Research Article

Frequency of Recovered Orders at the Cardiac Care Unit

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Abstract

Background: Patients' safety is one of the basic concepts in health care systems and one of the major concerns of patient care. Medical errors are amongst the main factors that could threat patients' safety. At intensive care units, there is always the possibility of errors during various stages such as the ordering stage.

Objectives: The aim of this study was to determine the frequency of pharmacological and non-pharmacological recovered orders at intensive care units and its associated issues.

Patients and Methods: This study was a cross-sectional study based on pharmacological and non-pharmacological orders obtained from patients' records and daily record sheets at the intensive care units of Mazandaran heart center during year 2015. All orders from patients' records (n = 1046), which included 29214 orders, were reviewed during a three-month period. Data was collected using a researcher-made checklist and included patients' demographic information and a medical checklist on the patients' conditions, name of the person who had recorded the order and the person who had discovered the recovered order, type of recovered pharmacological and non pharmacological orders and related factors. To analyze the data, statistical tests such as mean and relative frequency, contingency parts and chi-square test were applied using the SPSS 19 software.

Results: A total of 29214 pharmacological and non pharmacological orders, written in 1046 patients' records of six coronary care units were investigated. We found that 150 (0.5%) recovered orders were documented. The results showed a significant relationship between the academic year of medical assistants and the recovered orders ($K_2 = 88.619$, P < 0.05); most orders were recovered by second-year assistants.

Conclusions: According to this study, it is necessary to define a procedure for careful review of pharmacological and non pharmacological orders. In addition, it is recommended to use clinical pharmacologists and expert critical care nurses to allow the possibility of discovering wrong orders before putting them into practice.

Keywords: Pharmacological Recovered Orders, Non-Pharmacological Recovered Orders, Coronary Care Units (CCU)

1. Background

Maintaining patient's safety is one of the basic concepts in health care systems; managers and staff's efforts are very important in this regard (1-3). Medical errors obviously influence patients' safety (1). Despite all the efforts, medical errors are inevitable and according to investigations, they are still happening in the current health system (4, 5). Committing an error is an integral part of the human life. All the staff of health care teams, regardless of their skills, commitment and accuracy, may commit an error in performing professional tasks (4). Among different hospital wards, intensive care units are preventable in terms of human errors and inappropriate events are more considered in the health care system of these wards (6). One of the errors at intensive care units is pharmacological and non-pharmacological orders that are issued and

written, but are recovered before or after performance (7, 8). Some recovered orders are in fact among errors that will harm the patients in the case they are not recovered (8). Errors resulting from false orders and medical errors are the eighth common cause of patients' death in the US (4). Annually, 44 to 98 thousand patients are dying due to mistakes and errors in the US (9-12). Also statistics have shown that the number of deaths resulting from pharmacological and non-pharmacological errors are more than the number of deaths due to motorcycle accidents, breast cancer, Human Immunodeficiency Virus (HIV), poisoning and drowning (3, 13). According to the achieved results, from 4% to 17.7% of patients in the world are affected by adverse consequences arising from pharmacological and non-pharmacological errors (5). Costs of pharmacological and non-pharmacological errors have been reported as

17 - 29 billion dollars (12-14); such costs are for compensation of adverse events resulting from pharmacological and non-pharmacological errors (9). The World Health Organization (WHO) has reported in 2009 that there are 10 million cases of morbidity or mortality due to unsafe health services around the globe (15). In addition, since medical unwanted errors affect one in every ten patients throughout the world, WHO has referred to it as endemic. Also a patients' safety national organization has recently provided some guidelines with the aim of promoting patients' safety (16). There is increased risk of committing errors at intensive care units during different stages of treatment such as writing orders; this is due to the nature of such wards such as appearance of emergency and critical situations, variety of medications and medication orders, different methods of drug delivery to patients, critically ill patients and their need for accurate care at all times (3, 17-19). Studies have shown that other factors such as the number of admissions, prescriber's work-load and their knowledge, are also effective factors on the occurrence of wrong orders (20-22). These recovered orders may be in the form of pharmacological recovered orders such as prescribing wrong drugs or non-pharmacological recovered orders such as diagnostic errors (7, 23, 24). Nowadays, to reduce the incidence of errors, they have been used as an index for determining the level of patients' safety in hospitals (3). Results of studies have shown that errors are common at intensive care units (25) and there are 1.7 cases of pharmacological and non-pharmacological errors every day (17). Death and patient's critical condition are the adverse consequences of not recovering mistakes and pharmacological and non-pharmacological errors (7, 8). According to the available statistics, the outcomes due to pharmacological and non-pharmacological errors do not only harm the patients, but also cause physical and mental stress for the health care staff, patients' relatives, and even the society and reduce patients' satisfaction and trust (26, 27). Most studies regarding medical errors and their related factors (24, 28) have shown that nurses, doctors, clinical pharmacists and even the patients themselves play effective roles in recovering pharmacological and non-pharmacological errors and preventing their complications (7, 24). According to the available statistics, nurses are the first treatment and care force; they have an important role in the improvement procedure of critically ill patients that need careful and constant care. This is due to their constant presence at intensive care units. Therefore, nurses play an important role in performing duties related to patients' safety. The recovered orders can indicate the possibility of committing errors. Recovered errors show us how to prevent errors that can harm patients in the future. Therefore, studying errors and recovered orders are important.

2. Objectives

This study was designed and performed with the aim of determining the frequency of pharmacological and non-pharmacological recovered orders at the CCU to assess the frequency of recovered orders and to identify their related factors.

3. Patients and Methods

This study was a descriptive-analytical research that was done to determine the frequency of pharmacological and non-pharmacological recovered orders and their related factors at the CCUs of Mazandaran heart center during years 2014 to 2015. The research environment included six CCUs (heart surgery and CCU) of Mazandaran heart center. For performing the study, referred to the related center with a referral letter from their education provider and started the study after obtaining permission from the center manager. The orders available in the patient files and the recording sheet about the daily situation of the patients were assessed for three months through a census method in terms of frequency of pharmacological and non-pharmacological recovered orders and their related factors. Also the medical staffs (patient's doctor, the doctor in charge of the ward, assistants, nurses and head nurses) were the information source. The researcher assured the participants that all their information will be confidential. Two researcher-made checklists, which were designed by collecting texts and lecturers' views, were used as a tool for collecting data. Some questions were answered by observing the files and the record sheet of the patients' daily condition and some others were answered through interview and interaction with the order discoverer and issuer. Demographic and clinical features of the patients, the orders discoverer and issuer were collected in the first checklist. Nine questions were on demographic and clinical features of the patients including; age, gender, type of diagnosis and hospitalization ward, shift, day and duration and the number of pharmacological and non-pharmacological orders. The eight questions about demographic features of the order's issuer included; age, gender, type of expertise, education level, assistant's academic year, work experience, work experience at the current ward and the way of ordering. Also, this checklist included six questions on demographic features of the discoverer regarding age, gender, education level, job responsibilities, work experience at other wards and work experience at the current ward. Information on pharmacological and non-pharmacological

recovered orders and their related factors at the CCU were written in the second part of this checklist and included 11 questions. pharmacological errors, name of the pharmacological group, changes in the recovered pharmacological orders, cause of wrong order, discovering the recovered orders before administration, working shift when the recovered order was issued and causes that led to the discovery of recovered orders. Checklists were prepared and given to 10 faculty members, specialists in heart surgery, heart, intensive care and nursing to investigate the validity, and their reforms were considered in the checklists. Also intra-observer agreement coefficient (kappa) was used for determining the tools reliability. The achieved agreement coefficient was reported over 0.7, which indicated the reliability of the tool. The researcher attended the research location during three work shifts of morning, evening and night and assessed the issued orders in the file and the recording sheet of the patients' daily condition. In this study, at four of the CCUs, all of the orders were written traditionally and manually, while at two CCUs writing orders traditionally was combined with computerized recording. Recovered orders in this study were pharmacological and non-pharmacological orders written in the patients' file, which were identified, cancelled or recovered as a wrong order by the issuer or discovered before or after administration. In this study $P < 0.05$ was considered significant. The collected data were assessed and analyzed with the SPSS 19 software and descriptive statistical tests such as average, absolute and relative frequency, contingency and analysis such as chi-square test.

4. Results

Overall, 29214 pharmacological and non-pharmacological issued orders in the file and recording sheet of daily condition of 1046 patients hospitalized at different CCUs of Mazandaran heart center were assessed for three months. In total, 17215 pharmacological orders and 11999 non-pharmacological orders were issued by the issuers. The average and standard deviation of issued pharmacological and non-pharmacological orders during hospitalization in 1046 files and totally 29214 issued orders were 16 ± 14 and 11 ± 7, respectively. Among 29214 orders, 150 orders were recovered. Also, the results showed that there were 130 recovered pharmacological orders and 20 recovered non-pharmacological orders. Six hundred and seven files were related to male and 439 files were related to female patients. The average and standard deviation of the patients' age was 61.27 ± 11.81. Furthermore, 89.7% of the patients were hospitalized on working days and 10.3% of the patients were hospitalized on holidays. The mean of hospitalization duration was three days. Most of the

patients were admitted during the evening shift (57.4%), morning shift (33.1%) and night shift (9.6%). The average age and standard deviation of the issuers of the recovered orders were 34.41 ± 5.49 years old (the age range was 30 to 63 years old). Overall, 55.3% of the recovered orders were issued by males and 44.7% of the orders were issued by females. Moreover, 84.7% of the orders were issued by medical assistants, 10.7% by specialists and only 4.7% by subspecialists. The heart internal department had issued 88.7% of the recovered orders. Average and standard deviation of work experience of the recovered orders issuers were 35.11 ± 47.64 months (5 to 240 months). Sixty-eight percent of the recovered orders discoverers were female and 32% were male. Also 67.7% of administrative orders discoverers had a PhD degree and 31.3% had MA. The average and standard deviation of work experience at the ward of the order discoverers were 73.24 ± 54.44 months (five to 180 months). There was a significant statistical relationship between work shift of the issuers and the recovered orders at the CCU ($K_2 = 26.040$, $P < 0.05$), so that most of the recovered orders (46%) were issued in the morning work shift, followed by the night work shift with 60 cases (40%). Also the least number of recovered orders (14%) were issued during the evening shift. There was a significant statistical difference between the academic year of medical assistants who were issuing the orders and the recovered orders at CCUs ($K_2 = 88.619$, $P < 0.05$); 69.3% of the recovered pharmacological orders were issued by the assistants of the second year (Table 1).

Table 1. The Academic Year of Medical Assistants That had Issued Recovered Orders[a]

Assistant Academic Year	Recovered orders	
	Number	Relative Frequency
Second Year	87	69.3
Third Year	38	29.9
Fourth Year	1	0.8

[a]Chi-2 statistical test: $K_2 = 88.619$; P [U+02C2] 0.05.

Overall, 55.3% (83 orders) and 44.7% (67 orders) of the orders were issued, respectively by males and females; there was no significant statistical relationship between gender of the issuer and the recovered issues ($k_2 = 1.707$, $P > 0.05$) (Table 2).

There was a significant statistical difference between order discoverers' profession and the recovered orders at CCUs ($K_2 = 19.440$, $P < 0.05$). One hundred and two orders were discovered in this study; 68% were issued by doctors and 32% by nurses. Most of the recovered orders involved the cardiovascular drug group (46.2%). Also 22.3% were related to anticoagulant and thrombolytic factors and 12.3%

Table 2. The Relationship Between the Issuers' Gender and Pharmacological and Non-Pharmacological Recovered Orders[a]

Order Issuers Gender Number	Recovered Orders	
	Relative Frequency	
Male	83	55.3
Female	67	44.7

[a] Chi-2 statistical test: $K_2 = 1.707$; $P > 0.05$.

were related to antibiotics. This is while the least recovered orders were related to the central nervous system (CNS) drugs. One hundred and forty-eight (98.7%) recovered orders were written by the issuers. The average age and standard deviation of patients, who had been issued recovered orders was 63.46 ± 13.59 years old. Also there was a significant statistical difference between the patients' age and the recovered orders at the CCUs in the mentioned study ($K_2 = 40.533$, $P < 0.05$). Most of the recovered orders were for above 70-year-old patients (31.3%).

5. Discussion

The results of our study showed that 150 recovered orders were issued and corrected during three months. There were 130 (86.7%) recovered pharmacological orders and 20 (13.3%) non-pharmacological orders, while in a similar study by Rothschild et al. (2006), performed during 147 days, 142 recovered medical errors were reported (8). Also in another study by Rothschild et al. (2010) from the USA, there were 504 recovered orders that is 7.8% for every patient and 2.9% for every issued pharmacological order (29). In a study by Vazin et al. (2014), 707 (68.5%) medical errors were reported at different pharmacological stages; among them, 217 errors (21.1%) were during the stage of issuing the order (30). In the study of Stasiak et al. (2013), 99 errors (3.2%)(31), and in the study of Vessal (2009) 86 errors (10.5%) of recovered orders were calculated and reported (32); the cause of contradiction in the results of recent studies with the present study can be due to assessment of recovered orders during different stages of drug prescription procedure, difference in the sample volume, difference in patients' demographic features, type of hospitalization, difference in type of wards and using or lack of using computerized recording system in the case of issuing orders. In this study, most of the recovered orders were issued during the morning shift, which is consistent with the results of the study of Vazin et al. (2012) (33). However, in the studies of Mohsenzadeh (2009), Kozer (2002) and Zeraatchi (2013) et al. increased issuing of recovered orders and more pharmacological errors were reported during the night work

shift (34-36), also in the study of Stasiak et al. (2013), more than half of the errors in issuing pharmacological orders had occurred in the evening, which are not consistent with the results of the present study (31). The cause of this contradiction is the difference in the system and the way of admitting patients; in the patient medical centers, most of the patients are admitted by the assistants and the orders are written by them in the patients' file, therefore the morning shift is very busy. There was a significant statistical difference between the academic year of the medical assistants, who issued the order, and the recovered orders in different parts of the CCU. So that assistants of the second year issued 69.3% of the recovered orders; results of this study are similar to the study of Ryan et al. (2014) in Scotland (21). However, in the study of Seden et al. (2012), it was clear that there was no significant difference between assistants' academic year in issuing orders and there was no remarkable difference between novice doctors and medical assistants of higher years (37); the cause of the difference of these results with the present study can be due to the difference in the protocols of patients' admission and the way of writing orders in different countries. There was no significant statistical difference between issuers' gender and the recovered orders in the present study; results of this study are consistent with the results of the study of Shamsaii et al. (2010)(1). However, in the study by Aala et al. (2014), it was reported that most of the issued pharmacological orders had been done by males(38), which is in contrary with the results of the present study and it could be due to the lack of difference in gender of the recovered orders' issuers in our study. There was a significant statistical difference in the present study between age of the patients and the recovered orders; this result is consistent with the findings of the studies done by Mousavi (2012), Zeraatchi (2013), Dabaghzadeh and Stasiak et al. (31, 35, 39, 40). This is while in the study done by Mohsenzadeh et al. (2009), it was clear that most of the pharmacological errors were related to younger than two-year-old children (34). The cause of this difference could be due to children's sensitivity and the difference of the issuers in terms of specialty in the two studies. The present study showed that the most common form of issuing recovered orders at the CCU was the written form. Also results of studies of Stasiak (2013) and Evans et al. (2009) showed that pharmacological recovered orders are not general in the oral form; results of these studies are similar to the present study (31, 41). There was a significant statistical difference between orders discoverers' profession and recovered orders, which is consistent with the findings of Osmon (2004) and Rothschild et al. (2005) studies (42, 43); most of the wrong orders were discovered and recovered by doctors. Most of the recovered orders were related to cardiovascular drugs and the

least were related to central nervous system drugs. In the study done by Stasiak et al. (2013), it was reported that the most common recovered orders included the cardiovascular drug group (21.2%), followed by neurological drugs (10.1%) and inhaled drugs (9.1%) (31), which are similar to the results of this study. Recovered orders were issued mostly by first year assistants, therefore, it is recommended to have a detailed review of medical, pharmacological and non-pharmacological issued orders before administration and to design and perform a supervision and training system regarding controlling issued orders by the assistants. Some strategies are recommended for maintaining and promoting patients' safety in health services, increasing patients and their relatives' trust and satisfaction and decreasing the cost of country health system; these strategies include using clinical pharmacologists and nurses specialist in intensive care; these strategies increase the possibility of discovering and diagnosing wrong orders before performance. Also it is recommended to use randomized observational studies in the future studies for achieving accurate statistical frequencies regarding recovered orders at CCUs.

Acknowledgments

Footnote

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