

Medications Related Emergency Admissions: Causes and Recommendations

Namareq ALDARDEER ^a, Nabila BENSLIMANE ^a and Mohamed KHALIFA ^{b,1}

^a *King Faisal Specialist Hospital and Research Center, Jeddah, Saudi Arabia*

^b *Centre for Health Informatics, Australian Institute of Health Innovation, Faculty of Medicine and Health Sciences, Macquarie University, Sydney, Australia*

Abstract. Adverse drug events could require a patient to visit the emergency department, many of these visits lead to hospital admissions. A retrospective study, October 2015 to March 2016, examined the severity and factors contributing to medications related emergency visits leading to admissions at King Faisal Specialist Hospital and Research Center, Jeddah, Saudi Arabia. Out of 698 reviewed patients, 92 were medications related admissions. Adverse drug reactions were the primary cause (46.7%), drug prescribing (30.4%), compliance (14.1%), and drug dosing (8.7%). The majority of cases were of moderate severity (82.6%). Most medications involved in emergency admissions were antihypertensive (18.4%), chemotherapy (17.4%), anticoagulant (15.2%), and anti-diabetics (12%). Emergency admissions secondary to medication could be minimized whenever the causes of problems are identified. Motivating physicians to apply shared decision making strategy during prescribing and involving pharmacists in emergency and ambulatory care setting is highly important and to educate patients and support healthcare providers in making best medications related decisions.

Keywords. Adverse Drug Events, Emergency Visits, Admissions, Hospitals.

Introduction

Medications are the most common, convenient and appropriate treatment option for many acute and chronic medical conditions, however the inappropriate use of medicine could harm or injure patients. The undesired effect caused by a drug is known as adverse drug events (ADE) [1]. Those events can be further classified into adverse drug reactions (ADR); any unintended harm or injury resulting from the use of a drug given at proper doses during regular use, and medication errors (ME); any preventable event that occurs during prescribing, transcribing, dispensing, administering, adherence or monitoring of a drug [2]. ADE could occur in variable severity; some might lead patients to visit the emergency department (ED), many of these could result in hospital admissions [3]. In 2011, the center of disease control and preventions reported that there were a 136.2 million emergency visits caused by medications in the United States, whereas 11.9% of them needed hospitalization [4]. Many studies investigated the reasons for medications related emergency admissions (MREA). Researchers found prescribing error contribute to 35% of all medications related admitted patients, the adherence to the medications accounts for 30% with antiepileptic, hypoglycemic,

¹Corresponding Author. Mohamed KHALIFA, E-mail: mohamed.khalifa@mq.edu.au

diuretics, inhaled corticosteroids, cardiac glycosides, and beta blockers as commonly associated with the admission [5]. Other investigators found that 6.5% of admissions are drug related and 69% of them were preventable. The avoidable medications related admission was caused mainly by an error in prescribing (35%), monitoring (26%) or adherence (30%), Geriatric population with polypharmacy was at higher risk for MREA [6]. The purpose of this study was to investigate the incidence of ADEs leading to hospitalization and to evaluate the severity and factors contributing to MREAs at King Faisal Specialist Hospital and Research Center, Jeddah, Saudi Arabia.

1. Methods

A retrospective study was conducted, over October 2015 to March 2016; all inpatients admitted through ED and reviewed by a pharmacist for medication reconciliation were included, those have been identified through medication safety record that has all the reconciled admitted patients, we focused only on those patients reconciled from ED to be included. We excluded all self-poisoning patients, drug abusers and ADR's with Naranjo score less than five. The primary outcome is to evaluate the frequency of MREAs, in relation to all inpatient admissions done through the ED, and the secondary outcome is analyzing the severity and factors contributing to the MREA. We classified the causes of MREA to 1) Adverse drug reactions (ADR), 2) Patient compliance issues, 3) Drug prescribing causes and 4) Dosing causes. We defined ADR as any unintended harm or injury resulted from the use of a drug given at proper doses during regular use. The Naranjo Adverse Drug Reactions Probability Scale was used for the assessment of adverse drug reactions; it is designed to determine whether an ADR is actually due to the drug or a result of other factors [7]. We categorize patient's compliance to non-compliant; who doesn't take or stopped taking prescribed medication, and wrongly compliant or non-conforming; who takes his prescribed medications but not as instructed [8]. Drug prescribing causes include drug-drug interactions (DDI), contraindications (CI), patient self-medications (PSM) and uncontrolled condition (UC). We defined drug dosing causes as any sub-therapeutic or supra-therapeutic dose in which a patient takes too little or too much of the correct medication [8]. The severity ranges from minor, moderate, to severe. Minor includes laboratory abnormality or symptoms not requiring immediate medical intervention, moderate symptoms required treatment either by emergency physician or by admitted service whereas, severe when patient had permanent disability or has been coded or came with life-threatening symptoms that required an emergent intervention [9].

2. Results

Out of 2199 emergency admissions over the study period; 698 patients have been enrolled in the study. 92 (13.2%) were admitted due to drug related problems. Males were 53.3% and females were 46.7%. The mean age was 55 in medications related emergency admissions patients and 54.3 in non-medications related admissions. Causes of MREAs have been classified to ADR which were 43 (46.7%) of all MREAs, 16 (37.2%) out of the 43 were chemotherapy related ADRs. Drug prescribing was 28 (30.4%), 25 (89.3 %) were uncontrolled conditions, 1 (3.6%) was a DDI, PSM, and CI. Compliance 13 (14.1%), in which 10 (76.9%) were non-compliant and 3 (23.1%) were

wrongly compliant. Drug dosing were 8 (8.7%), where sub-therapeutic dose were 5 (62.5%) and supra therapeutic dose were 3 (37.5%). The severity of cases ranged from minor 4 (4.35%), moderate 76 (82.6%) to severe 12 (13.04%). The service of admission was 17 (18.5%) oncology patients and 75 (81.52%) from other services. Most medications involved in emergency admission are antihypertensive 17 (18.48%), Chemotherapy 19 (17.39%), anticoagulant 14 (15.22%) and anti-diabetics 11 (11.96%). Other medications that were not involved frequently in MREAs are antiepileptic's 9 (9.78%), antimicrobials 7 (7.61%), Analgesics/Sedatives 6 (6.52%), both steroids and bronchodilators 3 (3.26%), bisphosphonates 2 (2.17%). While immunosuppressant, diuretics and muscle relaxants MREAs were only 1 (1.09%).

3. Discussion and Conclusion

Ensuring medication safety and preventing errors is becoming a goal for all high standard healthcare institutes [10]. This needs an assessment of the causes and correlations with the healthcare system in each country, the hospital system and patients' psychology and literacy. Unnecessary visits contribute to ED overcrowding, which could risk patient safety and jeopardize the reliability and the quality of the emergency services [11]. In our study, medications related emergency admissions accounted for 13.2% of all emergency admissions. Similarly in a study conducted in Vancouver general hospital, Canada, 12% of emergency visits were drug-related [12]. Preventing ADRs could be obtained by improving the hospital system; implementing an ADR reporting to track the incidence and re-occurrence of ADRs among medications, improving the nursing system in administering and monitoring medications, emphasizing on the importance of allergy documentation and providing a system that alerts physician for possible ADRs while prescribing. Involving pharmacists to revise physicians' orders and provide education on medications to health care providers and patients could also help in ADR awareness and minimization [13]. Other ways include considering patient's age, especially elderly patients with multiple medications, patient's weight, renal/hepatic functions and underlying conditions [14]. Closer monitoring of patients with a known uncontrolled medical condition is needed to minimize emerging situations. In Saudi Arabia, the rules and regulations that control the healthcare system are not firmly applied. Prescribed medications, which should strictly be dispensed based only on a doctor's prescription, are sometimes dispensed by community pharmacies to patients based on their personal request without a written prescription; this could increase the risk of undesirable ADE. Patient adherence to medication plays a significant role in treatment success. Factors that influences non-adherence include complex medication regimen, patient satisfaction, patient literacy level and length of treatment. Healthcare providers play an important role in improving medication adherence. Ensuring the understanding of patient to his/her treatment is critical. Patients have the right to know what their medications are for, how they work, and how long the course of the treatment is. Physicians and discharge counseling pharmacist could answer these questions; however, the time barriers could affect the physician ability to talk to their patients. In fact, discussing treatment options and the selection of the best regimen upon prescribing is a good way in promoting patient's adherence. Recently, studies have investigated the impact of the shared decision making strategy in improving patients' outcome [15]. Other adherent methods include the use of tools like schedules, mobile applications, and pillboxes.

Some patients need to schedule their medications with one of their routine habits to avoid forgetting them. Behavioral intervention and family support help in better adherence with a complicated regimen [8]. Methods to minimize dosing problems include: implementation of hospital dosing protocols, patient awareness for symptoms associated with high or low drug levels, laboratory monitoring of certain medications to ensure optimum drug level and educating physicians and patients for possible drug interactions that might require an adjustment of doses, taking into consideration the high worldwide noncompliance rate of clinicians and low response to system drug alerts. In conclusion, emergency admission secondary to medication problems could be minimized whenever the causes of medications related problems have been identified. The impact of the health care system, hospital system and patient's psychology should be considered. It is recommended to assess patient's needs, increase drug awareness and promote drug adherence. Furthermore, it is recommended to motivate physicians to apply the shared decision making strategy during prescribing and involve pharmacists in emergency and ambulatory care setting to counsel and educate patients and support healthcare providers in making best medications related decision.

References

- [1] D. W. Bates, D. J. Cullen, N. Laird, L. A. Petersen, S. D. Small, D. Servi, M. Vander Vliet, Incidence of adverse drug events and potential adverse drug events: implications for prevention, *Jama* **274**(1) (1995), 29-34.
- [2] T. Morimoto, T. K. Gandhi, A. C. Seger, T. C. Hsieh, D. W. Bates, Adverse drug events and medication errors: detection and classification methods, *Quality and safety in health care* **13**(4) (2004), 306-314.
- [3] M. Pirmohamed, S. James, S. Meakin, C. Green, A. K. Scott, T. J. Walley, A. M. Breckenridge, Adverse drug reactions as cause of admission to hospital: prospective analysis of 18 820 patients, *Bmj* **329**(7456) (2004), 15-19.
- [4] Emergency Department Visits (2011). Retrieved July, 2011, from <http://www.cdc.gov/index.htm>
- [5] A. J. Leendertse, P. M. Van Den Bemt, J. B. Poolman, L. J. Stoker, A. C. Egberts, M. J. Postma, Preventable hospital admissions related to medication (HARM): cost analysis of the HARM study, *Value in Health* **14**(1) (2011), 34-40.
- [6] R. L. Howard, A. J. Avery, P. D. Howard, M. Partridge, Investigation into the reasons for preventable drug related admissions to a medical admissions unit: observational study, *Quality and Safety in Health Care* **12**(4) (2003), 280-285.
- [7] C. A. Naranjo, U. Busto, E. M. Sellers, P. Sandor, I. Ruiz, E. A. Roberts, Naranjo ADR probability scale, *ClinPharmacolTher* **30** (1981), 239-245.
- [8] B. Jimmy, J. Jose, Patient medication adherence: measures in daily practice, *Oman Med J* **26**(3) (2011), 155-159.
- [9] I. R. Edwards, J. K. Aronson, Adverse drug reactions: definitions, diagnosis, and management, *The Lancet* **356**(9237) (2000), 1255-1259.
- [10] D. S. Budnitz, N. Shehab, S. R. Kegler, C. L. Richards, Medication use leading to emergency department visits for adverse drug events in older adults, *Annals of internal medicine* **147**(11) (2007), 755-765.
- [11] S. Trzeciak, E. P. Rivers, Emergency department overcrowding in the United States: an emerging threat to patient safety and public health, *Emergency medicine journal* **20**(5) (2003), 402-405.
- [12] K. Lynas, Drug-Related Problems Responsible for 1 in 9 Emergency Room Visits, *Canadian Pharmacists Journal/Revue des Pharmaciens du Canada* **141**(4) (2008), 211.
- [13] B. L. Kass, Reducing and preventing adverse drug events to decrease hospital costs, *Research in action* **1** (2001), 1-20.
- [14] P. A. Routledge, M. S. O'Mahony, K. W. Woodhouse, Adverse drug reactions in elderly patients, *British journal of clinical pharmacology* **57**(2) (2004), 121-126.
- [15] A. Loh, D. Simon, C. E. Wills, L. Kriston, W. Niebling, M. Härter, The effects of a shared decision-making intervention in primary care of depression: a cluster-randomized controlled trial, *Patient education and counseling* **67**(3) (2007), 324-332.