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Comparing different scoping and mapping review methodologies: A practical example using the nursing mobile workstation

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Abstract

Aims: To provide (1) an overview of core characteristics of scoping and mapping review methodologies and (2) to illustrate the differences and similarities of these methodologies using literature on nursing mobile workstations.

Design: Systematic review.

Methods: Systematic searches were conducted to identify (1) scoping and mapping review methodologies used in the field of nursing and (2) literature on nursing mobile workstations. For each systematic search, two reviewers independently screened all titles, abstracts, and full texts. We conducted narrative syntheses for both review questions. Publications on scoping and mapping review methodologies in the field of nursing were searched in MEDLINE (PubMed), Web of Science, Scopus, and CINAHL (September 2022). Publications on nursing mobile workstations were searched in MEDLINE (PubMed), CINAHL, and Web of Science (April 2022).

Results: We identified six scoping and mapping review methodologies (aim 1): bibliometric analysis, evidence mapping, focused mapping review and synthesis, and scoping review. The methodologies aim to provide a graphical, tabular, or narrative overview without a formal critical assessment of the literature. We provide an overview of key variables that reflect the different focus of these methodologies. We also included 26 publications on nursing mobile workstations (aim 2). Nineteen different terms were used to describe the workstations. An overall definition of the nursing mobile workstation was not found.

Conclusion: Scoping and mapping methodologies are regularly applied in nursing research. Although there is overlap between the different methodologies, we found some unique characteristics. Despite the regular use of nursing mobile workstations, little is known about their impact in care processes and important features. Future studies on nursing mobile workstations could explore the impact of the workstations in the care process and the current functions of the workstations. A universal definition of the workstations is warranted.

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Clinical Relevance: Most publications address aspects of practicability of nursing mobile workstations, but we found no universal definition. Little knowledge is available on the impact of the workstations in clinical practice.

KEYWORDS
bibliometric analysis, mapping review, methodology, nursing mobile workstations, scoping review

INTRODUCTION

Systematic reviews are an established method to summarize and critically appraise the available scientific evidence on a specific research question (Krnic Martinic et al., 2019). In the last decades, review methodology has evolved and differentiated. In addition to systematic reviews of quantitative, qualitative, and mixed study designs, review formats to map the available knowledge and to identify research gaps have gained importance (Colquhoun et al., 2014; Polit & Beck, 2017). These include scoping, mapping, or bibliometric reviews. In contrast to "traditional" systematic reviews, these methodologies focus more on broad review questions on study characteristics or metadata of publications, such as the methodology, objectives, methods of included studies, years of publication, and journals, rather than detailed analyses of the actual content. Several typologies have been developed to categorize the different forms of review. The latest approach defined different review "families," including the systematic review family, qualitative review family, rapid review family, and review of reviews family among others (Sutton et al., 2019). Scoping and mapping reviews were categorized as "purpose specific reviews," bibliometric reviews were not included in this typology. Another recent paper sorted these types of review as the "Big Picture review family" (Campbell et al., 2023).

Although scoping reviews, mapping reviews, and bibliometric reviews address broad research questions, there are also differences in terms of scope and focus of these methodologies (Campbell et al., 2023; Khalil & Tricco, 2022; Sutton et al., 2019). Another challenge is that the methodologies, especially scoping reviews, have emerged over time and different descriptions of the same review methodologies have been published (Bougioukas et al., 2021; Davis et al., 2009). Despite several papers aimed to describe the focus of the different types of "big picture" review methodologies, the borders between mapping reviews, scoping reviews, and bibliometric reviews still remain vague. Applying the different methodologies to a specific topic may help to clarify the similarities and differences between the methodologies. Such a worked example may also help researcher selecting the most appropriate methodology for their research. This paper provides a comprehensive overview on the core characteristics of mapping, scoping, and bibliometric review methodologies by reviewing the literature on nursing mobile workstations with each of these methodologies.

The nursing mobile workstation (NMW), also known as the nursing cart, is a very common item within hospitals and other residential settings where nurses are employed. Although it is widely used, surprisingly little is known on the topic (Anderson, 2009; Kao et al., 2015), taking into account the nursing cart's presence and meaning in daily nursing practice. Due to the prominent role of NMW in nursing practice, their use impacts nurses all around the world. Thus, there is a need for a comprehensive overview of the available knowledge and the knowledge gaps on this topic.

AIM

The aim of this study was twofold: (1) to identify scoping and mapping methodologies and to describe their core characteristics and (2) to provide a comprehensive overview of the current knowledge on the nursing mobile workstation in clinical nursing practice by applying the identified scoping and mapping methodologies.

MATERIALS AND METHODS

We conducted a systematic review to systematically identify the available literature on the two review questions.

Scoping and mapping review methodologies

A literature-based analysis of available scoping review and mapping methodologies in the field of nursing was conducted. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) were used to structure this report (Page et al., 2021).

Eligibility criteria

We included all publications on scoping and mapping methodologies that were applied in the context of nursing, that is, studies published in academic journals that focus on producing a (sort of) map or provide an overview of the available research on a nursing topic. All publications in Dutch, English, French, or German language were eligible for inclusion, since these were the native languages of the researchers involved. There was no restriction

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on the year of publication. Books, theses, and other gray literature were also excluded as well as methodological articles, protocols, reviews, commentaries, letters, editorials, and abstract-only publications.

Information source and search strategy

A systematic search was performed on MEDLINE (via PubMed), Web of Science Core Collection, Scopus, and CINAHL, using database-specific search strategies. The search strategy combined a methodological search component (e.g., "mapping study," "mapping review," and "evidence map") with a nurse-related search component ("nurs*") containing controlled vocabulary (Medical Subject Heading "Nursing") using the Boolean operator AND. The search was conducted in December 2019, and updated in September 2022. The final search strategies are presented in Appendix S1, part 1.

Study selection

Two out of three reviewers (RM, JH, and SM) screened titles, abstracts, and full texts independently using the web app Rayyan in blinding mode (Ouzzani et al., 2016). Conflicts were discussed between the two reviewers. If no consensus was reached, conflicts were discussed with all members of the research team.

Data extraction and synthesis

The Search, AppraisaL, Synthesis, and Analysis (SALSA) framework (Grant & Booth, 2009) was reported to be able to help to identify the inputs and processes, strengths, and deviancies, which characterize the main phases of each review type (Grant & Booth, 2009). We used the SALSA framework to guide data extraction and to confirm the information on scoping and mapping review methodologies.

One reviewer (JH) extracted the data using a data extraction form based on the SALSA framework, and a second reviewer (MV) double-checked 100% of the data.

The semantics used by the included scoping and mapping review methodological approaches were used to identify differences and similarities between the methodologies. We conducted a narrative synthesis of these differences and similarities by comparing the characteristics of the different methodologies.

Overview of nursing mobile workstations

Eligibility criteria

All studies concerning nursing mobile workstations used by nurses during direct patient care at nursing units in hospital settings were eligible for inclusion. Studies on other types of carts or carts with a single use or another purpose were excluded: crash carts, carts used for education, carts used for specific procedures, or carts used in the Operating Room (OR), the Intensive Care Unit (ICU), the Emergency Room (ER), or on the pediatric and maternity wards, case carts, food carts, carts used in primary care or nursing homes and carts used for the distribution of (medical) supplies. There were no restrictions on study design, publication type, and publication year. Therefore, all qualitative, quantitative, and mixed-methods studies mentioning nursing mobile workstations were included. All publications in Dutch, English, French, or German language were eligible for inclusion, since these were the native languages of the researchers involved.

Information source and search strategy

In November 2019, MEDLINE (via PubMed), CINAHL, and Web of Science Core Collection were searched using a combination of "nursing," "mobile," and "workstation" and their synonyms. This search was updated in April 2022. The final search strategies are presented in Appendix S1, part 2.

Study selection

Two reviewers (SM and MV) screened titles, abstracts, and full texts independently using the web app Rayyan in blinding mode (Ouzzani et al., 2016). Conflicts were discussed between the two reviewers. If no consensus was reached, conflicts were discussed with all members of the research team.

Data extraction and synthesis

The methodological guidance for the included scoping and mapping review methodologies each specified what information needs to be extracted. These variables were extracted from the included publications on the NMW. A data extraction sheet divided into six different sub-parts, one for each identified methodology, was developed (MV) and piloted.

Across all six methodologies, a total of 31 extraction variables were identified: year of publication, country, publication type, journal, institution(s) involved, author(s)/number of authors, patents, number of citations, co-citations, the impact factor of the journal of the year the article was published, duration of the study, study design, number of pages, different terminology used, definitions, stand-alone projects /part of larger research projects, sector, funder, country income level of the year the article was published, population, analyzed (*n*), sample (age), data collection/analysis method, intervention type, comparator, duration of the intervention, aims of the study, outcome measures, important results, publication language, and the topics the paper focuses on.

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All variables were extracted from the included articles. The number of citations was extracted using the reported citation network on Web of Science (extracted on May 11, 2022). The number of co-citations (the number of times that two papers are cited together in a single paper [Okubo, 1997]) was extracted from cocites.com (extracted on May 11, 2022) (Janssens, 2021). Country income level (GDP per capita—current US$ on May 11, 2022) of the year in which the article was published, was extracted from data on worldbank.org (Worldbank, 2022).

If applicable, the reported interventions and comparisons, the used outcome measurement(s), and the reported results were extracted. Data extraction was performed by one reviewer (MV), and a second reviewer (JH) double-checked randomly 10% of the extractions.

A quality appraisal was carried out by one reviewer (MV). The Mixed Methods Appraisal Tool (Hong et al., 2018) and the Critical Appraisal Checklist for Systematic Reviews and Research Syntheses (Aromataris et al., 2015) were used. Quality appraisal was not possible for two conference papers (Hsu et al., 2011; Tsai et al., 2009), one research proposal paper (Ledbetter et al., 2017), and three perspective pieces (Anderson, 2009; Free, 2014; Slabodkin, 2014) since no validated tools exist (Laplante et al., 2009).

All results were narratively synthesized. Based on the description of the core characteristics of the different methodologies identified before (see Scoping and mapping review methodologies), the extracted data from all included studies were grouped and presented in tabular form.

RESULTS

The results of the two searches conducted during this study are reported separately. Next, the characteristics of the identified review methodologies are reported (see Characteristics of scoping and mapping review methodologies), followed by an overview of the literature on nursing mobile workstations (see Characteristics of the literature on the nursing mobile workstation).

Results of the searches

Scoping and mapping review methodologies

The systematic literature search identified 326 papers. Following screening of titles, abstracts, and full texts ($n = 33$), six different scoping and mapping review methodologies with theoretical similarities or overlaps were identified in the field of nursing research. A flowchart of the literature searching and selection process is presented in Appendix S1, part 3. The following methodological approaches were included: Bibliometric analysis (Okubo, 1997), evidence mapping (Clapton et al., 2009), focused mapping review and synthesis (Bradbury-Jones et al., 2019), scoping review (Peters et al., 2020; Tricco et al., 2018), scoping review (Pham et al., 2014), and scoping studies (Arksey & O'Malley, 2005) (Table 1).

Literature on nursing mobile workstations

After removing duplicates, two authors screened 1070 citations by title and abstract, and 66 in full text. Finally, 26 relevant articles were included. Reasons for exclusion were wrong population, foreign language, no reference to nursing mobile workstations, or commercial purposes. Figure 1 provides an overview of the literature searching and selection process.

Characteristics of scoping and mapping review methodologies

We identified one paper describing a bibliometric review methodology (Okubo, 1997). The aim is to evaluate research activities by enumeration and statistical analysis of articles, publications, citations, patents, and other scientific output.

The second group consisted of two methodologies that refer to a type of mapping review. Evidence mapping (Clapton et al., 2009) aims to describe the existing literature whereas Focused mapping review and synthesis (Bradbury-Jones et al., 2019) aims to address an epistemological question.

The third group consisted of three methodologies that referred to a type of scoping review. These approaches differ regarding objectives, study selection, and analysis of the literature (Table 1). In scoping reviews (Peters et al., 2020; Tricco et al., 2018), studies using a variety of study designs as well as non-research publications such as policy papers are eligible for inclusion. Scoping reviews aim to draw conclusions from the available literature, but go no further than a basic descriptive analysis. The scoping review methodology by Pham et al. (2014) aims to detect knowledge gaps and topics or questions recommended for future research. In this approach, the purpose or research question of the study guides the literature search. The scoping review methodology by Arksey and O'Malley (2005) describes an iterative process in search for all relevant literature. In this approach, a descriptive-analytical method is used with the focus on knowledge gaps and the explicit aim to draw conclusions from the available literature.

Each included scoping and mapping review methodology extracted a specific and unique set of variables (Figure 2). A total of 31 unique extraction variables were found. No variables were extracted by all methodologies. The amount of coverage of all extraction variables varied depending on the chosen methodology: Arksey and O'Malley (2005) and Pham et al. (2014) each cover 35.48%, Bradbury-Jones et al. (2019) and Clapton et al. (2009) each cover 19.35%, Okubo (1997) covers 32.26% and Tricco et al. (2018) covers 25.81%. Some overlap was detected when the extracted variables by Arksey and O'Malley (2005) were

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TABLE 1 Overview of identified types of scoping review and mapping review methodologies.

			Methods used (SALSA) (Grant & Booth, 2009)			
	Type	**Description**	**Search**	**Appraisal**	**Synthesis**	**Analysis**
Bibliometric analysis	Bibliometric analysis (Okubo, 1997)	Evaluating research activities, laboratories, and scientists, as well as the scientific specializations and performance of countries	The source for bibliometrics is always a database. The choice of a database for compiling bibliometric indicators hinges directly on the objectives pursued and the questions the base must answer	No formal quality assessment but the quality of articles may be influenced through choice of database(s)	May be graphical, tabular, or narrative	Enumeration and statistical analysis of scientific output in the form of articles, publications, citations, patents, and other, more complex indicators
Evidence mapping	Evidence mapping (Clapton et al., 2009)	Describes the existing literature, and gaps in the literature, in a broad topic area	Multiple information sources such as bibliographic databases, registries, aggregated journal databases, individual journal electronic tables of contents, journal hand-searching, and other sources such as websites	No formal quality assessment	May be graphical, or tabular	Coding and data extraction of key features of studies
	Focused mapping review and synthesis (Bradbury-Jones et al., 2019)	Addresses epistemological questions that relate to a particular research field	Determined by timeframe and sources of information such as one or more journals	No formal quality assessment but the quality of articles may be influenced by the choice of sources of information	May be graphical, tabular, or narrative	More qualitative description than statistical analysis
Scoping review	Scoping review (Peters et al., 2020; Tricco et al., 2018)	Draws on evidence from any research methodology and may also include evidence from non-research sources such as policy	May include any and all types of literature but may be limited based on the knowledge that particular types of sources would be most useful and appropriate	No formal quality assessment	May be graphical, tabular, or narrative	Basic descriptive analysis (e.g., frequency counts) or qualitative technique (such as basic coding of data to particular categories), is largely dependent on the purpose of the review and subject to the authors' judgment and creativity
	Scoping review (Pham et al., 2014)	Aims to map the existing literature in a field of interest in terms of the volume, nature, and characteristics of the primary research	Determined by research question or study purpose	Should include all relevant literature regardless of methodological quality but some form of quality assessment would enable the identification of gaps in the evidence base	May be graphical, or tabular	Research gaps, lacking research, and recommended topics or questions for future research
	Scoping studies (Arksey & O'Malley, 2005)	Aims to identify gaps in the existing research literature with the explicit aim to draw conclusions from the existing literature	All relevant literature, regardless of study design needs to be identified. Restrictions on time span and language are possible. The search process is not linear but iterative. Different sources are being used: electronic databases, reference lists, hand-searching of key journals, existing networks, relevant organizations, and conferences	The scoping study does not seek to assess the quality of evidence	May be graphical, tabular, or narrative	Descriptive-analytical method uses a data charting form (excel) to collect a mixture of general information about the included studies

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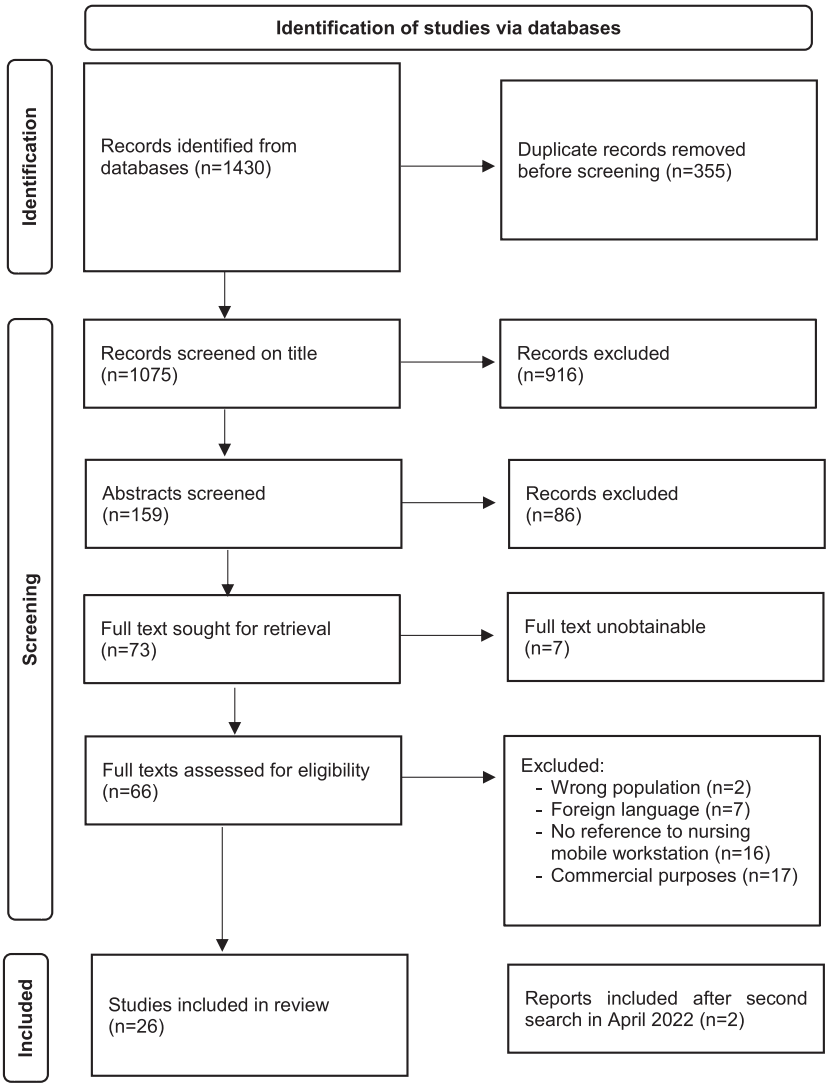

FIGURE 1 Flowchart of the literature searching and selection process.

compared with the other scoping and mapping review methodologies: Pham et al. (2014) and Bradbury-Jones et al. (2019) each extracted two variables (18.18%) that were also extracted by Arksey and O'Malley (2005), Tricco et al. (2018), and Okubo (1997) each extracted three (27.27%), and Clapton et al. (2009) extracted four variables (36.36%).

The extraction variables could be separated into three different categories (Figure 2), each with its own focus: the first category focused on geographical and organizational information, the second on bibliometric data, and the third on study and design characteristics.

Nineteen variables were only relevant for one of the included scoping and mapping review methodologies: number of citations, co-citations, institutions involved in the study and patents (bibliometric analysis [Okubo, 1997]); publication language (Evidence mapping [Clapton et al., 2009]); number of analyzed participants, age of the participants and country income level of the year the article was published (scoping review [Peters et al., 2020; Tricco et al., 2018]); definitions on the research topic, different terminology used to describe the research topic, duration of the study, number of pages, sector in which the study was carried out, stand-alone projects/part of larger research projects (scoping review [Pham et al., 2014]); and comparator used in the study, duration of the intervention, important results and outcome measures (scoping study [Arksey & O'Malley, 2005]).

Characteristics of the literature on the nursing mobile workstation

In the 26 included publications, 19 different terms were used to describe the NMW. In four articles multiple terms were used (Anderson et al., 2011; Giraldo et al., 2018; Nielsen & Trinkoff, 2003; Schachner et al., 2017).

The NMW were used to record information, get supplies, dispose of waste, document patient histories, perform assessments, point-of-care medication administration, and are stationed adjacent to patient rooms. In addition to materials and instruments for

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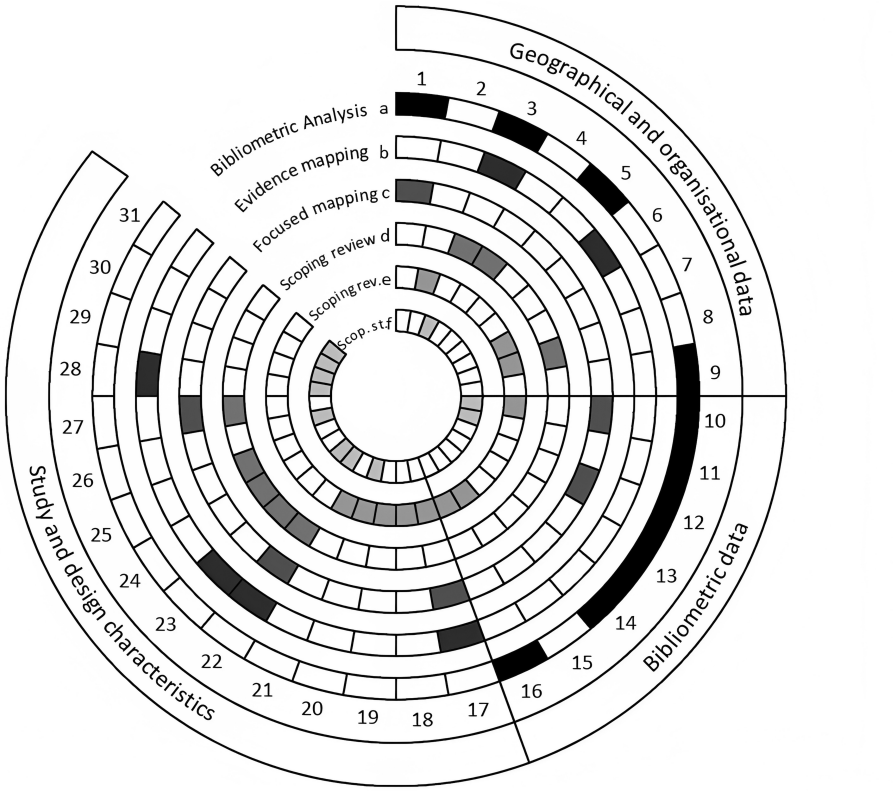

1. Journal
2. Sector
3. Country
4. Country income level of the year the article was published
5. Institution(s) involved
6. Publication language
7. Stand-alone projects /part of larger research projects
8. Funder
9. Patents
10. Year of publication
11. Author(s)/Number of authors
12. Impact factor of the journal of the year the article was published
13. Number of citations
14. Co-citations
15. Number of pages
16. Publication type
17. Topics the paper focuses on
18. Definitions
19. Different terminology used
20. Aims of the study
21. Duration of the study
22. Study design
23. Population
24. Analysed participants, n
25. Sample, age
26. Outcome measures
27. Data collection/analysis method
28. Intervention type
29. Comparator
30. Duration of the intervention
31. Important results

a: Bibliometric analysis (Okubo, 1997), b: Evidence mapping (Clapton et al., 2009), c: Focused mapping review and synthesis (Bradbury-Jones et al., 2019), d: Scoping review (Peters et al., 2020; Tricco et al., 2018), e: Scoping review (Pham et al., 2014), f: Scoping studies (Arksey & O'Malley, 2005)

FIGURE 2 Overview of the extracted variables for scoping review and mapping review methodology.

clinical care, patient-specific medications, and a working surface, the NMWs comprised a computer, a barcode reader, or other technical equipment. Table 2 provides an overview of the terminology, definitions, and descriptions that were used.

As described in 4.2, the characteristics of the included studies on NMW are presented in the following categories: geographical and organizational information, bibliometric data, and study and design characteristics. An overview of the differences in the extracted variables between the scoping review and mapping review methodologies is presented in Appendix S1, parts 4 and 5.

Geographical and organizational data

None of the included articles explicitly mentioned the sector in which their study took place or in which they aimed to make a contribution. All articles could be placed under research for the health sector and were written in English.

The articles were published in a wide range of journals. Recurring scopes of the journals were computers and informatics ($n = 3/11.54\%$), environmental hygiene and hospital infection ($n = 5/19.23\%$), health research in general ($n = 5/19.23\%$), engineering and technology ($n = 7/26.92\%$), pharmacy practice ($n = 1/3.85\%$), and nursing research ($n = 5/19.23\%$).

About half of the studies were conducted in the United States ($n = 12/46.16\%$) (Abbott, 2012; Anderson, 2009; Beam et al., 2016; Carroll & Geiger, 2007; Free, 2014; Guillen et al., 2011; Jimenez et al., 2019; Ledbetter et al., 2017; Nielsen & Trinkoff, 2003; Slabodkin, 2014; Wager et al., 2010; Xu et al., 2013), others were conducted in Taiwan ($n = 4/15.40\%$) (Chan et al., 2014; Hsu et al., 2011; Kao et al., 2015; Tsai et al., 2009), United Kingdom ($n = 3/11.54\%$) (Anderson et al., 2011; FitzGerald et al., 2013; Smith et al., 2012), Argentina ($n = 2/7.69\%$) (Giraldo et al., 2018; Schachner et al., 2017), China ($n = 1/3.85\%$) (Xuan et al., 2019), Canada ($n = 1/3.85\%$) (Rochais et al., 2013), The Netherlands ($n = 1/3.85\%$) (Schimmel et al., 2011), Singapore ($n = 1/3.85\%$) (Pada et al., 2021), and Brazil ($n = 1/3.85\%$) (Nietsche et al., 2020).

The gross domestic product (GDP) per capita (in current US$) of the countries in the years that the articles were published, ranged from US$6796.8 (Brazil in 2020) to US$65279.5 (United States in 2019).

Bibliometric data

All articles were published between 2003 and 2021. The impact factor, in the year in which the article was published, was not available for 14 of the 26 articles (53.85%). The impact factor of the

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TABLE 2 An overview of the terminology and definitions/descriptions of the nursing mobile workstations.

Different terminology used	Definition/description
Computer on wheels (COW), $n=5$	1. Not specified ($n=3$) (Abbott, 2012; Pada et al., 2021; Wager et al., 2010) 2. "The COWs typically consist of laptops fastened to a wheeled cart or workstation"; "The COW was a laptop connected to a wheeled cart with panels to hold the keyboard and mouse. The cart also had baskets and a holder for the barcode scanner" (Beam et al., 2016) 3. "Mobile carts for the bedside nursing care" (Schachner et al., 2017)
Nursing cart, $n=3$	1. Not specified ($n=2$) (Guillen et al., 2011; Slabodkin, 2014) 2. "Nursing carts with computers installed have been developed to assist nursing staff in hospitals and clinics. Nursing staff can move such carts freely to take care of the patients, freeing them from a fixed nursing station. The four hard rubber wheels were rotatable. Three wood boxes (length × width × depth: 40.5 × 54 × 86 cm) were placed on the cart. The bottom and middle boxes were divided into 9 blocks. The 18 blocks were indicated by *x*, *y* and *z* axes. There were 3 levels on the *x* axis, 2 levels on the *y* axis, and 3 levels on the *z* axis. A load of about 23 kg was placed into a single block of a wooden box. Three wood boxes, wheels and other parts were weighed to be 52 kg. The total weight was 75 kg. The dimensions, the wheels and the weight were comparable to the carts used by nurses" (Kao et al., 2015)
Workstation on wheels (WOW), $n=3$	1. "Healthcare carts that housed a computer on the top and storage space at the bottom. At the WoW, nurses usually recorded information, got supplies, and disposed of waste" (Xuan et al., 2019) 2. Not specified (Giraldo et al., 2018) 3. "Mobile carts for the bedside nursing care" (Schachner et al., 2017)
Notes trolley, $n=2$	Not specified ($n=2$) (Anderson et al., 2011; Smith et al., 2012)
(Nurse) computer cart, $n=1$	"The cart generally features a laptop computer, a writing surface, secure medication, and supply drawers."/"The nurse computer cart is often utilized in bar-coded medication administration, documentation of patient histories, assessment, and other essential nursing tasks" (Ledbetter et al., 2017)
Care facilitator cart (CFC), $n=1$	"The CFC consisted of two floors; four wheels made of silicone material; two drawers with tilting opening on the side where professionals would push the product; floor below with open sides; front side of the cart with two separate compartments for waste bins with lids with sensor opening" (Nietsche et al., 2020)
Drug trolley, $n=1$	Not specified (Anderson et al., 2011)
Equipment trolley, $n=1$	Not specified (FitzGerald et al., 2013)
Individual workstation, $n=1$	"Distributed adjacent to patient rooms throughout a unit" (Jimenez et al., 2019)
Intelligent Nursing Cart (iNuC), $n=1$	"A mobile, point-of-care medication administration tool for the purpose of preventing medication errors and enhancing patient safety. It provides its user with work and time management and record keeping capabilities as well as a web portal to hospital services and information system. In addition, iNuC has several labour saving and automation capabilities, including generating shift report from data and notes collected during the user's shift, tracking medication and medical supply usages and automating requests for medication replenishment" (Tsai et al., 2009)
Medicine cart, $n=1$	"A typical six-drawer medicine cart. The cart was 1.10 m long, 0.60 m wide, and 1.16 m high. The pushing direction was along the length of the cart. The cart had four hard rubber wheels 12.7 cm in diameter. The ball bearings on all four wheels allowed full swivel. The plastic cart top included a 4-cm-high moulded hand-coupling. With the experimental equipment embedded in the cart, the total weight of the cart was 120 kg, which approximated cart weight measured in the field" (Xu et al., 2013)
Mobile cart, $n=1$	"Mobile carts that give nurses easy access to information systems, diagnostic equipment, bar code readers and more. Hospitals are trying to use the carts as a nurse station" (Anderson, 2009)
Mobile nursing cart (MNC), $n=1$	Not specified (Hsu et al., 2011)
Mobile nursing information system unit, $n=1$	"This system comprises a database server, Tablet PC, and wireless devices such as blood pressure monitor, infrared thermometer and barcode scanner. The Tablet PC and wireless devices are put on a cart" (Chan et al., 2014)
Mobile station, $n=1$	Not specified (Giraldo et al., 2018)
Mobile workstation, $n=1$	"Carts must be ergonomic and height-adjustable to comfortably fit as many end-user employees as possible. Carts must be designed to reduce operator fatigue and discomfort. Carts must have a portable power source that stay charged for entire work shifts, and can be quickly recharged. Workstations need to allow complete, undistracted data entry at the point of care" (Free, 2014)

(Continues)

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TABLE 2 (Continued)

Different terminology used	Definition/description
Multifunctional nursing workstation, $n=1$	"The top panel is covered with a copper coloured phenolic sheet. The finished prototype uses Styrofoam cut outs to display the placement of the computer, telephone, light, fingerprint locking system, trashcan, and refrigerated drawer. A divider installed 10 inches from the bottom of the cart sets aside space for the refrigerated section. A simple silver handle attached to each small and medium drawer makes accessing the drawers quick and easy. High traffic drawers are equipped with plastic drawer dividers. The dividers color coded, adjustable and removable" (Carroll & Geiger, 2007)
Nurse computer workstation, $n=1$	Not specified (Nielsen & Trinkoff, 2003)
Standing workstation, $n=1$	Not specified (Nielsen & Trinkoff, 2003)

other 12 articles ranged from 0.217 (Nielsen & Trinkoff, 2003) to 3.393 (Anderson et al., 2011) (median = 1.724/ IQR = 1.737).

The number of citations ranged from 1 to 44 (mean = 12.25/ median = 6/IQR = 19). Five articles had no citations (Carroll & Geiger, 2007; Guillen et al., 2011; Hsu et al., 2011; Pada et al., 2021; Schachner et al., 2017) and the number of citations were not found for five of the articles (Anderson et al., 2011; Free, 2014; Ledbetter et al., 2017; Nietsche et al., 2020; Slabodkin, 2014). The number of co-citations ranged from 1 to 40 (mean = 10.47/median = 3/ IQR = 21). The co-citations were not found for six articles (Carroll & Geiger, 2007; Chan et al., 2014; Hsu et al., 2011; Nietsche et al., 2020; Pada et al., 2021; Tsai et al., 2009) and five articles had no co-citations (Free, 2014; Guillen et al., 2011; Ledbetter et al., 2017; Schachner et al., 2017; Slabodkin, 2014).

Study and design characteristics

The articles addressed one or more of the following topics: design and development of NMWs ($n=2$/6.90%) (Carroll & Geiger, 2007; Nietsche et al., 2020), the evaluation of NMW ($n=3$/10.34%) (Free, 2014; Rochais et al., 2013; Schachner et al., 2017), workflow and efficiency ($n=6$/20.69%) (Anderson, 2009; Carroll & Geiger, 2007; Chan et al., 2014; Rochais et al., 2013; Schimmel et al., 2011; Wager et al., 2010), ICT programs ($n=8$/27.59%) (Abbott, 2012; Chan et al., 2014; Giraldo et al., 2018; Guillen et al., 2011; Hsu et al., 2011; Ledbetter et al., 2017; Slabodkin, 2014; Tsai et al., 2009), hand-hygiene and isolation behaviors ($n=5$/17.24%) (Anderson et al., 2011; Beam et al., 2016; FitzGerald et al., 2013; Pada et al., 2021; Smith et al., 2012), ergonomics ($n=3$/10.34%) (Kao et al., 2015; Nielsen & Trinkoff, 2003; Xu et al., 2013), and unit design ($n=2$/6.90%) (Jimenez et al., 2019; Xuan et al., 2019).

Twenty-four of the 26 articles proposed at least one aim: to assess hand hygiene ($n=5$/18.52%), to increase the satisfaction of the nursing staff ($n=1$/3.70%), to increase ($n=3$/11.12%), or report ($n=2$/7.41%) on the efficiency of the nursing staff, to create or evaluate an ICT program ($n=4$/14.81%) or an NMW ($n=5$/18.52%), to compare or report on unit designs ($n=1$/3.70%), to evaluate workplace ergonomics or to state recommendations that can increase workplace ergonomics ($n=4$/14.81%). Two articles did not report an aim ($n=2$/7.41%) (Free, 2014; Slabodkin, 2014).

Quality appraisal of the included literature

The scoping review method by Pham et al. (2014) suggests a formal quality appraisal of the included studies.

Twelve articles reported the use of a qualitative approach. Three studies did not have an adequate data collection method or did not sufficiently report on it (Carroll & Geiger, 2007; Rochais et al., 2013; Schachner et al., 2017). Five studies did not adequately derive the findings from the data and did not substantiate the interpretation of the results sufficiently enough by the data (Anderson et al., 2011; Beam et al., 2016; Carroll & Geiger, 2007; Rochais et al., 2013; Schachner et al., 2017).

Two quantitative non-randomized trials met all quality criteria except that they did not account for the confounders in the design and analysis of their study, or did not sufficiently report on it (Pada et al., 2021; Xu et al., 2013).

Eight studies reported the use of a quantitative descriptive method. Three studies did not use a sample that is representative of the target population or did not sufficiently report on it (Chan et al., 2014; Guillen et al., 2011; Schachner et al., 2017). One study has a low risk of non-response bias (Kao et al., 2015), and the other seven studies have a higher risk or did not report on the risk of non-response bias. Two studies did not sufficiently report on the statistical analysis that was used, or used an analysis that was not appropriate to answer the research question (Chan et al., 2014; Guillen et al., 2011).

Four articles reported the use of a mixed methods approach. One study did not adequately interpret the integrated outputs of the different components (Rochais et al., 2013) and all four studies did not adequately address the divergences and inconsistencies between the qualitative and quantitative results (Abbott, 2012; Anderson et al., 2011; Rochais et al., 2013; Xuan et al., 2019).

The JBI critical appraisal checklist for systematic reviews was used to appraise two studies (Aromataris et al., 2015). The review question was not clearly and explicitly stated in one study (Nielsen & Trinkoff, 2003). It was unclear if the inclusion criteria, the search strategy, and the criteria for appraising studies were appropriate in one study (Nielsen & Trinkoff, 2003). It was unclear if the critical appraisal was conducted by two or more reviewers, if the methods used to combine studies were appropriate, and if methods to minimize errors in data extraction were used (Jimenez et al., 2019;

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Nielsen & Trinkoff, 2003). In one study the likelihood of publication bias was not assessed (Nielsen & Trinkoff, 2003), this was unclear in the other study (Jimenez et al., 2019).

A summary of the quality appraisal process can be found in Appendix S1, part 6.

Summary of the studies' content on the NMW

An in-depth analysis of the study results was not performed in this article. Several studies addressed the design, physical safety, and practicability of the NMW (Nielsen & Trinkoff, 2003). In summary, NMWs should be ergonomic and height-adjustable, must be designed to reduce operator fatigue and discomfort, must have portable power sources that stay charged for entire shifts, and need to allow complete and undistracted data entry at the point of care (Carroll & Geiger, 2007; Free, 2014; Kao et al., 2015; Nietsche et al., 2020; Wager et al., 2010; Xu et al., 2013). The use of portable devices and ICT programs on the NMW could result in a reduced time of data transcription, eliminated errors caused by handwritten notes, and real-time access to vital sign records (Abbott, 2012; Chan et al., 2014; Ledbetter et al., 2017; Tsai et al., 2009).

Negative features of the NMWs were the lack of stability and difficulty in maneuvering, noise while maneuvering, a too-large design, and power cables that were too short (Kao et al., 2015; Schachner et al., 2017; Xu et al., 2013). It is also mentioned that there might be issues with teamwork, support, and communication in a decentralized unit (Jimenez et al., 2019). Reported malfunctions of the portable devices and ICT programs were often due to poor network connections, and a higher risk of interruptions by patients/relatives or colleagues (Guillen et al., 2011; Rochais et al., 2013). Studies on hospital hygiene reported high levels of organic soil on frequently used items of clinical equipment (Anderson et al., 2011; FitzGerald et al., 2013; Smith et al., 2012). One study showed that the use of a hand hygiene dispenser at the point of use of the NMW could result in a reduction in microbial contamination of the keyboards (Pada et al., 2021). It is concluded that specific education and intervention programs should focus on the potential contaminations of ward computers and the proper disinfection of NMWs (Beam et al., 2016).

DISCUSSION

The identified six scoping and mapping review methodologies were analyzed to find a total of 31 unique variables that were extracted from the available literature. Nineteen variables were only extracted by one methodology (61%). Due to the fact that each scoping and mapping review methodology uses a specific and unique set of extraction variables, it is plausible that the overview of the existing literature on a specific topic might differ, depending on which methodology was chosen to conduct the study.

Bibliometric analysis (Okubo, 1997) focuses on research activity. It provides insight into the dissemination of the research on the NMW but gives no information on the content, study, and design characteristics of the included studies on the NMW.

Evidence mapping (Clapton et al., 2009) seems to focus on the dissemination, population, and interventions mentioned in the included articles. It only covers six of the 31 variables (19.35%) which might mean that a lot of valuable information is missed. The same number of variables are covered by Focused mapping review and synthesis (Bradbury-Jones et al., 2019). It provides information on the journal, the year of publication, and the design and data collection method of the included articles. Both methodologies give a rapid overview of the existing literature but might leave a lot of questions unanswered.

Scoping reviews can be considered to explore the content of the included articles, which helps to identify gaps in the existing literature. Scoping review (Pham et al., 2014) is the only scoping and mapping review methodology that provides information on "definitions on the research topic" and "different terminology used to describe the research topic." These two variables give an overview of the terms that are used to describe the research topic and can detect possible discrepancies in terminology on the research topic. This information might also help to define the search string, and inclusion and exclusion criteria when conducting a systematic review or another study on the same research topic. This information was of great importance in the search for literature on the NMW, since this topic is not considered to be well-known or well-researched.

In order to gather as much information on the research subject as possible while carrying out a study, a combination of several scoping and mapping review methodologies could be made. A combination of bibliometric analysis (Okubo, 1997), scoping review (Peters et al., 2020; Tricco et al., 2018), and scoping review (Pham et al., 2014) would cover 80% of the extraction variables. The variables that are left out are intervention type, comparator, duration of intervention, outcome measures, important results, and publication language. These variables obviously provide interesting information. However, one could argue that since the aim of the scoping review is to give a broad overview of the existing literature on a specific research topic, these earlier-mentioned variables might go too much into detail. Khalil and Tricco (2022) state that systematic reviews are better suited to answer questions about interventions, population, and diagnosis, since the research question of a systematic review is much more defined (Khalil & Tricco, 2022).

None of the six included scoping and mapping review methodologies perform a quality appraisal (Arksey & O'Malley, 2005; Campbell et al., 2023; Polit & Beck, 2017). Khalil and Tricco (2022) consider this a limitation of the methodologies (Khalil & Tricco, 2022). The lack of a quality appraisal of the included literature in this particular study could influence the identification of research gaps. For instance, a large amount of literature on the NMW could be found, but the quality of the literature might be poor. Hence, there still might be a research gap concerning the topic because of the lack of literature of good quality. It might also be of concern when

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the results of the review are used by policymakers and healthcare providers in clinical practice (Arksey & O'Malley, 2005; Campbell et al., 2023; Daudt et al., 2013; Khalil & Tricco, 2022). In this study, a quality assessment of the included articles was conducted to show the importance of caution while drawing conclusions based on the content of the selected literature.

Two methodologies report on the impact factor (Bradbury-Jones et al., 2019; Okubo, 1997), citations, and co-citations (Okubo, 1997) of the evidence. These parameters might also give an indication of the quality of the literature. However, there have been warnings about the misuse and misinterpretation of these statistics (Adler et al., 2008; Bennet et al., 2019).

From a clinical point of view, only 26 articles that mention the NMW could be identified. No global definition of the NMW was found, though most of the NMW designs seemed to have the same features. These discrepancies in terminology could hinder research on the topic since it might influence the ability to collect all existing literature on the NMW. Therefore, it is necessary to develop a universal definition and term to define the NMW.

The articles in this study were selected broadly, meaning the mere mentioning of an NMW in an article was enough for that article to be selected in this study. This resulted in 26 articles of which only 5 (19.23%) articles had the NMW as a main topic (Carroll & Geiger, 2007; Free, 2014; Nietsche et al., 2020; Rochais et al., 2013; Schachner et al., 2017). They seemed to focus on one function of the NMW in order to improve or develop a NMW. None of these studies questioned what features were necessary to fully support nurses during their daily tasks, before developing or buying a new NMW. They did not question whether an NMW was the best answer to their problem. They did not wonder if maybe their goals could be met by using something other than an NMW.

Research on the impact of the NMW in the care process is missing. The NMW is frequently seen as a collection point of (medical) supplies rather than as a tool to deliver more patient-centered and high-quality care. Richards et al. (2018) expressed the need to produce robust evidence to improve nursing care and to ensure that nurses no longer need to rely on a combination of guesswork, folk knowledge, tradition, or evidence from studies that are at substantial risk of bias (Richards et al., 2018). It seems the NMW should be included in this endeavor. It should be considered that perhaps a different format could be found that also provides the nurses with the equipment they need but also provides a healthy and safe workspace for nurses in which patient-centered and high-quality care takes priority.

Limitations

One specific search strategy was used in this study. However, each scoping and mapping review methodology describes a specific strategy to search for literature. In order to truly discover the differences between the outcomes of the methodologies, these different search strategies might also be of note, but they were not applied in this study.

The extraction of the variables per scoping and mapping review methodologies was based on the explicitly mentioned variables and/or on the extracted variables in the examples each methodology provided. Whether the list of variables was exhaustive, was not mentioned by the scoping and mapping review methodologies.

The data extraction on the topic of the nursing mobile workstation was completed by one reviewer with 10% of the data extraction that was double-checked. The data extraction performed by one reviewer could have increased the risk of extraction errors, even though double-checking by the second reviewer did not reveal significant deviations or ambiguities. The quality appraisal was also completed by one reviewer; this was not double-checked. It could be argued that this process might have needed a second reviewer to ensure the impartiality of the process.

CONCLUSION

The aim of this paper was twofold and had both a focus on a methodological issue as well as on a clinical issue. First, different scoping and mapping review methodologies were compared to provide a comprehensive overview of the characteristics, differences, and similarities of these methodologies in order to support users on how to select the most appropriate framework. Second, a comprehensive and broad overview of the current knowledge of the NMW in clinical nursing practice was provided.

The scoping and mapping review methodologies that were applied in nursing research are characterized by different searching methods and extraction variables. Each methodology might provide an overview of a certain research subject with emphasis on different parts of the body of knowledge. Deciding the aim and scope of the research before selecting a scoping and mapping review methodology is recommended.

The NMW is widely used on a daily basis in nursing care, however, knowledge is limited to non-existent. Future studies could explore the impact of the NMW in the care process and the current functions of the NMW. Furthermore, a universal definition or term for the NMW is needed in order to compare research on the topic.

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CONFLICT OF INTEREST STATEMENT

All authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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CLINICAL RESOURCES

PRISMA Statement for Systematic Reviews: https://www.prisma-statement.org/prisma-2020-statement.

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REFERENCES

Abbott, P. A. (2012). The effectiveness and clinical usability of a handheld information appliance. *Nursing Research and Practice*, *2012*, 1–8. https://doi.org/10.1155/2012/307258

Adler, R., Ewing, J., & Taylor, P. (2008). Citation statistics. Joint IMU/ICIAM/IMS-Committee on Quantitative Assessment of Research. https://www.mathunion.org/fileadmin/IMU/Report/CitationStatistics.pdf

Anderson, H. J. (2009). Hospitals tune up cart strategies. Providers use the devices to save nurses steps, improve efficiency. *Health Data Management*, *17*(2), 34–38.

Anderson, R. E., Young, V., Stewart, M., Robertson, C., & Dancer, S. J. (2011). Cleanliness audit of clinical surfaces and equipment: Who cleans what? *Journal of Hospital Infection*, *78*(3), 178–181. https://doi.org/10.1016/j.jhin.2011.01.030

Arksey, H., & O'Malley, L. (2005). Scoping studies: Towards a methodological framework. *International Journal of Social Research Methodology*, *8*(1), 19–32. https://doi.org/10.1080/1364557032000119616

Aromataris, E., Fernandez, R., Godfrey, C. M., Holly, C., Khalil, H., & Tungpunkom, P. (2015). Summarizing systematic reviews: Methodological development, conduct and reporting of an umbrella review approach. *International Journal of Evidence-Based Healthcare*, *13*(3), 132–140. https://doi.org/10.1097/XEB.0000000000000055

Beam, E. L., Gibbs, S. G., Hewlett, A. L., Iwen, P. C., Nuss, S. L., & Smith, P. W. (2016). Evaluating isolation behaviors by nurses using mobile computer workstations at the bedside. *CIN: Computers, Informatics, Nursing*, *34*(9), 387–392. https://doi.org/10.1097/CIN.0000000000000248

Bennet, L., Eisner, D. A., & Gunn, A. J. (2019). Misleading with citation statistics? *The Journal of Physiology*, *597*(10), 2593–2594. https://doi.org/10.1113/JP277847

Bougioukas, K. I., Vounzoulaki, E., Mantsiou, C. D., Papanastasiou, G. D., Savvides, E. D., Ntzani, E. E., & Haidich, A.-B. (2021). Global mapping of overviews of systematic reviews in healthcare published between 2000 and 2020: A bibliometric analysis. *Journal of Clinical Epidemiology*, *137*, 58–72. https://doi.org/10.1016/j.jclinepi.2021.03.019

Bradbury-Jones, C., Breckenridge, J. P., Clark, M. T., Herber, O. R., Jones, C., & Taylor, J. (2019). Advancing the science of literature reviewing in social research: The focused mapping review and synthesis. *International Journal of Social Research Methodology*, *22*(5), 451–462. https://doi.org/10.1080/13645579.2019.1576328

Campbell, F., Tricco, A. C., Munn, Z., Pollock, D., Saran, A., Sutton, A., White, H., & Khalil, H. (2023). Mapping reviews, scoping reviews, and evidence and gap maps (EGMs): The same but different— The "big picture" review family. *Systematic Reviews*, *12*(1), 45. https://doi.org/10.1186/s13643-023-02178-5

Carroll, J., & Geiger, J. (2007). Improving patient care: A multifunctional nursing workstation. *IEEE Systems and Information Engineering Design Symposium*, *2007*, 1–6. https://doi.org/10.1109/SIEDS.2007.4373997

Chan, Y.-S., Liang, H.-J., & Lin, Y.-H. (2014). Using wireless measuring devices and tablet PC to improve the efficiency of vital signs data collection in hospital. *2014 IEEE International Symposium on Bioelectronics and Bioinformatics (IEEE ISBB 2014)*, 1–4. https://doi.org/10.1109/ISBB.2014.6820930

Clapton, J., Rutter, D., & Sharif, N. (2009). *SCIE systematic mapping guidance* (p. 151). SCIE.

Colquhoun, H. L., Levac, D., O'Brien, K. K., Straus, S., Tricco, A. C., Perrier, L., Kastner, M., & Moher, D. (2014). Scoping reviews: Time for clarity in definition, methods, and reporting. *Journal of Clinical Epidemiology*, *67*(12), 1291–1294. https://doi.org/10.1016/j.jclinepi.2014.03.013

Daudt, H. M., van Mossel, C., & Scott, S. J. (2013). Enhancing the scoping study methodology: A large, inter-professional team's experience with Arksey and O'Malley's framework. *BMC Medical Research Methodology*, *13*(1), 48. https://doi.org/10.1186/1471-2288-13-48

Davis, K., Drey, N., & Gould, D. (2009). What are scoping studies? A review of the nursing literature. *International Journal of Nursing Studies*, *46*(10), 1386–1400. https://doi.org/10.1016/j.ijnurstu.2009.02.010

FitzGerald, G., Moore, G., & Wilson, A. P. R. (2013). Hand hygiene after touching a patient's surroundings: The opportunities most commonly missed. *Journal of Hospital Infection*, *84*(1), 27–31. https://doi.org/10.1016/j.jhin.2013.01.008

Free, J. (2014). Empowering your front-line workers: Five essential features to consider when purchasing mobile workstations. *Health Management Technology*, *35*(2), 16–17.

Giraldo, L., Schachner, B., Luna, D., & Benítez, S. (2018). Exploring nurses' perceptions and expectations toward a BCMA implementation using a mobile app and workstations as a change management strategy. *Studies in Health Technology and Informatics*, *250*, 134–138.

Grant, M. J., & Booth, A. (2009). A typology of reviews: An analysis of 14 review types and associated methodologies: A typology of reviews. *Health Information and Libraries Journal*, *26*(2), 91–108. https://doi.org/10.1111/j.1471-1842.2009.00848.x

Guillen, S., Traver, V., Monton, E., Castellano, E., Valdivieso, B., & Valero, M. R. (2011). Accessing to electronic medical history using a mobility intra hospital system. In *2011 Annual International Conference of the IEEE Engineering in Medicine and Biology Society* (Vol. *2011*, pp. 3546–3549). IEEE. https://doi.org/10.1109/IEMBS.2011.6090590

Hong, Q., Pluye, P., Fàbregues, S., Bartlett, G., Boardman, F., Cargo, M., Dagenais, P., Gagnon, M.-P., Griffiths, F., Nicolau, B., O'Cathain, A., Rousseau, M.-C., & Vedel, I. (2018). Mixed Methods Appraisal Tool (MMAT). http://mixedmethodsappraisaltoolpublic.pbworks.com/w/file/fetch/127916259/MMAT_2018_criteria-manual_2018-08-01_ENG.pdf

Hsu, C.-H., Hsieh, S.-H., Hsu, J.-T., Cheng, P.-H., Chen, S.-J., & Lai, F. (2011). Mobile nursing cart with software defined radio for healthcare enterprises. TENCON 2011–2011 IEEE Region 10 Conference (pp. 1221–1224) https://doi.org/10.1109/TENCON.2011.6129307

Janssens, A. C. J. W. (2021). Cocites. https://cocites.com/

Jimenez, F. E., Puumala, S. E., Apple, M., Bunker-Hellmich, L. A., Rich, R. K., & Brittin, J. (2019). Associations of patient and staff outcomes with inpatient unit designs incorporating decentralized caregiver workstations: A systematic review of empirical evidence. *HERD: Health Environments Research & Design Journal*, *12*(1), 26–43. https://doi.org/10.1177/1937586718796590

Kao, H. C., Lin, C. J., Lee, Y. H., & Chen, S. H. (2015). The effects of direction of exertion, path, and load placement in nursing cart pushing and pulling tasks: An electromyographical study. *PLoS One*, *10*(10), e0140792. https://doi.org/10.1371/journal.pone.0140792

Khalil, H., & Tricco, A. C. (2022). Differentiating between mapping reviews and scoping reviews in the evidence synthesis ecosystem. *Journal of Clinical Epidemiology*, *149*, 175–182. https://doi.org/10.1016/j.jclinepi.2022.05.012

15475069, 2024, 6, Downloaded from https://sigmapubs.onlinelibrary.wiley.com/doi/10.1111/jnu.13005 by Universitat Bern, Wiley Online Library on [30/03/2026]. See the Terms and Conditions (https://onlinelibrary.wiley.com/terms-and-conditions) on Wiley Online Library for rules of use; OA articles are governed by the applicable Creative Commons License

Krnic Martinic, M., Pieper, D., Glatt, A., & Puljak, L. (2019). Definition of a systematic review used in overviews of systematic reviews, meta-epidemiological studies and textbooks. *BMC Medical Research Methodology*, *19*(1), 203. https://doi.org/10.1186/s12874-019-0855-0

Laplante, P., Rockne, J., Montuschi, P., Baldwin, T., Hinchey, M., Shafer, L., Voas, J., & Wang, W. (2009). Quality in conference publishing. *IEEE Transactions on Professional Communication*, *52*(2), 183–196. https://doi.org/10.1109/TPC.2009.2017989

Ledbetter, T., Shultz, S., & Beckham, R. (2017). Are technology interruptions impacting your bottom line? An innovative proposal for change. *Nursing Forum*, *52*(4), 232–243. https://doi.org/10.1111/nuf.12148

Nielsen, K., & Trinkoff, A. (2003). Applying ergonomics to nurse computer workstations: Review and recommendations. *CIN: Computers, Informatics, Nursing*, *21*(3), 150–157. https://doi.org/10.1097/00024665-200305000-00012

Nietsche, E. A., Cassenote, L. G., Salbego, C., Ramos, T. K., Perlini, N. M. O. G., Böck, A., & Brasil, M. A. B. (2020). Care facilitator cart: A product technology built with nursing professionals. *Revista Brasileira de Enfermagem*, *73*(suppl 6), e20190741. https://doi.org/10.1590/0034-7167-2019-0741

Okubo, Y. (1997). Bibliometric indicators and analysis of research systems: Methods and examples (OECD Science, Technology and Industry Working Papers 1997/01; OECD Science, Technology and Industry Working Papers, Vol. 1997/01). https://doi.org/10.1787/208277770603

Ouzzani, M., Hammady, H., Fedorowicz, Z., & Elmagarmid, A. (2016). Rayyan—A web and mobile app for systematic reviews. *Systematic Reviews*, *5*(1), 210. https://doi.org/10.1186/s13643-016-0384-4

Pada, S. K. M. S., Lishi, P., Ng, K. S., Rethenam, S., Alenton, L. S., Chee, P. L., Guo, W., Hsann, Y. M., Cheng, C. W. R., Ong, C. H., Lasantha, R., Chan, D., & Tambyah, P. A. (2021). The impact of a 'milking the COW' campaign in a regional hospital in Singapore. *Antimicrobial Resistance & Infection Control*, *10*(1), 81. https://doi.org/10.1186/s13756-021-00948-1

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., … Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ*, *372*, n71. http://doi.org/10.1136/bmj.n71

Peters, M. D. J., Marnie, C., Tricco, A. C., Pollock, D., Munn, Z., Alexander, L., McInerney, P., Godfrey, C. M., & Khalil, H. (2020). Updated methodological guidance for the conduct of scoping reviews. *JBI Evidence Synthesis*, *18*(10), 2119–2126. https://doi.org/10.11124/JBIES-20-00167

Pham, M. T., Rajić, A., Greig, J. D., Sargeant, J. M., Papadopoulos, A., & McEwen, S. A. (2014). A scoping review of scoping reviews: Advancing the approach and enhancing the consistency. *Research Synthesis Methods*, *5*(4), 371–385. https://doi.org/10.1002/jrsm.1123

Polit, D. F., & Beck, C. T. (2017). *Nursing research: Generating and assessing evidence for nursing practice* (10th ed.). Wolters Kluwer.

Richards, D. A., Hilli, A., Pentecost, C., Goodwin, V. A., & Frost, J. (2018). Fundamental nursing care: A systematic review of the evidence on the effect of nursing care interventions for nutrition, elimination, mobility and hygiene. *Journal of Clinical Nursing*, *27*(11–12), 2179–2188. https://doi.org/10.1111/jocn.14150

Rochais, É., Atkinson, S., & Bussières, J.-F. (2013). Nursing perception of the impact of medication carts on patient safety and ergonomics in a teaching health care center. *Journal of Pharmacy Practice*, *26*(2), 131–137. https://doi.org/10.1177/0897190012451908

Schachner, B., González, Z., Cano, R., Luna, D., & Benítez, S. (2017). Looking for the best WOW: Understanding the nurses' needs. *Studies in Health Technology and Informatics*, *245*, 212–215.

Schimmel, A. M., Becker, M. L., van den Bout, T., Taxis, K., & van den Bemt, P. M. L. A. (2011). The impact of type of manual medication cart filling method on the frequency of medication administration errors: A prospective before and after study. *International Journal of Nursing Studies*, *48*(7), 791–797. https://doi.org/10.1016/j.ijnurstu.2010.12.007

Slabodkin, G. (2014). Carts confront mobile reality: Nursing staffs are leading an effort to incorporate handhelds and even robots into workflows that relied heavily on carts. *Health Data Management*, *22*(5), 32–34.

Smith, S. J., Young, V., Robertson, C., & Dancer, S. J. (2012). Where do hands go? An audit of sequential hand-touch events on a hospital ward. *Journal of Hospital Infection*, *80*(3), 206–211. https://doi.org/10.1016/j.jhin.2011.12.007

Sutton, A., Clowes, M., Preston, L., & Booth, A. (2019). Meeting the review family: exploring review types and associated information retrieval requirements. *Health Information & Libraries Journal*, *36*(3), 202–222. https://doi.org/10.1111/hir.12276

Tricco, A. C., Lillie, E., Zarin, W., O'Brien, K. K., Colquhoun, H., Levac, D., Moher, D., Peters, M. D. J., Horsley, T., Weeks, L., Hempel, S., Akl, E. A., Chang, C., McGowan, J., Stewart, L., Hartling, L., Aldcroft, A., Wilson, M. G., Garritty, C., … Straus, S. E. (2018). PRISMA extension for scoping reviews (PRISMA-ScR): Checklist and explanation. *Annals of Internal Medicine*, *169*(7), 467–473. https://doi.org/10.7326/M18-0850

Tsai, P. H., Chuang, Y. T., Chou, T. S., Liu, J. W. S., & Shih, C. S. (2009). INuC: An intelligent mobile nursing cart. 2009 2nd International Conference on Biomedical Engineering and Informatics (pp. 1–6). https://doi.org/10.1109/BMEI.2009.5305225

Wager, K. A., Schaffner, M. J., Foulois, B., Kazley, A. S., Parker, C., & Walo, H. (2010). Comparison of the quality and timeliness of vital signs data using three different data-entry devices. *CIN: Computers, Informatics, Nursing*, *28*, 8–212.

Worldbank. (2022). Data worldbank. GDP per Capita (Current US$). https://data.worldbank.org/indicator/NY.GDP.PCAP.CD?end=2019&locations=US&start=2004

Xu, X., Lin, J.-H., & Boyer, J. (2013). Shoulder joint loading and posture during medicine cart pushing task. *Journal of Occupational and Environmental Hygiene*, *10*(8), 446–454. https://doi.org/10.1080/15459624.2013.803417

Xuan, X., Li, Z., & Chen, X. (2019). An empirical examination of nursing units in China based on nurse experience. *HERD: Health Environments Research & Design Journal*, *12*(1), 108–123. https://doi.org/10.1177/1937586718786126

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

Appendix S1.

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