NEW GRADUATE NURSES' CLINICAL COMPETENCE:
A MIXED METHODS SYSTEMATIC REVIEW

ABSTRACT

Aim: To appraise and synthesize evidence of empirical studies reporting assessment of new graduate nurses' clinical competence in clinical settings.

Design: Mixed methods systematic review.

Data sources: The search strategy included keywords relevant to: new graduate nurse, clinical competence, and competence assessment. The searched literature databases included CINAHL, MEDLINE, Embase, PsycINFO and Web of Science. The search was limited to full-text papers in English or French, published between 2010 and September 2019.

Review Methods: Inclusion criteria were: 1) empirical studies; 2) detailed method and complete results sections; 3) competence assessment in clinical settings; and 4) new graduate nurses (≤ 24 months). Two independent reviewers screened eligible papers, extracted data and used the Mixed Methods Appraisal Tool framework for quality appraisal. Divergences were solved through discussion.

Results: 42 papers were included in this review: quantitative (*n*=31), qualitative (*n*=7) and mixed methods (*n*=4). Findings suggest that new graduate nurses exhibit a good or adequate level of competence. Longitudinal studies show a significant increase in competence from 0-6 months, but findings are inconsistent from 6-12 months.

Conclusion: There are a multitude of quantitative tools available to measure clinical competence. This suggests a need for a review of their rigor.

Impact: No recent reviews comprehensively synthesized the findings from new graduate nurses' clinical competence. This review has found that new graduate nurses' competence has been mostly assessed as good, despite the expectation that they should be more competent. Longitudinal studies did not always show a significant increase in competence. These findings can help nurse educators in providing more support to new graduate nurses throughout the transition period or design improved transition program. This review also identified quantitative tools and qualitative methods that can be used for competence assessment.

Key words: assessment**,** clinical competence, competency assessment, literature review, mixed methods, new graduate nurse, nursing, systematic review

1.   INTRODUCTION

The movement towards competency-based education (CBE) has led to renewed interest in the concept of competence in nursing education. Numerous analyses of the concept have been published in the past 15 years (Axley, 2008; Cowan et al., 2005; Fernandez et al., 2012; Garside & Nhemachena, 2013; Smith, 2012). Definitions of competence are usually classified as behaviorist, understood as a technical skill used while undertaking specific tasks, or holistic, a complex and evolutive combination of knowledge, skills, attitudes and values, bound to the context of practice (Gonczi, 1994). Consistent with this holistic stance, Quality and Safety Education for Nurses (QSEN), an American collaborative, developed a framework of six core competencies that would apply to all nurses, no matter their context of practice (Cronenwett et al., 2007): 1) patient-centered care; 2) teamwork and collaboration; 3) evidence-based practice; 4) quality improvement; 5) safety; and 6) informatics.

In their concept analysis, Charette et al. (2014) found that most nursing authors agreed on the holistic conceptualization of competence. However, its operationalization, including its assessment, remains a challenge because of its dual perspective, whether aimed at professional regulation or emancipation (Blanchet Garneau et al., 2017). Despite this challenge, competence assessment regularly takes place in clinical settings, either to assess the performance of new graduate nurses (NGNs, defined here as registered nurses within two years after graduation) or to assess outcomes of specific interventions aiming to develop their competence. In a review of clinical competence assessment in nursing, Yanhua and Watson (2011) concluded that most studies were cross-sectional, thus giving a limited view of the change in competence levels during NGNs' transition. The present paper seeks to examine how competence assessment of NGNs has been performed in the last decade.

1.1 Background

Since Benner published her novice-to-expert model in 1982, there has been a growing interest in clinical competence development, with many authors focusing on the transition from student to registered nurse (Duchscher, 2008, 2009; Dyess & Sherman, 2009) and the level of competence

NGNs exhibit (Lima et al., 2016; Lima et al., 2014). There appear to be inconsistencies in the literature, with researchers reporting adequate levels of competence, but with a constant debate about NGNs being unfit or unprepared for practice (Darbyshire & Watson, 2019; Hickey, 2009; Wolff et al., 2010). This may reflect subjectivity of assessments, with some studies reporting NGNs' self-assessment and others using third-party assessments by preceptors and/or managers.

Inconsistencies in the reported level of NGNs' competence could also be a reflection on the various measurement tools and methods used. In a 2001 literature review on existing competence assessment tools, Meretoja and Leino-Kilpi (2001) noted the lack of rigorous peer-reviewed research and the availability of psychometric data of these tools. Similarly, Watson et al. (2002) found that much of the literature pertaining to the assessment of clinical competence was lacking reliability and validity while a more recent review concluded that psychometric properties of developed tools needed further investigation (Yanhua & Watson, 2011). While these reviews focused on quantitative measurement tools, recent studies used qualitative designs to describe the competences of NGNs (Goudreau et al., 2015; Stirling et al., 2012).

Many authors use the terms 'competence', 'competency' and 'clinical competence' interchangeably, which adds to the confusion and complexity of competence assessment. To ensure consistency, we deem important to define the terms that were used in this review. Throughout this paper, the term 'competence' will be used unless it is used as a standard (such as competency framework). We also adopted the holistic definition of a competence, defined as the context-bound, holistic combination of knowledge, skills, attitudes and values (Gonczi, 1994), such as those defined by QSEN (Cronenwett et al., 2007). Finally, clinical competence was conceptualized as the overall competence or integration of many core competences.

An initial search of CINAHL, MEDLINE and PROSPERO found no systematic review since 2011 (published or in progress) on the clinical competence assessment of NGNs in clinical settings. Therefore, there is a clear need to synthesize the literature of the last 10 years, by integrating quantitative, qualitative and mixed methods studies.

2. THE REVIEW

2.1 Aim

To appraise and synthesize evidence of empirical studies reporting assessment of NGNs' clinical competence in clinical settings.

The review was guided by three research questions:

- What approaches have been used to assess NGNs' clinical competence?
- What are the reported levels/findings of NGNs' clinical competence?
- What is the quality of the included studies?

2.2 Design

We conducted a two-phase mixed methods systematic review, inspired by Yu and Kirk (2008, 2009). The current paper reports the results of phase 1. As the complex nature of competence calls for an array of methodologies (Franklin & Melville, 2015; Stirling et al., 2012; Thomas & Mraz, 2017), it appeared coherent to include all research designs in this review. We based this review on the Question, Eligibility, Source, Identification, Selection, Appraisal, Extraction, and Synthesis (QESISAES) framework developed by Pluye et al. (2016), which is based on the PRISMA statement (Moher et al., 2009). The QESISAES framework offers guidance on designing, conducting and reporting mixed methods systematic review to synthesize quantitative, qualitative and mixed methods studies. An initial version of the protocol was registered with PROSPERO (CRD42018109711); however, due to numerous findings to report, we divided the protocol into Phase 1 (report of clinical competence) and Phase 2 (psychometric review of scales).

2.3 Search Methods

With the assistance of a librarian, we developed a search strategy using keywords related to: (1) new graduate nurse, (2) clinical competence and (3) competence assessment. The searched literature databases included CINAHL, MEDLINE, Embase, PsycINFO and Web of science (see Supplementary file 1). The search was limited to papers published in English or French between 2010 and September 2019.

The inclusion criteria were: 1) empirical studies (quantitative, qualitative or mixed methods); 2) detailed methods and results sections; 3) competence assessment in clinical settings; and 4) NGNs (≤ 24 months since graduation) as the individuals being assessed.

Exclusion criteria were: 1) studies assessing technical skills; 2) studies focusing on a single competence (e.g. clinical decision-making); 3) studies using various tools and each one assessing a single competence; and 4) literature reviews, opinion papers, or editorials.

2.4 Search Outcomes

The initial database search yielded 1566 unique references. Two authors (initials omitted) independently screened titles and abstracts to identify eligible references. Full-text of eligible papers (n=171) were obtained for further assessment of eligibility. References of the full-text papers were hand-searched to retrieve additional records (n=12). Disagreement was solved by consensus and if necessary, a third author was involved. References screening and selection was performed using Covidence (www.covidence.org).

A total of 42 papers were included in the review (Figure 1).

Figure 1: Search outcomes flow chart

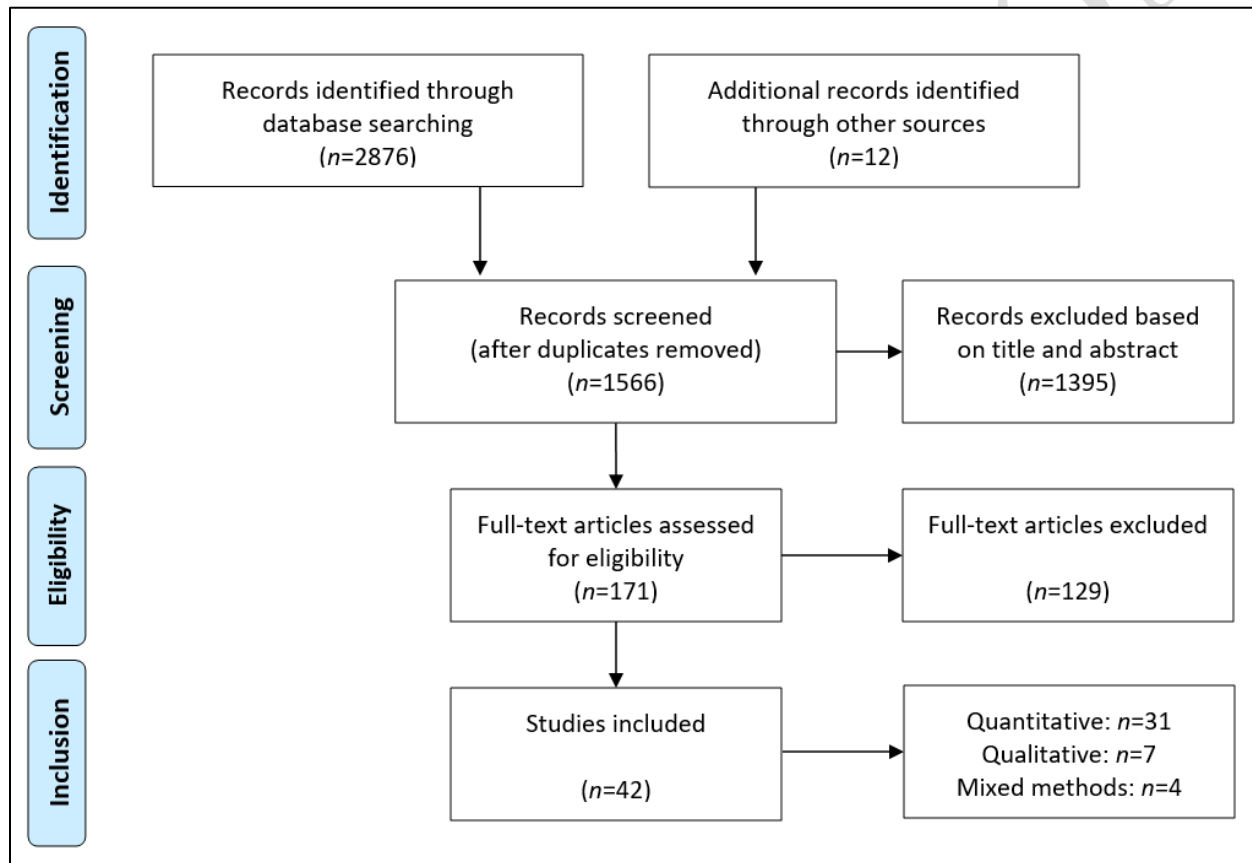## 2.5 Quality appraisal

Quality appraisal of the studies was undertaken using the Mixed Methods Appraisal Tool (MMAT; Hong et al., 2018). The MMAT can be used to appraise five of the most common types of study designs: qualitative research, randomized controlled trials, quantitative non-randomized studies, quantitative descriptive studies, and mixed methods studies. Two authors (initials omitted)

independently rated the studies, and consensus was reached through discussion. As recommended by Hong et al. (2018), no study was excluded from the review based on its methodological quality.

2.6 Data Extraction

For each study, the following information was extracted independently by two authors (initials omitted): (1) authors, year and country; (2) aim; (3) study design; (4) sample and settings; (5) data collection methods and tools to assess clinical competence, including validity and reliability; and (6) key conclusions. The data extraction form was developed, and pilot tested by the first author. Disagreements in extraction were solved by consensus or by consulting a third author.

2.7 Synthesis

Given the purpose of this review, a data-based convergent synthesis of the extracted data was undertaken (Hong et al., 2017; Pluye et al., 2016), which consists of the integration of both quantitative and qualitative data, presented narratively. This synthesis design is useful when the review question is broad. Quantitative meta-analysis was not deemed appropriate, nor feasible considering the heterogeneity of the quantitative studies in terms of aims, designs and data collection methods.

3. RESULTS

3.1 Study characteristics

After screening, 42 papers (representing 34 studies) were included in this review. Based on first author affiliation, studies came from 13 countries. Most papers (n=30) were from the United States, Australia, Finland and Canada.

3.2 Approaches used

Of the 42 papers included in this review, 31 used a quantitative methodology, either cross-sectional (n=19) or longitudinal (n=12). Seven studies were qualitative and four were mixed methods.

Most quantitative studies or quantitative components of mixed methods studies used a previously developed or validated tool (n=23). The Nurse Competence Scale (NCS) was the most used tool (n=10; Kuokkanen et al., 2016; Lima et al., 2016; Lima et al., 2014; Numminen et al., 2014; Numminen et al., 2015a, 2015b; Numminen, Leino-Kilpi, et al., 2016; Numminen et al., 2017; Numminen, Ruoppa, et al., 2016; Wangensteen et al., 2012). All other tools were used in four or less research papers each: Six-Dimension Scale of Nurse Performance (6-D Scale; Aggar et al., 2017; Aggar et al., 2018), Modified Six-Dimension Scale of Nurse Performance (M6-D Scale; Bratt et al., 2014), Holistic Nursing Competence Scale (HNCS; Jung et al., 2017; Takase et al., 2014), New Graduate Registered Nurse Transition Program Competency Tool (NGRNTPCT; Oblea et al., 2019), Nurse Competence Questionnaire (NCQ; Chen, Chen, et al., 2017; Chen, Chien, et al., 2017), Nurse Professional Competence (NPC; Holowaychuk, 2018) and Overall

Competency Tool/Specific Competency Tool (OCT/SCT; Blegen et al., 2015; Spector et al., 2015; Wilson et al., 2018; Woda et al., 2019).

The authors of 12 papers designed their own quantitative tool to collect data, mostly based on literature or empirical results from previous studies (Altuntaş & Baykal, 2017; Applin et al., 2011; Aung & Jamal, 2017; Kowalski & Cross, 2010; Liu et al., 2019; Marks-Maran et al., 2013; McKillop et al., 2016; Missen et al., 2016; Oermann et al., 2010; Thomas et al., 2011; Williams et al., 2015; Wolsky, 2014).

Qualitatively, different designs were used to report NGNs' competences: phenomenological approach or analysis (*n*=4; Hopkins, 2015; Stirling et al., 2012; ten Hoeve et al., 2018; Thomas & Mraz, 2017), focused ethnography (*n*=1; Charette et al., 2019a) and descriptive design (*n*=6; Aggar et al., 2017; Goudreau et al., 2015; Marks-Maran et al., 2013; McKillop et al., 2016; Missen et al., 2015; Thomas et al., 2011;). To collect data, researchers used individual interviews (Aggar et al., 2017; Charette et al., 2019a; Goudreau et al., 2015; Hopkins, 2015; Missen et al., 2015; Thomas & Mraz, 2017), focus groups (Charette et al., 2019a; Goudreau et al., 2015; McKillop et al., 2016; Stirling et al., 2012), written diaries (Marks-Maran et al., 2013; ten Hoeve et al., 2018), video recording (Marks-Maran et al., 2013) or qualitative questionnaires (Marks-Maran et al., 2013; Thomas et al., 2011). Content analysis led to themes to elicit the participants' view of NGNs' competences. Participants were mostly NGNs discussing their own experience, but some interviews and focus groups were done with preceptors or managers.

3.3 Reported levels/findings of clinical competence

This section is organized according to the main purpose of studies: cross-sectional assessments of NGNs' clinical competence and associated variables (*n*=16, Table 1), change in competence level during transition (*n*=17, Table 2) and outcome of pre-licensure education (*n*=9, Table 3).

Cross-Sectional Assessments of Clinical Competence and Associated Variables

Sixteen studies (Table 1) reported cross-sectional assessments self-perceived levels of clinical competence of NGNs (*n*=9) or from a third-party assessor (*n*=7). Three quantitative studies reported self-perceived levels of clinical competence of NGNs. One study showed a moderately adequate level (Chen, Chen et al., 2017), while two other studies reported rather good (Lima et al., 2014) and good levels of competence (Wangensteen et al., 2012).

Although qualitative research is not meant to provide a measurement, it can provide some insights into how NGNs use and develop clinical competence. In a qualitative study, ten Hoeve et al. (2018) analyzed diaries that were completed weekly by NGNs. The content analysis revealed how they demonstrated competence, felt competent and in control of situations.

Seven studies reported competence assessment by third-party assessors (preceptors, educators or managers): five quantitative, one qualitative and one mixed methods. In a mixed methods study

(Thomas et al., 2011), managers qualitatively perceived that NGNs lacked competence. Quantitatively, NGNs were rated as being between novice and advanced beginners according to Benner's model (1982) In another study, coordinators in charge of their hospital-based nurse transition programs perceived that NGNs were lacking technical skills and had communication and professional behavior issues but were perceived as proactive, keen to learn, with a strong base of theoretical knowledge, research competence and information technology (Missen et al., 2015). However, in a follow-up study, Missen et al. (2016) reported that nurses rated NGNs' competence as largely positive in most areas, and Aung and Jamal (2017) reported that 98-100% of nurse managers rated NGNs' competence as good or excellent.

To better understand how different groups assess NGNs' competence, three studies used comparative designs, with different findings. Chen, Chien, et al. (2017) found no significant difference in overall competence assessment of NGNs compared to their preceptors. Numminen et al. (2014) found that educators working in university settings assessed NGNs' competence higher than nurse managers (mean=60.1 vs. 43.7; p≤0.001). They also found that less experienced educators and more experienced managers tended to assess NGNs' competence as lower. Those results were challenged by a similar Canadian study (Wolsky, 2014) that reported no significant difference between practicing nurses and educators' assessments of NGNs' competence, which was deemed acceptable.

Seven studies explored the relationship between competence and other variables. Competence was significantly positively correlated with empowerment (r_s=0.482; Kuokkanen et al., 2016), ethical climate (r=0.307; Numminen et al., 2015a), occupational commitment (Numminen, Leino-Kilpi, et al., 2016), and practice environment (r=0.241; Numminen, Ruoppa, et al., 2016). Chen, Chen, et al. (2017) found significant positive associations between clinical competence and satisfaction with current nursing job, participation in interprofessional education conferences, satisfaction with current preceptor, and benefit of preceptor policies to personal nursing capacity. Finally, two studies identified predictors of clinical competence: previous healthcare experience and working in specialized health care (Wangensteen et al., 2012) and satisfaction with current preceptor, satisfaction with the current nursing job, and participation in interprofessional education conferences (Chen, Chen, et al., 2017).

Change in Competence Level During Transition

Seventeen studies explored change in competence during the transition to practice of NGNs, either through hospital-based educational programs or preceptorship/residency programs (Table 2).

Four studies explored the outcomes of short hospital-based simulation programs or reflective practice sessions. Jung et al. (2017) reported no significant change in competence of NGNs in an experimental group undergoing short simulation sessions compared to a control group. Qualitatively, other researchers reported that simulation activities and reflective practice sessions

in clinical settings had a positive impact on NGNs' competence (Goudreau et al., 2015; Stirling et al., 2012; Thomas & Mraz, 2017).

Several studies found significant increases in NGNs' competence during their first transition year. Two studies showed a significant increase from 0-6 months, but not from 6-12 months (Lima et al., 2016; Wilson et al., 2018). Bratt et al. (2014) and Oblea et al. (2019) reported a significant increase in competence after 6 months in a transition program, with Bratt et al. (2014)'s findings being sustained at 12 months. Kowalski and Cross (2010) also found a consistent increase in NGNs' competence assessed by a preceptor from 3 weeks to 8 months, but the attrition rate of participants between first and last measurement (82%) was quite considerable. Finally, Spector et al. (2015) also reported a significant increase in NGNs' competence from 0-12 months, without reporting intermediate timepoints (3, 6 and 9 months), which would be needed to compare the results to other studies.

In two mixed methods studies (Marks-Maran et al., 2013; McKillop et al., 2016), researchers reported a positive impact of transition programs on NGNs' competence both in terms of quantitative and qualitative findings, without quantifying the competence level of NGNs.

Three studies did not show a significant increase in NGNs' competence from 0-12 months (Aggar et al., 2017; Aggar et al., 2018) or 0-24 months (Liu et al., 2019), despite participants qualitatively perceiving an improvement in competence (Aggar et al., 2017; Liu et al., 2019). Blegen et al. (2015) examined the influence of being in a high preceptor-support group compared to low support on the overall competence of NGNs during the first year of practice. Even though competence was significantly higher at 9 months in the high-support group, that difference was not sustained at 12 months.

Change in competence beyond the first year was explored by collecting data at 1, 2 and 3 years post-graduation, without showing a significant increase in overall competence (Numminen et al., 2017).

Outcome of Pre-Licensure Education

Nine studies assessed competence level of NGNs as the outcome of pre-licensure education (Table 3). Two studies concluded that exposure to clinical experience while being students had a positive impact on competence of NGNs. Hopkins (2015) reported that participation in a summer-long internship before senior year supported NGNs competence mastery once graduated. Similarly, Holowaychuk (2018) found a significant positive correlation (r=0.394) between the amount of direct care hours as a nursing student and perception of professional competence at 3 and 6 months post-graduation.

Four studies explored clinical competence of NGNs from specific pre-licensure education programs or by comparing graduates from different programs. NGNs were deemed competent both by themselves or by their managers, even though NGNs self-assessed themselves significantly

higher than their managers (Altuntaş & Baykal, 2017). Takase et al. (2014) explored if holding a Bachelor of Nursing (BN) made a difference in NGNs' competence; NGNs with a BN rated themselves significantly lower than non-BN at 3 months, but no difference was perceived at 6, 9, and 12 months between groups. In both groups, competence was rapidly growing 0-6 months post-graduation, and slowly later, which is consistent with other longitudinal studies (Lima et al., 2016; Wilson et al., 2018). NGNs from accelerated nursing programs were also compared to those from traditional programs, again without finding a significant difference at baseline or at 12 months (Oermann et al., 2010). Finally, Woda et al. (2019) also could not find a significant difference between NGNs who benefitted from supplementing clinical placements with simulation and a control group.

Three Canadian studies examined outcomes of CBE pre-licensure programs or problem-based learning (PBL). Two studies reported no significant difference when comparing competence of NGNs from PBL with non-PBL, 6 months post-graduation (Applin et al., 2011) and 2 years post-graduation (Williams et al., 2015). However, qualitatively, Applin et al. (2011) reported that NGNs from PBL were more explicit in how their education helped them develop their competence. Charette et al. (2019a) performed a focused ethnography to describe competences used by NGNs from a competency-based BN program and concluded they demonstrated 7 out of the 8 competencies they developed, with the competency on health promotion being more difficult to use in the acute care setting.

Table 1: Cross-sectional assessment and associated variables

Authors, country	Aim of the study	Study design	Sample, setting	Data collection (competence assessment)	Key findings
Aung and Jamal (2017); Malaysia	To explore nurse managers' perspectives on nurses' performance in a mentorship program	Quantitative descriptive cross-sectional	N=51 nurse managers	Self-designed tool (based on mentoring guidebook) rated by nurse managers No mention of validity. Reliability by Cronbach's alpha (α) at 0.994	Nurse managers rated NGNs' performance as good or excellent for communication (100%), professional development (98%) and creative thinking (98%).
Chen, Chen et al. (2017)*; Taiwan	To investigate self-perceived nursing competency, its personal characteristics and hospital-related factors in NGNs	Quantitative cross-sectional	N=105 NGNs	NCQ, self-rated by NGNs Previous validity and reliability mentioned. Content validity assessed (CVI 0.90-0.96). Reliability by Cronbach's (α) at 0.91	Self-perceived nursing competency adequacy was moderate in NGNs. Adequacy was highest for communication (3.86; SD 0.52) and lowest for research (3.13; SD 0.63).
Chen, Chien et al. (2017)*; Taiwan	To explore and compare NGNs' self-assessment of clinical competence with their preceptor's assessment	Quantitative cross-sectional	N=99 pairs of NGNs and preceptors	NCQ, self-rated by NGNs and rated by preceptors Previous validity and reliability mentioned. Content validity assessed (CVI 0.90-0.96). Reliability by Cronbach's (α) at 0.91	There was no significant difference in NGNs' and preceptors' perception of overall competence (p=0.75). However, NGNs rated themselves higher (p<0.05) for communication, patient education, and management competencies.
Kuokkanen et al. (2016)*; Finland	To explore NGNs' empowerment and its associations with their self-assessed professional competence	Quantitative descriptive cross-sectional correlational	N=318 NGNs	NCS, self-rated by NGNs Previous validity and reliability mentioned. No mention of current validity. Reliability by Cronbach's (α) a at 0.76-0.92 (subscales).	A significant positive correlation (r_s=0.482, p<0.001) between empowerment and professional competence was found.
Lima et al. (2014)*; Australia	To determine the self-assessed level of competence of NGNs at the start of a transition program	Quantitative cross-sectional	N=47 NGNs	NCS, self-rated by NGNs Previous validity and reliability mentioned. No mention of current validity. Reliability by Cronbach's (α) at 0.96 (overall) and 0.61-0.95 (subscales).	The overall competence level was 40.1 (±10.5), ranging from 35.0 (±14.3) for the teaching-coaching domain to 47.5 (±14.6) for ensuring quality. For frequency of use, the helping role was most frequently used (74%) while the work role was least used (34%).
Missen, McKenna, and Beauchamp (2015); Australia	One of the aims was to explore perceptions of graduate nurse program coordinators on the work readiness of NGNs	Qualitative descriptive	N=16 coordinators	Individual interviews with coordinators No mention of validity of the interview guide or member checking. Inter-coder reliability asserted by independent analysis by three researchers.	Two relevant subthemes: 1) clinical skills deficits but strength in research and information technology, being proactive, keen to learn and strong theoretical knowledge; and 2) communication and professional behaviour issues.
Missen et al. (2016); Australia	To explore views of qualified nurses in relation to NGNs' abilities	Quantitative cross-sectional	N=201 nurses	Self-designed tool (based on a previous study) rated by nurses	NGNs' abilities were rated as largely positive in six key skill areas: medication administration, routine physical assessment,

				Content and face validity reviewed by an expert panel. Reliability by Cronbach's (α) at 0.964 (scale).	clinical skills regularly undertaken, emergency procedures, communication skills, and preparedness for nursing practice.
Numminen et al. (2015a)*; Finland	To examine NGNs' perceptions of the ethical climate of their work environment, and its association with self-assessed professional competence	Quantitative descriptive cross-sectional correlational	N=318 NGNs	NCS, self-rated by NGNs Previous validity and reliability mentioned. Current structural validity assessed by confirmatory factor analysis (fairly good model fit). Reliability by Cronbach's (α) at 0.76-0.92 (subscales).	There was a moderate positive correlation (r=0.307, $p<0.001$) between NGNs' competence and their perception of the ethical climate.
Numminen et al. (2015b)*; Finland	To explore the combined effect of NGNs' perceptions of their professional competence and individual and organizational factors	Quantitative descriptive cross-sectional correlational	N=318 NGNs	NCS, self-rated by NGNs Previous validity and reliability mentioned. Current structural validity assessed by confirmatory factor analysis (fairly good model fit). Reliability by Cronbach's (α) at 0.76-0.92 (subscales).	Multivariate analysis demonstrated that NGNs who were more competent felt themselves more empowered and occupationally committed and perceived their practice environment and its ethical climate more positively.
Numminen, Leino-Kilpi et al. (2016)*; Finland	To explore NGNs' occupational commitment and its association with self-assessed professional competence	Quantitative descriptive cross-sectional correlational	N=318 NGNs	NCS, self-rated by NGNs Previous validity and reliability mentioned. Current structural validity assessed by confirmatory factor analysis (fairly good model fit). Reliability by Cronbach's (α) at 0.76-0.92 (subscales).	Professional competence was positively associated with affective commitment only ($p<0.005$).
Numminen, Ruoppa, et al. (2016)*; Finland	To explore NGNs' perceptions of their practice environment, and its association with self-assessed professional competence	Quantitative descriptive cross-sectional correlational	N=318 NGNs	NCS, self-rated by NGNs Previous validity and reliability mentioned. Current structural validity assessed by confirmatory factor analysis (fairly good model fit). Reliability by Cronbach's (α) at 0.76-0.92 (subscales).	There was a weak positive significant correlation (r=0.241, $p<0.001$) between practice environment and professional competence.
Numminen et al. (2014); Finland	To explore the correspondence between nurse educators' and nurse managers' assessments of the level of novice nurses' professional competence	Quantitative cross-sectional comparative	N=227 (n=86 nurse educators and n=141 managers)	NCS, rated by nurse educators and managers Previous validity and reliability mentioned. No mention of current validity. Reliability by Cronbach's (α) at 0.93-0.97 (subscales).	Educators' assessments of novice nurses' competence were significantly higher than managers' assessments (60.1 vs 43.7; $p<0.005$). The highest difference (20.2) between educators' and managers' assessments were in therapeutic interventions and smallest in helping role (9.6) domains.

ten Hoeve et al. (2018); The Netherlands	To investigate described experiences of NGNs during their first 2 years after graduation.	Qualitative longitudinal, using a phenomenological analysis	N=18 NGNs	Diary completed by NGNs No mention of validity of the diary format or questions or of member checking. Inter-coder reliability asserted by independent analysis by three researchers.	Three relevant themes: display of competence and feeling competent, the need for continuing professional development and being in control of situations.
Thomas, Ryan, and Hodson-Carlton (2011); USA	To describe nurse managers' perceptions of competency levels of NGNs	Mixed-methods cross-sectional	N=148 managers	Self-designed mixed-methods tool (Competency Levels of New Registered nurses, partly based on QSEN) rated by managers No mention of validity or reliability.	Managers rated that NGNs' competencies were between novice (1) and advanced beginners (2): Patient-centred care (1.67), interdisciplinary team (1.74), quality improvement (2.03), EBP (1.67), informatics (2.74). Qualitative findings show that managers perceived a lack of competences of NGN.
Wangensteen et al. (2012); Norway	To describe NGNs' perceptions of competence and identify possible predictors influencing their perceptions	Quantitative cross-sectional	N=620 NGNs	NCS, self-rated by NGNs Previous validity and reliability mentioned. No mention of current validity. Reliability by Cronbach's (α) at 0.72-0.92	Clinical competence level was 62.5 (SD 13.0), with the lowest domain being Ensuring quality (53.8, SD 18.7) and the highest being Helping role (70.0, SD 12.2). Items that were used more frequently were also assessed as higher competence level. Significant predictors of 4 of the 7 domains on the NCS were previous health care experience and working in specialist health care.
Wolsky (2014); Canada	To explore perspectives of nurses in academia and practice related to NGN's competencies.	Quantitative non-experimental	N=72 nurses	Self-designed tool (Expectations of New Graduate Nurses Survey, based on another survey) rated by nurses Face and content validity asserted by a pilot test. No mention of reliability.	NGNs overall met an acceptable level of practice as identified by both academia and practice nurses, highest category being clinical knowledge (2.528) and lowest management responsibilities (4.931).

*This symbol means more than one paper was published with the same sample of participants.

Note: NCQ: Nurse Competence Questionnaire; NCS: Nurse Competence Scale; NGN: New graduate nurse; QSEN: Quality and Security Education for Nurses; SD: Standard deviation

Table 2: Change in competence level during transition

Authors, country	Aim of the study	Study design	Sample, setting	Data collection (competence assessment)	Key findings
Aggar et al. (2017); Australia	To determine whether a transition program led to competent practicing nurses in their first-year post-graduation	Mixed methods exploratory longitudinal design (measures: 3-6-12 months)	*N*=11 (*n*=4 NGNs and *n*=7 preceptors)	Modified version of 6-D Scale, self-rated by NGNs and rated by preceptors; individual interview with NGNs and preceptors No mention of previous validity and reliability (other than the reference) and no mention of current validity and reliability.	NGNs' self-assessed competence did not significantly vary between timepoints (M=3.2/2.9/3.3; p>0.05), neither did the preceptors' assessment (M=3.5/3.4/3.2; p>0.05). Using the National Practice Standards, NGNs were assessed as competent by the preceptors.
Aggar et al. (2018); Australia	To evaluate PHC NGNs' competence, confidence and experiences of program support and to compare these outcomes with acute care NGNs	Quantitative cohort design (measures: 6-12 months)	*N*=25 NGNs	6-D Scale, self-rated by NGNs and rated by preceptors No mention of previous validity and reliability (other than the reference) and no mention of current validity and reliability.	No difference in NGNs' competence between PHC and acute care, self-assessed (T1=3.0/3.0/p=0.993 and T2=3.0/3.1/p=0.408) or assessed by preceptors (T1=3.4/3.2/p=0.454 and T2=3.4/3.1/p=0.151). There was also no significant difference in competences between T1 and T2, for both groups (p=0.439 and 0.520).
Blegen et al. (2015)*; USA	One aim was to determine the effect of preceptorship (low vs high support) on NGNs' competence	Quantitative randomized longitudinal design (measures: 6-9-12 months)	*N*=567 (*n*=238 NGNs and *n*=329 preceptors)	OCT/SCT (self-designed), self-rated by NGNs and rated by preceptors No mention of validity of OCT, reliability by Cronbach's (α) at 0.868. Structural validity of SCT assessed by exploratory factor analyses. Reliability by Cronbach's (α) at 0.88-0.93 (subscales).	Preceptors in high support group rated the overall competence of NGNs significantly higher only at 9 months (p=0.001); there was no difference in the NGNs' overall competence at 6 or 12 months between high or low preceptor support. Some specific competences were significantly higher in high support group at 6 months (patient-centred care) and 12 months (EBP, technology and teamwork/communication).
Bratt, Baernholdt, and Pruszynski (2014)*; USA	To examine NGNs' perceptions of their professional practice and to explore outcomes of different nurse residency programmes (rural vs urban)	Quantitative longitudinal cohort (measures: 0-6-12 months)	*N*=468 NGNs (*n*=382 urban and *n*=86 rural)	M6-D Scale, self-rated by NGNs Previous reliability mentioned. No mention of current validity. Reliability by Cronbach's (α) at 0.95 (scale) and 0.71-0.90 (subscales)	Findings show no significant difference between groups at any time point. Both groups significantly improve their competence at 6 and 12 months (p<0.001).
Goudreau et al. (2015); Canada	One aim was to describe NGNs' perceptions of their	Qualitative descriptive	*N*=85 (*n*=12 managers, *n*=18 nurses	Individual interview with NGNs; focus group interview with managers (based on CBE).	Themes: NGNs' perceptions of development of their competences and managers' perceptions.

	clinical reasoning and leadership development	longitudinal evaluative	and n=55 NGNs)	No mention of validity of the interview guide. Inter-coder reliability attained through coding of 15% of data by a second research assistant, and list of codes and themes refined until a 90% inter-coder agreement was reached. No mention of member checking	
Jung et al. (2017); South Korea	One aim was to test effects of a simulation program on NGNs' competences	Quasi-experimental (measures: 0-3 months)	N=48 NGNs (n=24 EG and n=24 CG)	HNCS, self-rated by NGNs No mention or previous validity and reliability (other than the reference). No mention of current validity. Reliability by Cronbach's (α) at 0.93.	The change in HNCS score was not significant between groups (p=0.992).
Kowalski and Cross (2010); USA	To present outcomes of a residency program	Quantitative longitudinal design (measures: 3-6-8 weeks and 3-6-8 months)	N=55 NGNs	Self-designed tool (based on hospital assessment tool) rated by preceptors Validity asserted by a panel of expert nurses. No mention of reliability.	Clinical competence level consistently increased at each time point (78.1-87.9-93.5-101.7-105.3-111.1 on a 124-point scale; χ^2 = 29.92, df = 5, p < 0.001).
Lima et al. (2016)*; Australia	To determine the extent to which competence develops in the first year of transition	Quantitative longitudinal design (measures: 0-3-6-12 months)	N=47 NGNs	NCS, self-rated by NGNs Previous validity and reliability mentioned. No mention of current validity. Reliability by Cronbach's (α) at 0.96 (overall).	Self-assessed level of overall competence was 41.4 at commencement, 61.1 at 3 months, 72.9 at 6 months and 76.7 at 12 months. The increase in overall competence level (and for each domains) was significant from 0-6 months (p<0.001), but not significant from 6-12 months.
Liu et al. (2019); Taiwan	One aim was to evaluate the effectiveness of NGNs' transition program	Quantitative descriptive cross-sectional	N=49 (n=32 NGNs and n=17 evaluators)	Mini-CEX rated by evaluators Content validity assessed by an expert panel. Reliability by an inter-rater coefficient of 0.7.	Mean evaluation scores ranged from 5 to 7 on a 9-point scale, assessed as satisfactory and excellent. No significant difference in the scores in relation to length in the program.
Marks-Maran et al. (2013); UK	To explore the impact of a preceptorship programme from the preceptees' perspectives	Mixed-methods evaluative	N=44 NGNs	Self-designed mixed-methods tool (based on an evaluation framework) self-rated by NGNs, reflective journals and recordings by NGNs No mention of validity. Reliability demonstrated by Cronbach's (α) at 0.708-0.938 (subscales). No mention of inter-coder reliability.	The integrated results of both quantitative and qualitative components show a positive impact of preceptorship on competence of NGNs.
McKillop et al. (2016); New Zealand	To explore the impact of a postgraduate transition programme on NGNs	Mixed-methods, descriptive cohort	N=136 (n=122 NGNs and n=14 preceptors)	Self-designed quantitative tool self-rated by NGNs and their preceptors (based on the outcomes of the programme); focus group interview with NGNs and preceptors (also based on outcomes of programme)	This programme provided opportunities and environments for NGNs to advance their critical thinking, patient assessment skills and clinical reasoning.

				Mention of 'previously validated' tool, without reference. No mention of validity or reliability. Inter-coder reliability asserted by independent analysis by two researchers.	
Numminen, et al. (2017)*; Finland	To explore NGNs' perceptions of their competence, practice environment, ethical climate, occupational commitment, empowerment, job satisfaction, and turnover intentions; To explore the change over 3 years, the association between factors and prediction of competence development	Quantitative descriptive longitudinal correlational design (measures: 1-2-3 years)	N=318 NGNs	NCS, self-rated by NGNs

Previous validity and reliability mentioned. Current structural validity assessed by confirmatory factor analysis (fairly good model fit). Reliability by Cronbach's (α) at 0.76-0.92 (subscales). | Overall competence did not significantly vary between timepoints (p=0.554). However, there was a significant increase in the therapeutic interventions subscale between year 1 and 3 (p=0.013). Multiple regression modelling revealed that increase in empowerment (p = .003), satisfaction with quality of care in work unit (p = .022), longer work experience (p = .002), and shorter time from graduation (p = .002) statistically significantly predicted higher competence. |
| Oblea et al. (2019); USA | To determine the effectiveness of the clinical nurse transition program for newly commissioned Army nurses | Quantitative pre-post design (measures: 0-26 weeks) | N=86 NGNs | NGRNTPCT self-rated by NGNs

Previous validity and reliability mentioned. No mention of current validity/reliability. | Participants reported significant improvement (p < 0.0001) on all items of the scale. |
| Spector et al. (2015)*; USA | To examine quality and safety, stress, competence, job satisfaction, and retention in NGNs in an evidence-based transition program compared to a control group | Quantitative randomized longitudinal design (measures: 0-6-9-12 months) | N=567 (n=238 NGNs and n=329 preceptors) | OCT/SCT (self-designed), self-rated by NGNs and rated by preceptors

No mention of validity of OCT, reliability demonstrated by Cronbach's (α) at 0.868. Structural validity of SCT assessed by exploratory factor analyses. Reliability by Cronbach's (α) at 0.88-0.93 (subscales). | NGNs' and preceptors' assessment were not significantly different at any timepoint. NGNs' overall competence in every group increased significantly over 12 months (p=0.018), but there was no difference between groups (p=0.054). |
| Stirling, Smith, and Hogg (2012); UK | One aim was to identify the perceived effect that simulation has in supporting professional development of NGNs | Qualitative phenomenological approach | N=4 NGNs | Focus group interview with NGNs

No mention of validity or inter-coder reliability | Themes: Development of stress management skills, improved management of the acutely unwell patient, transfer of skills learnt in simulation to the clinical setting, development of communication skills, development of reflection skills. |
| Thomas and Mraz (2017); USA | To discover how simulation influenced the practice and development of NGNs | Qualitative descriptive phenomenological approach | N=14 NGNs | Individual interview with NGNs | Themes: communication with patient and co-workers, critiquing, theory to practice integration/clinical problem solving, |

				No mention of validity of interview guide or inter-coder reliability. Member checking of themes and authenticity of analysis done.	seeing the big picture of patient care, and responsibility for independent practice.
Wilson, Weathers, and Forneris (2018); USA	To evaluate nurse resident outcomes of nurses completing the residence program irrespective of the option used at their institution.	Quantitative descriptive longitudinal design (measures: 0-6-12 months)	N=292 NGNs	SCT, self-rated by NGNs Previous reliability mentioned. No mention of previous or current validity. No mention of current reliability.	NGNs' competence increased significantly for all subscales from 0-6 months, but only for the quality improvement/EBP subscales from 6-12 months.

*This symbol means more than one paper was published with the same sample of participants.

Note: 6-D Scale: Six-Dimension Scale of Nurse Performance; CBE: Competency-based education; EBP: Evidence-based practice; HNCS: Holistic Nursing Competence Scale; M6-D Scale: Modified Six-Dimension Scale of Nurse Performance; Mini-CEX: Mini-Clinical Evaluation Exercise; NCS: Nurse Competence Scale; NGN: New graduate nurse; NGRNTPCT: New Graduate Registered Nurse Transition Program Competency Tool; OCT: Overall Competency Tool; PHC: Primary health care; SCT: Specific Competency Tool

Table 3: Outcomes of pre-licensure education

Authors, country	Aim of the study	Study design	Sample, setting	Data collection (competence assessment)	Key findings
Altuntaş and Baykal (2017); Turkey	To evaluate the performance of nurses who graduated from one institution	Quantitative descriptive, cross-sectional comparative	$N=509$ ($n=314$ NGNs and $n=195$ managers)	Self-designed tool (based on literature), self-rated by NGNs and rated by managers Content validity was assessed by an expert panel. Reliability by Cronbach's (α) at 0.96-0.98 and correlation values from 0.55-0.94.	NGNs rated themselves significantly higher than their managers, but were deemed competent by both groups, with the research competency being the weakest.
Applin et al. (2011); Canada	To determine if PBL had an impact on self-rated competence of NGN	Mixed methods descriptive comparative	$N=121$ NGNs ($n=64$ PBL and $n=57$ non-PBL)	Self-designed quantitative tool (GCQ, based on practice standards) with open ended questions, self-rated by NGNs No mention of validity. Reliability by Cronbach's (α) at 0.771	There was no significant difference between both groups ($p=0.163$). Qualitatively, NGNs from PBL wrote more detailed comments on how PBL has prepared them to practice.
Charette et al. (2019a); Canada	To describe the deployment of competencies of NGN from a CBE undergraduate nursing program	Focused ethnography	$N=19$ ($n=4$ NGNs, $n=2$ preceptors, $n=9$ CNS and $n=4$ managers)	Individual interview with NGNs and preceptors; focus group interview with other participants (interview guide based on Benner and CBE) Content validity of interview and focus group guides asserted by expert panel. Inter-coder reliability asserted for 20% of data by a second researcher. No mention of member checking	Findings showed that NGNs deployed 7 of the 8 competencies they developed during their pre-licensure program.
Holowaychuk (2018); USA	To compare the relationship between hours and NGNs' perception of competence	Quantitative correlational	$N=44$ NGNs	NPC, self-rated by NGNs Previous validity and reliability mentioned. No mention of current validity or reliability.	A positive correlation ($r=0.394$; $p=0.011$) between the number of direct care hours and perception of professional competence (3-6 months) was found.
Hopkins (2015); USA	To describe and explore the lived experience of NGNs	Qualitative phenomenological	$N=12$ NGNs	Individual interviews with NGNs No mention of validity of the interview guide or inter-coder reliability. Participants validation of thematic content of interview was done	Themes: delegation, communication, competence, time management, prioritization, and collaboration.
Oermann et al. (2010); USA	To examine differences in performance, job satisfaction, and transition into the	Quantitative descriptive	$N=47$ NGNs	Self-designed tool (based on hospital assessment tool) self-rated by NGNs	There was no significant difference in the competence of NGNs from different programs.

	professional role of new graduates of different programs			Content validity reviewed by an expert panel. No mention of reliability.	
Takase et al. (2014); Japan	To identify NGNs' perceptions of their competence during the first year of transition and compare the competence levels of BN nurses to non-BN nurses	Quantitative longitudinal (measures: 3-6-9-12 months)	N=122 NGNs (n=67 BN and n=51 non-BN)	HNCS, self-rated by NGNs No mention of previous validity and reliability (other than the reference). No mention of current validity. Reliability by Cronbach's (α) at 0.962–0.974.	NGNs with a BN rated themselves lower than non-BN at 3 months (p=0.03) but no significant difference was perceived at other timepoints. In both groups, competence is rapidly growing during the first half of the graduate year, and slowly later.
Williams, Richard, and Al Sayah (2015); Canada	To examine the impact of CBL approach on self-rated competence and transition to practice at 1 to 2 years post-graduation.	Quantitative descriptive comparative	N=163 NGNs (n=70 CBL and n=93 non-CBL)	Self-designed tool (GCQ, based on provincial practice standards) self-rated by NGNs Content validity asserted by provincial standards. No mention of reliability.	There was no significant difference competence of CBL and non-CBL nurses (p>0.05).
Woda et al. (2019); USA	To explore whether supplementing traditional clinical experiences with simulation had an impact on NGNs' perception of competence	Quasi-experimental	N=115 NGNs	OCT self-rated by NGNs Mention of previous reliability. No mention of previous validity or current validity/reliability.	No significant difference in self-perceived clinical competence level between both groups. Clinical competence was positively correlated with job satisfaction (r=0.408, p < 0.001) and negatively correlated with work stress (r=-0.526, p < 0.001).

Note: BN: Bachelor of nursing; CBE: Competency-based education; CBL: Context-based learning; CNS; Clinical nurse specialist; GCQ: Graduate Competence Questionnaire; HNCS: Holistic Nursing Competence Scale; NGN: New graduate nurse; NPC: Nurse Professional Competence; OCT: Overall Competency Tool; PBL: Problem-based learning

3.4 Quality Appraisal of Included Studies

To answer our last research question, we undertook a quality appraisal of included papers using the MMAT tool: mixed methods (*n*=4), qualitative (*n*=11), quantitative randomized control trial (*n*=2), quantitative non-randomized (*n*=11) or quantitative descriptive (*n*=22). As recommended by Hong et al. (2018), mixed methods studies were appraised on their qualitative, quantitative and mixed components. This explains why the number of papers appraised in Table 4 (*n*=50) is higher than the total number of included papers in this review (*n*=42).

Each type of paper was assessed on five criteria with a 'yes/no/unsure' scale. Hong et al. (2018) do not suggest calculating an overall quality score, but rather report complete findings, which are more informative. However, they acknowledge that a score can be informative for the narrative section. Therefore, we attributed a value (yes = 1; no or unsure = 0) and divided studies into low quality (score ≤ 3) or high quality (score > 3). The complete quality appraisal can be found in Supplementary file 2.

The methodological quality of the quantitative studies varied considerably and was influenced mostly by the data collection tools employed. Several researchers designed their own tools without assessing both their validity and reliability (Applin et al., 2011; Aung & Jamal, 2017; Kowalski & Cross, 2010; Marks-Maran et al., 2013; McKillop et al., 2016; Oermann et al., 2010; Thomas et al., 2011; Williams et al., 2015; Wolsky, 2014) or did not fully report those properties when they were available (Aggar et al., 2017; Aggar et al., 2018; Jung et al., 2017; McKillop et al., 2016; Takase et al., 2014).

Even though most (*n*=9/11) of the qualitative studies were deemed high-quality, many authors did not specify how the data collection tool (qualitative questionnaire or interview guide) was developed or validated before use (Aggar et al., 2017; Applin et al., 2011; Goudreau et al., 2015; Hopkins, 2015; Marks-Maran et al., 2013; McKillop et al., 2016; Missen et al., 2015; Stirling et al., 2012; ten Hoeve et al., 2018; Thomas & Mraz, 2017; Thomas et al., 2011). Some authors did not have any sort of inter-rater reliability of the analysis (Aggar et al., 2017; Applin et al., 2011; Hopkins, 2015; Marks-Maran et al., 2013; Stirling et al., 2012; Thomas & Mraz, 2017), or findings were not sufficiently supported by quotes from participants (Goudreau et al., 2015; Thomas et al., 2011).

Mixed methods studies included in this review appear to be of lower quality because of the interpretation of what are (or are not) mixed methods. A criterion often cited is the need to have an integration of the findings or of the interpretation of both the qualitative and quantitative components. Moreover, each component (quantitative and qualitative) of a mixed methods study should adhere to quality criteria, which was not the case in some studies in this review (Aggar et al., 2017; Thomas et al., 2011).

Table 4: Quality appraisal

Type of studies	Low quality (score ≤ 3)	High quality (score > 3)
Mixed methods (*n*=4)	2	2
Qualitative (*n*=7+4*)	2	9
Randomized controlled trial (*n*=2)	2	0
Quantitative non-randomized (*n*=10+1§)	3	8
Quantitative descriptive (*n*=19+3§)	3	19
Total	12	38

Note: *The second number represents the qualitative component of mixed methods studies. §The second number represents the quantitative component of mixed methods studies.

4. DISCUSSION

This paper provides a critical overview of studies that examined clinical competence assessment of NGNs since 2010. Even though seven qualitative studies were found, most studies used a quantitative data collection: from 35 studies which gathered quantitative data, 23 studies used an existing tool and 12 designed their own, for a total of 20 different tools. This plurality is not surprising, considering the complexity of the concept of competence. However, it makes the comparison of studies challenging, some tools using an adjectival scale (between 3- and 7-point) or a visual analogue scale (101-point). The vocabulary employed by researchers also varies, some using good, adequate, positive or acceptable to describe NGNs' competence level. However, most studies concluded that NGNs' level of competence was adequate/good/acceptable/positive, with some specific items or subscales being reported as not adequate. While NGNs from different types of nursing programs were judged competent, comparative studies between programs failed to find a significant difference between programs.

In 2011, Yanhua and Watson identified three tools: the NCS (developed by Meretoja et al., 2004), the Self-Evaluated Core Competencies (SECC) Scale (developed by Hsu & Hsieh, 2009) and a Competency Inventory (developed by Liu et al., 2009). No studies included in our review used the latter two tools. Several researchers preferred to develop their own tool, despite existing tools. This can be adequate if there is a rationale and if the validity and reliability of the tool is tested. Unfortunately, that was not the case in most of these studies, which can affect the rigor of the findings and the credibility of nursing education research.

This review has focused on the assessment of clinical competence of NGNs, cross-sectionally or longitudinally. Most studies show that there is a significant gain to be made from 0-6 months, but it is unclear if the improvement is solely due to the transition program or to a maturation effect. There is a gray zone on the gain from 6-12 months; quantitatively, studies found contradictory results, but qualitatively, NGNs and preceptors acknowledged that there was an improvement in clinical competence of NGNs during this period. These results are consistent with recent systematic reviews on effectiveness of transition programs and competence development during

the first year of NGNs (Al-Dossary et al., 2014; Edwards et al., 2015; Rush et al., 2019). Surprisingly, the only study in this review that looked at competence development of NGNs from 1 to 3 years post-graduation did not show a significant increase (Numminen et al., 2017).

NGNs need support early in their careers to expand their clinical competence by integrating and combining different sources of knowledge and learning from their experience (Benner et al., 2010; Duchscher, 2008). Educators in clinical settings could improve this support by developing continuing professional development activities that are guided by a competency framework that describes specific expected levels to attain for each competency (Charette et al., 2019b). This competency framework can be used to customize professional development plans for each NGN, based on their competence level.

Criticisms of competence assessment lies in its subjectivity, as self-assessments are seen by many as less objective and biased. However, a third-party assessor is not exempt from these criticisms, as evidenced by Numminen et al. (2014), who reported significant differences between the assessments of educators and managers. Many studies comparing self-assessment to a third-party assessment showed no significant difference, pointing out that self-assessment could be a valid method to assess competence.

Moreover, another way to look at third-party assessments is to consider them from the angle of whom is assessed. From the studies reported in Table 1, only one study reported assessment on an individual basis, where preceptors were assessing one specific NGN (Chen, Chien, et al., 2017). In all other studies, assessment was made on a collective basis as participants were asked to report their assessment of NGNs as a group. The latter is more likely to be biased, but more studies would be needed to compare both types of assessments. Collective assessments also were not linked to a specific time point during the transition of NGNs, which can influence the findings from those studies.

Instead of assessing clinical competence, some studies have rather explored experienced nurses' expectations towards NGNs (Brown & Crookes, 2016a, 2016b), or satisfaction of experienced nurses with NGNs' competence levels (Hopkins & Bromley, 2016; Rhodes et al., 2013; Shin et al., 2010). The difference between expectation, satisfaction and actual competence echoes in the endless debate of readiness for practice of NGNs, also referred to as work readiness, preparedness or fitness for/to practice (Darbyshire & Watson, 2019; El Haddad et al., 2017; Mirza et al., 2019; Patterson et al., 2017; Walker & Campbell, 2013). In two studies (Charette et al., 2019a; Thomas et al., 2011), researchers reported that NGNs' practice still corresponded to the description Benner provided of advanced beginners. Moreover, this review has identified many studies that reported NGNs to have adequate/good/acceptable levels of competence. In addition to assessing NGNs' competence, Wolsky (2014) collected data on expectations. Unsurprisingly, expectations were higher than actual competence levels of NGNs. Therefore, focus in the debate on fitness for practice should be on the high expectations some nurses have of NGNs and the reasons behind those expectations.

Some recommendations for future studies can be made. Franklin and Melville (2015) suggested that to encompass the complexity of competence assessments, data should be collected on multiple occasion and in a variety of contexts, rather than on a very specific occasion. To increase validity and reliability of competence assessments in clinical settings, they suggest using a multifaceted approach, by using an appropriate competence assessment tool but also to train competent assessors who can also act as role models. We agree with Franklin and Melville (2015) that future studies looking into NGNs' competence should be multifaceted, not only in terms of assessors, but also in terms of methods. Mixed methods studies offer great opportunities to assess clinical competence and enhance findings or address the complexity of competence assessments. Our findings show that qualitative studies provide insights on the lived experience of NGNs regarding their competence or how the clinical context affects their practice and competence level, by offering a thick description of specific events. In line with the holistic perspective of competence, this context needs to be considered to understand and correctly interpret competency levels.

4.1 Limitations

We only included English and French published papers, but some important work might have been undertaken in other languages. In addition, no effort was made to search the gray literature. The validity of results of this review is limited by the quality of included primary studies, which varied considerably. One main limitation of this review was its lack of a critique of the measures themselves, which will be subsequently reported in Phase 2 of this review. Despite these limitations, this review provides insightful findings on methods used to assess NGNs' competence in clinical settings.

5. CONCLUSION

The synthesis provided in this review showed that overall competence of NGNs in clinical settings has been assessed as adequate or good in the last 10 years, despite the expectation that NGNs should be more competent. This higher expectation may come from a complex context of care or difficulty in retention of nurses, which puts pressure on NGNs to fill gaps quickly. While NGNs might continue to develop their competence during their first year of practice, many studies failed at capturing the increase in competence, especially after the first six months of practice. More longitudinal studies with adequate sample sizes are necessary.

Many methods have been used in the last decade to assess NGNs' competence. Conceptualization of competence should be made explicit in future research. Although quality of the studies is generally good, there is a lack of rigor in methods employed. This suggests the need for a systematic psychometric review of quantitative tools used to measure competence level and evaluate their properties. Evaluating validity and reliability of these tools is important for the credibility of nursing education research and informing decision makers who wish to improve preregistration and continuing education of nurses.

Authors contribution

All authors have approved the final version of this article and meet both of the following criteria, based on the recommendations by the ICMJE (http://www.icmje.org/recommendations):

- substantial contributions to conception and design, acquisition of data or analysis and interpretation of data;
- drafting the article or revising it critically for important intellectual content.

Conflict of Interest statement

No conflict of interest has been declared by the authors.

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