenced by many factors (Mcintosh et al., 2016). Nibbelink and Brewer (2018) state that decision-making processes can be intuitive and unconscious, and unsound decisions can lead to poor patient outcomes. This is particularly relevant to telehealth because the lack of physical assessment could potentially lead to misdiagnosis (Haimi et al., 2018). Given that the health landscape is trending towards being remote and digital, it is important to explore our current understanding of clinical decision-making in telehealth. The aim of this integrative review is to explore how clinicians make decisions for a patient's management plan in telehealth.

2 | RESEARCH QUESTIONS AND OBJECTIVES

The research question of this literature review is:

How do clinicians make decisions for a patient's management in telehealth?

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The objectives of this literature review are:

To explore clinician's decision-making process in telehealth.

To understand the relevant internal or external influencing factors affecting decision-making in clinicians in telehealth.

3 | REVIEW METHOD

A systematic integrative literature review (ILR) method informed by the framework described by Whittemore and Knafl (2005) was adopted. An ILR includes a variety of types of evidence, including qualitative, quantitative and mixed-method studies. ILR reviews, critiques and reconceptualizes the knowledge base of a topic holistically leading to new knowledge or understanding of the topic (Torraco, 2005). The ILR framework follows six steps: clearly formulating the review problem; comprehensive and replicable search strategy; data evaluation/appraising quality; data abstraction, comparison and synthesis; and, finally, presentation (Whittemore & Knafl, 2005).

A preliminary scoping literature search demonstrated that there were both qualitative and quantitative studies that may inform the answer to the research question; therefore, a qualitative synthesis approach was adopted whereby first themes were extracted, and then the descriptive quantitative data were qualified and assimilated into themes (Pluye & Hong, 2014).

The review is reported according to PRISMA-S reporting guidelines (Rethlefsen et al., 2021). The ENTREQ checklist (Tong et al., 2012) was attached as an Appendix; Table A1.

3.1 | Search strategy

3.1.1 | Search terms

In consultation with the healthcare librarian, the following search terms were identified using the PICo (Population, Issue of interest, Context) framework (Lockwood et al., 2017; Miller & Forrest, 2001): how do clinicians (P) make decisions (I) for a patient's management plan (O) in telehealth (C). Relevant synonyms were used. Where possible, Medical Subject Headings (MeSH) and Subject Headings were used (see Table 1).

3.1.2 | Data sources

This search strategy was applied consistently in five databases: CINAHL, APA PsycInfo, Academic Search Complete, PubMed and Web of Science. Google Scholar was also used to complement the search. In Google Scholar, the combination of two keywords (free text), i.e., decision-making and telemedicine, decision-making and telehealth, and decision-making and telenurse, were searched. Google Scholar tends to yield too many results, with the most relevant ones at the top. Hence, it was decided to review the first 50 hits in Google Scholar (no new article was found in Google Scholar). Searches were conducted by and checked by another independent researcher.

3.1.3 | Inclusion and exclusion criteria

Inclusion and exclusion criteria were employed as detailed in Table 2. As this review aims to explore clinicians' decision-making rather than the effectiveness of decision-making support software, articles pertaining to CDSS only were excluded unless the literature explored situations when clinicians incorporated their own clinical judgement when using decision-making aids, such as when they overrode CDSS recommendations. The assumption is that these scenarios, i.e., clinicians VS protocol/algorithm/artificial intelligence software, may serve as a rich information source to highlight the rationale for clinicians' decision-making.

Data were screened by title and abstract against the eligibility criteria. Full-text reviews were conducted on those identified. Data screening was conducted independently by two researchers.

3.2 | Quality appraisal

Joanna Briggs critical appraisal tools (Joanna Briggs Institute, 2016) and mixed-methods appraisal tool (MMAT) version 2018 (Hong et al., 2018) were selected to evaluate the literature critically. Appraisals were conducted by one researcher and independently verified by another.

TABLE 1 Search strategy.

Search terms	Subject heading/MeSH
Decision-making	"decision making" or "decision-making" or "decision making process" or "decision-making process" or "clinical reasoning"
	and
Management plan	"management plan" or "treatment plan" or "care plan" or prescri* or "therapy plan"
	and
Telehealth	"virtual review" or "remote prescribing" or "remote therapy" or "remote consultation" or "remote treatment" or "tele-review" or telehealth or telemedicine or telemonitoring or telepractice or telenursing or telecare or ehealth or e-health or econsult or mhealth or "digital health" or telephone triage

Note: MeSH stands for the Medical Subject Headings, an indexing or cataloguing system for searching health-related information.

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TABLE 2 Inclusion and exclusion criteria.

Inclusion criteria	Exclusion criteria
• Articles Published in English between 2012 and 2022 • Primary studies on decision-making in relation to treatment plan • In virtual settings • Papers looking at clinicians' decision-making process or influencing factors, including doctors and nurses	• Studies that look at decision-making aids alone • Studies that look at how to incorporate decision-making aids, such as CDSS, into clinical settings • Studies that look at decision-making with regard to whether to adopt telemedicine or which modalities of telemedicine to adopt • Studies that look at ethical decision-making • Studies assessing the usefulness of use of CDSS in clinicians' decision-making process • Studies that look at shared decision-making in telehealth • Articles that are not in English • Articles published before 2012

3.3 | Data abstraction

Data were reduced into fundamental components, including year of the study, method, sample, results and quality of the study (Torraco, 2005). These components were entered into a review matrix (Table 3), which is a structured document to support the review synthesis (Garrard, 2017).

3.4 | Data analysis/synthesis

Results from each study were sorted and grouped. An inductive approach was used in qualitative and mixed-method research. Thematic analysis was conducted (Whittemore & Knafl, 2005) by one researcher and independently verified by another. When synthesizing the result, Knafl and Whittemore (2017) advised not just to list the information sources like a laundry list, but to organize the themes within a structure, a model or a framework to present the body of literature (Harstade et al., 2018).

4 | SEARCH OUTCOME

The search strategy identified 382 articles. In EBSCO, a total of 168 articles were retrieved (Academic Search Complete 90; CINAHL 55; APA PsycInfo 23), of which 42 duplicates. One hundred six articles were found in Web of Science and 108 in PubMed. After further duplication removal (34), there were 306 studies. Screening titles and abstracts against the eligibility criteria resulted in 15 articles requiring full-text review. After a full-text review, six articles were included. Articles were excluded due to not focusing on decision-making, not in the setting of telehealth, and being concerned with the patient/carer's decision-making (e.g. patient or caregivers). Both backward and forward citation searches were conducted, leading to a further four papers being identified and included in the final review. Thus, a total of 10 articles were included in this review (see Figure 1 for PRISMA report).

5 | RESULTS

Five main themes were identified that are relevant to decision-making processes in telehealth: *characteristics of decision-making in telehealth*, *patient factor*, *clinician factor*, *CDSS factor and external influencing factor*. These themes show that the decision-making process in telehealth has unique characteristics compared to traditional clinical settings, and decision-making in telehealth is not a linear process authored by clinicians and patients but is subject to the influence of external factors and digital technology.

Figure 2 represents the framework of the relationship between the themes when a clinician decides on a management plan in telehealth.

5.1 | Characteristics of decision-making in telehealth

5.1.1 | Benefits and risks

Compared with traditional face-to-face clinical settings, studies reported that clinicians found telehealth convenient, fast (Hah & Goldin, 2022) and engaging (Barken et al., 2017). However, the inconvenience of not being able to perform physical assessment led clinicians to ask for more information and a detailed medical history via the mode of telehealth (Hah & Goldin, 2022), pay more attention to the tone of the voice (Haimi et al., 2018; Wouters et al., 2020) and check parents' health literacy if children were patients (Haimi et al., 2018, 2020). Clinicians were also concerned that a lack of accurate risk assessment could lead to misdiagnosis. Working alone in telehealth with no one to consult with did not help the situation (Haimi et al., 2018). Not all studies report concerns, nevertheless. Despite clinicians in telehealth working alone with a lack of collaboration, Barken et al. (2017) reported working alone gave clinicians time and space to focus on clinical reasoning without distraction.

In addition, clinicians in telehealth needed to address technology issues, such as camera quality or software failure, which would affect the decision-making process (Barken et al., 2017; Haimi et al., 2018).

5.1.2 | Processing multi-media patient information

Two studies explored video consultation (Hah & Goldin, 2022; Haimi et al., 2018). Hah and Goldin (2022) found that in asynchronous

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TABLE 3 Data matrix.

Study	Location	Objective	Samples	Design	Main findings	Critical appraisal
Barken et al. (2017)	Norway	To explore telenurses' clinical reasoning process with CDSS for managing chronic obstructive pulmonary disease (COPD)	3 telenurses	Ethnography (including observations, think-aloud technique, and a focus group interview)	Telenurses regularly advanced their clinical reasoning beyond the CDSS system recommendations, based on their own knowledge of each patient	The small sample size of three begs the question of whether data saturation had been achieved
Hah and Goldin (2022)	USA	(1) To find out what support clinicians needed to manage multi-media patient information (MPI), which were composed of both words and pictures, in traditional settings; (2) how clinicians processed video information in synchronous telehealth settings; and (3) how clinicians dealt with AI images and audio in asynchronous telehealth settings.	87 family nurse practitioner (FNP) students who used AI in healthcare settings	Online simulation surveys and cross-sectional case study	*In non-telehealth settings*: clinician should process information with task-orientated focus, which could be distracted by AI-supported medium. *In synchronous telehealth setting*: clinicians needed more time to collect more patient information in Zoom and technology-related issues, which could slow down clinicians' ability to collect assessment data. AI support for processing MPI can reduce the length of time for assessment. *In asynchronous telehealth setting*: clinicians tended to use images more on audio information	The study recruited small group of FNP students; hence, the generalization of the findings to larger cohort of clinicians might be limited. Case study and descriptive design also limited the study in its value in predictive inference
Haimi et al. (2018)	Israel	To explore physicians' experience, attitude and challenges in paediatric telemedicine service, and whether clinicians used any non-medical factors to make clinical decisions	15 physicians working in telemedicine service	Semi-structured qualitative study	Seven themes were identified from the study. Clinicians used non-medical factors when making decisions and tools like intuition or 'rules of thumb' to help decision-making	The sample of the study was restricted to one call centre in Israel. It was unsure how much influence culture plays in the study. Also, the doctors responded to the recruitment might be more interested in telemedicine, hence creating response bias
Haimi et al. (2020)	Israel	To find out any non-medical factors which might influence doctors' decision-making in paediatric telemedicine	15 physicians and 339 consultations	Mixed method	Non-medical factors influencing DECISION-MAKING included doctors' impression of the parents, socio-demographic status, patients' access to healthcare, fear of lawsuits, doctors' personal experience, intuition and factors relating to the system or shift. Non-medical factors were associated with clinical decision-making and reasonability of the decisions. Four variables were related to referring a child to emergency department (ED), i.e., physicians' specialty and gender, family location and shared decision-making	The research studied paediatric doctors and symptoms were reported by parents mainly rather than children themselves, making it difficult to arrive at accurate diagnosis due to possible unreliable report. Also, the study may be subject to some measurement bias, for instance, incorrect judgement of the anxiety of the parents or quality of the phone call. The author admitted that older parents with younger age children may be associated with congenital issues, which would be a medical factor, and posed itself as a hidden confounder

(Continues)

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TABLE 3 (Continued)

Study	Location	Objective	Samples	Design	Main findings	Critical appraisal
Huibers et al. (2012)	Netherlands	To assess the relationship between history taking and urgency estimation	304 audio-recordings from four GP cooperatives (GPCs)	Mixed method	Incomplete asking of questions to elicit history was not associated with the decision for urgency. Instead, the pattern recognition may be more important	*Sampling bias*: Only four GPCs were selected limiting the result generalizing to other GPCs with drastic change of regions or level of urbanization. *Measurement bias*: the research used national telephone triage guidelines, which was not validated for measurement purpose. *Reporting bias*: Nurse self-reported their assessment outcome
Timotijevic et al. (2020)	UK, Italy, Slovenia and Greece	To develop a set of principles of CDSS for Parkinson disease (PD): the type of decisions clinicians make for patients with PD; information needs of clinicians; and judgement under uncertainty	Prescribing clinicians, including doctors and PD nurse specialists, and supporting clinicians, including physiotherapist, occupational therapist, psychologist and speech therapist, were included in the study	Mixed method	Five task-orientated themes were identified when managing PD patients, i.e., assess disease status, review existing care plan, discuss and agree future care plan, prescribe future care plan and set appropriate clinical contact and communicate with multiple disciplinary team (MDT). Instead of dividing the symptoms into 'motor' and 'non-motor', the most important domain is quality of life. Different clinicians weighed similarly on tremor but varied on bradykinesia. DECISION-MAKING in care plan change were associated with a combination of factors. Clinicians treated subjective and objective information equally in relation to changing care plan. They were more likely to change plan if these two types of information were congruent with each other, and less so if incongruent	The study was developed specifically for PD patient and the symptoms were described specifically for PD. Clinicians may have different weighing patterns with other chronic conditions other than PD
Tuden et al. (2019)	Canada	To understand the cognitive process of DECISION-MAKING in telenurses, with assistance of health information systems (HIS), such as CDSS, and identify the influencing factors with telenurses using CDSS	Eight telenurses (all female)	Qualitative approach (cued recall approach)	Six themes were identified in the study, which would affect telenurses' decision-making whilst using CDSS: professional experience, knowledge and education, familiarity of the CDSS, call complexity, personal experience and system problems	Small sample in a call centre with all female participants might limit the study's transferability to other telenurses

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TABLE 3 (Continued)

Study	Location	Objective	Samples	Design	Main findings	Critical appraisal
Murdoch et al. (2014)	2 GP practices in UK	To compare nurse-led and GP-led telephone consultation in primary care settings	51 recordings from 22 nurses and 29 GPs, including 10 video-recordings of nurses using CDSS were analysed. 40 females (17 nurse and 23 GP) and 11 males participated in the study	Qualitative comparative approach	GPs and nurses differed in the question number, content and forms. Nurse seemed to ask more information about symptoms related and wider information whilst GPs tended to ask questions involving patient concerns and expectations. Nurses using CDSS asking many questions designed requesting confirmation and often leading to a 'no problem' answer, whilst GPs asked more interrogative questions. The study demonstrated the different questioning patterns nurses adopted when using CDSS verses GPs and nurses when not using CDSS	The sampling was limited to two GP practices in the UK, which might limit the generalization of the findings to other areas. The nurses who participated in the study were 8 weeks post training of CDSS. It is unclear whether navigating unfamiliar system of CDSS might affect the telephone triage nurses' performance under investigation
Murdoch et al. (2015)	One GP practice in UK	To gain insight into any interactional dilemmas telephone triage nurses facing when applying CDSS	22 audio-recorded consultation by telephone triage nurse including 10 video-recordings, obtained in one GP practice	Conversation analysis	When using CDSS, telephone triage nurses were restrained to reduce the patients' complaint into one or a few symptoms in line with the structure of CDSS. The result raised questions regarding CDSS as a supportive tool or not, and possibly reducing a clinician's understanding of patients' 'lifeboat' and their concerns	The study has a restricted sampling size (one single GP practice). The investigators did not take into account of the nurses' experience or the maturity level of the CDSS, which might be attributable to the difficulty triage nurses faced by using CDSS
Wouters et al. (2020)	Netherlands	To understand the clinical reasoning and decision-making process of telephone triage nurses for patients suspected of acute cardiac events, with the use of CDSS	24 triage nurses with varies of experience from nine out-of-hours primary care centres were recruited	Mixed method	Telephone triage nurses use various reasoning patterns to determine cardiac urgency of patients; and when their clinical judgement was not congruent with the CDSS, they used various strategies to manage the situation, including tinkering, overruling, complying or transferring	The study used recall of real scenarios as the methodology. However, as the recordings took place 2 weeks ago, some participants were unable to remember their reasoning in that time. The study was carried out in out-of-hour call centre where the triage nurses dealt with cardiac urgency; hence, the findings of the clinical pattern may be completely applicable to other telehealth settings with less urgency level

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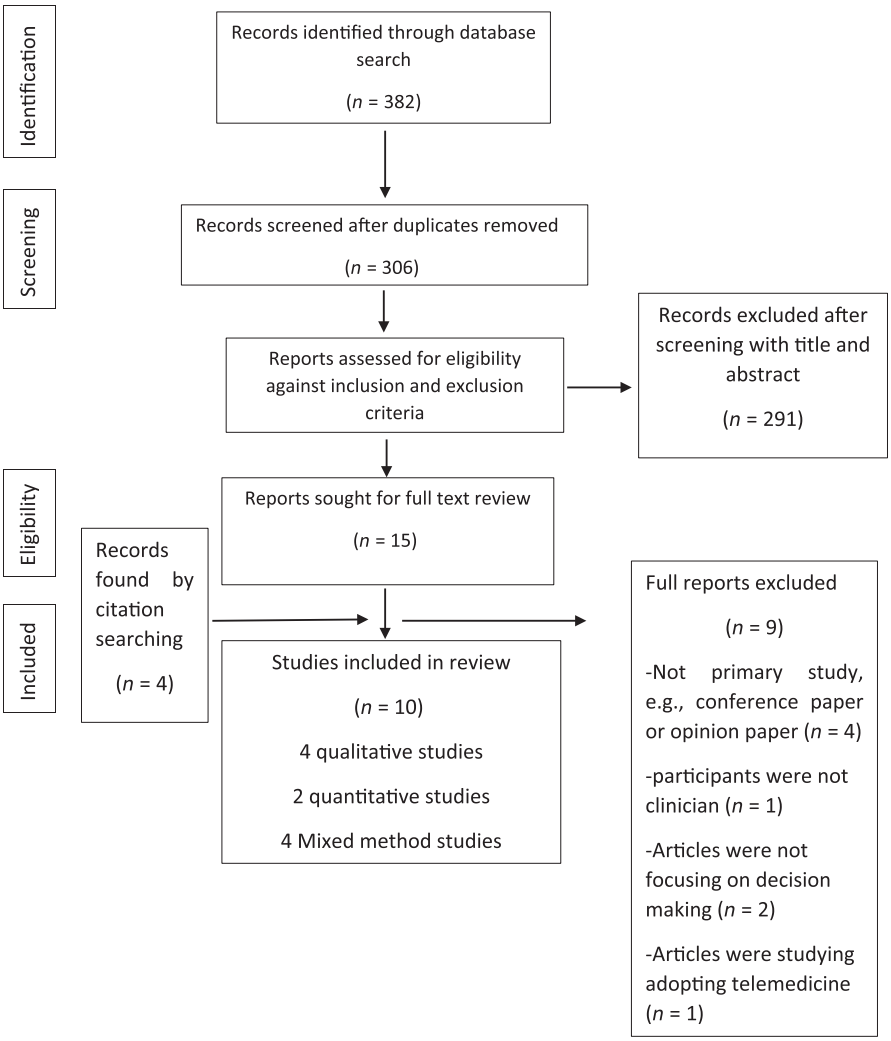

FIGURE 1 Prisma flow chart for searching strategy.

telehealth with AI aids, clinicians were more inclined to process images rather than audio information and generally gained more satisfaction in doing so. Similarly, Haimi et al. (2018) and Barken et al. (2017) found that in telehealth clinicians mostly dealt with unfamiliar patients, and to overcome the difficulties in telehealth, pictures and video information to some extent compensated for the lack of physical examination.

5.1.3 | Dealing with uncertainty

In telehealth, clinicians may need to make a remote diagnosis based on sometimes unreliable care seekers' reports. Hence, it is more difficult to diagnose with certainty (Haimi et al., 2018). Wouters et al. (2020) reported that too much, too little, or conflicting information (such as CDSS) led to uncertainty. When clinicians were unsure about the diagnosis, they tended to opt for the safest option if potential urgency was identified (Wouters et al., 2020). Alternative strategies were inviting patients for a video consultation, checking with senior clinicians (rarely), and asking patients to ring again later (frequently) (Wouters et al., 2020).

5.2 | Patient factor

5.2.1 | Medical factors

Only one study examined the relationship between a patient's symptoms and the likelihood of a management plan/prescription change. Timotijevic et al. (2020) found that clinicians were more likely to change care plans and adjust medication if there were motor symptoms present in patients with Parkinson's disease, for example bradykinesia, rigidity; less likely if there were non-motor symptoms such as depression or cognitive function; and symptoms like sleep or constipation rarely affected management plan.

5.2.2 | Subjective vs objective information

Timotijevic et al. (2020) pointed out that clinicians were most likely to change a management plan when both patients (subjective data) and remote monitoring devices (objective data) reported worsening symptoms. Subjective information and objective information were equally influential in the clinician's decision. Clinicians were less

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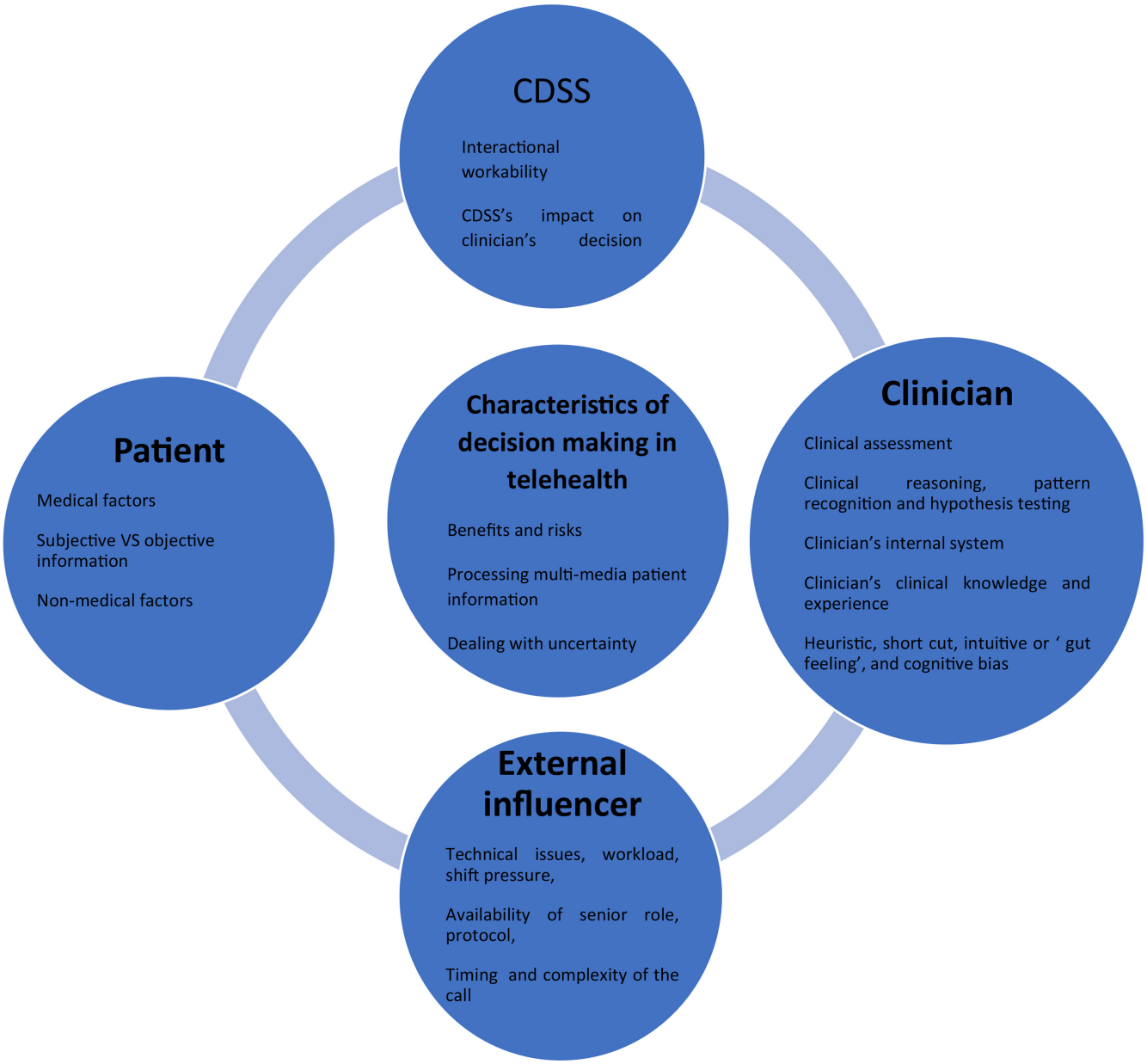

FIGURE 2 Decision-making process in telehealth.

likely to revise a plan if subjective information and objective information were incongruent with each other (Timotijevic et al., 2020).

5.2.3 | Non-medical factors

Five articles mentioned the importance of non-medical factors in the decision-making process in telehealth (Haimi et al., 2018, 2020; Timotijevic et al., 2020; Tuden et al., 2019; Wouters et al., 2020). Timotijevic et al. (2020) recognized that clinicians combined medical factors (symptoms) and non-medical factors (age and employment status) when making decisions about changing a care plan in Parkinson's patients. Haimi et al. (2018, 2020) studied the role of non-medical factors in paediatric telehealth, such as parents' health literacy, tone of voice, level of anxiety and socio-demographic information (residence, language, culture and economic status). They found that these factors were associated with the accuracy and reasonability of diagnosis and the decision to refer to the emergency department (ED) or monitor at home. For instance, older children (more than 10 years old), those who lived in remote areas, and children with aggressive parents were more likely to be referred to ED. Similarly, Wouters et al. (2020) identified that telephone triage nurses strongly considered paralinguistic aspects of the conversation when reasoning clinically, including the caller's call history and behaviour.

5.3 | Clinician factor

5.3.1 | Clinical assessment

Two studies investigated clinicians' questions to gather medical history in telehealth (Huibers et al., 2012; Murdoch et al., 2014). The findings suggested that GPs and nurses might orientate on different

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aspects of the assessment process. Whilst nurses mainly focused on patients' reported symptoms and related wider information, GPs seemed better at eliciting patients' own explanations and detailed medical history. Moreover, GPs moved on to triage resolution straight after eliciting explanations and responding to patients' responses (Murdoch et al., 2014). Conversely, Wouters et al. (2020) stated that nurses in telehealth did gather patients' context and wishes, along with symptoms. The difference observed between doctors and nurses disappeared when nurses conducted consultations without CDSS. Hence, the observed investigating pattern may be associated with the CDSS restraining questioning design (Murdoch et al., 2014).

Huibers et al. (2012) found that the comprehensiveness of history-taking was not associated with the accuracy of urgency estimation and that patterns of history-taking (a cluster of frequently asked questions) might be more important in identifying urgent situations.

5.3.2 | Clinical reasoning, pattern recognition and hypothesis testing

Four papers explored clinical reasoning and pattern recognition (Barken et al., 2017; Huibers et al., 2012; Timotijevic et al., 2020; Wouters et al., 2020). Clinicians used a hypothetico-deductive approach when they tested hypotheses based on their knowledge and experience and an intuitive-humanistic approach, using pattern recognition to gather and process information. Clinicians in telehealth interpret non-verbal cues, such as breathing speed or the presence of gasping, to gauge the credibility of the caller and create a 'mental image' to judge a patient's clinical issues (Wouters et al., 2020, p. 1180).

Barken et al. (2017) also mentioned building up a bigger picture and recognizing patterns. The researcher conducted an ethnographic study and proposed a clinical reasoning process in telehealth, including mapping (collecting diverse data), combining (assessing details to form a complete overview) and interpreting data (reflection and cross-analysis of different forms of clinical data).

5.3.3 | Clinician's internal system

Clinicians' internal systems, such as age, gender, beliefs, personal experience, fear and fatigue, can affect the outcome of decision-making (Haimi et al., 2018, 2020; Tuden et al., 2019). For instance, fear of litigation can lead clinicians to prescribe defensive medicine; female physicians referred more patients to ED compared with male counterparts in paediatric telemedicine; doctor's age associated with reasonability of the decision, older doctors (over 60 years) made less reasonable decisions contra-intuitively; doctors referred low economic status patients to ED more, perhaps due to their belief that economic background connected to poor health literacy, or their own desire to help the poor (Haimi et al., 2018, 2020). Tuden et al. (2019) quoted an example when telenurses identified a case of mastitis as she herself experienced the illness before. Fatigue was also found to influence the management plan – clinicians were more likely to refer to ED or rely on CDSS's recommendations if they were fatigued (Haimi et al., 2020).

5.3.4 | Clinician's clinical knowledge and experience

Tuden et al. (2019) studied telenurses' decision-making with clinical decision aids. They stated that knowledge and education were an influencing factor, which echoed the findings of Haimi et al. (2020) that specialist paediatricians tended to refer less to ED than general physicians. It was speculated that their experience enabled them to be more comfortable and confident with higher-risk thresholds. The length of using CDSS associated with knowledge and familiarity with using CDSS lead to better navigation in the system (Tuden et al., 2019). Not only does experience improve diagnostic capability, but the skill of interpreting paralanguages also improves with experience (Wouters et al., 2020). More senior nurses tend to ask more questions, which were not included in CDSS (Wouters et al., 2020). Whilst junior nurses found CDSS challenging to use, this also improves with experience (Barken et al., 2017).

5.3.5 | Heuristic, short cut, intuitive or 'gut feeling' and cognitive bias

Three papers discussed how clinicians used fast or heuristic processes to help make decisions (Haimi et al., 2018, 2020; Wouters et al., 2020). Clinicians found using intuition helpful but were also aware of the cognitive biases it could bring (Haimi et al., 2018; Wouters et al., 2020).

5.4 | CDSS factor

5.4.1 | Interactional workability

Interactional workability in CDSS describes the effect of CDSS on the interactions between clinicians and their work process (May et al., 2007). Three papers mentioned how CDSS affected the way clinicians work (Murdoch et al., 2014, 2015; Wouters et al., 2020). It was found that CDSS was helpful with patient information registration, such as demographic details and date of birth (Wouters et al., 2020). However, CDSS usually requires clinicians to enter one or a few main symptoms as the main presenting complaint, and then, clinicians need to complete the prompted questions designed for the main complaint (Murdoch et al., 2014, 2015; Wouters et al., 2020). This process does not accurately reflect patients' clinical narratives, when patients have equally competing symptoms requiring investigation (Murdoch et al., 2015; Wouters et al., 2020). Therefore, CDSS can be too 'restrictive' (Wouters et al., 2020, p. 1180) causing an interactional dilemma.

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Murdoch et al. (2015) explored several situations when the structure of CDSS misaligned with patients' reported experience or patients' language style, leading to failure to accurately capture patients' clinical condition. This inaccurate representation of the clinical picture often led clinicians working in telehealth settings to override the recommendations from CDSS. Moreover, this dissonance between the clinician and CDSS resulted in further personal conflict in the clinician, as they needed to choose either referring patients to ED inappropriately (abiding by CDSS recommendations) or downgrading the decision with the risk of the patient's condition worsening (overriding CDSS recommendations) (Murdoch et al., 2015). Murdoch et al. (2015) suggested that by constraining and reducing patients' stories to one or a few more problems, we may have missed seeing a patient as a person and hearing their hearts and concerns. In contrast with Murdoch et al. (2015) and Barken et al. (2017) reported that telehealth settings allowed clinicians to build up strong relationships with patients and gain insight into their personalities and life stories.

Murdoch et al. (2014) reported that CDSS significantly affected how clinicians asked questions to gather information, including the number, order and type of questions. Clinicians adapt their questions to enable progression through the list of questions, rendering the information-gathering process like a checklist questionnaire.

5.4.2 | CDSS's impact on clinician's decision-making

CDSS both enables and constrains clinicians' reasoning processes (Barken et al., 2017). It was found to be helpful when used to initiate clinical reasoning, such as identifying health problems, and decision-making relating to prioritizing follow-up needs.

Compared to the reasoning process in traditional settings, clinicians in telehealth using CDSS often need to navigate the CDSS to accurately record patients' reports whilst responding to patients appropriately (Murdoch et al., 2015). This process requires clinicians to have clinical, interactional and technical skills (Murdoch et al., 2015). As previously mentioned, CDSS affects clinicians' way of asking questions and shaping their way of talking and interacting with patients. Clinicians, however, frequently advance beyond the CDSS recommendations and seek more information, such as checking clinical data and eliciting more subjective information, to form their decision (Barken et al., 2017). Contrary to the traditional settings when the patient and clinician were seen as the two main authors to form the clinical story, CDSS perhaps can be seen as the third author in telehealth settings to shape the clinical narrative and outcome (Murdoch et al., 2015).

5.4.3 | Congruence or incongruence, and strategies for deviation

CDSS is helpful when it is congruent with the clinician's decisions, but a dilemma occurs when it is incongruent (Wouters et al., 2020). Strategies that clinicians employed for situations when incongruence happened were tinkering (when clinicians switched between main complaints or upgrading/downgrading symptoms); overruling (when clinicians decided not to comply with CDSS recommendations); complying (clinicians decided to comply with CDSS despite disagreement, e.g., due to organizational pressure such as audits); and transferring (clinicians transfer the responsibility to senior clinicians for decision-making) (Wouters et al., 2020).

5.5 | External influencing factor

Four articles discussed external influencing factors affecting decision-making in telehealth (Haimi et al., 2018, 2020; Tuden et al., 2019; Wouters et al., 2020). Technical issues were mentioned numerous times as a factor affecting decision-making (Haimi et al., 2018, 2020; Wouters et al., 2020). Workload, shift pressure, availability of senior roles, availability of built-in protocol, call timing (Haimi et al., 2020) and call complexity (Tuden et al., 2019) can all affect the decision outcome. For instance, clinicians referred more patients to ED just before the weekend (Haimi et al., 2020).

6 | DISCUSSION

This literature review identified four main factors encompassing the decision-making process during telehealth: clinician, patient, CDSS and external factors.

Clinicians in telehealth develop skills of a more discerning ear in interpreting tone of voice, identifying the stress level of patients and health literacy of carers, and relying more on pictures and videos, if available, to help them decide on a patient management plan (Hah & Goldin, 2022). Clinicians build up a mental picture of patients by gathering verbal, non-verbal and other clinical data from multi-media information sources, which mirrors previous findings (Edwards, 1994; Holmström, 2007). Clinicians in telehealth do use a hypothetico-deductive approach, pattern recognitions and other useful tools such as protocol and intuition, to decide on a patient management plan. This bears similarities with decision-making in traditional (face-to-face) settings (Benner et al., 1992; Benner & Tanner, 1987), which means that most decision-making skills in non-telehealth perhaps can be transferred to telehealth settings. Clinicians are aware of the existence of cognitive bias in the individual cognitive processes. However, none of the literature mentioned how to address this.

Clinicians' fatigue can affect decision-making. Similar findings were reported by previous studies (Ernesäter et al., 2009; Purc-stephenson & Thrasher, 2010) when telenurses felt tired, or there was a large volume of calls; they reported rushing through the calls or solely relying on CDSS.

This review indicated that different clinicians may give different weight to presenting symptoms when assessing multiple symptoms caused by a specific illness (Timotijevic et al., 2020). This may lead to different management plans by different clinicians on the same presenting symptoms. This was only mentioned in one of the studies in

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this LR (Hah & Goldin, 2022), and it was conducted in patients with Parkinson's disease only. Furthermore, studies are needed to determine how clinicians weigh up different symptoms or the pattern of combination of symptoms in other chronic conditions, that is the Hierarchy of symptoms leading to a change of management plan or medication adjustment. This will help articulate clinicians' decision processes and make their diagnostic strategies more transparent.

It is worth noting that most of the studies were conducted in primary care settings (Barken et al., 2017; Huibers et al., 2012; Murdoch et al., 2014, 2015; Tuden et al., 2019; Wouters et al., 2020). It is unclear how much the findings from this literature review can be applied to hospital settings, where professional dynamics (multi-disciplinary teams) and organizational targets (e.g., avoiding unnecessary hospital admission) may differ from primary care settings. Due to organizational pressure such as meeting national targets and freeing up hospital beds, avoiding hospital admission and treating patients in the appropriate setting may have become a competing priority. How clinicians navigate the risks, patients' needs, limitations of protocols/guidelines/CDSS and organizational pressure have not been explored.

CDSS has become a major theme in this literature review—six out of 10 papers included a component of CDSS (Hah & Goldin, 2022; Murdoch et al., 2014, 2015; Timotijevic et al., 2020; Tuden et al., 2019; Wouters et al., 2020). This may indicate that telehealth increasingly employs CDSS to help with clinical decision-making (Sutton et al., 2020). Consequently, this may also imply a change in the decision-making process: telehealth is not a pure human brain activity solely based on a remote conversation, but more like a dual assessment with CDSS on processing multiple sources of knowledge and information, aiming to standardize the decision-making and minimize individual cognitive bias (Noon, 2014; O'Cathain et al., 2004).

AI was superior in its precision and speed in identifying tasks and producing medical reports (Lysaght et al., 2019), and can be seen as equal in performance as clinicians, or even surpass less experienced clinicians (Shen et al., 2019) It was also known for its biased algorithm in ethical scenarios such as end-of-life care (Krittanawong, 2018). Therefore, AI or CDSS was found to inform rather than be the final decision-maker at present (ANSI, 2020; Murdoch et al., 2015). In our literature review, whilst some studies advocated that CDSS enabled clinicians to free up their time for clinical reasoning and communication with patients to understand their lives more (Barken et al., 2017), other studies hold somewhat negative opinions regarding the use of CDSS (Murdoch et al., 2014, 2015). Rather than standardizing the clinical decision-making process, which CDSS was designed for (Noon, 2014), it was found that CDSS brought about more divergence. Clinicians frequently needed to balance interactional dilemmas and professional accountability when their clinical judgement disagreed with the CDSS (Murdoch et al., 2014, 2015). This resonates with previous findings from Dong et al. (2007) who asserted that general rules may not always apply to individual cases, and O'Cathain et al. (2004) who argued that using CDSS without using one's own clinical or critical reasoning equalled being a robot compromising patient-centred care. Therefore, relevant competency and education curricula in relation to telehealth need to be developed and incorporated into clinicians' training programmes to enable the effective utilization of this digital care model (Bajra et al., 2023).

This literature review summarized the clinical assessment and reasoning pattern and influencing factors affecting decision-making in telehealth and identified that CDSS had become an important part of interacting with clinicians and shaping the outcome of decision-making, for better or worse. Future studies are called for to analyse the decision-making process in telehealth in wider settings such as hospitals and specialist areas. Solutions are needed to address the interactional dilemma facing clinicians in telehealth when using CDSS, to accurately reflect patients' clinical narratives and better patients' experience of answering questions like a checklist.

7 | LIMITATION OF THE LITERATURE REVIEW

The heterogeneity of the studies included makes it difficult to combine the results and generalize them to other settings. The studies included looked at various situations, from urgency estimation, acute cardiac events and chronic conditions like COPD and Parkinson's disease to specialized areas like paediatric services. Most of the studies were conducted with clinicians working in primary settings. The heterogeneity and restriction of settings may limit the extent of its external validity. The literature review is also subject to publication bias. Only published papers in English were included.

Only four studies were concerned with doctors. It is uncertain about the influence brought into the result by combining medical doctors and nurses. The studies included were heavily focused on nursing professions. This leads to preserved interpretations of the medical profession.

8 | IMPLICATIONS TO CLINICAL PRACTICE AND EDUCATION

Similar themes can be drawn from the studies in this LR that comparatively, telehealth carries higher risk and uncertainty for clinicians than face-to-face encounters. CDSS, rather than bringing unification and clarity, seems to bring more divergence and ambiguity. Clinicians, therefore, need to use their own clinical judgement when using CDSS to help decision-making. Solely relying on CDSS risks reducing patients' clinical stories into one or two presenting complaints, hence compromising holistic patient-centred care. It is noted that with experience, the confidence in making decisions in telehealth and the capability of making CDSS compatible with clinicians' own decisions both improve. As mentioned previously, much knowledge in decision-making was tacit and heuristic, such as intuition. These unknown clinical reasoning processes in telehealth need to be verbalized and made transparent, to prepare junior or less experienced clinicians to be better equipped in utilizing digital care, with skills to minimize risks associated with telehealth.

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9 | CONCLUSION

The decision-making process in telehealth is a complicated cognitive process that is influenced by multi-faceted components, including patient factors, clinician factors, external influencing factors and technological factors. The heterogeneity of the current studies included in this literature review suggests further and wider studies are warranted to understand clinicians' decision-making process in telehealth, especially in specialist areas in hospital settings. CDSS, as a supportive decision-making tool, seems to present itself as an interactional dilemma for clinicians sometimes. Furthermore, research is needed to find out how to address this dilemma and make the human–AI interaction more satisfying, for both clinicians and patients.

AUTHOR CONTRIBUTIONS

Made substantial contributions to conception and design, or acquisition of data, or analysis and interpretation of data: Y.Z., L.S. Involved in drafting the manuscript or revising it critically for important intellectual content: Y.Z., L.S., S.S., K.G. Given final approval of the version to be published. Each author should have participated sufficiently in the work to take public responsibility for appropriate portions of the content: Y.Z., L.S., S.S., K.G. Agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved: Y.Z.

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CONFLICT OF INTEREST STATEMENT

None declared.

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DATA AVAILABILITY STATEMENT

Data sharing not applicable to this article as no datasets were generated or analysed during the current study.

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APPENDIX

TABLE A1 Enhancing transparency in reporting the synthesis of qualitative research: the ENTREQ statement.

No	Item	Guide and description
1	Aim	State the research question the synthesis addresses. ✓
2	Synthesis methodology	Identify the synthesis methodology or theoretical framework which underpins the synthesis, and describe the rationale for choice of methodology (e.g. *meta-ethnography, thematic synthesis, critical interpretive synthesis, grounded theory synthesis, realist synthesis, meta-aggregation, meta-study, framework synthesis*). ✓
3	Approach to searching	Indicate whether the search was pre-planned (*comprehensive search strategies to seek all available studies*) or iterative (*to seek all available concepts until they theoretical saturation is achieved*). ✓
4	Inclusion criteria	Specify the inclusion/exclusion criteria (e.g. *in terms of population, language, year limits, type of publication, study type*). ✓
5	Data sources	Describe the information sources used (e.g. *electronic databases* (*MEDLINE, EMBASE, CINAHL, psycINFO and Econlit*), *grey literature databases* (*digital thesis, policy reports*), *relevant organizational websites, experts, information specialists, generic web searches* (*Google Scholar*) *hand searching and reference lists*) and when the searches conducted; provide the rationale for using the data sources. ✓
6	Electronic Search strategy	Describe the literature search (e.g. *provide electronic search strategies with population terms, clinical or health topic terms, experiential or social phenomena related terms, filters for qualitative research and search limits*). ✓
7	Study screening methods	Describe the process of study screening and sifting (e.g. *title, abstract and full-text review, number of independent reviewers who screened studies*). ✓
8	Study characteristics	Present the characteristics of the included studies (e.g. *year of publication, country, population, number of participants, data collection, methodology, analysis and research questions*). ✓
9	Study selection results	Identify the number of studies screened and provide reasons for study exclusion (*e.g. for comprehensive searching, provide numbers of studies screened and reasons for exclusion indicated in a figure/flowchart; for iterative searching describe reasons for study exclusion and inclusion based on modifications to the research question and/or contribution to theory development*). ✓
10	Rationale for appraisal	Describe the rationale and approach used to appraise the included studies or selected findings (e.g. *assessment of conduct* (*validity and robustness*), *assessment of reporting* (*transparency*), *assessment of content and utility of the findings*). ✓
11	Appraisal items	State the tools, frameworks and criteria used to appraise the studies or selected findings (e.g. *Existing tools: CASP, QARI, COREQ, Mays and Pope* [25]; *reviewer developed tools*; *describe the domains assessed: research team, study design, data analysis and interpretations, reporting*). ✓
12	Appraisal process	Indicate whether the appraisal was conducted independently by more than one reviewer and if consensus was required. ✓
13	Appraisal results	Present results of the quality assessment and indicate which articles, if any, were weighted/excluded based on the assessment and give the rationale. ✓
14	Data extraction	Indicate which sections of the primary studies were analysed and how were the data extracted from the primary studies? (e.g. *all text under the headings 'results /conclusions' were extracted electronically and entered into a computer software*). ✓
15	Software	State the computer software used, if any. N/A
16	Number of reviewers	Identify who was involved in coding and analysis. ✓
17	Coding	Describe the process for coding of data (e.g. *line by line coding to search for concepts*). ✓
18	Study comparison	Describe how were comparisons made within and across studies (e.g. *subsequent studies were coded into pre-existing concepts, and new concepts were created when deemed necessary*). ✓
19	Derivation of themes	Explain whether the process of deriving the themes or constructs was inductive or deductive. ✓
20	Quotations	Provide quotations from the primary studies to illustrate themes/constructs, and identify whether the quotations were participant quotations of the author's interpretation. N/A
21	Synthesis output	Present rich, compelling and useful results that go beyond a summary of the primary studies (e.g. *new interpretation, models of evidence, conceptual models, analytical framework, development of a new theory or construct*). ✓

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