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Interventions to improve patient health education competence among nursing personnel: A scoping review protocol

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Interventions to improve patient health education competence among nursing personnel: A scoping review protocol

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Keywords: Patient education; Health education; Nurse; Competence; Nursing Education

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ABSTRACT

Introduction Patient health education has gradually become an indispensable and important part of nursing work. However, nursing personnel's performance in this domain remains below satisfactory levels. The absence of patient health education competence constitutes a significant impediment to the effective implementation of such education by nursing personnel. Effective training in patient health education competence can enable nursing personnel to recognize the importance of patient health education, improve their attitudes toward patient health education, and gain comprehensive knowledge and skills, thus improving patients' health outcomes and quality of life, while also enhancing the overall quality of nursing. However, the related research is fragmented and there is a lack of systematic review of related literature. The scoping review aims to provide a comprehensive overview of existing interventions related to cultivating the patient health education competence of nursing personnel.

Methods and analysis We will use the Joanna Briggs Institute (JBI) methodology to guide the scoping review proposed by this protocol. Between April 1, 2024, and April 15, 2024, a systematic search of electronic bibliographic databases, including Cochrane Library, PubMed, EMBASE, CINAHL, MEDLINE, and ERIC, will be conducted. Two reviewers will independently screen and conduct data extraction. Any discrepancies that arise will be resolved through consultation with a third reviewer. The data will be analyzed and presented in tables, flow diagrams, and text.

Ethics and dissemination Ethical approval is not applicable for this study. We will share the findings from the study at national and/or international conferences and in a peer-reviewed journal in the fields of nursing education and/or patient education.

Registration number This scoping review had been registered on Open Science Framework (http://osf.io/dapq7).

Strengths and limitations of this study

- The Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) checklist will be used to guide the reporting of the scoping review.
- The review proposed by this protocol will follow the Joanna Briggs Institute (JBI) methodology for scoping reviews.
- The scoping review may fail to include relevant literature published outside of the searched databases.

1. INTRODUCTION

With the transformation of the disease-centered care model to the patient-centered holistic care model, patient health education has gradually become an indispensable and important part of nursing work.[1 2] Patient health education is a planned educational process designed to impact patient behavior and result in changes in knowledge, attitudes, and skills that are necessary for maintaining or improving health.[3] A series of studies have demonstrated that effective patient health education can enhance patients' comprehension of their own health status and measures for disease management. It has

been shown to improve their health literacy, alleviate anxiety, and foster increased compliance and satisfaction with nursing personnel. Thus, it improves patients' health outcomes and quality of life, while also enhancing the overall quality of nursing.[2 4-8] Moreover, patient health education emerges as a cost-effective measure, offering potential savings in healthcare costs and alleviating the overall economic burden on society.[9] A specific study demonstrated noteworthy cost-effectiveness, indicating that for each USD 1 invested in patient health education services, there was a remarkable saving of USD 6 in healthcare costs.[2]

While nursing personnel acknowledge the pivotal role of patient health education in their clinical practice, their performance in this domain remains below satisfactory levels.[9-11] Numerous studies consistently indicate that the absence of patient health education competence (PHEC) constitutes a significant impediment to the effective implementation of such education by nursing personnel.[2 9-11] Effective training in PHEC can enable nursing personnel to recognize the importance of patient health education, improve their attitudes toward patient health education, and gain comprehensive knowledge and skills, thus promoting the development of PHEC.[12-14] Hence, it is imperative to enhance the PHEC of nurses and nursing students through training, as this is crucial for improving their skills and fostering the development of patient health education.

Although studies have documented interventions aimed at enhancing the PHEC of nursing personnel, a comprehensive review of these interventions has not been

conducted at present.[13-18] It is unknown what types of interventions exist, what content and pedagogical methods are covered, and how interventions may improve nursing personnel's PHEC. Through systematic combing and analysis of the existing literature, we can develop a comprehensive framework that provides insights into the characteristics, strategies, and suitability of various interventions. This aids in identifying gaps and informing the development of future interventions to develop high-quality and effective evidence-based related training. Consequently, there is a pressing need for systematic analysis and integration of existing interventions to maximize their effectiveness, thereby providing a basis for constructing more effective interventions in the future. Furthermore, the existing literature is fragmented. Therefore, we propose the adoption of a scoping review to address this knowledge gap and gather dispersed information. The scoping review aims to provide a comprehensive overview of existing interventions related to cultivating the PHEC of nursing personnel. It intends to provide up-to-date, evidence-based recommendations related to the training of nursing personnel's PHEC for future researchers, intervention designers, and educational policy makers.

Review question

(1) What are the characteristics (e.g., year, country, study design) of the studies on interventions aimed at improving the PHEC of nursing personnel?

(2) What intervention strategies (e.g., teaching modalities, teaching objectives, teaching content, teaching methods, teaching duration and frequency, teaching media,

and teaching faculty) are being used for the interventions aimed at improving the PHEC of nursing personnel?

(3) What are the outcomes measured and what assessment methods (e.g., quizzes, interviews) are used to measure outcomes?

2. METHODS

We will use the Joanna Briggs Institute (JBI) methodology to guide the scoping review proposed by this protocol.[19] The scoping review will be reported following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) checklist.[20] This scoping review had been registered on Open Science Framework (http://osf.io/dapq7).

Search strategy

Between April 1, 2024, and April 15, 2024, a systematic search of electronic bibliographic databases, including Cochrane Library, PubMed, EMBASE, CINAHL, MEDLINE, and ERIC, will be conducted. The search time limit will span from the creation date of the respective libraries to the search date. Furthermore, references of included studies will be thoroughly searched to identify any additional eligible studies. The literature search will employ a combination of subject terms and free words to ensure comprehensive coverage. The search terms related to nursing, patient education, competence, and training will be used. The search strategy tailored for PubMed is presented in Table 1, while the corresponding search strategies for other databases can be found in Supplementary file 1. A three-step search strategy will be employed: (1)

Initially, the researchers will conduct a limited search in PubMed and Embase to analyze the MeSH terms and keywords found in the titles and abstracts. (2) Subsequently, a comprehensive search will be carried out across all target databases, using the search terms identified in the first step. (3) Finally, the researchers will explore the reference lists of all identified articles to identify additional relevant studies.

Table 1. Search strategy for PubMed

1	#1	(Nurses[MeSH Terms] OR Students, Nursing[MeSH Terms]) OR (nurs*[tiab] OR nursing student*[tiab])
2	#2	(((Health Education[MeSH Terms] OR Patient Education as Topic[MeSH Terms]) OR (health education[tiab] OR education, health[tiab] OR patient education[tiab] OR education, patient*[tiab] OR education of patient*[tiab] OR patient teaching[tiab] OR patient training[tiab])) OR (hospital education[tiab] OR clinical education[tiab])) OR (((((("educate individual"[tiab:~2]) OR ("inform individual"[tiab:~2])) OR ("teach individual"[tiab:~2])) OR ("train individual"[tiab:~2])) OR ("learn individual"[tiab:~2])) OR (((((("educate consumer"[tiab:~2]) OR ("inform consumer"[tiab:~2])) OR ("teach consumer"[tiab:~2])) OR ("train consumer"[tiab:~2])) OR ("learn consumer"[tiab:~2]))) OR ((("educate patient"[tiab:~2]) OR ("inform patient"[tiab:~2])) OR ((("teach patient"[tiab:~2]) OR ("train patient"[tiab:~2])) OR ("learn patient"[tiab:~2]))))
3	#3	((professional competence[MeSH Terms]) OR (competenc*[tiab] OR capabilit*[tiab] OR capacit*[tiab] OR abilit*[tiab])) OR ((knowledge[tiab]) AND (skill*[tiab]))

4	#4	(education, nursing[MeSH Terms] OR nursing education research[MeSH Terms] OR Education, Nursing, Baccalaureate[MeSH Terms] OR Education, Nursing, Continuing[MeSH Terms] OR curriculum[MeSH Terms]) OR (educat*[tiab] OR teach*[tiab] OR learn*[tiab] OR course*[tiab] OR class*[tiab] OR train*[tiab] OR lecture*[tiab] OR intervene*[tiab] OR workshop[tiab])
5	#5	#1 AND #2 AND #3 AND #4

Inclusion and exclusion criteria

The PCC (Population, Concept, Context) model will guide the development of inclusion and exclusion criteria.

Population: Any nursing personnel (e.g., clinical nurses, nursing supervisors, nurse managers, and nursing students) in any clinical setting (e.g., hospital, community) are eligible. The literature will also be considered if the intervention is aimed at health professionals but includes nursing personnel, with at least half of the participants being nursing personnel.

Concept: Any intervention designed to improve nursing personnel's PHEC. Any intervention content, intervention method, and intervention duration will be included as concepts.

Context: Interventions provided in any setting by professional or non-professional providers will be considered.

Literature type: This review will consider different research methods (e.g., quantitative, qualitative, and mixed methods study designs) for inclusion. Protocols,

conference abstracts, and reviews will be excluded. If full-text versions of the studies are not available online, we will contact the authors of these articles, and if we are unable to obtain valid information after contacting the authors, we will exclude these articles. No limitation is on publication time and language.

Study selection

We will manage study selection through Endnote. The selection will consist of two steps, conducted by two independent reviewers who will adhere to pre-specified eligibility criteria. In the first step of the screening process, titles and abstracts will be reviewed by two independent researchers according to the established eligibility criteria. Any discrepancies that arise will be resolved through consultation with a third reviewer. The second step will entail a full-text review of the studies that pass the first step, conducted by the same independent reviewers. In the event of a disagreement, a third researcher will be consulted to assist with the literature screening. The results of the review will be reported using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram.[21] Because this scoping review aims to provide a mapping of the available evidence rather than to offer a comprehensive, clinically meaningful answer to a specific question, we will not conduct risk of bias assessments or quality assessments for the included studies. The screening processes of this study are shown in Figure 1.

Data extraction

Two reviewers will conduct data extraction from the included studies independently, using the data extraction table. The data extraction table is shown in Supplementary file 2. In case of any discrepancies or disagreements, a third reviewer will be consulted to resolve them through discussion. The data to be extracted will include: (1) characteristics of all included studies (i.e., author, year of publication, country, type of study/design); (2) participants (i.e., target population, sample size, study setting); (3) study aims; (4) intervention strategies (i.e., teaching modalities, teaching objectives, teaching content, teaching methods, teaching duration and frequency, teaching media, and teaching faculty); (5) outcomes measured; (6) outcome assessment methods and measurement instruments; (7) key findings and conclusions.

Synthesis and presentation of the results

In accordance with the study objectives of this scoping review, we aim to offer a narrative description of the data, supplemented by the utilization of tables and flow diagrams to enhance the visual representation of our findings.

Patient and public involvement

Neither patients nor the public will be involved in this study.

Ethics and dissemination

Ethical approval is not applicable for this study. We will share the findings from the study at national and/or international conferences and in a peer-reviewed journal in the fields of nursing education and/or patient education.

3. DISCUSSION

In this scoping review, the available evidence and innovative practices on the topic of the interventions to improve nursing personnel's PHEC will be identified and mapped. The findings from this study will contribute to the development of more effective intervention programs aimed at enhancing nursing personnel's PHEC. By synthesizing the evidence, research gaps in the existing literature will be recognized. Researchers can conduct specific and high-quality studies to bridge the gaps to provide more evidence to develop related interventions.

Author contributions All authors have read and agreed to the published version of the manuscript.

Conceptualization: GW, QC, ST;

Methodology: QC, SW, GW;

Data curation: QC, SW, KL, YQ;

Writing—original draft preparation: SW, GW, LK;

Writing—review and editing: QC, ST, YQ;

Supervision: QC and ST.

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Competing interests None declared.

Patient consent Not required.

Data sharing statement No additional data available.

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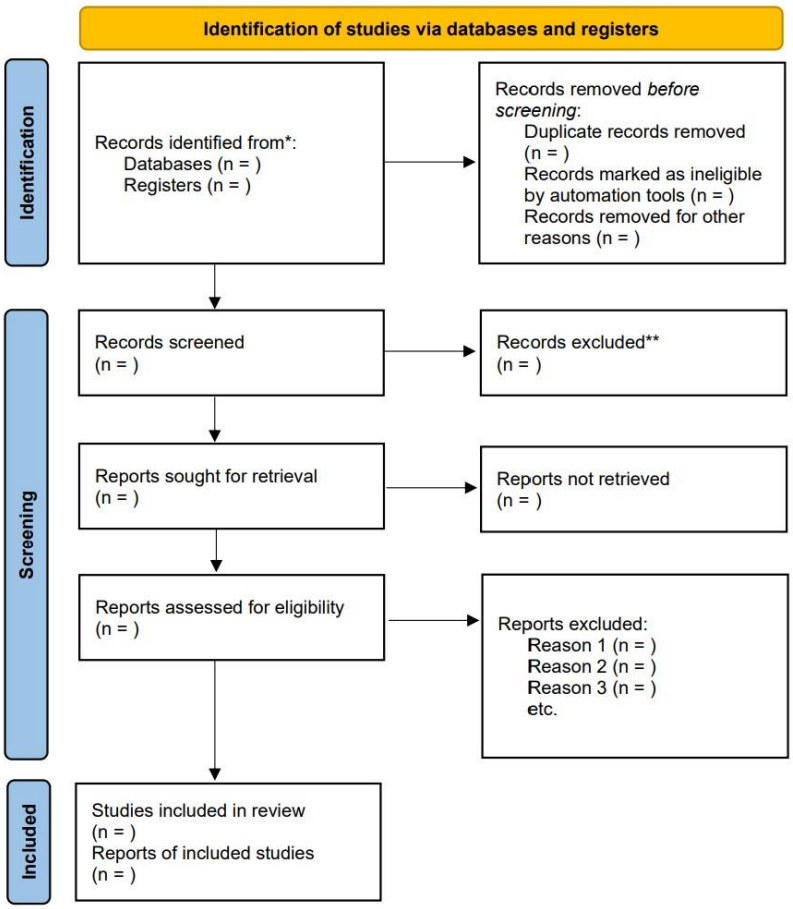

*Consider, if feasible to do so, reporting the number of records identified from each database or register searched (rather than the total number across all databases/registers).

**If automation tools were used, indicate how many records were excluded by a human and how many were excluded by automation tools.

Figure 1. PRISMA flow diagram for this systematic review

Table S1. Search strategy for Cochrane Library

1	#1	MeSH descriptor: [Nurses] this term only OR MeSH descriptor: [Students, Nursing] this term only OR (nurs* OR nursing student*):ti,ab,kw
2	#2	MeSH descriptor: [Health Education] this term only OR MeSH descriptor: [Patient Education as Topic] this term only OR (health education OR education, health OR patient education OR education, patient* OR education of patient* OR patient teaching OR patient training OR hospital education OR clinical education):ti,ab,kw OR ((educat* OR inform* OR teach* OR train* OR learn*):ti,ab,kw NEAR/2 (health OR patient* OR consumer* OR individual*):ti,ab,kw)
3	#3	MeSH descriptor: [Professional Competence] this term only OR (competenc* OR capabilit* OR capacit* OR abilit*):ti,ab,kw OR ((knowledge):ti,ab,kw NEAR/2 (skill*):ti,ab,kw)
4	#4	MeSH descriptor: [Education, Nursing] this term only OR MeSH descriptor: [Nursing Education Research] this term only OR MeSH descriptor: [Education, Nursing, Baccalaureate] this term only OR MeSH descriptor: [Education, Nursing, Continuing] this term only OR MeSH descriptor: [Curriculum] this term only OR (educat* OR teach* OR learn* OR course* OR class* OR train* OR lecture* OR intervene* OR workshop):ti,ab,kw
5	#5	#1 AND #2 AND #3 AND #4

Table S2. Search strategy for Embase

1	#1	'nurse'/mj OR 'nursing student'/mj OR nurs*:ab,ti OR 'nursing student*':ab,ti
2	#2	('health education'/mj OR 'patient education'/mj OR 'health education':ab,ti OR 'education, health':ab,ti OR 'patient education':ab,ti OR 'education, patient*':ab,ti OR 'education of patient*':ab,ti OR ' patient teaching ':ab,ti OR 'patient training':ab,ti OR 'hospital education':ab,ti OR 'clinical education':ab,ti) OR ((educat* OR inform* OR teach* OR train* OR learn*) NEXT/1 (health OR patient* OR consumer* OR individual*))
3	#3	'professional competence'/mj OR competenc*:ab,ti OR 'competence'/mj OR 'competency'/mj OR 'competencies'/mj OR capabilit*:ab,ti OR 'capacitance'/mj OR 'capacity'/mj OR abilit*:ab,ti OR (knowledge:ab,ti AND skill*:ab,ti)
4	#4	'nursing education'/mj OR educat*:ab,ti OR teach*:ab,ti OR 'curriculum'/mj OR learn*:ab,ti OR course*:ab,ti OR class*:ab,ti OR train*:ab,ti OR lecture*:ab,ti
5	#5	#1 AND #2 AND #3 AND #4

Table S3. Search strategy for Medline

1	#1	The search strategy of #1 is the same as that in Embase.
2	#2	The search strategy of #2 is the same as that in Embase.
3	#3	The search strategy of #3 is the same as that in Embase.
4	#4	The search strategy of #4 is the same as that in Embase.
5	#5	The search strategy of #5 is the same as that in Embase.

Table S4. Search strategy for CINAHL

1	#1	(MM "Nurses") OR (MM "Students, Nursing") OR AB (nurs* OR Nursing student*)
2	#2	(MM "Health Education") OR (MM " Patient Education") OR TI (health education OR education, health OR patient education OR education, patient* OR education of patient* OR patient teaching OR patient training OR hospital education OR clinical education) OR (AB (educat* OR inform* OR teach* OR train* OR learn*) N1 AB (health OR patient* OR consumer* OR individual*))
3	#3	(MM "Professional Competence") OR AB (competenc* OR capabilit* OR capacit* OR abilit*) OR AB (Knowledge N1 skill*)
4	#4	(MM "Education, Nursing") OR (MM "Curriculum") OR AB (educat* OR teach* OR learn* OR course* OR class* OR train* OR lecture* OR intervene* OR workshop)
5	#5	#1 AND #2 AND #3 AND #4

Table S5. Search strategy for ERIC

1	#1	(DE "Nurses") OR (DE "Students, Nursing") OR AB (nurs* OR Nursing student*)
2	#2	(DE "Health Education") OR (DE "Patient Education") OR AB (health education OR education, health OR patient education OR education, patient* OR education of patient* OR patient teaching OR patient training OR hospital education OR clinical education) OR (AB (educat* OR inform* OR teach* OR train* OR learn*) N1 AB (health OR patient* OR consumer* OR individual*))
3	#3	(DE "Professional Competence") OR AB (competenc* OR capabilit* OR capacit* OR abilit*) OR AB (Knowledge N1 skill*)
4	#4	(DE "Education, Nursing") OR (DE "Curriculum") OR AB (educat* OR teach* OR learn* OR course* OR class* OR train* OR lecture* OR intervene* OR workshop)
5	#5	#1 AND #2 AND #3 AND #4

Table S1. The characteristics of included studies

Author(s)/year developed	Country	Type of study	Participants			Study aims	Key findings and conclusions
			Target population	Sample size	Setting		

Table S2. The extra characteristics of included studies

Author(s)/year developed	intervention strategies							outcomes measured	outcome assessment methods/measurement instruments
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Keywords: Patient education; Health education; Nurse; Professional competence; Nursing Education

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ABSTRACT

Introduction Patient health education has gradually become an indispensable and important part of nursing work. However, nursing personnel's performance in this domain remains below satisfactory levels. The absence of patient health education competence constitutes a significant impediment to the effective implementation of such education by nursing personnel. Effective training in patient health education competence can enable nursing personnel to recognize the importance of patient health education, improve their attitudes toward patient health education, and gain comprehensive knowledge and skills, thus improving patients' health outcomes and quality of life, while also enhancing the overall quality of nursing. However, the related research is fragmented and there is a lack of systematic review of related literature. The scoping review aims to provide a comprehensive overview of existing interventions related to cultivating the patient health education competence of nursing personnel.

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Strengths and limitations of this study

- The Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) checklist will be used to guide the reporting of the scoping review.
- The review proposed by this protocol will follow the Joanna Briggs Institute (JBI) methodology for scoping reviews.
- The scoping review will incorporate the gray literature source, the Google search engine, to ensure a comprehensive and systematic literature search.

1. INTRODUCTION

With the transformation of the disease-centered care model to the patient-centered holistic care model, patient health education has gradually become an indispensable and important part of nursing work.[1 2] Patient health education is a planned educational process designed to impact patient behavior and result in changes in knowledge, attitudes, and skills that are necessary for maintaining or improving health.[3] A series of studies have demonstrated that effective patient health education can enhance patients' comprehension of their own health status and measures for disease management. It has been shown to improve their health literacy, alleviate anxiety, and foster increased compliance and satisfaction with nursing personnel. Thus, it improves patients' health outcomes and quality of life, while also enhancing the overall quality of nursing.[2 4-8] Moreover, patient health education emerges as a cost-effective measure, offering potential savings in healthcare costs and alleviating the overall economic burden on society.[9] A specific study demonstrated noteworthy cost-effectiveness, indicating that for each USD 1 invested in patient health education services, there was a remarkable saving of USD 6 in healthcare costs.[2]

While nursing personnel acknowledge the pivotal role of patient health education in their clinical practice, their performance in this domain remains below satisfactory levels.[9-11] Numerous studies consistently indicate that the absence of patient health education competence (PHEC) constitutes a significant impediment to the effective implementation of such education by nursing personnel.[2 9-11] Effective training in PHEC can enable nursing personnel to recognize the importance of patient health

education, improve their attitudes toward patient health education, and gain comprehensive knowledge and skills, thus promoting the development of PHEC.[12-14] Hence, it is imperative to enhance the PHEC of nurses and nursing students through training, as this is crucial for improving their skills and fostering the development of patient health education.

Although studies have documented interventions aimed at enhancing the PHEC of nursing personnel, a comprehensive review of these interventions has not been conducted at present.[13-18] It is unknown what types of interventions exist, what content and pedagogical methods are covered, and how interventions may improve nursing personnel's PHEC. Through systematic combing and analysis of the existing literature, we can develop a comprehensive framework that provides insights into the characteristics, strategies, and suitability of various interventions. This aids in identifying gaps and informing the development of future interventions to develop high-quality and effective evidence-based related training. Consequently, there is a pressing need for systematic analysis and integration of existing interventions to maximize their effectiveness, thereby providing a basis for constructing more effective interventions in the future. Furthermore, the existing literature is fragmented. Therefore, we propose the adoption of a scoping review to address this knowledge gap and gather dispersed information. The scoping review aims to provide a comprehensive overview of existing interventions related to cultivating the PHEC of nursing personnel. It intends to provide up-to-date, evidence-based recommendations related to the training of

nursing personnel's PHEC for future researchers, intervention designers, and educational policy makers.

Main review question

What intervention strategies (e.g., teaching modalities, teaching objectives, teaching content, teaching methods, teaching duration and frequency, teaching media, and teaching faculty) are being used for the interventions aimed at improving the PHEC of nursing personnel?

Secondary review question

(1) What are the characteristics (e.g., year, country, study design) of the studies on interventions aimed at improving the PHEC of nursing personnel?

(2) What are the outcomes measured and what assessment methods (e.g., quizzes, interviews) are used to measure outcomes?

2. METHODS

We will use the Joanna Briggs Institute (JBI) methodology to guide the scoping review proposed by this protocol.[19] The scoping review will be reported following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) checklist.[20] This scoping review had been registered on Open Science Framework (http://osf.io/dapq7).

Inclusion and exclusion criteria

The PCC (Population, Concept, Context) model will guide the development of inclusion and exclusion criteria.

Population: Any nursing personnel (e.g., clinical nurses, nursing supervisors, nurse managers, and nursing students) in any clinical setting (e.g., hospital, community) are eligible. The literature will also be considered if the intervention is aimed at health professionals but includes nursing personnel, with at least half of the participants being nursing personnel.

Concept: Any intervention designed to improve nursing personnel's PHEC. Any intervention content, intervention method, and intervention duration will be included as concepts.

Context: Interventions provided in any setting by professional or non-professional providers will be considered.

Literature type: This review will consider different research methods (e.g., quantitative, qualitative, and mixed methods study designs) for inclusion. Protocols, conference abstracts, and reviews will be excluded. If full-text versions of the studies are not available online, we will contact the authors of these articles, and if we are unable to obtain valid information after contacting the authors, we will exclude these articles. No limitation is on publication time and language.

Search strategy

Between April 1, 2024, and April 15, 2024, a systematic search of electronic bibliographic databases, including Cochrane Library, PubMed, EMBASE, CINAHL, MEDLINE, and ERIC, will be conducted. The search time limit will span from the creation date of the respective libraries to the search date. Furthermore, references of

included studies will be thoroughly searched to identify any additional eligible studies. In addition, the gray literature source Google search engine will also be searched. The literature search will employ a combination of subject terms and free words to ensure comprehensive coverage. The search terms related to nursing, patient education, competence, and training will be used. The search strategy tailored for PubMed is presented in Table 1, while the corresponding search strategies for other databases can be found in Supplementary file 1. A three-step search strategy will be employed: (1) Initially, the researchers will conduct a limited search in PubMed and Embase to analyze the MeSH terms and keywords found in the titles and abstracts. (2) Subsequently, a comprehensive search will be carried out across all target databases, using the search terms identified in the first step. (3) Finally, the researchers will explore the reference lists of all identified articles to identify additional relevant studies.

Table 1. Search strategy for PubMed

1	#1	(Nurses[MeSH Terms] OR Students, Nursing[MeSH Terms]) OR (nurs*[tiab] OR nursing student*[tiab])
2	#2	(((Health Education[MeSH Terms] OR Patient Education as Topic[MeSH Terms]) OR (health education[tiab] OR education, health[tiab] OR patient education[tiab] OR education, patient*[tiab] OR education of patient*[tiab] OR patient teaching[tiab] OR patient training[tiab])) OR (hospital education[tiab] OR clinical education[tiab])) OR (((((("educate individual"[tiab:~2]) OR ("inform individual"[tiab:~2])) OR ("teach individual"[tiab:~2])) OR

		("train individual"[tiab:~2])) OR ("learn individual"[tiab:~2])) OR (((((("educate consumer"[tiab:~2]) OR ("inform consumer"[tiab:~2])) OR ("teach consumer"[tiab:~2])) OR ("train consumer"[tiab:~2])) OR ("learn consumer"[tiab:~2]))) OR ((("educate patient"[tiab:~2]) OR ("inform patient"[tiab:~2])) OR ((("teach patient"[tiab:~2]) OR ("train patient"[tiab:~2])) OR ("learn patient"[tiab:~2]))))
3	#3	((professional competence[MeSH Terms]) OR (competenc*[tiab] OR capabilit*[tiab] OR capacit*[tiab] OR abilit*[tiab])) OR ((knowledge[tiab]) AND (skill*[tiab]))
4	#4	(education, nursing[MeSH Terms] OR nursing education research[MeSH Terms] OR Education, Nursing, Baccalaureate[MeSH Terms] OR Education, Nursing, Continuing[MeSH Terms] OR curriculum[MeSH Terms]) OR (educat*[tiab] OR teach*[tiab] OR learn*[tiab] OR course*[tiab] OR class*[tiab] OR train*[tiab] OR lecture*[tiab] OR intervene*[tiab] OR workshop[tiab])
5	#5	#1 AND #2 AND #3 AND #4

Study selection

We will manage study selection through Covidence. The selection will consist of two steps, conducted by two independent reviewers who will adhere to pre-specified eligibility criteria. In the first step of the screening process, titles and abstracts will be reviewed by two independent researchers according to the established eligibility criteria. Any discrepancies that arise will be resolved through consultation with a third reviewer. The second step will entail a full-text review of the studies that pass the first step, conducted by the same independent reviewers. In the event of a disagreement, a third

researcher will be consulted to assist with the literature screening. The results of the review will be reported using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram.[21] Because this scoping review aims to provide a mapping of the available evidence rather than to offer a comprehensive, clinically meaningful answer to a specific question, we will not conduct risk of bias assessments or quality assessments for the included studies. The screening processes of this study are shown in Figure 1.

Data extraction

Two reviewers will conduct data extraction from the included studies independently, using the data extraction table. The data extraction table is shown in Supplementary file 2. In case of any discrepancies or disagreements, a third reviewer will be consulted to resolve them through discussion. The data to be extracted will include: (1) characteristics of all included studies (i.e., author, year of publication, country, type of study/design); (2) participants (i.e., target population, sample size, study setting); (3) study aims; (4) intervention strategies (i.e., teaching modalities, teaching objectives, teaching content, teaching methods, teaching duration and frequency, teaching media, and teaching faculty); (5) outcomes measured; (6) outcome assessment methods and measurement instruments; (7) key findings and conclusions.

Synthesis and presentation of the results

In accordance with the study objectives of this scoping review, we aim to offer a narrative description of the data, supplemented by the utilization of tables and flow diagrams to enhance the visual representation of our findings.

Patient and public involvement

Neither patients nor the public will be involved in this study.

Ethics and dissemination

Ethical approval is not applicable for this study. We will share the findings from the study at national and/or international conferences and in a peer-reviewed journal in the fields of nursing education and/or patient education.

Author contributions All authors have read and agreed to the published version of the manuscript.

Conceptualization: GW, QC, ST;

Methodology: QC, SW, GW;

Data curation: QC, SW, KL, YQ;

Writing—original draft preparation: SW, GW, LK;

Writing—review and editing: QC, ST, YQ;

Supervision: QC and ST.

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Competing interests None declared.

Patient consent Not required.

Data sharing statement No additional data available.

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Supplementary file 2. Data extraction table

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Supplementary file 3. PRISMA-ScR-checklist

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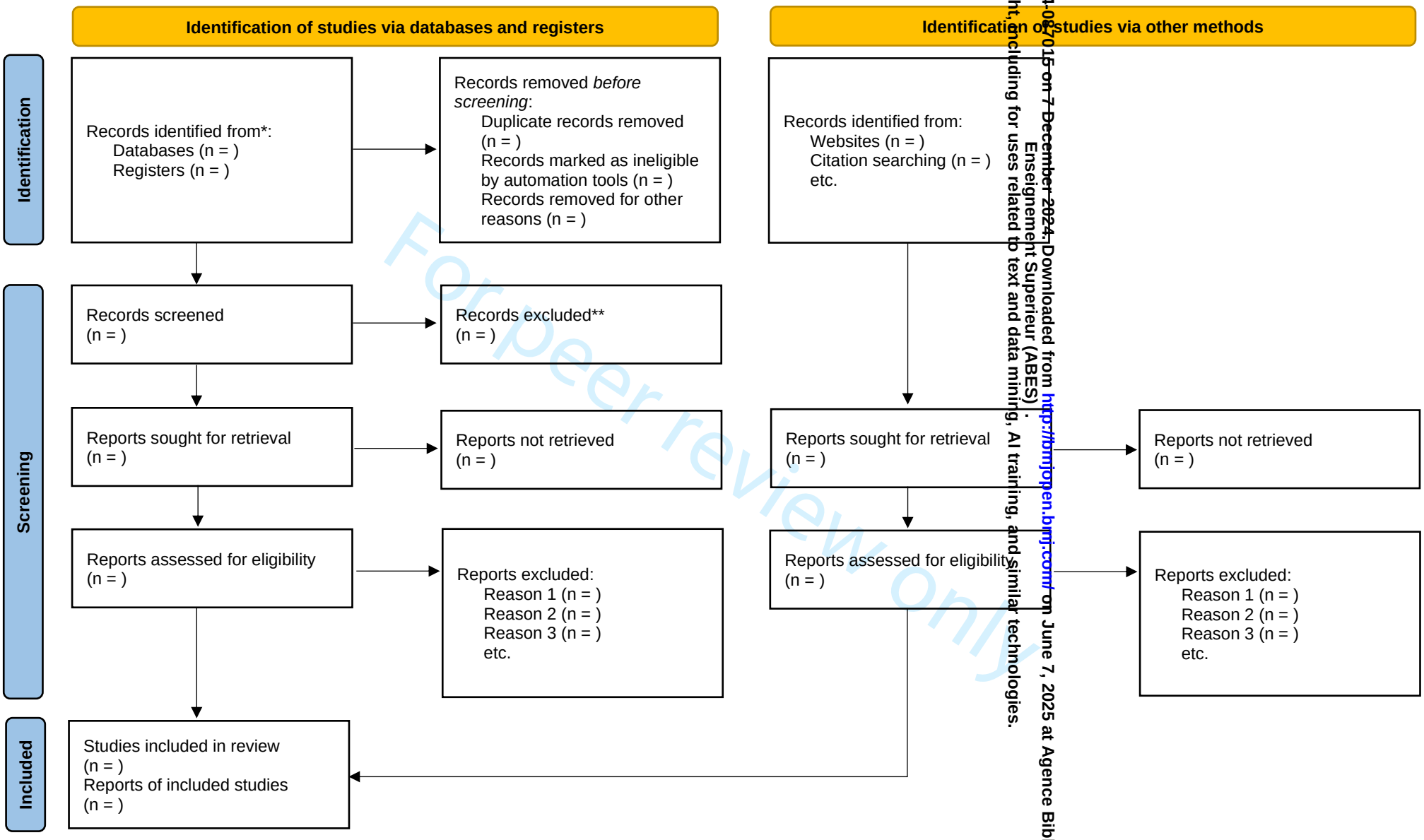

*Consider, if feasible to do so, reporting the number of records identified from each database or register searched (rather than the total number across all databases/registers).
**If automation tools were used, indicate how many records were excluded by a human and how many were excluded by automation tools.

Figure 1. PRISMA flow diagram for this systematic review

Table S1. Search strategy for Cochrane Library

1	#1	MeSH descriptor: [Nurses] this term only OR MeSH descriptor: [Students, Nursing] this term only OR (nurs* OR nursing student*):ti,ab,kw
2	#2	MeSH descriptor: [Health Education] this term only OR MeSH descriptor: [Patient Education as Topic] this term only OR (health education OR education, health OR patient education OR education, patient* OR education of patient* OR patient teaching OR patient training OR hospital education OR clinical education):ti,ab,kw OR ((educat* OR inform* OR teach* OR train* OR learn*):ti,ab,kw NEAR/2 (health OR patient* OR consumer* OR individual*):ti,ab,kw)
3	#3	MeSH descriptor: [Professional Competence] this term only OR (competenc* OR capabilit* OR capacit* OR abilit*):ti,ab,kw OR ((knowledge):ti,ab,kw NEAR/2 (skill*):ti,ab,kw)
4	#4	MeSH descriptor: [Education, Nursing] this term only OR MeSH descriptor: [Nursing Education Research] this term only OR MeSH descriptor: [Education, Nursing, Baccalaureate] this term only OR MeSH descriptor: [Education, Nursing, Continuing] this term only OR MeSH descriptor: [Curriculum] this term only OR (educat* OR teach* OR learn* OR course* OR class* OR train* OR lecture* OR intervene* OR workshop):ti,ab,kw
5	#5	#1 AND #2 AND #3 AND #4

Table S2. Search strategy for Embase

1	#1	'nurse'/mj OR 'nursing student'/mj OR nurs*:ab,ti OR 'nursing student*':ab,ti
2	#2	('health education'/mj OR 'patient education'/mj OR 'health education':ab,ti OR 'education, health':ab,ti OR 'patient education':ab,ti OR 'education, patient*':ab,ti OR 'education of patient*':ab,ti OR ' patient teaching ':ab,ti OR 'patient training':ab,ti OR 'hospital education':ab,ti OR 'clinical education':ab,ti) OR ((educat* OR inform* OR teach* OR train* OR learn*) NEXT/1 (health OR patient* OR consumer* OR individual*))
3	#3	'professional competence'/mj OR competenc*:ab,ti OR 'competence'/mj OR 'competency'/mj OR 'competencies'/mj OR capabilit*:ab,ti OR 'capacitance'/mj OR 'capacity'/mj OR abilit*:ab,ti OR (knowledge:ab,ti AND skill*:ab,ti)
4	#4	'nursing education'/mj OR educat*:ab,ti OR teach*:ab,ti OR 'curriculum'/mj OR learn*:ab,ti OR course*:ab,ti OR class*:ab,ti OR train*:ab,ti OR lecture*:ab,ti
5	#5	#1 AND #2 AND #3 AND #4

Table S3. Search strategy for Medline

1	#1	The search strategy of #1 is the same as that in Embase.
2	#2	The search strategy of #2 is the same as that in Embase.
3	#3	The search strategy of #3 is the same as that in Embase.
4	#4	The search strategy of #4 is the same as that in Embase.
5	#5	The search strategy of #5 is the same as that in Embase.

Table S4. Search strategy for CINAHL

1	#1	(MM "Nurses") OR (MM "Students, Nursing") OR AB (nurs* OR Nursing student*)
2	#2	(MM "Health Education") OR (MM " Patient Education") OR TI (health education OR education, health OR patient education OR education, patient* OR education of patient* OR patient teaching OR patient training OR hospital education OR clinical education) OR (AB (educat* OR inform* OR teach* OR train* OR learn*) N1 AB (health OR patient* OR consumer* OR individual*))
3	#3	(MM "Professional Competence") OR AB (competenc* OR capabilit* OR capacit* OR abilit*) OR AB (Knowledge N1 skill*)
4	#4	(MM "Education, Nursing") OR (MM "Curriculum") OR AB (educat* OR teach* OR learn* OR course* OR class* OR train* OR lecture* OR intervene* OR workshop)
5	#5	#1 AND #2 AND #3 AND #4

Table S5. Search strategy for ERIC

1	#1	(DE "Nurses") OR (DE "Students, Nursing") OR AB (nurs* OR Nursing student*)
2	#2	(DE "Health Education") OR (DE "Patient Education") OR AB (health education OR education, health OR patient education OR education, patient* OR education of patient* OR patient teaching OR patient training OR hospital education OR clinical education) OR (AB (educat* OR inform* OR teach* OR train* OR learn*) N1 AB (health OR patient* OR consumer* OR individual*))
3	#3	(DE "Professional Competence") OR AB (competenc* OR capabilit* OR capacit* OR abilit*) OR AB (Knowledge N1 skill*)
4	#4	(DE "Education, Nursing") OR (DE "Curriculum") OR AB (educat* OR teach* OR learn* OR course* OR class* OR train* OR lecture* OR intervene* OR workshop)
5	#5	#1 AND #2 AND #3 AND #4

Table S1. The characteristics of included studies

Author(s)/year developed	Country	Type of study	Participants			Study aims	Key findings and conclusions
			Target population	Sample size	Setting		

Table S2. The extra characteristics of included studies

Author(s)/year developed	intervention strategies							outcomes measured	outcome assessment methods/measurement instruments
	teaching modalities	teaching objectives	teaching content	teaching methods	teaching duration and frequency	teaching media	teaching faculty		

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Interventions to improve patient health education competence among nursing personnel: A scoping review protocol

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Keywords: Patient education; Health education; Nurse; Professional competence; Nursing Education

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ABSTRACT

Introduction Patient health education has gradually become an indispensable and important part of nursing work. However, nursing personnel's performance in this domain remains below satisfactory levels. The absence of patient health education competence constitutes a significant impediment to the effective implementation of such education by nursing personnel. Effective training in patient health education competence can enable nursing personnel to recognize the importance of patient health education, improve their attitudes toward patient health education, and gain comprehensive knowledge and skills, thus improving patients' health outcomes and quality of life, while also enhancing the overall quality of nursing. However, the related research is fragmented and there is a lack of systematic review of related literature. The scoping review aims to provide a comprehensive overview of existing interventions related to cultivating the patient health education competence of nursing personnel.

Methods and analysis We will use the Joanna Briggs Institute (JBI) methodology to guide the scoping review proposed by this protocol. Between April 1, 2024, and April

15, 2024, a systematic search of electronic bibliographic databases, including Cochrane Library, PubMed, EMBASE, CINAHL, MEDLINE, and ERIC, will be conducted. In addition, the gray literature source Google search engine will also be searched. Two reviewers will independently screen and conduct data extraction. Any discrepancies that arise will be resolved through consultation with a third reviewer. The data will be analyzed and presented in tables, flow diagrams, and text.

Ethics and dissemination Ethical approval is not applicable for this study. We will share the findings from the study at national and/or international conferences and in a peer-reviewed journal in the fields of nursing education and/or patient education.

Registration number This scoping review had been registered on Open Science Framework (http://osf.io/dapq7).

Strengths and limitations of this study

- The Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) checklist will be used to guide the reporting of the scoping review.
- The review proposed by this protocol will follow the Joanna Briggs Institute (JBI) methodology for scoping reviews.
- The scoping review will incorporate the gray literature source, the Google search engine, to ensure a comprehensive and systematic literature search.

1. INTRODUCTION

With the transformation of the disease-centered care model to the patient-centered holistic care model, patient health education has gradually become an indispensable and important part of nursing work.[1 2] Patient health education is a planned educational process designed to impact patient behavior and result in changes in knowledge, attitudes, and skills that are necessary for maintaining or improving health.[3] A series of studies have demonstrated that effective patient health education can enhance patients' comprehension of their own health status and measures for disease management. It has been shown to improve their health literacy, alleviate anxiety, and foster increased compliance and satisfaction with nursing personnel. Thus, it improves patients' health outcomes and quality of life, while also enhancing the overall quality of nursing.[2 4-8] Moreover, patient health education emerges as a cost-effective measure, offering potential savings in healthcare costs and alleviating the overall economic burden on society.[9] A specific study demonstrated noteworthy cost-effectiveness, indicating that for each USD 1 invested in patient health education services, there was a remarkable saving of USD 6 in healthcare costs.[2]

While nursing personnel acknowledge the pivotal role of patient health education in their clinical practice, their performance in this domain remains below satisfactory levels.[9-11] Numerous studies consistently indicate that the absence of patient health education competence (PHEC) constitutes a significant impediment to the effective implementation of such education by nursing personnel.[2 9-11] Effective training in PHEC can enable nursing personnel to recognize the importance of patient health

education, improve their attitudes toward patient health education, and gain comprehensive knowledge and skills, thus promoting the development of PHEC.[12-14] Hence, it is imperative to enhance the PHEC of nurses and nursing students through training, as this is crucial for improving their skills and fostering the development of patient health education.

Although studies have documented interventions aimed at enhancing the PHEC of nursing personnel, a comprehensive review of these interventions has not been conducted at present.[13-18] It is unknown what types of interventions exist, what content and pedagogical methods are covered, and how interventions may improve nursing personnel's PHEC. Through systematic combing and analysis of the existing literature, we can develop a comprehensive framework that provides insights into the characteristics, strategies, and suitability of various interventions. This aids in identifying gaps and informing the development of future interventions to develop high-quality and effective evidence-based related training. Consequently, there is a pressing need for systematic analysis and integration of existing interventions to maximize their effectiveness, thereby providing a basis for constructing more effective interventions in the future. Furthermore, the existing literature is fragmented. Therefore, we propose the adoption of a scoping review to address this knowledge gap and gather dispersed information. The scoping review aims to provide a comprehensive overview of existing interventions related to cultivating the PHEC of nursing personnel. It intends to provide up-to-date, evidence-based recommendations related to the training of

nursing personnel's PHEC for future researchers, intervention designers, and educational policy makers.

1.1 Main review question

What intervention strategies (e.g., teaching modalities, teaching objectives, teaching content, teaching methods, teaching duration and frequency, teaching media, and teaching faculty) are being used for the interventions aimed at improving the PHEC of nursing personnel?

1.2 Secondary review question

(1) What are the characteristics (e.g., year, country, study design) of the studies on interventions aimed at improving the PHEC of nursing personnel?

(2) What are the outcomes measured and what assessment methods (e.g., quizzes, interviews) are used to measure outcomes?

2. METHODS

We will use the Joanna Briggs Institute (JBI) methodology to guide the scoping review proposed by this protocol.[19] The scoping review will be reported following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) checklist.[20] This scoping review had been registered on Open Science Framework (http://osf.io/dapq7).

2.1 Inclusion and exclusion criteria

The PCC (Population, Concept, Context) model will guide the development of inclusion and exclusion criteria. The eligibility criteria are listed in Table 1.

Table 1. Eligibility criteria

	Inclusion Criteria	Exclusion Criteria
Population	Any nursing personnel (e.g., clinical nurses, nursing supervisors, nurse managers, and nursing students) in any clinical setting (e.g., hospital, community) are eligible.	Other health professionals (e.g., doctors, therapists) will be excluded.
Concept	Any intervention designed to improve nursing personnel's PHEC will be eligible.	-
Context	Interventions provided in any setting (e.g., hospitals, communities, universities, colleges) will be eligible.	-

This review will consider different research methods (e.g., quantitative, qualitative, and mixed methods study designs) for inclusion. Protocols, conference abstracts, and reviews will be excluded. If full-text versions of the studies are not available online, we will contact the authors of these articles, and if we are unable to obtain valid information after contacting the authors, we will exclude these articles. No limitation is on publication time and language.

2.2 Search strategy

Between April 1, 2024, and April 15, 2024, a systematic search of electronic bibliographic databases, including Cochrane Library, PubMed, EMBASE, CINAHL, MEDLINE, and ERIC, will be conducted. The search time limit will span from the creation date of the respective libraries to the search date. Furthermore, references of included studies will be thoroughly searched to identify any additional eligible studies. In addition, the gray literature source Google search engine will also be searched. The literature search will employ a combination of subject terms and free words to ensure comprehensive coverage. The search terms related to nursing, patient education, competence, and training will be used. The search strategy tailored for PubMed is presented in Table 2, while the corresponding search strategies for other databases can be found in Supplementary file 1. A three-step search strategy will be employed: (1) Initially, the researchers will conduct a limited search in PubMed and Embase to analyze the MeSH terms and keywords found in the titles and abstracts. (2) Subsequently, a comprehensive search will be carried out across all target databases, using the search terms identified in the first step. (3) Finally, the researchers will explore the reference lists of all identified articles to identify additional relevant studies.

Table 2. Search strategy for PubMed

1	#1	(Nurses[MeSH Terms] OR Students, Nursing[MeSH Terms]) OR (nurs*[tiab] OR nursing student*[tiab])
2	#2	(((Health Education[MeSH Terms] OR Patient Education as Topic[MeSH Terms]) OR (health education[tiab] OR education, health[tiab] OR patient education[tiab] OR education, patient*[tiab]

		OR education of patient*[tiab] OR patient teaching[tiab] OR patient training[tiab])) OR (hospital education[tiab] OR clinical education[tiab])) OR (((((((“educate individual”[tiab:~2]) OR (“inform individual”[tiab:~2])) OR (“teach individual”[tiab:~2])) OR (“train individual”[tiab:~2])) OR (“learn individual”[tiab:~2])) OR (((((“educate consumer”[tiab:~2]) OR (“inform consumer”[tiab:~2])) OR (“teach consumer”[tiab:~2])) OR (“train consumer”[tiab:~2])) OR (“learn consumer”[tiab:~2]))) OR (((“educate patient”[tiab:~2]) OR (“inform patient”[tiab:~2])) OR (((“teach patient”[tiab:~2]) OR (“train patient”[tiab:~2])) OR (“learn patient”[tiab:~2]))))
3	#3	((professional competence[MeSH Terms]) OR (competenc*[tiab] OR capabilit*[tiab] OR capacit*[tiab] OR abilit*[tiab])) OR ((knowledge[tiab]) AND (skill*[tiab]))
4	#4	(education, nursing[MeSH Terms] OR nursing education research[MeSH Terms] OR Education, Nursing, Baccalaureate[MeSH Terms] OR Education, Nursing, Continuing[MeSH Terms] OR curriculum[MeSH Terms]) OR (educat*[tiab] OR teach*[tiab] OR learn*[tiab] OR course*[tiab] OR class*[tiab] OR train*[tiab] OR lecture*[tiab] OR intervene*[tiab] OR workshop[tiab])
5	#5	#1 AND #2 AND #3 AND #4

2.3 Study selection

We will manage study selection through Covidence. The selection will consist of two steps, conducted by two independent reviewers who will adhere to pre-specified eligibility criteria. In the first step of the screening process, titles and abstracts will be

reviewed by two independent researchers according to the established eligibility criteria. Any discrepancies that arise will be resolved through consultation with a third reviewer. The second step will entail a full-text review of the studies that pass the first step, conducted by the same independent reviewers. In the event of a disagreement, a third researcher will be consulted to assist with the literature screening. The results of the review will be reported using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram.[21] Because this scoping review aims to provide a mapping of the available evidence rather than to offer a comprehensive, clinically meaningful answer to a specific question, we will not conduct risk of bias assessments or quality assessments for the included studies. The screening processes of this study are shown in Figure 1.

2.4 Data extraction

Two reviewers will conduct data extraction from the included studies independently, using the data extraction table. The data extraction table is shown in Supplementary file 2. In case of any discrepancies or disagreements, a third reviewer will be consulted to resolve them through discussion. The data to be extracted will include: (1) characteristics of all included studies (i.e., author, year of publication, country, type of study/design); (2) participants (i.e., target population, sample size, study setting); (3) study aims; (4) intervention strategies (i.e., teaching modalities, teaching objectives, teaching content, teaching methods, teaching duration and

frequency, teaching media, and teaching faculty); (5) outcomes measured; (6) outcome assessment methods and measurement instruments; (7) key findings and conclusions.

2.5 Synthesis and presentation of the results

In accordance with the study objectives of this scoping review, we aim to offer a narrative description of the data, supplemented by the utilization of tables and flow diagrams to enhance the visual representation of our findings.

Patient and public involvement statement

None.

Ethics and dissemination

Ethical approval is not required for this study as it relies solely on published literature and does not involve private personal information or sensitive data. We will share the findings from the study at national and/or international conferences and in a peer-reviewed journal in the fields of nursing education and/or patient education.

Author contributions All authors have read and agreed to the published version of the manuscript.

Conceptualization: GW, QC, ST;

Methodology: QC, SW, GW;

Data curation: QC, SW, KL, YQ;

Writing—original draft preparation: SW, GW, LK;

Writing—review and editing: QC, ST, YQ;

Supervision: QC and ST. Shuyi Wang is the guarantor.

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Competing interests None declared.

Patient consent Not required.

Data sharing statement No additional data available.

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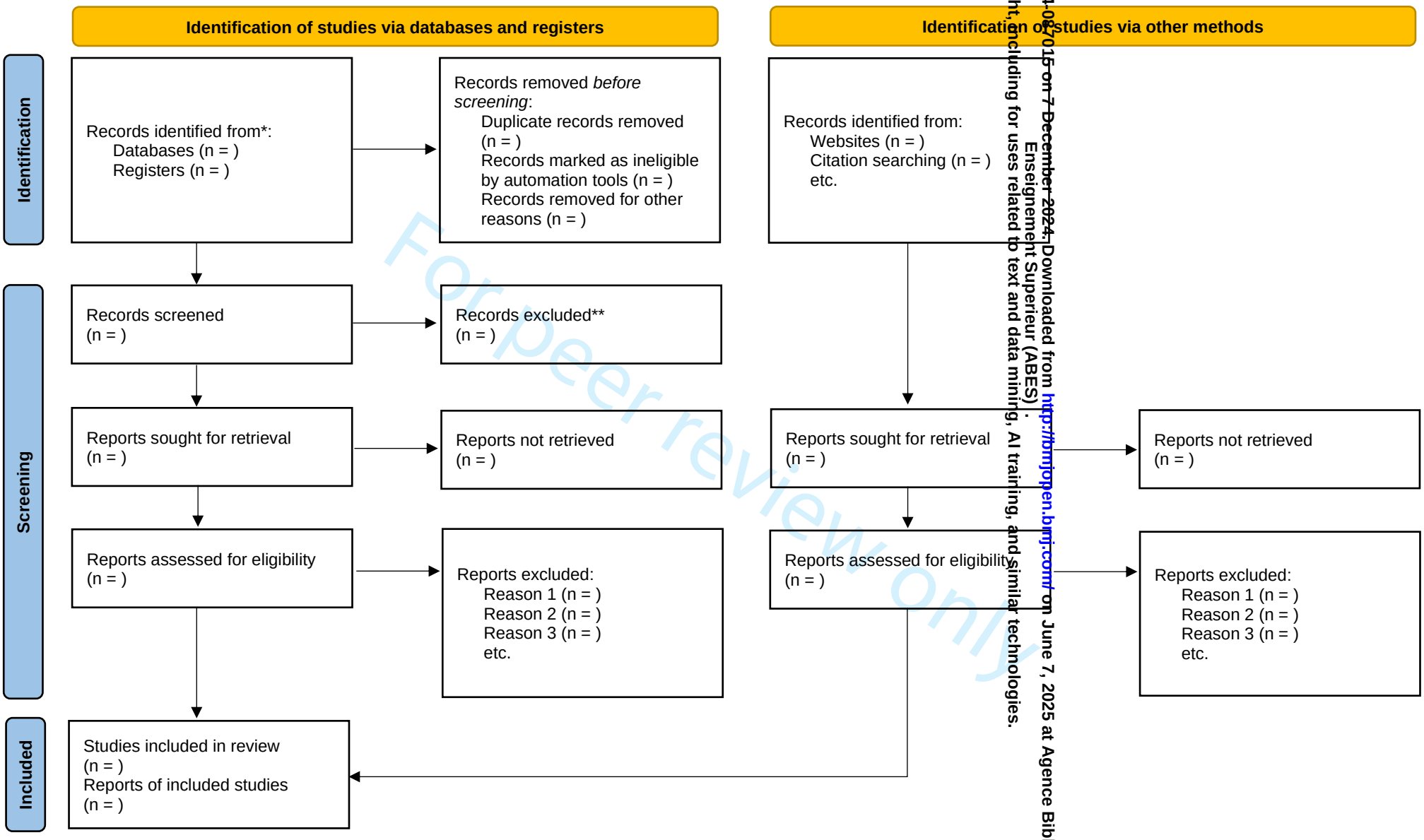

*Consider, if feasible to do so, reporting the number of records identified from each database or register searched (rather than the total number across all databases/registers).
**If automation tools were used, indicate how many records were excluded by a human and how many were excluded by automation tools.

Figure 1. PRISMA flow diagram for this systematic review

Table S1. Search strategy for Cochrane Library

1	#1	MeSH descriptor: [Nurses] this term only OR MeSH descriptor: [Students, Nursing] this term only OR (nurs* OR nursing student*):ti,ab,kw
2	#2	MeSH descriptor: [Health Education] this term only OR MeSH descriptor: [Patient Education as Topic] this term only OR (health education OR education, health OR patient education OR education, patient* OR education of patient* OR patient teaching OR patient training OR hospital education OR clinical education):ti,ab,kw OR ((educat* OR inform* OR teach* OR train* OR learn*):ti,ab,kw NEAR/2 (health OR patient* OR consumer* OR individual*):ti,ab,kw)
3	#3	MeSH descriptor: [Professional Competence] this term only OR (competenc* OR capabilit* OR capacit* OR abilit*):ti,ab,kw OR ((knowledge):ti,ab,kw NEAR/2 (skill*):ti,ab,kw)
4	#4	MeSH descriptor: [Education, Nursing] this term only OR MeSH descriptor: [Nursing Education Research] this term only OR MeSH descriptor: [Education, Nursing, Baccalaureate] this term only OR MeSH descriptor: [Education, Nursing, Continuing] this term only OR MeSH descriptor: [Curriculum] this term only OR (educat* OR teach* OR learn* OR course* OR class* OR train* OR lecture* OR intervene* OR workshop):ti,ab,kw
5	#5	#1 AND #2 AND #3 AND #4

Table S2. Search strategy for Embase

1	#1	'nurse'/mj OR 'nursing student'/mj OR nurs*:ab,ti OR 'nursing student*':ab,ti
2	#2	('health education'/mj OR 'patient education'/mj OR 'health education':ab,ti OR 'education, health':ab,ti OR 'patient education':ab,ti OR 'education, patient*':ab,ti OR 'education of patient*':ab,ti OR ' patient teaching ':ab,ti OR 'patient training':ab,ti OR 'hospital education':ab,ti OR 'clinical education':ab,ti) OR ((educat* OR inform* OR teach* OR train* OR learn*) NEXT/1 (health OR patient* OR consumer* OR individual*))
3	#3	'professional competence'/mj OR competenc*:ab,ti OR 'competence'/mj OR 'competency'/mj OR 'competencies'/mj OR capabilit*:ab,ti OR 'capacitance'/mj OR 'capacity'/mj OR abilit*:ab,ti OR (knowledge:ab,ti AND skill*:ab,ti)
4	#4	'nursing education'/mj OR educat*:ab,ti OR teach*:ab,ti OR 'curriculum'/mj OR learn*:ab,ti OR course*:ab,ti OR class*:ab,ti OR train*:ab,ti OR lecture*:ab,ti
5	#5	#1 AND #2 AND #3 AND #4

Table S3. Search strategy for Medline

1	#1	The search strategy of #1 is the same as that in Embase.
2	#2	The search strategy of #2 is the same as that in Embase.
3	#3	The search strategy of #3 is the same as that in Embase.
4	#4	The search strategy of #4 is the same as that in Embase.
5	#5	The search strategy of #5 is the same as that in Embase.

Table S4. Search strategy for CINAHL

1	#1	(MM "Nurses") OR (MM "Students, Nursing") OR AB (nurs* OR Nursing student*)
2	#2	(MM "Health Education") OR (MM " Patient Education") OR TI (health education OR education, health OR patient education OR education, patient* OR education of patient* OR patient teaching OR patient training OR hospital education OR clinical education) OR (AB (educat* OR inform* OR teach* OR train* OR learn*) N1 AB (health OR patient* OR consumer* OR individual*))
3	#3	(MM "Professional Competence") OR AB (competenc* OR capabilit* OR capacit* OR abilit*) OR AB (Knowledge N1 skill*)
4	#4	(MM "Education, Nursing") OR (MM "Curriculum") OR AB (educat* OR teach* OR learn* OR course* OR class* OR train* OR lecture* OR intervene* OR workshop)
5	#5	#1 AND #2 AND #3 AND #4

Table S5. Search strategy for ERIC

1	#1	(DE "Nurses") OR (DE "Students, Nursing") OR AB (nurs* OR Nursing student*)
2	#2	(DE "Health Education") OR (DE "Patient Education") OR AB (health education OR education, health OR patient education OR education, patient* OR education of patient* OR patient teaching OR patient training OR hospital education OR clinical education) OR (AB (educat* OR inform* OR teach* OR train* OR learn*) N1 AB (health OR patient* OR consumer* OR individual*))
3	#3	(DE "Professional Competence") OR AB (competenc* OR capabilit* OR capacit* OR abilit*) OR AB (Knowledge N1 skill*)
4	#4	(DE "Education, Nursing") OR (DE "Curriculum") OR AB (educat* OR teach* OR learn* OR course* OR class* OR train* OR lecture* OR intervene* OR workshop)
5	#5	#1 AND #2 AND #3 AND #4

Table S1. The characteristics of included studies

Author(s)/year developed	Country	Type of study	Participants			Study aims	Key findings and conclusions
			Target population	Sample size	Setting		

Table S2. The extra characteristics of included studies

Author(s)/year developed	intervention strategies							outcomes measured	outcome assessment methods/measurement instruments
	teaching modalities	teaching objectives	teaching content	teaching methods	teaching duration and frequency	teaching media	teaching faculty		