Review Article

Physical Assessment Competence of Nursing Students: A Literature Review

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Abstract

Background: Physical assessment is an integral part of nursing and a key learning outcome in nurse education programs. Some nursing students, however, feel inadequately trained to perform physical assessment effectively.

Objectives: This literature review surveys and evaluates current research findings on the training of nursing students in physical assessment and their confidence and competence in performing this skill.

Methods: In four electronic databases—CINAHL (1), Medline (2), ProQuest-Nursing and Allied Health Database (3), and PubMed (4)—Boolean operators and nested key terms were used to craft strings for database searches. Broad search criteria were employed to ensure that all relevant articles were included. Titles were hand-searched based on the reference lists of the full texts of reviewed literature. The data was extracted from January 2019 to March 2019.

Results: Three major topics were derived from a synthesis of the findings: (a) barriers in performing physical assessment, (b) assessment tools, (c) approaches towards the improvement of physical assessment competence.

Conclusion: Physical assessment competence is fundamental to the delivery of nursing care. Evaluation and measurement of physical assessment competence is essential to determine and foster the skills of nurses in training, and evaluation and feedback are necessary to take proper corrective action for improvement. Assessment includes identifying barriers to arrive at action plans to eliminate them. Action plans can focus on good practice environments, improvement of curriculum, trainings and simulations, mentoring, emphasis on safety, and improving non-technical skills.

Keywords: assessment tools; barriers; competence; nursing student; physical assessment

الملخص

الخلفية: التقييم الصحي هو جزء لا يتجزأ من التمريض ونتائج التعلم الرئيسية في برامج تعليم التمريض. ومع ذلك ، يشعر بعض طلاب التمريض بعدم كفاية التدريب على إجراء التقييم الصحي بفعالية.

الأهداف: توفير مراجعة أدبية لتقديم فهمًا دقيقًا لكفاءة التقييم الصحي لطلاب التمريض.

الأساليب: في أربع قواعد بيانات إلكترونية - CINAHL (١) ، Medline (٢) ، ProQuest-Nursing and Allied Health Database (٣) و PubMed (٤) - استخدمت العوامل المنطقية والمصطلحات الأساسية المتداخلة لصياغة سلاسل لعمليات البحث في قواعد البيانات. تم استخدام معايير البحث على نطاق واسع لضمان إدراج جميع المقالات ذات الصلة. تم البحث اليدوي في العناوين ذات الصلة بناءً على قوائم مراجع النصوص الكاملة. تم استخراج البيانات من يناير ٢٠١٩ إلى مارس ٢٠١٩.

النتائج: تم استخلاص ثلاثة مواضيع رئيسية: (أ) الصعوبات في إجراء التقييم الصحي ، (ب) أدوات التقييم ، (ج) النهج نحو تحسين كفاءة التقييم الصحي.

الخلاصة: كفاءة التقييم الصحي أمر أساسي لتقديم الرعاية التمريضية. تقييم وقياس كفاءة التقييم الصحي ضروري لتحديد وتعزيز مهارات الطلاب في التدريب ، والتقييم والتغذية الراجعة ضروريان لاتخاذ الإجراءات التصحيحية المناسبة للتحسين. يشمل التقييم تحديد الحواجز من أجل التوصل إلى خطط عمل للقضاء عليها. يمكن أن تركز خطط العمل على بيئات الممارسة الجيدة ، وتحسين المناهج الدراسية ، والتدريبات والمحاكاة ، والتوجيه ، والتركيز على السلامة ، وتحسين المهارات غير الفنية.

Introduction

Physical Assessment (PA) is an essential part of the nursing process and a key learning outcome in nursing education [1]. It comprises a set of skills that nurses and future nurses learn from academic preparation and actual practice in clinical settings to provide patients with quality care [1]. Competence is the ability to accomplish a task, and clinical instructors evaluate their students' competence and readiness for clinical exposure [1]

when they demonstrate knowledge, attitude, and skills in relevant situations [3]. Rather than attempt to define levels of competence in this paper, we accumulate available evidence regarding competence regardless of the level adopted in particular studies. According to Alamri and Almazan [2], PA consists of system assessment (e.g. cardiovascular, respiratory, gastrointestinal, genitourinary, neuromuscular, and integument).

There are several tools for assessing students' PA competence. They include (a) Objective-Summative Examinations (e.g. structured observation and assessment of practice [SOAP]) [3], (b) Objective Structured Clinical Examinations (OSCEs) [4], (c) patient observation [5,6], (d) the use of case scenarios [5,6], and (e) clinical skills readiness checklists [5,6]. Knowledge and skills are measured through PA competence in nursing education [7]. It contains six important domains: (a) responsibility, (b) performance-based evaluation, (c) circumstantial significance, (d) evidence-based evaluation, (e) tool validity and reliability, (f) and participation and collaboration [8]. Students are expected to demonstrate mastery in each of domains. PA evaluation relies upon the head-to-toe assessment principle [9]. Evaluating a student's competence can be extremely challenging, as nursing requires multidimensional skills and areas of knowledge including interpersonal indications, clinical decision methods (i.e. interpreting, responding and reflecting), and psychomotor programs. However, the ability to render a precise assessment of a student's practice competence is critical in the nursing profession [10], especially given the complexity of the clinical practice environments in which future nurses are challenged to acquire a comprehensive range of PA skills in order to provide safe and effective patient care across different health care settings [11].

Healthcare institutions and nursing schools face numerous challenges pertaining to PA competence. A study conducted in Saudi Arabia identified dependence on others and technology, the culture in the ward, and the lack of patient care as barriers to PA competence in both the classroom and clinical settings [2]. A study in Sweden found that patient's congestion as perceived by 83 students (45%) was a barrier in performing PA [12]. In Ireland, PA obstacles and complexity of the language were reported to be hindrances in PA performance [13]. Addressing these hindrances is the first step to improving patient assessment by student nurses. Hospitals are expected to equip their nurses with the PA skills necessary to provide safe nursing care [14]. Academia can also play a significant role in better equipping nursing students to effectively perform PA [15]. However, several health care institutions are worried that current nursing graduates are not knowledgeable or capable enough to do basic PA and their work competencies are misaligned [16].

Empirical studies showed that nursing student's PA competence was vague [2,16]. Further, some nursing students reported that they felt inadequately trained [15] and con-

fused [2]. PA competencies are introduced in a classroom setting [2], and the gap between the orientation in the classroom and the actual demand in a clinical setting contributes to this confusion. What is not yet clear is the impact on the PA competence of nursing student worldwide. PA is very essential to the delivery of nursing care. Through PA, future nurses should be aware of the health problems affecting a patient and how to manage it.

Currently, no synthesis of available empirical reports has been conducted, suggesting the need for this type of literature review. A review of present studies is necessary to collect and synthesize evidence necessary to reach accurate and consistent judgments about PA among nursing students. Deliberate scrutiny and analysis of the mined data regarding PA competence can help improve current practices in the classroom and clinical settings, which will eventually improve the quality of nursing care [17].

Methods

Aims

This literature review aims to provide an understanding of PA competence among nursing students based on information that is accurate and documented appropriately. The researcher wants to explore the current available evidence to arrive at recommendations for students to improve their PA skills.

Search strategy

Strategies using relevant search terms in electronic databases to identify relevant literature were implemented [18]. The following four electronic databases were utilized: (a) CINAHL, (b) Medline, (c) ProQuest-Nursing and Allied Health Database, and (d) PubMed. The following keywords were used for literature search: ("physical assessment" OR "health examination") AND (competence OR competency) AND ("nursing student" OR "future nurses" OR "student nurses"). Keywords were identified using a thesaurus of the searched databases and MeSH terms. The author utilized broad search criteria to ensure that all relevant articles were included. Titles were hand-searched based on the reference lists of the full texts of reviewed literature. The data was extracted from to March January 2019.

Inclusion and exclusion criteria of articles

Inclusion criteria: (a) no restriction of year, (b) peer-reviewed journal articles, (c) original research, and (d) English language. Exclusion criteria: conference proceedings abstracts, articles in press; irrelevant to research keywords, letters to the editor, unpublished manuscripts (abstracts or dissertations), and non-English languages. Only studies in which nursing students were enrolled as research participants were included in the review, regardless of the venue in which PA competence was measured (classroom, laboratory or clinical). The PA competence of nurses was not considered in this paper, since nursing students have different level of knowledge, skills, experience and training.

Search outcomes

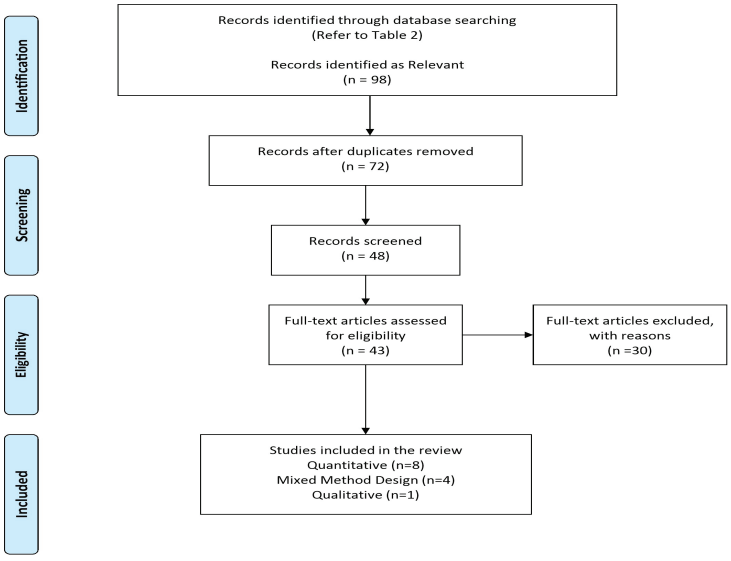
A comprehensive search review on PA competence of nursing students was conducted resulting in the following:

Table 1. Number of hits per Database

Database	String	Hits
CINAHL	((physical assessment) OR (health examination)) AND (competence OR competency) AND ((nursing student) OR (future nurses) OR (student nurses))	57
Medline	((physical assessment) OR (health examination)) AND (competence OR competency) AND ((nursing student) OR (future nurses) OR (student nurses))	114
ProQuest-Nursing and Allied Health Database	(“physical assessment” OR “health examination”) AND (competence OR competency) AND (“nursing student” OR “future nurses” OR “student nurses”)	191
PubMed	((physical assessment) OR (health examination)) AND (competence OR competency) AND ((nursing student) OR (future nurses) OR (student nurses))	458

After title review, a total of 98 articles were identified as relevant. After reading the abstracts, 43 were selected. After reading the complete article texts, 13 articles were judged to meet the criteria. One utilized qualitative method; eight used quantitative methods; and four used a combination of methods. The flow diagram illustrating the process of identifying relevant articles is presented in Figure 1.

Figure1. Search Flow Process



From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). *P*referred *R*eporting *I*tems for *S*ystematic Reviews and *M*eta-*A*nalyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

Quality appraisal and data synthesis

Each article was appraised for methodological validity using the instrument authored by Kmet et al. [19]. The instrument has standard quality assessment criteria for evaluating primary research papers. The checklist contains two scoring systems for assessing the quality of the research articles to identify articles suitable for review inclusion. The checklist for quantitative research reports contains 14 questions regarding the objective, study design, methods, respondents, sample size, measurements, main results and conclusion. For qualitative research reports, the checklist contains 10 questions concerning the study objectives, study design, connection to a theoretical framework, sampling strategy, data collection methods, data analysis, results, conclusions, and reflexivity. The scale was coded with "Yes" (score of 2), "Partial" (score of 1), and "No" (score of 0) response options. The total for 'Yes' responses served as the quality score index. In this review, the quality score ranged from 75% to 95 % out of a possible score of 100%. More than one checklist was developed by Kmet et al. [19] to assess different research methodologies. Studies employing quantitative methods were appraised using the system for quantitative studies, while qualitative studies (such as focus groups, semi-structured interviews) were appraised using the system for qualitative studies. Articles using mix method design utilized both instruments.

The checklists were used to assess the methodological quality of the research articles [19]. The results were organized in a tabular manner that demonstrated the features of the studies (author/country, design, study aim, sample population, data collection and analysis, and key findings). The research articles were then synthesized based on the following: (a) barriers to performing effective PA, (b) assessment tools, (c) approaches towards improvement of PA competence.

Results

Table 2. Reviewed of studies included

Author, country	Design	Aim of the study	Sample population	Data collection and analysis	Key findings
Alamri et al. (Saudi Arabia)	Quantitative	To examine the PA barriers among Saudi nursing students	Convenience sampling, nursing students (n=206)	Questionnaire, Independent Samples t-test	• Subscale "reliance on others and technology," ward culture, "lack of influence on patient care" are considered barriers in PA.

Bisholt et al. (Sweden)	Quantitative	To illustrate the learning environment in different clinical settings as perceived by nursing students	Nursing students (n=185)	Questionnaire, Kruskal-Wallis Test, Qualitative content analysis	• Learning environment affects students PA regardless of the students exposed to primary health care, psychiatric care, and community health care • Leadership skills contribute to the PA competence
Burke et al. (Ireland)	Mixed methods	To identify the nursing student's clinical competence with the used of competence tool	Preceptor nurse (n=170)	Questionnaire, Focus group interviews, Qualitative analysis, Descriptive statistics	• The key themes identified as an assessment tool, recognizing competence and valuing adult learners. • Complex language affects students PA performance.
Clemens et al. (US)	Quantitative	To determine the perception of nursing students about oral health assessment.	Convenience sampling, nursing student (n=163)	Questionnaire, Descriptive statistics	• Majority of respondents have a good understanding of oral health assessment.
Duygulu et al. (Turkey)	Quantitative	To determine the effect of service users in clinical practice assessments as perceived by nursing students	convenience sampling, baccalaureate degree nursing students (N=179)	Questionnaire, Content analysis, Chi-square	• Majority of respondents have PA problems in clinical practice. • Majority of respondents is using a service user involvement in clinical PA.

Heaslip (United Kingdom)	Mixed methods	To evaluate a practice assessment tool using a grading of practice.	Mentors (n=112) Nursing students (n=210)	Questionnaire, Chi-square	• The assessment tool enabled to determine the students PA competence. • Grading system help to determine the students PA competence.
Hunt et al. (UK)	Qualitative	To identify reason why mentor fail to recognize underperforming students in PA.	Nursing mentor (n=31)	Semi-structured interviews, Theoretical sampling techniques	• Students used guilt and fear towards mentors and coercive actions action in order to pass their PA competence.
Langari et al. (Finland and UK)	Quantitative	To examine and compare the self-assessment of patient safety competence between British and Finnish nursing students.	Nursing students in Finland (n=195) and the UK (n=158)	Questionnaire, Mann-Whitney U, Pearson's chi-squared tests	• Over 60% of both British (n = 100, 65.8%) and Finnish (n = 124, 63.9%) pre-registration nursing students highly agreed that their "patient safety competence has continuously improved during their nursing education". • Students high in terms of competence to prevent patient safety incidence (attitude) (mean = 3.48, SD = .40), building patient safety competence (knowledge) (mean = 3.44, SD = .44), and competence to act after an error (skill) (mean = 3.20, SD = .53) respectively.

Leung et al. (Hong Kong)	Mixed method	To examine the PA competence of students enrolled in a mental health nursing course.	Purposive sampling students (n=31)	Focus group interviews, Two-step cluster analysis.	• Multiple-choice tests constructed with case scenarios facilitate students critical thinking skills.
Murray et al. (UK)	Quantitative	To assess the NTS framework towards nursing students' PA	Purposive sampling, nursing student (N=200)	Questionnaire, Content validity analysis	• NTS improved students: communication, decision making, situational awareness, teamwork and task management, initiative and responsiveness to patient.
Pratinidhi et al. (India)	Quantitative	To evaluate the simulation training device as teaching tool used among nursing students	Total sampling, nursing student (N=88)	Questionnaire, Descriptive statistic	• Simulation training device improved student's PA competence.
Slater et al. (US)	Mixed method	To evaluate strategies for PA.	Convenience sampling, nursing student (N=117)	Questionnaire, Descriptive statistics, Open ended question Content analysis	• Instructional video improved students PA grade performance.
Zolezzi et al. (Qatar)	Quantitative	To assess the perception of students towards performing CVD risk assessments	Total sampling, nursing students (N=207)	Questionnaire, Kruskal-Wallis test	• Students have good knowledge and equipped in CVD risk assessment.

Barriers in performing PA

Four studies [2,12,13,20] reported barriers to the effective performance of PA. The study by Alamri et al. [2] of 206 Saudi nursing students conveniently selected found that "reliance on others and technology," "ward culture," and "lack of influence on patient care" were perceived as barriers to their performance of PA. The study by Bisholt et al. [12] of 185 Swedish nursing students found out that a large patient load presents challenges to students in performing PA. The same study found that the learning environment is important in building confidence and competence in performing PA. In a mixed method design conducted by Burke et al. [13] among Irish nursing students, the very complex language employed in the assessment tool was found to create difficulty interpreting the results of students' PA performance. In the same study, time constraints during the PA hindered performance. In terms of tools used to assess PA, Duygulu et al. [20] conducted a quantitative cross-sectional study that conveniently selected 179 Turkish students. They reported that these students lacked confidence in performing PA. These students further expressed their difficulties in discussing this lack of confidence with their nursing instructors (68.2%). Adjustment to the clinical setting environment (17.9%) posed additional difficulties, as did other assessment methods utilized (24.0%). Insufficient time, lack of clarity in assessments, and frequent clinical rotations also acted as barriers to effective PA.

Assessment tools

Three studies highlighted different tools used to assess students' PA competence [13,20,21]. Burke et al. [13] used competence tools to assess nursing students' clinical competence and found that a humanistic approach to learning and the principles of adult learning improved their PA competence. Duygulu et al. [20] discussed in-service users' assessment involvement as a useful factor in assessing students' PA competence. In a two-stage mixed-method study conducted by Heaslip et al. [21] among mentors (n=112) and nursing students (n=210), the tool utilized was a service evaluation of PA integrating the grading of practice. The tool can grade both PA competence and confidence in performing PA. Leung [1] assessed the influence of multiple-choice examinations on the PA learning of nursing students enrolled in a mental health nursing assessment course. The study found that multiple-choice examinations with case scenarios are useful in accelerating students' critical thinking about PA and improving PA skills.

Approaches toward improvement of PA competence

Nine studies highlighted approaches to improving physical assessment competence [1,12,17,22,23,24,25,26,27]. The study conducted in Sweden [12] recommended a good practice environment (e.g. good teamwork and collaboration, adequate patient-student ratio, and good pedagogy) to allow nursing students to become more proficient in performing PA.

Close cooperation and supervision should be required between nursing instructors and nursing staff in order to create and maintain a good environment for learning PA. More with cooperation and supervision, collaboration also play a role in improving PA competence. A study in Qatar [27] measuring medical, nursing, and pharmacy students' performance of cardiovascular disease (CVD) risk assessments suggested that collaboration decreased assessment barriers, while teamwork and team communication led to greater efficiency and higher quality results. The study recommended that collaboration be increased in order to decrease (CVD) assessment barriers.

Simulations and clinical training programs also play a role in developing PA competence. A study in the US [17] cited that simulations and participation in clinical training programs could improve student accuracy in oral PA. A study conducted in India investigated the effect of a simulation training device on nursing students' performance and found out that the cervical dilatation training device improved judgment of cervical dilatation in actual clinical settings [19]. Outcomes of simulations and trainings are always targeted to participants' learning, but the facilitator's role is another factor in the equation. That role may include mentorship. A UK published study [22] investigated why underperforming students fail as perceived by nursing instructors and arrived at a recommendation that mentoring should be employed. The study claimed that a mentoring role when efficiently employed increases students' confidence in performing PA.

Simulations and training with mentoring is not adequate; evaluation is necessary to determine the effects of training and to provide feedback for continuous improvement employment. Furthermore, evaluation of non-technical skills is necessary to determine how they contribute to performance of PA. Murray et al. [24] described a framework for evaluation of non-technical skills (NTS) to assess nursing students' PA skills. The authors suggested that NTS improve nurses' PA skills. A separate study conducted in the United States [26] used evaluation strategy for PA competence among nursing students and found that evaluation strategy encouraged greater learning and PA understanding and created a more realistic clinical experience. Part of the evaluation should also address safety, since it is part of PA competence. A study conducted in UK and Finland [23] assessed the patient safety competence of students. It noted that the competence of students is an important part of improving patient safety, which puts emphasis on integrating student development into the curriculum. Curricula revision was recommended to focus more on patient safety and a safe practice environment.

An interesting empirical report from Hong Kong [1] evaluated the effects of multiple-choice tests on the learning and competence of nursing students enrolled in a mental health nursing course. In this study, a surface learning approach helps students cope with the weighty workload of acquiring various

PA skills within strict time limitations.

Discussion

This literature review provides an expansive understanding of the PA competence of nursing students. The majority of the research studies were conducted in the US and Europe (N=7). Three significant themes were generated from the review.

First, barriers in performing physical assessment affect students' performance and the quality of patient care. Three studies revealed that the complexity of the earning environment hinders students' performance of PA [2,12,13], reinforcing the notion that a proper learning environment is necessary to perform a comprehensive health assessment utilizing the core competencies so that it can develop essential skills and improve PA self-confidence in assessing patient's health status. It should be noted, however, that two of the studies analyzed are cross-sectional [2,12], and only one utilized a mixed-method design [13], which cannot be used to analyze behavior over a period of time and does not help determine cause and effect. Further studies could be developed, particularly interventional studies, to minimize barriers in performing PA.

Four studies highlighted advantages of different tools for assessing students' PA competence [1,13,20,21]. Two studies focused on service users in clinical practice assessments [20,21], while one study assessed students' PA competence Burke et al. [13] and yet another study evaluated students' PA competence using multiple-choice tests on the learning approaches [1]. All these studies were self-administered, which can lead to social desirability bias. Another weakness is that all respondents from the above studies were from one geographical area, limiting the generalizability of the studies. Future research could draw from a larger and more diverse population to generalize the findings.

Several approaches to improvement of PA competence will clearly improve learning outcomes [1,12,17,22,23,24,25,26,27], including a good clinical practice environment, communication, and teamwork [5,22,24]. with the surface learning approach is useful in coping with the weighty nursing workload of several nursing PA skills within limited time constraints and developed critical PA skills [1]. Case-based scenario simulation has also proven to be a consistent and effective method of PA evaluation [26]. While the above strategies certainly help to improve students' PA competence, the results are complicated by the fact that PA simulation-based and case scenarios requires multiple trainings for nursing instructors [28].

Assessment of PA competence is essential, since the feedback students receive can be the basis for their improvement and for the crafting of strategies by nursing educators. Evaluation and feedback are necessary to the student, teachers, and academic administrators so that proper corrective action can be taken, and improvements made. When the students become aware of their skill deficits, they can retreat to their confi-

dence and adjust their learning strategies to improve those skills. Teachers and academic administrators are guided by identifying the symptom, investigate for the root causes, and employ appropriate interventions. The lists of barriers to and approaches for improving PA competence provide useful information for academic planning to improve PA competence. The barriers can be eliminated with a good plan and proper execution. Action plans can focus on a good practice environment, improved curriculum, trainings and simulations, mentoring, safety training, and instruction in non-technical skills.

Limitations of this review

Only four electronic databases were utilized, so some relevant studies may not have been included. The use of a limited set of keywords and the two-month window for data extraction may also have decreased the strength of the scientific evidence. Combining diverse data sources such as quantitative studies and qualitative studies is complex and challenging. Nevertheless, reviews can play a large role in describing the complexity of PA competence, identifying central issues in PA education, and exploring potentially useful future research methods.

What does the study add to what was already known?

This review reveals that the barriers to PA competence are numerous and may differ based on nursing students' clinical environment and practice. It also highlights the shift in focus from perceived barriers in physical assessment skills, which served as the basis for curriculum development. The use of PA skills is associated with good validated and reliable PA tools. Individualmotivational, professional, environmental, educational, cultural, and communicational factors, as well as the factors related to patients and their cultures, are involved in skilled assessment. Indeed, future nurses themselves express a need for improved training in these areas.

Conclusion

PA competence is fundamental to good nursing care. This review highlights the barriers that prevent nursing students from performing PA effectively, as well as the need for PA assessment tools to be validated and integrated into the grading practices. A valid and reliable PA competence evaluation tool develops critical thinking skills and improved PA skills. Specific approaches to building PA competence (e.g. good teamwork and collaboration, adequate patient-student ratio, simulations and clinical training program participation, and a surface learning approach) led to improved PA skills performance. A review of studies of PA competence should be undertaken to guarantee continuing improvement of nursing education and nursing care. This study provides valuable insights into PA competence and the barriers to its effective performance in order to better prepare student nurses to perform PA in a clinical environment.

Assessment of PA competence is essential to determine a student nurse's skills

and preparedness. Evaluation and feedback are necessary so that proper corrective actions and improvement can be taken. This includes identifying barriers to arrive at action plans to eliminate them. Action plans can focus on good practice environment, improvement of curriculum,

Recommendation

Nursing education recommendation. The assessment of competence of students to perform PA is an important part of improving patient safety and patient quality care. PA theory and skills should be taught in all clinical and laboratory nursing courses so that students will be consistent in performing PA. Clinical training programs and case-scenarios simulations could also be included. Clinical instructors will also have more time to focus on the improvement of each competence. They will also conduct debriefing to encourage students to verbalize their concerns and issues. Finally, clinical instructors should be open and identify students' learning needs in order to reduce anxiety and stress in performing PA and increase student self-confidence in the performance of all clinical nursing skills. Finally, in order to maintain high levels of PA competence in healthcare, the researcher recommends that all schools of nursing and faculties revise their curricula so that more patient safety theory is discussed and applied to clinical practice in a safe environment.

Implications for Clinical Practice. Upholding a positive PA practice environment for nursing students is also the shared responsibility of staff nurses and hospital administrators. A clear line of communication should exist between clinical instructors and students to avoid errors in clinical settings. Clear coordination between nursing universities and hospitals is also important to the support of students' PA practice in clinical setting. Adequate supervision during students' exposure in clinical practice will prevent errors and promote patient safety. Early exposure to clinical practice can foster positive feelings in nursing students toward performing PA.

Future Research. The current review illustrates the value of PA competence among nursing students. This review recommends further research in PA competence among nursing students to validate the findings. It also recommends that barriers affecting PA could be studied utilizing research methods other than the use self-reported data from nursing students. PA assessment tools should also be studied to determine the validity and reliability of specific tools in assessing students' PA competence.

Key Point Box:

- PA competence is fundamental to the delivery of nursing care.
- This review highlighted how assessment tools used to measure PA competence, the barriers to PA competence, and approaches to improving PA competence affect students' PA performance.
- This paper provides valuable insights into

PA competence and the barriers its development when students work in an actual clinical environment.

• PA theory and skills should be taught in all clinical and laboratory nursing courses so that student will be consistent in performing PA effectively.

Conflicts of Interest

The author declares that there are no conflicts of interest.

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