

Development of entrustable professional activities for ICU novice nurses education: A modified Delphi study

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Research Article

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Abstract

Background

The Entrustable Professional Activity (EPA) framework has gained prominence in competency-based healthcare education across disciplines and countries. Unlike traditional time-based training approaches, EPAs effectively bridge the gap between theoretical competency frameworks and real-world clinical practice. However, despite the increasing adoption of EPAs in nursing education, limited research exists on developing EPA frameworks specifically tailored to novice Intensive Care Unit (ICU) nurses. Given the high-acuity nature of ICU settings, where rapid decision-making and advanced technical skills are critical, a context-specific EPA tool is urgently needed to support structured training, objective assessment, and safe clinical delegation for novice nurses.

Objectives

To develop and evaluate a core competency-based EPAs framework for Chinese ICU novice nurses.

Methods

The four-stage approach was adopted for the EPAs development, including: (1) forming a research team, (2) drafting an initial EPAs framework, (3) identifying and reviewing EPAs framework, and (4) conducting EPAs consensus assessment.

Results

A framework containing twenty EPAs was developed, including: 1) gather a medical history, 2) perform nursing processes, 3) perform basic nursing operation techniques, 4) obtain informed consent, 5) write nursing documents, 6) perform health education and publicity, 7) report cases, 8) Manage transitions of care for critically ill patients within and between health care settings, 9) take over the care of critically ill patients, 10) identify and rescue critically ill patients, 11) Properly handling unexpected incidents in the ICU, 12) recognize and manage pharmacology needs of critically ill patients, 13) monitor the vital signs of critically ill patients, 14) perform specialized nursing operation techniques, 15) use the critical medical equipment correctly, 16) perform clinical nursing teaching, 17) conduct nursing research, 18) participate in team collaborative care, 19) Participate in hospital infection control, 20) participate in health quality improvement initiative.

Conclusion

The developed EPAs framework in this study is a reliable tool to assess the core competencies of Chinese ICU novice nurses in clinical practice and assist with their training program design.

1. Introduction

With the increasing complexity of healthcare systems and the growing demand for high-quality and safe patient care, the development and assessment of nurses' clinical competence have become central issues in nursing education and workforce development ^[1, 2]. Intensive Care Units, characterized by critically ill patients, rapid decision-making, advanced technologies, and multidisciplinary collaboration, place particularly high demands on nurses' clinical competence and professional judgment ^[3].

Novice ICU nurses often experience significant challenges during the transition from education to independent clinical practice ^[4]. Although competency frameworks provide structured descriptions of required knowledge, skills, and professional attributes, competencies are often abstract and difficult to operationalize in daily clinical work. The gap between theoretical competency frameworks and real-world clinical responsibilities may hinder accurate assessment and appropriate task allocation, thereby affecting patient safety and professional development ^[5].

Entrustable Professional Activities, first introduced by Ten Cate, offer a practical solution to bridge this gap ^[6]. EPAs define units of professional practice that can be observed, measured, and entrusted to trainees once sufficient competence has been demonstrated. By linking competencies to specific clinical tasks and supervision levels, EPAs provide a structured approach to competency-based education and workplace assessment ^[7]. While EPAs have been increasingly adopted in medical education and have gradually expanded into advanced nursing practice and novice nurse training, there remains limited research on developing EPA frameworks tailored to ICU novice nurses.

Therefore, this study aims to develop and validate a set of core Entrustable Professional Activities for novice ICU nurses, grounded in core competency theory and role theory, to support structured assessment, safe delegation, and progressive professional development in the ICU setting.

2. Background

Competency-based education emphasizes outcome-oriented training and focuses on ensuring that healthcare professionals demonstrate essential knowledge, skills, and attitudes required for safe practice ^[8]. However, competencies are inherently multidimensional and abstract. Their assessment often relies on fragmented evaluations or time-based clinical exposure rather than observable workplace performance ^[9].

This limitation has been widely recognized in nursing education reform. Particularly in high-acuity environments such as ICUs, merely describing competencies does not adequately guide supervisors in determining when a novice nurse can safely perform complex clinical tasks independently.

Entrustable Professional Activities were developed to operationalize competencies into concrete clinical responsibilities. EPAs integrate multiple competencies and translate them into observable units of work. Entrustment decisions are made based on supervision levels, ranging from observation only to independent practice and supervision of others ^[10].

Recent studies have expanded EPA application into nursing education: Zhou et al.^[11] developed nine core EPAs for Advanced Practice Nurse education in Singapore, aligning them with competency domains and supervision levels. Zhang et al.^[12] constructed a 12-item EPA framework for novice nurses using a modified Delphi method, focusing on general hospital settings. Yang et al.^[13] developed 12 core competency-based EPAs for Master of Nursing Specialist graduates in China to support advanced clinical preparation. These studies demonstrate the feasibility and educational value of EPAs in nursing contexts. However, most existing frameworks target either advanced practice nurses or general novice nurses. The ICU context presents unique characteristics, including rapid patient deterioration, high technological dependence, and complex interprofessional collaboration, which necessitate a context-specific EPA framework. ICU novice nurses face high cognitive workload, emotional stress, and rapid responsibility escalation. Inappropriate delegation or unclear expectations may compromise patient safety and increase professional anxiety ^[14]. A structured ICU-specific EPA framework can: Clarify clinical expectations for novice ICU nurses, Standardize supervision and entrustment decisions, Provide measurable milestones for progressive competence development, Enhance patient safety by aligning responsibility with demonstrated competence. Therefore, constructing an ICU-focused EPA framework is both theoretically necessary and practically urgent.

3. Methods

This study was conducted from April 2024 to February 2025, targeting Chinese ICU novice nurses. Referring to Ten Cate's guidelines for designing EPAs ^[15], the four-stage approach was used to develop an EPAs framework for Chinese ICU novice nurses (Fig. 1), including: (1) forming a research team, (2) drafting an initial EPAs framework, (3) reviewing EPAs framework through the Delphi method, and (4) conducting EPAs consensus assessment. Figure 1 shows a detailed illustration of the overall procedure. The Institutional Ethics Board of a university (ZZU-IRB-2024-85) approved the study.

3.1 Forming a research team

A research team was established, including one academic educationalist in nursing, one ICU nurse manager, three critical care nursing experts, and one ICU novice nurse. The team met on a regular basis to discuss the development of the EPAs framework, during these sessions, the team decided on the ideal number and scope of EPAs, developed and issued questionnaires, identified and recruited experts, gathered and evaluated experts' feedback, and then iteratively refined the framework based on the collated opinions.

3.2 Drafting an initial EPAs framework

The development of the initial EPAs framework was conducted referring to the AAMC's conceptual framework^[16]. In the process of drafting an initial EPAs framework, A multi-method approach was employed to address the inherent limitations of any single strategy. First, a comprehensive scoping review of the literature was undertaken to map existing research on EPAs within both international and Chinese nursing settings. Next, current clinical practice guidelines were systematically examined to ensure that the drafted EPAs conformed to established standards and evidence based best practices. Finally, a series of focus groups with critical care nurse managers and nursing educators was convened to obtain expert feedback and further refine the EPA framework.

3.2.1 Focus group interview

Participants for the focus group interviews were recruited through purposeful sampling following informed consent. Selection criteria focused on their expertise in nursing education, training and clinical supervision of ICU novice nurses. The interviews were facilitated by a trained moderator, independent of any professional or commercial relationship with the participants and assisted by a co-moderator. The group comprised 20 participants, including ICU nurse managers, clinical educators, ICU novice nurses, and ICU physicians.

Prior to the interviews, the research team developed a structured interview guide focused on the competencies and essential behaviors required for ICU novice nurses in practice. Key questions posed included: (1) What specific tasks do ICU novice nurses need to complete during their developmental growth? (2) What are the primary job responsibilities of ICU novice nurses? Which of these do you consider most important, and why? (3) Which tasks in the daily work of ICU novice nurses are the most repetitive? (4) Of the above tasks and responsibilities, which constitute observable behaviors? If some are not directly observable, how could they be transformed into observable behaviors? (5) When evaluating ICU novice nurses, which clinical work behaviors should be prioritized, and why? (6) How should these observable behaviors be categorized or graded? Interviews were carried out until thematic saturation was reached, at which point no additional themes emerged. The focus group discussion lasted roughly two hours. All collected material was then systematically coded and subjected to thematic analysis, with the patterns that recurred across sources informing the construction of an initial roster of EPAs framework and their detailed descriptors.

3.3 identifying and reviewing EPAs framework

3.3.1 Selection of experts

A purposive sampling strategy was used to select Delphi experts who met all of the following criteria: (1) either a Master's or Doctoral degree paired with an intermediate professional rank, or a Bachelor's degree accompanied by a senior professional rank; (2) a minimum of ten years' experience in ICU nursing, in either clinical or educational roles; and (3) expressed willingness to participate in the study.

Between May and July 2024, we recruited 18 panel members according to the recommendation in the literature^[17]. Experts were recruited from across mainland China, spanning eight provinces (from north to south) and three directly administered municipalities to ensure a diverse range of perspectives and the incorporation of national best practices.

3.3.2 Questionnaire design and pilot testing

The first-round questionnaire comprises four sections: (1) Research Background and Objectives; (2) Expert Demographic and Professional Information (age, years of experience, professional title, highest educational attainment, country of practice, etc.); (3) The EPAs framework. The first draft of the framework included 20 candidate EPAs and 108 content descriptions, Experts were required to rate the importance of each candidate EPA and to propose revisions. Importance was rated on a 5-point Likert scale (1 = not important at all; 5 = extremely important) with respect to the contribution of each EPA to standardized training for novice ICU nurses. Experts also provided narrative comments on the content and wording of each EPA. This yielded both quantitative ratings and qualitative input for refinement. (4) Experts' Familiarity Coefficient (Cs), and Judgement Coefficient (Ca). The Cs data were separated into five levels from 0.20 (unfamiliar) to 1 (extremely familiar), and the Ca data were divided into four categories: theoretical analysis, literature reference, practical experience, and subjective judgement. Following data analysis, an online consultation meeting was held in July 2024 to present round-1 findings and to facilitate detailed review and revision of each EPA and its descriptions.

Delphi Round 2: In the second round, experts were presented with the revised EPAs, updated based on the first round's feedback. Experts reassessed the importance of the revised EPAs. EPAs are integrated assessment frameworks that ground competencies in daily skills^[9]. ICU novice nurses are assessed by supervisors to determine their levels of entrustment for specific activities based on supervision levels^[18]. Therefore, experts also assessed the required competencies for performing each EPA and determined the expected levels of entrustment for each EPA at different stages of standardized training. These competencies were based on the framework for ICU nurses in China, including Critical Care Clinical Competence, Leadership and Management Skills, Professional Development, Teaching Capability, and Evidence-Based Research Aptitude^[19]. Entrustment levels were assessed based on five levels of supervision: 1) Observed, 2) Direct supervision, 3) Moderate supervision, 4) Minimal supervision and 5) Can supervise^[18]. This process aims to create a competence matrix linking each EPA to specific competencies and outlining the entrustment levels appropriate for various stages of ICU Novice nurse development, ultimately developing a comprehensive EPA framework for application in clinical settings.

3.4 Conducting EPAs consensus assessment

Upon reaching a consensus for the twenty core EPAs and their full descriptions, the EPA development team proceeded to pilot the EPAs.

ICU novice nurses at different stages of clinical training at Henan provincial people's hospital participated in the consensus assessment. The initial list of candidate EPAs and their descriptors

underwent a rigorous evaluation process using the EPA Quality (EQual) measuring scoring rubric. The 14-item EQual rubric is organized into three categories, namely: 1) discrete units of work (6 items), 2) entrustable and essential tasks of the profession (4 items) and 3) education focused considerations (4 items) ^[20]. Revision thresholds for each domain were set at 4.17, 4.00 and 4.00, with a general average cutoff of 4.07 ^[21], ensuring the quality and relevance of each EPA.

3.5. Data analysis

Data were double-entered and cross-checked by two researchers. A database was established using Microsoft Excel 2019, and data processing and statistical analyses were conducted with IBM SPSS Statistics version 27.0. Expert enthusiasm, reflecting the extent of experts' engagement with the study, was evaluated by the questionnaire response rate. Expert authority was assessed using the authority coefficient (Cr). The degree of agreement among experts, indicating whether there was disagreement regarding the indicators, was evaluated using the coefficient of variation (CV) and Kendall's coefficient of concordance (Kendall's W). According to Song et al. ^[22], indicators were retained if the mean importance rating was > 3.50 and the coefficient of variation was < 0.25. The consensus assessment was analyzed by using the mean, SD, and overall score range for each domain.

4. Results

4.1. Initially candidate EPAs

Through an initial process involving a literature review, guideline consultation and focus groups with clinical nurse managers and educators, 20 candidate EPAs and 108 content descriptors were formulated.

4.2. Delphi method evaluation results

4.2.1. Expert characteristics

All 18 experts who were invited to participate in the Delphi survey agreed to take part, with no declines and all experts remained actively engaged throughout both rounds of the process. The experts ranged in age from 40 to 61 years (mean 47.28 SD 5.64), with professional experience spanning from 14 to 42 years (mean 25.67 SD 8.64) and ICU professional experience spanning from 12 to 32 years (mean 21.94 SD 7.46). Their academic qualifications included 2 PhDs, 7 Master's degrees and 9 Bachelor's degrees. In terms of professional titles, 8 held senior-level positions and 10 held associate senior-level positions.

4.2.2. Expert authority

The response rates of the two rounds of survey were 100% and 94% respectively. In the first round, 18 experts provided 64 comments; in the second round, 17 offered 26 comments. The Expertise Credibility Ratio (Cr) was 0.89, indicating high credibility and reliability of the results.

4.2.3. Coordination of experts' opinions

The consensus coefficients for the two rounds were 0.164 and 0.214, respectively, both $P < 0.01$, suggesting a strong degree of expert agreement. In the first Delphi survey round, EPAs had mean importance scores ranging from 4.50 to 5.00, with a coefficient of variation (CV) from 0.00 to 0.23. The research team made modifications based on the selection criteria and expert feedback, which included adding one EPA, removing one and revising four. Additionally, content descriptions were adjusted with seven additions, ten removals and 24 revisions. In the second round, the newly added EPA received a mean importance score of 4.88 with a coefficient of variation of 0.07. The EPAs, which assessed importance had scores ranging from 4.53 to 5.00, with coefficients of variation between 0.05 and 0.15. Based on additional expert feedback, eight content descriptions were further adjusted, culminating in a finalized set of 20 EPAs and 105 content descriptions. The detailed results of the Delphi survey are presented in Supplement A.

4.3. Finalized EPA framework

Following the steps mentioned above, the finalized EPA framework was developed, including a list of EPAs, as shown in Table 1. Content descriptions for each EPA are provided in Supplement B, the levels of entrustment are detailed in Table 1.

Table 1
Final EPAs framework for Chinese ICU novice nurses

EPA titles	Entrustment level				
	3 months	6 months	1 year	2 years	3 years
EPA 1 gather a medical history	2	3	4	5	5
EPA 2 perform nursing processes	2	4	4	5	5
EPA 3 perform basic nursing operation techniques	3	4	4	5	5
EPA 4 obtain informed consent	2	4	4	5	5
EPA 5 write nursing documents	2	4	4	5	5
EPA 6 perform health education and publicity	2	4	4	5	5
EPA 7 report cases	2	4	4	5	5
EPA 8 Manage transitions of care for critically ill patients within and between health care settings	2	3	4	4	5
EPA 9 take over the care of critically ill patients	2	3	4	4	5
EPA 10 identify and rescue critically ill patients	2	3	3	4	5
EPA 11 Properly handling unexpected incidents in the ICU	2	3	3	4	5
EPA 12 recognize and manage pharmacology needs of critically ill patients	2	3	4	4	5
EPA 13 monitor the vital signs of critically ill patients	2	3	4	4	5
EPA 14 perform specialized nursing operation techniques	2	3	4	4	5
EPA 15 use the critical medical equipment correctly	2	3	4	4	5
EPA 16 perform clinical nursing teaching	1	2	4	4	5
EPA 17 conduct nursing research	1	2	3	3	4
EPA 18 participate in team collaborative care	2	3	4	4	4
EPA 19 Participate in hospital infection control	2	2	3	4	4
EPA 20 participate in health quality improvement initiative	2	2	3	4	4

4.4 Results of EPAs consensus assessment

A total of 60 ICU novice nurses completed the assessment. Among them, 24 had one year of work experience, 21 had two years, and 15 had three years. All 60 ICU novice nurses agreed that the 20 EPAs were suitable as discrete activities, entrustable, essential and important tasks of the profession, and as a clinical practice tool. EPA1 and EPA12 scored lower in Domain 1. EPA6 scored lower in Domain 2. EPA1 and EPA2 scored lower in domain 3. The scores of EPAs' quality for ICU novice nurses are shown in Supplement C.

5 Discussion

This study successfully developed a structured EPAs framework specifically tailored for ICU novice nurses in China, integrating competency domains with observable clinical tasks and defined entrustment levels. The findings offer significant contributions to the advancement of competency-based nursing education, particularly in high-acuity settings.

5.1 Educational Interpretation of the Core Findings

The finalized framework of 20 EPAs provides a comprehensive operationalization of the core competencies required for novice ICU nurses. It spans essential domains including core clinical skills, specialized ICU techniques, and advanced professional capabilities such as teaching, research, and team collaboration. This structure directly addresses a central challenge in nursing education: the gap between abstract competency frameworks and the realities of clinical practice. By translating competencies like "critical care clinical competence" into observable activities such as "identify and rescue critically ill patients" or "correctly use critical medical equipment," the framework makes workplace-based assessment feasible and transparent. This alignment with China's national goals for competency-based nursing education ensures that training programs can be designed with clear, measurable milestones, fostering a more structured and objective approach to professional development from the outset of a nurse's career.

5.2 Educational Comparison with Existing Research

Compared to general EPA frameworks for novice nurses^[12], the ICU-specific EPAs developed in this study exhibit a distinct educational focus dictated by the high-acuity practice environment. The inclusion of EPAs such as "identify and rescue critically ill patients," "manage transitions of care," and "participate in hospital infection control" moves beyond general ward competencies to address the unique educational demands of critical care. This echoes the educational direction of advanced practice nursing frameworks but is calibrated for the foundational training of novice nurses^[13]. Internationally, while EPAs are well-established in medical education, their application in ICU nursing, particularly within the Asian context, remains limited. This study provides a vital Chinese perspective and a localized, empirically derived tool, contributing to the global discourse on competency-based critical care nursing education.

5.3 Educational Implications from Research Findings

The consensus assessment using the EQual rubric provided critical insights for nursing education practice. The lower scores for EPA1 and EPA12 in domain 1 warrant particular attention from nurse educators. The finding that EPA6 scored lower on "entrustable and essential tasks of the profession" suggests that while health education is recognized as a core nursing function, the path to entrusting a novice nurse with this complex, patient-specific task is less clear. This implies a need for more structured pedagogical approaches. Clinical institutions and nursing schools should consider developing standardized teaching modules and simulation-based practice opportunities for health education, focusing on communication strategies, patient assessment, and individualized care planning. Similarly, the lower scores for EPA1 and EPA2 in the "education focused considerations" domain highlight that novice nurses may not yet perceive these as distinct, entrustable activities, but rather as integrated steps within a broader workflow. Educators should therefore design training that explicitly deconstructs these processes, using tools like structured debriefing and direct observation to help novices recognize and master each component. These findings underscore that the EPA framework is not just an assessment tool, but a diagnostic instrument that can pinpoint specific curricular weaknesses and guide targeted educational interventions.

5.4 Strengths and Limitations

A major strength of this study lies in its rigorous methodological approach, combining a multi-method strategy for initial framework development with a robust two-round Delphi process involving a nationally representative panel of experts from eight provinces and three municipalities. The use of the EQual rubric for consensus assessment added a layer of objective quality control, ensuring the educational soundness and practical relevance of each EPA. The framework's integration with defined supervision levels and developmental timelines enhances its utility as a practical guide for clinical preceptors, nurse managers, and educational institutions to make consistent entrustment decisions and design staged training programs. However, certain limitations should be acknowledged. The consensus assessment was conducted within a single provincial hospital, which may limit the generalizability of the quality evaluation. Multi-center validation across diverse ICU settings in China is necessary to confirm the framework's broad applicability. Furthermore, while the framework provides a structured tool for assessment, its long-term educational effectiveness in improving novice nurses' clinical competence, reducing training time, or enhancing patient safety outcomes has not yet been empirically verified. Future research should focus on implementing this EPA framework in longitudinal training programs and rigorously evaluating its impact on both learner outcomes and patient care. Studies exploring the experiences of clinical preceptors and novice nurses using the framework in real-time would also provide valuable insights for its ongoing refinement and successful integration into the fabric of critical care nursing education.

6 Conclusion

The ICU novice nurse EPA framework developed in this study provides a structured, context-specific, and competency-based assessment model. By translating competencies into entrustable clinical activities,

the framework strengthens the link between nursing education and real-world ICU practice, promotes safe delegation, and supports systematic professional development.

Abbreviations

AAMC

Association of American Medical Colleges

Ca

judgment coefficient

Cr

expert authority coefficient

Cs

familiarity coefficient

CV

coefficient of variation

EPA

entrustable professional activity

EQual

EPA Quality measuring scoring rubric

ICU

intensive care unit

Declarations

Supplementary Materials

Supplement A: detailed Delphi survey results; Supplement B: content descriptions for each EPA; Supplement C: EQual quality scores for the ICU novice nurse EPA framework.

Author Contributions

Xiaoxiong Sun: Writing – review & editing, Writing – original draft, Visualization, Validation, Software, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. Xiaoang Zhang: Writing – original draft, Data curation. Haibo Wang: Supervision, Project administration, Funding acquisition. Hongmei Zhang: Supervision, Project administration, Funding acquisition, Conceptualization. Jianmei Wei: Writing – review & editing, Writing – original draft, Supervision, Project administration, Methodology, Conceptualization.

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Ethics approval and consent to participate

The study was approved by the Ethics Review Committee of the School of Life Sciences, Zhengzhou University (Approval No. ZZUIRB2024-85) and conducted in accordance with the Declaration of Helsinki. Informed consent was obtained from focus-group participants as described in the Methods.

Data availability

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

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Conflicts of Interest

The authors declare no conflicts of interest.

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Figures

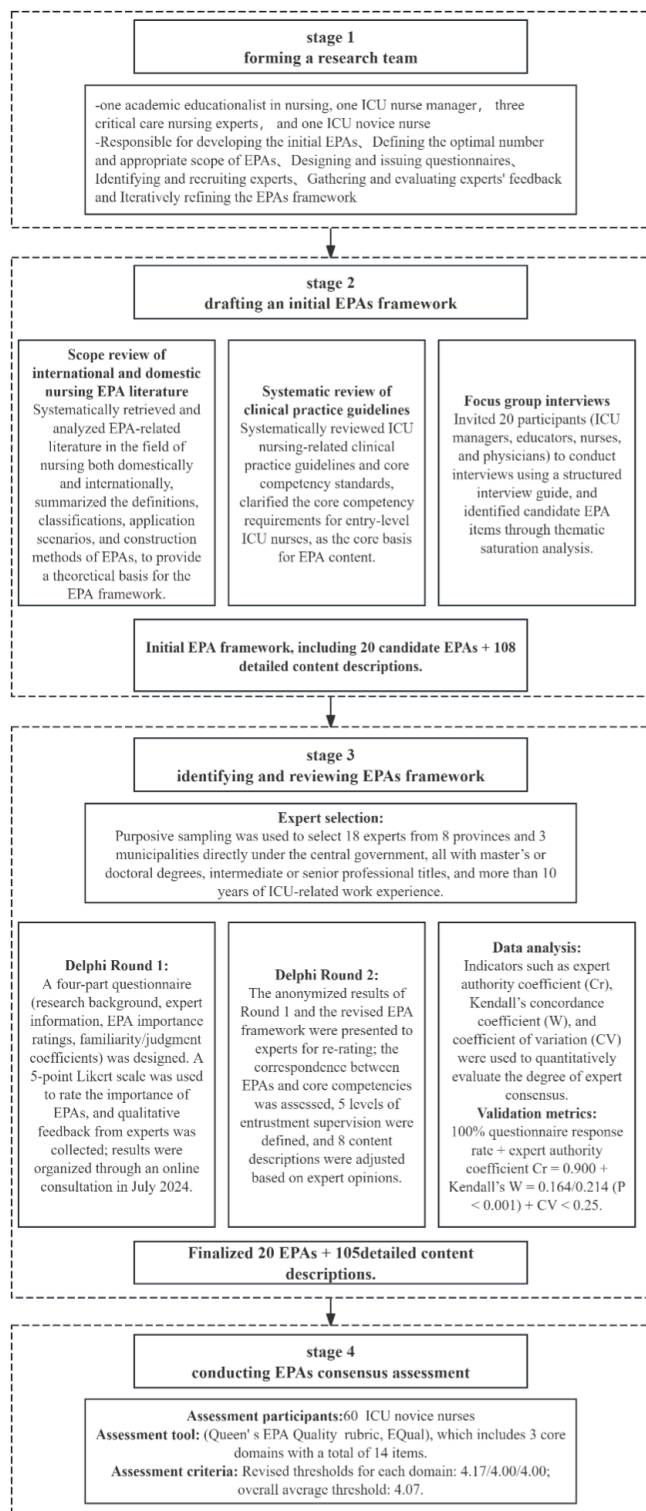


Figure 1

Flowchart of the four-stage EPA development process.

Supplementary Files

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