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# Communication issues contributing to medication incidents: Mixed-method analysis of hospitals' incident reports using indicator phrases based on literature

Tiina Syyrilä MSc, RN[1,2] | Katri Vehviläinen-Julkunen PhD, RN, RM, FEANS[1,3] | Marja Härkänen PhD, RN[1]

[1]Faculty of Health Sciences, University of Eastern Finland (UEF), Kuopio, Finland

[2]Helsinki University Hospital (HUS), Helsinki, Finland

[3]Kuopio University Hospital (KUH), Kuopio, Finland

**Correspondence**
Tiina Syyrilä MSc, RN, Department of Nursing Science, Faculty of Health Sciences, University of Eastern Finland (UEF), PO Box 1627, 70211 Kuopio, Finland.
Email: tiina.syyrila@uef.fi

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## Abstract

**Aim:** To identify the types and frequencies of communication issues (communication pairs, person related, institutional, structural, process and prescription-related issues) detected in medication incident reports and to compare communication issues that caused moderate or serious harm to patients.

**Background:** Communication issues have been found to be among the main contributing factors of medication incidents, thus necessitating communication enhancement.

**Design:** A sequential exploratory mixed-method design.

**Methods:** Medication incident reports from Finland ($n$ = 500) for the year 2015 in which communication was marked as a contributing factor were used as the data source. Indicator phrases were used for searching communication issues from free texts of incident reports. The detected issues were analysed statistically, qualitatively and considering the harm caused to the patient. Citations from free texts were extracted as evidence of issues and were classified following main categories of indicator phrases. The EQUATOR's SRQR checklist was followed in reporting.

**Results:** Twenty-eight communication pairs were identified, with nurse–nurse (68.2%; $n$ = 341), nurse–physician (41.6%; $n$ = 208) and nurse–patient (9.6%; $n$ = 48) pairs being the most frequent. Communication issues existed mostly within unit (76.6%, $n$ = 383). The most commonly identified issues were digital communication (68.2%; $n$ = 341), lack of communication within a team (39.6%; $n$ = 198), false assumptions about work processes (25.6%; $n$ = 128) and being unaware of guidelines (25.0%; $n$ = 125). Collegial feedback and communication from patients and relatives were the preventing issues. Moderate harm cases were often linked with lack of communication within the unit, digital communication and not following guidelines.

**Conclusions:** The interventions should be prioritised to (a) enhancing communication about work-processes, (b) verbal communication about digital prescriptions between professionals, (c) feedback among professionals and (f) encouraging patients to communicate about medication.

**Relevance to clinical practice:** Upon identifying the most harmful and frequent communication issues, interventions to strengthen medication safety can be implemented.

**KEYWORDS**
communication, critical incidents, hospitals, management, medication error, nursing, patient harm, patient safety, quality and safety, research methods

## 1 | INTRODUCTION

Medication incidents are among the major issues jeopardising patient safety (Härkänen, Vehviläinen-Julkunen, Murrells, Rafferty, & Franklin, 2018;Keers et al., 2018;Manias, Cranswick, et al., 2019;WHO, 2017), accruing the equivalent of 42 billion USD in global costs annually, based on estimations of World Health Organization (WHO, 2017). Communication is one of the most common (46%-60%) contributing factors of medication incidents (Keers, Williams, Cooke, & Ashcroft, 2013;Lawton, Carruthers, Gardner, Wright, & McEachan, 2012a;Parry, Barriball, & While, 2015).

For the purpose of this study, *communication*, *medication* and *medication incidents* are defined as follows: Communication refers to transmitting information through verbal or nonverbal methods, including silence, body language and manual or technical devices (Agarwal, 2010, pp. 23–28, Manias, 2010). The communication actors—senders and receivers—in our study were healthcare professionals at all levels of the organisation (nurses, physicians, pharmacy staff, specialists, management and students; Lawton, McEachan, et al., 2012), and patients or collaborating family members (Kim et al., 2018) taking part in the administration of the patient's medication. The term *diverse communication issues* refer to the selection of communication issues detected in previous scientific literature, and from the study sample of voluntarily reported incidents in hospital. The definition of medication in this study includes all types of medication (e.g. oral, subcutaneous, intramuscular, intravenous and patch medication), intravenous fluid infusions, contrast media and blood products used in hospitals. Medication incident can be defined as "any preventable event or circumstance related to medication which could have resulted, or did result, in unnecessary harm to a patient" (National Coordinating Council for Medication Error Reporting & Prevention [NCCMERP], 2019;Runciman et al., 2009). Medication incidents are caused by unintentional or intentional acts, including errors or acting without knowing the guidelines, but rules might also be violated in good intention regardless of knowing the rules (Karttunen, Sneck, Jokelainen, & Elo, 2020). Ultimately, incidents might stay as near misses without involving the patient or may involve patients and cause or not cause harm (Runciman et al., 2009).

WHO (2017) has set a Global Patient Safety Challenge: Medication Without Harm to halve medication errors in five years by the year 2022, in which communication was named as a strategic domain. However, detailed priority areas of communication enhancement are not clear. Detailed information about the type and number of challenges or promoting issues of communication related to medication incidents is needed for planning targeted interventions in the future. Measurement of communication issues related to medication incidents is needed.

**What does this paper contribute to the global clinical community?**

- Identifies the most frequent communication issues related to medication incidents, facilitating the planning of targeted interventions to enhance medication communication.
- Identifies medication communication issues which are causing most harm to patients.
- Indicator phrases can be used for evaluation of communication issues on the unit level.

## 2 | BACKGROUND

According to research evidence of the last two decades, research interest in communication-related medication incidents has increased. In the PuBMed database, a search using the keywords *medication incident* OR *medication error* AND *communication* yielded 11 hits in the year 2000, 97 hits in 2010 and 127 hits in 2018. Errors in medication communication being linked with medication incidents have been studied from specific viewpoints, such as within diverse care-provider settings or between them (Petersen, Foged, Madsen, Andersen, & Nørholm, 2018), in speciality practices (Keers et al., 2018;Liu, Manias, & Gerdtz, 2014;Manias, Cranswick, et al., 2019;Tobiano, Chaboyer, Teasdale, Raleigh, & Manias, 2019) or among specific patient age group settings (Borrott et al., 2017). Evidence of medication communication exists for a variety of care process situations (Braaf, Rixon, Williams, Liew, & Manias, 2015a;Liu, Manias, & Gerdtz, 2012;Manias, Braaf, et al., 2019;Yu, Li, Gao, Liu, & Lin, 2018), and concerning a diverse range of communication methods (Foged, Nørholm, Andersen, & Petersen, 2017;Redley & Botti, 2013). Medication communication has been assessed ethnographically from the interplay viewpoint between nurses, patients, physicians and students (Liu, Gerdtz, & Manias, 2015, 2016;Rutledge, Retrosi, & Ostrowski, 2018;Schoenthaler, Allegrante, Chaplin, & Ogedegbe, 2012;Tobiano et al., 2019), but also concerning professionals' tendency to follow communicated guidelines (Karttunen

et al., 2020). Studies of medication communication have been conducted on emergency situations concerning language barriers (Pun, Chan, Murray, Slade, & Matthiessen, 2016), racial issues affecting medication communication (Schoenthaler et al., 2012) and environmental issues of communication (Liu et al., 2014;Manias, Cranswick, et al., 2019;Yu et al., 2018). Nevertheless, the relative frequency of a wide variety of specific communication issues has not been measured using incident reports submitted in acute care. It is challenging to prioritise communication interventions due to the lack of evaluations.

A decade ago, Manias (2010) discussed the concept of *medication communication* and voiced a need for the development of a practical tool for the assessment of medication communication. Until recently, there has been a paucity of information regarding the tool development. The following communication aids have been developed: Redley (2016) highlighted the need for research on standardised handover tools; Kim et al. (2018) developed a tool to measure patient and family engagement in medication communication; and the Agency for Healthcare Research and Quality (AHRQ, 2019) introduced a Communication and Optimal Resolution (CANDOR) toolkit as a communication aid for professionals. However, this is a general communication instrument for all types of postincident situations. It is not linked purely to medication incidents, nor is it a tool for the assessment of communication.

Regardless of the previous information about medication communication from diverse viewpoints, the relative meaningfulness of specific communication issues related to medication incidents is unclear. Frequency of the broad variety of communication issues has not been measured simultaneously, as a measuring instrument for communication does not exist.

The aim of our study was to identify the types and frequency of communication issues (communication pairs, person related, institutional, structural, process and prescription-related issues) detected in medication incident reports and to compare situations that caused moderate or severe harm to patients.

## 3 | METHODS

### 3.1 | Design

We conducted a sequential exploratory mixed-method study (Creswell & Plano Clark, 2018, pp. 66, 152) using medication incident reports. The method was chosen due to the lack of both a concept description and an instrument for measuring the phenomenon of communication-related medication incidents. This paper is reported using EQUATOR's Standards for Reporting Qualitative Research (SRQR) 21-item guideline (Supplement S1). http://www.equator-network.org/reporting-guidelines/srqr/

### 3.2 | Setting

The study was conducted in tertiary health care in one university hospital district in Finland serving 1.6 million people. The hospital district consisted of 25 hospitals and 19 clinical entities, consisting of 12,000 healthcare employees and specialty areas of emergency care, paediatrics, an operation theatre, intensive care and pain management, women's health and obstetric care, psychiatry, head and neck care, internal medicine and rehabilitation, heart and thorax, cancer care, orthopaedics and traumatology, plastic surgery, infections, abdominal care, pharmacy, laboratory services, radiology, and four small local hospital areas with several specialties in each.

### 3.3 | Instrument

For this study, we developed the Mediation Incidents and Communication in Hospital (MIComHos) instrument. It consists of three sections (as shown and explained in Table 1): (a) categorical data of incident reports, (b) indicator phrases searched from free text of incident reports and (c) extraction of citations as samples of detected communication issues.

The readily available categorical data included:

1. Specialty area (19 named specialty areas),
2. Hospital (25 named hospitals),
3. Weekday (Monday–Sunday),
4. Month (January–December),
5. Time of occurrence (00.01–06.00; 6:01–12:00; 12.01–18.0; 18.01–23.59),
6. Factual incident (near miss; affected patient),
7. Type of medication incident (prescribing; documenting; dispensing; error during medication preparation or giving to patient; ordering; delivery; storing; and adverse reaction to patient),
8. Product type (oral or patch; blood products; injections, intravenous medication, injections or intravenous fluids; and contrast media),
9. Impact on the patient (no harm; minor harm; moderate harm; and serious harm),
10. Impact on the unit (no harm; harm to image; material harm; extra costs; additional work, prolonged care; long term care; harm to professionals; and harm to other persons),
11. Risk class (not meaningful; minor; moderate; and severe; serious),
12. Challenges in information transmission as contributing factors to incidents (patient's identification not confirmed; transmitting false, unclear or inadequate information; transmitting the information to a false location; not transmitting the information at all, or transmitted information not complete; misunderstanding; transmitted information about wrong patient; available information had not been utilised; and something else).

In order to measure communication issues from free text of the incident reports (Grove, Burns, & Gray, 2013, pp. 281 and 443), we identified the unique indicator phrases. We first formed the conceptual framework of communication-related medication incidents (Figure 1). This was developed through the deductive-inductive content analysis of 21 scientific articles from seven scientific databases

**TABLE 1** Sections of the medication incidents and communication in hospital (MIComHos) instrument for assessing communication issues related to medication incidents from incident reports

| MIComHos instrument | | | |
|---|---|---|---|
| **Section** | **Data type collected** | **Items searched** | **Measuring level and information type gained** |
| Section 1 | Categorical data<br>• readily available in the incident reports<br>• data had been inserted to the register of incident reports by reporter of an incident report, or by managers who had analysed the incident reports in the organisation | Incident's clinical area, place, type (e.g. near miss/occurred to the patient), time of occurrence, risk level, consequences to a patient and to an organisation | Nominal and ordinal scales<br>Descriptive numeric and qualitative information about incidents and contexts |
| Section 2 | Indicator phrases<br>• indicator phrases were searched from free texts of the incident reports<br>• inclusion through interpretation by the first researcher | Content of the 128 indicator phrases describing communication issues related to medication incidents<br>Phrases were based on a content analysis of scientific literature<br>Phrases were grouped according to five main categories of conceptual MIComHos framework:<br>1. communication pairs, 2. person-related issues, 3. institutional issues, 4. structure- and process-related issues and 5. prescription-related issues | Dichotomic<br>"yes detected" =1 "not detected" =0<br>Frequencies of detected issues<br>The detected issues were presented as percentage of all incident reports *N* = 500 |
| Section 3 | Citations presenting communication issues<br>• citations were extracted from free texts of the incident reports<br>• inclusion through interpretation by the first researcher was based on the indicator phrases<br>• saturation point was decided by the first researcher based on the coverage of five main categories of conceptual MIComHos framework | Text samples answering to three questions were searched:<br>1. Are there challenging issues of communication related to medication?<br>2. Are there promoting issues of communication relate to medication communication?<br>3. Are there additional communication issues compared to the indicator phrases? | Qualitative text samples as citations<br>Citations were grouped following the conceptual MIComHos framework |

(Medline Ovid, PubMed, PsycINFO, Scopus, CINAHL EBSCO, COCHRANE and Web of Science). The selected articles from three continents were evaluated by the first and third authors of this paper using the criteria from the Joanna Briggs Institute (JBI, 2014). The developed conceptual framework consisted of the five main categories comprising communication-related medication incidents: (a) communication pairs, (b) person-related issues, (c) institutional issues, (d) structural and process issues and (e) prescription-related communication issues. Each main category included several communication issues. The issues were detected from articles either as part of previous theories or as issues in lay texts. Second, each issue was presented in the framework as an indicator phrase. One or more scientific references were stated for each indicator phrase (see Supplement S2). Reliability of the indicator phrases was tested through the analysis of the medication incident reports. The validation is reported among limitations and strengths.

## 3.4 | Data collection and sample

For this study's data source, we used medication incidents voluntarily reported by healthcare professionals in 2015 to a digital incident-reporting register called HaiPro (2019) in Finland. We draw the data from the register of one university-hospital district. The total number of all medication incident reports in the hospital district in 2015 was *n* = 5,925, and the number of medication incident reports having communication marked as a contributing factor was *n* = 1,185. After receiving the organisational approval, the first author collected the data from HaiPro system for three working days.

First, the pilot study sample was drawn using 50 incident reports submitted since August of 2015. The sample of pilot study was not included in the results. Second, the final study sample (*n* = 500) was drawn as a convenience sample covering reports between 1 January and 4 June 2015. The sample covered half of the annual amount of the HaiPro reports. We considered the sample size to be sufficient for the study based on previous similar register studies. The total number of copy and pasted pages was 911 in Word, with 12-point Times New Roman font and single spacing.

## 3.5 | Data analysis

The first author analysed the categorical data (Table 1) and entered the data manually into the SPSS 24 software. The first author checked the entered data (entry frequencies, minimum and maximum values, missing data) in case of incorrect entries. Typing errors (*n* = 31)

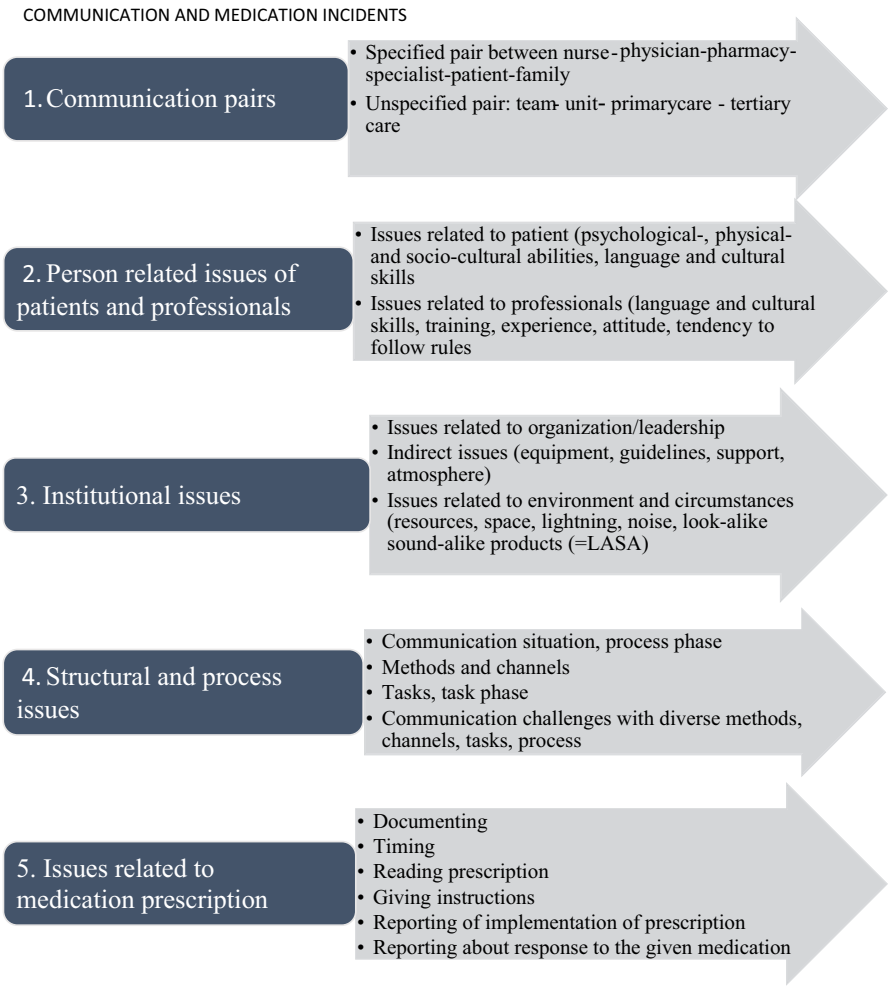


**FIGURE 1** MIComHos (MIComHos = Medication Incidents and Communication in Hospital instrument) conceptual framework: Main categories of communication issues related to medication incidents

were re-checked from the incident reports and corrected before the analysis. The types of the incidents ("near miss" or "occurred to the patient") were revised during the data saving, because previous literature shows fluctuation in interpretation of "near miss situations" (Keers et al., 2018;Runciman et al., 2009). In our study, an incident was marked as "occurred to the patient" if the incident had reached the patient—regardless of whether the incident caused harm.

The indicator phrases (Supplement S2) were used in searching for contributing communication issues from the free texts of the medication incident reports (Table 1). The first author read the incident reports carefully several times, compared the free text in incident reports against the indicator phrases one by one, and evaluated using a dichotomous grading scale if the phrase was detected in the incident report. Thus, one incident report equalled one statistical unit. If the specified communicator was not named in the free text, the term *team* was used for analysis (i.e. unspecified communication pairs).

We calculated the quantitative data—which consisted of categorical data and the numbers of detected indicator phrases—as frequencies and percentages, and then presented the data according to MIComHos main categories (Figure 1).

Severity of actual harm caused to a patient by an incident had been marked to the HaiPro register by a reporter of an incident, or by a manager who analysed each incident report. The possible categories of evaluated harm were as follows: *consequences not known*, *no harm*, *minor harm* (discomfort, delayed or prolonged care), *moderate harm* (procedures required, effect on health status, unnecessary suffering or temporary inability to work) and *severe harm* (death or permanent and severe effect on health status or quality of life, injury or inability to work) (HaiPro, 2019). The potential risk levels of the incidents were not presented in this study for clarity purposes, but generally the potential risk levels were estimated slightly higher than the actual harm levels.

The data of caused harm were used for naming the communication issues of the most serious and moderate harm-causing incidents. The incidents causing no harm or minimal harm were not compared, as their frequencies were in line with the largest frequencies of communication issues, which are presented in the results (Supplement S3).

Samples of citations were collected as evidence of detected communication issues, including issues in MIcomHos framework, as well as additional issues found in the reports. The qualitative data were saved in a Word document totalling 37 pages, single-spaced, with 12-point Times New Roman font. The citations were printed on paper and cut into single citation units. The citations were classified and grouped following the main categories of MIComHos conceptual framework (Figure 1) and presented jointly with the quantitative results (Grove et al., 2013, 210; Creswell & Plano Clark, 2018, p. 216, 218).

### 3.6 | Ethical considerations

According to the guidelines of National Research Ethics Committee (TENK, 2019, 62), the use of register data did not require an approval from the National Committee of Research Ethics. The official research permission and the license to access the register of incident reports were applied from the hospital district. A standardised frame recommended by the university for data management plan was used. This paper was reported using EQUATOR's 21 item SRQR checklist for qualitative studies.

## 4 | RESULTS

### 4.1 | Categorical data of incident reports

Five of the clinics that submitted the largest amount of reports contributed to 8%–11% of the total reports. The hospital was not stated in 8.6% ($n$ = 43) of the reports. The largest proportion of reports from one hospital was 17.4% ($n$ = 87), and the minimum number of reports was one. Average amount of reports from one hospital was 19.9, and the median amount was 11.5. Most often the incidents were concerning oral or patch medication (49.2%; $n$ = 246) or intravenous medications or fluids (41.2%; $n$ = 206). The incident impacted the patient most of the time (69.5%; $n$ = 344), and near misses were under one third of incidents (30.5%; $n$ = 151).

Managers classified contributing factors as "challenges in information transmission" in most cases, entered under the categorical group "transmitting false, unclear, or inadequate information" (51.8%; $n$ = 259) or "available information had not been utilised" (38.8%; $n$ = 198). Rarely was there concern about "not transmitting the information at all" (6.0%; $n$ = 30), "misunderstanding" (2.4%; $n$ = 12) or "transmitting the information to a false location" (0.6%; $n$ = 3). Information on the wrong patient was transmitted once (0.2%; $n$ = 1).

### 4.2 | Communication issues found from free texts

The identified types and frequencies of communication issues found from free texts of incident reports are presented as follows: (a) communication pairs, (b) person-related issues, (c) institutional issues, (d) structural and process issues, (e) medication prescription-related issues and (f) caused harm linked with communication issues.

#### 4.2.1 | Communication pairs in medication incidents

Typically, more than one communication pair was mentioned in each report. In three quarters of the cases, the communication pairs were located "within the same unit" (76.6%; $n$ = 383), and between different working units in the same organisation in roughly a third (29.4%; $n$ = 147) of the cases. Communication pairs between primary and tertiary health care were seldom noted (3.4%; $n$ = 17). Twenty-four communication pairs were detected in the incident reports and four additional pairs (student–professionals, student–patient, student–family and professionals–management) totalling 28 pairs (Figure 2). The most common communication pairs were the nurse–nurse pair (68.2%; $n$ = 341) and the nurse–physician pair (41.6%; $n$ = 208). The nurse–patient pair (9.6%; $n$ = 48), physician–physician pair (5.2%; $n$ = 26) and physician–patient pair (4.6%; $n$ = 23) were fairly rare communication pairs.

#### 4.2.2 | Person-related communication issues of medication incidents

Person-related communication issues were linked to both patients and healthcare professionals. Patient-related issues existed less than issues related to professionals (Figure 3), but were most often harm preventing, such as patient or family alerted about an error (5.4%; $n$ = 27) (incident report 1 [IR1]). In 4.4% ($n$ = 22) of cases, patients had unintentionally withheld the necessary information, causing a medication incident:

> *Incident report 1 [IR1] The patient was given morning medication. The patient was personally able to report that, of their morning medication, Azamum 125 mg had been raised to 150 mg. They had already taken this on Fri 7 May. The evening dose had also been increased to 175 mg. These changes had not been made included the medication section of the patient's file or under multiprofessional orders and instructions. However, this change in medication was reported in the doctor's document…*

Regarding patients' abilities, psychological communication issues (3.4%; $n$ = 17) were the most frequent contributing issues. However, physical communication abilities, language skills, or cultural background issues were rare (<1%; $n$ = 1–3/issue). Patients' sociocultural backgrounds were not detected in the incident reports. Lacking communication on patient's identity was rarely detected (1.8%; $n$ = 9).

The professional-related issues were often linked to not following the existing guidelines[IR2] (64.8%; $n$ = 324) or to false interpretation of communicated information (31.4%):

> *[IR2]The patient was admitted to the ward from the outpatient clinic where they had booked an appointment. Surgery planned for the following day. Medication list unchecked… Patient had taken with them the medication list from the inpatient facility, but this was not checked. Also, consultation by an anaesthesiologist was carried out, and on the morning of the operation the patient was prescribed medication that the patient was no longer even using.*

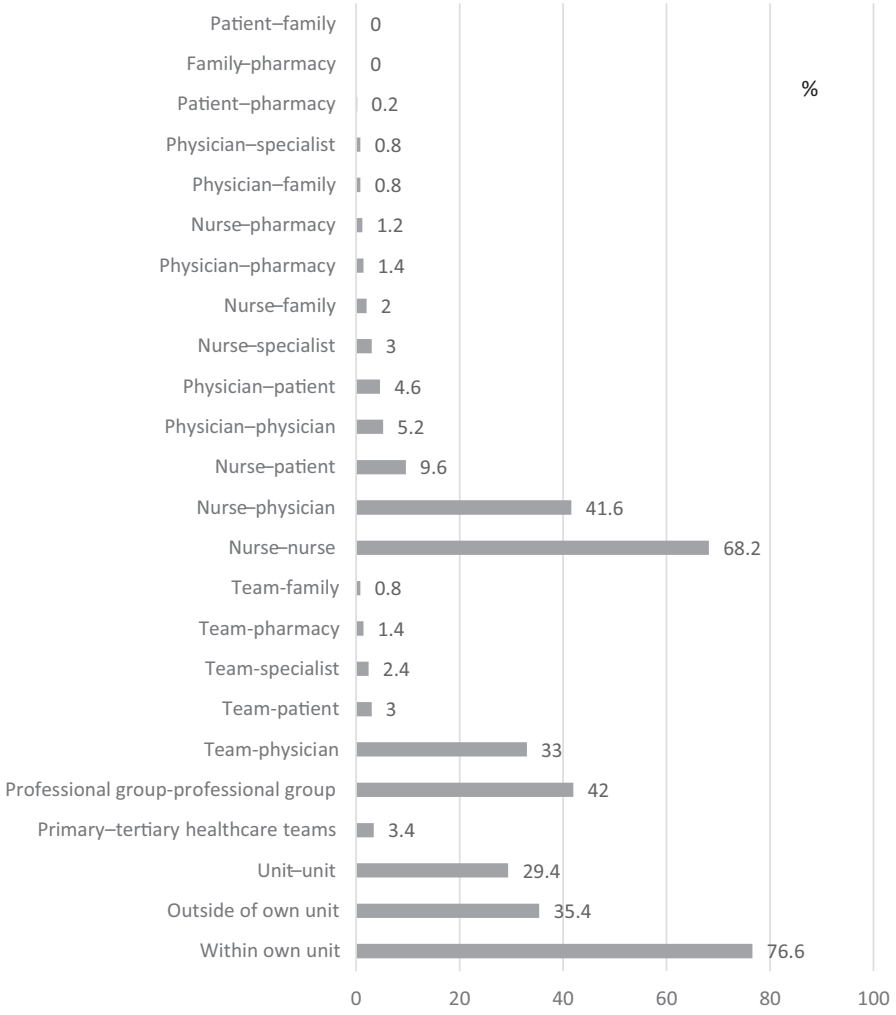


**FIGURE 2** Detected communication pairs in medication incident reports ($n$ = 500) (the following new communication pairs were detected: student–professionals, student–patient, student–family and professionals–management)

Work orientation of new staff was lacking in nearly one third (32.8%; $n$ = 164) of cases, and professionals were not aware of the guidelines or rules [IR3] in over one quarter of the cases (27.8; $n$ = 139). A professional had not asked advice when unsure about the situation in 8.4% ($n$ = 42) of the cases:

> *[IR3]INR measured in the morning, but was not taken into account, and the patient was left without Marevan. Was given a larger dose of Marevan the following day. On the weekend, there was a shortage of staff and a newly graduated nurse was working the shift as a temporary employee and had not previously worked at our ward.*

Forgetting to communicate was mentioned in 11% ($n$ = 55) of the reports. The language skills or cultural background of healthcare professionals were not mentioned in the sample.

### 4.2.3 | Institutional issues in medication incidents

Institutional issues were classified under (a) organisation or leadership issues, (b) indirect issues and (c) environmental issues (Figure 1). Concerning organisational or leadership issues, team communication was a challenge [IR4] in over one third of the cases (39.6%; $n$ = 198), and task coordination was lacking almost equally as often (37.6%; $n$ = 188; Figure 3). Feedback from colleagues [IR4] had prevented or minimised an incident in 1.0%, ($n$ = 75) of the cases. Mutual respect had encouraged professionals to seek advice from colleagues in over 5.4% ($n$ = 27) of incidents (Supplement S3):

> *[IR4]Medication is distributed based on the lists in patient files. Another nurse who had come in for a night shift had dispensed Furesis in a syringe. When checking medication, they noticed that the list in the i.v. file was actually of a patient that had been discharged. At least they did not give the drug to the new patient who had come to that bed from emergency care. P.o. medication had also been dispensed for the same patient on a tray according to the list.*

The cases where guidelines restricted the transferring (3.8%; $n$ = 19) or receiving (5.2%; $n$ = 26) of information were relatively rare and were related to technical conduct or unstandardised protocols [IR5] of medication care within an organisation.

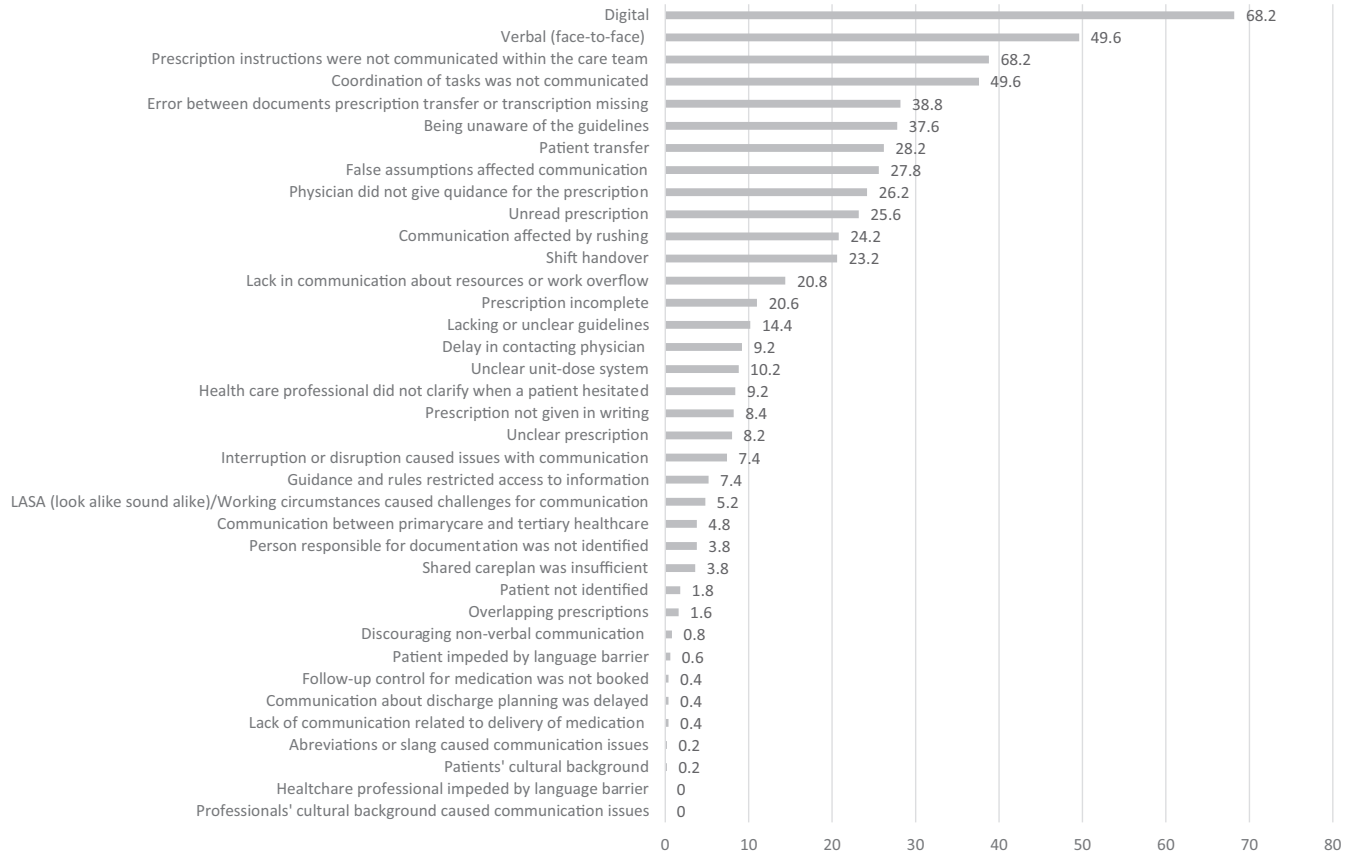


**FIGURE 3** Percentage of detected communication issues within medication incident reports (*n* = 500; selected issues)

> *[IR5] No use in printing out instructions on further treatment as there is a risk this will not include all prescriptions. Doctors should remember the rule in place that at our unit, prescriptions are reported on an observation form. Other work units should also report prescriptions in the medication section from where this can then be recorded in the patient's files as part of the medication given.*

The most common indirect issues were lack of support from colleagues (32%; *n* = 160), being unaware of the guidelines (25.0%; *n* = 125; i.e. communication about location of the information), lack of communication about resources or excess workload [IR6] (14.4%; *n* = 72; i.e. professionals-management communication) and missing guidelines (10.2%; *n* = 51; i.e. communication between professionals and management about the necessity of guidelines). Repeated incidents or the situations which were stated as continuing for a long period of time [IR6] were detected in 6.6% (*n* = 33) of the reports.

> *[IR6] A nurse who had come in for temporary work was previously unfamiliar with the patient and the situation at the ward. There was not enough time or opportunity to check the patients' medications on a computer before dinner time. Many new surgical patients had come in from an operating room, there were a lot of concerned family members at the ward, the phone kept ringing, and many restless patients were taking up the nurses' time… no idea what had happened to the tray card… A severe or often reoccurring problem" (Marevan was missing from the medication card)*

Cases linked with missing or false equipment (3.4%; *n* = 17; i.e. logistic communication) were detected seldom.

Environmental or issues of circumstance [IR7] in medication care also had some effect on communication. The most frequent issues were rushing (20.8%; *n* = 104), and the more rare issues were interruption of work (7.4%; *n* = 37) and look-alike-sound-alike (LASA) [IR8] medications (4.8%; *n* = 24; Supplement S3):

> *[IR7]During the night shift, the patient was treated by a nurse working a temporary shift unfamiliar with the used filing system… Transferring papers from one file to another (several papers, several files!) as patients change rooms poses a risk! This is complicated by the fact that nurses carry the files with them: the computers they use for work and printing are located in three different spaces and, as a result, the nurses may take the files with them to a number of places during the day.*

> *[IR8]The patient was supposed to get Octaplex 1500 IU (3 doses) pre-surgery but was given Octaplas 3 units (3 bags of fresh frozen plasma) instead… Was probably*

*given the wrong drug agent because of the similarity of the names.*

Both blaming (0.2%; *n* = 1) and discouraging body language or fear of authority (0.8%; *n* = 4) hardly existed.

### 4.2.4 | Process and structural issues in medication incidents

The process and structural issues were presented under the following titles: (a) situation, (b) process phase, (c) methods and channels, (d) tasks and (c) challenges with all of these. The most common process issues in communication were related to the documentation phase of medication care (25.8%; *n* = 129) or prescribing medication (18.8%; *n* = 94). The least common process issues were communication about delivery or storing of medication (0.4%; *n* = 2). Among the structural issues, incidents were more linked to a situation where communication was lacking (50%; *n* = 250), than to a situation where information had been communicated falsely or insufficiently (35.0%; *n* = 175). Patients' transfer [IR9] between the units was detected in over one quarter (26.2%; *n* = 131) of cases, and shift change was detected in a fifth of the cases (20.6%; *n* = 103):

*[IR9] A doctor in the emergency services had prescribed a single dose of Prednisolon 40mg in the Miranda system at 16.20. This prescription had not been followed at the emergency unit. The patient was transferred to the ward, where this prescription continued to not be followed… This meant that starting the medication was postponed by over 12 hours. It is not known whether a nurse at the emergency unit reported to the ward that this medication has not been given when admitting the patient to the ward by telephone.*

The most frequent communication method in incident reports was digital (68.2%; *n* = 341), mentioned in three quarters of the reports, followed by verbal communication, which was mentioned in half of the incidents (49.6%; *n* = 248; Figure 3). Transferring a medication prescription between documents [IR10] had been incorrect or lacking in more than a quarter of the cases (28.2%; *n* = 141). Printed medication charts (26.8%; *n* = 134) were involved in a quarter of the cases and were usually linked to digital prescriptions:

*[IR10]A doctor had recorded the information in the patient's list of medications by hand, resulting in the information missing on the computer, and a failure to include the change on the patient's tray card. As a result, the patient was not given the medication until today when this error was spotted during doctor's rounds.*

The least common issues of communication methods were illegible handwriting, phone calls, Post-it memos and labels of added medication. Identification wristband and nonverbal communication as communication types were detected in few single cases (Supplement S3).

The most common task-related issue was linked to assumptions of colleagues' work process [IR11] (25.6%; *n* = 128) between professional groups, between temporary and permanent staff, and between permanent staff in the same professional group:

*[IR11]The nurse treating the patient in the morning was someone 'green' to this ward and the practices used at the ward. The nurse thought that the night nurse gives patients their morning insulin. The nurse in charge of medication was sure that insulin had not been given as is usually the case.*

Regarding challenges, the most common issue was the misleading digital unit-dose system [IR12], which was recognised in under a 10th of the cases (8.8%; *n* = 44).

*[IR12] The time of giving medication was reported as 19 o'clock in the electronic system. This was given as 8:00 on the medication card on paper. It is possible that the patient has not been given the medication on several days or, in the worst case, they may have been given the medication twice during the same day.*

Issues concerning confusion about the person responsible for notes (3.8%; *n* = 19), or missing communication about discharge timing were not common.

### 4.2.5 | Medication prescription-related issues in medication incidents

Communication regarding prescriptions within the team [IR13] was a major issue among incident reports (38.8%; *n* = 194). In nearly a fifth of the prescription-related incidents, physician did not give instructions (24.2%; *n* = 121). Prescriptions not being read (23.2%; *n* = 116; Figure 3), or a prescription being misunderstood were equally common (17.2%; *n* = 86). In 14.4% (*n* = 72) of cases, a physician had not been informed of the fact that his or her written prescription was not actually implemented, that it was implemented incorrectly, or that the prescription was modified when implemented (Supplement S3):

*[IR13] It was noticed that the patient had been prescribed Klexane injection treatment on the evening of the surgery. The treatment plan (patient record) for the day of the surgery included no mention of this, and this medication had also not been included in the medication section*

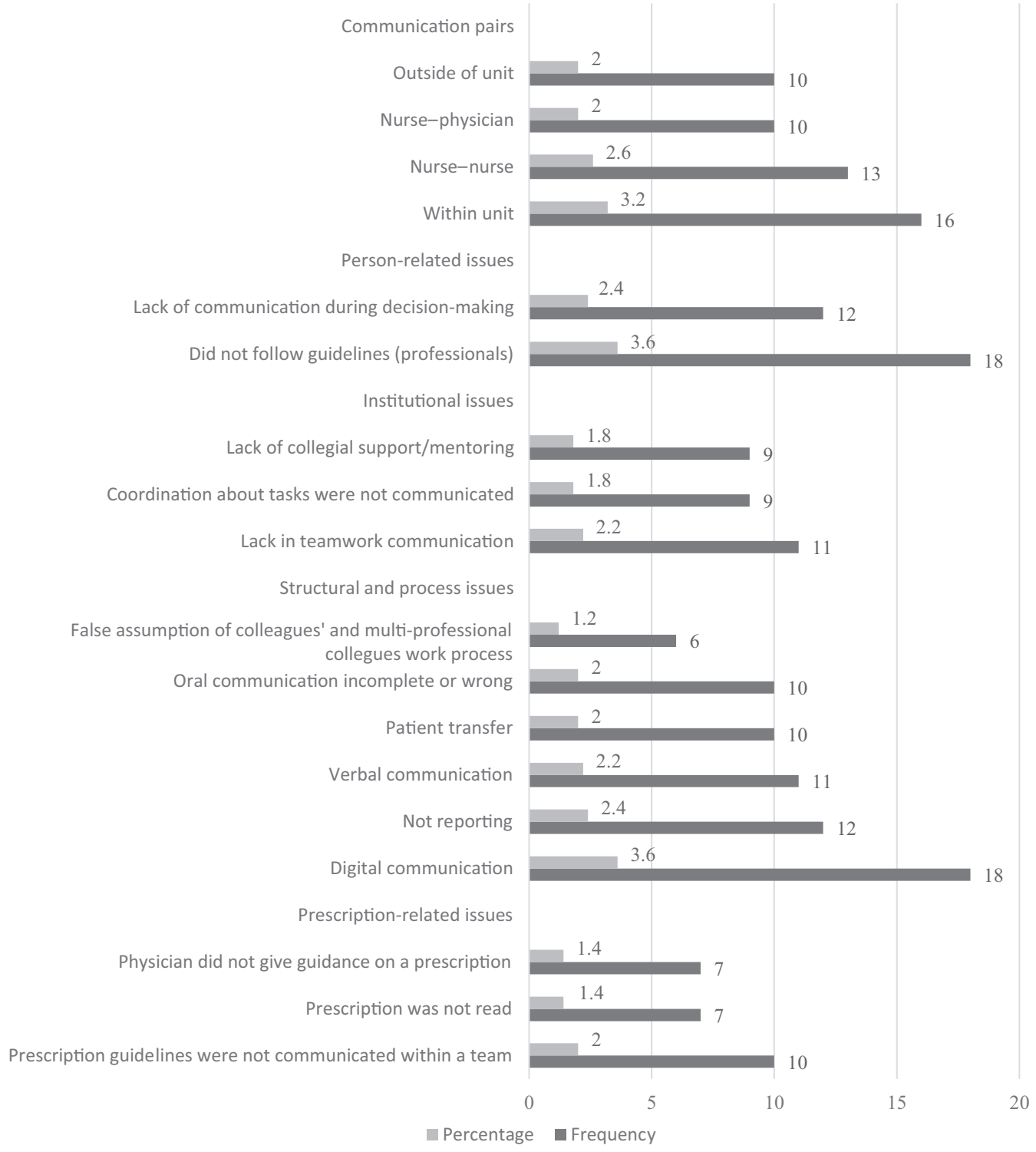


**FIGURE 4** Frequencies and percentages of moderate harm cases linked to a communication issue ($n$ = 500)

*of the patient's files… The operative report was still unavailable during the night shift, which means that it was also impossible to notice the Klexane prescription there.*

Delayed answer from a physician was observed in 9.2% ($n$ = 46) of the reports, and lacking communication about patients' response to prescribed and given medication was not often documented (0.6%; $n$ = 3).

### 4.3 | Caused harm linked with communication issues in incident reports

The medication incident reports having communication as a contributing factor did not cause harm in most cases (62.4%; $n$ = 312). During the research process, it was common for several communication issues to be present in a single incident report.

Serious harm was caused in only one case (0.2%), in which several professionals were involved within one unit. Identified issues were nurse–nurse and nurse–physician communication pairs, not following guidelines, not complete documentation, lacking verbal and digital communication, lacking communication during decision-making and not reporting response to medication.

Moderate harm cases were most often linked with structural and process issues, or professional-related issues (Figure 4). Digital (3.6%; *n* = 18) or incomplete verbal (2%; *n* = 10) communication cases were the most frequent structural issues linked with moderate harm to a patient. Issues related to professionals, such as not following the guidelines, were among the major issues linked to moderate harm (3.6%; *n* = 18). As for communication pairs, the highest frequency of moderate actual harm incidents (Figure 5) took place within the same unit (3.2%; *n* = 16).

The most common institutional issues associated with moderate harm were not-optimal team communication (2.2%; *n* = 11) and lack of task coordination (1.8%; *n* = 9). The most frequent, although rare, situations causing moderate harm were patient transfers between units (2%; *n* = 10), or when a prescription was transferred between documents (1.6%; *n* = 8).

In prescription-related issues, moderate harm to a patient was caused mainly when a prescription was not communicated within the team (2%; *n* = 10), the physician did not give instructions for a prescription (1.8%; *n* = 9), or prescription was not read (1.4%; *n* = 7).

Although strongly marginal, the relatively highest proportions of moderate harm cases were linked with the nurse–pharmacist pair (0.2%; *n* = 1; 1 case out of 6), nurse–patient (1.2%; *n* = 6; 6 cases out of 48) and primary healthcare–tertiary healthcare pairs (0.4%; *n* = 2; 2 cases out of 17; Supplement S3; Figure 5). Patient-related issues were mostly classified as causing no harm to patients; however, odd cases of moderate harm were linked with lacking communication with patient or patient identification.

Among longstanding issues or repeated incidents, actual moderate harm was low (0.4%; *n* = 2). Regarding environmental and circumstances issues, harm was most linked with rushing (0.8%; *n* = 4). One case of blaming atmosphere (0.2%; *n* = 1) and discouraging body language (0.2%; *n* = 1) were marked was causing moderate harm and happened in an on-call situation. No moderate harm cases concerning LASA products (0%) were detected.

## 5 | DISCUSSION

The aim of our study was to identify types and frequencies of communication issues (communication pairs, person related, institutional, structural, process and prescription-related issues) detected in medication incident reports, and to compare cases that were reported as causing serious or moderate harm to patients. We confirmed most of the communication issues identified in previous literature and managed to distinguish the most frequent and most serious harm-causing communication issues. Our study contributes to Manias' (2010) and Lawton, McEachan, et al. (2012) enquiry of measuring communication factors.

To our knowledge, there are currently no studies providing a detailed selection and frequencies of medication communication pairs and their relation to medication incidents. We detected 28 communication pairs. Surprisingly, the majority of the communication

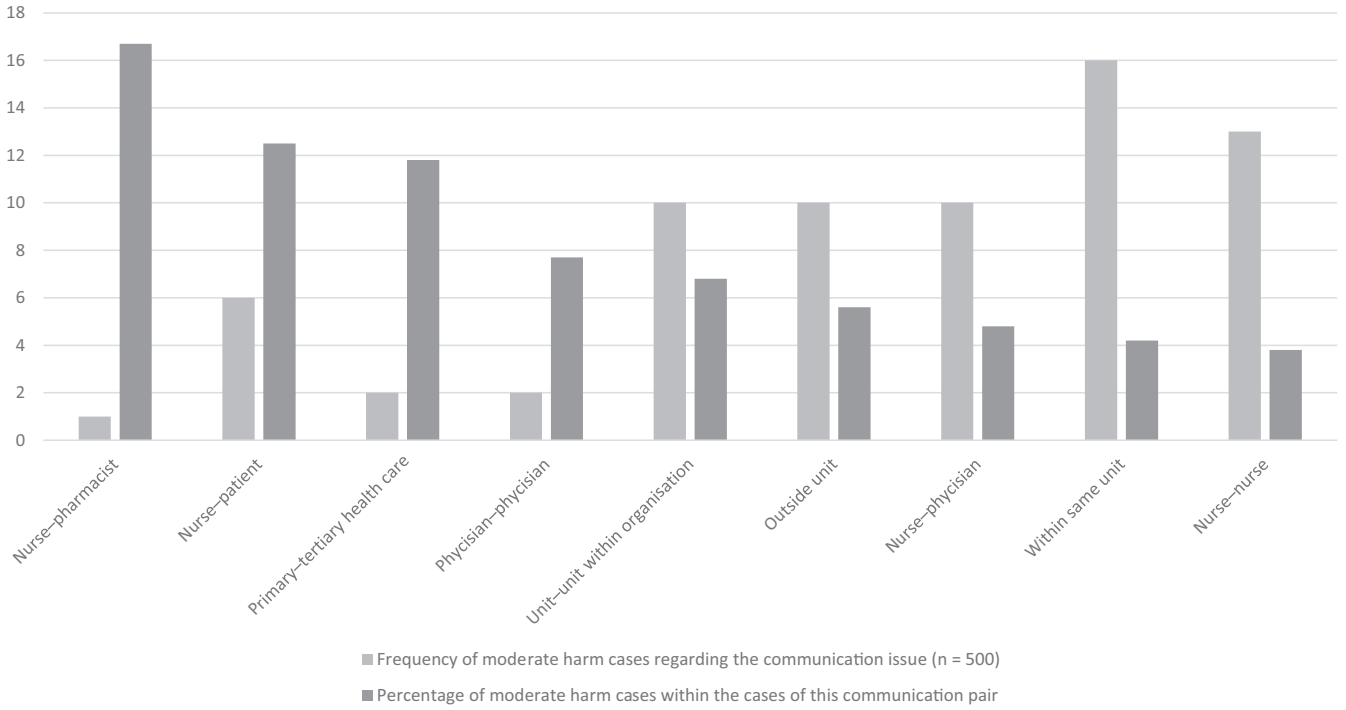


**FIGURE 5** Frequencies of moderate harm cases per communication pair and percentage of moderate harm cases of all cases concerning each communication pair

pairs were within the same unit, whereas previous literature states that most medication errors occur during the transition phase (Gracie, Randall, & Alexander, 2014;Petersen et al., 2018;Tobiano et al., 2019). Even if our study revealed that patient transfers between units were the most common scenarios in which communication errors occurred, the number of cases between organisations (primary-tertiary healthcare units) was low. It might be due to the fact that incident-reporting systems have been used since 2007 in Finland, but cross-organisational incident reporting is only a very recent development. The real incident number involving primary care might be higher, as Gracie et al. (2014) observed that under half of hospital discharge summaries were accurate concerning medication. Schepel et al. (2019) detected that nearly all patients admitted to hospital in Finland had discrepancies in their medication. Thus, attention must be paid to the communication pairs between units within the same organisation, but also between primary- and tertiary-care units.

Person-related communication issues involving patients or family members were rare (5%). However, most of them were preventing incidents. The number of reports in which patients or family members alerted about an error was higher (8%–15%) in previous studies (Manias, Kinney, Cranswick & Williams 2014; Manias, Cranswick, et al., 2019). Our findings mirror previous evidence (Braaf, Riley, & Manias, 2015b; Keers et al., 2018; Manias, Braaf, et al., 2019; Tobiano et al., 2018, Tobiano et al., 2019) in which patients and family members are vigilant co-operators and should be further encouraged to communicate. Unfortunately, previous studies have revealed that professionals are not involving patients in medication communication as much as they could (Theys et al., 2019). Nurses prefer communication with professionals compared to the family or patient (Manias, 2015). Professionals need to be further informed about the advantages of patient engagement. New methods of patient involvement should be developed in co-operation with clinicians in order to maximise willingness to implement them.

Our study echoes Parry et al.'s (2015) findings that sociocultural (i.e. demographic) characteristics of patients contribute very little to medication incidents. This result might illustrate a good conduct of equality by professionals during medication communication with patients. However, homogenous cultural characteristics in Finland might skew the results.

Professional-related communication issues were most often linked to "not following guidelines," which is in line with previous evidence (Härkänen, Saano, & Vehvilainen-Julkunen, 2017; Karttunen, Sneck, Jokelainen, Männikkö, & Elo, 2019; Keers et al., 2018). Not following guidelines were strongly linked with lacking work orientation or professionals being not informed about guidelines as was stated similarly by Härkänen et al. (2017) and Karttunen et al. (2020). The third reason could be that expectations for following the guidelines were insufficiently communicated (Keers et al., 2018;Yu et al., 2018). These issues would be beneficial to discuss at the unit and organisation levels to clarify the cascading process of new and existing guidelines. Communication conducted by managers plays a crucial role in preventing medication incidents.

Contrary to previously reported language barriers in health care between professionals (Ali & Johnson, 2017;Hull, 2016), or between professionals and patients (van Rosse, Bruijne, Suurmond, Essink-Bot, & Wagner, 2016), such barriers were hardly detected in our study. We did not detect communication challenges related to handwriting, abbreviations or slang language which have been mentioned in several studies according to Härkänen et al. (2017). This may be because of the low migrant population, standardised and regulated qualifications, and high digitalisation in the focus country. However, proactive actions would be beneficial in mitigating language challenges in the future, as global migration is increasing.

Institutional issues were in line with previous studies. Communication about teamwork and the division of tasks between professionals were lacking (Keers et al., 2018) and mostly occurring within the same unit. Lack of collegial support or mentoring appeared during heavy workload or during working with new or unexperienced colleagues. When supportive communication and open atmosphere were detected in our study, it often mitigated incidents. Strengthening collegial support, mentoring and general communication between organisational levels about skill requirements and workload would be beneficial (Härkänen et al., 2017). Repeated or persistently continuing incidents, as indirect communication issues, were seen as cases of "silent acceptance of errors" (i.e. knowingly not solving a longstanding problem). Longstanding incident types, however, should be solved, as Vrbnjaka, Denieffeb, O'Gormanb, and Pajnkiharc (2016) presented evidence that active response to reporting supports tendency to submit incident reports in the future.

We found several structural and process issues in our study. Incidents were most linked to cases in which communication or information flow was partly lacking. Categorical data indicated that, in only a minor number of cases, information was not transferred at all. These results indicate challenges in the mere communication process between the sender and the receiver, or in the standardisation of communication content (Karttunen et al., 2020).

As previous studies have shown (Braaf, Rixon, et al., 2015), the most common communication situations were patient transfer and shift handover, and the most frequent challenging communication method was digital communication combined with information transfer between digital and other documents (Keers et al., 2013). Our results also support conclusions stated by Redley and Botti (2013) that total digitalisation in medication management might decrease breakdown challenges in inter-professional communication. However, according to Braaf, Riley, et al. (2015) study, verbal enforcement about digital prescriptions is still needed, as failures in medication communication were linked with limited access to documents. However, in our study, the frequent reasons for communication delay were found more in the false assumption of colleagues` work processes (26%) and lack of task coordination than technical access barriers (5.2%). Similar to our findings, Borrott et al. (2017) reported nurses' frustration in the lack of verbal enforcement of changed digital prescriptions. To avoid delays in the implementation of prescriptions in the future, enforced verbal communication is needed, especially outside the ward round

periods (Borrott et al., 2017). The importance of verbal enforcement was verified by the results of Härkänen et al.'s study (2018) about medication administration errors and mortality, in which omission or delay of medication was the most common issue causing fatal incidents.

Fortunately, incidents linked with communication issues causing severe and moderate harm were rare (≤3.6% of all cases related to communication issues), which is consistent with previous studies (Lyons et al., 2018). The most frequent moderate harm cases were concerning digital communication and professionals not following the guidelines. However, we found it challenging to compare harm levels to previous studies, because of inconsistent use of the terms *potential* (risk) and *actual harm* (Gates, Baysari, Mumford, Raban, & Westbrook, 2019).

Preventive factors of medication incidents have been little studied (Härkänen et al., 2017), thus Lyons et al. (2018) are calling for new studies about medication incident prevention. As an answer, we found in our study that collegial feedback and respectful atmosphere minimises incidents. Discouraging nonverbal communication or fear of authority was marginal, which might be a signal of good collegiality (Kohn, Corrigan, & Donaldson, 2000;Rutledge et al., 2018). However, we did not find evidence of mandatory mentoring as a method used for preventing medication errors. Our results are supported by the intercultural RN4Cast study of Bruyneel, Lesaffre, Meuleman, and Sermeus (2019), where relationship between physicians and nurses in Finland was experienced good, but level of teamwork was perceived relatively low. Medication safety could be further improved by strengthening mentoring, systematic collegial feedback and supportive interprofessional communication (Bruyneel et al., 2019;Härkänen et al., 2017;Vrbnjaka et al., 2016).

## 6 | LIMITATIONS AND STRENGTHS

There were several limitations in this study. The indicator phrases were based on scientific literature, but the final decision regarding the included text excerpts and their conversion into numerical data was done through interpretation, causing risk of bias. Over 90% of the literature-based indicator phrases were identified in the analysed medication incident reports. The identified communication issues were proven by citations from the free text of incident reports. The original incident reports were numbered according to statistical unit numbers, allowing for the re-checking of the analysis. Thus, the results are only indicative and should be used cautiously until supporting evidence is available.

Most of the incident reports were submitted by nurses and physicians, which is in line with previous literature (Härkänen et al., 2017;Redley & Botti, 2013). The incident reports were submitted on a voluntary basis. Some incident types may not have been reported. Voluntarily submitted incident reports in previous literature have been estimated to cover from 0.5% (Palmero et al., 2019) to 67% (Vrbnjaka et al., 2016) of factual medication incidents. Reported near misses being minor in numbers might explain the small number of preventive issues. Potential bias is associated with the reported harm to patient, because the reports were submitted immediately after the incident. Due to the short time period, the possible final harm to patient might not been visible or might be difficult to evaluate. On the other hand, the reporters may have unintentionally marked potential harm instead of actual harm.

Convenience sampling is not a strong sampling type (Grove et al., 2013, p. 363), but we chose it for resource reasons. To facilitate bias evaluation, the background knowledge of the data was described. This research sample covers widely clinical specialties on a national level, and the reports were submitted from all hospitals in the hospital district. The size of the sample accounted for half of the total annual number of communication-related medication incident reports. The sample represents the target population, and majority of reporters were nurses and doctors, as they are employed within the organisation studied.

Ethically, it was beneficial to use register data instead of collecting data from frontline professionals.

## 7 | CONCLUSIONS

At least 28 communication pairs related to medication incidents exist in the hospital context. The pairs are most often located within the same unit, but in the most severe incident cases between units or organisations. The most frequent and most serious harm-causing communication issues were identified as follows: (a) being unaware of the most resent digital communication between professional groups, and (b) not following guidelines due to the lack of communication between clinical professionals and management. Management plays an important role in ensuring guideline compliance. Incomplete communication and false assumptions of colleagues' work process compromises teamwork. Specific communication challenges might vary between countries. Supportive communication among professionals and involving patients or families in medication communication minimises incidents and harm.

### 7.1 | Relevance and implications to clinical practice

In knowing the most frequent communication challenges and communication-promoting issues related to medication incidents, targeted interventions can be applied to enhance medication communication in clinical practice. Based on our results, interventions for medication safety improvement should be prioritised as follows: (a) enhance communication about work processes and task coordination between professionals within the same unit and between units, (b) strengthen verbal communication between professionals about recent digital prescriptions, (c) strengthen collegial feedback through standardised mentoring, and (d) encourage and involve patients and family in communication about medication care.

### 7.2 | Implication for research

Searching the contributing communication issues using the MIComHos instrument was time consuming. Future studies are required to develop practical level instruments for measuring communication issues related to medication incidents locally. A factor analysis method should be employed for simplification of the instrument in the future. Text mining as a new method would be beneficial for studying free texts written by professionals in larger samples of incident reports, and to detect communication as human factor contributing to medication errors.

### CONFLICT OF INTEREST STATEMENT

The authors have disclosed that they have no significant relationships with, or financial interest in, any commercial companies pertaining to this article.

## 9 | Publication Ethics

The national legislation and international guidance stated in the Declaration of Helsinki (WMA, 2013) were followed in this study. The Finnish Medical Research Act and Decree (488/1999) regulates medical research involving human beings and sets the framework for medical research concerning the requirement for ethical evaluation. Accordingly, ethical pre-evaluation is generally conducted by the ethics committees of hospital districts, but for this study (being a register study), it was not required, according to the Finnish National Ethics Committee (TENK, 2019, 62).

## 10 | Institutional review board

The research proposal has been reviewed by the University of Eastern Finland, and the research permission was granted by Helsinki University Hospital.

### AUTHOR CONTRIBUTIONS

This is all those who: (a) made a substantial contribution to the concept and design, acquisition of data or analysis and interpretation of data (TS, KV-J, MH). (b) TS drafted the article and KV-J, MH commented and revised it critically for important intellectual content. (c) Approved the version to be published (TS, KV-J, MH). (d) Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved (TS, KV-J, MH).

### ORCID

*Tiina Syyrilä* https://orcid.org/0000-0001-5351-4468
*Katri Vehviläinen-Julkunen* https://orcid.org/0000-0002-6828-8261
*Marja Härkänen* https://orcid.org/0000-0001-8542-8193

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## SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

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