Relationships Between Nursing Management, Nurses' Job Satisfaction, Patient Satisfaction, and Medication Errors at the unit Level: A Correlational Study

Anu Nurmeksela (anu.nurmeksela@uef.fi)
University of Eastern Finland https://orcid.org/0000-0003-0474-0404
Santtu Mikkonen
University of Eastern Finland
Juha Kinnunen
Central Finland Central Hospital
Tarja Kvist
University of Eastern Finland

Research article

Keywords: job satisfaction, medication errors, nurses, nurse manager, patient satisfaction, hospital

Posted Date: June 16th, 2020

DOI: https://doi.org/10.21203/rs.3.rs-32156/v1

Version of Record: A version of this preprint was published at BMC Health Services Research on April 1st, 2021. See the published version at https://doi.org/10.1186/s12913-021-06288-5.

Abstract

Background Nurse managers play a critical role in enhancing nursing and patient outcomes. Nurse managers' behaviour and the clinical environment have been shown to affect nurses' job satisfaction. In addition, leadership, managers' support, and nurse-manager trust all improve the patient safety culture climate and reduce medication errors. However, hospital management and organisational support influence both manager and staff attitudes, which can affect care quality outcomes. This study aims to describe the relationships between nurse managers' work content, nurses' job satisfaction, patient satisfaction, and medication errors at the hospital unit level.

Methods The questionnaire data were collected from nurse managers (n= 29), nursing staff (n=306), and patients (n=651) from 28 units across three Finnish acute care hospitals in year 2017. Analysis of covariance (ANCOVA) was used to estimate relationships between data from Nurse Managers' Work Content Questionnaire, Kuopio University Hospital Job Satisfaction Scale, and Revised Humane Caring Scale subscales, along with medication errors reports.

Results Multiple relationships were identified for components of nurse managers' work content, nurses' job satisfaction, patient satisfaction, and medication errors. How nurse managers divide their time between various responsibilities was shown to influence the patient satisfaction Outcomes subarea (p< .001), the Requiring factors of work subarea of nurses' job satisfaction (p< .001), as well as medication errors (p< .001).

Conclusions It would be recommendable for nurse managers to prioritise focusing on employee well-being, development, and communication. However, to be effective and beneficial, the work in each of these subareas must be well organised. The results demonstrate that nurse managers need to consciously balance their workloads to achieve better outcomes.

Background

The constantly changing healthcare setting has made nurse managers' work increasingly demanding. This challenge is exacerbated by healthcare reform, an aging population, and staff shortages, all of which are international phenomena. Nurse managers largely influence nurses' job satisfaction (1,2) and patient safety (3,4), while motivated and engaged staff improve patient satisfaction (5,6).

Nurse managers' work contains multiple different responsibilities and duties, ranging from staff recruitment and daily management to strategic planning and financial management (7). In recent years, nurse managers have become more involved in administrative work at the expense of clinical work (8,9). Previous research have shown that nurse managers' leadership styles and behaviour, along with the clinical practice environment, affect nurses' job satisfaction and turnover intentions (10,11). Multiple studies have found the relational leadership style to strongly influence nurses' job satisfaction (2,5,12), while other research has linked this leadership approach with patient satisfaction (1,2,13). However, the effectiveness of a certain leadership style has also been suggested to depend on the situational context.

For example, transactional leadership has been found to be suitable for situations like medication administration (Hughes 2019). This leadership approach is not always suited for nurse leaders, as a significant portion of their time goes to balancing workload, being available to their employees, and supporting various staff members (14). In addition, nurse managers are responsible for implementing evidence-based practice and developing nursing to ensure high-quality care (15,16).

Leadership, including management and supervision, has a large impact on nurses' job satisfaction and job stress (17). In addition to poor leadership, nurses commonly attribute dissatisfaction and turnover intentions to poor educational opportunities, a career trajectory with a low chance of advancement, and substandard treatment practices in the workplace. Hence, nurse managers can improve nurses' job satisfaction and morale by providing appreciation, a high-quality work environment, and regular opportunities for competence and professional development (20).

Patient satisfaction is positively related to nurses' job satisfaction, work engagement, self-efficacy, and self-regulation, but negatively related to nurses' turnover intentions (21). This is because patients appreciate professional, high-quality care (22). Moreover, the education level of nurses has been shown to positively influence patient satisfaction, patients' willingness to recommend a hospital, quality of care, patient safety and nursing outcomes (23). Nurse leaders are tasked with facilitating and organising knowledge by promoting collective learning and coordinating units (24). Moreover, hospital-level predictors, e.g., hospital size and teaching status, have been connected with patient satisfaction (25,26).

Low nurse-patient ratios precede nurse burnout and dissatisfaction, which can result in low-quality care (27), while an adequate number of well-educated nurses in acute care has been shown to reduce patient mortality (28). Moreover, Griffiths et al. (2016) found associations between low staffing and medication errors, but it is important to state that a definitive threshold for an appropriate nurse-patient ratio does not exist (28). Higher nurse-patient ratios, effective processes, and good quality outcomes are positive predictors of satisfied patients (30), while staff expertise decreases adverse events (31) and collaboration between staff increases patient satisfaction (32).

Leadership, managers' support and nurse-manager trust reduce medication errors and increase both patient safety culture climate and quality of care (4,5,33) and reduce medication errors. Furthermore, hospital management and organisational support significantly impact the attitudes of the hospital's managers and staff. A positive practice environment enhances patient safety; as such, the actions of nurse managers are pivotal to guaranteeing patient safety. Therefore, nurse managers are pivotal to creating and maintaining a patient safety culture (3,34).

This study aimed to describe relationships between nurse managers' work content, nurses' job satisfaction, patient satisfaction, and medication errors at the hospital unit level. The research question underlying the present study was: what are the interrelations between nurse managers' work content, nurses' job satisfaction, patient satisfaction, and medication errors?

Methods

Study design and participants

The study design included a correlational questionnaire and register study. The research applied convenience sampling, with nurse managers (N=104) and nurses (N=3225) from three Finnish acute care hospitals invited to participate. Furthermore, 50 patients (N=3050) from each unit in which the participating nurse managers worked were invited to take part in the study. All registered nurses, midwives, practical nurses, paediatric nurses and mental health nurses as well as specialised nurses were included in the study. Furthermore, only adult patients from inpatient and outpatient units from which patients were directly discharged were included. Register data describing the medication errors which had occurred over one year (2017) were acquired from the hospitals' incident reporting register. Data regarding nurse managers, nurses, patients and medication errors were pooled by unit. The inclusion criterion for units was that one nurse manager, three or more nurses, and three or more patients had answered the survey. Data were collected between April and November 2017 from nurse managers and nurses by e-mail and from patients by paper questionnaire. A patient safety coordinator from each hospital delivered anonymous registered data by e-mail or mail. All of the hospitals were public hospitals that offer specialised medical care. The included hospitals had between 390 to 440 beds and 2 396 to 3 748 employees. In addition, the hospitals had between 1 285 and 1 928 nursing staff (35).

Measurements

Nurse managers' work content data were collected using an electronic questionnaire (Nurse Managers' Work Content Questionnaire, NMWCQ) (9). The NMWCQ was developed in 2016 to identify the current content of nurse managers' work. The questionnaire includes 87 items across 13 subscales, more specifically: *Recruitment* (5 items) (e.g. "I participate in the acquisition of new employees"); *Organising* (7 items) (e.g. "I draft the work schedule"); *Work well-being* (5 items) (e.g. I promote work safety activities for staff in my unit); *Work atmosphere* (3 items) (e.g. "I manage staff conflicts"); *Communication* (5 items) (e.g. "I manage unit meetings and have conversations with personnel"); *Clinical nursing* (9 items) (e.g. "I arrange patient follow-up care"); *Development of the unit* (12 items) (e.g. "I organise and promote evidence-based practice in my unit"); *Personnel development* (8 items) (e.g. "I evaluate work performance"); *Development of nursing* (4 items) (e.g. "I organise orientation and education in my unit"); *Financial management* (7 items) (e.g. "I monitor the unit's budget"); *Planning and evaluation of activities* (6 items) (e.g. "I plan and evaluate how organisational strategies are implemented in the unit"); *Collaboration* (10 items) (e.g. "I collaborate with different professionals"); and *Development with collaborating partners* (6 items) (e.g. "I collaborate with nurse managers from other units") (Additional file 1). Nurse managers were asked to evaluate how frequently they perform various tasks using a six-point Likert scale (1= daily; 2= weekly; 3= monthly; 4= 2-4 times a year; 5= annual; and 6= never). Principal component analysis was used to test the construct validity of the instrument. The development of the questionnaire and preliminary results were reported in an earlier study; as such, the data used in this

study represent secondary data. Cronbach's alpha values between 0.554-0.890 were previously calculated for the NMWCQ (9.)

Nurses' job satisfaction data were collected with the Kuopio University Hospital Job Satisfaction Scale (KUHJSS) via an electronic survey (36). The KUHJSS comprises 15 background questions and seven subscales, namely, *Leadership* (7 items) (e.g. "My manager is genuinely interested in the well-being of the staff), *Requiring factors of work* (8 items) (e.g. "There are usually enough staff in my unit"), *Motivating factors of the work* (6 items) (e.g. "I appreciate my own work"), *Working welfare* (4 items) (e.g. "I look after my personal well-being"), *Participation in decision-making* (4 items) (e.g. "I have a chance to influence decision-making in my unit"), *Sense of community* (4 items) (e.g. "The flow of information works well in my unit"), and *Working environment* (4 items) (e.g. "My unit has appropriate work facilities") (Additional file 2). The subscales include a total of 37 continuous scale questions, which respondents score from 0-10, i.e., totally disagree (0) – totally agree (10). Exploratory factor analysis was used to test the internal consistency of the instrument (36), while instrument validity and reliability were evaluated in several other studies. Cronbach's alpha values between 0.64-0.92 have previously been calculated for the KUHJSS (36,37), while we calculated Cronbach's alpha values between 0.723-0.950 for the data collected in the present study.

Patients were asked to evaluate their satisfaction with care through a paper questionnaire that employed the Revised Humane Caring Scale (RHCS) (38,39). This instrument includes seven background questions and seven subscales, namely, *Professionalism of staff* (17 items) (e.g. "The nursing staff were professional"), *Information andparticipation in own care* (11 items) (e.g. "I was able to participate in the planning of my care"), *Responding to physical needs* (4 items) (e.g. "I was helped with my personal hygiene if necessary"), *Human resources* (3 items) (e.g. "The staff had enough time for me"), *Pain and apprehension* (4 items) (e.g. "I received medication for my pain at the right time"), *Interdisciplinary collaboration* (3 items) (e.g. "There was good collaboration between members of staff"), and *Outcomes variables* (4 items) ("I set clear goals for my care together with the staff", "The goal of my care was received", "I am satisfied with the outcome of my care" and "I am satified with care") (Additional file 3). These seven subscales include a total of 46 items, which respondents' grade from 0-10: totally disagree (0) – totally agree (10). Cronbach's alpha values between 0.775–0.946 have been reported for the RHCS (38,39), with values between 0.786-0.970 calculated from the data collected in the present study.

Data concerning medication errors during the year 2017 were acquired from the hospitals' incident reporting register (HaiPro). HaiPro is a national, web-based patient safety reporting system launched in 2007. Today, over 200 Finnish health- and social care organisations report medication errors in HaiPro (40).

Ethical considerations

Ethics committee approval was obtained from the University of Eastern Finland. Approval was also requested, and received, from each of the three hospitals prior to data collection. Furthermore, the General Data Protection Regulation was followed throughout the research (41). Nurse managers, nurses and

patients were informed of the voluntary nature of the study and that data would be anonymously analysed. In addition, the registered data of medication errors were anonymous.

Data analysis

Frequencies and percentage distributions were used to describe the demographic variables. Mean scores were calculated for the NMWCQ, KUHJSS and RHCS subscales while frequencies were used to describe medication errors. A Spearman's correlation matrix was used to identify correlations between nurse managers' work content, nurses' job satisfaction, and patient satisfaction. This analysis assesses the monotonic relationship – instead of the linear relationships - between two variables (42). Subscales with correlation coefficients ≥ 0.3 were included in the covariance analysis. Analysis of covariance (ANCOVA) was used to evaluate the relationships between the NMWCQ, KUHJSS, and RHCS subscales and medication errors (42). Items with $p \leq 0{,}1$ was an inclusion criterion for the ANCOVA models. Furthermore, the original scale of the NMWCQ (1= daily, 2 = weekly, 3= monthly, 4= 2-4 times a year, 5= annual, 6= never) was reversed to improve the interpretation of results, i.e. the reversed scale was: 6= daily; = 5 weekly; 4= monthly; 3= 2-4 times a year; 2= annual; and 1= never.

Data analysis was performed in SPSS for Windows (version 25.0, IBM Corporation, Armonk, NY).

Results

The analyses included data from 28 units, including responses from 29 nurse managers, 306 nurses, and 651 patients (Table 1). In general, each unit was represented by one nurse manager, with the exception of one unit which was represented by two nurse managers. The nurse managers, nurses and patients had average ages of 51, 46, and 57 years, respectively. Nurse managers were – on average - in charge of 35 nurses (range: 14-60). A total of 468 medication errors occurred across the 28 units during the one-year study period, which translates to an annual average of 18 medication errors per unit (range: 0-75).

Table 1. Characteristics of nursing staff (n=306) and patients (n=651), described as number (n) and percentage (%)

The mean score for nurses' total job satisfaction was 7.36 (0-10 scale), with the *Requiring factors of work* and *Motivating factors of the work* subscales showing the lowest (6.340) and highest (8.461) mean scores, respectively. The mean score for total patient satisfaction was 8.74 (0-10 scale), with the *Human resources* and *Professional practice* subscales showing the lowest (8.512) and highest (9.155) scores, respectively (Table 2).

Table 2. Job satisfaction (n=306) and Patient satisfaction (n=651) presented according to subscale, and described using mean score, standard deviation (SD), and Cronbach's Alpha

Models of Patient satisfaction

The performed ANCOVA identified eight distinct factors that affected patient satisfaction. Notably, an increase in four factors of nurses' job satisfaction (*Leadership* (B=6.12), *Requiring factors of work* (B= .515), *Working environment* (B= .474), and *Participation in decision-making* (B= .188)) translated to an increase in the patient *Outcomes* subscale (p< .001), whereas a higher number of *Medication errors* (B=-.009) in a unit was negatively related with the patient *Outcomes variables* subscale (Table 3).

An increase in either a nurse manager's *Work well-being* duties (B= -.171) or medication errors (B= -.005) was found to decrease patient perceptions of *Interdisciplinary collaboration* (p= .002), while an increase in a nurse manager's *Development of nursing* duties (B= -.782) and an increase in nurses' ratings of *Requiring factors of work* (B= -.543) both diminished patient perceptions of *Cognition of physicalneeds* (p= .003). Three factors decreased patient satisfaction with *Professionalism practice* (p= .004), namely, a nurse manager's increased commitment to *Organising* (B= -.124) and *Clinical nursing* (B= -.178), along with an increase in nurses' perceptions of *Leadership* (B= -.114) (Table 3).

Increased commitment to *Communication* (B= .324) among nurse managers was found to improve patient satisfaction with *Pain and apprehension* (p= .005), while this component of patient satisfaction decreased with an increase in a nurse manager's *Development of nursing* duties (B= -.327), nurse perceptions of *Working welfare* (B= -.420) and the number of medication errors (B= -.011) (Table 3).

Furthermore, an increase in a nurse manager's *Organising* duties (B= -.201) and a higher number of medication errors (B= -.011) were negatively related to patient assessments of *Information and participation in own care* (p= .007). In addition, an increase in either a nurse manager's commitment to *Financial management* (B= -.782) or medication errors (B= -.543) diminished patient satisfaction with *Human resources* (p= .028) (Table 3).

An increased focus on *Work well-being* (B= -.217) among nurse managers, higher nurse ratings of *Working welfare* (B= -.356), and a growing number of medication errors (B= -.006) were all found to decrease total patient satisfaction (p= .001) (Table 3).

Table 3. The influence of nurse managers' work content, nurses' job satisfaction and medication errors on patient satisfaction subareas at the unit (n= 28) level

Models of Job satisfaction

The performed ANCOVA demonstrated that six factors influenced nurses' job satisfaction. The most significant effects were found for the *Requiring factors of work* subscale (p< .001). An increase in a nurse manager's *Development of nursing* duties (B= -.623) and patient assessments of *Cognition of physical needs* (B= -.547) were both negatively related with this component of nurses' job satisfaction. Patient views of *Outcomes* (B= .779) were positively associated with nurses' *Requiring factors of work* (Table 4).

There were inter-hospital differences in terms of nurses' perceptions of *Working environment* (p= .002). Accordingly, nurses from hospital 1 (B= .932) scored this factor of job satisfaction higher than nurses from hospital 2 (B= .201), while nurses from hospital 3 gave this factor the lowest score. A small number

of nurses (n<40; B= -.410) per nurse manager was negatively related to nurses' perceptions of the *Working environment*. Furthermore, increased commitment towards *Communication* (B= -.457) among nurse managers was negatively correlated with nurses' experiences of *Working environment* at the unit level (Table 4).

However, a small number of nurses (n<40; B= .654) was positively related with nurses' perceptions of *Leadership* (*p*= .047). In addition, patient ratings of *Outcomes variables* (B= .966) and the number of medication errors (B= .022) were both found to be positively associated with the *Leadership* aspect of nurses' job satisfaction. In contrast, an increase in a nurse manager's *Work well-being* duties (B= -.413) was negatively related with nurses' perceptions of *Leadership*. An increase in patient perceptions of *Cognition of physical needs* (B= -.239) slightly decreased nurses' *Working welfare* (*p*= .025). Furthermore, increased commitment to *Communication* (B= -.306) among nurse managers was negatively associated with nurses' ratings of *Motivating factors of the work* (*p*= .050), as well as nurses' total job satisfaction (B= -.301, *p*= .044). Patient ratings of *Outcomesvariables* (B .403) was positively correlated with total job satisfaction among nurses (Table 4).

Table 4. Influences of nurse managers' work content, patient satisfaction and medication errors on nurses' job satisfaction subareas at the unit (n= 28) level

The model of medication errors

An ANCOVA was also performed to determine whether factors associated with nurse managers' duties, nurses' job satisfaction, and patient satisfaction influenced medication errors. Several of the tested variables were shown to significantly affect medication errors (*p*< .001). The analysis revealed inter-hospital differences in medication error prevalence, with hospital 2 showing the highest prevalence of medical errors. Furthermore, both hospitals 1 (B= 16.212) and 2 (B= 23.084) had significantly more medication errors than hospital 3 (B= 0[a]). The number of nurses per manager was positively correlated with the number of medication errors; as such, a small number of nurses per nurse manager decreased (B=-.12.891) the amount of medication errors at a unit. Furthermore, increases in nurse managers' *Work atmosphere* (B= 14.853) and *Planning and evaluation of activities* (B=8.255) duties were found to be linked to an increase in medication errors. In contrast, patients' opinions of *Human resources* (B=-31.920) and *Pain and apprehension* (B=-39.408) were both negatively correlated with medication errors. Interestingly, total patient satisfaction (B=70.513) had the most significantly positive impact on medication errors (Table 5).

Table 5. The effect of hospital, number of nurses, nurse managers' work content, nurses' job satisfaction and patient satisfaction on medication errors at the unit (n= 28) level

Discussion

The performed ANCOVA identified several relationships between medication errors and various components of the NMWCQ, KUHJSS, and RHCS instruments. The *Outcomes variables* (*p*< .001) and

Requiring factors of work ($p < .001$) subareas of patient satisfaction and nurses' job satisfaction, respectively, along with medication errors, were to be the most significantly affected by other factors.

Nurse managers' various work duties influenced all aspects of patient satisfaction. One interesting finding was that an increase in most of NMWCQ subscales had a negative impact on different components of patient satisfaction. For example, the decision by a nurse manager to dedicate more time towards *Organising*, *Work well-being*, *Work atmosphere*, *Financial management*, *Clinical nursing* or *Development of nursing care* was found to decrease at least one subscale of patient satisfaction. However, it should be noted that most of these observed decreases were rather slight. In contrast, a nurse manager's decision to focus more on *Communication* improved patient perceptions of *Pain and apprehension*. It is also important to note that more time spent in one area of a nurse manager's job does not necessarily translate to an improvement in the quality of work. For example, the nurse manager's overwhelming workload has been described in several recent studies. According to Steege et. al. (2017), fatigue among nurse managers decreases the quality of their work, and can impact decision-making (43). On the other hand, research by Labrague et al. (2018) suggests that – in some cases - more control over a job and a higher extent of responsibility lead to less occupational stress.

The performed ANCOVA also revealed that an increase in certain aspects of nurses' job satisfaction, namely, *Leadership*, *Requiring factors of work, Work environment,* and *Working welfare,* were negatively correlated with patient satisfaction. This finding could also describe how nurse managers indirectly influence patient satisfaction. Nevertheless, an increase in other aspects of nurses' job satisfaction, more specifically, *Leadership*, *Requiring factors of work, Work environment,* and *Participation in decision-making,* positively influenced patient assessments of *Outcomes variables.* This finding is similar to what was reported in a study by De Simone et al. (2018), i.e., patient satisfaction was positively correlated with nurses' job satisfaction, work engagement, self-efficacy, self-regulation, and anticipation, but negatively correlated with nurses' turnover intentions. Another notable finding of our study was that an increase in medication errors negatively affected almost every component of patient satisfaction, including total patient satisfaction.

Moreover, six factors were shown to influence nurses' job satisfaction. For example, a nurse manager's decision to dedicate more time to *Work well-being,Development of nursing care,* and *Communication* decreased nurses' job satisfaction to some extent. On the other hand, improved patient perceptions of *Outcomesvariables* increased nurses' total job satisfaction, along with their ratings of the *Leadership* and *Requiring factors of work* components of job satisfaction. However, an increase in patients' ratings of *Cognition of physical needs* decreased nurses' *Work well-being*, while a lower number of nurses per nurse manager ($n<40$) strengthened nurses' opinions of *Leadership* yet weakened their views of *Working environment*. Previous studies have found supporting and motivating staff to be a significant part of nurse managers' work (8,9). Nurse managers can enhance staff well-being by encouraging staff to participate in planning, and can improve unit performance by being interested in nursing outcomes (5). Moreover, the quality of nurse management at the unit level affects care quality and nurses' turnover intentions (11,20). Zaghini et al. (2020) found that nurses who are dissatisfied with leadership will have

increased feelings of discomfort, which can lead to cynicism. Furthermore, nurses who perform counterproductive work feel more interpersonal strain, which can lead to patients feeling depersonalised and reporting lower levels of satisfaction with care. Karlsson et. al (2019) reported that nurses feel satisfied when they provide patient-centred care, while an excessive workload, interruptions, and incomplete work frustrates nurses. Moreover, nurses enjoy variability in their work, but would like to have control over their work. (20.)

According to prior research, nurse staffing affects patient outcomes (23,27), satisfaction (44), and safety (28). Gunawan et al. (2019) suggest that managers should be more proactive in the human resource management process, from recruitment to personnel appraisal. Moreover, Wong et al. (2013) have previously discussed how leaders influence certain human resource variables and, as such, a leader's actions may be connected to patient care outcomes, the nurse-to-patient ratio, and number of overtime hours, along with staff expertise, turnover, and absenteeism. Unfortunately, managers at large hospitals are rarely involved in the recruitment process although the aspect of staffing has significant financial implications (45,46).

The most significant impacts in the performed ANCOVA were found for medication errors. There were large inter-hospital differences, as hospitals 1 and 2 had 16 and 23 times more medication errors, respectively, than hospital 3. In addition, units with a small number of nurses (n<40) per nurse manager showed almost 13 times less medication errors than units with more than 40 nurses per nurse manager. Furthermore, a nurse manager's decision to dedicate more time to *Work atmosphere* and *Planning and evaluation of activities* noticeably increased medication errors, with these subareas showing unstandardized coefficients of more than 15 and eight, respectively. An increase in patient ratings of *Human resources* and *Pain and apprehension* noticeably decreased medication errors, showing unstandardized coefficients of approximately 30 and 40, respectively. Surprisingly, total patient satisfaction increased medication errors over 70 times, which could be explained by a safe clinical climate to report errors. Some of these factors have also been linked to medication errors in previous studies. Wong et al. (2013) found a strongly negative relationship between transformational leadership and the incidence of adverse events, especially medication errors. Accordingly, units with strong patient safety culture are characterised by organisational learning, continuous improvement, nonpunitive responses to errors, as well as feedback and open communication. Furthermore, these environments include an atmosphere in which employees feel safe to report medication errors, discuss them, and learn from previous mistakes. Accordingly, Hughes et al. (2019) promote the transactional leadership style as an approach that is conducive to reducing medication errors. However, it should be noted that nurse managers should consider contextual circumstances when choosing an appropriate leadership style.

Limitations

The main limitation of the study was that only 28 units met the inclusion criteria. This small amount of units limited the choice of an appropriate analytic method. Therefore, structural equation modelling was excluded, with analysis of covariance chosen to investigate relationships between the variables (42).

Nevertheless, 305 nurses and 651 patients participated in the study. In addition, we only studied patient satisfaction and nurses' job satisfaction at the unit level. It would have been interesting to examine whether the hours each registered nurse spent per patient affected patient satisfaction or medication errors. However, we did examine how the number of nurses per nurse manager affects patient satisfaction, nurses' job satisfaction, and medication errors. Hence, the study results provide clarity into the interactions between nurse managers' work content, nurses' job satisfaction, patient satisfaction, and medication errors.

The NMWCQ is a new instrument and, as such, needs to be tested more. It is also important to note that all of the questionnaires (NMWCQ, KUHJSS, and RHCS) are based on self-assessment, which can introduce a certain degree of bias as respondents tend to overestimate their own skills (47). However, several studies have reported that the KUHJSS and RHCS are reliable and valid instruments. Medication error data from the HaiPro register are based on nurses' initiative to report medication errors. Therefore, it is impossible to know whether every medication error has been reported. However, it should be noted that HaiPro is the first adverse event reporting system that was introduced in Finland and is now widely used. To gain a representative picture of medication errors, we decided to collect medication error data over one year, whereas other data were collected over a time period of approximately one month.

Conclusions

Healthcare organisations would greatly benefit from nurse managers who are able to focus on actions directed at improving nursing practices and patient outcomes. The present study identified several relationships between nurse managers' work content, nurses' job satisfaction, patient satisfaction, and medication errors. Organisational factors such as the number of nurses per nurse manager and hospital were also somewhat related to job satisfaction and medication errors. The findings suggest that nurse managers should focus more on duties related to nurses' work well-being, developing nursing care, and communication, but the work under each of these subareas must be well organised. However, the results also indicated that a nurse manager's actions, i.e. which areas of management to focus on, influences both patient satisfaction and nurses' job satisfaction. Hence, nurse managers face the challenging task of considering various factors – and prioritising them – when deciding which activities they will dedicate their limited time to. The present study suggests that certain interventions to enhance patient safety and avoid medication errors should be considered in the near future.

Abbreviations

Analysis of covariance (ANCOVA), Nurse Managers' Work Content Questionnaire (NMWCQ), Kuopio University Hospital Job Satisfaction Scale (KUHJSS), Revised Humane Caring Scale (RHCS), number of participants (n), Standard Deviation (SD), Cronbach's Alpha (α), Significance (*p*), Unstandardized coefficients (B)

Declarations

Acknowledgements

We would like to thank the hospitals and their contact persons for cooperation, along with the nurse managers, nurses, and patients who contributed to the study by completing the questionnaires.

Author's contributions

AN and TK acquired the data and designed the study. AN and SM performed the statistical analysis. AN prepared the draft of the manuscript. AN and TK made major contributions to the conception and design of the study as well as data acquisition, analysis, and interpretation. TK, SM, and JK also revised this manuscript. All authors read and approved the final manuscript.

Funding

This study was supported by the Finnish Nurses Association and The Nurses Training Foundation. SM was supported by The Academy of Finland Competitive funding to strengthen university research profiles (PROFI) for the University of Eastern Finland (grant no. 325022). The funding institutions did not have any role in the design of this study, the collection or interpretation of the data, or the preparation of the manuscript.

Availability of data and materials

All data supporting our findings were presented within the manuscript.

Ethics approval and consent to participate

The Committee of Research Ethics of University of Eastern Finland (Decision Date: 07.02.2017, No: 6/2017) reviewed the ethical aspects of the research project and issued a statement regarding its ethical acceptability. We conducted three anonymous, self-administered questionnaires, and considered answering the questionnaire as consent to participate in the study.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

Author details

1 University of Eastern Finland, Faculty of Health Sciences, Department of Nursing Sciences, Kuopio, Finland

2 University of Eastern Finland, Department of Applied Physics and Department of Environmental and Biological Sciences, Kuopio, Finland

3 Central Finland Central Hospital

4 University of Eastern Finland, Faculty of Health Sciences, Department of Nursing Sciences, Kuopio, Finland

References

1. McCay R, Lyles AA, Larkey L. Nurse Leadership Style, Nurse Satisfaction, and Patient Satisfaction: A Systematic Review. J Nurs Care Qual. 2018;33(4):361–7.
2. Hughes V. Nurse leader impact: A review. Nurs Manage. 2019;50(4):42–9.
3. Merrill KC. Leadership Style and Patient Safety: Implications for Nurse Managers. J Nurs Adm. 2015;45(6):319–24.
4. Lotfi Z, Atashzadeh-Shoorideh F, Mohtashami J, Nasiri M. Relationship between ethical leadership and organisational commitment of nurses with perception of patient safety culture. J Nurs Manag. 2018;26(6):726–34.
5. Boamah SA, Spence Laschinger HK, Wong C, Clarke S. Effect of transformational leadership on job satisfaction and patient safety outcomes. Nurs Outlook [Internet]. 2018;66(2):180–9. Available from: https://doi.org/10.1016/j.outlook.2017.10.004
6. Doucette JN. Nursing Management partners with ANCC's Pathway to Excellence® Program. Nurs Manage [Internet]. 2018 Apr;49(4):13–5. Available from: http://search.ebscohost.com/login.aspx?direct=true&db=cin20&AN=128582799&site=ehost-live
7. Warshawsky N, Cramer E. Describing Nurse Manager Role Preparation and Competency: Findings from a National Study. J Nurs Adm. 2019;49(5):249–55.
8. Bjerregård Madsen J, Kaila A, Vehviläinen-Julkunen K, Miettinen M. Time allocation and temporal focus in nursing management: An integrative review. J Nurs Manag. 2016;24(8):983–93.
9. Nurmeksela A, Kinnunen J, Kvist T. Nurse managers' work content: development of the questionnaire and results of the pilot study. Scand J Caring Sci. 2019;(8):3–6.
10. Leineweber C, Chungkham HS, Lindqvist R, Westerlund H, Runesdotter S, Smeds Alenius L, et al. Nurses' practice environment and satisfaction with schedule flexibility is related to intention to leave due to dissatisfaction: A multi-country, multilevel study. Int J Nurs Stud [Internet]. 2016;58:47–58. Available from: http://dx.doi.org/10.1016/j.ijnurstu.2016.02.003
11. Roche M, Duffield C, Dimitrelis S, Frew B. Leadership skills for nursing unit managers to decrease intention to leave. Nurs Res Rev. 2015;5:57–64.
12. Cummings GG, Tate K, Lee S, Wong CA, Paananen T, Micaroni SPM, et al. Leadership styles and outcome patterns for the nursing workforce and work environment: A systematic review. Int J Nurs Stud [Internet]. 2018;85(April):19–60. Available from: https://doi.org/10.1016/j.ijnurstu.2018.04.016

13. Alloubani A, Akhu-Zaheya L, Abdelhafiz IM, Almatari M. Leadership styles' influence on the quality of nursing care. Int J Health Care Qual Assur. 2019;32(6):1022–33.
14. Weaver SH, Lindgren T. Administrative supervisors a qualitative exploration of their perceived role. Nurs Adm Q. 2016;40(2):164–72.
15. Caramanica L, Spiva L. Exploring nurse manager support of evidence-based practice: Clinical nurse perceptions. J Nurs Adm. 2018;48(5):272–8.
16. Bianchi M, Bagnasco A, Bressan V, Barisone M, Timmins F, Rossi S, et al. A review of the role of nurse leadership in promoting and sustaining evidence-based practice. J Nurs Manag. 2018;(March):918–32.
17. McVicar A. Scoping the common antecedents of job stress and job satisfaction for nurses (2000-2013) using the job demands-resources model of stress. J Nurs Manag. 2016;24(2):E112–36.
18. Aiken LH, Sloane DM, Bruyneel L, Van den Heede K, Sermeus W. Nurses' reports of working conditions and hospital quality of care in 12 countries in Europe. Int J Nurs Stud [Internet]. 2013;50(2):143–53. Available from: http://dx.doi.org/10.1016/j.ijnurstu.2012.11.009
19. Flinkman M, Salanterä S. Early career experiences and perceptions - a qualitative exploration of the turnover of young registered nurses and intention to leave the nursing profession in Finland. J Nurs Manag. 2015;23(8):1050–7.
20. Karlsson AC, Gunningberg L, Bäckström J, Pöder U. Registered nurses' perspectives of work satisfaction, patient safety and intention to stay – A double-edged sword. J Nurs Manag. 2019;27(7):1359–65.
21. De Simone S, Planta A, Cicotto G. The role of job satisfaction , work engagement , self-efficacy and agentic capacities on nurses ' turnover intention and patient satisfaction. Appl Nurs Res [Internet]. 2018;39:130–40. Available from: https://doi.org/10.1016/j.apnr.2017.11.004
22. Zaghini F, Fiorini J, Piredda M, Fida R, Sili A. The relationship between nurse managers' leadership style and patients' perception of the quality of the care provided by nurses: Cross sectional survey. Int J Nurs Stud. 2020;101.
23. Aiken LH, Sloane D, Griffiths P, Rafferty AM, Bruyneel L, Mchugh M, et al. Nursing skill mix in European hospitals : cross-sectional study of the association with mortality , patient ratings , and quality of care. 2017;26:559–68.
24. Lunden A, Teräs M, Kvist T, Häggman-Laitila A. A systematic review of factors influencing knowledge management and the nurse leaders' role. J Nurs Manag. 2017;25(6):407–20.
25. Mazurenko O, Collum T, Ferdinand A, Menachemi N. Predictors of Hospital Patient Satisfaction as Measured by HCAHPS: A Systematic Review. J Healthc Manag. 2017;62(4):272–83.
26. Mcfarland DC, Shen MJ, Parker P, Meyerson S. Does Hospital Size Affect Patient Satisfaction? Qual Manag Healthc. 2017;26(4):205–9.
27. Wynendaele H, Willems R, Trybou J. Systematic review: Association between the patient–nurse ratio and nurse outcomes in acute care hospitals. J Nurs Manag. 2019;27(5):896–917.

28. Coster S, Watkins M, Norman IJ. What is the impact of professional nursing on patients ' outcomes globally ? An overview of research evidence. Int J Nurs Stud [Internet]. 2018;78:76–83. Available from: https://doi.org/10.1016/j.ijnurstu.2017.10.009
29. Griffiths P, Ball J, Drennan J, Dall C, Jones J, Maruotti A, et al. International Journal of Nursing Studies Nurse staffing and patient outcomes : Strengths and limitations of the evidence to inform policy and practice . A review and discussion paper based on evidence reviewed for the National Institute for Health and Car. Int J Nurs Stud [Internet]. 2016;63:213–25. Available from: http://dx.doi.org/10.1016/j.ijnurstu.2016.03.012
30. Kraska RA, Weigand M, Geraedts M. Associations between hospital characteristics and patient satisfaction in Germany. Heal Expect. 2017;20(4):593–600.
31. Audet LA, Bourgault P, Rochefort CM. Associations between nurse education and experience and the risk of mortality and adverse events in acute care hospitals: A systematic review of observational studies. Int J Nurs Stud [Internet]. 2018;80(January):128–46. Available from: https://doi.org/10.1016/j.ijnurstu.2018.01.007
32. Mazurenko O, Richter J, Kazley AS, Ford E. Examination of the relationship between management and clinician perception of patient safety climate and patient satisfaction. Health Care Manage Rev. 2019;44(1):79–89.
33. Kim MS, Seok JH, Kim BM. Mediating role of the perceived benefits of using a medication safety system in the relationship between transformational leadership and the medication-error management climate. J Res Nurs. 2019;
34. Chiang HY, Hsiao YC, Lee HF. Predictors of Hospital Nurses' Safety Practices: Work Environment, Workload, Job Satisfaction, and Error Reporting. J Nurs Care Qual. 2017;32(4):359–68.
35. Association of Finnish Local and Regional Authorities. Hospitals and Hospital Districts January to December 2017. Summary of demand, production and economy [Internet]. 2018 [cited 2018 Jul 4]. p. 47. Available from: https://www.kuntaliitto.fi/asiantuntijapalvelut/sosiaali-ja-terveysasiat/sairaanhoitopiirien-osavuosi-ja-vuosikatsaukset
36. Kvist T, Mäntynen R, Partanen P, Turunen H, Miettinen M, Vehviläinen-Julkunen K. The Job Satisfaction of Finnish Nursing Staff: The Development of a Job Satisfaction Scale and Survey Results. Nurs Res Pract [Internet]. 2012;2012:1–11. Available from: http://www.hindawi.com/journals/nrp/2012/210509/
37. Ylitörmänen T, Turunen H, Kvist T. Job satisfaction among registered nurses in two Scandinavian acute care hospitals. J Nurs Manag [Internet]. 2018;26:888–97. Available from: http://doi.wiley.com/10.1111/jonm.12620
38. Kvist T, Mäntynen R, Turunen H, Partanen P, Miettinen M, Wolf GA, et al. How magnetic are Finnish hospitals measured by transformational leadership and empirical quality outcomes? J Nurs Manag. 2013;21(1):152–64.
39. Kvist T, Voutilainen A, Mäntynen R, Vehviläinen-Julkunen K. The relationship between patients' perceptions of care quality and three factors: Nursing staff job satisfaction, organizational

characteristics and patient age. BMC Health Serv Res. 2014;14(1):1–10.
40. Awanic Ltd. Reporting System for Safety Incidents in Health Care Organizations [Internet]. 2018. Available from: http://awanic.com/haipro/eng/
41. European Commission. General Data Protection Regulation (GDPR). Brussels, Belgium: European Commission. [Internet]. 2016. Available from: https://gdpr-info.eu/
42. Tabachnick BG, Fidell LS. Using multivariate statistics. 6th ed. Boston, MA: Pearson Education; 2014. 983 p.
43. Steege LM, Pinekenstein BJ, Arsenault Knudsen É, Rainbow JG. Exploring nurse leader fatigue: a mixed methods study. J Nurs Manag. 2017;25(4):276–86.
44. Palese A, Gonella S, Fontanive A, Guarnier A, Barelli P, Zambiasi P, et al. The degree of satisfaction of in-hospital medical patients with nursing care and predictors of dissatisfaction: findings from a secondary analysis. Scand J Caring Sci. 2017;31(4):768–78.
45. Gunawan J, Aungsuroch Y, Fisher ML. Competence-based human resource management in nursing: A literature review. Nurs Forum. 2019;54(1):91–101.
46. Olley R, Edwards I, Avery M, Cooper H. Systematic review of the evidence related to mandated nurse staffing ratios in acute hospitals. Aust Heal Rev. 2018;43(3):288–93.
47. Thoma C. Under- versus overconfidence: an experiment on how others perceive a biased self-assessment. Exp Econ [Internet]. 2016;19(1):218–39. Available from: http://dx.doi.org/10.1007/s10683-015-9435-2

Tables

Table 1. Characteristics of nursing staff (n=306) and patients (n=651), described as number (n) and percentage (%)

Nursing staff	n	%
Hospital	98	32.0
1	121	39.5
2	87	28.4
3		
Gender	291	95.1
female	15	4.9
male		
Age (years)	37	12.1
< 30	79	25.8
30-39	81	26.5
40-49	88	28.8
50-59	21	6.9
60-69		
Type of employment	254	83.0
Permanent	52	17.0
Temporary		
Working Hours	187	61.1
Rotational; 3- shift work	119	38.9
Day		
Type of contract	258	84.3
Full-time employment	48	15.7
Short-term employment		
Work experience (years)	80	26.1
< 10	106	34.6
10-19	120	39.2
≥ 20		
Patients		
Hospital	151	23.2
1	364	55.9

2	136	20.9
3		
Gender	388	60.0
female	259	40.0
male		
Age (years)	78	12.5
< 30	53	8.5
30-39	50	8.0
40-49	95	15.3
50-59	173	27.8
60-69	173	27.8
≥ 70		
Hospital admission	421	58.1
of patients	224	30.96
Planned		
Emergency		

Table 2. Job satisfaction (n=306) and Patient satisfaction (n=651) presented according to subscale, and described using mean score, standard deviation (SD), and Cronbach's Alpha

Scale (number of items)	n	Mean	SD	α
Job satisfaction				
Leadership (7)	305	7.275	1.998	0.950
Requiring factors of work (8)	303	6.340	1.648	0.843
Motivating factors of the work (5)	301	8.461	1.154	0.816
Working welfare (4)	304	7.992	1.296	0.723
Participation in decision-making (4)	303	6.492	1.889	0.815
Sense of community (4)	304	7.473	1.639	0.811
Working environment (4)	304	7.178	1.432	0.766
Patient satisfaction				
Professional practice (17)	650	9.155	1.098	0.970
Information and participation in own care (11)	650	8.813	1.387	0.946
Cognition of physical needs (4)	590	8.741	1.803	0.846
Human resources (3)	642	8.512	1.775	0.881
Pain and apprehension (4)	621	8.356	1.917	0.786
Interdisciplinary collaboration (3)	645	9.153	1.162	0.916
Outcomes variables (4)	644	8.929	1.479	0.894

Abbreviations: n= number of participants, α= Cronbach's Alpha

Scale 0-10: 0= not satisfied at all; 10= completely satisfied

Table 3. The influence of nurse managers' work content, nurses' job satisfaction and medication errors on patient satisfaction subareas at the unit (n= 28) level

Professional practice *p*= .004**	Information and participation in own care *p*= .007**	Cognition of physical needs *p*= .003**	Human resources *p*= .028*
Organising (NMWCQ) B= -124 Clinical nursing (NMWCQ) B= -.178* Leadership (KUHJSS) B= -.114*	Organising (NMWCQ) B= -.201 Medication errors B= -.011**	Development of nursing (NMWCQ) B= -.782** Requiring factors of work (KUHJSS) B= -.543**	Financial management (NMWCQ) B= -.273* Medication errors B= -.014*
Pain and apprehension *p*= .005**	Interdisciplinary collaboration *p*= .002**	Outcomes variables *p*< .001***	Total patient satisfaction *p*= .001**
Communication (NMWCQ) B= .324* Development of nursing (NMWCQ) B= -.327 Working welfare (KUHJSS) B= -.420 Medication errors B= -.011*	Work well-being (NMWCQ) B= -.171* Medication errors B= -.005 **	Leadership (KUHJSS) B= .612*** Requiring factors of work (KUHJSS) B= .515** Working environment (KUHJSS) B= .474*** Participation in decision-making (KUHJSS) B= .188 Total job satisfaction B= -1.841*** Medication errors B= -.009**	Work well-being (NMWCQ) B= -.217** Working welfare (KUHJSS) B= -.356** Medication errors B= -.006**

Significance: * = $p<0.05$; ** = $p<0.005$; *** = $p<0.001$

Abbreviations: B= Unstandardized coefficients; NMWCQ= Nurse Managers' Work Content Questionnaire; KUHJSS= Kuopio University Hospital Job Satisfaction Scale; RHCS= Revised Humane Caring Scale

Table 4. Influences of nurse managers' work content, patient satisfaction and medication errors on nurses' job satisfaction subareas at the unit (n= 28) level

Leadership *p*= .047*	Requiring factors of work *p*< .001***	Motivating factors of the work *p*= .050*
Number of nurses <40 B= .654 >40 B= 0[a] Work well-being (NMWCQ) B= -413 Outcomes variables (RHCS) B= .966 Medication errors B= .022	Development of nursing (NMWCQ) B= -.623* Cognition of physical needs (RHCS) B= -.547** Outcomes variables (RHCS) B= .779*	Communication (NMWCQ) B= -.306*
Working environment *p*= .002**	Working welfare *p*= .025*	Total job satisfaction *p*= .044*
Hospital 1 B= .932 ** 2 B= .201 3 B= 0[a] Number of nurses <40 B= -.410 >40 B= 0[a] Communication (NMWCQ) B= -.457*	Cognition of physical needs (RHCS) B= -.239*	Communication (NMWCQ) B= -.301 Outcomes variables (RHCS) B= .403

Significance: * = $p<0.05$; ** = $p<0.005$; *** = $p<0.001$

Abbreviations: B= Unstandardized coefficients; NMWCQ= Nurse Managers' Work Content Questionnaire; KUHJSS= Kuopio University Hospital Job Satisfaction Scale; RHCS= Revised Humane Caring Scale

Table 5. The effect of hospital, number of nurses, nurse managers' work content, nurses' job satisfaction and patient satisfaction on medication errors at the unit (n= 28) level

Medication errors *p*= .001***
Hospital 1 B= 16.212*** 2 B= 23.084 3 B= 0[a] Number of nurses <40 B= -12.891* >40 B= 0[a] Work atmosphere (NMWCQ) B= 14.853* Planning and evaluation of activities (NMWCQ) B= .255* Human resources (RHCS) B= -31.920** Pain and apprehension (RHCS) B= -39.408** Total patient satisfaction B= 70.513**

Significance: * = $p<0.05$; ** = $p<0.005$; *** = $p<0.001$

Abbreviations:

B= Unstandardized coefficients; NMWCQ= Nurse Managers' Work Content Questionnaire; KUHJSS= Kuopio University Hospital Job Satisfaction Scale; RHCS= Revised Humane Caring Scale

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- Additionalfile1.NMWCQ.docx
- Additionalfile2.KUHJSS.docx
- Additionalfile3.RHCS.docx