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4 The relationship between perceptions of caring relationships, person-centred climate, and medication administration in nursing: a mixed-methods study

Abstract: Medication administration errors are a severe safety issue, especially in hospitals. Analysis of the medication errors process is needed for quality care and patient safety. Previous studies show positive outcomes related to caring culture in nursing, such as patient satisfaction. However, little is known about the relationships between caring culture and medication administration errors. Therefore, we aimed to analyze the causes of medication administration errors, reasons for not reporting them, the estimated percentage of reported medication administration errors, and how this correlates with perceptions of caring cultures among nursing staff in hospital settings. We have conducted a sequential explanatory mixed-methods study. Quantitative data gathering included five psychometrically sound questionnaires with 790 nurses and nursing assistants working in 69 surgical and internal wards in 11 Slovenian hospitals. Perceptions of medication administration errors were measured using the Medication Administration Error Survey. Caring relationships were measured using the Caring Factor Surveys. The person-centred climate was measured using a Person-centred climate questionnaire – staff version. We have used descriptive and inferential statistics to describe and interpret data. Grounded theory was used in the qualitative strand. Data collected with open-ended questions and semi-structured interviews were coded using OpenCode 3.6 software. Quantitative and qualitative findings were integrated at the interpretation level. Quantitative results showed that medication administration errors mainly occur due to nurses' resources and knowledge, working processes, and communication with physicians. Participants believed that underreporting is the result of fear and inadequate response. Perceptions of person-centred climate, safety climate, caring of provider, and caring by manager were linked with more significant medication error reporting. Core category lack of caring for patient safety with several categories emerged from qualitative analysis. The study showed a lack of caring relationships at the organizational and individual levels, various complex organizational and personal factors, errors occurrence, and underreporting. A caring culture was found to be the basis for safety; however, there are many other, mostly organizational, system issues. There is a need for a systematic approach in hospital settings.

Keywords: Medication administration errors, safety, reporting, caring culture, nursing

4.1 Introduction

The World Health Organization launched the global initiative *Medication Without Harm* to decrease severe preventable medication harm by half over five years [1]. Medication errors are preventable events related to causing unnecessary harm, costs, and even deaths [2]. The worldwide cost of medication errors has been estimated at 42 billion US dollars yearly [1]. For example, England counts 37 million medication errors each year, costing their health care system over 98 million GBP. Medication errors are causing or contributing to between 712 and 1,708 deaths. Prevalence and cost analysis of medication errors in Slovenia have not been done [3].

Reporting medication errors is essential for quality care and patient safety [4–6]. Nurses are accountable for reporting, and only by reporting the cause analyses is possible [5]. However, more medication administration errors occur than reported [4, 7], and underreporting results from various individual and system reasons [4, 8, 9]. Research shows reporting rates from 10 to 67% of actual cases [4, 9–11].

Safety culture is frequently addressed for improving patient safety [12, 13]. Some research shows positive relationships between safety culture and medication error reporting; however, other possible variables should be considered [12]. The caring concept is the foundation for quality of care [14–17] and has been theoretically linked to patient safety [14, 15, 18]. Errors are not always the result of a lack of knowledge and skills but also uncaring behaviour [19]. As nurses should perform person-centred care with a caring approach [20], person-centredness is closely linked to caring [20, 21]. Especially supportive environment such as a person-centred climate is needed to support the patient as a person. Individuals and their needs and beliefs should be the centre of attention and care [22, 23]. Both concepts are essential in nursing care; however, to our knowledge, no studies were conducted examining relationships between caring relationships, person-centred climate, and medication error administration.

4.1.1 Background

There are many causes of medication administration errors and these could be defined as individual or system factors [6]. Some of the critical causes highlighted by nursing staff are the lack of knowledge of nurses [6, 24], disruptions and interruptions in work [25], ineffective oral and written communication, and fatigue [26]. Errors also occur due to non-compliance with recommended guidelines or standards [25] and various drug delivery systems [27].

Open and honest disclosure is crucial to patient safety. Medication administration error reporting is mainly influenced by organizational barriers like culture, error reporting systems and management. However, personal and professional

characteristics like fear, accountability, and nurses' attributes influence reporting [4]. Researching the reporting errors is vital for better patient safety. However, it is an under-researched topic in Slovenia [3, 28, 29]. Slovene hospital records show that only a few medication errors are reported yearly [28, 30], pointing to the possibility of a high underreporting rate.

In her Theory of Human Caring, Jean Watson describes nursing as person-centred transpersonal caring [31]. Caring relationships include relationships with the patient and outside nurse–patient relationships such as co-workers and managers [32]. When nurses have positive perceptions of caring in their work environment, this improves the perception of caring in patients [33]. To be a caring person, one should be cared for and have established caring relationships with all persons one works with [34, 35]. Nurse managers have an essential role in creating a caring environment and caring relationships with their staff [36–38]. Caring managers promote values of person-centred care, compassion, respect, and caring for the patient. They are aware that errors can happen to the best nurses, so they treat errors confidentially and constructively [34]. They are also strongly committed to creating a working environment that allows nurses to establish genuine, caring relationships with patients [37]. Nurses spend much of their time with their nurse peers; therefore, these relationships could also create a caring environment [39].

It has been established that caring is significantly linked to patient well-being and satisfaction [17, 40, 41] and nurse mental well-being [40], but there is limited research and evidence on its impact on patient safety. Glennon Kempf [42] researched caring leadership characteristics of nurse managers and patient satisfaction and quality of care and found no statistically significant relationships, possibly because of the small sample size and inclusion of only some nursing-sensitive indicators. Relationships between nurse-sensitive indicators and nurse caring behaviours were studied by Burt [43], who also found no significant relationship, possibly due to the small sample size and underreporting of adverse occurrences. However, both Glennon Kempf [42] and Burt [43] focused only on a selected type of caring relationship, either caring relationships with managers or relationship with the patients.

Person-centred care is also associated with quality of care [44–46] and focuses on an individual person's perspective [47]. Attributes of nurses and the care environment should be considered when delivering person-centred outcomes [48]. Edvardsson et al. [22] found that especially psychosocial dimensions of care environments support the provision of person-centred care. An important indicator of caring environments is the perception of a person-centred climate [49]. Researchers have established a link between person-centredness and quality of care, but limited research on how person-centred climate relates to organizational quality indicators [50].

Caring for patients, caring relationships with managers and coworkers, and a person-centred climate are essential elements of caring culture [30, 51]. Research on caring and person-centred climate could lead to greater safety and quality; however, limited research supports a positive relationship between caring relationships, person-centred climate, and medication error administration in nursing.

4.2 The study

4.2.1 Aim

We aimed to determine the causes and reporting of medication administration errors, reasons for not reporting them, the estimated percentage of reported medication administration errors and how this correlates with perceptions of caring culture.

4.2.2 Design

We have conducted a multi-centre descriptive study using a sequential explanatory mixed-methods design.

4.2.3 Setting and sample

The study population in the quantitative strand consisted of nurses and nursing assistants employed in internal and surgical units in hospital settings. Twelve Slovene hospitals have at least one or more medical and surgical units [50]. Of those 12, one hospital declined to participate, and 69 units in two university medical centres and seven general hospitals were included in the research. Convenience sampling was used and we conducted a priori sample size calculation with G-power (version 3.0.10) in a pilot study of 120 nursing employees of surgical and medical units in two hospitals. Assuming a power of 95% and 5% type I error rate, an adequate sample size calculation resulted in 115 nursing employees [30]. However, as hospitals were interested in the study, we decided to invite all nurses and nursing assistants responsible for enteral or parenteral medication administration who were working in a morning or afternoon shift and willing to participate in the study on a selected day when questionnaires were distributed. Nurse managers were excluded, as they rarely administer medications [29, 50]. Of the 1,295 distributed questionnaires, 790 were returned, giving a 61% response rate. Of 790 respondents, 382 answered at least one open question in the questionnaire (48.4% response).

In the qualitative strand, purposive sampling was used. Six head nurses of hospitals, clinics, departments, and wards who have knowledge and experience and come from different backgrounds and were able to help develop concepts and understand the research issues were included.

4.2.4 Data collection and analysis

Quantitative strand

We collected data from October 2015 to March 2016. Questionnaires were administered to nursing employees on a selected day by a researcher, nurse manager or hospital's nurse research coordinator, depending on hospital research policy. Nursing employees returned questionnaires in sealed envelopes or to a designated box.

Hospital, unit, and nursing employees' characteristics include hospital and unit size (number of beds and number of employees), age, sex, educational level, unit, number of years working as a nurse or nursing assistant, and number of years in the current unit was collected.

Medication administration error was measured using the Medication Administration Error Survey (MAE) Wakefield, Uden-Holman [52]. The MAE consists of three parts: reasons why medication errors occur (29 statements, 6-item Likert scale), why medication errors are not reported (16 statements, 6-item Likert scale), and estimated percentage of medication errors reported [11, 53–56]. Slovene versions of questionnaires were translated and evaluated for their psychometric properties in previous studies [29, 30, 50].

Three versions of the Caring Factor Survey (CFS) were used to measure caring relationships as perceived by nursing employees: 20-item Caring Factor Survey – Care Provider Version (CFS-CP) [57], 10-item CFS – Caring of Manager (CFS-CM) [58], and CFS – Caring for Co-workers (CFS-CC) [59]. All three instruments are designed as a 7-item Likert Scale.

Perception of how a climate of hospital environment from nursing employees is viewed as person-centred can be measured using a 14-item Person-centred climate questionnaire – staff version (PCQ-S), by Edvardsson et al. [22]. The questionnaire is designed as a 6-item Likert scale that can explore how employees experience the environment or climate of hospital settings as person-centred [23, 60, 61]. Using descriptive and inferential statistics, statistical analysis was done using IBM SPSS Statistics (Version 20.0. for Windows).

Qualitative strand

To facilitate the interpretation of the data, we also added open-ended questions related to researched constructs in the quantitative strand.

After quantitative analysis, sequenced data collection using semi-structured interviews was carried out in 2016. The interview guide was prepared based on quantitative data analysis [30]. The recorded interviews lasted up to 1 h and were later transcribed. We used field notes and theoretical and analytical memos to support the data analysis process. The qualitative data analysis was performed using Corbin and Strauss's coding paradigm [62]. It was supported using OpenCode 3.6 software [63].

Data integration

Integration of quantitative and qualitative data was carried out using the grounded theory approach by Corbin and Strauss (2015) and a discussion of the findings.

4.2.5 Ethical considerations

Republic of Slovenia National Medical Ethics Committee permitted to conduct the study (no. 127/07/14).

4.3 Results

4.3.1 Quantitative strand

The participants were 790 nursing staff with a mean age of 37.58 and mean years' experience of 16.19. Most were female ($n = 684$, 86.6%), nursing assistants 48.8% ($n = 378$), followed by nurses with diploma degree ($n = 323$; 40.9%); 64.2% ($n = 507$) were employed on surgical and 35.2% ($n = 278$) on internal wards.

Table 4.1 shows descriptive statistics for components of the MAE questionnaire, reasons for medication administration error occurrence and reasons for not being reported: 455 (70.8%) respondents perceived that all errors were reported at 0–60%, and 188 (29.2%) considered that all errors were reported at 61–100%.

For PCQ-S, the mean value was 4.39 (SD = 0.86). Mean values for subscales climate of safety, the climate of community and climate of everydayness were 4.68 (SD = 0.89), 4.36 (SD = 1.14), 3.67 (SD = 1.15), and 4.39 (SD = 0.86), respectively. The mean value for CFS-CP was 5.84 (SD = 0.76), for CFS-CM 5.84 (SD = 1.40), and for CFS-CC 5.04 (SD = 1.24).

Tab. 4.1: Reasons why medication errors occur and are not reported.

Reasons why medication administration errors occur	<i>n</i>	Mean	Standard deviation
Human resources and work processes	781	3.93	1.05
Physician communication	782	3.86	1.02
Knowledge	781	3.85	0.94
Medication packaging	782	3.81	1.30
Individual causes	783	2.62	0.85
Pharmacy processes	780	2.07	0.91
Reasons why medication administration errors are not reported			
Response	759	3.54	1.17
Fear	763	2.80	1.08
Reporting process	762	2.72	0.94

n, number of participants.

Table 4.2 shows relationships between perceptions of caring relationships with patients, co-workers and managers, person-centred climate, and medication administration error reporting.

Tab. 4.2: Perceptions of caring relationships with patients, co-workers and managers, person-centred climate, and medication administration error reporting.

Scale/subscale	% of reported MAE	Mean rank	<i>n</i>	Mann–Whitney <i>U</i>	<i>Z</i>	<i>p</i>	<i>n</i>
PCQ-S	0–60%	310.03	452	46,769.00	2.124	0.034*	639
	61–100%	344.10	187				
Climate of safety	0–60%	307.38	452	47,964.50	2.696	0.007*	639
	61–100%	350.49	187				
Climate of everydayness	0–60%	311.99	452	45,884.00	1.710	0.087	639
	61–100%	339.37	187				
Climate of community	0–60%	317.27	452	43,497.00	0.585	0.559	639
	61–100%	326.60	187				

Tab. 4.2 (continued)

Scale/subscale	% of reported MAE	Mean rank	<i>n</i>	Mann–Whitney <i>U</i>	<i>Z</i>	<i>p</i>	<i>n</i>
CFS-CP	0–60%	305.15	447	46,869.50	2.530	0.011*	633
	61–100%	345.49	186				
CFS-CM	0–60%	307.31	448	46,678.50	2.277	0.023*	635
	61–100%	343.62	187				
CFS-CC	0–60%	312.05	449	43,977.50	1.169	0.243	634
	61–100%	330.72	185				

*Statistical significance at ≤ 0.05 ; %, percent; *CFS-CC*, Caring Factor Survey-Caring for Co-workers; *CFS-CM*, Caring Factor Survey-Caring of Manager; *CFS-CP*, Caring Factor Survey-Care Provider version; *n*, number of participants; *p*, statistical significance; *PCQ-S*, person-centred climate questionnaire – staff version; *Z*, Z-score.

4.3.2 Qualitative strand

Six categories were constructed by researchers in the process of analysis of open-ended questions: perceptions of medication administration errors; organizational and individual factors of medication administration errors; inconsistent perception of reporting medication administration errors; organizational and individual factors for not reporting medication administration errors; improving medication safety and caring for patient and caring culture.

The main category “lack of caring for safety” was constructed. Due to a lack of caring at the organizational and individual level, the respondents described the practice as one where medication errors occur and are underreported. Respondents believe that we do not know how many errors happen in practice. They also provided different definitions of what constitutes medication administration error. Errors are the result of various complex organizational (staff workload, medication administration process, management support, and interprofessional collaboration) and individual factors (knowledge and training, caring). These are also not fully reported due to various organizational (culture, system, and management of reporting medication administration errors) and individual factors (fear, responsibility, and caring).

Organizational and individual factors of medication administration errors

The respondents pointed out the shortcomings in the existing work organization, the workload, and the lack of staff. For example: “Mistakes happen because employees are mostly very busy. . . .”

Due to the workload and lack of staff, there are shortcomings in the medication administration process; there is a pre-preparation of medicines, disregard of competencies, and the use of the so-called “notebook therapy” for orientation on how much and which medications are needed on nursing trolleys. Disruptions at work also contribute to errors. Some medications cannot be delivered on time and are prepared in advance, mainly for the morning shift. It is a practice that everyone is aware of but reluctant to discuss. For the same reasons, nursing assistants often administer intravenous therapy. For instance: “Therapy is not prepared in advance . . . except on weekends and at night . . . but not officially. . .” and “Too many times something interrupts you at work . . . in the meantime, someone comes and orders you something, one physician this, another nurse this, the phone, a third”

Another important factor the respondents pointed out was the lack of interprofessional cooperation with pharmacists and physicians, especially concerning generic medications. There are lists of interchangeable medications in the wards, but they are not the best solution. One respondent recounted their experience this way: “in the morning when I order medication, I don’t know which parallel I’m getting. And when that parallel comes, the physician should, according to all the rules, write it on the patient therapy sheet . . . but he won’t come out of the operating room because of that. . . .”

Respondents highlighted the lack of knowledge about medications and patient safety during education and the lack of training for employees. New employees are a problem because they lack knowledge and experience, and it is necessary to emphasize the need for continuous improvement and training. One expressed problem: “I did not acquire this necessary knowledge during the education, I acquired the knowledge later in practice . . . but the management and supervisors must pay enough attention to this and take care of continuous education, improvement and then transfer what has been learned into practice. . . .”

The respondents highlighted caring as an important factor, namely caring for safety, quality, professional work, and compliance with standards. Failure to do so may result in errors. For instance: “We can’t work safely without caring for patient . . . if you don’t have morale, ethics in you. . . .” Respondents believe that caring has a psychological and technical dimension, and they see it as holistic and individual care that requires a mutual partnership. Some expressed beliefs: “Caring means to me that you take care of the patient from all perspectives, to embrace him as a whole. . .” and “To act the way you would like to be cared. . .”. They believe that caring is something you are born with but can be learned as well. It is a personal quality that an individual acquires in a family environment and later builds

in the context of education and the workplace: “Caring for another person is a reflection of one’s upbringing and the environment (family) from which one comes, and then you constantly build on it during education, employment, and function” Caring for an individual is not enough to ensure safety; one must perceive caring in co-workers, superiors, and the entire work environment. For instance: “it’s not just caring for the patient, there’s also caring for the co-worker, caring in the work environment, I often miss that. . . .” Even though according to the respondents, caring is the foundation and precondition for safety, they point out that other factors also lead to errors.

Organizational and individual factors for underreporting of medication administration errors

Respondents highlighted a silent culture, where medication errors are not discussed. For instance: “What is not reported does not exist. . . .” Reporting also differs slightly from one institution to another. In general, they believe that we are looking for individual culprits in our environments and punishing them. System approach and punitive culture pervade. One respondent expressed concern: “They are still trying to find out who is guilty, point the finger at one person and punish them . . . if an error happens, someone is punished. . . .” The reporting system is anonymous; errors are reported to superiors, and a root cause analysis and corrective action are implemented. However, despite the anonymous system, the identity of the culprit can be revealed. There is also a problem with the complexity of the reporting system and the burden to the employee.

Respondents predict fear as the main reason why errors are not reported. Fear stems primarily from a punitive culture. Employees are afraid of the consequences and the punishment that may follow. They are also ashamed of errors and worried about their careers and their co-workers’ thinking about them. They also fear the response from patients and their families. Error reporting can also be negatively affected by media reactions. For example: “That fear, what will happen, what others will think of me, what if the patient finds out, what if it is written down somewhere, how it will affect my career . . . and there is also media. . . .” Underreporting can also be due to a lack of responsibility of the individual; also, one must acknowledge and be aware of the error.

4.4 Discussion

Medication administration errors are a safety issue, and organizational and individual factors influence their occurrence. Organizational factors include personal factors,

work processes, medication delivery processes, communication with physicians, medicines, pharmacists, management support, knowledge and skills. Individual factors include personal characteristics and individual and patient factors. Nursing employees perceive errors as something negative, and the inconsistency of definitions is worrying, as it can affect reporting. Underreporting is also influenced by several organizational and individual causes, including response, communication processes and culture, fear, responsibility, and professional and personal characteristics. Elements of caring culture are associated with medication error reporting. Caring culture is the foundation for patient safety; however, other factors influence medication administration errors and reporting.

Our findings align with previous work examining the causes [64] and reporting of medication administration errors [65]. We found very problematic generic substitutions. Respondents are concerned about the situation; they report a lack of knowledge and skills. Nurse managers should implement strategies to address this potential risk of error. Some suggest that standardized labelling and information about medication may reduce nurse time in the medication administration process [66]. Essential is adequate support from pharmacists and efficient communication with physicians [26]. Lack of staff and high workload are common factors for errors in existing literature [67]. Managers and policymakers should evaluate and implement strategies to overcome staff shortages and manage increased workloads effectively without increasing staff.

Caring was perceived as an holistic and individual approach that requires mutual interpersonal relationships, which is also in line with other findings [68]. Nursing includes technical and expressive skills and knowledge [69]. Respondents perceived caring as providing for physical needs and respecting the person as a whole, thus providing for spiritual needs and creating positive energy. Caring is about ensuring dignity, inspiring hope, empathy and compassion and caring for others as you want others to take care of you. Caring is perceived as a moral and ethical act or as Watson claims – a moral imperative [70].

Respondents also believe that caring is the foundation for safety and quality; however, caring behaviours of all nurses and managers and a caring environment are needed. It is difficult to discuss findings because relationships between caring [30], person-centredness [71] and medication administration are under-researched. However, it is well established that organizational culture and safety climate impact medication administration error occurrence and reporting. Leadership management and interprofessional relationships with colleagues are also critical [72, 73].

Readers should interpret findings with caution due to convenience sampling, self-reported data collection techniques, and cross-sectional design. Social-desirability bias is possible. The study should be replicated, mainly as we have conducted a study prior Covid-19 pandemic, which has caused nursing additional staffing shortages and other challenges [74]. Further studies should evaluate cause-effect relationships using more robust research designs. Interventions for improving safety need to be implemented

and evaluated. There is a possibility of exploring relationships between caring culture and other nurse-sensitive indicators, like patient falls and bed sores. Nurse education and training interventions can actively improve patient safety. Stronger emphasis on acquiring knowledge of pharmacology, mathematical skills in calculating drug doses, critical thinking and clinical decision-making, clinical judgment, effective teamwork and communication, and the prevention and reporting of errors are needed.

4.5 Conclusion

Our study highlights the lack of caring in medication administration, especially at the system level. Several complex organizational and personal factors influence medication administration errors. Medication error reporting is influenced by caring culture. Hospital settings require a systematic approach to reduce medication administration errors. Nurses will report errors in culture, where caring is nurtured and when not perceiving fear and blame.

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