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A hybrid systematic narrative review of instruments measuring home-based care nurses' competency

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Abstract

Aim: The aim of the study was to identify and synthesize the contents and the psychometric properties of the existing instruments measuring home-based care (HBC) nurses' competencies.

Design: A hybrid systematic narrative review was performed.

Review Methods: The eligible studies were reviewed to identify the competencies measured by the instruments for HBC nurses. The psychometric properties of instruments in development and psychometric testing design studies were also examined. The methodological quality of the studies was evaluated using the Medical Education Research Study Quality Instrument and COSMIN checklist accordingly.

Data Sources: Relevant studies were searched on CINAHL, MEDLINE (via PubMed), EMBASE, PsychINFO and Scopus from 2000 to 2022. The search was limited to full-text items in the English language.

Results: A total of 23 studies reporting 24 instruments were included. 12 instruments were adopted or modified by the studies while the other 12 were developed and psychometrically tested by the studies. None of the instruments encompassed all of the 10 home-based nursing care competencies identified in an earlier study. The two most frequently measured competencies were the management of health conditions, and critical thinking and problem-solving skills, while the two least measured competencies were quality and safety, and technological literacy. The content and structural validity of most instruments were inadequate since the adopted instruments were not initially designed or tested among HBC nurses.

Conclusion: This review provides a consolidation of existing instruments that were used to assess HBC nurses' competencies. The instruments were generally not comprehensive, and the content and structural validity were limited. Nonetheless, the domains, items and approaches to instrument development could be adopted to develop and test a comprehensive competency instrument for home-based nursing care practice in the future.

Impact: This review consolidated instruments used to measure home-based care nurses' competency. The instruments were often designed for ward-based care

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nurses hence a comprehensive and validated home-based nursing care competency instrument is needed. Nurses, researchers and nursing leaders could consider the competency instruments identified in this review to measure nurses' competencies, while a home-based nursing care competency scale is being developed.

Patient or Public Contribution: No patient or public contribution was required in this review.

KEYWORDS

community care, competency, home health nursing, home-based care, instrument, nurse

1 | INTRODUCTION

The capacity for community care has been rapidly expanding across the globe to provide access to long-term care and healthy ageing for older people (Woodworth, 2022). It is estimated that by 2030, one in six persons globally will be 60 years of age or older (World Health Organization [WHO], 2022). The ageing population presents a set of unprecedented challenges, such as the shifting of disease burden towards chronic diseases, social-related issues and increased healthcare expenditure (Bloom et al., 2015). Therefore, the purpose of community care is to establish integrated, non-fragmented and person-centred care for older people (WHO, 2023).

Home-based care (HBC) is one example of a community care service. There are three broad categories of HBC, namely, transition care for post-discharge patients, hospital-at-home care by a multidisciplinary team and home personal care by community partners (Kwan et al., 2019; Liao et al., 2020). In this review, HBC refers to the management of adult patients with long-term care or post-discharge care needs either in the patient's home or medical posts within the patient's housing districts (Rusli et al., 2021). Nurses play a key role in HBC because they perform home visits independently and are often one of the first to detect signs of deterioration in patients' health conditions (Fjørtoft et al., 2021). Unlike in ward-based care settings, support from other healthcare professionals and the availability of hospital resources are often limited in HBC settings (Melby et al., 2018). Therefore, HBC nurses are expected to be highly competent in performing nursing care and confident in accessing appropriate help when a medical problem is identified in patients' homes (Hinck, 2022). However, studies have found that HBC nurses experienced a steep learning curve when transitioning into HBC and the nurses felt that their learning needs were not well supported (Pavloff & Labrecque, 2021; Rusli et al., 2022). These experiences could be due to the paucity of evidence-based research focusing on nurses' competency and practices in HBC. The lack of educational opportunities and understanding of HBC nurses' learning needs were also linked to high turnover rates (Chamanga et al., 2020).

The term competency describes 'a specific knowledge, skills or judgement required for a nursing area of practice and for evaluation or assessments to infer nurses' competence' (Moghabghab et al., 2018). To date, only a limited number of studies have discussed the expected competencies for HBC nurses. A recent scoping review by Rusli

et al. (2021) identified 10 home-based nursing care competencies from 64 studies, which comprise care assessments, performance of nursing procedures, management of health conditions, critical thinking and problem-solving skills, interpersonal relationship and communication, interdisciplinary collaboration, leadership and resource management, professional development, technological literacy and quality and safety. While the review may lend some support to standardizing home-based nursing care expectations between HBC stakeholders, it does not offer clear insight into the evaluation or assessment methods to infer nurses' competency levels or learning needs.

Understanding nurses' learning needs and their level of competency is important because these factors have an impact on patient care and safety (Rahmah et al., 2021). To accurately identify nurses' learning needs for HBC practice, a valid and reliable competency instrument is required (Pueyo-Garrigues et al., 2021). However, most existing instruments used to measure HBC nurses' competencies were designed for ward-based care setting such as acute hospitals, community hospitals or nursing homes, which raised concerns about the validity and reliability of the instruments. The validity of an instrument is important to ensure that the instrument is actually measuring the intended measure. Furthermore, without understanding the test validity of the instruments, decisions or interpretations of the results may be misinformed or harmful (Furr & Bacharach, 2014). In an earlier systematic review, Bing-Jonsson et al. (2013) identified 11 instruments that were used to measure nurses' competency in community health care, which included HBC and ward-based settings such as nursing homes and community hospitals. Similar to our preliminary findings, the review found that only four instruments provided adequate evidence of the instrument's validity. Thus, given the review was conducted over a decade ago and included ward-based community healthcare settings, an update to the existing evidence is warranted. Moreover, consolidation of the available instruments that assess HBC nurses' competency may facilitate the process of developing a competency instrument that is valid and reliable for the present HBC nursing practice.

2 | METHODS

The methodological approach of this review was based on Turnbull et al.'s (2023) blueprint for a hybrid systematic narrative review,

which comprises six key elements: (1) aims and research questions, (2) justification, (3) literature sources, (4) search parameters, (5) data cleaning and (6) information synthesis. The systematic narrative review approach has been adopted in disciplines such as dentistry, hospitality and psychiatry (Robinson et al., 2016; Teoh et al., 2021; Thompson et al., 2022). This approach features elements of both systematic and narrative review. The protocol of this review has been registered in Prospero (CRD42022349404). The Preferred Reporting for Systematic Review and Meta-analysis guidelines (Appendix S4) were also used to ensure satisfactory reporting (Page et al., 2021).

2.1 | Aims and research questions

This study aimed to identify and synthesize the contents and psychometric properties of the existing instruments measuring HBC nurses' competencies. The research questions were as follows:

1. What are the competencies of HBC nurses addressed by the existing competency instruments?
2. What are the reported psychometric properties of these competency instruments?

2.2 | Justification

The hybrid systematic narrative review approach allowed the study to adopt features of both systematic and narrative review, for example the source of literature was comprehensive and focused, the selection criteria were criterion-based, the included literature was appraised critically, and the data synthesis included elements of descriptive and quantitative evidence (Turnbull et al., 2023). Furthermore, because a wide variety of instruments used to measure HBC nurses' competency was expected, the hybrid approach could ensure that the review minimized the risk of omitting potential instruments that reported limited evidence of validation, as found in the Bing-Jonsson et al. (2013) review. The hybrid approach also enabled a balance of breadth and depth in the inclusion of relevant studies for this review because it is comprehensive in coverage of existing articles yet focused on specific inclusion and exclusion criteria (Turnbull et al., 2023).

2.3 | Literature sources

Three systematic review databases—Cochrane Library, Prospero and the database of systematic reviews by COnsensus-based Standards for the selection of health Measurement Instruments (COSMIN)—were searched to avoid duplication of identical studies. A preliminary search was performed on MEDLINE (via PubMed) and CINAHL to identify relevant keywords and index terms. Relevant literature was searched on CINAHL, MEDLINE (via PubMed), EMBASE, PsychINFO and Scopus using the search strategies provided in Appendix S1. An additional search was also performed by hand searching relevant

journals (*Journal of Nursing Measurement and Evaluation & the Health Professions*), books related to the instruments' (e.g. *Measurement of Nursing Outcomes: Client Outcomes and Quality of Care*) and references and citations of identified studies. Zotero (Version 6.0.23) was used to export and manage the retrieved studies.

2.4 | Search parameters

The search terms were developed based on population, interest and context format (Munn et al., 2018). The following keywords were used in multiple combinations: nurse, registered nurse, staff nurse, competency, capacity, ability, skill, aptitude, performance, capability, proficiency, home care, home health care and home-based care. In addition, index terms, Boolean operators 'AND' and 'OR', truncation '*' and proximities 'N2' and 'adj5' operators were used. The full search strategies are presented in Appendix S1.

2.5 | Eligibility criteria

The inclusion and exclusion criteria are presented in Table 1 and are described below.

2.5.1 | Population

This review examined studies focusing on post-registered HBC nurses, which included registered nurses and post-registration student nurses. Studies focusing solely on ward-based care nurses, pre-registration nursing students, other healthcare professionals or care recipients such as patients, carers and family members were excluded. These criteria were selected because the majority of HBC nurses were post-registration nurses and they were expected to have some level of competency that could be assessed by the instruments (Rusli et al., 2022).

2.5.2 | Interest and construct

This review included studies focusing on nurses' competencies, competency assessments, tool development and testing, or competency evaluation using an instrument. The term competency refers to any form of knowledge, skills or judgement required for nursing practice (Moghabghab et al., 2018). Studies that focused on non-nursing-related tasks such as housekeeping and qualitative design studies were excluded.

2.5.3 | Study types

Limiters such as a year of publication between 2000 and 2022 were also applied to ensure that the identified competencies were

TABLE 1 Inclusion and exclusion criteria.

PICO		Inclusion	Exclusion
Population	Home-based care nurses	<ul style="list-style-type: none"> Registered nurses General nurses Post-registration nursing students 	<ul style="list-style-type: none"> Solely on institutional-based care nurses (e.g. acute hospital, community hospital, nursing homes, inpatient hospice) Pre-registration nursing students Solely on other healthcare professionals (e.g. doctors, pharmacist or allied health professionals) Patients, carers, family members
Interest	Competencies		<ul style="list-style-type: none"> Non-nursing related tasks, for example housekeeping
Construct	Competency assessment	<ul style="list-style-type: none"> Tool development and testing studies Competency evaluation studies using questionnaire or surveys 	<ul style="list-style-type: none"> Qualitative only studies
Other aspects	<ul style="list-style-type: none"> Publication year Language Type of article 		<ul style="list-style-type: none"> Published before 2000 or after 2022 Available in English language Available in full text and peer reviewed

up to date and relevant to current practice. In addition, only peer-reviewed studies published in the English language and available in full text were included.

2.6 | Data cleaning

Following the removal of duplicates, a two-step screening process was performed independently by K.D.B.R. and W.H.D.A. First, the title and abstract of the studies were screened to remove any non-relevant studies. Second, full-text screening and discussion about any disagreement were performed; a third reviewer (W.L.C.) was consulted to resolve any persistent disagreement.

2.7 | Information synthesis

The content and psychometric properties of the identified studies and instruments were synthesized and analysed in three ways. First, key data were extracted on a piloted data extraction template using Microsoft Excel and Microsoft Word by K.D.B.R. and verified by W.L.C. The general characteristics of the studies and instruments, such as references, territories, study design, number of participants, name of instruments, response types, number of items, type of nursing competency measured, subscales and reported psychometric properties were extracted.

Second, the methodological quality of the studies was appraised using either the Medical Education Research Study Quality Instrument (MERSQI) (Cook & Reed, 2015) for primary research design studies or the COSMIN checklist (Mokkink et al., 2018) for instrument development and psychometric evaluation design studies. The 10-item MERSQI assesses six domains of study quality and has a possible total score range from 5 to 18, with a higher score suggesting better quality. The average total score of

10 or higher was considered a benchmark in this study based on the average score of 9.95 among 210 published medical education studies in Reed et al. (2007) and the average score of 11.33 among published articles in Stephenson et al. (2017). However, mean scores lower than 10 did not indicate that the study was of low quality since different research questions require different designs and the rating should be used as relative rather than absolute judgement (Cook & Reed, 2015). The components of the COSMIN checklist used to assess comprised quality of instrument development, content validity, structural validity, internal consistency and reliability. The final evaluation of each psychometric component was assessed based on the 'worst score counts' principle and rated as very good (++), adequate (+), doubtful/unclear (?) (Charette et al., 2020; Mokkink et al., 2018).

Third, to address research question one, primary analyses were performed by extracting the domains and items of the instruments to perform a narrative synthesis by mapping the competencies addressed by the instruments onto the 10 HBC nursing competencies introduced earlier (Rusli et al., 2021). The narrative synthesis and mapping were performed to organize the identified competencies, explore the similarities or differences of the competencies measured by the instruments and assess the robustness and frequency of the measured competencies (Popay et al., 2006).

Additionally, to address research question two, secondary analyses were performed for instrument development and psychometric testing design studies. These studies were examined according to the reported evidence of measure, which included face or content validity, structural validity, hypotheses testing, cross-cultural validity and criterion validity, reliability such as internal consistency, measurement error and responsiveness component. Table 2 provides an overview of the extracted psychometric properties of instruments from instrument development and psychometric testing design studies. Primary design studies were excluded from the secondary analyses because of their lack of description of the psychometric

TABLE 2 Characteristics of development and psychometric evaluation studies.

Reference	Instrument	Item generation	Content validity	Structural validity	Internal consistency	Reliability	Others
Asahara et al. (2013)	Moral competence scale for home care nurses	<ul style="list-style-type: none"> Theoretical component and model Existing literature Open-ended qualitative surveys and interviews with 55 home care nurses 	<ul style="list-style-type: none"> Experts (n = 7) HCN, researchers, HCN graduate students Item analysis criteria: 27 items removed 	<p>EFA</p> <ul style="list-style-type: none"> 18 items removed 5-factor model <p>CFA</p> <ul style="list-style-type: none"> $\chi^2 = 10001.29$ ($p < .001$) CFI = 0.82 RMSEA = 0.070 (90% CI = 0.069–0.071) Maximum likelihood factor analysis and promax rotation-oblique factor, it is easier than orthogonal factors 	<p>$\alpha =$ (subscales) .78–.93</p>	NIL	<p>Valid response: 1961 participants</p> <p>RR: 22.8%</p>
Bing-Jonsson et al. (2015)	Nursing Older People-Competence Evaluation Tool	<ul style="list-style-type: none"> Seek, review and evaluate competency instruments for community-based nurses 	<ul style="list-style-type: none"> Experts (n = 42) Community care clinicians, RNs/ANs, Community care leaders, Teachers in nursing older people nursing, Researchers, Patient organization representatives <p>Face validity</p> <ul style="list-style-type: none"> 26 Registered nurses (3 rounds) 	<p>EFA</p> <ul style="list-style-type: none"> 10 items removed 28-factor model Knowledge (11 factors: 54.98% variance) Skills (9 factors: 65.03% variance) Personal attributes (8 factors: 52.83% variance) Principal factor analysis with oblique rotation 	<p>$\alpha =$ Knowledge: .883 Skills: .930 Personal attributes: .774</p> <p>18 factors had $\alpha < .7$</p>	<p>Valid response: 1016</p> <p>RR: 36%</p> <p>Missed percentage: 1.2%–18.3%</p> <p>Duration: 30–45 min</p> <p>Degree of difficulty: 7% of dichotomous score items were “too hard”, 49% were “too easy”.</p>	
Akhtar-Danesh et al. (2010)	Community Health Nurse Learning Needs Scale	<ul style="list-style-type: none"> Discussion with research team who are community health nursing experts <p>The Canadian Community Health Nursing Standards of Practices</p>	<ul style="list-style-type: none"> Expert panel 4 community nurses with postgraduate training 4 items removed, had ICVI <0.5 <p>Face validity</p> <ul style="list-style-type: none"> 4 community health nurses 	<p>EFA</p> <ul style="list-style-type: none"> 9 factor model (Overall variance: 58.84%) 53 items removed Principal axis factoring <p>CFA</p> <ul style="list-style-type: none"> RMSEA = 0.058 (90% CI = 0.057–0.059) 	<p>$\alpha =$ (subscales) .70–.98 (overall) .99</p>	<p>Test-retest (2-week interval): .92</p> <p>nurses</p> <p>$r = .89, p < .01$</p>	<p>Valid response: 213 (phase 1)</p> <p>1313 (phase 2)</p> <p>RR: 40% (phase 1)</p> <p>47% (phase 2)</p>

(Continues)

TABLE 2 (Continued)

Reference	Instrument	Item generation	Content validity	Structural validity	Internal consistency	Reliability	Others
Finnbakk et al. (2015)	Professional Nurse Self-Assessment Scale	Adopted and translated from Swedish to Norwegian Assessment and revision by study team: 7 new items added	Face validity • 5 independent experts Content validity • 15 nursing home RNs • Translation	EFA • 3 rounds • 6 factor model • Direct clinical practice (33.9% of variance explained) • Professional development items (6.6% variance) • Ethical decision-making (5.5% variance) • Clinical leadership (3.8%) • Cooperation and consultation (3.5% variance) Critical thinking (2.8% variance) • Principal component analysis • Oblimin oblique rotation	α =(subscales) .737-.940	Valid response: 357 RR: 52.7%	
Furuno et al. (2020)	Behavioural and psychological symptoms of dementia scale	Semi-structured interviews with 12 experienced BPSD visiting nurses	Expert panel • Nurses • Researchers (home nursing theory, geriatric nursing science and psychiatric nursing science) • 114 items removed Face validity • 23 nurses • 3 items removed • 1 item added	EFA • 4 factor model • 9 items removed • Promax rotation (Maximum likelihood) CFA • RMSEA =0.059 • GFI=0.901 • AGFI=0.877 • CFI=0.913	α =(subscales) .729-.860 (overall) .904	Convergent & discriminant validity Spearman's correlation ($r = .356-.634$).	Valid response: 411 RR: 66.5%
Guo et al. (2008)	Community Healthcare Competency scale	Literature review	Experts • 2 public health researchers • 2 public health nurse educators • 2 public health nursing practitioners and 1 statistician • CVI=0.90	EFA 1 factor model Variance: 72.94%	α =(overall) .95 (split half) .93	Test-retest reliability Correlation coefficient: $r = .97$	Valid response: 1837 RR: 62.1% (not for EFA)

TABLE 2 (Continued)

Reference	Instrument	Item generation	Content validity	Structural validity	Internal consistency	Reliability	Others
Haddad et al. (2007)	Depression Attitude Questionnaire	Adopted from existing scale	Unclear	EFA <ul style="list-style-type: none"> 3 factor model (47.2% overall variance explained) Negative attitude to depression and its treatment (17.9% variance) Professional ease (12.6% variance) Tendency to defer to specialists (16.5% variance) <ul style="list-style-type: none"> Principal component analysis Orthogonal (varimax rotation) 	α =(subscales) .59-.64 (overall) .62	Nil	Valid response: 189 RR: 66%
Karikawa and Nakatani (2019)	Home Nursing Scale to Help Spousal Caregivers	2 round of interviews with spouses Literature review	Experts <ul style="list-style-type: none"> 6 home hospice care experts 2 home nursing researchers 77 items removed 	EFA <ul style="list-style-type: none"> 4 factor model Promax rotation 4 items removed CFA <ul style="list-style-type: none"> $\chi^2 = 679.628$ ($p < .001$) CFI = 0.917 TLI = 0.907 RMSEA = 0.077 	α =(subscales) .822-.935 (overall) .949	Convergent & discriminant validity: Spearman's correlation (.350-.719)	Valid response: 453 RR: 85.6%
Lauder et al. (2000)	Mental Health Problems Perception Questionnaire	Revised from existing scale Theoretical frameworks	Unclear	EFA <ul style="list-style-type: none"> 3 factor model (53.77% overall variance) Therapeutic commitment: 24.38% Role competency: 15.21% Role support: 14.18% 	α =(subscales) .83-.91		Valid response: 82
Lin et al. (2010)	Public Health Nurse Professional Competency Scale	Public health Nursing handbook Nurse researchers	Experts <ul style="list-style-type: none"> 7 public health professional or nurse CVI: 0.90-0.96 	EFA <ul style="list-style-type: none"> 3 factor model (67.47% overall variance) 49-82% subscale variance 9 items removed Principal component analysis with orthogonal rotation was chosen 	α =(subscales) .93-.97	Test-retest reliability: $\alpha = .50-.81$ Convergent and discriminant validity	Valid response: 1431 Missing data rate 6.7% RR: 55.7%

(Continues)

TABLE 2 (Continued)

Reference	Instrument	Item generation	Content validity	Structural validity	Internal consistency	Reliability	Others
Ogawa and Nakatani (2020)	Public Health Nurse Professional Confidence scale	Literature review	Pilot testing 10 public health nurses	EFA 4 factor model (64.71% overall variance) Maximum likelihood Promax rotation CFA 340.028, df 111. GFI=0.918 AGFI=0.888 CFI=0.958 RMSEA=0.067	α =(subscales) .847-.934.		Valid response: 467 nurses RR: 30.9%
Reckinger et al. (2013)	Public Health Nursing Competency Instrument	Four theoretical frameworks	Original Community/public health nursing educators, administrators and staff nurses Authors reviewed drafts and the final publication of Quad Council list of PHIN competencies	EFA • 6 factor model (64% overall variance) • Evaluation competencies: 51.4% • Individual/Family/Community: 4.7% • Systems' competencies: 3.14% • Partnership/collaboration competencies: 2.91% • Planning competencies: 2.29% • Assessment competencies: 1.79% 112 items removed Principal component oblique rotation	α =(subscales) .92-.98		Valid response: • 2269 • 1003 • RR: 44.2% • Average time taken 20 min (13-29 min) Missing data: 11.2%–25.2% per item

TABLE 2 (Continued)

Reference	Instrument	Item generation	Content validity	Structural validity	Internal consistency	Reliability	Others
Tanabe et al. (2020)	Community Orientation Scale among Community Health Nurses	Conceptual framework Qualitative descriptive study	Experts <ul style="list-style-type: none"> 4 medical and nursing managers 1 senior nursing lecturer 3 public health researchers Pilot testing <ul style="list-style-type: none"> 29 community health nurses 	EFA <ul style="list-style-type: none"> 4 factor model 8 items removed Maximum likelihood technique and promax CFA <ul style="list-style-type: none"> GIF = 0.799 AGFI = 0.766 RMR = 0.089 RMSEA = 0.075 CMIN = 915.099, $p < .001$ 	α = (subscales) .787-.861 (overall) .935	Concurrent validity $r = .263$ Test-retest: $r = .519$ $(p < .001)$ Known group: $p = .10$	Valid response 226 RR: 77.4%
Veldhuizen et al. (2021)	Nurse-Sensitive outcomes in district nursing care	Literature review Review of related reports	15 District nurse, researcher, teacher, practice or policy maker Delphi approach testing: Round 1 22 items relevant 2 items not relevant 17 items uncertain 9 item influenceable 2 item not influenceable 30 item uncertain Round 2 30 items relevant 6 items not relevant 10 items uncertain 27 item influenceable 3 item not influenceable 16 item uncertain 26 items were found to be nurse-sensitive outcome (both relevant and influenceable)	NIL	NIL	NIL	Round 1 Valid response: 15 RR: 93.8% Round 2 Valid response: 11 RR: 73.3%

Abbreviations: AGFI, adjusted goodness of fit index; AN, assistant nurse; CFA, confirmatory factor analysis; CFI, comparative fit index; CMIN, Chi-square minimum; CVI/ICVI, content validity index; EFA, exploratory factor analysis; GFI/GIF, goodness of fit index; HCN, home care nurse; RMSEA, root mean square error of approximation; RN, Registered nurse; RR, response rate; RMR, root mean square residual; TLI, Tucker-Lewis index; χ^2 , Chi-square; α , Cronbach's alpha

properties of the adapted instruments and ambiguity surrounding the source of the adopted or modified instruments. The exclusion was a minor deviation from the initial protocol. Nevertheless, the instruments in primary design studies were essential to address research question one, and this review does not seek to select or recommend the most suitable instrument for the measurement of HBC nurses' competency as per a conventional systematic review of psychometric properties. Therefore, both primary research design studies evaluating nurses' competency and development and psychometric testing design studies were included and analysed in this review.

3 | RESULTS

3.1 | Database search

The database search identified 6129 studies, while the additional search identified five more studies. After removing duplicate studies, 5667 titles and abstracts were screened. Subsequently, the full text of 113 studies was retrieved and assessed for eligibility. The screening resulted in 23 studies reporting 24 instruments for inclusion in the review. Figure 1 illustrates the PRISMA flow diagram and Appendix S2 provides examples of excluded studies.

3.2 | Characteristics of included articles

Nine studies were primary research designs, namely, study designs that were cross-sectional ($n=5$), descriptive correlational ($n=2$), mixed-methods ($n=1$) and longitudinal ($n=1$). The remaining 14 studies were instrument development and psychometric testing design studies. The studies were published between 2000 and 2021, and most had been published after 2012 ($n=17$), which may suggest an emerging interest in HBC nurses' competency in the last decade. The studies were conducted in the United States of America ($n=5$) (Bladen & McAtee, 2016; Delaney et al., 2011; Dowding et al., 2018; Hodge, 2020; Reckinger et al., 2013), Japan ($n=5$) (Asahara et al., 2013; Furuno et al., 2020; Karikawa & Nakatani, 2019; Miyata et al., 2022; Ogawa & Nakatani, 2020), Norway ($n=4$), (Bing-Jonsson et al., 2015, 2016; Finnbakk et al., 2015; Hovland et al., 2018), United Kingdom ($n=3$) (Haddad et al., 2007; Lauder et al., 2000; Shipman et al., 2008), Taiwan ($n=2$) (Guo et al., 2008; Lin et al., 2010), Canada ($n=1$) (Akhtar-Danesh et al., 2010), Fiji ($n=1$) (Tanabe et al., 2020), Netherlands ($n=1$) (Veldhuizen et al., 2021) and Sweden ($n=1$) (Hasson & Arnetz, 2008). In total, 15,531 participants were involved in the included studies. Fourteen of the studies recruited only HBC nurses, while the remaining nine studies recruited a mix of nurses from other settings, including HBC nurses. Table 3 provides an overview of the study characteristics.

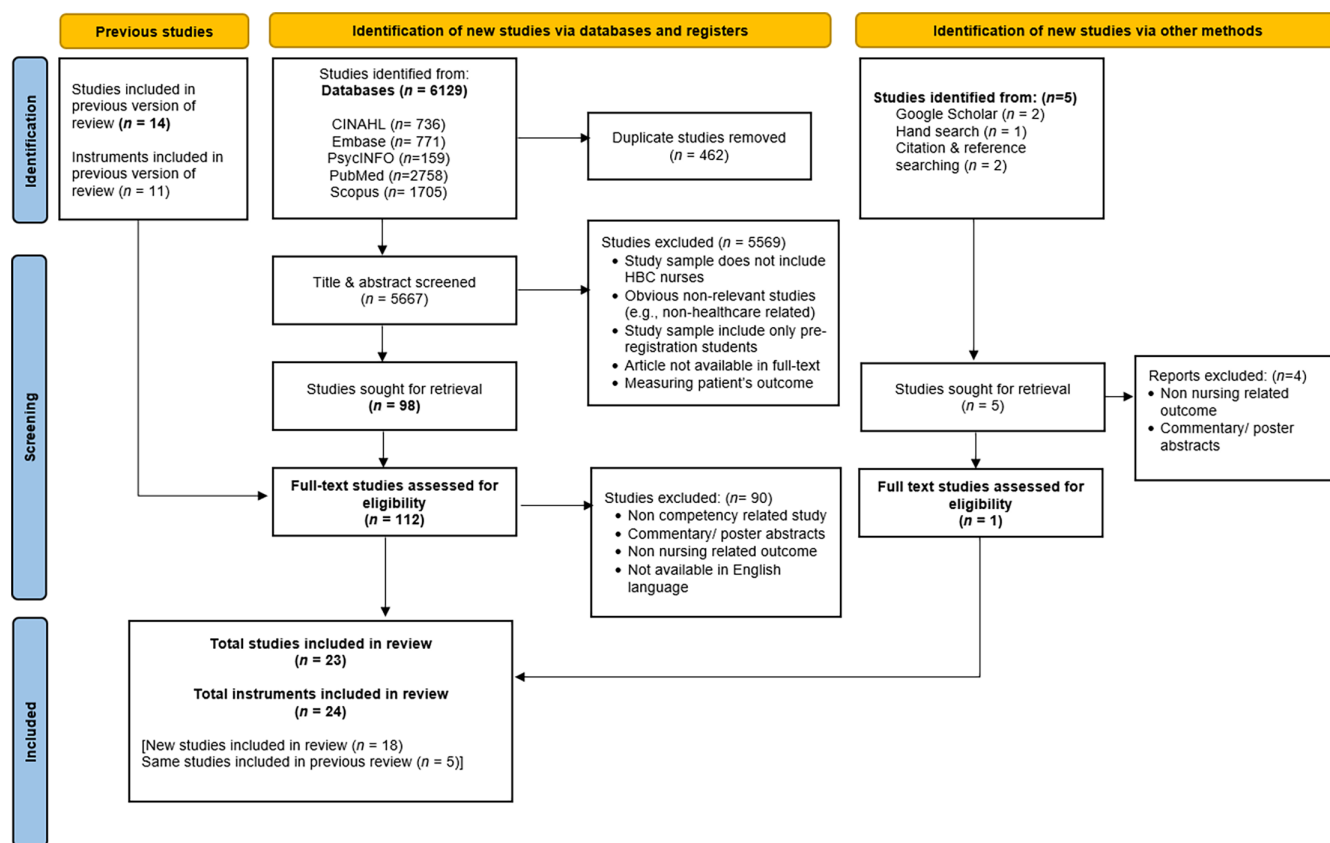


FIGURE 1 PRISMA flow diagram. Adapted from Page et al. (2021).

3.3 | Characteristics of included instruments

The instruments were found to be newly developed ($n=12$) or adopted or modified from existing instruments ($n=12$). The number of domains or categories of the instruments ranged between one and eight, and the number of items ranged between 10 and 81, with a median of 27 items. The instruments adopted multiple approaches to quantify nurses' competencies, the most common approach being a 5-point Likert scale ($n=7$), followed by a 4-point Likert scale ($n=4$), binary option ($n=3$), 7-point Likert scale ($n=2$), visual analogue scale ($n=2$) and a combination of multiple response types ($n=4$).

3.4 | Quality appraisal

The overall quality of primary research design studies was found to be high. These studies obtained a MERSQI score of 10 or more, except for two studies, as shown in Table 4. The majority of the studies did not fulfil the criteria for question 5 on internal structure and question 6 on content validation. This was due to the paucity of information surrounding the validity of the adopted instruments in measuring HBC nurses' competency since most of the instruments were initially designed and tested among ward-based care nurses.

The overall methodological quality of instrument development and psychometric evaluation design studies was assessed to be 'very good' or 'adequate' across the instrument development, content validity, structural validity, internal consistency and reliability components, as shown in Table 5. Cross-cultural validity and hypothesis testing were not assessed as the studies generally did not perform or clearly describe these tests.

3.5 | Research question 1: Primary analysis findings

This review found that all 10 HBC nursing competencies were covered across the instruments. However, there is a lack of uniformity and congruence on the expected competencies of HBC nurses as the instruments often focused on a single competency or concept of nursing care. The frequency of mapping the measured competencies into the 10 HBC nursing competencies is shown in Figure 2, and Appendix S3 presents the mapping for individual instruments.

3.5.1 | Mapping of measured competencies

The two most frequently measured competencies by the instruments were the management of health conditions ($n=17$) and critical thinking and problem-solving skills ($n=14$). This finding highlighted the greater emphasis on these competencies among HBC nurses. Conversely, nurses' competency in quality and safety ($n=6$) and technological literacy ($n=2$) were the two least measured competencies by the instruments, suggesting that these competencies may

be overlooked by the current studies or that these competencies are emerging in HBC practice.

Components of nursing care that were mapped onto the management of health conditions competency included competency in nursing older people, diabetes management, medication compliance, fall prevention (Bing-Jonsson et al., 2015, 2016; Veldhuizen et al., 2021) and competency in community or public health nursing such as immunization and health promotion (Akhtar-Danesh et al., 2010; Lin et al., 2010). These components of nursing care suggest that chronic disease management and preventive health education for patients are fundamental nursing practices in HBC.

HBC nurses are also expected to demonstrate abilities to make value-based decisions, since the instruments measured nurses' ability to practise and plan their care activities autonomously and flexibly (Hovland et al., 2018), ability to prioritize activities according to changing situations, confidence in their values, thinking and judgement (Reckinger et al., 2013) and ability to detect complaints that patients did not express through non-verbal expressions (Furuno et al., 2020). These components of nursing care were mapped onto the critical thinking and problem-solving skills competency.

Other components of nursing care that were mapped onto the other home-based nursing care competencies included performing care assessments (Lin et al., 2010; Miyata et al., 2022), performing nursing procedures such as monitoring vital signs (Delaney et al., 2011), using nursing informatics to support nursing care (Akhtar-Danesh et al., 2010; Hodge, 2020) and coordination of care with other care partners (Guo et al., 2008; Ogawa & Nakatani, 2020; Shipman et al., 2008).

3.5.2 | Thematic structure of the instruments

The aim of the instruments provided insights into the types of competencies that are typically expected of HBC nurses and can be categorized into two themes. The first theme focused on the area of nursing work such as early recognition of patient's problems (Bladen & McAtee, 2016), management of patients with heart failure (Delaney et al., 2021), general numeracy skills (Dowding et al., 2018), graph reading skill (Dowding et al., 2018), caring for individuals with behavioural and psychological symptoms of dementia (Furuno et al., 2020), helping spousal caregivers (Karikawa & Nakatani, 2019), care for individuals with mental health problems (Lauder et al., 2000), competencies for general nursing or public health nursing (Bing-Jonsson et al., 2015, 2016; Akhtar-Danesh et al., 2010; Guo et al., 2008; Hodge, 2020; Hovland et al., 2018; Lin et al., 2010; Reckinger et al., 2013; Veldhuizen et al., 2021) and competencies of palliative care (Shipman et al., 2008).

The second theme focused on the attributes of the nurses such as moral competence (Asahara et al., 2013), professional nursing (Finnbakk et al., 2015), attitudes towards individuals with depression (Haddad et al., 2007), work quality and stress (Hasson & Arnetz, 2008), developing of trusting relationships

TABLE 3 Characteristics of included studies.

Reference; territory	Study design; no. of participants	Name of scale	
		Response types	Nursing competency measured and aim of the instrument
		No. of items	
Asahara et al. (2013); Japan	Development and Psychometric evaluation; 1961 home care nurses	Moral competence scale for home care nurses 5-point Likert scale 45 items	Moral and ethical practices To evaluate nurses' ethical and moral competence as HBC nurses may occasionally face discrepancies in intentions between family members, patients and other professionals regarding patient's care plan
Akhtar-Danesh et al. (2010); Canada	Development and Psychometric evaluation; 1677 nurses (23.5% home health agency, 23.0% public health department)	Community Health Nurse Learning Needs Scale 5-point scale 63 items	Community health nurse general nursing needs To identify community health nurses' continuing education needs that can inform the development of programmes for nurses to meet the practice standards
Bladen and McAtee (2016); United States of America	Descriptive correlational; 107 home health agency registered nurses	The Manifestations of Early Recognition 5-point scale 16 items	Concepts of early recognition of client problems To measure the concept of 'knowing' and early recognition of patient issues to facilitate rapid intervention to avoid health issues
Bing-Jonsson et al. (2015); Norway	Development and Psychometric evaluation; 1016 community-based nursing staff including home care	Nursing Older People-Competence Evaluation Tool 4-point Likert scale 3-point scale Multiple choice Dichotomous score 65 items	Nursing older people To measure nurses' competence in providing safe and sound care for older people in the community
Bing-Jonsson et al., (2016); Norway	Cross-sectional survey; 991 (354 RN, 528 AN, 90 Assistant nurses, 44 others), 321 (31.6%) home care	Nursing Older People-Competence Evaluation Tool 4-point Likert scale 3-point scale Multiple choice Dichotomous score 65 items	Nursing older people To measure nurses' competence in providing safe and sound care for older people in the community
Delaney et al. (2011); United States of America	Cross-sectional survey; 94 home care nurses	Heart failure Binary (true/false) 20 items	Management of patients with heart failure To measure home care nurses' knowledge of evidence-based education topics for patients with heart failure as there are limited studies conducted among home care nurses
Dowding et al. (2018); United States of America	Cross-sectional	Numeracy literacy measure Binary outcome 11 items Graph literacy measure Binary outcome 13 items	Numerical skills To evaluate nurses' ability to comprehend health care data by visualization techniques Graph reading and comprehension skills To evaluate nurses' ability to comprehend numeric data when it is displayed in graphs
Finnbakk et al. (2015); Norway	Psychometric evaluation; 357 long-term and home care registered nurses	Professional Nurse Self-Assessment Scale 5-point scale 51 items	Professional nurse competency To assess the clinical competence of nurses at different educational levels in long-term and home care settings

Subscales	Reported psychometric properties
(i) Arranging the caring situation to bring optimal benefit to the client or family (ii) Strong will to face difficult situations (iii) Judgement based on the values as a nurse (iv) Judgement based on the standards of the organization or outsider (v) Recognition of a discrepancy of intention	<ul style="list-style-type: none"> • Content validity • Structural validity (EFA and CFA) • Internal consistency • Response rate
(i) Promoting health (ii) Building individual and community capacity (iii) Building relationships (iv) Facilitating access and equity (v) Demonstrating professional responsibility and accountability results	<ul style="list-style-type: none"> • Content validity • Face validity • Structural validity (EFA and CFA) • Internal consistency • Test-retest • Response rate
(i) Knowing the patient and family (ii) Knowing the system and institution (iii) Knowing skills of oneself and one's colleagues	Adopted from Minick and Harvey (2003)
(i) Knowledge (ii) Skills (iii) Personal attributes	<ul style="list-style-type: none"> • Content validity • Face validity • Structural validity (EFA) • Internal consistency • Response rate • Duration • Degree of difficulty
(iv) Knowledge (v) Skills (vi) Personal attributes	Adopted from Bing-Jonsson et al. (2015)
(i) Signs or symptoms of worsening condition (ii) Fluids or weight (iii) Diet (iv) Medications (v) Exercise	Adopted from Albert et al. (2002)
(i) General numeracy items (ii) Context of health risks	Adopted from Lipkus et al. (2001)
(i) Ability to read data (ii) Ability to read between data (iii) Ability to read beyond data	Adopted from Galesic and Retamero (2011)
(i) Direct clinical practice (ii) Professional development (iii) Ethical decision-making (iv) Clinical leadership (v) Cooperation and consultation (vi) Critical thinking	Adopted from Nieminen et al. (2011) <ul style="list-style-type: none"> • Face validity • Structural validity (EFA) • Internal consistency • Response rate

(Continues)

TABLE 3 (Continued)

Reference; territory	Study design; no. of participants	Name of scale	
		Response types	Nursing competency measured and aim of the instrument
		No. of items	
Furuno et al. (2020); Japan	Development and Psychometric evaluation; 411 visiting nurses	Behavioural and psychological symptoms of dementia scale 5-point scale 22 items	Competency to care for individuals with BPSDS To assess visiting nurses' practice components for individuals with BPSDS
Guo et al. (2008); Taiwan	Development and Psychometric evaluation; 1837 public health nurse (station)	Community Healthcare Competency scale 6-point scale 4-point scale 10 items	Community healthcare competency To explore the professional competency of public health nurses including community-focused healthcare competency
Haddad et al. (2007); United Kingdom	Psychometric evaluation; 217 nurses (68% district or community nurses)	Depression Attitude Questionnaire Visual analogue scale (0 to 100) 12 items	Depression attitude To examine the attitudes towards depressive illness among staff of the district nursing services
Hasson and Arnetz (2008); Sweden	Cross-sectional questionnaire survey; 298 home care nurses; 565 nursing home nurses	Quality-Work-Competence 5-point Likert scale 4-point Likert scale 6-point Likert scale Visual analogue scale 75 items	Staff rated competence, strain, stress and work satisfaction To compare the perception of competence and work strain between HBC nurses and nursing home nurses
Hodge (2020); United States of America	Descriptive correlational; 40 home care nurses	Competency Inventory for Registered Nurse 40 home care nurses	Nursing competency To assess the different dimensions of nursing competence of nurses objectively
Hovland et al. (2018); Norway	Descriptive cross-sectional; 89 nurses (43.3% home health care nurses)	Nurses Competence Scale Visual analogue scale (0 to 100) 73 items	Nursing competency To measure nurses' competence and frequencies of applying the action-oriented competence categories of nursing
Karikawa and Nakatani (2019); Japan	Development and psychometric evaluation; 453 visiting nurses	Home Nursing Scale to Help Spousal Caregivers 5-point scale 26 items	Helping spousal caregiver's role To guide nurses in supporting spousal caregivers of patients with terminal cancer
Lauder et al. (2000); United Kingdom	Development and psychometric evaluation; 82 district nurses	Mental Health Problems Perception Questionnaire 7-point scale 27 items	Care for individuals with mental health problems To investigate the therapeutic commitment, role support and role competency of district nurses in caring for individuals with mental illness
Lin et al. (2010); Taiwan	Development and psychometric evaluation	Public Health Nurse Professional Competency Scale 4-point scale 29 items	Professional competencies for public health nursing To evaluate the expected roles and competencies of public health nursing among current public health nurses in Taiwan

Subscales	Reported psychometric properties
(i) Assessment and response factors related to BPSD (ii) Interventions to reduce family care burden (iii) Non-pharmacological approaches (iv) Attitudes to trying to understand a patient's intentions	<ul style="list-style-type: none"> • Content validity • Face validity • Structural validity (EFA and CFA) • Internal consistency
One factor model	<ul style="list-style-type: none"> • Content validation • Structural validity (EFA) • Internal consistency • Test-retest reliability • Response rate
(i) Negative attitude to depression and its treatment (ii) Professional ease (iii) Tendency to defer to specialist	Adopted from Botega et al (1992) <ul style="list-style-type: none"> • Structural validity (EFA) • Internal consistency
(i) Skill's development (ii) Work stress (iii) Work-related exhaustion (iv) Mental energy	Adopted from Arnetz and Blomkvist (2007)
(i) Clinical care (ii) Leadership (iii) Interpersonal relationship (iv) Legal/ethical practice (v) Professional development (vi) Teaching/coaching (vii) Critical thinking/research aptitude	Adopted from Liu et al. (2009)
(i) Helping role (ii) Teaching-coaching (iii) Diagnostic functions (iv) Managing situations (v) Therapeutic interventions (vi) Ensuring quality (vii) Work roles	Adopted from Meretoja et al. (2004)
(i) Helping spouses plan their futures (ii) Helping caregivers alleviate any regrets regarding their care (iii) Understanding the bond between a couple (iv) Providing support for anticipatory grief (v) Addressing the spousal caregiver's emotions after their spouse's	<ul style="list-style-type: none"> • Content validity • Structural validity (EFA and CFA) • Internal consistency • Convergent and discriminant validity • Response rate
(i) Therapeutic commitment (ii) Role support (iii) Role competency	Adopted from Shaw et al. (1978) <ul style="list-style-type: none"> • Structural validity (EFA and CFA) • Internal consistency
(i) Basic care (ii) Community-based competency (iii) Self-development competency	<ul style="list-style-type: none"> • Content validity • Structural validity (EFA) • Internal consistency • Test-retest reliability • Response rate

(Continues)

TABLE 3 (Continued)

Reference; territory	Study design; no. of participants	Name of scale	
		Response types	Nursing competency measured and aim of the instrument
		No. of items	
Miyata et al. (2022); Japan	Longitudinal observational; 61 novice public health nurse	Home visit experience, home-visit skills, significance of home-visit 5-point Likert scale 20 items	Developing trusting relationships with clients To understand the status of novice public health nurses' home-visit skills
Ogawa and Nakatani (2020); Japan	Development and psychometric evaluation; 467 public health nurses	Public Health Nurse Professional Confidence scale 6-point scale 17 items	Professional confidence To measure the degree of professional confidence and factors that are associated with professional competency among public health nurses
Reckinger et al. (2013); United States of America	Scale reduction and psychometric evaluation; 2269 public health nurses	Public Health Nursing Competency Instrument 4-point scale 81 items	Public Health Nursing Competency To measure nurses' competency in population-focused public health nursing practice
Shipman et al. (2008); United Kingdom	Mixed-methods evaluation; 374 district nurses	Confidence in palliative care competence 4-point scale 30 items	Palliative care To assess nurses' knowledge, confidence and perceived competency in palliative care
Tanabe et al. (2020); Fiji	Development and psychometric evaluation; 226 community health nurses (85 former/current district nurses, 33.2%)	Community Orientation Scale among Community Health Nurses 7-point scale 30 items	Community Orientation Scale To measure the attitude, value, and self-image towards community orientation among community health nurses
Veldhuizen et al. (2021); Netherlands	Delphi's study; Round 1: 15 nurses (7 district nurse) Round 2: 11 nurses (7 district nurse)	Nurse-Sensitive outcomes in district nursing care Unclear 26 items	Nursing competency To understand the internal quality of teams by measuring nurse-sensitive outcomes for district nursing care

Abbreviations: CFA, confirmatory factor analysis; EFA, exploratory factor analysis.

with clients (Miyata et al., 2022), professional confidence (Ogawa & Nakatani, 2020), community orientation attitude (Tanabe et al., 2020). These two themes suggest that nurses in HBC are expected to be competent in a broad range of nursing work and have a high degree of positive attributes when caring for patients and caregivers. The instruments were also designed based on different frameworks, theories, or sources of information as presented in Appendix 55. The majority of these conceptual structures were based on generalist or acute-based nursing practice. These findings support the notion of the lack of a standardized and acceptable framework to define and measure competencies for home-based nursing care.

3.5.3 | Comprehensive instruments

Among the 24 instruments, three were found to be the most comprehensive in encompassing the 10 HBC competencies: the Community Health Nurses Learning Needs (CHLN) scale (Akhtar-Danesh et al., 2010), the Nursing Older People Competence Evaluation Tool (NOP-CET) (Bing-Jonsson et al., 2015) and the Professional Nurse Self-Assessment Scale (ProffNurseSAS) (Finnbakk et al., 2015).

The CHLN instrument covered eight of the 10 home-based nursing care competencies. The aim of the instrument was to explore and identify community health nurses' learning needs measured on

Subscales	Reported psychometric properties
(i) Developing trusting relationship (ii) Using a nursing process (iii) During the visiting stage (iv) After the visiting stage	Self-designed and self-validated
(i) Technical practice (ii) Effortful learning (iii) Exploring the evidence (iv) Educators in workplace	<ul style="list-style-type: none"> • Pilot testing • Structural validity (EFA and CFA) • Internal consistency • Spearman correlation • Response rate
(i) Evaluation competencies (ii) Individual/Family/Community competencies (iii) Systems' Competencies (iv) Partnership/Collaboration competencies (v) Planning Competencies (vi) Assessment Competencies	Adopted from Cross et al. (2006) <ul style="list-style-type: none"> • Structural validity (EFA and CFA) • Internal consistency
(i) Pain control (ii) Control of other symptoms (iii) Emergencies and onward referral (iv) General assessment and support	Self-developed
(i) Initiative promotion (ii) Consensus Building (iii) Commitment (iv) Trusting Relationships	<ul style="list-style-type: none"> • Content validation • Face validity • Structural validity (EFA and CFA) • Internal consistency • Concurrent validity • Test-retest validity • Known group test • Response rate
(i) Perceived health (ii) Family health (iii) Functional health (iv) Death (v) Healthcare utilization (vi) Health knowledge and behaviour (vii) Psychosocial health (viii) Physiologic health	<ul style="list-style-type: none"> • Content validation

a 5-point scale across five domains and 63 items (Akhtar-Danesh et al., 2010). The domains measured include (1) promoting health, (2) building individual and community capacity, (3) building relationships, (4) facilitating access and equity and (5) demonstrating professional responsibility and accountability. Item generation and content validation of the instruments were performed among community health nursing experts and with reference to the Canadian Community Health Nursing standards of practice. However, the instrument does not specifically focus on HBC practice since it also covers competencies for community health practice nurses in the ward-based setting.

The NOP-CET was designed to measure community-based nurses' competency in providing care to older people in both nursing homes and HBC (Bing-Jonsson et al., 2015). The instrument covered seven of the 10 home-based nursing care competencies and was used in two of the studies included in this review (Bing-Jonsson et al., 2015, 2016). The instrument consists of three domains: (1) knowledge, (2) skills and (3) personal attributes. It comprises 65 items and is measured on a combination of a 4-point scale, 3-point scale, multiple choice questions and dichotomous score. Items were generated through a review and evaluation of existing instruments and Delphi's consensus approach among 42

Primary research studies											
Author (date)	1	2	3	4	5	6	7	8	9	10	Overall
Bladen and McAtee (2016)	1	1.5	1	1	0	0	1	1	1	1.5	9
Bing-Jonsson et al. (2016)	1	1.5	0.5	1	1	1	1	1	1	3	12
Delaney et al. (2011)	1	1.5	1	1	1	1	1	1	2	1.5	12
Dowding et al. (2018)	2	1	0.5	1	1	0	1	1	2	1.5	11
Hasson and Arnetz (2008)	1	1	1.5	1	1	1	1	1	2	1.5	12
Hodge (2020)	1	0.5	1	1	1	0	1	1	2	1.5	10
Hovland et al. (2018)	1	1	1	1	1	1	0	1	1	1.5	9.5
Miyata et al. (2022)	1.5	1.5	1.5	1	0	1	1	1	2	1.5	12
Shipman et al., 2008	1.5	1.5	1	1	0	0	1	1	2	2	11

Note: 1, Study design; 2, Sampling; 3, Response rate; 4, Types of data; 5, Content validity; 6, Internal structure; 7, Relationship with other variables; 8, Data analysis (appropriateness); 9, Data analysis (sophistication); 10, Outcome.

TABLE 5 Development or psychometric evaluation studies.

Author (date)	Quality of scale development	Content validity	Structural validity	Internal consistency	Reliability
Asahara et al. (2013)	(++)	(++)	(++)	(+)	NA
Akhtar-Danesh et al. (2010)	(++)	(++)	(++)	(++)	(+)
Bing-Jonsson et al. (2015)	(++)	(++)	(+)	(+)	NA
Finnbakk et al. (2015)	(+)	(+)	(+)	(+)	NA
Furuno et al. (2020)	(++)	(++)	(++)	(++)	(+)
Guo et al. (2008)	(+)	(++)	(?)	(+)	(+)
Haddad et al. (2007)	?	?	(+)	(+)	NA
Karikawa and Nakatani (2019)	(++)	(+)	(++)	(++)	(+)
Lauder et al. (2000)	?	?	(+)	(+)	NA
Lin et al. (2010)	(++)	(++)	(+)	(++)	(+)
Ogawa and Nakatani (2020)	(+)	?	(++)	(+)	NA
Reckinger et al. (2013)	(+)	?	(+)	(+)	NA
Tanabe et al. (2020)	(++)	(++)	(++)	(++)	(++)
Veldhuizen et al. (2021)	(++)	(++)	NA	NA	NA

Note: Very good (++), adequate (+), doubtful/unclear (?).

experts in geriatric nursing. The instrument was also pilot tested among 26 registered nurses with experience in community geriatric care. However, similar to the CHLN scale, this instrument does not specifically focus on HBC practice, and it also focuses only on care for older people.

The ProffNurseSAS was developed following the adoption and translation of the Nurse Clinical Competence Scale from the Swedish language to Norwegian and English language (Finnbakk et al., 2015). Seven new items were also added to supplement the instrument with advanced-level skills such as history-taking, physical assessment and decision-making. The validity and reliability of the instrument were then tested in long-term and home care settings in Norway. The instrument consisted of 51 items with six domains: (1) direct clinical practice, (2) professional development, (3) ethical decision-making, (4) clinical leadership, (5) cooperation and consultation and (6) critical thinking. The competencies were measured on a scale

ranging from 0 to 5 at 0.5 intervals. The content of ProffNurseSAS was assessed by 15 registered nurses from nursing homes and face validity was assessed by five independent experts. However, this instrument was initially designed for ward-based care nursing practice. Therefore, further validity and reliability testing among HBC nurses may be needed.

3.6 | Research question 2: Secondary analysis findings

Fourteen of the included studies were instrument development and psychometric testing design studies, which were used for the secondary analysis. The evidence of psychometric measures reported in the studies was examined and synthesized to provide an overview of the common approaches to developing a competency instrument.

TABLE 4 Assessment of methodological quality.

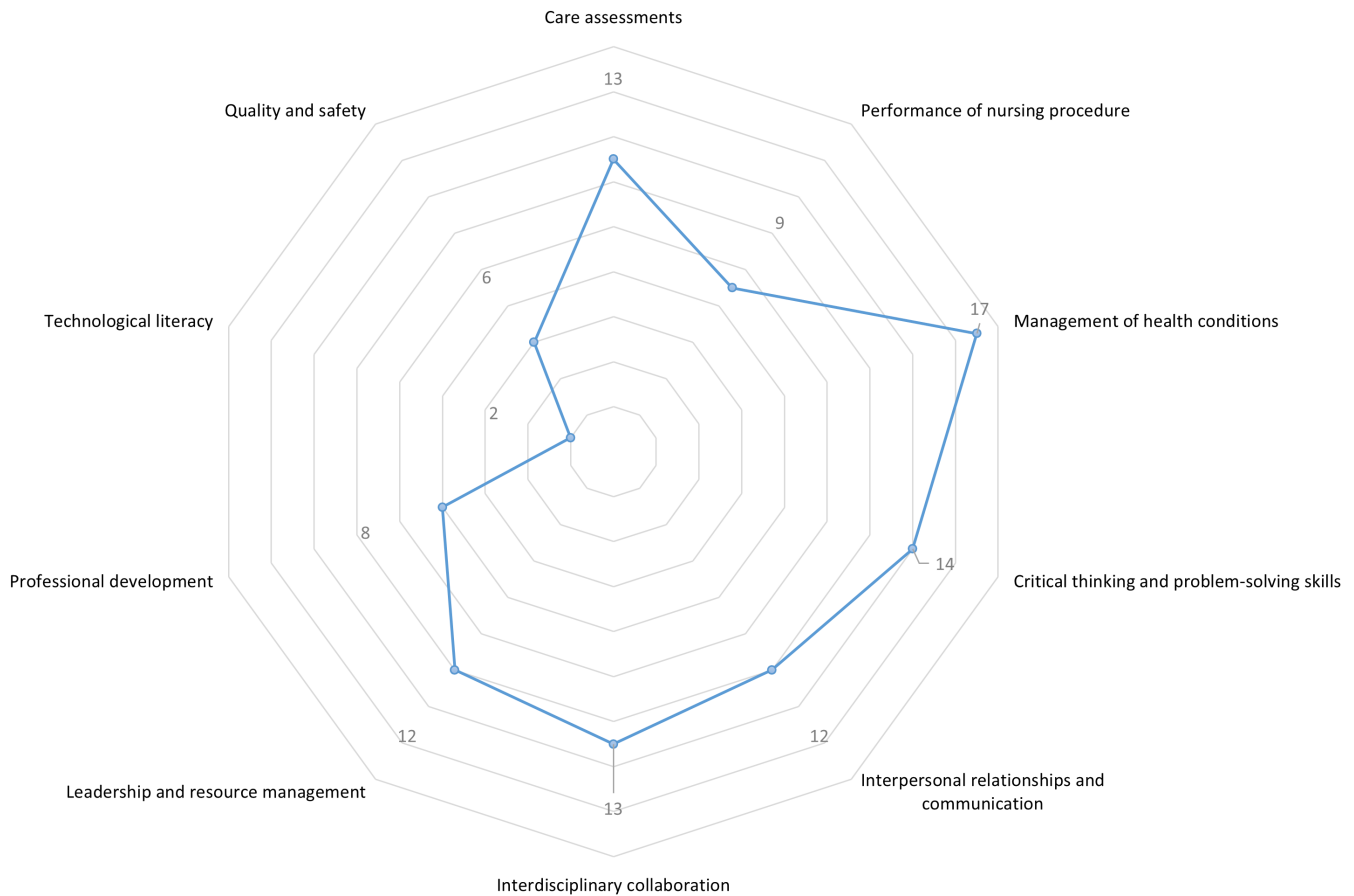


FIGURE 2 Illustration of competency mapping to home-based care competencies.

Table 2 provides an overview of the extracted psychometric properties of instruments from instrument development and psychometric testing design studies.

3.6.1 | Item generation

The majority of studies described the item generation and initial instrument development process well. The review found six approaches to item generation, and the majority of the studies adopted more than one approach ($n=9$). The most commonly adopted approach was a literature review of existing studies or instruments ($n=6$), followed by a qualitative study approach using interviews or surveys ($n=5$), reference to theoretical concepts or frameworks ($n=4$), refinement of earlier instruments ($n=4$), reference to official guidelines or handbooks ($n=3$) and discussion among team members or experts ($n=2$).

3.6.2 | Content and face validity

Content validity measures the degree to which the items of the instruments measure the intended construct. The content validity index of >0.78 or scale content validity index average of >0.90

are often used to determine good content validity or consensus among a panel of experts (Wynd et al., 2003). The conduct of content validity was sufficiently reported in most of the studies, except for three studies that adopted and tested existing instruments (Haddad et al., 2007; Lauder et al., 2000; Reckinger et al., 2013). One exception was Finnbakk et al. (2015), who described the process of translation and addition of items to fit the Swedish context. Therefore, a clear description of the content/face validity process for adopted instruments may be helpful to examine the relevance of the measured content to the respective practice setting and sample.

The reported number of experts involved ranged between 7 and 42, and a total of 184 were reported in the studies. The majority of experts were nurses ($n=9$), followed by researchers ($n=6$), community care healthcare professionals ($n=3$), nurse educators or teachers ($n=3$), postgraduate nursing students ($n=1$), community care leaders, practice or policy persons ($n=2$), a patients' organization representative ($n=1$), independent experts ($n=1$), a statistician ($n=1$) and nurse practitioners ($n=1$).

The reported number of items removed after the content/face validity ranged between 1 and 117, while the number of items added after the content/face validity ranged between 1 and 7. However content validity measurement was only reported in two studies using the content validity index ranging from 0.90 to 0.96 (Guo

et al., 2008; Lin et al., 2010), and face validity or pilot testing was only reported in six studies.

3.6.3 | Structural validity

Exploratory factor analysis (EFA), confirmatory factor analysis (CFA), convergent validity and discriminant validity analysis are often performed to determine the structural validity of instruments. Structural validity refers to the extent to which the instrument is measuring the intended model or theories and suggests the degree of generalisability of the instruments (Strauss & Smith, 2009). Factor analysis was used by the studies for data reduction and identifying the relevant domains or constructs of the instruments. All except one (Veldhuizen et al., 2021) of the 14 studies performed EFA. Multiple approaches of factor analysis were used, namely principal component analysis ($n=5$), maximum likelihood ($n=4$), principal axis factoring ($n=2$) and least squares method ($n=1$). In terms of rotating factors, promax or oblique rotation ($n=8$) was the most common approach used by the studies.

The studies also used various methods to select factors and to select items for the factors. The four most common criteria were the exclusion of items with factor loading <0.4 ($n=10$), extracting factors with an eigenvalue greater than 1.0 ($n=8$), scree plot ($n=7$) and interpretability or conceptual consistency of the items ($n=3$). The number of items removed during factor analysis ranged between 4 and 112 items, and overall instrument variance ranged between 64% and 72.94%. However, only six studies reported the use of CFA, and only four studies reported the adopted sampling ratio method namely 1:5 ($n=3$), 1:4.8 ($n=1$) and more than 100 participants.

3.6.4 | Internal consistency, reliability and other evaluation

Internal consistency was reported using Cronbach's alpha. Reported overall values of the instruments in six studies ranged from .62 to .99 with an average alpha of .89. The median reported response rate was 59% (22.8%–85.8%). Twelve studies also reported internal consistency of subscales ranging from .59 to .98. However, few studies reported the conduct of test-retest reliability ($n=4$), convergent or discriminant validity tests ($n=3$), duration of completion ($n=2$), missing data percentage ($n=3$) and degree of difficulty ($n=1$). Therefore, the relationship between the constructs or types of competencies under examination in these instruments was unclear.

4 | DISCUSSION

This review seeks to identify and synthesize the content and the psychometric properties of the existing instruments measuring HBC nurses' competencies. The literature search identified 24 instruments that have been employed to measure HBC nurses'

competencies. Although this study identified a substantial number of instruments, there is a lack of uniformity in the use of instruments to measure HBC nurses' competencies, for example the types of competencies measured and the evidence of the validity and reliability of the adopted or modified instruments. The inconsistency may be due to the lack of consensus regarding the expected competencies of HBC nurses. It was not until recently that the international home care guidelines by Narayan et al. (2017), and 10 home-based nursing care competencies outlined by Rusli et al. (2021) became available to offer some form of standardized expectations of nurses' competencies in HBC. None of the instruments encompassed all of the 10 competencies. The majority of instruments were used to measure a specific competency or a health condition.

4.1 | Types of competencies measured

The instruments included were found to measure a wide range of nursing competencies among HBC nurses. Competencies such as the management of health conditions, critical thinking and problem-solving skills would often require the nurse to have prior clinical experience or have undergone advanced training. These findings corroborate Andrade et al.'s (2017) study that highlighted the complexity and broad scope of nursing practice in HBC. Unlike in a hospital-based setting, HBC patients would be required to balance their everyday activities constantly, such as their daily work relating to their disease management (Hämel et al., 2022). Therefore, nurses in HBC play an important role in supporting patients to lead their life as normally as possible and to facilitate healthcare continuity after being discharged from the hospital (Stanhope & Lancaster, 2019). It is also important for nurses to involve patients and caregivers in the management of their own care plans (Jacobs, 2019). These roles would require the nurse to have good interpersonal relationships and communication competency. However, this review found that only a few instruments measured these competencies.

HBC nurses typically perform home visits independently and are often the primary link for patients to the healthcare system (Fjørtoft et al., 2021). Therefore, it is important for nurses to be confident in performing care assessments to identify early signs of deterioration in patient's health and to ensure the quality and safety of care at home. This review found that nurses are expected to perform different types of assessments, namely physical assessments, psychological assessments, family assessments, lifestyle assessments and community-related assessments (Furuno et al., 2020; Miyata et al., 2022). Apart from being competent in care assessments, nurses are also expected to adopt evidence-based practice and be able to identify an area of patient care that requires improvement (Hovland et al., 2018; Veldhuizen et al., 2021). These competencies are vital to ensure that nursing care in HBC continues to be relevant and safe. However, as reported earlier, these competencies were not measured as frequently as other competencies. Therefore, based on these findings there is a need for a comprehensive competency

instrument that encompasses all 10 competencies for home-based nursing practice. The newly developed instrument could then be used to explore and understand nurses' learning needs for HBC practice.

4.2 | Psychometric properties of instruments

The evidence of item generation and content validation was generally found to be satisfactory; six of the 14 instruments reported face validity or pilot testing. However, only two of the instruments reported content validity indices. Item generation and content validation are extremely important in instrument development because they determine what is the precise scope and aim of the intended measure (Almanasreh et al., 2019). Sinclair et al. (2020) suggested a combination of an inductive approach to establish a theoretical foundation and a deductive approach to pool and generate the initial items. These approaches were evident in the instrument development and psychometric testing design studies since the studies adopted multiple approaches to generate the initial items and validate the content. The experts involved in content validation were also found to be diverse. This is important because it could offer a mix of perspectives and at the same time offer an opinion to support or reject the adequacy of the instrument's conceptual content (Slocumb & Cole, 1991). However, only Bing-Jonsson et al. (2015) involved patient representatives during the content validation stage. Involving patients or public representatives could add value to the instrument by including not only healthcare professionals' expectations and experiences but also those who are receiving the care (Harmsen et al., 2022; Skovlund et al., 2020).

The evidence for structural validity of the instruments, such as EFA, was reported in all except one content validation design study. Only six studies performed CFA. CFA could be used to refine existing theoretical perspectives, support existing structures or verify the hypothesized factor structure of the instrument with a separate sample (Barnes et al., 2023; DiStefano & Hess, 2005). However, as discussed earlier, evidence regarding the scope of practice among HBC nurses is still unclear, which may pose a challenge for studies to examine or perform CFA effectually. Thus, greater attention is needed to determine HBC nurses' scope of practice to offer future instrument development studies a standard structure or dimension to test and explore the CFA of the instruments. In addition, CFA could determine the degree to which the measured variables represent the underlying construct of interest. The two key dimensions of reliability are internal consistency (homogeneity of measure) and stability (repeatability over time) (Thanasegaran, 2009). The internal consistency of several instruments was reported using Cronbach's alpha score. The general rule of thumb is that a Cronbach's alpha of .7 or more indicates acceptable reliability (Taber, 2017). There was only one study (Haddad et al., 2007) had an overall Cronbach alpha of <.70, suggesting that most instruments that reported an overall Cronbach

alpha had an acceptable internal consistency. However, it may be challenging to generalize the findings as each of the studies examined different groups of participants from different territories and practice standards. Furthermore, the aim of the instruments, domains and items were designed based on different conceptual structures. Therefore, additional reliability evaluation may be needed when adopting these instruments in different groups of participants or settings.

There was limited evidence to evaluate the stability of the instruments as few studies reported the conduct of test-retest reliability or intraclass correlation coefficient. Therefore, further testing may be needed to understand the reproducibility of the instruments and the ability of the instruments to provide consistent measures across time (Souza et al., 2017). The sensitivity and specificity measures of the instruments were underreported in the studies. This could be due to the lack of a reference standard on HBC nursing competencies for comparison (Trevethan, 2017). There were also few studies that reported the response rate and the duration of completing the instruments. This information is important as nurses were often characterized by low response rates and the information could highlight any potential sampling or nonresponsive bias (Fincham, 2008; VanGeest & Johnson, 2011). Nevertheless, the overall validity and reliability of the instruments were acceptable. However, future instrument development studies could underpin the instruments with relevant HBC competency guidelines or studies to ensure that both the conceptual and operational construct of the instrument is valid and reliable for use among HBC nurses.

4.3 | Implications

This review has consolidated the current suite of available instruments for the measurement of HBC nurses' competencies. There are three potential implications of this review. First, there is a need for an all-encompassing competency instrument to identify areas of learning and professional development needs among HBC nurses. This review provides a consolidation of existing instruments and items that could be adopted when developing the instrument for HBC nurses. Second, the review provided an overview of the common approaches of psychometric testing used by the included studies. This overview could guide and inform future nursing competency instrument development studies. Third, nursing leaders could adopt the included instruments to identify the competency needs of HBC nurses. The types of competencies, domains or conceptual frameworks of the included instruments could also guide nursing leaders to develop training programmes to advance nursing practice in HBC. However, as most of the instruments were not initially designed for HBC practice, the validity and reliability of the instruments would require further testing among HBC nurses. Furthermore, caution should be taken when inferring the findings from the included instruments and studies due to the differences in the deliveries and structures of HBC across different healthcare systems.

4.4 | Study limitations

This review has two limitations. First, we included only studies that were available in the selected databases and in the English language. Hence some relevant studies indexed in other databases or in other languages might have been missed. However, efforts were made to employ manual search approaches to expand the search beyond the five databases. Second, other relevant instruments might exist but were not included in this review because the terms used in them to refer to HBC nurses may differ or the studies may have been published outside of the year of publication limits. Nonetheless, this review has adopted a variety of generally accepted terms used to refer to HBC nurses and included studies that were identified in an earlier review. Despite these limitations, the authors believe that this review provides an updated and insightful finding on the competency instruments used to assess nurses' competency in HBC.

5 | CONCLUSION

This review aimed to identify the types of competencies measured by instruments used to assess HBC nurses' competencies and to explore the characteristics and psychometric properties of those instruments. Twenty-four instruments were identified; however, further validity and reliability testing of the identified instruments among HBC nurses may be needed. There is also a need for a comprehensive competency instrument that encompasses all the expected competencies of an HBC nurse. The range of items, domains and psychometric testing approaches from the included instruments and studies could guide the development and psychometric testing of competency instruments for home-based nursing practice.

AUTHOR CONTRIBUTIONS

Conception and study design and data analysis and interpretation: Khairul Dzakin Bin Rusli, Sok Ying Liaw, Wei Ling Chua. *Acquisition of data and data extraction:* Khairul Dzakin Bin Rusli, Wei Ling Chua, Wei How Darryl Ang. *Drafting of original draft:* Khairul Dzakin Bin Rusli. *Drafting and critical review of final draft:* Ying Lau, Wei How Darryl Ang, Seng Giap Marcus Ang, Wei Ling Chua, Sok Ying Liaw, Khairul Dzakin Bin Rusli.

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CONFLICT OF INTEREST STATEMENT

No conflict of interest has been declared by the authors.

DATA AVAILABILITY STATEMENT

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

ETHICS STATEMENT

No ethical approval is required.

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