



The relationship between specialty nurse certification and patient, nurse and organizational outcomes: A systematic review



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ABSTRACT

Objectives: To review the current evidence on the relationship between specialty nurse certification and outcomes.

Design: A structured and comprehensive systematic review was undertaken using the Joanna Briggs Institute framework to include both published research studies and expert opinion papers.

Data sources: Four electronic databases CINAHL, MEDLINE, PubMed, and PsychINFO were searched between 2000 and 2018. The search for expert opinion papers included nursing organizations, OaLster, Grey Literature Report, and The National Database of Nursing Quality Indicators.

Review methods: The records generated through the search were exported to EndNote X8 and duplicates were removed. Title and abstracts of the records were screened by three reviewers for eligibility using the selection criteria. In the absence of an abstract, records were retained for full text review. Full text assessment of each paper was conducted by two reviewers with a third referee, if necessary, to review any discrepancies. In the case of multiple articles drawing on one set of primary data, only one article was included. A review of each article was completed using the JBI Quality Appraisal checklists to assess internal and external reliability and validity. Both quality appraisal and data extraction were conducted by the review team independently and were validated by one other member of the team. Discrepancies were resolved through rigorous discussion between the reviewers.

Results: Forty one original research studies were included in the final analysis of the literature. The findings from the included articles were synthesized into three major categories and subsequent sub-categories: Patient outcomes, nurse outcomes and organizational outcomes. Twenty seven findings contributed to the sub-category of specialty nurse certification and patient outcomes. Patient outcomes were further classified into nurse sensitive outcomes, patient mortality and patient satisfaction. Fifty-four findings related to nurse outcomes with the sub-categories: personal and professional factors, knowledge and skills, organizational commitment, job satisfaction, empowerment and confidence. Six findings related to organizational benefits: including the sub-categories of nursing turnover and vacancy rates, perception of healthcare, and costs to the organization.

Conclusions: The current model risks driving further proliferation of specialty certifications and certifying organizations without questioning the assumptions underlying the goals of certification. The challenges of measuring impact and the cost and value to individual nurses and healthcare organizations are key areas for consideration.

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What is already known about the topic?

- Many organizations promote, offer and endorse courses leading to specialty nurse certification, especially in Australia, Canada, New Zealand, the UK and USA.
- Nurses derive feelings of personal accomplishment from certification
- Professional literature links specialty nurse certification to improved quality of care and patient outcomes

What this paper adds

- The evidence on the impact of nurse certification on outcomes is inconclusive
- Refinement of research design and the measure of meaningful patient, nurse and organizational outcomes is needed for the field to move forward.
- Research is needed to more specifically delineate the relationships between the type of specialty nurse certification and clinical practice associated with certification.

1. Introduction

Safe, high quality health care for all is the goal of health organizations and practitioners. Accreditation, licensing and certification have been described as three interconnected layers of a “whole-system” approach to patient safety, quality assurance, and performance improvement (Cochrane, 2014). Accreditation, licensing and certification are all terms applied to processes used to designate that a program, institution, product or individual have met established standards set by an agent (governmental or nongovernmental). Accreditation, licensing and certification are viewed by stakeholders (e.g. the public, health care administrators, policymakers, and healthcare professionals) as effective mechanisms for ensuring quality of care (ANCC, 2018; Boulet and Zanten, 2014; Brubakk et al., 2015). The purpose of *accreditation* is to monitor and promote healthcare organizations’ performance against predetermined optimal standards. *Licensing* is the process by which a government authority grants permission (i.e., the legal authority) to health provider organizations and to individuals to practice. *Certification* is the process used to verify the qualifications and experience of health professionals to determine their ability to provide safe, ethical, high quality health care services within specific health care settings (Australian Commission on Safety and Quality in Healthcare, 2015). In this review, *certification* is viewed as one form of credentialing, with recognition and accreditation programs other forms of credentialing (Hickey et al., 2014). This review focuses on specialty nursing certification, and is defined as a credentialing program for individuals. Specialty certification is administered by a college, board or agency who assess whether a nurse has met the requirements set by them as a recognised standard in a specialty area of practice. For example, a nurse working in the field of critical care in the United States of America can apply to the American Nursing Certification Center for the Critical Care Registered Nurse Certification. Eligibility for the certification requires a current U.S. nursing license and evidence of 1,750 h in direct care of acutely/critically ill paediatric patients during the previous 2 years. Eligible nurses are required to pass the certification focused on clinical judgment and professional caring and ethical practice. Once certified, critical care nurses are required to renew every 3 years. Although specialty nurse certification is gaining credence worldwide (e.g. Australia, Canada, New Zealand and recently the UK), historically this concept has been a stronghold in the United States of America (USA).

Nurses work within and across a large number of specialty and subspecialty areas of clinical practice. Specialty nurse certification is widely linked to improved quality of care and patient outcomes (Hickey et al., 2014), however, the evidence supporting certification has not been reviewed systematically to assess how additional specialty training and education influences outcomes for healthcare consumers, nurses, and healthcare organizations.

2. Methods

2.1. Objectives

The objective of the review was to synthesize the evidence on the relationship between specialty nurse certification and patient, nurse and organizational outcomes.

2.2. Design

A systematic review of primary research studies using the Joanna Briggs Institute (JBI) methodology. The JBI approach to systematic reviews is a well-recognized and internationally accepted framework for analyzing and evaluating the existing evidence (Aromataris and Riitano, 2014; Peters et al., 2015).

2.3. Search strategy

The search strategy was developed with support from a subject librarian. The search included the use of individual terms and combinations of terms (Fig. 1). Electronic databases CINAHL, MEDLINE, PubMed, and PsychINFO were searched for evidence published between 2000 and 2018 with the main search conducted in July 2017 and updated in May 2018. Articles and reports published by nursing organizations, OaLster, Grey Literature Report, and The National Database of Nursing Quality Indicators were included. The reference lists of included articles were screened for potential relevant references not otherwise found in the search. The reference lists of included articles were screened for potential relevant references not otherwise found in the search. A specific search for publications related to all refereed conference proceedings and theses identified as relevant to the review was conducted.

2.4. Inclusion/exclusion criteria

Quantitative and qualitative research articles using any methodology on the relationship between specialty nurse certification and outcomes were included.

The inclusion criteria were: studies published in English; published between 2000 and 2018 and a focus on outcomes following specialty certification for Registered Nurses (RN). Reports relating to advanced nursing practice where specialty certification was not discussed were excluded. Articles that included mixed professional groups such as physician assistants and social workers, in addition to registered nurses but did not report findings by professional group were excluded.

2.5. Study selection

The study selection process was guided by the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) (Moher et al., 2009). A filtering option was applied in the electronic database searches to display the search records in English and only published between 2000 and 2018. The records were then exported to EndNote X8 and duplicates were removed. Title and abstracts of the records were screened by three

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(Credential* OR ((MH "Credentialing")) OR ((MH "Credentialing Examinations")) OR
Certification OR ((MH "Certification")) OR ((MH "Specialties, Nursing")) OR ("nurse
specialty certification")) AND (((("Acute care") OR ((MH "Acute Care")) OR ("Critical
care") OR ((MH "Critical Care")) OR ("Intensive care") OR ((MH "Intensive Care Units"))
OR ("short term care") OR ((MH "Long Term Care")) OR ((MH "Nursing Home Patients"))
OR ("long term care") OR ("nursing home*") OR ((MH "Nursing Homes")) OR ((MH "Family
Centered Care")) OR ((MH "Family Nursing")) OR ("home health care") OR ((MH
"Community Health Nursing")) OR ("Community nurs* care") OR ("residential care") OR
((MH "Residential Care")) OR Hospice OR ((MH "Hospice Care")) OR ((MH "Hospice and
Palliative Nursing")) OR ("Palliative care") OR ((MH "Palliative Care")) OR ("terminal care")
OR ((MH "Terminal Care")))) AND (((MH "Iowa Nursing Outcomes Classification") OR (MH
"Nursing Outcomes")) OR ("Nurs* Sensitive") OR ("hand off") OR ((MH "Hand Off (Patient
Safety)")) OR ("Patient Safety") OR ((MH "Patient Safety")) OR ("patient outcomes") OR
((MH "Patient-Reported Outcomes")) OR ((MH "Health Care Errors")) OR (medication
errors by nurs*) OR (medication errors*) OR ((MH "Medication Errors")) OR (MH "Health
Care Errors") OR (MH "Treatment Errors")) OR ("Adverse event*") OR ((MH "Adverse
Health Care Event") OR (MH "Adverse Drug Event")) OR ("Near miss") OR ("Patient
harm") OR ("Length of stay") OR ((MH "Length of Stay") OR (MH "Bed Occupancy") OR
(MH "Treatment Duration") OR (MH "Disease Duration")) OR ("Quality of care") OR ((MH
"Quality of Nursing Care")) OR ("patient mortality") OR ((MH "Hospital Mortality")) OR
("Patient* satisfaction*") OR ((MH "Patient Satisfaction")) OR ("Patient* fall*") OR ((MH
"Accidental Falls")) OR ("Patient* confidence")
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Fig. 1. Search strategy for CINAHL.

reviewers (**, ** and ** blinded for review process) for eligibility using the selection criteria. Where there was disagreement, the reviewers met to discuss and resolve conflicts. In the absence of an abstract, records were retained for full text review. Full text assessment of each paper was conducted by two reviewers with a third referee, if necessary, to review any discrepancies. In the case of multiple articles drawing on one set of primary data, only one article was included.

2.6. Quality appraisal and data extraction

A review of each article was completed using the JBI Quality Appraisal checklists for all types of evidence (Hannes et al., 2010; Pearson et al., 2005) to assess internal and external reliability and validity. Included study details are presented in Table 1 in Supplementary material. Both quality appraisal and data extraction were conducted by the review team independently and were validated by one other member of the team. Discrepancies were resolved through rigorous discussion between the reviewers.

The GRADE system for assessing the quality of studies was used (Schunemann et al., 2013). This system grades studies from 1A (well conducted randomized controlled trial) through to 5C (single expert opinion). In this review, each study was assessed and an overall rating for each sub-category made.

Data were extracted on any finding that reported a link between nursing specialty certification and outcome.

2.7. Synthesis of findings

Synthesis of the results was conducted by the whole team with iterative discussion to gain consensus. All outcomes were categorized into three major groups each containing a number of sub-categories.

3. Results

3.1. The search results

Fig. 2 presents an overview of the search and selection process. A total of 7412 records were identified from databases and other sources. After removal of duplicates, and title and abstract screening, 490 full text articles were assessed for eligibility. Finally, 41 original research papers were included in the qualitative synthesis.

3.2. Included studies and characteristics

Of the total included articles (n = 41), 39 were conducted in the USA and two in Australia. The methodological quality of the included articles ranged from JBI levels of evidence 2.d to 4.d (Table 1 in Supplementary material). The characteristics of the studies and quality ratings, are presented in Table 1 in Supplementary material.

3.3. Findings

Due to the heterogeneity of outcome measures, a meta-analysis of the quantitative data could not be completed. A textual narrative synthesis was completed and the findings were synthesized into three major categories; patient outcomes, nurse outcomes and organizational outcomes. Each synthesis contained sub-categories, some with further sub-categories (Fig. 3).

3.4. Patient outcomes

Thirty three findings related to the relationship between specialty nurse certification and patient outcomes. The analysis generated three sub-categories: nurse sensitive outcomes, patient mortality and patient satisfaction.

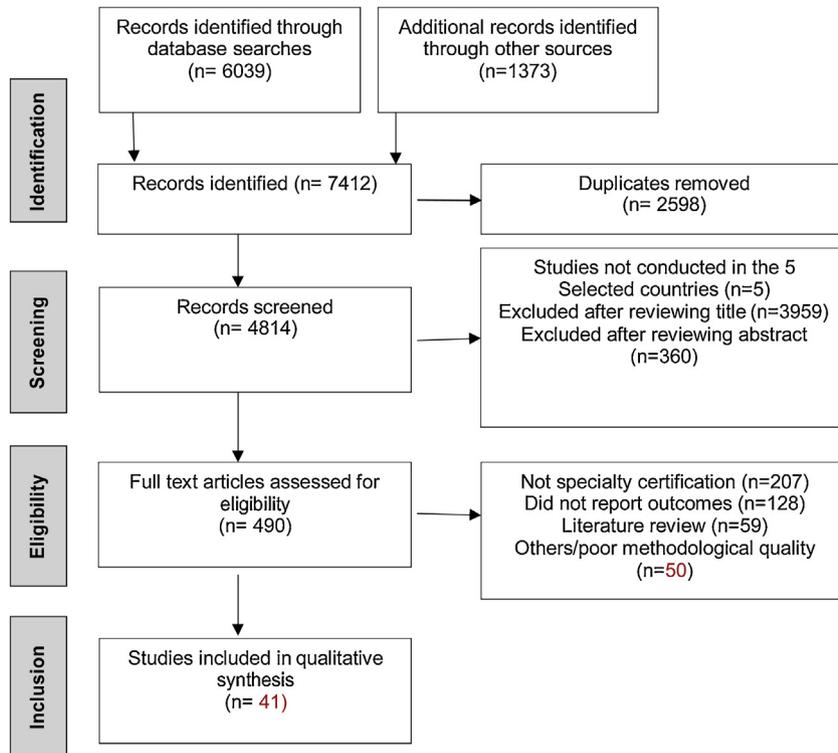


Fig. 2. Study Selection Process.

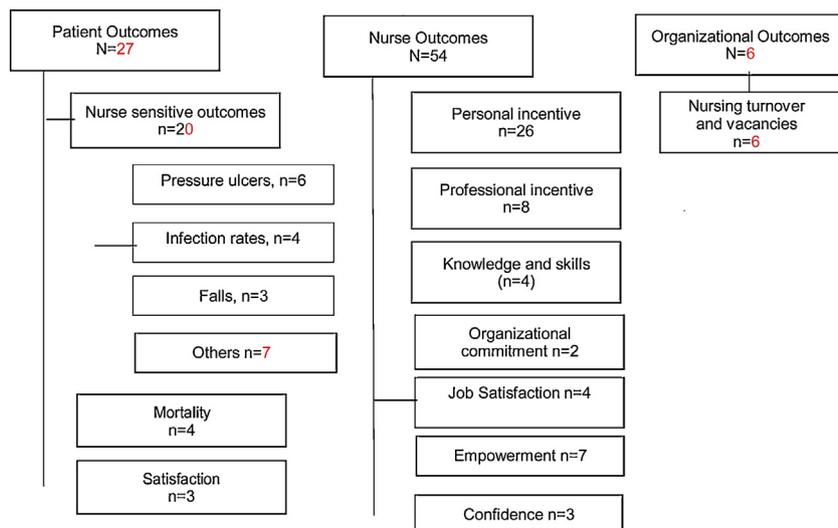


Fig. 3. Categories and sub-categories.

3.5. Nurse sensitive outcomes

Nine studies reported on outcomes that were classified as nurse sensitive outcomes and were further classified into the sub-categories: pressure ulcers, infection rates, falls and other.

3.6. Pressure ulcers

Six studies reported on outcomes related to pressure ulcers. Four studies reported no difference in relation to either the healing

rate of ulcers (Bliss et al., 2013), or prevalence of hospital acquired pressure ulcers (Boltz et al., 2013; Kendall-Gallagher and Blegen, 2009; Krapohl et al., 2010) by rates of specialty nurse certification within a ward or unit.

A survey of 1142 nursing homes (Trinkoff et al., 2015) reported a statistically significant ($\beta = -0.077$, $p = .001$, no further parameters presented) decrease in the number of pressure ulcers (7.4%) amongst aged care residents at high risk (residents with stage I–IV pressure ulcers who were bed bound, comatose, or experiencing malnutrition) when the director of nursing at the facility was a certified nurse. The number of directors of nursing was not

provided, but 42.5% were reported as certified, although no specialty was reported. Boyle et al.'s (2014) study of a large number of perioperative surgical intensive care units (n = 178) and surgical units (n = 269) reported specialty certification rates ranging from 20.0% to 63.0% in the perioperative surgical intensive care units and 16.1% to 62.1% in the surgical units. The number of nurses was not reported. The study reported *higher* rates of hospital acquired pressure ulcers ($\beta = 0.08$, $p = .03$) and unit acquired pressure ulcers ($\beta = 0.13$, $p = .00$) when the rate of specialty certified nurses working in a setting increased. No further breakdown or parameters were presented. The authors note that higher case mix index hospitals employed greater proportions of nurses with specialty certification than those with lower case mix index and suggest that in hospitals with a higher case mix index, the impact of specialty certification on outcomes maybe obscured by patient acuity (may be at higher risk for adverse events, more likely to have undergone specialized surgery, live with severe systemic diseases, and experience longer surgeries).

The sub-category, pressure ulcers, was based on evidence from three retrospective cohort studies (3e) and three cross-sectional surveys (4d). Gaps in reporting of data were noted and confounders were not controlled for. A GRADE rating of "very low" was assigned.

3.7. Infection rates

Four studies reported on specialty nurse certification and infection rates. Rates of central line associated bacteraemia were reported as lower when inserted by nurses credentialed in the insertion of central venous catheters in the intensive care unit setting (Alexandrou et al., 2012). This study involved three hospitals and all nurses, number unknown, were certified and had also received training in inserting central venous catheters. Across the three nurse-led services, 760 vascular access devices were placed, making up approximately 5% of the total vascular access devices inserted. The rate of central line associated bacteraemia was lower in comparison to the aggregated rate [1.3 per 1000 catheters (95% confidence interval (CI) = 0.03–7.3) vs. 7.2 per 1000 catheters (95% CI = 5.9–8.7)].

Lower central line associated bloodstream infection rates in surgical intensive care units with higher rates of certified post anaesthesia nurses ($\beta = -0.09$, $P = .05$) and certified nurse operating room/ certified RN first assist nurses ($\beta = -0.17$, $P = .00$) were reported by Boyle et al. (2014). No further parameters were presented. This study, referred to earlier, involved a large number of perioperative surgical intensive care units (n = 178) and surgical units (n = 269). The number of nurses was not reported, but the specialty certification rate ranged from 20.0% to 63.0% in the perioperative surgical intensive care units and 16.1% to 62.1% in the surgical units.

Two studies (Kendall-Gallagher and Blegen, 2009; Krapohl et al., 2010) explored infection rates by rates of certification. No difference in outcome was reported. Of note the study by Krapohl et al. (2010) reported data from 25 intensive care units across eight hospitals and the rates of certification ranged from 4% to 38%.

The sub-category of infection rates was based on evidence from two retrospective cohort studies (3e), one retrospective cohort merged with cross-sectional survey, and one cross-sectional survey (4d). A GRADE rating of "low" was assigned.

3.8. Falls

Three studies explored the association between specialty nurse certification and falls (Boltz et al., 2013; Boyle et al., 2014; Kendall-Gallagher and Blegen, 2009). A statistically significant decrease in the number of falls was noted when certification rates increased in both studies. The study by (Boltz et al., 2013) included 25 hospitals,

including 12 Magnet-designated hospitals. The mean proportion of nurses certified per unit in any specialty was 13.1, ranging from 0 to 75. Certification was a significant predictor of number of falls. Units with a lower percentage of certified nurses were more likely to report falls (chi-square wald = 3.80; $p = 0.05$; $df = 1$). Certification was not a predictor of the nature of falls. No difference in the number of injurious falls by rate of specialty certification was reported (chi-square wald = 1.66; $p = 0.20$; $df = 1$).

The study by Boyle et al. (2014) of 7583 units across 903 hospitals, reported an increase in specialty certification rates associated with improvements in total fall rates over time ($r = -0.08$, $p = .04$, no further parameters reported). The authors acknowledged that a national effort to improve patient safety and care is likely to have contributed to outcomes and was not examined.

An analysis of secondary data from a sample of 48 adult ICUs (31 medical-surgical, 17 cardiac) in 29 hospitals (Kendall-Gallagher and Blegen, 2009) reported that the proportion of certified staff nurses on the unit was inversely related to frequency of patient falls ($p = .04$, no further parameters reported). The results provide a preliminary foundation for further research on the relationship between certification of RNs and safety of patients.

The sub-category, falls, was based on evidence from two retrospective cohort studies (3e) and one cross-sectional survey (4d). The authors both discuss the need to further understand how certification links with wider environmental factors in relation to patient safety. A GRADE rating of "very low" was assigned.

3.9. Other nurse sensitive outcomes

Trinkoff et al. (2015) reported a decrease of 16.7% ($\beta = -0.182$, $p < .001$) in catheter use among aged care residents (n = 1142 nursing homes) when the director of nursing was a certified nurse. Individual studies reported on a range of outcomes including surgical wounds (Bliss et al., 2013), urinary incontinence (Bliss et al., 2013), bowel incontinence (Bliss et al., 2013), urinary tract infections (Bliss et al., 2013), restraint (Boltz et al., 2013), documentation of pain (Coleman et al., 2009; Frank-Stromborg et al., 2002), nausea (Coleman et al., 2009), fatigue (Frank-Stromborg et al., 2002), medication errors (Kendall-Gallagher and Blegen, 2009), and ventilator associated pneumonia (Krapohl et al., 2010). No study reported any difference in outcome by individual or unit level rates of certification.

A GRADE rating of "very low" was assigned based on the small number of studies reporting on each area of care and mostly cross-sectional studies.

3.10. Patient mortality

Four research studies reported a *reduction* in patient mortality associated with nurse specialty certification; however, a direct association between mortality and nurse certification was not demonstrated. Two studies (Kendall-Gallagher et al., 2011; McHugh et al., 2015) involved exceptionally large data sets and controlled for a number of hospital and nurse related factors. McHugh et al. (2015) compared Magnet and non-Magnet hospitals and reported that while nursing characteristics (e.g., certification) played an important part in mortality and failure to rescue rates, nursing characteristics did not fully account for the differences between Magnet and non-Magnet hospitals. The evidence suggested that nurse certification was only one indicator of nursing characteristics among several others that played a role in the outcomes of the study. Magnet hospitals had higher proportions of specialty-certified nurses (0.40 vs. 0.36; $p < 0.03$, no further parameters reported), but also significantly better work environments (2.86 (0.18) vs 2.66 (0.22), $p < 0.001$, as measured by the Practice Environment Scale), significantly higher proportions

of degree-educated nurses (0.46 vs. 0.39; $p < 0.001$), and lower proportions of supplemental nursing staff (0.39 vs. 0.51; $p < 0.03$). Moreover, nurse staffing was higher in Magnet hospitals compared to non-Magnet hospitals (4.82 vs. 5.03 patients per nurse; $p = 0.056$). Of the surgical patients in Magnet hospitals, 1.5% died within 30 days compared to 1.8% in non-Magnet hospitals ($p < 0.001$). In addition, in Magnet hospitals, 3.8% of the surgical patients with complications died (failure-to-rescue) compared to 4.6% in non-Magnet hospitals ($p < 0.001$).

The study by Kendall-Gallagher et al. (2011) reported data on 1,282,241 surgical patients and 28,017 nurses. The study explored certification with mortality within 30 days and failure to rescue and found no effect for certification alone. Education level alone and education and certification were significant predictors. For example, every 10% increase in degree qualified nurses in the hospital setting was associated with a 6% decrease in the odds of patients dying. In addition, for every 10% increase in nurses who were degree qualified and held a specialty certification, a further 2% decrease in the odds of patients dying was reported.

Reich et al. (2016) reported on an initiative to increase nurse certification over a three-year period (2012–2015). Certification increased from 21% in 2012 to 50% in 2015 and the mortality index decreased from 0.75 in 2012 to 0.56 in 2015. No further detail or discussion of the data were reported.

Newhouse et al. (2005) reported data from 1894 patient records from 32 hospitals. No difference in the estimated odds of complications or death based on the proportion of RNs with specialty certification was reported. The estimated odds of complications or death decreased by approximately 8% per 10% increase in the proportion of RNs with specialty certification. The results were adjusted for age, gender, race, comorbidities, rupture, admitting code, extubation, and aortic surgery hospital volume.

The four studies were cross-sectional or retrospective cohort studies merged with a cross sectional design. Gaps in reporting were noted and despite large sample size for some studies, the authors note that many further factors need to be explored before a direct association between certification and patient mortality can be made. A GRADE rating of “very low” was assigned.

3.11. Patient satisfaction

Three research papers examined the association between patient satisfaction and certification. Coleman et al. (2009) surveyed patients ($n = 270$) receiving treatment in a hospital oncology setting, rating their levels of satisfaction, pain and nausea. Results were divided between patients who received care from nurses with certification in oncology nursing and those without certification. Patient satisfaction scores were highly comparable between the two groups (72.3 vs 71.7 $p = 0.55$, range 0–80), as were pain scores (31.5 vs 32.6, $p = 0.48$, range 0–60), and ratings of nausea (3.3 vs 3.6, $p = 0.66$, scale 0–32), in effect showing no difference between certified and non-certified nurses. A small study of an acute care medicine unit (Craven, 2007) reported an increase in patient satisfaction scores one year following the development of an initiative to increase the number of nurses with specialty nurse certification. A 60% increase in certification ($n = 9$) was achieved and patient ratings of nursing care as excellent rose from 83.7% to 88.2%. Whilst the results indicated an increase in patient satisfaction following a rise in certification of 2.2%, the annual hospital wide satisfaction mean score also increased (3.5%). No data on sample size or data beyond percentages were reported. Reich et al. (2016) reported on an initiative to increase nurse certification over a three-year period (2012–2015). Nurse certification increased from 21% in 2012 to 50% in 2015 and the satisfaction index increased from 14% in 2012 to 51%. The authors acknowledge that the increase of 8% in BSN qualified staff at the

hospital over the same time period may have also contributed to the increase in patient satisfaction. No further detail or discussion of the data are reported.

A GRADE rating of “very low” was assigned based on the methods employed, gaps in data and recognition by the authors that other organizational factors could have influenced the findings.

3.12. Nurse-related outcomes

The value of certification as reported by nurses included 54 findings and generated the largest body of evidence in this review. The categories of personal and professional incentives, knowledge and skills, job satisfaction, organizational commitment, empowerment and confidence were generated.

3.12.1. Personal incentives

Twenty-six research studies explored the value of certification to nurses and reported on personal incentives. In thirteen studies nurses completed the Perceived Value of Certification Tool (PVCT). The PVCT (Gaberson et al., 2003) classifies outcomes into intrinsic and extrinsic factors. The sample size of the 13 studies ranged from 87 to 11,427 nurses. Specialty areas were public health (Bekemeier, 2007), infusions (Biel, 2007), oncology (Brown et al., 2010), perioperative (Gaberson et al., 2003), medical-surgical (Gulick and Halper, 2014; Haskins et al., 2011), various within a hospital setting (McNeely et al., 2015; Messmer et al., 2011; Niebuhr and Biel, 2007; Prowant et al., 2007; Sechrist et al., 2006; Straka et al., 2014) and by Magnet vs non-Magnet hospital (McLaughlin and Fetzer, 2015). Seven studies presented data on the value of certification by comparing responses from certified and non-certified nurses (Biel, 2007; Haskins et al., 2011; McNeely et al., 2015; Messmer et al., 2011; Niebuhr and Biel, 2007; Sechrist et al., 2006; Straka et al., 2014). Two studies combined data from certified and non-certified nurses (Brown et al., 2010; Prowant et al., 2007), two studies presented data from certified nurses only (Bekemeier, 2007; Gaberson et al., 2003), one compared nurses currently certified with nurses with lapsed certification status (Gulick and Halper, 2014). Finally, one study (McLaughlin and Fetzer, 2015) reported data on the value of certification by Magnet and non-Magnet status, and included reference to the higher value placed on certification by certified nurses.

The top three findings across all 13 studies in relation to intrinsic variables were consistent. Two studies (Gulick and Halper, 2014; Messmer et al., 2011) reported data in a different format that made comparisons with studies reporting percentages impossible. The three factors with the highest levels of agreement were: certification enhances a “feeling of personal accomplishment”, “provides personal satisfaction”, and “validates specialized knowledge”. An average of the outcomes across the seven studies comparing certified versus non-certified nurses reported higher levels of agreement among certified nurses for all three statements (98.45% vs 95.05%; 97.93% vs 93.43%; 97.13% vs 91.68%). The findings also suggest that for those nurses who were not certified, the perceived value of certification was high across personal accomplishment and satisfaction and validation of specialized knowledge.

3.12.2. Professional incentives

The findings from the four highest scoring extrinsic values and the lowest value of extrinsic values are presented in relation to the perceived value of certification related to professional factors. Agreement with the statement that “certification promotes recognition from peers”, “certification promoted recognition from other health professionals”, “certification promotes recognition from employers”, and “increases salary” were all higher among

certified nurses versus non-certified nurses apart from “increases salary (85.96% vs 76.5%; 78.68% vs 62.8%; 84.45% vs 77.26%; 41.1% vs 43.42%).

Agreement around the value of certification related to extrinsic factors were *lower* than intrinsic factors, although still high, except for the item relating to certification linked to an increased salary. Differences between certified and non-certified nurses were greater for extrinsic factors than for intrinsic factors but followed a similar trend. Interestingly, a higher proportion of non-certified nurses than certified nurses agreed with the statement that certification was linked to “increased salary”.

The potential for personal intrinsic and extrinsic benefits of certification to impact on patient outcomes have been shown to be indirect in the literature and no study reported data linking the value of certification to nurses to patient outcomes. A GRADE rating of “very low” was assigned to the collective data generated by studies using the PVCT.

3.12.3. Nurse-related outcomes not measured by the PVCT

The studies reported in this section explored the relationship between specialty certification and knowledge and skills, organizational commitment, job satisfaction, empowerment and confidence.

3.12.3.1. Knowledge and skills. Four studies explored areas related to nurses' knowledge and skills following certification. [Coleman et al. \(2009\)](#) explored the difference between knowledge of pain and nausea in the oncology setting between certified ($n=35$) and non-certified ($n=58$) nurses using the Nurses Knowledge and Attitudes Survey Regarding Pain and the Nausea Management: Nurses' Knowledge and Attitude Survey. A significant difference in knowledge of pain management (77.5% correct on pain survey (SD 8.4) vs 72.5% (SD 10.4), $p=0.02$) was noted in favour of certified nurses. [Santiano and Daffurn \(2003\)](#) assessed perceived level of competence (PLC) of critical care nurses post certification ($n=36$) against the 20 competency standards for specialist critical care nurses. An increase in all standards was observed with 'recognising own abilities and professional competence' the biggest increase (no further data presented). [Schroeter et al. \(2012\)](#) reported that many of the nurses who responded to their survey ($n=149$) stated that achieving certification had increased their knowledge in the operating room and believed this has translated into improved care for patients (no further data presented). [Valente \(2010\)](#) surveyed the knowledge of nurses who completed certification at one hospital by specialty area, sample size unknown, and reported an increase from 70% to 95% ($p<0.01$) (no further data presented). The incomplete reporting of the methods of the study made it difficult to assess the meaning of the results.

In contrast to the studies using the PVCT, these studies directly compared nurses' perception of certification on their knowledge and skills in relation to practice rather than perception of the validation of specialized knowledge. A GRADE rating of “very low” was assigned.

3.12.3.2. Organizational commitment. Two studies explored the relationship between specialty certification and nurses' reports of organizational commitment. [Fleischman et al. \(2011\)](#) reported an increase of 25 newly certified paediatric nurses in 2009 on a unit and reported that achieving this status was reflected in nurses' individual annual evaluations under the core competency category of “commits to service.” The sample size was not reported and further data were not provided. [Hughes et al. \(2001\)](#) reported weak, but statistically significant correlations ($r=0.08$, $p<0.001$) between certification and organizational commitment in a survey of 1217 oncology nurses (514 certified nurses, 306 recertified nurses, and 397 non-certified nurses). The magnitude of the

correlation suggests that certification had limited practical significance in accounting for variances in nurses' job perceptions.

The link between specialty certification and organizational commitment is inconclusive and the limited data suggests it is likely to be inter-related with other factors ([Hughes et al., 2001](#)). A GRADE rating of “very low” was assigned.

3.12.3.3. Job satisfaction. Four studies explored the relationship between specialty certification and job satisfaction. [Coleman et al. \(2009\)](#) explored the difference between job satisfaction in the oncology setting between certified ($n=35$) and non-certified ($n=58$) nurses using a survey developed for the study. The survey questions were drawn from evidence-based guidelines from the National Comprehensive Cancer Network (NCCN, 2009) and content validity reported as established by three experts in oncology nursing. Further reliability and validity testing were not reported. Job satisfaction was relatively high for both groups 77.5 (maximum score 96) (SD15.8) in the certified group and 80.9 (SD11) in the non-certified group ($p=0.2$). [Hughes et al. \(2001\)](#) reported weak, but statistically significant correlations ($r=0.07$, $p<0.01$) between certification and job satisfaction. The magnitude of the correlation suggests that certification had limited practical significance in accounting for variances in nurses' job perceptions. Data were collected through a survey of 1217 oncology nurses (514 certified nurses, 306 recertified nurses, and 397 non-certified nurses). [Reich et al. \(2016\)](#) reported on an initiative to increase nurse certification over a three-year period and included a report on job satisfaction over the period 2012–2015. Nurse certification increased between 2012–2015, from 21% in 2012 to 50% in 2015 and nurses reported an increase in job satisfaction of 14%. No further detail or discussion of the data are reported.

[Wyatt and Harrison \(2010\)](#) surveyed certified paediatric nurses on perceptions of certification on job satisfaction. Of the 1354 nurses who responded (a 19.6% return rate), 88% reported that their job satisfaction was excellent to good (30.3% noted excellent job satisfaction, 57.7% reported good job satisfaction). Only 1.4% indicated poor job satisfaction. Eighty-two per cent indicated that relationships with colleagues was very important and 79.7% felt that a supportive work environment was very important to their levels of job satisfaction. The study provides some insight into the factors that contribute to the broad category of job satisfaction, but the link to certification is not a direct one and no comparisons with colleagues who were not certified were made.

The data relating to specialty certification and job satisfaction was again, inconclusive with one study reporting no relationship, one study a weak relationship and two reporting results that are not directly linked to certification and job satisfaction. A GRADE rating of “very low” was assigned.

3.12.3.4. Empowerment. Seven papers explored the relationship between specialty certification and nurses' perceptions of empowerment. A large survey of critical care nurses ([Fitzpatrick et al., 2010](#)) reported a statistically significant difference in empowerment between certified nurses ($n=3684$) and non-certified nurses ($n=2905$) ($t=2.73$, $df=6587$, $p=0.006$). The total empowerment scores of the sample was described as being in the moderate range (scores 14–22), with a mean score of 21.21 for certified nurses and 20.95 for non-certified nurses. In a further publication on the same data ([Fitzpatrick et al., 2011](#)), the empowerment scores for staff nurses, a subsample of the original survey (certified $n=2873$, non-certified $n=1395$) reported no significant difference on empowerment scores between the two groups ($t=2.83$; $df=4266$, $p=0.005$). Again, the range of scores for both groups were in the range of moderate empowerment (14–22). The authors report the potential difference between the two publications as related to the educational level of

nurses in positions other than staff nurses or to a combination of education and position. Sixty-five percent of the original sample were staff nurses and 35% nurse managers, clinical nurse specialists, nurse practitioners, and educators.

A survey of 2633 emergency department nurses (Fitzpatrick et al., 2014) did not report a difference in sense of empowerment between nurses certified in emergency nursing and those who were not. A statistically significant difference was reported on the subscale of informal power ($t=-2.83$, df 263, $p=.01$) with staff nurses who were certified reported higher informal power scores. A study exploring outcomes by rates of certification among emergency nurses ($n=2237$) reported a relationship between certification and empowerment (Krapohl et al., 2010). The total association between nurses' perception of overall workplace empowerment and certification was positive and statistically significant ($r=.397$, $p=0.05$). The rates of certification ranged from 4% to 38% in 25 intensive care units across eight hospitals. A separate analysis of each of the four subscales revealed a strong, positive and statistically significant relationship between nurses' perceptions of resources ($r=.503$, $p=0.01$) and specialty certification and a moderately strong and positive relationship between nurses' perception of support ($r=.407$, $p=0.04$) and specialty certification. The proportion of nurses with specialty certification in each unit also bore a moderate and marginally significant association with information ($r=.390$, $p=0.05$). However, no association was found between nurses' perception of opportunity ($r=.296$, $p=0.15$) and the proportion of nurses who were certified on a unit.

Perceptions of empowerment of certified nurses versus non-certified nurses working in a community hospital ($n=254$) (Piazza et al., 2006) reported significant differences in empowerment scores between certified ($M=3.68$, SD 0.7) and noncertified nurses ($M=3.45$, SD 0.74) ($t=2.45$, df 253 $p=.008$) with certified nurses reporting higher perceptions of formal power ($p=0.038$) and informal power ($p=0.000$). A survey of 80 perinatal RNs from one community hospital in New York (Samedy et al., 2012) reported that RNs who were certified in a perinatal specialty had higher total empowerment scores and higher scores on five of the six subscales. Forty-four participants were certified in perinatal nursing (55% of the total sample). The mean structural empowerment score was 20.52 ($SD=3.94$), indicating a moderate level of structural empowerment across the groups. Certified nurses reported higher levels of empowerment, including higher levels of formal power, access to informal power, access to information, and support (t 3.10, df 78, $p<.01$).

Ugur et al. (2015) explored actual and preferred Decision-making Involvement (DI) and DI by educational level and certification in a sample of 163 RN's at a health care organization. Three quarters (66%) of the sample had a diploma or associate degrees in nursing, and 20.9% were certified. Nurses with specialty certification reported greater involvement in decisions about unit staffing than nurses without certification (t 3.10, df 78, $p=.02$) but did not differ on any other aspect of decision-making involvement.

Studies exploring empowerment were consistent in reporting that nurses with certification reported higher perceptions of empowerment. Study limitations included the generalizability of findings related to low response rates and convenience sampling. The reporting of data does not support understanding the impact of potential relationships between empowerment and involvement in decision-making with education level, position within the organization and personal factors, for example pre-certification sense of empowerment. A GRADE rating of "very low" was assigned.

3.12.3.5. Confidence. Three studies reported on the relationship between specialty certification and nurses' perception of

confidence. Self-reported increase in confidence related to practice following certification was reported in three studies in the fields of paediatric nursing (Fleischman et al., 2011), medical-surgical (Sayre et al., 2010); and perioperative nursing (Schroeter et al., 2012). However, without pre-tests of confidence and without comparison groups, exploring this link further was not achievable. A GRADE rating of "very low" was assigned.

3.13. Organizational outcomes

The category of organizational outcomes contained data derived from seven studies exploring the association between certification and organizational benefits. The synthesis resulted in three sub-categories: nursing turnover and vacancy rates, perception and costs to the organization.

3.13.1. Nursing turnover and vacancy rates

Six studies reported on the association between certification and nursing turnover and vacancy rates. Three studies (Craven, 2007; Reich et al., 2016; Shirey, 2005) reported on nursing turnover rates and two studies (Craven, 2007; Valente, 2010) reported a reduction in nursing vacancy rates. One study (Fitzpatrick et al., 2010) reported on intention to stay in current position.

Craven (2007) reported a reduction in nursing turnover rates from 16.7% in 2004 to 8.1% in 2005 with a corresponding increase in certification of 60%. No further data, including sample size were reported. Reich et al. (2016) reported a rise in the percentage of certified nurses from 21% in 2012 to 50% in 2015. Nursing turnover was reported as low across the five years at below 6.5%. No further data were reported. Shirey (2005) reported a 96% retention of certified nurses one year following the drive to increase certification. However, the retention rates pre the initiative were not presented and no comparison data with non-certified nurses were presented.

Craven (2007) reported a reduction in nursing vacancy rates from 11% in 2004 to 4.7% in 2005 with a corresponding increase in certification of 60%. No further data, including sample size were reported. Valente (2010) reported a decrease in RN vacancy rates as certification increased (12.8% vacancy rate, certification 8% at baseline to 6.9% vacancy rate, certification 30%) over a 12 month period ($p=.001$, no further data presented).

Fitzpatrick et al. (2010) reported that participants who held specialty certification reported they were less likely to leave their current position than non-certified nurses ($r=4.70$, $df=1$, $p=.05$). Significant differences ($p<0.001$) were found on total empowerment scores and all subscale scores between respondents who intended to leave their current position and those who did not intend to leave their position with the latter group reporting higher levels of empowerment.

The data related to certification and nursing turnover and vacancy rates is mixed and linked to individual hospitals. It is possible that in institutions supporting drives to increase certification rates over a short period of time that certification may be one of several initiatives across an institution that impacted on outcomes. A GRADE rating of "very low" was assigned.

4. Discussion

This systematic review identified and synthesized the findings from studies on the relationship between nurse specialty certification and patient, nurse and organizational outcomes. Inconsistent and contradictory evidence exists on the association between certification and outcomes. The quality of the combined data contributing to each of the findings ranged from low to very

low. The rates of certification among the nurses varied and no conclusion can be drawn on the optimum rates of certification in a ward or unit and improved outcomes. Studies that measured outcomes between a sample of certified and non-certified nurses demonstrated a greater impact of certification on patient outcomes, compared to those that reported impact related to the proportion of certified nurses on given units/wards. The majority of studies reported their findings by *proportion of certified and non-certified nurses* and these figures varied widely from study to study, making the links between certification and patient outcomes difficult to interpret.

Given the interdisciplinary and teamwork nature of healthcare delivery, attributing patient, nurse or organizational outcomes to any one individual (e.g. any one certified nurse) is extremely challenging. The review of the existing literature suggests that the question of whether certification per se impacts on patient outcomes needs to be reframed to assess the complex relationship between *proportions* of certified to non-certified nurses within a ward or unit and the impact on direct patient care. Achieving 100% certification within a ward or unit is impractical in most settings and, rather, research is needed that provides a more comprehensive understanding of whether and where a tipping point exists for certification in each individual healthcare setting, and whether this actually makes a practicable difference to outcomes (e.g. 50:50 certified, non-certified).

From an organizational perspective, the value of certification and the need to demonstrate certified nurses can be cost-effective still needs to be made and from a policy and funding perspective, it is vital to make this connection. This review identified studies that found a positive association between specialty nurse certification and lower rates of nursing turnover and vacancy rates. While indirect, in terms of cost 'savings', these findings could potentially reduce costs to organizations in terms of hiring and training nurses and warrant supplementary exploration of more refined and reliable indicators for measuring the association between certification, nursing turnover and vacancy rates and organizational employment costs.

The connection between certification and positive consumer perception (e.g., patient satisfaction with health care personnel and delivery, confidence in the capability of the healthcare personnel caring for patients as well as the competence of the organization to delivery quality and safe healthcare) is extremely challenging. Organizations prioritize the patient experience in healthcare delivery and reports of patient satisfaction are increasingly important. Consumer perception of healthcare delivery has been limited in the literature to date in that it focuses primarily on the outcome of generalized patient satisfaction, with minimal correlation to a refined set of patient and organizational outcomes. Diversity in focus exists between quality, patient-centeredness, experience and satisfaction (LaVela and Gallan, 2014). Patient satisfaction measures do not have a strong reputation within health services research, criticized for lacking a conceptual basis (Manary et al., 2013). The selection of a measure should reflect a balanced consideration of aspects of utility, for example educational impact, cost and acceptability (Beattie et al., 2015).

In addition to the recommendation for more robust research in this field, to better understand the benefits and limitations of certification, alternative models of life-long nursing education and training must include the evaluation and determination of the specific levels of certification and the types of certification that are absolutely needed to achieve optimum patient, nursing, and organizational outcomes relative to the investment required. Moreover, more refined discussion is needed around what elements of credentialing impact on outcomes and whether generic skills or specialty knowledge or a combination of the two are related to outcomes. This point is raised in relation to the possibility that a level of standardization across specialties could be

promoted. Such a move could support the growing need for nurses who can practice across specialty areas and with patients experiencing multimorbidity (NICE, 2016). The increasing proportion of elderly people with multiple, complex healthcare needs has, and continues to create, greater pressure on the healthcare system. Healthcare systems are designed to improve care for specific diseases and specialty certification further perpetuates the status quo of specialists and specific clinics for each disease. It has become clear that focusing on each disease individually has not created a system which effectively helps people with multiple diseases. We need to think broadly and holistically on how to improve care for people living with multimorbidity.

4.1. Strengths and limitations of the review

The broad methodological limitations of the studies reviewed include a concentration of research conducted in the USA and wide variation in the unit of analysis between studies. The majority of studies identified did not control for confounding factors such as years of experience and educational level. English only publications were included and it is possible that significant research has been conducted in other countries for which English is not the first language and we acknowledge this limitation.

5. Conclusion

The aim of this systematic review was to synthesize the evidence on the impact of specialty nurse certification on outcomes. The review highlighted a concentration of support for certification in the USA, the paucity of evidence related to certification and impact on practice and the challenges of measuring impact. The evidence on the impact of nurse certification on outcomes is inconclusive. Attention to research design and the measure of meaningful patient, nurse and organizational outcomes are needed for the field to move forward. This will include careful consideration of what specialty nurse certification brings to the broader, already complex, organizational and clinical picture and a more direct approach to understanding what aspects of care specialty nurse certification contributes to.

Conflict of interest

None.

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Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:<https://doi.org/10.1016/j.ijnurstu.2019.02.001>.

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