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The nurse manager's role in perioperative settings: An integrative literature review

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Abstract

Aim. To describe the nurse manager's role in perioperative settings.

Background. Role is complex and its content is unclear. There is a challenge to back up role with existing decision-making support tools. Research in this area is scarce. We need to better understand what this role is to support nurse manager's work with information systems.

Evaluation: Integrative literature review was performed in May 2018. Cinahl, Cochrane, Pubmed, Web of Science and a manual search were used. Review followed a framework especially designed for integrative reviews. Quality of the literature was analysed with an assessment tool. Nine studies published between 2001 and 2016 were included in the final review.

Key issue. Nurse manager's role requires education and experience, and skills that are followed up by tasks. A bachelor's degree with perioperative specialisation is the minimum educational requirement for nurse manager.

Conclusion. The nurse manager's role in a perioperative setting is evolving. Research lacks a clear description of the role. It seems that the required education is at odds with the more demanding tasks. Information technology could provide useful support for task management.

Implications for Nursing Management. Findings can be used to better answer current and future demands of nurse manager's work.

Key words: integrative review, nurse managers, perioperative settings, role

1. INTRODUCTION

Nurse managers are under pressure to put strategic decisions into action and be responsible for daily unit operation (Zhu et al., 2016). Health care organisations are rapidly changing and this causes challenges in nurse manager's work. Digitalisation and strong demand for economic solutions require new and innovative ways of organising daily unit operation (Ministry of Employment and the Economy, 2012). Nurse managers have a vital role to play in improving health care outcomes.

One way to support nurse manager's work is to develop information systems for daily unit operation. Currently, many single information systems (e.g. operating department management system for service planning, human resource management system, and system for staff's shift planning) are used in the management of perioperative settings, but these are often not connected to each other and they neither support daily functions (Kuzimiesky & Bush, 2013) nor correspond to nurse manager's needs. Systems for nurse managers that are smoother, more effective and more user-friendly are needed, and users' opinions should be heard in the development phase (Saleem, Steel, Gercek, & Chandra, 2017).

The nurse manager's role needs to be described and understood to develop suitable information systems to support it. To the best of our knowledge, nurse manager's role in perioperative settings has not previously been clarified.

2. BACKGROUND

The nurse manager's role in perioperative settings is to lead the unit at an operational and tactical level. In this study, the nurse manager is defined as a person who is responsible for coordinating and managing an operating department or a day surgery unit. The term *role* is often seen as characteristic behaviour, norms and expectations by others in a social system (Biddle, 1986). We want to assess what the role that nurse managers have in perioperative settings is.

The nurse manager's role has been studied from different perspectives and in different health care settings (Furtado, Batista, & Silva, 2011; McCallin & Frankson, 2010; Miller & Buerhaus, 2013; Pegram, Grainger, & Sigsworth, 2014). Generally, role seems to be complex (Shirey, McDaniel, Ebright, Fisher, & Doebbeling, 2010), and the content of the role is unclear (McCallin & Frankson, 2010). Operating departments often cover many different surgical specialties (Zhu et al., 2016). When staffing nurses for operations, nurse managers should take environmental factors (such as technological demands) into account (Association of periOperative Registered Nurses, 2014). This makes nurse manager's role unique compared to other health care settings.

Public health care sector is one of the largest employers in Europe and it offers highly skilled jobs. Around 40% of health care staff are educated to tertiary level (European Commission, 2013). It seems that a baccalaureate (bachelor's) degree is not enough to master nurse manager's role (Shirey et al., 2010) and at least some management training is needed (McCallin & Frankson, 2010; Ramseur, Fuchs, Edwards, & Humphreys, 2018) starting already in nursing school (Brown, Crookes, & Dewing, 2016). The diversity of titles and the

content of education in different countries makes the definition of the role confusing. However, based on the Bologna Declaration (1999), nursing education in Europe has been standardised and the unification of education in the European Union has been ongoing since 2009. Nursing education should achieve higher education level in European countries (Büscher, Sivertsen, & White, 2009).

3. EVALUATION

3.1. Aim

The aim of this study was to describe the nurse manager's role in daily unit operation in perioperative settings. This study is part of a larger research project, with the goal of developing an information system to support nurse managers in their daily work.

The research question was:

How has the nurse manager's role in perioperative settings been described in earlier literature?

3.2. Study design

This study is an integrative literature review, and combines the analysis of both qualitative and quantitative scientific studies on nurse manager's role in perioperative settings (Whittemore & Knafl, 2005). An integrative review combines published articles that describe studies conducted with different methods. With the help of an integrative review it is possible to obtain a comprehensive picture of a certain phenomenon. An integrative review is suitable especially for nursing science in which many phenomena have still been scarcely studied. Particularly we wanted to focus on nurse managers' role in perioperative settings, not on the effectiveness of the role. (Whittemore & Knafl, 2005). The process consists of five stages: (1)

problem identification (presented in the aim); (2) literature search; (3) data evaluation; (4) data synthesis; and (5) presentation (presented in the results).

3.3. Literature search

The literature search was performed without limitations in year of publication till 23 May 2018. The following databases were used (in parenthesis the first year of publication): Cinahl (EBSCO; 1981), Cochrane (2008), Pubmed (Medline; 1970), Web of Science (1965). Also, a manual search was performed 23 May 2018. The search terms used were "nurse managers", "perioperative settings" and "role" and their synonyms. The terms were connected with the Boolean operator "OR" and "AND" combination.

To get a comprehensive understanding of the literature search, no exclusion criteria regarding the year of publication or languages were given at the beginning of the search. The relevant literature had to focus on nurse manager's role in operating departments or in day surgery units (Table 1). To support the search process, the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flow diagram was used (Moher, Liberati, Tetzlaff, Altman, & the PRISMA Group, 2009). The flow diagram is presented in Figure 1.

3.4. Data evaluation

A total of 2642 citations from electronic databases were identified. In addition, one relevant citation from the manual search was found. As a result, 150 titles focusing on the nurse manager's role were found. The results of the literature search were saved into an Excel file. Two authors (ES and HS) screened every phase (title, abstract, full text) of the search.

After reading the 150 abstracts, studies that were published before 1999 were excluded. This exclusion was based on year of the Bologna Declaration. Other exclusion criteria are presented in Table 1.

Based on reading the abstracts, 11 studies met the full text criteria and were accepted for quality appraisal. Quality (Whittemore & Knafl, 2005) was assessed with the assessment tool from Kmet, Lee and Cook (2004). This tool offers criteria and scoring systems to evaluate the quality of either quantitative or qualitative research reports. For quantitative studies, the checklist by Kmet et al. (2004) presents 14 criteria that are assessed on a scale "yes" (2 points), "partial" (1 point) or "no" (0 points). Thus, maximum scores for a quantitative study are 28. If one or several of the presented criteria were not applicable for a study, the criterion was assessed as "not applicable" and was excluded from the calculation of the total sum. The checklist for qualitative studies consisted of ten criteria, and the calculation of scores followed the same rules as for quantitative studies. However, the option of "not applicable" was not allowed, thus the maximum score for a study was 20.

Three quantitative and eight qualitative studies were independently assessed by two authors (ES and HS). The given sum of scores was divided by the possible maximum scores (Kmet et al., 2004), and an observed inter-rater agreement by item was calculated for each study. The total scores given by the first reviewer (ES) varied from 0.35 to 0.95, and by the second reviewer (HS) from 0.40 to 1.00, respectively (Table 2). For the quantitative studies, observed inter-rater agreement by item varied from 0.71 to 1.00, and for the qualitative studies, from 0.90 to 1.00, respectively (Table 2).

Both reviewers scored one quantitative and three qualitative studies in a total agreement. For the remaining studies, the reviewers' scoring differed mainly in terms of assessing the studies to fulfil specific criteria totally (i.e. "yes") or to some extent (i.e. "partial").

All studies that scored ≥ 0.55 scores from both independent reviewers were included in the analysis (Kmet et al., 2004). In the qualitative appraisal, two studies were rejected due to low total scores. Thus, nine studies were included in the integrative literature synthesis (Table 2).

3.5. Data synthesis

The initial analysis (Whittemore & Knafl, 2005) was done by the first author and the co-authors commented on the analysis process and the themes. Analysis was done using both the method and results sections from the studies. Qualitative content analysis was used, in which the single word or sentence that described the nurse manager's role was coded into sub-themes (Sandelowski, 2000). The data from the studies was fed into an Excel sheet and the themes were formed in it. The final themes were formed together with all the co-authors. A summary of the included studies is presented in Table 3. An example of the analysis process follows:

"Participants described the pressure of being responsible for appropriate recruitment" (Schroeder & Worral-Carter, 2002).

→ Recruitment skills → Nurse manager's skills

4. KEY ISSUE

4.1. Overall characteristics of the data

Nine studies published between 2001 and 2016 were included in the final review. Of these, six studies were qualitative (Martin & Waring, 2012; Moss & Xiao, 2004; Schroeder & Worral-Carter, 2002; Rudolfsson & Flensner, 2012; Rudolfsson, von Post, & Eriksson, 2007; Siirala, Peltonen, Salanterä, & Junttila, 2016) and three quantitative (Karathanasi, Prezerakos, Malliarou, Siskou, & Kaitelidou, 2014; Kondrat, 2001; Marjamaa & Kirvelä, 2007). Most studies were conducted in Europe (Table 3).

The research focus in the studies was nurse manager's role in perioperative settings. In one study (Karathanasi et al., 2014) participants were both nurses and nurse managers, and in another (Marjamaa & Kirvelä, 2007) they were nurse managers and anaesthesiologists. In the rest of the studies, the participants were all nurse managers.

Analysis of the literature review revealed that the nurse manager's role set requirements regarding "nurse managers' education and experience" and "nurse managers' skills" that are followed by "nurse managers' tasks". Detailed descriptions of the themes are presented in Table 4 and a summary of the findings is presented in Figure 2.

4.2. The nurse manager's education and experience

The nurse manager's education and experience consisted of both nurse manager's clinical and managerial education, and their clinical and managerial experience in perioperative settings.

Clinical and managerial education. Analysis revealed that nurse managers often had a bachelor's degree (Karathanasi et al., 2014; Martin & Waring, 2012; Rudolfsson & Flensner,

2012; Rudolfsson et al., 2007) and few were academically qualified (Kondrat, 2001; Rudolfsson & Flensner, 2012; Rudolfsson et al., 2007). In one study (Siirala et al., 2016), there was no mention of educational degrees for nurse managers.

Clinical and managerial experience. The nurse manager's clinical experience was assessed in three studies (Martin & Waring, 2012; Rudolfsson & Flensner, 2012; Schroeder & Worral-Carter, 2002) and three studies assessed managerial experience (Karathanasi et al., 2014; Rudolfsson et al., 2007; Schroeder & Worral-Carter, 2002). Only Martin and Waring's (2012) study focused on nurse manager's professional background in a management position.

4.3. The nurse manager's skills

The nurse manager's skills consisted of coordination, collaboration, communication, management, nursing and recruitment skills.

Coordination skills were needed in the managerial role to run the daily unit operation. Nurse managers were expected to have the skills to coordinate the daily unit operation with nurses and other professionals (Martin & Waring, 2012; Moss & Xiao, 2004).

Collaboration skills were also expected of nurse managers. Nurse managers rarely supervised any other professionals (e.g. physicians) than their own nurses (Marjamaa & Kirvelä, 2007) and challenges existed when managing other professionals (Martin & Waring, 2012). Sharing of responsibility between nurse managers and physicians should be clear to everyone (Marjamaa & Kirvelä, 2007; Martin & Waring, 2012). This requires collaboration. The sharing of responsibility differed between countries; in Greece, for instance, nurse managers were usually in charge of the daily unit operation alone (Karathanasi et al., 2014)

but in Finland the responsibility was shared between the nurse manager and the physician in charge (Marjamaa & Kirvelä, 2007, Siirala et al., 2016). Collaboration is also needed in decision-making. Decisions regarding daily unit operation is sometimes made together with the physician (Siirala et al., 2016.)

Communication skills. Good communication skills were seen as the content and the effectiveness of the communication (Karathanasi et al., 2014; Kondrat, 2001; Moss & Xiao, 2004). Nurse manager communication focused on coordinating the equipment, patient preparedness, staffing, room assignment, and scheduling and rescheduling of procedures (Moss & Xiao, 2004). Communication was expected to be effective (Karathanasi et al., 2014). Nurse managers mainly communicate with nurses in the operating department, technicians, clerks, surgeons or equipment managers (Moss & Xiao, 2004). One study also indicated that there was too little communication between professionals (Marjamaa & Kirvelä, 2007).

Management skills. Analysed studies showed that many types of management skills were needed (Karathanasi et al., 2014; Kondrat, 2001; Martin & Waring, 2012; Rudolfsson & Flensner, 2012; Rudolfsson et al., 2007; Schroeder & Worral-Carter, 2002; Siirala et al., 2016). These skills included certain qualities of human behaviour, such as trustworthiness, personal growth, time management and decision-making. Thus, management skills also included leadership skills.

Human behaviour necessary for nurse managers consisted of qualities such as listening, empathy and understanding (Martin & Waring, 2012). Nurse managers were expected to act as role models and to be trustworthy (Rudolfsson et al., 2007; Schroeder &

Worral-Carter, 2002). It was expected that nurse managers were able to build good relationships with nurses (Schroeder & Worral-Carter, 2002) and pay attention to each nurse's individuality (Rudolfsson et al., 2007). To cope with fulfilling these requirements, mentoring from their own supervisor seemed to be valuable and help nurse managers in stressful situations (Schroeder & Worral-Carter, 2002).

Management was seen to provide personal growth. If nurse managers had previously worked as nurses in the same department, this was seen as an obstacle for adapting to the new role (Rudolfsson & Flensner, 2012; Schroeder & Worral-Carter, 2002). This could also be seen in a study where some nurse managers did not want to call themselves *nurse managers* but rather wanted to be called *sisters* (Martin & Waring, 2012). In one study (Kondrat, 2001), older age was associated with higher competence in management skills. Nurse managers with management qualifications seemed to master the role better than those without qualifications (Schroeder & Worral-Carter, 2002).

One skill that was expected from nurse managers was time management. It was expected that nurse managers were prepared to redo the surgical schedule plan (Schroeder & Worral-Carter, 2002; Siirala et al., 2016) and understand the importance of perioperative prioritising to keep the daily unit operation on time (Rudolfsson et al., 2007).

Many of the previously mentioned skills call for decision-making skills, a requirement in some of alysed studies (Karathanasi et al., 2014; Schroeder & Worral-Carter, 2002; Siirala et al., 2016). Only one study (Siirala et al., 2016) focused on decisions made by nurse managers in daily unit operation. Decision-making can be seen, for example, as part of the

ability to prioritise, manage time and negotiate. The study by Siirala et al. (2016) revealed that decision-making can be operational or tactical by nature.

Nursing skills. It was expected that nurse managers had mastered nursing skills (Rudolfsson et al., 2007) and were able to evaluate clinical competence (Karathanasi et al., 2014). They were also expected to understand the special characteristics of perioperative nursing and they had to be able to secure the patient's dignity in the operating room (Rudolfsson et al., 2007). Another study (Karathanasi et al., 2014) revealed that significant work experience seemed to be associated with good technical competence.

Recruitment skills. Analyses showed that skills regarding interviewing techniques were not considered important (Karathanasi et al., 2014), although another study (Schroeder & Worral-Carter, 2002) mentioned challenges when hiring skilful nurses for perioperative settings.

4.4. The nurse manager's tasks

A variety of tasks were included in the nurse manager's role in daily unit operation. The identified tasks in the studies were: managing daily unit operation, perioperative nursing development, managing human resources and financial management.

Managing daily unit operation. Planning of the surgical schedule was mostly the task of nurse manager (Marjamaa & Kirvelä, 2007; Siirala et al., 2016). The scheduling of their managerial duties together with the daily unit operation helped nurse managers to cope with the managerial demands (Schroeder & Worral-Carter, 2002). One of nurse manager's tasks was to maintain a balance between the strategic and clinical management levels (Martin &

Waring, 2012). In addition, managing the daily unit operations was exposed to interruptions (Siirala et al., 2016).

Perioperative nursing development was a task of nurse managers (Martin & Waring, 2012; Rudolfsson et al., 2007). It consisted of enhancing the quality of nursing in perioperative settings (Martin & Waring, 2012).

Managing human resources focused on the welfare of nurses and a compassionate atmosphere in the department (Rudolfsson et al., 2007; Schroeder & Worral-Carter, 2002). In addition, giving time to nurses and supporting nurses in their career development were mentioned as being important aspects of nurse manager's work. Creating a good atmosphere was seen as a key element for supporting nurses' well-being. (Rudolfsson et al., 2007.) To cope with all the managerial demands, nurse managers were expected to have a social life outside of work (Schroeder & Worral-Carter, 2002).

Financial management was mentioned as a task in four studies (Karathanasi et al., 2014; Kondrat, 2001; Rudolfsson & Flensner, 2012; Siirala et al., 2016). Kondrat's study (2001) called for competence in financial management and Siirala et al. (2016) recognised decision-making in financial management.

5. Discussion

The aim of this study was to describe the nurse manager's role in perioperative settings. This study is part of a larger research project, with the goal of developing an information system to support nurse managers in their daily unit operation.

The findings indicate that the role of the nurse manager is evolving. The role is usually seen as a social behaviour (Biddle, 1986). In this study we focused on nurse manager's point of view. It seems that a baccalaureate education for managers is not enough to cope with the demands of the future. With higher education, nurse manager's tasks will change together with the skills.

The nurse manager's role in perioperative settings has not been studied widely. The literature search (Figure 1) indicated that the majority of the study reports were anecdotal, or that nurse manager's role was studied from a clinical nurse's point of view. Majority of the included studies in this integrative literature review were qualitative and were mainly interviews. More innovative ways of studying, such as shadowing, are needed. By shadowing, and using methods such as think aloud method, it is possible to get real-time data on a subject's thinking process and decision-making (Lundgrén-Laine & Salanterä, 2010). Data can be collected at the same time as the subject is working. Thus, differing from e.g. interviews, the subject does not have to remember the things and actions afterwards. The think aloud method has been used, among others, in usability studies but is also suitable in studies concentrating on revealing nursing actions. However, the method is still quite new in nursing science. (Lundgrén-Laine & Salanterä, 2010.)

The nurse manager's role set requirements regarding education and experience. Managerial education was not commonly evident in the included studies. Nurse managers with management qualifications seem to cope with their role more effectively (Schroeder & Worral-Carter, 2002). Analysis revealed that clinical experience in a perioperative setting was desirable for nurse manager's role. Managerial experience was also valued but perhaps not as strongly, and it could also be achieved through on-the-job training. Even though

clinical experience was valued, it was unclear in the studies as to how this experience was used in the management position.

It seems that collaboration between professionals suffers from a lack of communication opportunities (Marjamaa & Kirvelä, 2007). The analysed studies showed that communication between nurse managers and other professionals is scarce (Moss & Xiao, 2004). Many different specialties are working at the same time and communication should be clear between professionals to maintain patient safety. Communication between professionals needs to be clarified, because in the future different communication channels (e.g. chat and short message services) will be increasingly used.

Hiring good nurses was mentioned as a challenge (Schroeder & Worral-Carter, 2002). The European Operating Room Nurses Association (2009) has created a framework for perioperative nurse competencies, and this could be used in recruitment processes. Results of this review support the development of a framework also for perioperative nurse managers' competencies and core tasks. This study did not show if language skills were relevant for nurse managers. In future language skills might be significant due to the nurses' and patients' migration. New technology can be used to support the learning process of a language (Ettlinger, Morgan-Short, Faretta-Stutenberg, & Wong, 2016). Also, new technology such as artificial intelligence could be used in future for interpretation in daily patient care.

This study showed that decision-making skills were relevant for nurse managers (Karathanasi et al., 2014; Schroeder & Worral-Carter, 2002; Siirala et al., 2016). An earlier study carried out in the field of acute health care indicated that decision-making differed between professionals and nurse managers' decision-making was far-reaching (Lundgrén-

Laine et al., 2011). Future information systems need to support nurse managers' decision-making and they need to understand the users' judgement (Effken, Verran, Logue, & Hsu, 2010).

Nurse managers found it challenging when working in a management position and not participating in nursing practice (Rudolfsson & Flensner, 2012; Schroeder & Worral-Carter, 2002). One study (Furtado et al., 2011) pointed out that in some countries nurse managers are hired through internal searches. In doing so, the applicant already knows the department. If someone from outside is hired, new ideas and new ways of working might be introduced (Baumgart, Schupferb, Welker, Benderd, & Schleppers, 2010). Findings from this study help nurse managers to orient into their new position.

Perioperative nursing development was a task for nurse managers in this study. Patient safety is a central part of both the quality of care and a supportive culture, and effective management is important in improving those (World Health Organization, 2016). By strengthening nurse manager's role in nursing development, it is possible to enhance patient safety.

This study also pointed out relevant information that needs to be considered when developing future information systems. To support nurse managers' tasks, the architecture needs to be designed for nurse managers with various educational backgrounds. The system should also enhance communication with other professionals and connect to other departments at the hospital (Gurses, Xiao, & Hu, 2009). It should be simple to use and easy to access (Saleem et al., 2017). The system should support the daily unit operation (Marjamaa & Kirvelä, 2007) with real-time information. None of the analysed studies in this review

focused on nurse managers' information technology skills. They refer to abilities to use and optimally use the different information systems and applications. These will be essential skills in the future.

There were some limitations regarding the integrative literature review. The quality of the studies was not always high, so the analysis was partly challenging. Two co-authors solved any disagreements over the quality appraisal of the articles (Kmet et al., 2004). In addition, the content of the studies were partly weak and open to misinterpretation. However, in quality appraisal the observed inter-rater agreement by item for qualitative studies was very good (from 0.90 to 1.00), and good for quantitative studies (from 0.71 to 1.00), indicating a reliable assessment of studies.

6. CONCLUSIONS

The nurse manager's role in perioperative settings has not been studied, although nurse managers have a central role to play in daily unit operation. The nurse manager's role sets requirements regarding "nurse managers' education and experience", "nurse managers' skills" that are followed by "nurse managers' tasks". The role is evolving. There is no consensus on nurse manager's role in perioperative settings and more rigorous research into the role is needed. A wide variety of skills, including communication skills, is needed in management. The nurse manager is continuously collaborating with nurses as well as other professionals. Daily unit operation needs to be well scheduled and nurse managers have to be prepared for constant changes. In addition, the goal is to enhance nurse manager's role in ensuring a smooth and safe patient care processes in perioperative settings.

7. IMPLICATIONS FOR NURSING MANAGEMENT

This study provides new information on the nurse manager's role in perioperative settings. Findings of this study can be utilized in defining nurse manager's job description in daily unit operation. In addition, findings can be used in job advertisements in order to better answer the current and future demands of the nurse manager's work in perioperative settings. Furthermore, nurse managers' education can be developed to better answer the demands of their position. In the future it would be useful to study if the employers' demands meet the reality of nurse managers' tasks and required skills.

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TABLE 1 Eligibility criteria for the integrative literature review

Level of search	Inclusion criteria	Exclusion criteria
Title (n= 2643)	• Relevant literature focusing on the nurse manager's role in an operating department or in a day surgery unit • The keywords are included in the title • Studies focusing on the operational or tactical levels of management • All languages • All time frames	• Studies focusing on the roles, responsibilities or assignments of registered nurses, nurse practitioners or medical staff • Studies focusing on clinical decision-making and strategic management • The database does not provide the name of the author (or names of the authors)
Abstract (n = 150)	• Relevant literature focusing on the nurse manager's role in the operating department or in the day surgery unit • The keywords are included in the abstract • Published in peer-reviewed journal	• Duplicates • The abstract is not available • Literature reviews, anecdotal reports, editorials, discursive papers, proceedings or dissertations • Articles not published in the English language • Articles published before the Bologna Declaration 1999
Full text (n =11)	• Relevant literature focusing on the nurse manager's role in an operating department or in a day surgery unit	• Studies not meeting the eligible criteria of Kmet et al. (2004)
Studies included in the synthesis (n = 9)		

TABLE 2 Scores for quantitative and qualitative study inclusion

Name of the author(s) and year of publication	**Scores by raters**			**Observed inter-rater agreement by item**	**Total scores/max by raters**	
	ES	**HS**	**Max**		**ES**	**HS**
Quantitative studies						
1. Karathanasi et al. (2014)	14	16	20	0.86	0.70	0.80
2. Kondrat (2001)	15	15	20	1.00	0.75	0.75
3. Marjamaa and Kirvelä (2007)	13	15	18	0.71	0.72	0.83
Qualitative studies						
4. Martin and Waring (2012)	15	16	20	0.90	0.75	0.80
5. Moss and Xiao (2004)	11	11	20	1.00	0.55	0.55
6. Rudolfsson et al. (2007)	19	20	20	0.90	0.95	1.00
7. Rudolfsson and Flesner (2012)	19	19	20	1.00	0.95	0.95
8. Schroder and Worall-Carter (2002)	15	15	20	1.00	0.75	0.75
9. Siirala et al. (2016)	17	16	20	0.90	0.85	0.80
10. Masursky et al. (2008) *	7	8	20	0.90	0.35	0.40
11. Standley (2009) *	7	8	20	0.90	0.35	0.40

*Excluded from the review

TABLE 3 Evidence of the included studies

Author (year)	Country	Aims	Design	Participants	Findings
Kondrat (2001)	USA	To identify competencies that Operating Room (OR) nurse managers define to be essential in their work	Quantitative; survey ("Operating room nurse manager questionnaire")	N = 300 nurse managers; response rate 40% (n=120)	Most valued competencies: human and leadership competencies Least valued: conceptual and technical competencies
Schroeder and Worral-Carter (2002)	Australia	To explore role stressors experienced by nurse managers, and to identify resources and strategies they use to cope with multiple demands	Qualitative; interview	N = 6 nurse managers	The major stressors related to managing the staff. Stress was reduced through: - the use of hospital resources (post management education) - peer support (information obtained from attending conferences) - team building strategies - balancing priorities - engagement in social activities
Moss and Xiao (2004)	USA	To capture communication patterns in operating room (OR) management to describe the information needs of OR coordination	Qualitative; observation	Four operating departments. In all, 2074 communication episodes observed. The number of participating charge nurses was not mentioned	69.2% of the communication episodes occurred face to face. Purposes of communication: - coordinating equipment (38.7%) - coordinating patient preparedness (25.7%) - staffing (18.8%) - room assignment (10.7%) - scheduling and rescheduling surgery

					(6.2%)
Marjamaa and Kirvelä (2007)	Finland	To explore to what extent different professionals are involved in daily OR management	Quantitative; survey	N = 97 chief anaesthesiologists or staff anaesthesiologists in charge N = 115 head nurses Overall response rate: 87%	Head nurses' and anaesthesiologists' perceptions differed significantly. In the physician's opinion, the person responsible for daily operative OR management was an anaesthesiologist – either alone or in combinations – more often than in the head nurse's opinion. Anaesthesiologists' involvement increased by the type and size of the hospital, being greatest in the university hospitals. OR performance was measured most often by the number of procedures in a time unit, utilisation and turnover time. Monitoring was complicated by old-fashioned information systems, and rarely seemed to lead to organisational changes.

Rudolfsson et al. (2007)	Sweden	To understand what constitutes caring in the perioperative culture from the perspective of the nurse leader	Qualitative; interview and open-ended questions	N = 10 nurse leaders	A process of six phases could help to keep the sight of patient in perioperative caring culture: "(1) when the nurse leaders understood perioperative caring as a process, the nurse's and patient's shared world became obvious to them; (2) safeguarding the patient's position as a unique human being; (3) safeguarding the nurse's welfare by creating a compassionate atmosphere; (4) promoting an idea means never giving up; (5) attaching importance to being trustworthy; and (6) being involved in a dynamic interaction, comprising communion and reciprocity".
Rudolfsson and Flensner (2012)	Sweden	To capture and interpret the meanings of suffering from the perspective of perioperative nurse leaders	Qualitative; interviews and open-ended questions	N = 10 nurse leaders	Suffering can be seen as learning or non learning process. "Suffering as learning comprised 'struggling to come to terms with being misunderstood', 'struggling to wait patiently to be allowed to help', 'struggling to manage daily tasks' and 'struggling to be worthy of the trust of superiors'. Suffering as non-learning comprised 'feeling alone when in charge', 'feeling guilty about not managing daily tasks', 'feeling mistrusted by superiors', 'feeling unfairly criticised', 'feeling humiliated owing to loss of responsibilities' and 'feeling unable to help'."
Martin and Waring (2012)	UK	To explore the dynamics of newly constructed leaders - operating department team leaders and	Qualitative; interview	N = 23 team leaders – theatre coordinators	Hierarchies constrained leadership capacity, and leadership was in line with managerial relationships and mandates. Institutional

		coordinators - while putting their leadership roles into practice			structures and norms make leadership challenging in health care.
Karathanasi et al. (2014)	Greece	To identify and measure the managerial competencies, skills and knowledge necessary for a competent operating room nurse manager.	Quantitative; survey	N = 200 participants; response rate 77% (nurses and nurse managers)	Most necessary competencies: decision-making, ethical principles and effective communication Least necessary competencies: financial competencies The nurse's higher educational background advanced technical, human and leadership competencies. Younger nurse mangers perceived that financial management is more important than older nurse managers
Siirala et al. (2016)	Finland	To describe the tactical and operational decisions made by nurse managers when managing the daily unit operation in perioperative settings	Qualitative; Think aloud method	N=20 Nurse managers	Nurse managers made ad hoc, near future or long-term decisions. - Ad hoc: staff allocation, ensuring adequate staff, rescheduling surgical procedures, confirmation tangible resources and following up the daily unit operation. - Near future: planning of surgical procedures and tangible resources, planning staff allocation. - Long-term: human resources, nursing development, supplies and equipment, and finances in the unit.

TABLE 4 The nurse manager's role in perioperative settings

		The nurse manager's education and experience
• RN (Martin & Waring, 2012; Rudolfsson & Flensner, 2012; Rudofsson et al., 2007; Siirala et al., 2016) • Diploma, baccalaureate, associate degree (Kondrat, 2001) • Academic degree (Rudolfsson & Flensner, 2012; Rudofsson et al., 2007) • Master's degree (Kondrat, 2001)	*Clinical and managerial education*	
• Previous clinical experience (Martin & Waring, 2012; Rudolfsson & Flensner, 2012; Schroeder & Worral-Carter, 2002) • Management experience (Karathanasi et al., 2014; Rudolfsson et al., 2007; Schroeder & Worral-Carter, 2002)	*Clinical and managerial experience*	
		The nurse manager's skills
• Coordination of the daily unit operation (Martin & Waring, 2012; Moss & Xiao, 2004)	*Coordination skills*	
• Collaboration with other professionals (Karathanasi et al., 2014; Marjamaa & Kirvelä, 2007; Martin & Waring, 2012; Siirala et al., 2016)	*Collaboration skills*	
• Content of the communication (Marjamaa & Kirvelä, 2007; Moss & Xiao, 2004) • Effective communication (Karathanasi et al., 2014; Kondrat, 2001; Moss & Xiao, 2004)	*Communication skills*	
• Human behaviour (Martin & Waring, 2012) • Trustworthiness (Rudolfsson & Flensner, 2012; Rudofsson et al., 2007; Schroeder & Worral-Carter, 2002) • Personal growth (Rudolfsson & Flensner, 2012; Schroeder & Worral-Carter, 2002) • Time management (Schroeder & Worral-Carter, 2002)	*Management skills*	

• Decision-making (Karathanasi et al., 2014; Schroeder & Worral-Carter, 2002; Siirala et al., 2016)		
• Special characteristics of perioperative nursing (Rudolfsson et al., 2007) • Clinical competence (Karathanasi et al., 2014) Technical competence (Karathanasi et al., 2014; Kondrat, 2001)	*Nursing skills*	
• Recruitment process (Karathanasi et al., 2014; Schroeder & Worral-Carter, 2002)	*Recruitment skills*	
		The nurse manager's tasks
• Planning of the surgical schedule (Marjamaa & Kirvelä, 2007; Martin & Waring, 2012; Schroeder & Worral-Carter, 2002; Siirala et al., 2016)	*Managing the daily unit operation*	
• Developing nursing care (Rudolfsson et al., 2007)	*Perioperative nursing development*	
• Nurses' welfare (Rudofsson et al., 2007) Atmosphere (Rudolfsson et al., 2007; Schroeder & Worral-Carter, 2002)	*Managing human resources*	
• Financial management (Karathanasi et al., 2014; Kondrat, 2001; Siirala et al., 2016)	*Financial management*	

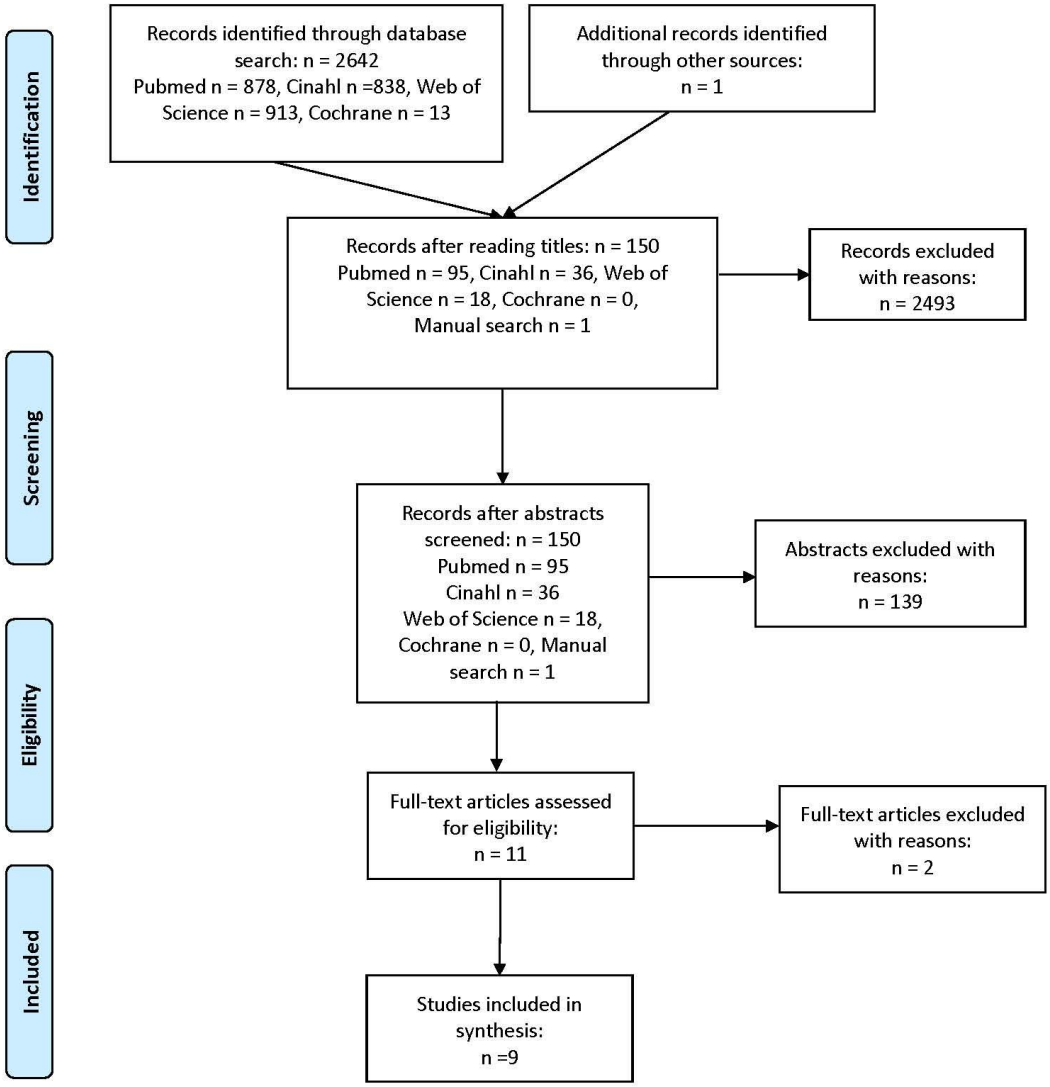

FIGURE 1 A PRISMA flow diagram of the literature search (adapted from Moher et al. 2009)

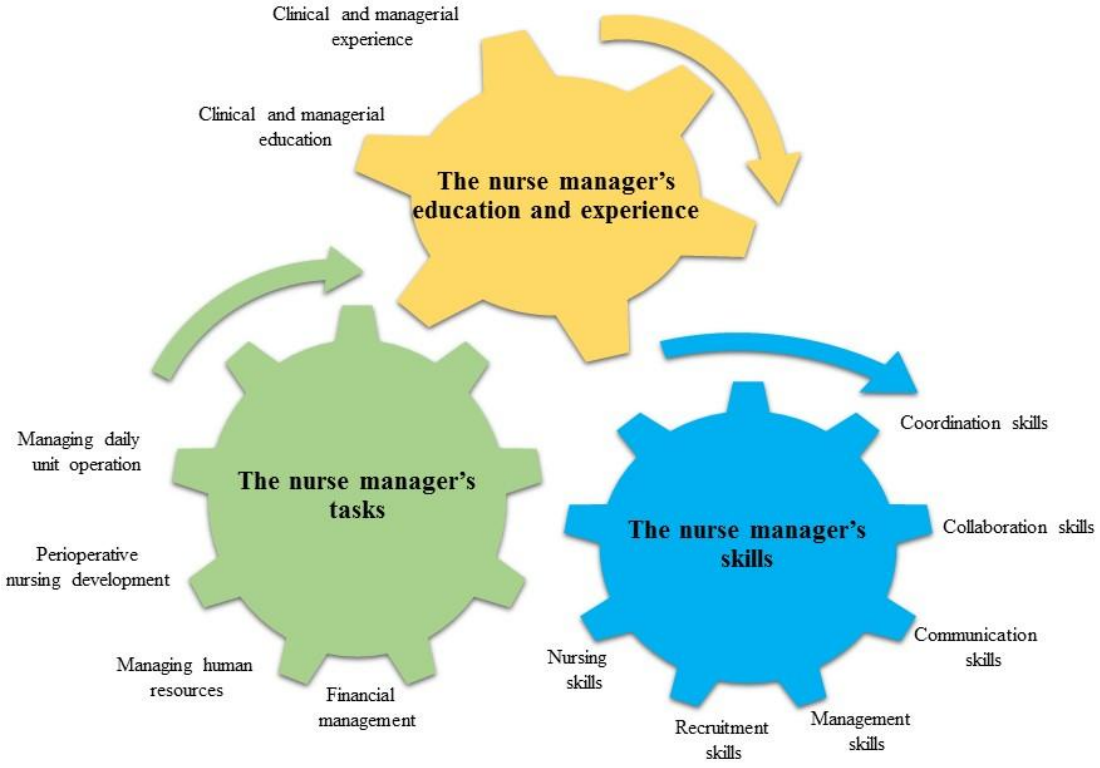

FIGURE 2 The nurse manager's role in perioperative settings