



# Weak Professional Interactions as main Cause of Medication Errors in Intensive Care Units in Iran

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## Abstract

**Background:** The goal of healthcare professionals is to provide safe care, prevent injury, and promote the health of patients. Different factors and conditions, in particular, medication errors, may threaten patient safety.

**Objectives:** This study was conducted to explore and to describe the role of interactions among healthcare professionals regarding medication errors in intensive care units.

**Methods:** The study was conducted using a descriptive qualitative method in 2016. The participants were purposively chosen. Data were collected by semi-structured interviews and used qualitative content analysis for the analysis. The setting of the study included 16 internal, surgical, poisoning, and cardiac intensive care units of 7 educational hospitals affiliated to Isfahan University of Medical Sciences located in central Iran with a total of 190 beds. Participants included 19 members of the healthcare team (physician, nurse and clinical pharmacist) with at least 1 year of work experience in intensive care units.

**Results:** The main category and 3 sub-categories were extracted from interviews. The 3 sub-categories were: "weak interprofessional interaction (physician and nurse)", "weak intraprofessional interaction (among physicians)", and "weak interaction of physician as well as nurse with the patient and family".

**Conclusions:** The findings suggest that medication errors may occur due to lack of interprofessional collaboration and weak communication of the healthcare team with the patient and his family. The collaboration between healthcare providers and communication with patients directly had an impact on patient outcomes. To improve the quality and safety of care delivery, healthcare center managers need to promote interprofessional collaboration, the participation of patient and family in care plan, interprofessional development, and implementation of programs to prevent as well as reduce medication errors in intensive care units.

**Keywords:** Patient Safety, Medication Errors, Intensive Care Units, Communication, Nurse, Physician, Qualitative Research

## 1. Background

The quality of care provided by healthcare centers has a substantial impact on the outcome of patients (1). Patient safety has been in the spotlight since the release of the Institute of Medicine's report on prevalence of medical errors (2). Patient safety is the prevention and reduction of adverse outcomes or injuries arising from the processes of healthcare (3). Among patient safety issues such as patient identification, transfusion error, and falls, medication safety has been considered as a major indicator of healthcare quality (4). Medication error refers to any preventable event at each stage of pharmacotherapy process, such as prescription, transcription, distributing medication, and administration (5), which can lead to improper

use of medicines or harm to patients (6).

In intensive care units (ICUs), on average, patients are exposed to 1.7 errors per day and medication errors account for 78% of serious medical errors (7). Detailed statistics of medical errors is not available in Iran (8), however, the results of studies indicate an increase in complaints of patients due to medical errors, leading to serious complications and even death (9). In a survey carried out by Farzi et al. (2015) to examine the rate of medication errors in ICUs, 80% of participants reported the occurrence of at least one medication error per month (10).

A different combination of treatments and healthcare providers in ICUs leads to incidents involving patient harm or risk of harm (near-misses); however, these errors are often preventable and multidisciplinary (11). Interpro-

professional collaboration (IPC) is seen as crucial to healthcare providers and patients, through which members of the health team operate to achieve an outcome in coordination with each other (12). The health team members need consistent and detailed information regarding the patient's condition, proper analysis, considering possible choices, related consequences, and finally the adoption of the proper decision. This process may not be possible alone and without group participation of healthcare team (1).

As most of the hospitalized patients in ICUs have numerous health problems and functional disorders affecting different organs, providing a consistent and safe care requires collaboration between members of the healthcare team including physicians and nurses. However, research conducted in patient safety represents the occurrence of serious incidents due to lack of IPC (13) so that 70% of the patients who suffered adverse events reported lack of cooperation and communication between the members of the health team as the main cause of error (12). Due to the complex and stressful nature of the ICUs and the necessity of providing interprofessional care in this unit (1, 14), improving patient safety requires participation and commitment of all members of the healthcare team (15). As studies indicate, communication and collaboration plays a major role in the provision of safe care and its interruption threatens patient safety.

## 2. Methods

### 2.1. Aim

The aim of the present study was to explore and describe the role of interactions among healthcare professionals regarding medication errors in ICUs.

### 2.2. Design

This manuscript presents the findings from part of a dissertation. The larger study employed a sequential mixed methods design to develop an interprofessional program to prevent and to reduce medication errors in ICUs. To achieve such an aim, firstly, healthcare professionals' experiences and perceptions about causes of medication errors were examined through a descriptive qualitative method. The goal of qualitative descriptive studies is to provide a comprehensive summary regarding everyday events. These studies are less interpretive than other qualitative approaches, such as ones based on phenomenological or grounded theory (16).

### 2.3. Sample

The setting of the study included 16 internal, surgical, poisoning, burn, and cardiac ICUs of 7 educational hospitals affiliated to the Isfahan University of Medical Sciences (IUMS) (Isfahan city), located in central Iran, with a total of 190 beds. Participants of the study were selected from among the physicians, nurses, and clinical pharmacists, at least 1 year of work experience in ICUs, and interested in participating in the study. Therefore, the exclusion criteria included unwillingness to participate in the study and work experience less than 1 year. Participants were selected using purposeful sampling method. In purposive sampling, researchers deliberately select participants using 2 criteria: the fit between their experience and the research questions as well as the characteristics of being a "good informant" (17). Sampling was performed with maximum variation by considering the characteristics of participants regarding age, gender, work experience, job status, education, their perspectives, and experiences.

### 2.4. Data Collection

The data were collected from September to October 2016 using in-depth and semi-structured individual interviews with the participants. All the interviews were conducted in a private room at the hospital or nursing faculty. The time and place of the interview was determined with the participants' consent. The interviews were in-depth, semi-structured, began with general questions, and continued with main research questions, including:

"As a physician how do you define your communication with different medical specialties in intensive care units?"

"Does this type of communication play a role in the occurrence of medication errors? If yes, how you describe it?"

"Is there cohesion and collaboration between provided cares? If yes, how much and how are these cohesions and cooperation take place?"

"How is your communication as a nurse with physicians in intensive care units? Does this type of communication play any role in the occurrence of medication errors? If yes, how it affect patient care?"

"Could you explain more?"

After written consent of the participants, all interviews were conducted and recorded by one of the researchers (SF). She is a PhD Candidate of Nursing with over 10 years of clinical experience as a fulltime intensive care nurse. The interviews lasted from 30 to 60 minutes with a mean duration of 45 minutes. Selection of participants and data analysis continued to reach a saturation point where no new concept emerges from data analysis. Data saturation refers

to the repetition of discovered information and confirmation of previously collected data (18). Sampling stops when no new information and categories were obtained (17).

### 2.5. Data Analysis

This study employed the qualitative content analysis method of Graneheim and Lundman for data analysis (19). The interviews were transcribed verbatim into Microsoft Word 2007 by (SF) followed by capturing the participants' perceptions. First, SF independently selected all meaning units (sentences or paragraphs extracted from the participants' statements) and condensed the meaning units of 3 selected manuscripts (1 physician, 1 nurse, 1 clinical pharmacist). After that, the authors discussed the meaning units; after resolving discrepancies, SF extracted the condensed meaning units from the remaining transcripts and reviewed them with AI and MS. Subsequently, SF, AI, and MS assigned codes to the condensed meaning units, reflecting the participants' words in a more abstract manner. Finally, similar codes grouped into comprehensive subcategories and category using an inductive process involving constant comparison, reflection, and interpretation by SF.

### 2.6. Data Rigor

The researchers undertook a number of procedures to ensure rigor and trustworthiness. This study employed conformability, credibility, dependability, and transferability to achieve the various aspects of rigor indicated by Guba (20). To enhance the conformability and to facilitate audit, detailed information explicitly expressed for different stages of data gathering, analysis, and inference. To obtain the credibility, information approval by peer debriefing and reviews of the data, codes, sub-categories, and main category was necessary. The extracted codes and results were retrieved and shared with the participants to validate the congruency of the codes with their experiences. Dependability was achieved by engaging more than 1 researcher in the data analysis (SF, AI and MS). Recruiting participants with different demographic characteristics enhanced transferability of the findings.

### 2.7. Ethical Considerations

Ethics committee of Isfahan University of Medical Sciences approved the study (IR.REC.1395.3.267). Verbal and written informed consent was obtained from the participants. After the introduction of the researcher and stating the importance and the objectives of the study, the allowance of participants to interview was obtained. Participants confided that the information would remain confidential. We used numeric codes in place of personal names to secure the confidentiality of the interviews. The participants were free to withdraw from the study anytime.

## 3. Results

Participants in this study included 19 members of the healthcare team (nurse: 68.43%, physician: 26.32%, and clinical pharmacist: 5.26%). Most participants were females (57.9%). Means and ranges of age and work experience of participants were 38 (56 - 25) and 11 (28 - 2) years, respectively. Other demographic characteristics of the participants and their working conditions are presented in Table 1. A total of 100 codes were extracted from the interviews after eliminating the repetitive and integrating the similar codes. After analyzing the interviews, main category and 3 subcategories emerged (Table 2).

### 3.1. Weak Interprofessional Interaction (Physician and Nurse)

The experiences of participants reflect the lack of communication and the collaboration between physicians and nurses in ICUs. The participants believed that some physicians do not provide adequate information for nurses when visiting patients and that there is no fair exchange of information between the physician and nurse. The inappropriate reaction of physicians toward the question of nurses to clarify the medication orders provides the conditions for the occurrence of multiple medication errors at the prescription, transcription, and even giving the wrong medication.

One of the nurses said: "...The handwritings of the physicians are illegible, and we doubt what they mean, if we ask them, they become angry and think we are careless. Thus, we do our best to decode their handwritings, but we make mistakes most of the time...". (p<sub>1</sub>)

Also, physicians' avoidance of communication with novice nurses in educational hospitals leads to reduced self-esteem, a detachment of nurses from attending at clinical rounds, visiting the patients, and the exchange of information. In this regard, one of the nurses stated: "...novice nurses have no willingness to visit with physicians due to weak confidence because physicians do not ask their opinion or ignore them if being asked. Physician says that this nurse is a novice and pays no attention to views and information that he/she provides, which usually is not the case. The novice night-shift nurse has been in patient's bedside until the morning and well knows the effects of the medication and the patient's reactions to the drug, so he/she is the best source of information if asked for his/her view...". (p<sub>18</sub>)

Lack of active participation of nurses while visiting patients by physicians is another aspect of the weak interaction between healthcare team members. In this regard, one of the physicians stated: "... many of physicians, especially in educational hospitals, do not believe in the presence of a nurse during the visit! Physician and nurse need

**Table 1.** Participants' Characteristics

Number	Gender	Age, Y	Job Status	Work Experience, Y	Education
P <sub>1</sub>	Male	32	Nurse	7	Master
P <sub>2</sub>	Female	25	Nurse	2	Bachelor
P <sub>3</sub>	Female	29	Nurse	5	Master
P <sub>4</sub>	Female	37	Nurse	11	Master
P <sub>5</sub>	Female	41	Nurse	18	Bachelor
P <sub>6</sub>	Male	56	Physician	28	Specialist
P <sub>7</sub>	Female	40	Nurse	15	Bachelor
P <sub>8</sub>	Male	27	Nurse	1	Bachelor
P <sub>9</sub>	Male	42	Physician	8	Specialist
P <sub>10</sub>	Male	52	Physician	20	Specialist
P <sub>11</sub>	Female	35	Nurse	11	Bachelor
P <sub>12</sub>	Female	34	Nurse	10	Bachelor
P <sub>13</sub>	Female	30	Nurse	7	Bachelor
P <sub>14</sub>	Male	42	Physician	8	Specialist
P <sub>15</sub>	Female	36	Nurse	12	Bachelor
P <sub>16</sub>	Female	36	Clinical pharmacist	3	Specialist
P <sub>17</sub>	Male	43	Physician	10	Specialist
P <sub>18</sub>	Female	37	Nurse	12	Master
P <sub>19</sub>	Female	45	Nurse	16	Master

**Table 2.** Category and Subcategories of the Role of Interactions Among Healthcare Professionals Regarding Medication Errors

Main Category	Sub-Categories
Weak professional interactions	Weak interprofessional interaction (physician and nurse)
	Weak intraprofessional interaction (among physicians)
	Weak interaction of physician and nurses with patient and family

to exchange information and to make necessary decisions on the patient. Well of course! Much of the information lost when the nurse is absent, and the physician may prescribe the wrong drugs...". (p<sub>14</sub>)

### 3.2. Weak Intraprofessional Interaction (Among Physicians)

In ICUs, according to the situation of the patient, physicians with different specialties visit the patients on a daily basis or as needed. Experiences of the participants show that the physician usually pays no attention to medicinal orders of each other and a lack of cohesion and collaboration between different medical specialties leads to medication interaction and prescription of duplicate or medications with opposite effects.

In this regard, one of the physicians stated: "...Neurosurgery service merely examines the medications of its

service and ignores internal service drugs that might lead to medication interactions. Most of the time, we witness medication duplication in prescriptions or two drugs that have same effects are prescribed simultaneously by two different services for one patient, leading to medication error...". (p<sub>6</sub>)

Experiences of participants also show that some medication mistakes, particularly in the stage of prescription, take place in educational hospitals where the attending physician, due to a high workload, was paying no attention to medication orders of residents. In this regard, clinical pharmacist stated that: "...in ICUs, medication error takes place at the stage of prescription and administration of drugs; I think most errors related to prescription stage. Perhaps one cause of this error is that resident comes and visits the patient and attendant does not monitor so much.

Several physicians visit the patient and begin treatments, while there is no one to make the final decision.” (p<sub>16</sub>)

### 3.3. Weak Interaction of Physician and Nurses with Patient and Family

The experiences of participants showed that some of the medication errors in ICUs are due to lack of communication between the physician, nurse, patient, and the patients' family. Many patients may use various medications at home due to several underlying diseases. With the hospitalization of these patients in ICUs and physician unawareness of his previous medications, different medication errors such as medication interactions as well as weakening or intensifying effects of the medication may occur.

In this regard, one physician stated: “... most of the time, we do not know which medications have been used so far by a patient hospitalized here, leading to a problem in the treatment process. I had trouble with the care of a patient and guessed he had a thyroid disorder, so I asked the patient's family, they said that he had used Levothyroxine for several years, and I was not aware of that. We should have a good relationship with the patient and his family to know the medications that he uses at home ...”. (p<sub>9</sub>)

Furthermore, paying less attention and obtaining incomplete history by physicians and nurses lead to a lack of detailed information from the medications utilized by the patient at home, which can result in the occurrence of medication errors in intensive care units. In this regard, one of the nurses said: “... Sometimes, physicians and nurses have no accurate history of the patient and his family, and they are unaware of his disease and the medications used by him at home, leading to medication interaction which it influences the treatment of the patient. This problem occurs most of the times...”. (p<sub>19</sub>)

## 4. Discussion

Findings of this study provide a clear understanding of weak interactions between the physician and nurse, among physicians, and between health providers and patients' family in ICUs of educational hospitals in Iran. Weak interactions among the healthcare team, lack of communication between physician and nurse, and incomplete patient history lead to the occurrence of a wide range of medication errors with possible drug interaction, duplication, synergism, and antagonism. Difficulties in the transcription stage are also another source of medication errors by nurses.

The communication between the physician and the nurse is critical, and the main objective of these 2 related professions is providing a safe and high quality care to the

patient. However, poor communication for various reasons such as the hierarchical structure of the healthcare team complicates this communication, leading to medication error and safety threat for the patient (21). The existence of any conflict and dispute between the healthcare team leads to reduced patient safety and quality of care provided (22).

Martin et al. (2010) stated that, according to the JCAHO report, communication failure between the healthcare team accounts for 60% of adverse events that have potentially harmful effects on the clinical outcome. With increasing interprofessional collaboration, these communications may improve (13). The issue of patient safety in a background of scarce human resources makes interprofessional collaboration a high priority in healthcare (23). Studies show that interprofessional collaboration faces with some challenges. Interprofessional education (IPE) can provide conditions necessary to resolve the challenges and to improve the interprofessional collaboration as well as patient care (24). Interprofessional education is an opportunity in which professionals learn to communicate effectively to improve the quality of care (25), to bring a change in attitude and perception of learners, to encourage them to adopt a holistic approach to meet the patients' needs, and to improve job satisfaction in health care team members (26).

Weak interprofessional collaboration among physicians and lack of attention to medication orders, and neglecting the patient and his family in the process of treatment cause improper medication reconciliation in ICUs. Medication reconciliation is the unintentional difference between medications taken by the patient during the patient care transfers (admission, discharge, and transfer). Unsuccessful medication reconciliation taking place in 67% of patients is mainly due to incomplete information of the medications taken by the patient and 11% to 59% of incorrect medication reconciliation cases are associated with harm to patient (27).

In teams with a high performance in healthcare, patients are members of the team, not merely as a receiver of the medical treatment. Patients are the reason for the existence of healthcare teams and in the team centered care, patients, families, and caregivers participate in the care team (28). Obtaining the patients' drug history from them, their families, or caregivers, the healthcare team can avoid medication interactions or duplications. Therefore, medication reconciliation is a useful tool that requires serious attention by the healthcare team to prevent harmful medication events (27). Active involvement and effective participation of patients and their families in the process of medication reconciliation is the key strategy to reduce prescribing errors, therefore, preventing any harm to the patient.



The physician and nurse should obtain an accurate and timely medical history of the patient, family, or caregiver to be aware of the medication taken by the patient at the time before admission so that they are integrated correctly with the medication prescribed currently. Also, the healthcare team should have access to computerized medical records of the patients for successful medication reconciliation, thus, being able to obtain the required information at any time and place. However, in Iran, the medical records are paper-based, which causes the separation of the information between the current conditions and previous conditions of the patient, including medications taken by patients. As computerized medical records are among the necessities in improving patient safety (29) and to provide a coherent, coordinated, and safe care, technology should be applied and considered by health managers and policy makers.

#### 4.1. Research Limitation

Though it is the nature of qualitative studies, one of the limitations of this study is the low number of participants that may reduce its generalization to different places. The lack of interviews with the patients and families are other limitations of the present study. The reason why we did not conduct such interviews was the overall unpleasant atmosphere against the healthcare team. As compensation, it was tried to obtain required information from physicians, nurses, and clinical pharmacist.

#### 4.2. Conclusion

Communication problems, weak interactions among members of the healthcare team, and absence of proper information exchange, such as lack of access to patient historical data, cause the occurrence of medication errors, which threaten patient safety in ICUs. Therefore, strategies to increase interprofessional collaboration and the use of computerized medical records/prescription while considering the professional, behavioral, cultural, and organizational requirements can play a major role in solving these problems, preventing and reducing the medication errors, as well as promoting the patient safety.

#### 4.3. Implication for Health Policy/ Practice/ Research/ Medical Education

The results of the present study can help improve patient safety in ICUs, through encouraging healthcare professionals to maintain and establish a professional interaction and participation of patients and their families in the care plan. This study can help to plan interprofessional programs for health policymakers to prevent and reduce medication errors.

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## Footnotes

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