

## Benefits of Pharmacist's Participation on Hospitalist Team

Simin Mahdikhani<sup>1,2</sup> and Fatemeh Dabaghzadeh<sup>1,2</sup>

<sup>1</sup> Pharmaceutical Care Center (Related to Food and Drug Department), Afzalipour Hospital, Kerman University of Medical Sciences, Kerman, Iran

<sup>2</sup> Faculty of Pharmacy, Kerman University of Medical Sciences, Kerman, Iran

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**Abstract-** This study was performed to assess the incidence of medication errors and irrational use of human albumin in two wards of our hospital and also aimed to evaluate the ability of pharmaceutical care center and pharmacists in improving patient care. Albumin administration was evaluated for patients who received albumin during the study period, in gastroenterology and general surgery wards. The indications for Albumin administration were evaluated on the basis of reliable guidelines. The prescribing errors were simultaneously evaluated by reviewing patients' medical records. Prescribing errors were defined as selecting improper drug (based on indications, contraindications, known allergies, drug-class duplications and drug-drug interactions), dose, dosage form, and route of administration. It was found that 465 containers of human albumin solution 20 % were used for 54 patients treated in gastroenterology and general surgery wards of our hospital. A total of 306 (65.81%) vials of the albumin administrations were in concordance with the reliable protocol. The cost of irrational use of this drug (159 vials) for patients is equivalent to \$ 8215. From 609 reviewed cases, 81 prescribing errors were detected in 64 patients. This study showed that the pharmacists were effective in identifying irrational drug use and medication errors.

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**Keywords:** Pharmacist; Drug utilization review; Albumin; Medication errors

### Introduction

In the last few years, the traditional role of pharmacists has been altered. Today the pharmacists hold an essential role among the other members of the healthcare team. The cooperation of pharmacists in hospital enhances the quality, safety and efficiency of pharmacotherapy (1). The advantages of pharmacists' participation on hospitalist team are numerous; such as giving professional advice to physicians, checking the prescribed medications to make sure about the rational use of drugs, controlling the undesirable reactions of drug, avoiding drug interaction, doing all the necessary calculations respected to the dose of drugs and dose correction, finding the errors regarding the use of drugs and identifying any other problem related to drugs, and etc. In addition to the above-mentioned aspects, a pharmacist can play an important role in reducing treatment costs (2). Medication errors are serious threats. They can cause severe morbidity, unnecessary tests, and treatment. They may prolong the duration of hospital stay, or even they can cause death (3,4). Almost 1-2% of inpatients have experienced the medication errors that

makes it harder for them to get well (5). The errors found in the prescription stage are the most concerning sources of medication errors (6,7). Studies have proved the profound positive impact of pharmacists on treatment results in the hospital, by avoiding and reducing the probability of the accidental medication errors (8-10) and decreasing the costs of the treatment (11-13). A study of the impact of pharmacists on reducing the costs of treatment highlighted the direct relation between the reduction of costs and the presence of a pharmacist in the ICU of a major hospital and reported 35.8% rate of cost reduction (11). Another study reported that when pharmacists were involved in treatment, only a small percentage of medication errors reached the patients (10). However, recently due to the extreme increase of illogical use of drugs, the health care costs and side effects of drugs have grown in large extent. So the world health organization (WHO) has been doing its best to intervene and solve the problem. Drug utilization review (DUR) is expected to be one of the most efficient solutions to this issue. Despite the fact that DUR is time-consuming, it has been proven to be a good means to start negotiation between pharmacists

**Corresponding Author:** F. Dabaghzadeh

Department of Pharmacology, School of Pharmacy, Kerman University of Medical Sciences, Kerman, Iran  
Tel: +98 341 3205034, Fax: +98 341 3205003, E-mail address: dabaghzadeh@kmu.ac.ir

and clinicians, so that high norms of rational drug use can exist (14,15). For sure, DUR will improve treatment by creating a better circumstance for pharmacists to solve the medicinal problems by planning to decrease the medication errors and related expenses (16). Afzalipour hospital affiliated to Kerman University of Medical Sciences is the first hospital equipped to "Pharmaceutical Care Center" in Kerman. Due to the report submitted from the hospital pharmacy, albumin is one of the most widely used drugs in our hospital. Albumin is an expensive drug, and numerous studies have shown that albumin is used inappropriately most of the times (14,17,18). According to the above, this study was performed to assess the incidence of medication errors and irrational use of human albumin in two wards of our hospital and also was to evaluate the ability of pharmaceutical care center and pharmacists in improving patient care.

## Materials and Methods

This study was conducted during July 2013 to March 2014 in Gastroenterology and general surgery wards of Afzalipour, 462-bed teaching hospital, affiliated with

Kerman University of Medical Sciences, Kerman, Iran. One trained pharmacist (from Afzalipour pharmaceutical care center) consumed 4 hours per day, two days per week (Saturday and Wednesday) to review medical records and complete the required forms. One clinical pharmacist (from Afzalipour pharmaceutical care center) referred to as preceptor and helped pharmacist to solve clinical problems. Gastroenterology and general surgery wards were chosen because these wards had the highest amount of Albumin 20% use among all hospital's wards based on inpatient pharmacy reports. The first part of this study was based on drug utilization review. Albumin administration was evaluated for patients who received albumin during the study period, in the two mentioned wards of our hospital. The indications for albumin administration were evaluated on the basis of reliable guidelines (14,18-20). Data collected for each patient included age, sex, weight, diagnosis, ward, serum albumin, and total serum protein, Contraindications for albumin administration, and the number of used vials. The appropriate and inappropriate indications for albumin administration are summarized in Table 1. In the second part, medication errors simultaneously were assessed in two mentioned wards.

**Table 1. Conditions where administration of albumin is appropriate or inappropriate (17)**

Appropriate indication	Inappropriate indication	
Plasmapheresis	Except	
Cardiac surgery	Hypoalbuminemia	When serum Albumin level is less than 2.5 g/dl
Hypoproteinemia	Nutritional supplementation	--
Hemorrhagic shock, nonhemorrhagic, or maldistributive shock	Acute pancreatitis	--
Hepatic resection	Chronic pancreatitis	--
ARDS	Acute normovolemic hemodilution during surgery	--
Nephrotic syndrome	Intradialytic blood pressure support	--
Organ/kidney and liver transplantation	Ovarian hyperstimulation syndrome	--
Paracentesis (>4L)	Cardiac failure	--
Patients in whom Fluid and sodium intake is restricted	Nutritional supplementation	--
Thermal injury	Acute pancreatitis	--
Cerebral ischemia/ maintaining cerebral perfusion pressure	Chronic pancreatitis	--
Hypovolemia (as a last choice in case of failure with crystalloids and nonprotein colloids)	Acute normovolemic hemodilution during surgery	--
Retroperitoneal surgery	other	--
Severe, necrotizing pancreatitis	--	--
Other	--	--

Data collection form had different parts including patient data (sex, age, weight, diagnosis, serum

Creatinine, file number, and ward), and type of medication error. The prescribing errors were only

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evaluated by reviewing patients' medical records. The definition of prescribing errors was based on American Society of Hospital Pharmacists guidelines on preventing medication errors in hospitals (21). Prescribing errors were defined as selecting improper drug (based on indications, contraindications, known allergies, drug-class duplications and drug-drug interactions), dose, dosage form, and route of administration. Medical software such as lexicomp and ifact were used for checking interactions. Descriptive statistics were used to describe data.

## Results

It was found that 465 containers of human albumin solution 20 % were used for 54 patients treated in gastroenterology and general surgery wards of our hospital. From the included patients 15 (27.78%) were female, and 39 (72.22%) were male. The mean age of the patients was  $61.7 \pm 14.5$  years (ranged 27-88 years). A total of 306 (65.81%) vials of the albumin administrations were in concordance with the reliable

protocol. The cost of irrational use of this drug (159 vials) for patients was equivalent to \$ 8215 (\$ 51.7 per vial). The number of albumin vials per indication in this study is listed in Table 2. An overview of the number of studied patients per ward and the number of albumin vials per ward is shown in Table 3. Hypoproteinemia was recorded as the most frequent reasons for albumin use. Nutritional supplementation, hypoalbuminemia, and paracentesis were the three most frequent reasons for inappropriate albumin use. From 609 reviewed cases, 81 prescribing errors were detected in 64 patients (0.13 errors per patient). The mean age of the patients was 57.93 years (ranged 16-89 years). Twenty-three (35.94%) of the patients were female. Prescribing errors rate in our hospital is 13.3%. The medication errors were classified according to the types of errors. Out of the 81 observed prescribing errors, inappropriate dose (49 (60.49%)) was noted as the top most medication errors. This was followed by drug- drug interaction (10 (12.35%)), duplication (8 (9.88%)), contraindication (8 (9.88%)), inappropriate dosage form (4 (4.94%)), No indication (2 (2.47%)).

**Table 2. The number of albumin vials per indication in this study**

Indication	Appropriate use		Inappropriate use	
	Number of patient	Number of vials	Number of patient	Number of vials
Hypoproteinemia	21 (38.89%)	146 (31.40%)	0	0
Paracentesis	7 (12.96%)	54 (11.61%)	5 (9.26%)	50 (10.75%)
Hypoalbuminemia	5 (9.26%)	89 (19.14%)	5 (9.26%)	58 (12.47%)
Nutritional supplementation	0	0	7 (12.96%)	41 (8.82%)
Nephrotic syndrome	3 (5.56%)	17 (3.66%)	0	0
Septic shock	0	0	1 (1.85%)	10 (2.15%)
<b>Total</b>	36 (66.67%)	306 (65.81%)	18 (33.33%)	159 (34.19%)

**Table 3. The number of studied patients per ward and the number of albumin vials per ward**

Ward	Number of patient			Number of vials		
	Appropriate use	Inappropriate use	total	Appropriate use	Inappropriate use	total
General surgery	19 (61.29%)	12 (38.71%)	31	197 (66.55%)	99 (33.45%)	296
Gastroenterology	17 (73.91%)	6 (26.09%)	23	109 (64.50%)	60 (35.50%)	169

## Discussion

Nowadays, due to the development of medical sciences and the complexity of drug therapy, pharmacists in hospitals can improve the treatment of patients. Several studies showed that the presence of a pharmacist in the health care team leads to improved quality of care by reducing medical errors and healthcare costs (22). In our hospital, Albumin was inappropriately prescribed for 33.33% of hospitalized patients, which could lead to high treatment costs. This

study also showed that the irrational use of albumin in this hospital raised treatment costs by as much as \$ 8215. According to our results nutritional supplementation (12.96%), hypoalbuminemia (9.26%) and paracentesis (<4L) (9.26%) were the most common causes of irrational use of this drug. Percentage of irrational use of albumin had different ranges in other studies. In a study conducted in a teaching University Hospital in Iran, as much as 34% of albumin prescription showed to be incorrect. The most of the frequent improper albumin administrations in this

research were volume expansion after the heart surgery (51.1%), and nutrition support in patients suffering from malnutrition (19.3%) (18). Mousavi Nejad *et al.* reported 91% of albumin administrations were inappropriate in bone marrow transplantation patients. In this study, hypoalbuminemia was the major reason for prescribing albumin, but only 7 % of patients had serum albumin  $\leq 2.5$  (16). Similar results had been reported in other studies in this field. Zhou *et al.*, (2013) evaluated albumin usage in Chinese people and found that 56.67% of albumin prescriptions in these patients were inappropriate (23). According to the another study in Istanbul, Uyeturk, *et al.*, reported that the rate of inappropriate human albumin use was 50.4 %, and the two top inappropriate indications of albumin were nutritional support (32.9%), and wound healing (29.8%) (24). On the other hand, retrospective DUR, (2011) indicated that organizing training programs and interventions by pharmacists for the treatment of patients could lead to great results in improving the treatment. During the recent years, DUR was performed as value-added programs to improve medical outcomes and control costs (25). Although DUR was time-consuming, but Talasaz *et al.*, and Mousavi Nejad *et al.*, proved, that "DUR" was a useful method for communication between physicians and pharmacists, to achieve the required standards in pharmacotherapy (14,16). Talasaz *et al.* reported albumin was administered inappropriately in 36.2% of patients at a hospital in Iran. The most frequent reasons for inappropriate use of albumin were mild hypoalbuminemia and nutritional support. In 2014, in a teaching hospital in Iran, only 5% of patients were correctly treated with albumin. This study showed the importance of DUR studies in reducing the cost of treatment (19). In addition, medication-related problems are common. In our hospital; the incidence of prescribing errors was 13.3%. The most common errors were a wrong dose (60.5%) and drug- drug interactions (12.3%) respectively. Khalili *et al.*, (2011), concluded that pharmacists by training other members of health care team played an important role in preventing medication errors (8). A review article of medication errors in Iran showed the prescribing errors were the second most frequent errors (26). Iranian studies indicated that the prescribing errors in Iran were ranged from 29.8% to 47.8%. The prevalence of the wrong dose in prescribing stage ranged from 5.9% to 37.0%, in different studies (26,27). In a study conducted in 2004 by Seeley *et al.*, University Medical Center, the prescribing errors rate of 18.6% had been reported. The

second most frequent prescribing errors were dose errors. This study also showed that the intervention of pharmacists in drug therapy would lead to a reduction in medication errors (28). In a study on frequency and type of medication error at the emergency department of an academic hospital in Iran, The errors rate has been reported as 0.41 per patient (29), while this factor in our study was 0.13. This difference came from that an emergency department was a fast place, and the rate of medication errors in this ward was high (30) and also we just evaluated the prescribing errors. They found more than 60% of errors occurred in the prescribing stage. In the mentioned study, most common prescribing errors were an incorrect dose (29). This result was similar to our study. The national study on the frequency, type, and causes of medication errors showed that 29% of medication errors in emergency department occurred at the prescribing stage. They reported improper dose as most often medication errors (31). Al-Dhawali *et al.* conducted a study at a teaching hospital in Saudi Arabia. They reported prescribing errors rate was 7.1%, and wrong strength and wrong administration frequency were the two most common prescribing errors. They also showed that pharmacists had an important role in minimizing prescribing errors. They demonstrated the irrational use of expensive drugs such as albumin as well as the rate of medication errors in their hospital and particularly in surgery ward was not uncommon. The number of pharmacists working in their hospital was the main factor in limiting this study (32). The major limit of this study was the lack of pharmacists in our hospital. This shortage made us perform our study two days a week and conducted only in two wards. To evaluate the effectiveness of pharmacist interventions to reduce medication errors and costs of treatment, further studies with larger sample size should be performed. We concluded that the presence of a pharmacist in a hospital, and cooperation with other members of the health care team, even if a few days a week could be used to identify irrational drug use and medication errors.

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