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# Physical assessment skills taught in nursing curricula: a scoping review

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## ABSTRACT

**Objective:** This scoping review sought to establish the current state of knowledge regarding physical assessment skills taught globally in undergraduate nursing curricula. Explicitly, which skills are being taught via curricula, and which skills are performed by students in clinical placements. Additionally, what physical assessment skills are being used by registered nurses in practice.

**Introduction:** Nursing programs are expected to teach the physical assessment skills required for entry-level registered nurses to practice competently. The discrepancy lies between determining which skills are essential to teach.

**Inclusion criteria:** Studies that examined physical assessment skills taught to students in any undergraduate registered nursing program or used by registered nurses in practice were considered. Physical assessments included all techniques or skills taught in any year of a university or college teaching global registered nursing curricula.

**Methods:** Databases searched included: MEDLINE (Ovid), CINAHL Complete (EBSCO), Scopus, and Cochrane Central Register of Controlled Trials (Ovid). Sources of unpublished studies included: ProQuest Dissertations and Theses Global, OpenGrey, Open Access Theses and Dissertations, and Google Scholar. Studies published in English between January 2008 and November 2019 were included. Two independent reviewers screened titles and abstracts. Studies meeting the inclusion criteria were imported into the Covidence systematic review manager. Extracted data were presented in a descriptive format, including characteristics of included studies and relevant key findings.

**Results:** Thirteen records were extracted for synthesis: one integrated review, one author reflection, one mixed method study, and 10 quantitative studies. The sources represented a global context: the United States, New Zealand, TurkeyAustralia, Norway, Korea, Italy, and one of unknown origin. Three studies examined physical assessment skills routinely taught in global nursing curricula. Four others explored physical assessment skills routinely used by students during clinical placements. Six final studies examined which physical assessment skills were routinely performed by registered nurses in practice.

In the studies, there were 98 to 122 physical assessment skills taught in global nursing programs. However, only 33 skills were routinely taught in curricula, and of those taught, only 20 were the same across all studies (core skills). Students in clinical settings routinely performed 32 physical assessment skills, and six of the 32 skills were the same across all studies (core skills). Of the six core skills routinely performed by students, five were also routinely taught in nursing curricula in the studies used for this scoping review. Registered nurses routinely performed 39 physical assessment skills, and 11 skills were the same across all studies (core skills). Also, 10 of the physical assessment skills taught in curricula are routinely performed by registered nurses in practice.

**Conclusion:** This scoping review provides insight into physical assessment skills taught in nursing curricula and used by registered nurses in practice. This knowledge is essential for curriculum revisions and planning as it provides insight on how to best meet the needs of future nursing students.

**Keywords:** curricula; education; nursing; physical assessment; student

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## Introduction

Nursing Practice Acts and Entry-to-Practice Competencies require that registered nurses (RNs) are able to competently conduct comprehensive nursing assessments post-licensure.<sup>1,2</sup> It is an expectation that nursing programs provide students with the essential skills necessary to practice competently as an entry-level RN.<sup>3</sup> Nursing graduates must have the ability to effectively gather relevant subjective and objective data,<sup>4</sup> and be able to problem-solve across a variety of health care sectors.<sup>4</sup> Graduate RNs must be flexible and possess the ability to care for the increasingly complex patient and adapt their practice to the rapidly changing demands of health care.<sup>5</sup> Proficiency in foundational physical assessment skills is imperative to making clinical decisions and implementing nursing interventions that ensure safe and competent patient care.<sup>6</sup>

Physical assessment skills are a foundational component of evidence-informed care.<sup>7</sup> Nurses use physical assessment skills to assess a patient's condition and evaluate their response to determine if the desired outcomes have been met.<sup>8</sup> Physical assessment skills, including inspection, palpation, auscultation, percussion,<sup>6-8</sup> and olfaction,<sup>8</sup> are considered part of the ongoing assessment required when collecting information to determine client status. Unfortunately, the specific knowledge and skills required for RNs to perform adequate physical assessments remains controversial.<sup>9</sup> There is a discrepancy in the literature regarding the physical assessment skills that are essential to teach, and those unnecessary for entry-level RNs. Literature suggests that nursing programs need to provide enough skills to ensure that RNs are competent to care for complex patients across different health care sectors,<sup>10</sup> while also providing opportunities for students to practice and master assessment skills, to ensure appropriate application as an RN.<sup>9</sup> Not providing enough opportunity to practice and master skills while in school, may lead to a lack of application of those skills post-licensure.<sup>9,11,12</sup>

In contrast, other authors claim that additional skills should be acquired in the RN's work area when the skill is utilized,<sup>13</sup> that students need more time to practice essential skills rather than adding additional content into overloaded nursing curricula.<sup>11,14</sup> Some authors propose teaching fewer skills, with a greater emphasis on interpretation and clinical judgment. They believe it is not realistic to expect new

graduates to possess all the skills required for every area in nursing.<sup>11,15</sup> Authors stress that the interpretation of patient assessment findings is an advanced skill that deserves more attention.<sup>15</sup> Emphasis should be placed on the interpretation of clinical assessment findings in nursing education, rather than focusing on the skills. The focus should be on teaching nurses how to use all their skills from a balanced perspective (integrating physical and holistic approaches to assessment), as this will serve nursing's purpose, which is to improve patient outcomes.<sup>15</sup>

The lack of consensus in the literature regarding what physical assessments are essential to teach leaves educators feeling they need to teach it all. As a result, nurse educators are faced with the difficult challenge of determining which physical assessment skills should be taught in curricula.

Adding to the complication of which physical assessments should be taught, are the differences in the length of nursing programs, ranging from two to four years. Moreover, variations exist in global nursing education regarding the physical assessment content taught. Differences exist between associate degree and baccalaureate degree nursing programs in the US. More than 80% of baccalaureate programs taught physical assessment content as an independent course, while only 19.4% of associate degree programs taught the content independently.<sup>11</sup> In Australia, physical assessment skills are taught as an independent subject (46%) or as integrated content (48%).<sup>16</sup> Additionally, using Giddens<sup>17</sup> 126 physical assessment skills as a comparator, 99 of the physical assessment skills are routinely taught by more than 50% of nursing programs in the US.<sup>11</sup> Similarly, 98 are taught throughout Australia,<sup>16</sup> while the nursing curricula in Italy teaches the same 30 core physical assessment skills as the comparator.<sup>18</sup> Alternately, only two skills that were in the comparators list (taking pulses and assessing for edema) are taught in the first three years of a nursing program in Turkey.<sup>19</sup>

Interestingly, even though there is a difference in the content of various programs regarding physical assessment skills taught, a study found no difference in practice. Giddens<sup>20</sup> examined RNs who completed an associate degree compared to those who completed a baccalaureate degree. A survey was conducted to identify the frequency of use for 124 survey items. Results found no statistical difference between the

groups regarding the frequency of performing the skills.<sup>20</sup> This study was not limited to new graduates, so it is difficult to know how experience and post-graduate education shaped their practice.

Evidence suggests there is also a disconnect between the physical assessment skills taught in nursing education and the actual skills used by students during clinical rotations.<sup>6,9,11</sup> Nursing students report discrepancies between what is taught in school and what is required or demonstrated in clinical settings<sup>21,22</sup> (specifically, students do not use all of the physical assessments taught in their nursing program) and studies support these concerns. A study conducted in the Philippines on undergraduate nursing students,<sup>23</sup> revealed that students only assessed vital signs and performed inspection and auscultation of the chest and the abdomen during clinical placements. Another study conducted at an Australian university<sup>9</sup> found that students routinely performed the following five skills: i) evaluating breathing, ii) assessing capillary refill, iii) palpation of temperature in the extremities, iv) assessing mental status/level of consciousness, and v) Glasgow coma scale during every assessment. There could be various reasons for the discrepancy between what is taught in educational programs and the physical assessment skills performed by students during clinical rotations, but as a result, graduate RNs may lack the practice and confidence to perform some essential physical assessment skills competently.

Research studies have compared the physical assessment skills used by RNs in practice to skills taught in undergraduate nursing programs. A survey conducted by Giddens<sup>17</sup> found that RNs at a university-affiliated hospital in the US use a limited number of skills when performing a physical assessment, with only 30 of a possible 126 skills used on a routine basis. The same survey was repeated in Australia by Birks *et al.*<sup>16</sup> who found that only 13 of the 126 skills were regularly used. Cicolini *et al.*<sup>18</sup> modified the survey to include only the 30 physical assessment skills required by nursing education in Italy. Their study results revealed that RNs practicing in Italy commonly used 20 out of the 30 physical assessment skills. In 2017, Kohtz *et al.*<sup>13</sup> replicated Giddens<sup>17</sup> 2007 study, once again in the US, and found that 30 skills were used routinely, while 79 of the 126 skills were not used in the clinical setting. Thus, the issue of what is taught versus what is practiced remains challenging.

The International Council of Nurses supports initial and ongoing education for RNs to obtain and maintain proficiency and competency to practice.<sup>24</sup> This includes both entry-level physical assessment skills and skills that will be learned in clinical practice once graduated. The International Council of Nurses asserts that nurse educators should focus on understanding the competencies and conditions required to deliver nursing care in our current and future health care environments. Therefore, nurse educators must continuously assess the needs of students and the health care system alike, making the necessary curricular changes to meet new and emerging demands. Educators must continually reflect on what is currently done in practice and what should be done to achieve the best outcomes for patients. This information is key to determining which physical assessment skills are essential to include in nursing curricula and which are not.

This scoping review will examine emerging evidence to establish the current state of knowledge regarding physical assessment skills taught in nursing programs globally. The objective of this scoping review is to determine which physical assessment skills are taught to undergraduate nursing students, in any year of a university or college nursing curricula globally, that leads to a diploma, bachelor of nursing, bachelor of science in nursing, or associate degree in nursing. A scoping review was the methodology selected for this research as they: i) determine the available evidence, ii) inform research, iii) identify implications for policy and practice change, and iv) identify gaps in the literature. A preliminary search of PROSPERO, MEDLINE, the Cochrane Database of Systematic Reviews and the *JBI Database of Systematic Reviews and Implementation Reports* was conducted on March 4, 2019. An *a priori* scoping review protocol has been registered and subsequently published through JBI.<sup>25</sup> No current or in-progress scoping reviews or systematic reviews on the topic were identified.

### Review questions

- What physical assessment skills are being taught in undergraduate nursing curricula?
- What physical assessment skills are students practicing during the undergraduate nursing program?
- Are RNs in clinical practice using these skills?

- What are the core physical assessment skills that are important to teach undergraduate nursing students?

### Inclusion criteria

#### *Participants*

This review considered studies that included students in any undergraduate tertiary degree program that prepares students to become RNs. This includes graduates from a university or college program that leads to a diploma, bachelor of nursing, bachelor of science in nursing, or associate degree in nursing. Studies were also included that examined skills used by RNs in practice. Nursing students refer to any undergraduate nursing student in any year of a university or college nursing program discussed above that leads to certification as an RN.

#### *Concept*

The concept of interest was the physical assessment skills taught to nursing students in any year of a university or college undergraduate nursing program worldwide. Additionally, the concept of interest is physical assessment skills used by RNs in practice. Physical assessments included skills required to perform inspection, palpation, auscultation, and percussion. This included facilitated learning through lectures, demonstrations, and hands-on applications. Nursing students refer to any undergraduate nursing student in any year of a university or college nursing program that leads to the certification mentioned above. Core skills were skills that were listed across all studies.

#### *Context*

This scoping review examined physical assessment skills taught in curriculum and practiced in any clinical setting by RNs globally.

#### *Types of sources*

This scoping review considered experimental and quasi-experimental study designs, including randomized controlled trials, non-randomized controlled trials, before and after studies, and interrupted time-series studies. In addition, analytical observational studies, including prospective and retrospective cohort studies, case-control studies, and analytical cross-sectional studies, were included. This review also considered descriptive observational study designs, including case series, individual

case reports, and descriptive cross-sectional studies for inclusion.

Qualitative studies that focused on qualitative data were considered, including, but not limited to, designs such as phenomenology, grounded theory, ethnography, qualitative description, action research, and feminist research. Systematic reviews that met the inclusion criteria were also included, as were text and opinion papers. Studies published in English and studies published from January 2008 to November 2019 were included, as health assessments need to reflect advancements in health care.

### Methods

The review followed the JBI methodology for scoping reviews.<sup>26</sup> Additionally, the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR)<sup>27</sup> will be used to guide the reporting of this review. This review was conducted in accordance with a previously published scoping review protocol.<sup>25</sup>

#### *Search strategy*

The search strategy included both published and unpublished studies. An initial limited search of MEDLINE (Ovid) and CINAHL Complete (EBSCO) was undertaken to identify articles on this topic. The articles found on the topic were analyzed for text words contained in the title and abstract, and for the keywords and index terms used to describe each article. This informed the development of the search strategy, which was tailored for each information source. The final search was conducted in MEDLINE via the Ovid platform rather than PubMed, which is a deviation from the protocol,<sup>25</sup> and was deemed desirable based on the research question to reduce out-of-scope results from beyond health sciences and to take advantage of the increased sensitivity of MeSH controlled terms within MEDLINE (See Appendix I).

The databases searched included: MEDLINE (Ovid), CINAHL Complete (EBSCO), Scopus (Elsevier), and Cochrane Central Register of Controlled Trials (Ovid). The search for unpublished studies included: ProQuest Dissertations and Theses Global, OpenGrey, Open Access Theses and Dissertations, and a modified search of Google Scholar. The final search was conducted on November 3, 2020.

### Study selection

Following the search, all identified citations were uploaded into Zotero (Corporation for Digital Scholarship and Roy Rozenweig Center for History and New Media, VA, USA) and duplicates were removed. Two independent reviewers screened titles and abstracts for assessment against the inclusion criteria for the review. Studies that met the inclusion criteria were retrieved in full and uploaded into Zotero and imported into the systematic review manager Covidence (Veritas Health Innovation, Melbourne, Australia). The full text of selected studies was retrieved and assessed in detail against the inclusion criteria. The results of the search are presented in the PRISMA<sup>27</sup> flow diagram (Figure 1). Studies that did not meet the inclusion criteria were excluded, and the reasons for exclusion detailed in Appendix II. Any disagreements between the reviewers were resolved through discussion or via a third reviewer.

### Data extraction

Data were extracted from papers included in the scoping review by two independent reviewers using information outlined in the *JBI Manual for Evidence Synthesis*.<sup>26</sup> The data extracted included specific details about the population, concept, context, study methods, and key findings relevant to the review objective. Any discrepancies between the reviewers were successfully resolved through discussion or by a third reviewer. Authors of papers were contacted to request missing or additional data, where required.

### Analysis and presentation of results

The extracted data was presented in a descriptive format that aligns with the objective of this scoping review to explore the literature for information related to the physical assessment skills taught in undergraduate nursing curricula globally and the skills used by RNs in practice. The extracted results were organized under categories that reflected the following questions of interest: i) physical assessment skills taught in nursing curricula, ii) physical assessment skills used by students during the nursing programs, iii) physical assessment skills used by RNs in practice, and iv) core physical assessment skills for nursing curricula. Each article was summarized using information outlined in the *JBI Manual for Evidence Synthesis*<sup>26</sup> (See Appendix III).

## Results

### Study inclusion

There were 2109 records screened by examining the abstracts and titles, and 2036 were deemed irrelevant. Seventy-three full-text articles were assessed, and 60 records were excluded based on the following reasons: did not address the research questions (39), not a physical assessment technique (14), and not related to education of the undergraduate RNs (4). Two others were excluded because the date was before 2008 and a final article was a duplicate (See Appendix II). The remaining 13 records were extracted for synthesis as they met the inclusion criteria of this scoping review: one integrative review, one author opinion, **ten quantitative and one mixed method study.**

### Characteristics of included studies

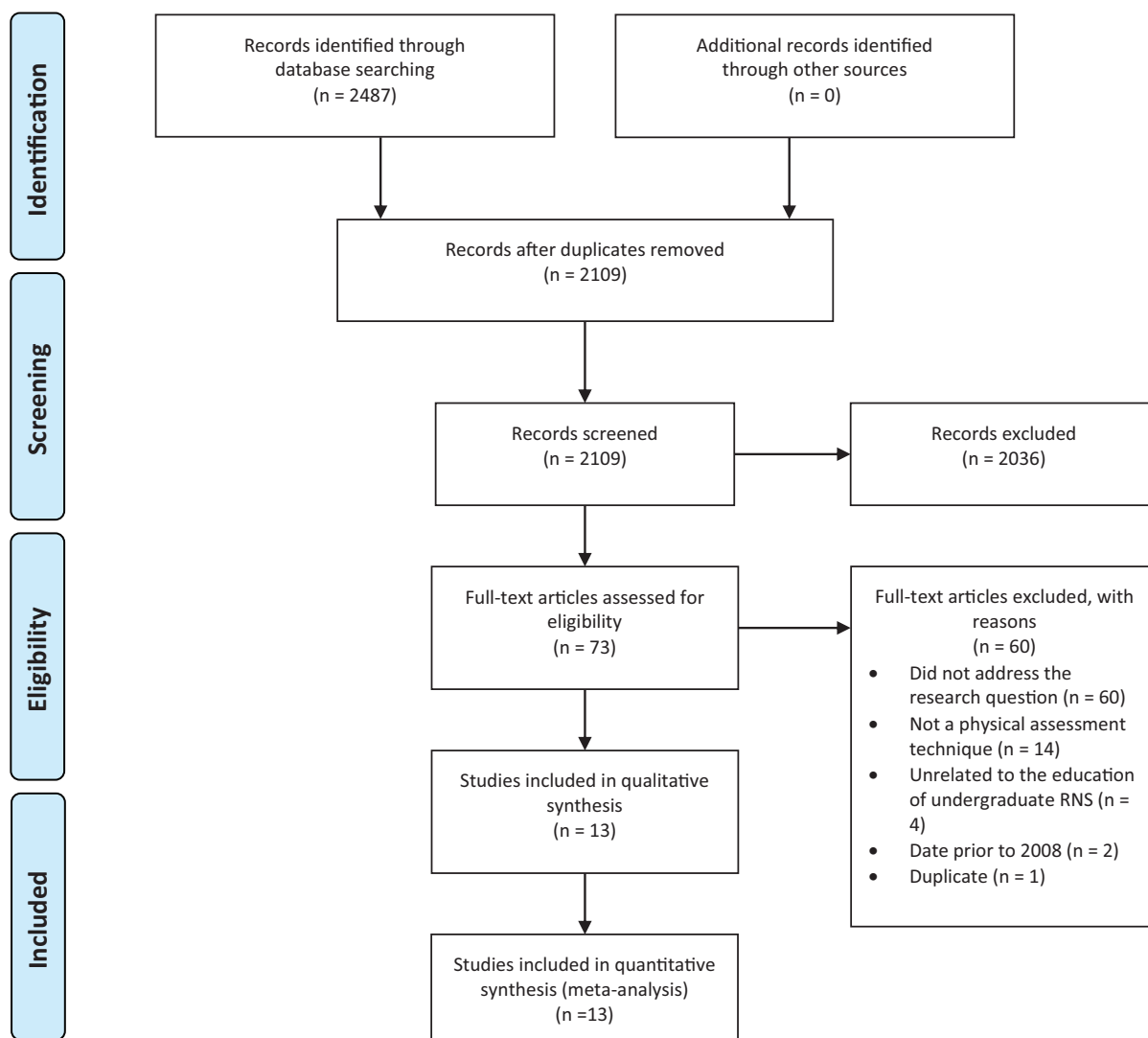
One of the included articles was an integrative review of the literature regarding the state of knowledge of nursing physical assessment.<sup>6</sup> The second article was an author's reflection<sup>21</sup> on the purpose of a systematic physical assessment. The other 11 articles (10 quantitative<sup>9,11,13,16,18,19,28-31</sup> and one mixed methods<sup>32</sup>) involved the administration of a survey<sup>9,11,13,16,18,28-32</sup> or a checklist.<sup>19</sup> The surveys and the checklist measured the frequency of physical assessments performed by RNs, physical assessment skills used by nursing students, or physical assessment skills taught in nursing curricula. The sources for this scoping review represented a global context: United States,<sup>11,13,28</sup> New Zealand,<sup>21</sup> Turkey,<sup>19</sup> Australia,<sup>9,16,29,30</sup> Norway,<sup>32</sup> Korea,<sup>31</sup> Italy,<sup>18</sup> and one unknown<sup>6</sup> (See Appendix III).

### Review findings

The sources for this scoping review were analyzed, summarized, and grouped according to categories outlined under data presentation. Some sources had findings that overlapped multiple research questions. As such, information may be included under multiple categories.

### Physical assessment skills taught in nursing curricula

Three articles discussed skills taught in undergraduate nursing curricula: Cinar *et al.*,<sup>19</sup> Birks *et al.*,<sup>16</sup> and Giddens and Eddy<sup>11</sup> (see Table 1 for skills that are routinely taught in undergraduate nursing curricula). Cinar *et al.*<sup>19</sup> conducted a descriptive study



From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

For more information, visit [www.prisma-statement.org](http://www.prisma-statement.org).

Figure 1: Search results and study selection and inclusion process<sup>33</sup>

**Table 1: Physical assessment skills routinely taught in undergraduate nursing curricula**

Assess mental status and level of consciousness <sup>+</sup>
Assess using Glasgow Coma Scale <sup>+</sup>
Assess muscle strength <sup>+</sup>
Assess hearing (on the basis of conversation)**
Assess gait <sup>+</sup>
Assess for PERRLA (pupils-equal, round, reactive to light, accommodation)**
Auscultate lung sounds <sup>+</sup>
Auscultate abdomen for bowel sounds <sup>+</sup>
Auscultate heart sounds <sup>+</sup>
Inspect overall skin colour <sup>+</sup>
Inspect skin lesions <sup>+</sup>
Inspect and palpate extremities for edema <sup>+</sup>
Inspect the oral cavity**
Inspect the spine**
Inspect wounds <sup>+</sup>
Inspect abdomen <sup>+</sup>
Inspect extremities for skin colour and hair growth**
Inspect external eyes**
Inspect chest shape**
Inspect muscles and extremities for size and symmetry**
Inspect and examine stool**
Evaluate speech <sup>+</sup>
Evaluate face for movement and sensation <sup>+</sup>
Evaluate breathing <sup>+</sup>
Observe the range of motion of joints <sup>+</sup>
Palpate extremities for temperature <sup>+</sup>
Palpate and inspect capillary refill <sup>+</sup>
Palpate distal pulses for circulation <sup>+</sup>
Palpate extremities for tenderness**
Palpate the abdomen for tenderness and distension <sup>+</sup>
Percuss the lungs*
Palpate chest wall for thoracic expansion*
Inspect for jugular pulsation*

Note: \*reported by one author \*\*reported by two authors, <sup>+</sup>reported by all (core skills)  
 Authors: Cinar et al.,<sup>19</sup> (Turkey); Birks et al.,<sup>16</sup> (Australia); Giddens and Eddy,<sup>11</sup> (US).

examining nursing skills taught in the first three years of a nursing program in Turkey. They aimed to determine if the skills were utilized during their community system education in an emergency department. During the first three years of their program, students received training on a variety of nursing and physical assessment skills. The physical assessment skills included assessing vital signs (temperature, blood pressure), and cardiac assessment (taking peripheral pulses and evaluating edema). Sixty-seven senior nursing students reported routinely assessing only vital signs throughout their community education in the emergency department.<sup>19</sup>

Birks et al.<sup>16</sup> explored which physical assessment skills were taught in nursing programs throughout Australia. Participants selected whether 121 physical assessment skills (derived from Giddens and Eddy<sup>17</sup>) were taught in their curriculum. Results demonstrated that 98 physical assessment skills (81%) were commonly taught, and of these, 69 (57%) were taught and practiced, 29 (24%) were taught but not practiced, and 23 (19%) were not taught across every program. Across curricula, 23 skills were found to be taught in more than 90% of the programs.<sup>16</sup>

Giddens and Eddy<sup>11</sup> distributed a web-based survey to educators in 198 undergraduate associate degree and baccalaureate science degree nursing programs (42% return rate) in the US to determine and analyze the physical assessment content taught in their curricula. More than 80% (n = 75) of baccalaureate science degree nursing programs reported teaching physical assessment content as an independent course compared to 19.4% (n = 18) of associate degree nursing programs. Of the 122 physical assessment skills (derived from two physical examination textbooks), 99 (81.1%) were reportedly taught by more than 50% of nursing programs, and another 78 skills (63.9%) were taught by over 75%.<sup>11</sup> When comparing all studies in this section, there are 33 physical assessment skills routinely taught in nursing curricula. Of those, 20 were reported by all authors; they are considered core skills.

### Physical assessment skills used by students in nursing programs

Three articles discussed the physical assessment skills used by students in undergraduate nursing programs: Douglas et al.,<sup>9</sup> Kohtz et al.,<sup>13</sup> and Egilisdottir et al.<sup>32</sup> (see Table 2). Douglas et al.<sup>9</sup> received



surveys from 208 graduating nursing students (36.5% return rate) at an Australian university. The survey measured their knowledge, frequency of use, and perceived barriers to physical assessment skills during clinical rotations. They examined the same 126 physical assessment skills derived from Giddens<sup>17</sup> and determined that the following five skills: i) evaluate breathing effort; ii) palpate and inspect capillary refill; iii) palpate extremities for temperature; iv) assess mental status/level of consciousness, and v) use Glasgow Coma Scale were consistently performed in clinical rotations. Findings also revealed that 15 core skills (12%) were used routinely, while 23 (18%) were performed occasionally, and another 53 (42%) were taught but never practiced. The students reported lacking the knowledge on how to perform a total of 35 skills (28%).<sup>9</sup>

Kohtz *et al.*<sup>13</sup> administered a Likert-type scale survey to examine physical assessment skills used among baccalaureate nursing students in the US. They used 126 physical assessment skills previously discussed in research conducted by Giddens<sup>17</sup> in 2007. They found that 21 skills were routinely performed by students during their clinical rotations (Median [Mdn] = 5). Nine physical assessment skills were performed two to five times per week (Mdn = 4), while another eight physical assessment skills were performed occasionally or rarely. Additionally, 79 skills were not used by student nurses in clinical (Mdn = 1) and a further eight skills were unfamiliar to students (Mdn = 0).<sup>13</sup>

Egilsdottir *et al.*<sup>32</sup> distributed a survey and completed focus group interviews with 363 students, in their first, second, or third year of a bachelor's degree program at a Norwegian university. The authors sought to evaluate nursing students' use of fundamental physical assessment skills during their clinical rotations. In their survey, participants selected whether they used any of the 30 skills (selected from Giddens<sup>17</sup> research) during their clinical rotations. Seven skills were found to be used routinely across all cohorts, and a total of 13 skills were used throughout all three years (Mdn = 4). Another 13 skills were used infrequently (Mdn = 3). Four physical assessment skills (auscultate heart sounds, percuss for kidney tenderness, evaluate CN I-XII, and evaluate patella and plantar reflexes) were techniques that either the students did not know how to perform or never used during clinical rotations (Mdn = 1 or 2).<sup>32</sup> Thirty physical assessment skills

**Table 2: Physical assessment skills routinely performed by students during undergraduate nursing program**

Assess gait*
Assess mental status and level of consciousness**
Assess hearing (on the basis of conversation)*
Assess muscle strength*
Assess using Glasgow Coma Scale*
Assess for PERRLA (pupils-equal, round, reactive to light, accommodation)**
Auscultate abdomen for bowel sounds*
Auscultate heart sounds*
Auscultate lung sounds*
Estimate skin fold*
Evaluate breathing <sup>+</sup>
Evaluate face for movement and sensation**
Evaluate speech*
Inspect abdomen <sup>+</sup>
Inspect and palpate extremities for edema <sup>+</sup>
Inspect chest shape**
Inspect external eyes*
Inspect extremities for skin colour and hair growth <sup>+</sup>
Inspect muscles and extremities for size and symmetry*
Inspect overall skin colour**
Inspect skin lesions*
Inspect the oral cavity*
Inspect wounds**
Observe the range of motion of joints*
Palpate and inspect capillary refill <sup>+</sup>
Palpate distal pulses for circulation <sup>+</sup>
Palpate extremities for temperature**
Palpate extremities for tenderness*
Palpate the abdomen for tenderness and distension*
Vital signs-respiratory rate, pulses, blood pressure, oxygen saturation*

Note: skills reported as practiced by Giddens and Eddy<sup>11</sup> are included in this table.  
 \*reported by one author.  
 \*\*reported by two authors.  
<sup>+</sup>reported by all authors (core skills).  
 Authors: (US); Kohtz *et al.*<sup>13</sup> (US) Douglas *et al.*<sup>9</sup> (Australia); Egilsdottir *et al.*<sup>32</sup> (Norway).

**Table 3: Core physical assessment skills routinely taught in nursing curricula and core skills routinely performed by students in clinical practice**

Core skills taught in curricula	Core skills performed by students in clinical practice
Assess gait+	
Assess mental status and level of consciousness+	
Assess muscle strength+	
Assess using Glasgow Coma Scale+	
Auscultate abdomen for bowel sounds+	
Auscultate heart sounds+	
Auscultate lung sounds+	
Evaluate speech+	
Evaluate face for movement and sensation+	
Evaluate breathing+	Evaluate breathing+
Inspect abdomen+	Inspect abdomen+
Inspect and palpate extremities for edema+	Inspect and palpate extremities for edema+
	Inspect extremities for skin colour and hair growth+
Inspect overall skin colour+	
Inspect skin lesions+	
Inspect wounds+	
Observe the range of motion of joints+	
Palpate and inspect capillary refill+	Palpate and inspect capillary refill+
Palpate distal pulses for circulation+	Palpate distal pulses for circulation+
Palpate extremities for temperature+	
Palpate the abdomen for tenderness and distension+	

Note: +reported by all authors (core skills).

Authors: Giddens<sup>1</sup> (US); Birks, et al.<sup>6</sup> (Australia); Cicolini et al.<sup>12</sup> (Italy); Kohtz et al.<sup>2</sup> (US); Douglas et al.<sup>9</sup> (Australia); Egilsdottir et al.<sup>10</sup> (Norway); Cinar et al.<sup>19</sup> (Turkey); Birks et al.<sup>16</sup> (Australia); Giddens and Eddy<sup>11</sup> (US); Douglas et al.<sup>9</sup> (Australia); Kohtz et al.<sup>13</sup> (US); Egilsdottir et al.<sup>20</sup> (Norway).

were routinely performed by students in clinical settings and six skills were the same across all studies (core skills).

Of the six core skills routinely performed by students, five were also routinely taught in nursing curricula (see Table 3 for core physical assessment skills routinely taught in practice or routinely performed by students).

### Physical assessment skills used by RNs in practice

Seven articles discussed physical assessment skills used by RNs in practice: Zambas,<sup>21</sup> Fennessey and Wittmann-Price,<sup>6</sup> Cicolini et al.,<sup>18</sup> Osborne et al.,<sup>29</sup>

Anderson et al.,<sup>28</sup> Birks et al.,<sup>30</sup> and Oh et al.<sup>31</sup> (see Table 4). A philosophical inquiry conducted by Zambas<sup>21</sup> and a literature review conducted by Fennessey and Wittmann-Price<sup>6</sup> discussed physical assessment skills previously established by Giddens<sup>18</sup> in research conducted in 2007. Both reviews outlined the 30 core physical assessment skills (out of 126 identified by Giddens<sup>17</sup>) that were routinely used by RNs in practice. Both literature reviews also discussed research by Secrest et al.<sup>12</sup> which examined 120 physical assessment skills (based on standard textbooks used in nursing education) taught by 12 educators from seven US states. Out of the 120 physical assessments taught, 111 (92.5%) were

**Table 4: Physical assessment skills routinely performed by RNs in practice**

Assess fory PERRLA (pupils-equal, round, reactive to light, accommodation)***
Assess gait****
Assess hearing (on the basis of conversation)****
Assess mental status and level of consciousness <sup>+</sup>
Assess muscle strength***
Assess using Glasgow Coma Scale****
Auscultate abdomen for bowel sounds***
Auscultate carotid artery*
Measure temperature using a thermometer*
Measure SpO2 using a pulse oximeter*
Measure BP using sphygmomanometer*
Measure BP using automatic equipment*
Auscultate heart sounds**
Auscultate lung sounds**
Evaluate breathing <sup>+</sup>
Evaluate face for movement and sensation****
Evaluate speech <sup>+</sup>
Inspect abdomen <sup>+</sup>
Inspect and examine stool***
Inspect chest shape <sup>+</sup>
Inspect extremities for skin colour and hair growth****
Inspect external eyes****
Inspect for jugular pulsation*
Inspect male genitalia (pubic hair, penis, scrotum)*
Inspect muscles and extremities for size and symmetry***
Inspect overall skin colour <sup>+</sup>
Inspect skin lesions <sup>+</sup>
Inspect/palpate extremities for edema <sup>+</sup>

Inspect the oral cavity****
Inspect the spine**
Inspect wounds <sup>+</sup>
Observe the range of motion of joints****
Palpate and inspect capillary refill****
Palpate chest wall for thoracic expansion**
Palpate distal pulses for circulation <sup>+</sup>
Palpate extremities for temperature <sup>+</sup>
Palpate extremities for tenderness***
Palpate the abdomen for tenderness and dis-tension***
Sensory Function-sensation to light touch*

BP, blood pressure; RN, registered nurse.  
 Note skills discussed by Giddens are included as they are skills discussed by Zambas<sup>21</sup> (New Zealand); Fennessey and Wittmann-Price<sup>6</sup> (unknown).  
<sup>\*</sup>selected by one author.  
<sup>\*\*</sup>selected by two authors.  
<sup>\*\*\*</sup>selected by three authors.  
<sup>\*\*\*\*</sup>selected by four authors.  
<sup>\*\*\*\*\*</sup>selected by five authors.  
<sup>+</sup>selected by all authors (core skills).  
 Authors: Giddens<sup>17</sup> (US); Anderson et al.<sup>28</sup> (US); Cicolini et al.<sup>18</sup> (Italy); Osborne et al.<sup>29</sup> (Australia); Birks et al.<sup>30</sup> (Australia); Oh et al.<sup>31</sup> (Korea).

taught and practiced by students, and nine (7.5%) were taught but not practiced. Additionally, Secrest et al.<sup>12</sup> studied 51 practicing RNs and found that they used 29% of the same skills on a daily or weekly basis, while 34% were used infrequently, and 37% were never used.

Cicolini et al.<sup>18</sup> collected 1182 completed surveys from all full-time RNs employed in either public or private facilities, in inpatient or outpatient settings in Italy. The authors selected 30 core physical assessment skills identified by Giddens<sup>17</sup> to establish which skills were routinely performed by RNs in practice in Italy. The 30 physical assessment skills used in the survey were routinely taught in the Italian bachelor nursing degree. Authors reported that only 20 of the 30 physical assessment skills were routinely performed by RNs in practice or “regularly” performed by most participants.<sup>18</sup>

Osborne et al.<sup>29</sup> conducted 434 self-reported surveys (RNs [n = 283], managers/educators [n = 47], and midwives [n = 96]) in Australia. Ten core skills were routinely performed. The first five most often performed included components of vital signs and

inspection of skin. Core skills regularly performed (every time they worked) differed by clinical area, with mental health using the least amount of physical assessment skills ( $n = 7$ ) and surgical using the most ( $n = 16$ ).<sup>29</sup>

Anderson *et al.*<sup>28</sup> randomly selected and surveyed 900 RNs (9.56% completion rate) in the US to determine which physical assessment skills out of 126 (Giddens<sup>17</sup>) were used in practice. Results showed that 29.37% ( $n = 37$ ) skills were performed almost every time RNs worked, 14.29% ( $n = 18$ ) were performed occasionally, and a final 56.35% ( $n = 71$ ) skills were used very minimally or not used in their practice.<sup>28</sup>

Birks *et al.*<sup>30</sup> sought to determine which physical assessment skills were performed on a regular basis by RNs in Australia using a modified version of Giddens' 2007 survey of physical assessment skills.<sup>17</sup> A total of 1220 surveys were completed, revealing that only 34% (13 of the 121 skills) are used on a routine basis. Additionally, 31% of skills were found to be used rarely in practice, with the remaining 35% of skills were found to not be used in practice at all.<sup>30</sup>

Oh *et al.*<sup>31</sup> sought to identify RNs learning needs about physical assessment. Specifically, they aimed to examine the perceived competency, frequency of skill use, and unmet training needs. They utilized a cross-sectional exploratory survey study with 104 RNs, and using mean scores  $\geq 3$  demonstrated that 26 skills were frequently or very frequently performed. The "evaluate breathing effort" physical assessment skill was rated as the most frequently implemented skill. Auscultation of heart sounds was rated as the least frequently performed.<sup>31</sup> When the articles were compared, 39 physical assessment skills were routinely performed by RNs in practice, and 11 skills were the same across all studies (core skills).

### Core physical assessment skills for nursing curricula

Core skills were skills that were listed across all studies. Birks *et al.*,<sup>16</sup> Cicolini *et al.*,<sup>18</sup> and Giddens and Eddy,<sup>11</sup> discussed physical assessment skills taught in undergraduate nursing programs, while Cinar *et al.*,<sup>19</sup> Egilsdottir *et al.*,<sup>32</sup> Kohtz *et al.*,<sup>13</sup> and Douglas *et al.*<sup>9</sup> examined skills used by students in undergraduate nursing curricula. Birks *et al.*<sup>16</sup> found that 23 physical assessment skills were taught in 90% of the nursing programs throughout

Australia. Similarly, Cicolini *et al.*<sup>18</sup> found that 30 core skills were routinely taught in the nursing curriculum in Italy. Conversely, Giddens and Eddy<sup>11</sup> found that 99 skills (81.1%) were routinely taught in more than 50% of nursing programs across the US. These skills were not provided.

Various physical assessment skills are taught in global nursing curricula; however, not all the skills are routinely utilized by the nursing students. Cinar *et al.*<sup>19</sup> examined one emergency department training hospital in Turkey and determined that many nursing skills were taught to students, however, physical assessments were limited to temperature, blood pressure, assessment of peripheral pulses, and evaluating edema. Of these, only vital signs were routinely assessed in clinical.<sup>19</sup> The study by Egilsdottir *et al.*,<sup>32</sup> done at a Norwegian university, noted that seven physical assessment skills scored a median of four or higher across all levels (first-, second-, and third-year students), indicating that these seven skills were used regularly in all three years of clinical rotations. Furthermore, there was a total of 13 skills used routinely during the program ( $Mdn \geq 4$ ). Kohtz *et al.*<sup>13</sup> reported 30 skills routinely used by students in the US nursing programs, while Douglas *et al.*<sup>9</sup> found only 15 were performed by students in Australia during clinical rotations (see Table 3 for core physical assessment skills routinely taught in practice or routinely performed by students).

Two articles, one by Anderson *et al.*<sup>28</sup> and the other by Cicolini *et al.*,<sup>18</sup> discussed skills used routinely by RNs in practice. Anderson *et al.*<sup>28</sup> found that 37 skills were routinely used by RNs in one state in the US. Comparably, Cicolini *et al.*<sup>18</sup> determined that 20 skills were used routinely by RNs in practice in Italy. Since many authors use all or some of the physical assessment skills identified by Giddens<sup>17</sup> in 2007, those 30 core assessment skills will be used as a comparator.

A comparison is made between core physical assessments taught in the curriculum and those performed by RNs in practice. There were more core skills taught in curricula compared to those performed in practice. Twenty core physical assessment skills were reported by authors as being routinely taught in school, while 11 were routinely performed in practice. In addition, 10 of the physical assessment skills that are taught in curricula are routinely performed by RNs in practice (see Table 5).

**Table 5: Core physical assessment skills taught in undergraduate nursing curricula and performed by RNs in practice**

Core skills taught in all curricula	Core skills performed by RNs in practice
Assess gait	
Assess mental status and level of consciousness	Assess mental status and level of consciousness
Assess muscle strength	
Assess using the Glasgow Coma Scale	
Auscultate abdomen for bowel sounds	
Auscultate heart sounds	
Auscultate lung sounds	
Evaluate breathing	Evaluate breathing
Evaluate face for movement and sensation	
Evaluate speech	Evaluate speech
Inspect abdomen	Inspect abdomen
	Inspect chest shape
Inspect overall skin colour	Inspect overall skin colour
Inspect skin lesions	Inspect skin lesions
Inspect/palpate extremities for edema	Inspect/palpate extremities for edema
Inspect wounds	Inspect wounds
Observe the range of motion of joints	
Palpate and inspect capillary refill	
Palpate distal pulses for circulation	Palpate distal pulses for circulation
Palpate extremities for temperature	Palpate extremities for temperature
Palpate the abdomen for tenderness and distension	

RN, registered nurses.

Note: core skills reported by all authors (core skills).

Authors: Core skills taught in curricula: Cinar *et al.*<sup>19</sup> (Turkey); Birks *et al.*<sup>16</sup> (Australia); Giddens and Eddy<sup>11</sup> (unknown).

Core skills performed by RNs in practice: Giddens<sup>17</sup> (US); Anderson *et al.*<sup>28</sup> (US); Cicolini *et al.*<sup>18</sup> (Italy); Osborne *et al.*<sup>29</sup> (Australia), Birks *et al.*<sup>30</sup> (Australia); Oh *et al.*<sup>31</sup> (Korea).

## Discussion

This scoping review identified and mapped the current knowledge regarding the physical assessment skills practiced in clinical settings by students and RNs globally. Specifically, this scoping review outlined the physical assessment skills routinely taught in undergraduate nursing programs, the skills routinely practiced by students during clinical rotations, and the skills routinely performed by RNs in practice. In addition, this scoping review outlined core physical assessment skills taught in school compared to the core skills performed by RNs in practice. There are more core skills taught in nursing curricula

than are performed by RNs in practice. Twenty core physical assessment skills are taught in nursing curricula, yet only 10 of these skills are performed by RNs in practice. Furthermore, one skill, inspect chest shape, is a core skill performed by RNs in practice that is not a core skill taught in curricula. This review supports prior claims in literature of a disconnect between physical assessment skills taught in nursing curricula and those routinely performed by RNs in practice.<sup>9,20</sup>

There are various factors in both academia and health care sectors that account for this disconnect. The development of nursing curricula is impacted by

the need to provide opportunities that solidify students' competency and confidence in practice.<sup>21</sup> Nursing graduates must be able to adapt their practice so that skills, competencies, and professional development align with the rapidly changing demands of health care.<sup>5</sup> Changing models of care and settings, expanding nursing scope of practice, and utilization of new technology<sup>6</sup> all impact what is taught in nursing curricula. The increasing complexity of patient care,<sup>5,33</sup> the risk for "failure to rescue,"<sup>11</sup> and the inability of RNs to recognize deteriorating patients<sup>34</sup> drive curricula development globally. Educators are forced to consider multiple factors when contemplating which physical assessment skills are essential to include in nursing curricula.

Health care sectors impact what is taught in nursing curricula. Institutional requirements, along with changing technology, increasingly complex patients, and expanding scope of practice for RNs, all alter the expectations of RNs in practice. There are even unit-specific expectations within health care as agencies determine physical assessment skills needed for various units.<sup>35,36</sup> To further add to the disconnect is the RNs themselves. There are variations in individual RNs' practices and the physical assessment skills they feel should be performed routinely. This is demonstrated by the multiple surveys reflecting the variations in the physical assessment skills used by RNs in practice.<sup>16,17,18,23</sup> The needs of the health care sector may not be reflected in curriculum. Indeed, nurse administrators report that new graduates do not meet competency expectations.<sup>20</sup> It is questioned whether nursing education even meets the needs of the health care sector.<sup>9</sup> As a result, educators must adapt curriculum to provide the education that meets expectations for new graduates. Changing nursing curricula is often a daunting and time-consuming task. Therefore, it is necessary to have educators with the knowledge and expertise to design a program relevant to nursing practice.<sup>37</sup>

There are also variations in the physical assessment skills performed by RNs practicing globally. In Italy, Cicolini's study<sup>18</sup> found that RNs never performed auscultation of lung, heart, or bowel sounds, nor did they perform spine inspection. Oh *et al.*<sup>31</sup> had similar findings. Registered nurses reported feeling less competent performing auscultation of heart and lung sounds as well as inspection of the spine. Their lack of perceived competency also resulted in decreased frequency in performing these skills.

Contrastingly, Anderson *et al.*<sup>28</sup> reported that in the US, all of these were considered core physical assessment skills performed routinely by RNs in practice, which was a similar finding of Giddens<sup>17</sup> in 2007. Giddens found that in the US, auscultation of lung, heart, and bowel sounds were routinely performed by more than 78% of the RNs, and spine inspection was assessed routinely in 51.8%. Global discrepancies can also impact nursing curricula. Registered nurses that practice in various international health care sectors need education regarding global practices and standards of care.<sup>38</sup> This will help ensure that RNs receive education that can transcend borders.

### Limitations

This article is a scoping review. As such there are limitations with this methodology. The purpose of a scoping review is primarily to gather information rather than appraise the quality of the evidence. Additionally, most of the articles in this scoping review reference Giddens<sup>17</sup> research, which identified 126 physical assessment skills taught in nursing curricula and the 30 skills routinely used by RNs in practice. Although this is a noteworthy article, the research was conducted in 2007, and additional skills that are currently taught in nursing curricula may have been missed. It was also difficult to compare all articles when there are differences in physical assessment skills used in some studies. In addition, Oh *et al.*<sup>31</sup> did not connect their rating on their Frequency of Physical Assessment Scale (FPAS) (1-5) with the comparison table. Therefore, it was difficult to align the mean score with FPAS score. Lastly, the search was limited to articles in the English language.

### Conclusion

Nursing curricula must be continually examined to determine if the educational needs and expectations for RNs in all health care sectors nationally and internationally are aligned. Nurse educators need to evaluate what physical assessments are taught and if the focus is on the appropriate core skills. Identifying core physical assessment skills for nursing education not only ensures consistency in practice, but also improves patient outcomes.

### Implications for research

More research is needed regarding the current curricula of nursing programs globally, to determine if

physical assessment skills are being taught that have not been captured in studies to date. Future research can also focus on large multisite studies to compare physical assessment skills used by RNs in practice. Additional research is also needed that examines the core skills routinely used in various health care agencies. This information may help establish a specific set of foundational core physical assessment skills that should be taught in all nursing curricula globally.

### Implications for practice

Although some countries teach similar physical assessment skills in their curriculum, there are variations in core skills utilized by RNs. Global similarities in nursing education are essential as RNs often practice in a variety of international health care sectors. It is not uncommon for RNs to obtain nursing education in one country, then seek employment abroad. The variations in global nursing curricula are concerning as it makes establishing universal physical assessment skills extremely challenging. Educators need to be aware of the implications for nursing education given that quality patient care and safety are top global priorities. Long term, similar core physical assessment skills should be taught in nursing curricula globally.

### Acknowledgments

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## Appendix I: Search strategy

### MEDLINE (Ovid)

Final searches conducted: November 3, 2020

Search	Query	Records retrieved
#1	exp Physical examination/ or (physical examination* or physical assessment*).ti,ab,kw.	
#2	exp education, nursing/ or (((education or program*) adj2 nurs*) or curricul*).ti,ab,kw.	
#3	((Nurs* adj2 student*) or pupil nurse*).ti,ab,kw. or Students, nursing.sh.	
#4	exp clinical competence/ and (exp nurses/ or nurs*.ti,ab,kw.)	
#5	#1 AND (#2 OR #3 OR #4)	
Limited to English Language, Published January 1, 2008–November 28, 2019		1710

### CINAHL Complete (EBSCO)

Search	Query	Records retrieved
#1	MH "Physical examination+" OR TI "physical examination" OR AB "physical examination" OR TI "physical examinations" OR AB "physical examinations" OR OR TI "physical assessment" OR AB "physical assessment" OR TI "physical assessments" OR AB "physical assessments"	
#2	MH "Education, nursing+" OR MH curriculum+ OR TI (education N2 nurs*) OR AB (education N2 nurs*) OR TI (program N2 nurs*) OR AB (program N2 nurs*) OR TI curricul* OR AB curricul*	
#3	MH "Students, nursing+" OR TI (nurs* N2 student*) OR AB (nurs* N2 student*) OR TI "pupil nurse" OR AB "pupil nurse" OR TI "pupil nurses" OR AB "pupil nurses"	
#4	(MH "Clinical Competence") AND ((MH "Registered Nurses") OR (TI (nurs*) OR AB (nurs*)))	
#5	S1 AND (S2 OR S3 OR S4)	
Limited to English Language, Published January 1, 2008–November 28, 2019		680

### Scopus (Elsevier)

Search	Query	Records retrieved
#1	TITLE-ABS-KEY("Physical examination" OR "physical examinations" OR "physical assessment" OR "physical assessments")	
#2	(TITLE-ABS-KEY((education W/2 nurs*) OR (program W/2 nurs*) OR curricul*))	

<i>(Continued)</i>		
Search	Query	Records retrieved
#3	(TITLE-ABS-KEY((nurs* W/2 student*) OR "pupil nurse" OR "pupil nurse"))	
#4	#1 AND #2 AND #3	
Limited to English Language, Published January 1, 2008–November 28, 2019		73

**Cochrane Central Register of Controlled Trials (Ovid)**

Search	Query	Records retrieved
#1	(physical examination* or physical assessment*).ti,ab,kw.	
#2	Exp education, nursing/ or curriculum.sh. or (((education or program*) adj2 nurs*) or curricul*).ti,ab,kw.	
#3	((Nurs* adj2 student*) or pupil nurse*).ti,ab,kw. or Students, nursing.sh.	
#4	#1 AND #2 AND #3	
Limited to English Language, Published January 1, 2008–November 28, 2019		8

**ProQuest Theses and Dissertations Global**

Search	Query	Records retrieved
#1	ab("Physical examination" OR "physical examinations" OR "physical assessment" OR "physical assessments") OR ti("Physical examination" OR "physical examinations" OR "physical assessment" OR "physical assessments") OR su("Physical examination" OR "physical examinations" OR "physical assessment" OR "physical assessments")	
#2	ab((education NEAR/2 nurs*) OR (program NEAR/2 nurs*) OR curricul*) OR ti((education NEAR/2 nurs*) OR (program NEAR/2 nurs*) OR curricul*) OR su((education NEAR/2 nurs*) OR (program NEAR/2 nurs*) OR curricul*)	
#3	ab((nurs* /N2 student*) OR "pupil nurse" OR "pupil nurse") OR ti((nurs* N/2 student*) OR "pupil nurse" OR "pupil nurse") OR su((nurs* N/2 student*) OR "pupil nurse" OR "pupil nurse")	
#4	#1 AND #2 AND #3	
Limited to English Language, Published January 1, 2008–November 28, 2019		8

**OpenGrey**

Search	Query	Records retrieved
#1	"physical examination" OR "physical examinations" OR "physical assessment" OR "physical assessments"	
#2	ab((education NEAR/2 nurs*) OR (program NEAR/2 nurs*) OR curricul*)	
#3	(nurs* NEAR/2 student*) OR "pupil nurse" OR "pupil nurse"	
#4	#1 AND #2 AND #3	
Limited to English Language, Published January 1, 2008–November 28, 2019		0

**Open Access Theses and Dissertations**

Search	Query	Records retrieved
#1	("physical examination") AND (education OR program OR curriculum OR curricula) AND ("nursing student")	
#2	("physical assessment") AND (education OR program OR curriculum OR curricula) AND ("nursing student")	
#3	#1 OR #2	
Published January 1, 2008–November 28, 2019		0

**Google Scholar**

Search	Query	Records retrieved
#1	intitle:(("physical examination" AND ("nursing education" OR "nursing program" OR "nursing curriculum") AND "nursing student")	
Published January 1, 2008–November 28, 2019		8

**Appendix II: Sources excluded following full text review**

Alamri MS, Almazan JU. Barriers of physical assessment skills among nursing students in Arab Peninsula. *Int J Health Sci.* 2018;12(3):58.

*Reason for exclusion:* Does not address the research question.

Aldridge-Bent S. Advanced physical assessment skills: implementation of a module. *Br J Community Nurs.* 2011;16(2):84-8.

*Reason for exclusion:* Does not address the research question.

Baker C. Commentary: future directions for nursing education. *Can J Nurs Leadersh.* 2014;27(2):35-9.

*Reason for exclusion:* Does not address the research question.

Blakeman JR, Clark BJ. Promoting creativity using a history and physical examination project in an undergraduate course. *J Nurs Educ.* 2018;57(6):386-7.

*Reason for exclusion:* Not a physical assessment technique.

Bland M, Ousey K. Preparing students to competently measure blood pressure in the real-world environment: a comparison between New Zealand and the United Kingdom. *Nurse Educ Pract.* 2012;12(1):28-35.

*Reason for exclusion:* Does not address the research question.

Bosse JD, Nesteby JA, Randall CE. Integrating sexual minority health issues into a health assessment class. *J Prof Nurs Off J Am Assoc Coll Nurs.* 2015;31(6):498-507.

*Reason for exclusion:* Does not address the research question.

Brokalaki H, Matziou V, Gymnopoulou E, Galanis P, Brokalaki E, Theodossiades G. Modification of nursing students' performance in blood pressure measurement: an educational retraining programme. *Int Nurs Rev.* 2008;55(2):187-91.

*Reason for exclusion:* Does not address the research question.

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*Reason for exclusion:* Does not address the research question.

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## Appendix III: Characteristics of the included studies

Author/year/ country of origin	Purpose	Population and sample size	Methodology	Concepts of interest	Outcomes and key findings
Anderson <i>et al.</i> (2014) <sup>28</sup> USA	The purpose of this study was to obtain current data relevant to the physical assessment competencies utilized by RNs living and practicing in the state where the university is located.	Participants (n = 900) included randomly selected RNs with active licensure residing in Arkansas.	A quantitative study involving the administration of a survey Of RNs was conducted.  Analysis: Survey responses were entered into a Microsoft Excel (Redmond, Washington, USA) spreadsheet by a non-biased university employee. Nursing faculty used the Excel spreadsheet to analyze the data.	Physical assessment skills used by nurses in practice	Authors found that 37 competencies were performed by participants every time they worked. Another 18 competencies were identified by participants as performed occasionally. Participants identified 71 competencies as components of physical assessment they did not know how to perform, had never performed in clinical practice, or had performed only a few times during their career. A total of 38 competencies were determined to be an essential component of the physical assessment.
Birks <i>et al.</i> (2013) <sup>30</sup> Australia	The purpose of this study was to explore the use of 121 physical assessment skills in Australian nurses.	N = 1220 Questionnaires were administered to members of the Australian Nursing Federation in New South Wales Australia	Quantitative survey was used. Giddens 2007 survey was modified and distributed to participants via mail. Analysis: Data were downloaded and analyzed using SPSS statistics software. Summary statistics (means, percentages) were used to describe demographic variables.  Spearman's rank order correlation was used to determine association between demographic variables. For each of the scale items, the median response was computed from the response range (0–5) and this was used as the main indicator of overall skills use. Section ratings were summed by category of survey item (eg, 'head', 'neck, thorax') to obtain a sectional response score.	Physical assessment skills used by nurses in practice.	Respondents indicated that they used only 34% of skills routinely. Results reinforce evidence found in the literature that many of the skills taught to nurses are either not used at all (35.5%) or are used rarely (31%). Core skills used every time they worked are as follows: Inspect overall skin color/tone Inspect skin lesions Inspect wounds Evaluate breathing effort (rate, patterns, chest expansion) Assess mental status/level of consciousness Glasgow Coma Scale Evaluate speech Palpate distal pulses for circulation Palpate and inspect capillary refill Inspect/palpate extremities for edema Palpate extremities for temperature Inspect extremities for skin color/hair growth Inspect abdomen

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<b>Author/year/ country of origin</b>	<b>Purpose</b>	<b>Population and sample size</b>	<b>Methodology</b>	<b>Concepts of interest</b>	<b>Outcomes and key findings</b>
Birks <i>et al.</i> (2014) <sup>16</sup> Australia	This study was part of a larger project to explore the teaching of physical assessment skills in pre-registration nursing programs across Australia	Participants (n = 53) consisted of nurse academics who completed the survey across Australian states.	A cross-sectional survey was conducted utilizing an online questionnaire. This involved use of an existing valid instrument developed by Giddens (in Giddens and Eddy, 2009).  Analysis: Following collection and downloading of data, analysis was undertaken using IBM SPSS v.17 computer software (Armonk, NY: IBM Corp). Data were summarized using summary statistics to describe skills teaching.	Physical assessment skills students use throughout the nursing program	Authors found that nearly half the respondents indicated that physical assessment skills were taught as: <ul style="list-style-type: none"> <li>• individual subject or unit (46%)</li> <li>• content integrated throughout the program (48%)</li> <li>• 81% of the 121 skills were commonly taught (Figure 1)</li> <li>• 69 skills (57%) were taught with student practice</li> <li>• 29 (24%) were taught with no student practice</li> <li>• 23 (19%) were not taught across every program.</li> </ul>
Cicolini <i>et al.</i> (2015) <sup>18</sup> Italy	The purpose of this study was to describe which of the core techniques of the physical assessment are regularly performed by a sample of Italian nurses, and to investigate the potential predictors of a more complete examination.	Participants (n = 1182) consisted of Italian RNs employed in a public or private facility with a full-time contract	A multi-centric, cross-sectional survey was performed using a validated questionnaire (Giddens 2007) through a web-based survey.  Analysis: Descriptive statistics were used to describe the general characteristics of the sample and the frequency of each physical examination item.	Physical assessment skills students use throughout the nursing program	30 items routinely taught and performed, according to the Italian bachelor's degree.  Of the 30 selected core techniques, 20 were "frequently" or "regularly" performed by the majority of the participants
Cinar F <i>et al.</i> (2014) <sup>19</sup> Turkey	The purpose of this study was to determine how often nursing students find an opportunity to observe and/or practice nursing skills during their training in an emergency department.	Participants (n = 67) included senior nursing students who underwent practical training.	A descriptive study was conducted in the emergency department of a research and training hospital by administering a "nursing skills evaluation form." Ninety-one skills in this form contain the nursing skills of first three years' courses. Students indicated skills they practiced and/or observed during their practical training.  Analysis: Descriptive analysis and inferential statistics were reported	How often nursing students have the opportunity to observe or perform the physical assessment skills that are taught in the nursing curriculum	Some nursing skills are practiced very often, while others were never practiced. There is an inequality among students related to practice or observing the nursing skills in practice. Authors assessed the frequency of nursing skills practiced or observed during the emergency training by senior nursing students. While skills are important to teach, students need opportunities to observe or practice in the clinical setting.

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<b>Author/year/ country of origin</b>	<b>Purpose</b>	<b>Population and sample size</b>	<b>Methodology</b>	<b>Concepts of interest</b>	<b>Outcomes and key findings</b>
Douglas <i>et al.</i> (2015) <sup>9</sup> Australia	The purpose of this study was to examine the pattern and correlates of physical assessment skill utilization by final semester nursing students.	Participants (n = 654) included students enrolled in a capstone unit following a four-week clinical placement at the beginning of the semester	<p>A cross-sectional survey design was used.</p> <p>Analysis: Descriptive statistics were used to summarize the sample characteristics and to examine the use of physical assessment and perceived barriers. Associations between student characteristics and use of physical assessment skills or perceived barriers were examined using t-tests and analyses of variance. The relationships between perceived barriers and use of physical assessment were explored using Pearson's correlations.</p> <p>Qualitative data were deductively coded around the analytic focus of physical assessment skills and perceived barriers to physical assessment.</p>	Physical assessment skills students use throughout the nursing program.	<p>Of the 126 skills surveyed, on average, only 5 were used every time students practiced. Most skills (70%) were, on average, never performed or learned and students perceived nursing physical assessment was marginalized in both university and workplace contexts. Lack of confidence was, thus, a significant barrier to use of skills.</p> <p>70% of skills were not learned or performed across the university and clinical settings in final semester nursing students. Of these, 42% of skills were learned, but not practiced.</p> <p>Authors felt that nursing students did not have the opportunity to develop and practice assessment skills during their education, which may help explain a lack of application in practice.</p>
Egilsdottir <i>et al.</i> (2019) <sup>32</sup> Norway	The purpose of this study was to evaluate nursing students' self-reported use of basic physical assessment skills (B-PAS) in clinical rotation after learning them in their nursing education. Authors also sought to identify factors that inhibit or encourage nursing students to use B-PAS and how these factors can influence the students' development of competence and confidence in applying these skills.	Participants (n = 363) included students from a nursing bachelor degree program at a Norwegian university	<p>A mixed-method cohort design was used for this study. Authors evaluated nursing students' self-reported use of B-PAS during their clinical rotation using the "Survey of Examination Techniques Performed by Nurses" questionnaire (30 items). In addition, two focus group interviews elicited factors that hinder or facilitate the actual use of B-PAS during clinical rotation.</p> <p>Analysis: Descriptive statistics were used to analyze demographic and B-PAS data in the questionnaires (SPSS 24). The focus group interviews were analyzed using content analysis. Central themes were identified, further abstracted as subcategories, and then presented as main categories</p>	Physical assessment skills students use throughout the nursing program	<p>Despite reduced PAS being taught in the curriculum, there is still a lack of use of B-PAS in clinical rotations. Even though B-PAS are not fully used, the results indicate that they are increasingly used in clinical rotation throughout the three-year nursing program.</p> <p>The main categories for the focus group interviews:</p> <ul style="list-style-type: none"> <li>i) Taking vital signs and being responsible for NEWS score are routine student assessments but doing more is challenging.</li> <li>ii) Skill development in clinical practice can be fostered by access to digital learning resources when in clinical rotation.</li> <li>iii) A culture for articulation of knowledge fundamental for clinical reasoning, clinical judgment, and self-efficacy in B-PAS.</li> </ul>

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<b>Author/year/ country of origin</b>	<b>Purpose</b>	<b>Population and sample size</b>	<b>Methodology</b>	<b>Concepts of interest</b>	<b>Outcomes and key findings</b>
Fennesey and Whitmann-Price. (2011) <sup>6</sup> unknown	The purpose of this integrative review of the literature was to explore the state of knowledge of nursing physical assessment within the framework of the overall nursing process, discuss the relevance of physical assessment to nursing practice, and relate physical assessment skills to current practice, competency, and clinical decision-making.	N = 76 articles identified, retrieved, and reviewed originating from the United States, New Zealand, Japan, Australia, and the United Kingdom.	A comprehensive literature review was conducted in December 2009 using EBSCO, CINAHL, MEDLINE (Ovid), MEDLINE (PubMed), and PsycINFO.  No strategy for analysis was provided.	Physical assessment skills used by nurses in practice. Physical assessment skills taught in nursing curricula	The review revealed various names used when referring to physical assessment. Two key themes or attributes emerged from this literature review: competency and clinical decision-making. Secret <i>et al.</i> <sup>23</sup> found that out of 120 physical assessment skills taught, only 29% of these skills were actually used on a daily or weekly basis by practicing nurses. Giddens <sup>26</sup> found 30 core skills to be consistently used in practice. Giddens and Eddy <sup>1</sup> found that the physical assessment skills taught to nursing students did not differ by the type of program.
Giddens and Eddy (2009) <sup>11</sup> USA	The purpose of this study was to determine and analyze the physical assessment content taught in undergraduate nursing programs.	Participants (n = 198) included individuals teaching undergraduate ADN and BSN nursing programs in the United States.	A descriptive cross-sectional study using a web-based survey that included 122 skills was performed. The second part of the survey comprised a list of 122 physical assessment skills in 18 system categories to determine which skills were being taught in the curriculum.  Analysis: A descriptive and comparative approach to data analysis was used. Cross tabulations and $\chi^2$ statistics were performed.	Physical assessment skills students use throughout the nursing program, and physical assessment skills used by students throughout their nursing program.	Physical assessment was taught as an independent course in 48.2% (n = 93) of undergraduate programs. The content was taught in an integrated approach across multiple courses in 26.4% (n = 51) of the programs and was paired with other course content within one course in 19.2% (n = 37). Other arrangements were described in 6.2% (n = 12) of the programs. Differences exist when comparing approaches between ADN and BSN programs; 80.6% (n = 75) of BSN programs reported teaching physical assessment content as an independent course compared to 19.4% (n = 18) of ADN programs. Of the 122 skills within the survey, 81.1% (n = 99) were reportedly taught by more than 50% of nursing programs; 63.9% (n = 78) were taught by over 75% of nursing programs.

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<b>Author/year/ country of origin</b>	<b>Purpose</b>	<b>Population and sample size</b>	<b>Methodology</b>	<b>Concepts of interest</b>	<b>Outcomes and key findings</b>
Kohtz, C. <i>et al.</i> (2017) <sup>13</sup> USA	The purpose of this study was to examine the physical assessment skills taught and used among nursing students at one baccalaureate nursing education program in midwestern United States.	Participants (n = 262) consisted of first, second, and third year baccalaureate nursing students	A cross-sectional, descriptive quantitative study was conducted using a survey  Analysis: Descriptive statistics were used to analyze demographic and physical assessment skill data.	Physical assessment skills students use throughout the nursing program.	126 physical assessment skills were surveyed. 21 skills were found to be performed each time the participant worked. 9 physical assessment skills were found to be performed two to five times per week. 30 skills were considered core assessment skills. 8 skills were performed occasionally or rarely. 3 physical assessment skills were never performed. 5 physical assessment skills were performed rarely or a few times in their academic career.  Participants knew how to perform 79 of the identified skills but had not done so in clinical practice. There were 8 skills whereby participants were unfamiliar with the skill altogether. Overlap existed between Giddens (2007) study and the current study for 27 of the 30 physical assessment skills.
Oh <i>et al.</i> (2012) <sup>31</sup> Korea	The purpose of this study was to identify registered nurses learning needs about physical assessment. The authors specifically aimed to assess the perceived competency, frequency of physical assessment skill use, and unmet training needs.	Participants (N = 104) were registered nurses with varying years of experience (<1 year to >5years).	A cross-sectional exploratory survey study. Data were collected through three instruments: i) the Perceived Competency in Physical Assessment Scale, ii) the Frequency of Physical Assessment Scale, and iii) the Training Needs of Physical Assessment Scale, which incorporated 30 core physical assessment skills. Analysis: Descriptive statistics, t-test, and Pearson's correlation coefficient were used to analyze the data.	RNs' perceived competency, frequency of skill use, and unmet training needs.	The results demonstrated that auscultation of heart and lung sounds and inspection of the spine were rated as the physical assessment skills the participants felt least competent performing and that they performed these skills less frequently. The most competent area rated by the subjects was assessment of the neurological system. The respiratory and abdominal system was identified as two systems where more education would be required. Perceived competency was positively related to the frequency of physical assessment.

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<b>Author/year/ country of origin</b>	<b>Purpose</b>	<b>Population and sample size</b>	<b>Methodology</b>	<b>Concepts of interest</b>	<b>Outcomes and key findings</b>
Osborne <i>et al.</i> (2015) <sup>29</sup> Australia	The objectives of this study were to determine a minimum data set of core skills used during nursing assessment of hospitalized patients and identify nurse and workplace predictors of the use of physical assessment to detect patient deterioration.	Participants (n = 434) registered nurses and midwives (Grades 5-7) involved in clinical care of patients on acute care wards, including medicine, surgery, oncology, mental health, and maternity service areas, at a 929-bed teaching hospital.	A single-center, cross-sectional, self-reported hospital-wide survey using the 133-item Physical Assessment Skills Inventory and the 58-item Barriers to Registered Nurses' Use of Physical Assessment Scale.  Analysis: Descriptive statistics to summarize the sample characteristics and use of physical assessment skills. Core skills-median frequency of 5. Mean core skill utilization was compared using ANOVAs. Associations between use of core skills and barrier subscales were explored using Pearson's correlations. Linear regression adjusted for clinical role and work area. Predictors of core skill utilization were analyzed using backward stepwise general linear modelling. Means and regression coefficients were reported with 95% confidence intervals. A p value < .05 was considered significant for all analyses. Nurses division of work was set as a random effect to account for any clustering effect.	Registered nurse and midwife frequency of use of physical assessment skills, and factors that influence registered nurses and midwives' physical assessment activities in the acute care hospital ward.	Core skills used by most nurses every time they worked included assessment of temperature, oxygen saturation, blood pressure, breathing effort, skin, wound and mental status. Reliance on others and technology, lack of confidence, work area, and clinical role were significant predictors of the extent of physical assessment skill use.
Zambas, SI (2010) <sup>21</sup> New Zealand	The purpose of this article was to explore systematic physical assessment through the lens of the philosophical paradigms of positivism and interpretivism.	N/A	Philosophical article call to action No analysis strategy identified	Physical assessment skills taught in nursing curricula. Physical assessment skills used by nursing students.	Skills used in clinical practice: educators confirmed that they taught 92% of a potential 120 assessment skills; only 29% were used daily or weekly and 37% were never used. Similarly, Giddens (2007) identified 30 core nursing skills routinely performed by nurses from a list of 126 identified from nursing assessment textbooks. Core skills were identified and were considered by nurses to be most beneficial to patient outcomes.

ADN, associate nursing degree; B-PAS, basic physical assessment skills; BSN, baccalaureate science degree nursing; PAS, physical assessment skills; RN, registered nurse

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