

Article type: Systematic review or other type of review paper

- Short informative title

ASSESSMENT OF NURSING STUDENTS' **COMPETENCE** IN CLINICAL PRACTICE: A SYSTEMATIC REVIEW OF REVIEWS

- Short running title

ASSESSMENT OF STUDENTS **COMPETENCE** IN CLINICAL PRACTICE

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2 **ABSTRACT**

3 **Background:** The assessment of nursing students' **nursing** competence is a matter of concern
4 worldwide and the complexity of assessing students' clinical **competence** has challenged educators
5 for decades. It has been recognized that there is inconsistency among assessment methods and
6 tools between countries and institutions.

7 **Objective:** To identify the current best evidence on the assessment of nursing students'
8 **competence** in clinical practice.

9 **Design:** Systematic review of reviews.

10 **Data sources:** The electronic databases CINAHL, PubMed, Eric, Medic and the JBI Database of
11 Systematic Reviews and Implementation Reports were searched in autumn 2018.

12 **Review methods:** Two researchers independently assessed the eligibility of the studies by title,
13 abstract and full-text, and then assessed the methodological quality of the included studies.
14 Analysis of study findings was conducted using the thematic synthesis approach.

15 **Results:** Six reviews were included following critical appraisal. **Assessment tools used to assess**
16 **students' nursing competence commonly focus on the domains of professional attributes, ethical**
17 **practices, communication and interpersonal relationships, nursing processes, critical thinking and**
18 **reason. Clinical learning environments and mentoring provide important support structures and**
19 **guide the learning of students. The availability of assessment tools and criteria along with**
20 **providing individualized feedback and time for reflection strengthen the objectivity and reliability**
21 **of assessment.**

22 **Conclusions:** **There continues to be a need to develop consistent and systematic approaches in**
23 **assessment, and to use reliable and valid instruments in assessment. Mentors find assessment of**
24 **students' competence to be particularly challenging and emphasize the importance of clear**
25 **assessment criteria, support from nurse educators and further education on assessment. Further**
26 **development in feedback practices and providing students with opportunities for reflection are**
27 **important in supporting the continuous learning process of students.**

28 **Key words:** **assessment, clinical practice, evaluation, nursing student, systematic review.**
29

1 What is already known about the topic?

- 2 - The assessment of nursing students' competence in nursing is a matter of concern
- 3 worldwide and the complexity of assessment has challenged educators for decades.
- 4 - Inconsistency exists among assessment methods and tools between countries and higher
- 5 education institutions.
- 6 - Clinical competence assessment is challenging for both mentors and nurse educators,
- 7 and agreement must be achieved on assessment content and processes at the beginning
- 8 of clinical practice.

9 What this paper adds

- 10 - It is important to strengthen collaboration between healthcare organizations and higher
- 11 education institutions and to involve all stakeholders in designing assessment
- 12 strategies.
- 13 - There continues to be a need to develop consistent and systematic approaches in
- 14 assessment along with reliable and valid assessment tools.
- 15 - Several assessment methods and tools exist, but it is imperative that the language used
- 16 is clear and that mentors' have competence to interpret and use these.
- 17 - The focus of assessment is to encourage the continuous learning process of students
- 18 which requires constructive feedback and opportunities for reflection between the
- 19 student, mentor and educator.
- 20

21 1. Introduction

22 The aim of nursing education is to educate students so that they achieve the necessary professional
 23 level of nursing competence before entering the nursing profession. According to the World Health
 24 Organization (WHO, 2013), it is imperative to not only increase the number of health
 25 professionals, but to ensure that they have the appropriate knowledge, skills and competencies
 26 relevant to the needs of the population. Quality education is the foundation for developing
 27 competent health professionals capable of delivering safe, quality care (WHO, 2016). Patient
 28 safety is a core value of nursing. Professional nurses have the ethical responsibility to safeguard
 29 individuals when care is endangered by health care personnel or any other person, while educators
 30 are responsible in promoting students' understanding for the importance of patient safety
 31 (International Council of Nurses, 2012).

32
 33 Both theoretical and practical preparation are key components of nursing curricula, which are
 34 needed in order for nursing students to achieve a professional level of nursing competence. In the
 35 European Union countries, the duration of clinical training should account for at least one half of
 36 the minimum duration of the nursing program (Directive 2013/55/EU). Even though higher
 37 education institutions are responsible for providing nursing education, nurses who work as mentors
 38 in clinical practice have a pivotal role in fostering students' clinical learning (Directive

1 2013/55/EU; Warne et al., 2010). Clinical learning environments have an essential role in the
2 development of students' professional competencies and identity (Pitkänen et al., 2018; Tomietto,
3 2018; Vizcaya-Moreno et al., 2018). Well-designed and organized clinical placements are
4 important in ensuring that students receive appropriate support and learning experiences needed
5 to develop their competence and knowledge, skills, and attitudes required in their future
6 professional careers (Vizcaya-Moreno et al., 2018; Lovecchio et al., 2015).

7
8 The assessment of nursing students' competence in nursing is a matter of concern worldwide and
9 the complexity of assessment has challenged educators for decades. Assessment of students'
10 competence during clinical practice is especially challenged for mentors and nurse educators
11 (Helminen et al., 2017). It has been recognized that there is inconsistency among assessment
12 methods and tools between countries and higher education institutions (Cant et al., 2013), and
13 there continues to be a lack of reliability and validity in the assessment of nursing students'
14 competence during clinical practice (Helminen et al., 2017). Assessment of students' competence
15 according to clear professional standards is core in ensuring that students deliver safe nursing care
16 (Trede and Smith, 2012).

17
18 According to Oermann (2018), assessment involves gathering information about student learning
19 and performance, which can be used to determine further learning needs of the student and to plan
20 activities that will assist students to meet these needs. Assessment is used to confirm the outcomes
21 and competences met by the student, and can be conducted using diagnostic, formative or
22 summative approaches (Oermann, 2018). Although many good practices related to the assessment
23 of nursing students' clinical competence exist, assessment remains a challenging issue (Helminen
24 et al., 2014). For example, various assessment tools have been developed to improve the
25 assessment of clinical competence and that aim to enhance clear assessment of students' clinical
26 competence according to safety and quality standards of nursing care (Ulfvarson and Oxelmark,
27 2012).

28
29 An essential component of competence assessment is the setting of learning goals (Clements and
30 Kamau, 2018). According to Oermann (2018), learning goals represent the level of nursing
31 competence that the student is required to achieve and may be written in the three domains of
32 learning: cognitive, affective, and psychomotor. Prior to entering clinical practice, students need
33 to be familiar with what they are expected to learn and of the clinical competences they are required
34 to develop. Learning goals need to be clearly defined and measurable, as they guide students in
35 their learning and also guide those involved in assessment in developing instruction and planning
36 the assessment (Oermann, 2018). Learning goals should be written clear enough so that they are
37 easy to follow and transparent assessment criteria should be made available (Hilli et al., 2014).

38
39 Successful completion of clinical practice requires the implementation of supportive and
40 continuous assessment within safe clinical learning environments and mentoring relationships

1 (Norton, 2008). **Effective mentoring in clinical environments supports development of students'**
2 **competence in nursing and promotes integration of theory into practice (Mikkonen et al., 2016).**
3 Mentors have the responsibility to assess the learning outcomes achieved by students
4 (Dobrowolska et al., 2016), to provide students with continuous, tailored, and constructive
5 feedback on their performance and skills, to provide students with learning situations and to
6 increase their responsibility to work independently (Jokelainen et al., 2011). Mentors need to
7 develop and maintain adequate communication and assessment skills in order to effectively
8 support the learning process of students (Jokelainen et al., 2013). A study by Tuomikoski et al.
9 (2018) found that mentors need to further develop their competence in mentoring, for example on
10 how to support reflective discussion with students (Tuomikoski et al., 2018). It is important that
11 further continuing education is provided to mentors to enhance their competence in mentoring,
12 however a study by Oikarainen et al. (2018) reported that over half of mentors had not previously
13 attended further education.

14
15 The World Health Organization (2016) defines the core competencies of nurse educators which
16 includes, among other things, the ability to adapt, design and use tools for assessing and
17 documenting clinical practice. Educators ensure that appropriate methods of assessment are used
18 and that the learning outcomes of the curriculum are achieved, foster students' reflection and self-
19 assessment skills, and provide students with timely and constructive feedback (WHO, 2016). The
20 role that nurse educators have in the assessment of nursing students' competence in clinical
21 practice varies significantly internationally. In some countries, nurse educators from higher
22 education institutions take the role of clinical facilitators and actively guide students during
23 completion of their clinical practice (Dimitriadou et al., 2015). In several European countries,
24 however, the role of nurse educators in clinical practice has decreased and at times nurse educators
25 visit students only once, often during clinical competence assessment (Warne et al., 2010). For
26 example, the role of nurse educators has been reduced in Finland to the extent that nurse educators
27 do not always attend the clinical practice of students (Pitkänen et al., 2018). Therefore, registered
28 nurses who mentor students during their clinical practice have an increasingly significant role in
29 guiding students in their learning process and supporting development of their professional nursing
30 competence (Jokelainen et al., 2013; Rahnavard et al., 2013).

31
32 Due to the diminishing role of nurse educators in the clinical practice of nursing students (Warne
33 et al., 2010), it is essential that mentors have a clear understanding of strategies and processes
34 designed to facilitate students' clinical competence assessment, and that they receive the necessary
35 support from higher education institutions (Helminen et al., 2017). Mentors and nurse educators
36 must work together and achieve agreement on assessment content and processes (Helminen et al.,
37 2017). It has been found that different expectations between students, mentors and nurse educators
38 generate situations where it is unrealistic or even impossible for students to achieve their goals in
39 clinical practice (Huston et al., 2018). The aim of this systematic review of reviews was to identify
40 the current best evidence on the assessment of nursing students' competence in clinical practice.

1 The following research questions guided the review: What kind of aspects are included in the
2 assessment of nursing students' competence during their clinical practice? What kind of tools and
3 approaches have been used during the assessment of nursing students' competence in clinical
4 practice?
5

6 **2. METHODS**

7 8 **2.1. Design**

9 A systematic review of reviews was conducted to compile evidence regarding the assessment of
10 nursing students' competence in clinical practice from multiple reviews into one useful, accessible
11 document. The guidelines published by the Joanna Briggs Institute (JBI) (Aromataris et al., 2017)
12 and the Centre for Review and Dissemination (CRD, 2009) were used to guide each phase of the
13 systematic review of reviews. An evaluation of this review was performed using the PRISMA
14 checklist of items to include when reporting a systematic review (Moher et al., 2009).
15

16 Although both guidelines by JBI (Aromataris et al., 2017) and CRD (2009) recommend that only
17 systematic reviews be included in systematic reviews of reviews, we included other types of
18 reviews in addition to systematic reviews because of the lack of systematic reviews on this topic.
19 A systematic review is a rigorous research method used to identify, evaluate, and summarize
20 findings from relevant individual studies (CRD, 2009). The systematic review differs from other
21 types of reviews such as literature, scoping or integrative reviews through its systematic and
22 comprehensive approach in study selection, critical appraisal and data extraction (Aromataris and
23 Pearson, 2014).
24

25 **2.2. Search methods**

26 The electronic databases CINAHL, PubMed, Eric, Medic and the JBI Database of Systematic
27 Reviews and Implementation Reports were searched in autumn 2018 by two researchers (KI, AO).
28 Prior to conducting database searches, three researchers (KI, AO, KM) defined the search strategy
29 after consultation with an library information specialist. The keywords used in the search are listed
30 in figure 1 and supplementary file 1. Selection of the reviews was conducted based on precise
31 inclusion and exclusion criteria, which were set according to the research question in the PICO
32 format (see Table 1; Aromataris et al., 2017; CRD 2009). This systematic review of reviews
33 included published, peer-reviewed systematic, integrative, narrative, scoping and literature
34 reviews. No time or language limitations were set. A search for the grey literature was not
35 conducted, however additional relevant evidence was searched for by screening the reference lists
36 of all of the articles included in the full-text review phase.

1 **2.3. Search outcomes**

2 **A total of** 1464 publications **were** retrieved from the database searches (Figure 1). Duplicate
3 publications (n=101) were removed and two researchers (KI, AO) independently screened and
4 assessed the title (n=1363), abstract (n=688) and full text (n=25) of each publication against the
5 inclusion criteria (CRD, 2009). The researchers discussed results of the screening process and
6 agreement was reached on the inclusion of eligible studies. A third researcher (KM) was consulted
7 in situations where there was uncertainty regarding the eligibility of studies. **Seventeen** out of the
8 25 reviews included in the full-text phase **did not meet the inclusion criteria** and were **excluded**.
9 No additional reviews were identified following screening of the reference lists of all of the
10 **reviews** included in the full-text **screening** phase. **The remaining eight reviews met the inclusion**
11 **criteria and were assessed for methodological quality.**

12

13 **2.4. Quality appraisal**

14 The eight reviews **that met inclusion criteria** were **assessed for methodological quality** by two
15 researchers (KI, AO) independently using the **JBI Critical Appraisal Checklist for Systematic**
16 **Reviews and Research Syntheses** (Aromataris et al., 2015). The checklist contains a total of 11
17 assessment criteria. Every criterion was given a rating of 'yes', 'no', 'unclear' or 'not applicable',
18 and one point was given to every criterion rated 'yes'. Following this, a total score was calculated
19 for each study. **Reviews were not included into this systematic review of reviews if they failed to**
20 **reach a score of at least 50% on critical appraisal, the predetermined cut-off score agreed upon by**
21 **the researchers.** Following critical appraisal, both researchers reached agreement on the
22 methodological quality of the studies. The total scores ranged from 0 (Wells and McLoughlin,
23 2014) to 11 (Suikkala et al., 2018) points (see Table 2). Two reviews (Lejonqvist et al., 2016;
24 Wells and McLoughlin, 2014) were excluded due to poor **methodological quality in order to avoid**
25 **compromising the validity of the results and recommendations of this systematic review of reviews**
26 **(Poritt et al., 2014).**

27

28 **2.5. Data extraction and synthesis**

29 Data relevant to the review question were extracted including: authors, year, country of
30 publication, journal type, type of analysis, study objectives, characteristics of participants,
31 characteristics of primary studies included in the review, databases searched, methods for quality
32 assessment of primary studies, number of primary studies included, and review findings (see Table
33 3).

34 Thematic synthesis was used to synthesize the data **and to facilitate interpretation of the results.**
35 **This is a method used in the synthesizing** of data from a focused research topic, **and an approach**
36 **often used in** identifying, analyzing, and reporting found themes (Nicholson et al., 2016;

1 Whittmore and Knafl, 2005). During thematic synthesis, one researcher (KI) carefully identified
2 and analyzed the results from the included reviews. Following this, frequently recurring themes
3 and issues were identified, which were given categorical, aggregating or explanatory names. These
4 were used to search for combining or interpreting themes. Researchers (KI, AO, KM) identified
5 five themes that explained the studied phenomenon (see Figure 2).

6 3. Results

7 3.1. Study characteristics

8 This systematic review of reviews included one integrative review (Almalkawi et al., 2018), one
9 narrative review (Helminen et al., 2016), one scoping review (Suikkala et al., 2018), one literature
10 review (Yanhua and Watson, 2011), and two systematic reviews (Yepes-Rios et al., 2016; Wu et
11 al., 2015). The reviews were published between the years 2011 and 2018, and included original
12 studies published between the years 1985 and 2016. The original studies included in the reviews
13 were conducted in the United Kingdom (n=48), United States (n=20), Ireland (n=15), Canada
14 (n=10), Australia (n=9), Sweden (n=7), Finland (n=3), Taiwan (n=3), South Africa (n=2), Belgium
15 (n=1), China (n=1), Denmark (n=1), Nepal (n=1), New Zealand (n=1), Norway (n=1), Thailand
16 (n=1), Turkey (n=1), Scotland (n=1), and jointly in Canada and USA (n=1).

17

18 The reviews included qualitative and quantitative studies, mixed methods studies and reviews (see
19 Table 3). In addition to including reviews, qualitative and quantitative studies, Yepes-Rios et al.
20 (2016) reported also including a newspaper report, editorial and teaching points. In four of the
21 included reviews, standardized critical appraisal tools were used to assess the methodological
22 quality of original studies (Almalkawi et al., 2018; Suikkala et al., 2018; Yepes- Rios et al., 2016;
23 Wu et al., 2015). Critical appraisal was not reported in two of the included reviews (Helminen et
24 al. 2016; Yanhua and Watson, 2011).

25 The assessment of nursing students' competence in clinical practice was divided into five themes
26 'nursing competence assessed during clinical practice', 'clinical learning environment',
27 'mentoring', 'approaches in assessment' and 'assessment instruments'.

28

29 3.2. Nursing competence assessed during clinical practice

30 Clinical competence of students has frequently been assessed in various clinical environments and
31 during completion of different clinical nursing tasks (Almalkawi et al., 2018; Helminen et al.,
32 2016; Wu et al., 2015). The domains of professional attributes, ethical practices, communication
33 and interpersonal relationships, nursing processes, critical thinking and reason are often included

1 in assessment tools used to assess nursing students' nursing competence during clinical practice
2 (Wu et al., 2015). According to Wu et al. (2015) the majority of assessment tools used to assess
3 nursing students' nursing competence are developed with reference to competency standards stated
4 by national boards of nursing. The authors list three broad conceptualizations of competence
5 models in nursing: 1) the behavioral approach, 2) identification of general attributes of the student
6 (knowledge, critical thinking skills), and 3) the holistic approach that addresses knowledge,
7 attitudes, values and skills used to function in clinical situations (Wu et al., 2015).

8
9 Studies have shown that there are significant problems associated with the language used to
10 describe competencies (Almalkawi et al., 2018; Helminen et al., 2016). Assessment may not
11 consider students' performance or competence and may not give a clear enough picture of what is
12 required of the student (Almalkawi et al., 2018). Written examinations have been proven to be an
13 efficient way to describe students' theoretical knowledge rather than their clinical practice skills
14 (Helminen et al., 2016). Wu et al. (2015) recommend the use of predefined standards to measure
15 the competence of students, for criterion-referenced assessment may facilitate reliable assessment.
16 Fair and clear assessment of students is impeded by the lack of appropriate and unambiguous
17 assessment systems and criteria (Almalkawi et al., 2018; Helminen et al., 2016). It has been shown
18 that students may feel that they are assessed according to personal characteristics rather than their
19 developing professional competence (Helminen et al., 2016). Assessment has also been found to
20 be inconsistent when evaluating students' competence in situations where they have failed clinical
21 practice (Suikkala et al., 2018; Helminen et al., 2016).

23 3.3. Learning environment

24 Clinical assessment can be a very stressful event for students (Wu et al., 2015) and the personal
25 characteristics of students may influence the entire assessment process (Helminen et al., 2016). It
26 is necessary to promote an understanding that assessment can be helpful in facilitating learning
27 rather than a process that highlights incompetence (Almalkawi et al., 2018). The provision of
28 formal, constructive and development feedback in supporting clinical learning environment is an
29 essential element in the development of students' competence (Almalkawi et al., 2018). Although
30 the role of patients in the assessment of students continues to be quite passive, it has been found
31 that patients' active participation in students' learning process and assessment is a valuable asset
32 in clinical assessment. Patients' contribution can also improve the effectiveness of the assessment
33 of students' competence (Suikkala et al., 2018).

35 3.4. Mentoring

36 The majority of clinical assessment focuses on collaboration between mentors, nursing students
37 and nurse teachers (Almalkawi et al., 2018; Helminen et al., 2016; Wu et al., 2015). Nurse
38 educators play an important role in ensuring that the mentor and student understand the use of
39 assessment criteria before the clinical practice begins (Helminen et al., 2016). They should also
40 clarify how the student can meet these criteria and to highlight that assessment aims to support

1 students' achievement of competences rather than to assess their personality (Helminen *et al.*,
2 2016). Helminen *et al.* (2016) emphasize the importance of a meeting between the nurse teachers,
3 mentor and student at the beginning of clinical practice **and to provide opportunity for**
4 **familiarization with assessment processes and forms.** These meetings can promote students'
5 understanding as to how they can overcome weaknesses (Almalkawi *et al.*, 2018). Furthermore,
6 nurse teachers are recommended to include mentors in curriculum planning in nursing education
7 and to adopt assessment tools in line with educational standards (Helminen *et al.*, 2016).
8 Mentors who are responsible for assessing students have expressed concern for their lack of
9 mentoring competence to assess students' performance, which is also challenged by the limited
10 exposure they have with students (Yepes-Rios *et al.*, 2016). The assessment process of nursing
11 students' clinical **competence** is multifactorial and includes several elements. Clinical mentors are
12 required to be aware of the variety of approaches and strategies, but this is difficult when they
13 work as healthcare professionals full time and lack knowledge and skills on these methods
14 (Jokelainen *et al.*, 2011).

15
16 A competent mentor has the capability to build a supportive clinical learning environment,
17 facilitate learning, monitor progress made by the student, assess the clinical competence of nursing
18 students, and give effective feedback to students (Wu *et al.*, 2015). According to students, a good
19 mentor provides constructive feedback during the clinical practice rather than allowing poor
20 practices to continue. Assessment is considered to be of high quality when mentors are well
21 prepared to conduct assessment and when mentors have worked to create an effective mentor-
22 student relationship (Wu *et al.*, 2015). Studies have shown that mentors do not always have a
23 sufficient amount of time to work together with students during clinical practice, which can affect
24 the reliability of their final assessment (Helminen *et al.*, 2016). Also, a close relationship between
25 the mentor and student can hinder assessment (Helminen *et al.*, 2016; Yepes-Rios *et al.*, 2016).
26 **Mentors' ability to conduct quality assessment needs to be strengthened (Yepes-Rios *et al.*, 2016;**
27 **Wu *et al.*, 2015) and issues that hinder mentors' interpretation of assessment documents need to**
28 **be addressed. Mentoring education has a significant influence on the assessment process and has**
29 **been recommended to be further developed (Almalkawi *et al.*, 2018; Helminen *et al.*, 2016; Yepes-**
30 **Rios *et al.*, 2016; Wu *et al.*, 2015). Lack of mentoring education may hinder mentors'**
31 **understanding of assessment criteria and the language used in these (Wu *et al.*, 2015). Well-**
32 **executed use of positive and negative feedback makes assessment more effective (Helminen *et al.*,**
33 **2016), but it can be manifested in completely different ways in clinical settings than in mentoring**
34 **education.**

35

36 **3.5. Approaches of assessment**

37 According to the included reviews, a variety of assessment approaches are utilized during clinical
38 practice (Helminen *et al.*, 2016; Wu *et al.*, 2015; Yanhua *and* Watson, 2011), but these are mainly
39 developed to meet the assessment needs of individual organizations. Some organizations use the
40 same assessment practices irrespective of the context of the clinical practice, even in situations

1 where other assessment practices could better fit the context. This situation can make comparison
2 of assessment approaches more difficult (Helminen *et al.*, 2016).

3
4 The assessment process needs to be objective (Yanhua *and* Watson, 2011), repeatable, and a
5 combination of different forms and tools should be used. Assessment should be conducted in close
6 collaboration between the mentor, student, and nurse teacher (Almalkawi *et al.*, 2018; Helminen
7 *et al.*, 2016; Wu *et al.*, 2015) and support learning and the relationship between different roles
8 during assessment. **Educators** need to provide support to mentors and nursing students and an
9 orientation to the assessment process (Helminen *et al.*, 2016; Wu *et al.*, 2015).

10
11 The assessment of students' competences can be based on a performance-based system, which
12 includes a variety of tools and provides an opportunity for students to reach a certain level
13 (Almalkawi *et al.*, 2018; Helminen *et al.*, 2016). The dimensions of clinical competence can be
14 roughly divided into formal, objective and subjectively experienced competence. Formal
15 competence is achieved by education and gives a certificate regulated by guidelines and law,
16 objective knowledge is demonstrable competence, and subjective competence expresses the
17 experiences of students. Knowledge and skills can be measured between these three dimensions,
18 but this is challenging to review and value, which makes it less common to achieve coverage.
19 When formative assessment is used in the assessment of learning **upon competence development**,
20 it is carried out by giving students individual feedback on their performance in clinical practice
21 (Almalkawi *et al.*, 2018). Objective assessment provides a cross-section of the students'
22 competence, but it is often limited to measure specific skills and uses only certain assessment
23 protocols.

24
25 Mentors play a substantial role in giving assessment feedback to students. Students desire that
26 mentors allocate more time to reflective discussion and to providing feedback (Almalkawi *et al.*,
27 2018). Feedback needs to be timely, coherent and individualized in order to foster effective
28 assessment. The review by Suikkala *et al.* (2018) identified studies that emphasize the usefulness
29 of feedback **from patients in supporting the learning process of students. Effective approaches that**
30 **can be used to** involve patients during the assessment process include allowing patients to provide
31 students with direct feedback, to participate in confidential assessment discussions or to fill in
32 assessment questionnaires (Suikkala *et al.*, 2018).

33 34 **3.6. Assessment instruments**

35 **Various** different assessment tools **have been** used to **assess students' competence and to** support
36 the learning process of students. Students are commonly assessed by being asked to answer
37 questions, through observation, completion of written exercises and self-assessment, through
38 feedback from mentors, staff, or patients, and through discussions between the student and the
39 mentor (Almalkawi *et al.*, 2018; Suikkala *et al.*, 2018; Helminen *et al.*, 2016; Wu *et al.*, 2015). In
40 addition, different scales, portfolios, formal documents, videos, skills laboratories, and learning

1 contracts are commonly used (Helminen et al., 2016; Wu *et al.*, 2015; Yanhua *and* Watson, 2011).
2 Students' self-assessment has been seen as an important part of the assessment process, however
3 the reliability of self-assessment remains unclear (Helminen *et al.*, 2016). The use of portfolios has
4 been proven to be an effective way to describe students' development in clinical competence,
5 knowledge and actions in clinical practice (Helminen *et al.*, 2016; Wu *et al.*, 2015; Yanhua *and*
6 Watson, 2011), especially in clinical placements that are longer in length. Portfolios have been
7 shown to promote students' active learning and their individual accountability in the development
8 of clinical skills (Yanhua *and* Watson, 2011).

9
10 A wide range of instruments and checklists have been used during assessment. These provide a
11 means to assess students' clinical competence especially in quantitative ways. Different kinds of
12 assessment instruments enable reliable assessment of the level of competence that the student has
13 achieved, along with clear direction for students on their opportunities for making progress (Wu
14 *et al.*, 2015). The majority of educational institutions use a pass or fail grading scale instead of
15 verbal or numerical grading scales (Helminen *et al.*, 2016).

16
17 Examples of assessment instruments include: the Objective Structured Clinical Assessment Tool
18 (OSCE) (Yanhua *and* Watson 2011), the Shared Specialist Document; the Competency Inventory;
19 the Nursing Student Core Competencies Scale; the Self-Evaluated Core Competencies Scale;
20 Nurse Competence scale; Structured Observation and Assessment of Practice (SOAP), the
21 Competency Assessment Tool (CAT); Assessment of Clinical Education (AssCE); Competency
22 Inventory of Nursing Studies (CINS) (Wu *et al.*, 2015); Generic Assessment Tool (SSPD) (Wu *et*
23 *al.*, 2015, Yanhua *and* Watson, 2011); and the Six Dimension Scale of Nurse Performance (Yanhua
24 *and* Watson, 2011). In the reviews, it was emphasized that assessment instruments should be
25 effectively evaluated (Wu *et al.*, 2015; Yanhua *and* Watson, 2011) and the reliability and validity
26 ensured (Wu *et al.*, 2015). The reviews commonly did not report the reliability and validity of the
27 instruments.

28 29 **4. Discussion**

30 This systematic review of reviews identified the current best evidence on the assessment of nursing
31 students' **competence** in clinical practice. Key developmental issues arose in this systematic review
32 of reviews including the need for enhancing assessment that supports the development of students'
33 professional competencies and the development of mentors' competence in assessing students, in
34 addition to the need for development of objective assessment methods.

35 Nursing competence assessed during clinical practice focused on clinical competence in nursing,
36 communication, ethical decision-making, collaboration and critical thinking. Previously, it has
37 been found that students focus more on learning subjects they know will be assessed (Helminen et

1 al., 2014). For this reason, the content of assessment should be clearly emphasized before students
2 enter clinical practice. The results of this review have further shown that nursing competence is
3 not the only learning outcomes that is being assessed during clinical practice. **Students also need**
4 **to develop critical thinking, ethical decision making and multi-professional collaboration.**

5 **In our review, we found that the supportive clinical learning environments are needed with mentors**
6 **that are competent and educated in mentoring and in assessment practices.** Mentors' positive
7 attitude towards the students' individual learning needs and the development of a good student-
8 mentor relationship remain important in enhancing students' learning (Wu *et al.*, 2015). When
9 trustworthiness has been established, students adopt self-assessment and self-regulation behaviors
10 in the assessment process. A good mentor-student relationship improves students' confidence in
11 sharing feedback (Allen *and* Molloy, 2017) and it influences students' learning outcomes **upon**
12 **their competence development** (Mikkonen *et al.*, 2016).

13 The role of nurse **educators** in the assessment of students' **competence in clinical practice** was
14 minimally emphasized in the results of the included reviews. This may indicate that the role of
15 nurse teachers is not considered to be a central part of the entire assessment process since
16 **internationally** the role of nurse teachers has been reduced **or has diminished completely from**
17 **clinical practice** educators (Warne *et al.*, 2010). However, active participation of nurse **educators**
18 in the clinical assessment process is particularly important (Helminen *et al.*, 2014; Hovland, 2011).
19 Nurse **educators** could share their pedagogical and methodological competence to support the
20 assessment process. Students have also expressed the need for nurse **educators** to take an active
21 role in clinical practice especially when challenging situations are faced (Arkan *et al.*, 2018;
22 Pitkänen *et al.*, 2018; Mikkonen *et al.*, 2017). Support from nurse **educators** as well as their ability
23 to explain unclear issues to students can enhance students' learning (Juntunen *et al.*, 2016;
24 Helminen *et al.*, 2014; Hovland, 2011).

25 Even when mentors have access to versatile assessment methods, the effective use of these may
26 be hindered when consistent and common guidelines are not available. Education has been
27 provided to those responsible for assessing students during clinical practice. Despite this, the
28 subjective views of the evaluator may affect the outcome of the assessment itself when assessment
29 forms are not properly used (Arkan *et al.*, 2018; Helminen *et al.*, 2014). **In this systematic review,**
30 **assessment has been seen as challenging** because the environment and the people involved in
31 assessment varied. Mentors are required to carry out a detailed assessment of students' learning in
32 clinical practice, but at the same time assessment greatly influences students' experiences of
33 clinical practice and the students' professional identity (Pitkänen *et al.*, 2018; Tuomikoski *et al.*,
34 2018). According to the results of this systematic review, the established relationship between the
35 mentor and the student strengthens successful assessment and contributes to successful clinical
36 learning and the development of professional identity.

37

1 Studies **included in this review** have shown that students perceive the final assessment as
2 inconsistent when feedback is provided solely on how poor clinical performance was (Suikkala **et**
3 **al.**, 2018; Helminen **et al.**, 2016). Students have experienced mentors who have the tendency to
4 focus on shortcomings in their competence and who place too high expectations on the level of
5 competence the student is to achieve, or that mentors are not aware of the actual knowledge that
6 students have achieved (Arkan **et al.**, 2018; Vae **et al.**, 2018). This causes increased anxiety in
7 students and affects the overall effectiveness of clinical learning. Assessment needs to be clear and
8 systematic, **encouraging students' continuous learning process**. Mentors need to develop an open
9 attitude towards providing constructive feedback that leads to the development of students'
10 competence, even in situations where the student fails to achieve the set learning outcomes. During
11 assessment, there is a need to foster open discussion on how to make progress in clinical learning
12 and **competence development**. This provides the opportunity to set clear learning goals and it helps
13 students to take responsibility of their own learning (Vae **et al.**, 2018). Assessment of students
14 needs to focus on objective criteria, and it is important to avoid the impact of personal factors
15 (Helminen **et al.**, 2016).

16
17 Assessment is conducted using a wide range of methods and tools, depending on the specific issue
18 being measured in each situation. Studies have shown that there continues to be variability in
19 mentors' competence in assessing students' learning, despite the fact that methods and tools are
20 available. **In this review, it was found that the objectivity can be increased by using validated**
21 **instruments to assess students' development of their competence in clinical practice**. Mentors have
22 experienced uncertainty about what is expected in assessment and therefore they need clear
23 guidelines and support (Kälkäjä **et al.**, 2016). The individual needs of students must to be taken
24 into account to provide comprehensive guidelines on how to assess students' **competence**
25 (Hovland, 2011).

26
27 **No one single correct approach exists** to performing assessment of nursing students' **competence**,
28 which is suitable in all different contexts. **A study by Flott and Linden (2015) has** shown that
29 educational and healthcare organizations need to invest in cooperation and to create appropriate
30 learning experiences for students that ultimately have a positive impact on students' professional
31 development and on the realization of safe patient care.

32 **Feedback** should be focused on the issues that students need to focus on in their learning (Vae **et**
33 **al.**, 2018). Students appreciate being treated equally, and that their opinion is valued and listened
34 to during the final assessment (Helminen **et al.**, 2014). Also, it is imperative that students have a
35 clear understanding **of** what is needed to reach the desired level of competence, and that students
36 can identify their personal weaknesses and strengths (Wu **et al.**, 2015). In this way, students are
37 better able to develop specific areas of competence during completion of their clinical practice and
38 to focus less on the issues that they have already mastered (Helminen **et al.**, 2016).

1 **4.1. Strengths and limitations**

2 To the best of the authors' knowledge, this is the first systematic review of reviews conducted to
3 identify the evidence on current best practices on the assessment of **nursing students' competence**.
4 The phases of this systematic review of reviews were conducted following rigid systematic review
5 methodology and guidelines. A systematic, comprehensive electronic database search was
6 conducted without use of time or language restrictions in order to ensure as comprehensive a search
7 as possible. Also, the reference lists of the studies included in the full-text review phase were
8 screened for additional eligible studies.

9
10 **The search of this systematic review of reviews was limited to nursing education and not**
11 **broadened to cover education in other health professions. With increasing emphasis on the**
12 **importance of multidisciplinary collaboration and interprofessional education during clinical**
13 **practice, we recognize this as a potential limitation of our review. However, during the screening**
14 **process, we came across a review by Jepes-Rios et al. (2016) that included original studies from**
15 **the fields of dentistry, medicine and nursing. We decided not to exclude this review as the majority**
16 **of included original studies were from nursing, and the authors did not find differences in the**
17 **results between the different fields in regards to assessment.**

18 **5. Conclusion**

19 **According to our findings presented in discussion we suggest that nursing students' competence**
20 **is not limited to the procedures of nursing care, but also their competence in becoming critical**
21 **thinkers, ethical decisionmakers and great collaborators. Students need to enter clinical practice**
22 **where learning environment is permissive and open for their continuous learning and professional**
23 **development.** Moreover, the mentor-student relationship is an essential premise to achieve
24 openness and mutual understanding in the assessment process, together with a clinical learning
25 environment in which this relationship is embedded. Interaction between the mentor, student and
26 nurse teacher in the clinical learning environment enhances the professional growth and learning
27 of the student. Mentors need to be provided with further education to enhance their competence in
28 the assessment of students' **competence**. The setting of goals prior to the beginning of clinical
29 practice is essential when designing effective assessment and in order to enhance constructive
30 feedback during clinical learning and **competence development**. Further studies could be
31 developed to detect which educational interventions could improve mentors' competences in
32 clinical assessment and in fostering students' achievement of learning outcomes **in nursing**
33 **competence development.**

35 **Declaration of Competing Interest**

36 **No conflict of interest has been declared by the authors.**

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Table 3. Characteristics of included studies (n=6).

Authors (Year) Country	Design	Objectives	Participants	Search strategy	Type of studies included	Critical appraisal used in review	Methods used in analysis	Key findings
Almalkawi, Jester and Terry (2018)	Integrative review	To evaluate the empirical and theoretical literature on the challenges mentors face in interpreting and assessing levels of competence of student nurses in clinical practice	Mentors, nursing students, tutors	<p>Databases: Medline, CINAHL, PsycINFO, ERIC, ERC, AMED, EMBASE, British Nursing Index, DARE, Cochrane Library, Joanna Briggs Institute, EThOS, along with search for grey literature (Department of Health databases, Google Scholar, Science direct)</p> <p>Time period for search: 1986-2016</p>	<p>Total studies included: n=8</p> <p>Range in years of included studies: 2000-2012</p> <p>Qualitative (n=1), quantitative (n=1), mixed method studies (n=5), literature review (n=1)</p> <p>Country of origin of included studies: Ireland (n=4), United Kingdom (n=4)</p>	Mixed Methods Appraisal Tool (MMAT)	Whittemore and Knaf'l's (2005) integrative review framework	<ul style="list-style-type: none"> • Difficulties in the interpretation of language used to describe competencies to be assessed • Challenges were experienced in distinguishing between different levels of nursing competence • Challenges associated with giving clear and constructive feedback to students regarding developmental needs • Lack of availability of appropriate tools and taxonomies to assist in assessing performance of the student • Lack of transparent and explicit criteria impedes accurate and fair assessment

Helminen, Coco, Johnson, Turunen and Tossavainen (2016)	Narrative review	To provide an overview of summative assessment of student nurses' practice currently in use	Nursing students, preceptors, mentors, tutors, lecturers, educators, nurses, faculty members	Databases: CINAHL, PubMed, Medic, ISI Web of Science, Cochrane, ERIC Time period for search: 2000-2014	Total studies included: n=23 Range in years of included studies: 2000-2014 Qualitative (n=5), quantitative (n=6), mixed method studies (n=6), literature reviews (n=6) Country of origin of included studies: Australia (n=2), Canada (n=1), Ireland (n=6), Sweden (n=1), United Kingdom (n=9), United States (n=4)	Not reported	Inductive content analysis	<p>Practices before final assessment:</p> <ul style="list-style-type: none"> • It is important to organize orientation and opportunity for familiarization with assessment process and forms at beginning of clinical practice • Mentors find the terminology of evaluation forms hard to understand • Lack of consistency in assessment process exists • Students conduct clinical practice in different environments making assessment of all competence areas challenging • Mentors' attitudes, qualifications, poor timing of assessment, or the mentors' lack of time with the student can impact assessment <p>Performance of final assessment</p> <ul style="list-style-type: none"> • The educator, mentor and student should participate in final assessment and conduct reciprocal discussion of achieved competencies • Role of educators is to support mentors and students in appropriate assessment
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- All actors must have consistent understanding of assessment criteria
- Situations where students fail to pass are challenging for the mentor

Following final assessment

- Appropriate documentation of assessment is necessary to conduct
- It may be necessary to organize extra time in clinical practice for failing students

Suikkala, Koskinen and Leino-Kilpi (2018)	Scoping review	To review and summarize the existing empirical literature regarding patients' involvement in nursing students' clinical education	Patients, service users, clients, students, nurses, teachers, faculty members, other stakeholders	Databases: CINAHL, Medline, PsycINFO, ERIC, along with manual search Time period for search: no time limitation set	Total studies included: n=32 Range in years of included studies: 1985-2016	Criteria by Reilly et al. (2008)	Inductive content analysis	<ul style="list-style-type: none"> • Patient involvement in the learning process and assessment of students varied from active to passive participation • Patients were supportive towards students and some felt positive about giving feedback on students' performance • Giving critical feedback was experienced as difficult • Some patients preferred direct feedback or confidential assessment discussions. Others preferred using an assessment questionnaire. • Students' interpersonal competence was important
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					(n=1), Canada (n=2), Finland (n=3), Nepal (n=1), New Zealand (n=1), South Africa (n=2), Sweden (n=3), United Kingdom (n=9), United States (n=8)			<ul style="list-style-type: none"> in building relationships with patients Students' professional attitudes and attributes related to knowledge and skills were important to patients The presence of the mentor was appreciated by patients
Wu, Enskär, Lee and Wang (2015)	Systematic review	To explore the clinical competency assessment for undergraduate nursing students	Nursing students, midwifery students, preceptors, clinical placement coordinators, clinical nurse managers, lecturers, nurses, educators	<p>Databases: PubMed, CINAHL, ScienceDirect, Web of Science, EBSCO</p> <p>Time period for search: 2000-2013</p>	<p>Total studies included: n=14</p> <p>Range in years of included studies: 2002-2014</p> <p>Qualitative (n=8) and quantitative studies (n=6)</p> <p>Country of origin of included studies: Australia (n=1), Denmark (n=1), Ireland (n=4), Norway (n=1), Scotland (n=1), Sweden (n=3), Turkey (n=1), Taiwan (n=2)</p>	<p>Qualitative Assessment and Review Instrument (QARI), Joanna Briggs Institute Meta Analysis of Statistics Assessment and Review Instrument (JBI-MASARI), Joanna Briggs Institute Critical Appraisal Criteria for Descriptive/ Case Series Studies</p>	Not specified	<p>Current assessment practices and processes</p> <ul style="list-style-type: none"> Clinical assessment focuses on collaboration among academics, nursing students, preceptors and hospitals The use of validated assessment tools enables objective and fair assessment of students <p>Issues with learning and assessment</p> <ul style="list-style-type: none"> Assessment, receiving negative feedback and insufficient guidance by mentors causes anxiety in students Mentors monitor students' progress, facilitate learning, provide feedback and assess students' clinical competency The role of educators is to visit and provide support to

students and mentors on a regular basis, discuss learning goals and review progress

Development of assessment tools

- Assessment tools generally include the domains of professional attributes, ethical practices, communication and interpersonal relationships, nursing processes, critical thinking and reasoning
- The majority of assessment tools are developed with reference to competency standards stated by national boards of nursing

Reliability and validity of assessment tools

- Reliability of assessment tools reported in 3 of the included studies, construct validity reported in 2 studies
- Instruments should be further evaluated to verify validity and reliability

Yanhua and Watson (2011)	Literature review	To investigate trends in the evaluation of clinical competence in nursing students	Nursing students, newly graduated nurses	Databases: Cochrane, Medline, CINAHL	Total studies included: n= 23 Range in years	Not reported	Not specified	Instrument development and testing • Instruments have been increasingly developed and tested using rigorous
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		and newly qualified nurses		Time period for search: 2001-2010	of included studies: 2001-2009			<p>methods for ensuring reliability and validity</p> <ul style="list-style-type: none"> National and international cooperation exists in instrument development <p>Approaches to testing competence</p> <ul style="list-style-type: none"> Portfolios have gained popularity as a tool to evaluate nursing students' clinical competences Objective structured clinical examinations are valid and reliable methods of assessment
Yepes-Rios, Dudek, Duboyce, Curtis, Allard and Varpio (2016)	Systematic review	To consolidate and analyze knowledge from medical, dental and nursing literature relating to assessor's ability and willingness to report poor clinical academic and professional performance	Focus on medical students, dental students, nursing students	Databases: CINAHL, EMBASE, and MEDLINE Time period for search: 2005-2015	Total studies included: n=28 Range in years of included studies: 2005-2014	Qualitative studies appraised using Critical Appraisal Skills Program – UK tool checklist (CASP-UK)	Thematic analysis	Barriers to failing underperforming students <ul style="list-style-type: none"> Failing a student has a strong impact on the assessor professionally and it can be easier to pass than to go through process of failing a student Assessors felt personal failure, guilt and emotional toll involved with failing a trainee

points (n=1),
editorial (n=1),
newspaper
report (n=1)

Country of
origin of
included
studies:
Australia
(n=1), Canada
(n=7), United
Kingdom
(n=15), USA
(n=4), jointly
in USA and
Canada (n=1)

- Assessors considered the emotional reaction and distress along with the impact that failure would have on the students' career
- Assessors felt unprepared in their evaluation role, with little formal training and lack of assessment tools
- Lack of support from institutions or pressure to pass underperforming students was experienced

Enablers supporting assessors' willingness to fail a failing student

- Responsibility to patients, to society and to the profession
 - Strong assessment systems along with institution support helped assessors recognize poor performance
 - Opportunities for students after failing enabled assessors to accept their decision to fail student
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Table 1. Inclusion and exclusion criteria using PICoS format

PICoS criteria	Inclusion	Exclusion
Participants	Nursing students	Students studying in healthcare fields other than nursing
Phenomenon of Interest/Outcomes	Assessment	Not focusing on assessment
Context	Clinical practice/ training	Settings other than clinical practice
Study design and publication type	Published, peer-reviewed systematic, integrative, narrative, scoping and literature reviews	Not reviews, not peer-reviewed, not published
Publication years	No limitations	No limitations
Language	No limitations	No limitations

Table 2. Analysis of the included studies using the JBI Critical Appraisal Checklist for Systematic Reviews and Research Syntheses (Aromataris et al., 2015)

	Almankawi et al. (2018)	Helminen et al. (2016)	Lejonqvist et al. (2016)	Suikkala et al. (2018)	Wells & McLoughlin (2014)	Wu et al. (2015)	Yanhua & Watson (2011)	Yepes-Rios et al. (2016)
1. Is the review question clearly and explicitly stated?	Yes	Yes	Yes	Yes	Unclear	Yes	Yes	Unclear
2. Were the inclusion criteria appropriate for the review question?	Yes	Yes	Yes	Yes	Unclear	Yes	Yes	Yes
3. Was the search strategy appropriate?	Yes	Yes	Unclear	Yes	No	Yes	Yes	Yes
4. Were the sources and resources used to search for studies adequate?	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
5. Were the criteria for appraising studies appropriate?	Unclear	No	Yes	Yes	No	Unclear	No	Yes
6. Was critical appraisal conducted by two or more reviewers independently?	No	No	No	Yes	No	Yes	No	No
7. Were there methods to minimize	Unclear	Unclear	Unclear	Yes	No	Yes	No	Unclear

errors in data extraction?

8. Were the methods used to combine studies appropriate?	Yes	Yes	Unclear	Yes	No	Unclear	Unclear	Yes
9. Was the likelihood of publication bias assessed?	No	Yes	No	Yes	No	Yes	No	No
10. Were recommendations for policy and/or practice supported by the reported data?	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
11. Were the specific directives for new research appropriate?	No	Yes	Unclear	Yes	No	Yes	Yes	No
Total points	6	8	5	11	0	9	6	6

Search keywords group 1: nurs* and student*
 Search keywords group 2: evaluat* or assess* or measure* or reflect* or grade or grading
 Search keywords group 3: clinical AND
 (practice or setting* or placement* or “learning environment” or education or training)
 Search keywords group 4: review or “meta-analysis” or “meta-review”

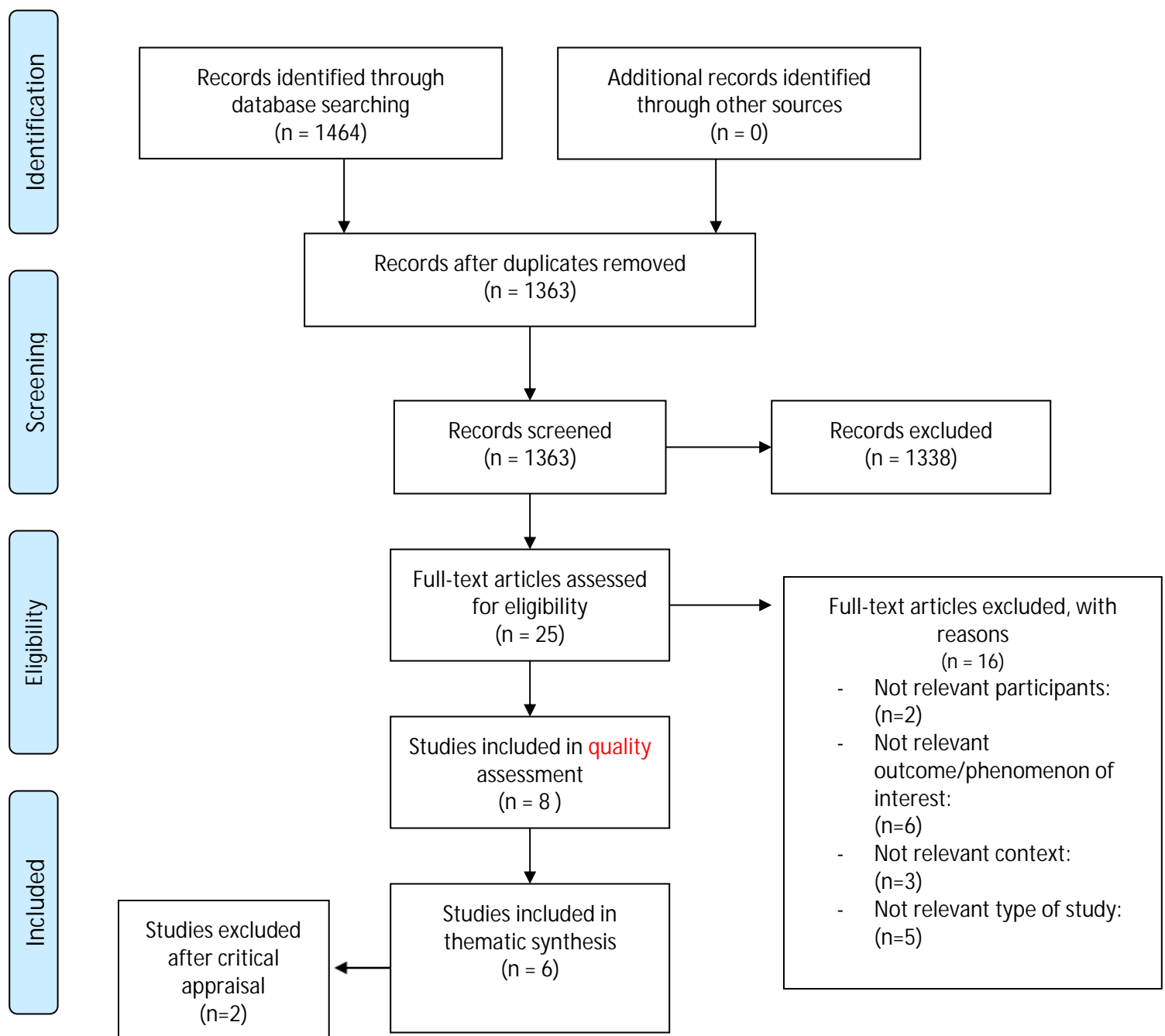


Figure 1. PRISMA flow diagram of study (Moher et al., 2009)

NURSING COMPETENCE ASSESSED DURING CLINICAL PRACTICE

The behavioral approach

Identification of general attributes of the student (knowledge, critical thinking skills)

The holistic approach that addresses knowledge, attitudes, values and skills used to function in clinical situations

MENTORING

Collaboration between mentor, student, and educators
Mentor involvement in curriculum of a student
Mentor competence in assessment
Mentor-student relationship
Mentor education

LEARNING ENVIRONMENT

Facilitates learning
Supports student progress
Providing constructive feedback
Interaction with patients

APPROACHES OF ASSESSMENT

Learning contract
Clear learning process (supportive, collaborative, objective)
Assessment criteria (objective, clear language, pedagogical)
Reflection discussion
Feedback (timely, constructive, coherent, individualized)
Tools supporting learning: portfolios, scales, formal documents, videos, skill laboratories, learning contracts

ASSESSMENT INSTRUMENTS

OSCE
The Shared Specialist Document
The Competency Inventory
The Nursing Student Core Competencies Scale
The Self-Evaluated Core Competencies Scale
Nurse Competence scale
Structured Observation and Assessment of Practice (SOAP)
The Competency Assessment Tool (CAT)
Assessment of Clinical Education (AssCE)
Competency Inventory of Nursing Studies (CINS)
Generic Assessment Tool (SSPD)
The Six Dimension Scale of Nurse Performance

Figure 2. Outcomes of thematic synthesis.

Supplementary File 1. Terms used to search the electronic databases.

	Search terms
CINAHL	(nurs* AND student*) AND (evaluat* OR assess* OR measure* OR reflect* OR grade OR grading) AND ((clinical) AND (practice OR setting* OR placement* OR "learning environment" OR education OR training)) AND (review OR "meta-analysis" OR "meta-review") Filters: Exclude MEDLINE records, Human
Eric	(nurs* AND student*) AND (evaluat* OR assess* OR measure* OR reflect* OR grade OR grading) AND ((clinical) AND (practice OR setting* OR placement* OR "learning environment" OR education OR training)) AND (review OR "meta-analysis" OR "meta-review") No filters applied
JBI Database of Systematic Reviews and Implementation Reports	(nurs* AND student*) AND (evaluat* OR assess* OR measure* OR reflect* OR grade OR grading) AND (clinical) AND (review OR "meta-analysis" OR "meta-review") No filters applied
Medic	(student*(in Finnish)) AND (evaluat* OR reflect* (in Finnish)) AND (clinical (in Finnish)) No filters applied
PubMed	("nurs*" [All Fields] AND "student*" [All Fields]) AND ("evaluat*" [All Fields] OR "assess*" [All Fields] OR "measure*" [All Fields] OR "reflect*" [All Fields] OR "grade" [All Fields] OR "grading" [All Fields]) AND (("clinical" [All Fields]) AND ("practice" [All Fields] OR "setting*" [All Fields] OR "placement*" [All Fields] OR "learning environment" [All Fields] OR "education" [All Fields] OR "training" [All Fields])) AND ("review" [All Fields] OR "meta-analysis" [All Fields] OR "meta-review" [All Fields]) Filters: Humans