

Evaluation the Role of Clinical Pharmacist on Prevents or Reduced the Medication Error in Emergency Department

تقويم دور الصيدلي السريري في منع او تقليل الاخطاء الدوائية في قسم الطوارئ

Rana Bahaa, D.Sc*

May S. Al_Sabagh, MSc**

Hassan M. Abbas, PhD***

*Clinical pharmacist, Al_Karama Hospital, Ministry of Health

** Assistant Professor, Clinical Pharmacy Department, Collage of Pharmacy, University of Baghdad

*** Medical City Hospital, Ministry of Health

المستخلص:

الهدف: معرفة دور واهمية الصيدلي السريري في منع او تقليل الاخطاء الدوائية في قسم الطوارئ .
المنهجية: قمنا بجمع ملفات ٣٤٠٠ مريض، ١٤٠٠ ملف في المستشفى (أ) و ١٠٠٠ ملف في كل من المستشفيات (ب ، ج)، للمرضى الداخليين في قسم الطوارئ خلال ايام الاسبوع من ٨ صباحا الى ٢ ظهرا، وسجلت جميع التداخلات الصيدلانية التي اجراها الصيدلي السريري من خلال البحث الدووب في ملفات المرضى وتحليل جميع الوصفات الطبية.احتمالية شدة الضرر الناتج من الخطأ الطبي وقد تم تقييمها من قبل طبيب (مقيم اقدم/طوارئ) وصيدلانية سريره بالاعتماد على نظام مجلس التنسيق القومي لتصنيف الاخطاء الدوائية (NCC) العالمي.
النتائج: اربعة من التداخلات الصيدلانية كان لها اكبر معدل حدوث والتي مثلت النسبة الاكبر من الحالات، والتي كانت متعلقة بما يأتي : لجرعه ٥٠٠ (٣٨%)، طريقة اعطاء العلاج ٣٠٠ (٢٣،٢%)، اوقات اعطاء العلاج ١٠٠ (٧،٧%)، عدم تجانس العلاج الوريدي ١٢٠ (٩،٣%). تصنيف شدة هذه الاخطاء وتأثيرها على المريض كانت كالتالي: شديدة الخطوره على الحياة ٦٧ (٥%)، خطيرة ١٣٥ (١٠،٤%)، مؤثره ٦٣٤ (٤٩،١%)، غير مؤثره ٤٥٤ (٣٥،١%). مدى التقبل لوجود الصيدلي السريري وتداخلاته الصيدلانية من قبل الكادر الطبي في قسم الطوارئ كان الطبيب الاخصائي ٧٥%، الطبيب المقيم الاقدم ٢٠%، الطبيب الدوري ٧٨%، الكادر التمريضي ٣٠%.
التوصيات:- على المستشفى التفكير مليا في تعيين صيادلة سريريين ذوي تدريب جيد، معرفة واسعة، واصحاب مهارات عالية في قسم الطوارئ لغرض قيامهم بمراجعة مستقبلية لاوامر صرف الدواء متى ماكان ذلك ممكنا سريريا. من التوصيات ايضا أنه على كل مستشفى ان تقوم بتحليل ملم بجميع الاخطاء العلاجية التي تحدث في قسم الطوارئ لتحديد سببها وبذلك انشاء الخدمات الصيدلانية الضرورية والاساسية في قسم الطوارئ

Abstract:

Objective: To identify the role and importance of the clinical pharmacist in the Emergency Department on prevent or reduced the medication error.

Methodology: We collected the medical file of 3400 patients, 1400 patient's file in (A) hospital, and 1000 patient's file in each of (B and C) hospital, who admitted to the ED, at primary weekdays between 8 am to 2 pm, and recorded all the intervention made by clinical pharmacist through an active search in clinical charts, with analysis of the daily medical prescription. The potential severity of harm of the medication error judged by two reviewers, a permanent emergency physician, and clinical pharmacist based on the National Coordinating Council (NCC) of Medication Error Reporting and Prevention error classification system.

Results: Four of intervention that have the greatest incidence which represent the majority of the cases, and they were related to: dosage 500 (38.7%), route of administration 300 (23.2%), frequency 100 (7.7%), and incompatibility 120 (9.3%). The severity of medication errors that was judged as potentially life threatening (67; 5.1%), serious (135; 10.4%), significant (634; 49.1%), and insignificant (454; 35.1%). The acceptance to the presence and intervention of pharmacist was as follow: senior physicians 75%, permanent physicians 20%, resident physicians 77%, and nurses 30%.

Recommendation: Hospitals should contemplate assigning well-trained knowledgeable, efficient and skilled ED clinical pharmacists to prospectively review medication orders whenever clinically possible. It is also recommended that each hospital performs acquainted analysis of medication errors occurring in its ED, in order to determine their origin and then establish the necessary ED-based clinical pharmacy services. The sets of actions needed to provide such services, as well as the skills, which their ED pharmacists must possess or acquire in order to be capable of producing desired outcomes

Keywords: Emergency Department, medication errors, clinical pharmacist, interventions.

Introduction:

Emergency department (ED) is the primary location to receive primary medical care, usually the patient admitted in ED for diagnosis before the physician decides to admit him as inpatient. Emergency Department in all the health care system all over the world are different special and unique as dealing with the question of life and deaths with subsequent swift decision for the best interest of patient. The high expectation under panic situation, overcrowding and high paced environment are big challenges in any ED development especially in developing country like Iraq. The mixture of extremely sick patients, boarded inpatients waiting for their beds, and patients seeking primary care renders an ED one of the most crowded and frenzied environments in hospital. In the middle of this commotion, few, if any, medication safeguards exist. As a result the emergency department considers the highest risk environment for the incidence of medication errors comparing with other sectors in the hospital⁽¹⁾. Medication error defined as incident in which error has occurred somewhere in the medication process, regardless of whether any harm occurred to patient or not⁽²⁾. Numerous^{study} have shown that medication error are one of the main cause for adverse event in the emergency department leading to disability and death in up to 6.5% of admissions to emergency department^(3, 4, 5, 6). Environment of EDs may increase the rate and frequency of medication errors particularly in the absence of double verification system involving pharmacist in dispensing of medication⁽⁶⁾. Clinical pharmacist in ED could make the difference, since the safe and effective medication use in ED can be promoted through collaboration of pharmacists and other healthcare professionals in developing and monitoring medication use systems⁽⁷⁾. Pharmacy services in the ED have been documented since the 1970s⁽⁸⁾, but it is relatively rare due to the unique and complex nature of the ED. The Joint Commission Accreditation of Healthcare Organizations (JCAHO)⁽⁹⁾, mandates in 2005 that medical institutions conduct

prospective medication order reviews by pharmacists in the emergency department before the medication is administered to the patient. An exception to this requirement would be urgent situations when the resulting delay would harm the patient, including those in which the patient experiences a sudden change in clinical status. The American Society of Health-System Pharmacists (ASHP) in 2009 believes every hospital pharmacy department should provide its ED with the pharmacy services that are necessary for safe and effective patient care. Although the nature of these services will vary according to each institution's needs and resources. Due to increased development of ED pharmacy services and increased involvement of pharmacist in improving the care provision through ED to the patients, the demand for ED pharmacists is increasing and to cope with it the initiative of incorporating emergency training programs should be taken⁽¹⁰⁾. In the light of the above background, the purpose of this systematic review is to investigate the role of clinical pharmacists in increasing medication safety through reduction in EDs medication error and to look into the rate of acceptance of such interventions by healthcare providers in the ED.

Methodology:

This was a prospective, intervention, cohort study conducted at three ED of three hospitals (A, B, C) between August 1st to October 1st, 2013. Since there is no position for clinical pharmacist in the ED, we cooperated with the pharmacy department in each hospital to hire the most efficient clinical pharmacist in the hospital for the purpose of the study. We collected the medical files of 3400 patients, 1400 patient's file in (A) hospital, and 1000 patient's file in each of (B, C) hospital, who admitted to the ED, at primary weekdays between 8 am to 2 pm and recorded all the intervention made by clinical pharmacist through an active search in clinical charts, with analysis of the daily medical prescription. The potential severity of harm of the medication error judged by two reviewers, a permanent emergency

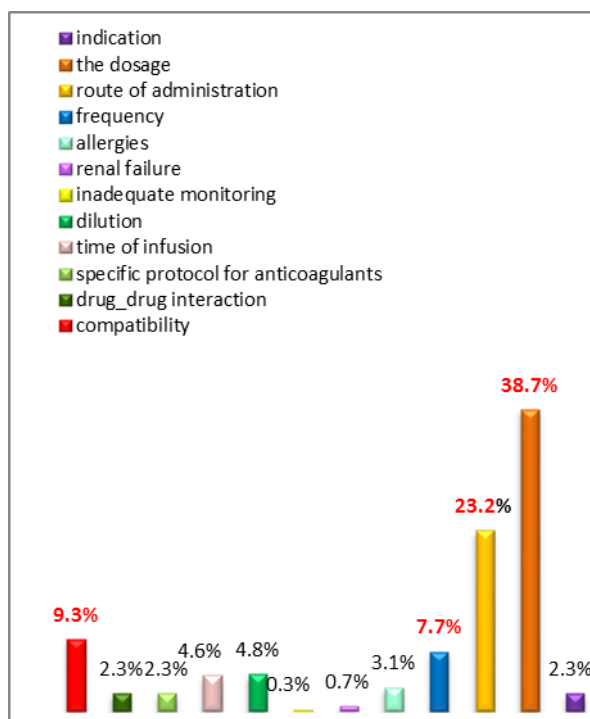
physician, and clinical pharmacist based on the NCC of Medication Error Reporting and Prevention error classification system.

Results:

The classification and the percentage of each of the intervention made by the pharmacist shown in figure (1), that was related to: Indication 30 (2.3%), dosage 500 (38.7%), route of administration 300 (23.2%), frequency 100 (7.7%), allergies 40 (3.1%), renal failure 10 (0.7%), drug-drug interaction 30 (2.3%), dilution 65 (4.8%), inadequate monitoring 5 (0.3%), time of infusion 60 (4.6%), specific protocol for anticoagulants 30 (2.3%), incompatibility 120 (9.3%). In addition, figure (1) shown four of intervention that have the greatest incidence which represent the majority of the cases, and they were related to: dosage, route of administration, frequency and incompatibility.

Examples of the types of recovered medication errors are provided in table (1). Three of the interventions that have the majority of cases are classified to specific categories as follows: the medication error category that was involved in wrong frequency, which are 80 cases (80%) due to administration error, and 20 cases (20%) due to prescription error. Categories involved incompatibility: there were 120 cases of medication incompatibility, 30 cases (25%) due to drug-drug incompatibility, and 90 cases (75%) due to drug-fluid incompatibility, and there were 72 cases (60%) of the incompatibility due to prescription error, and 48 cases (40%) due to administration error. Wrong route of administration: which are 66 cases (22%) due to prescription error, and 234 cases (78%) due to administration error.

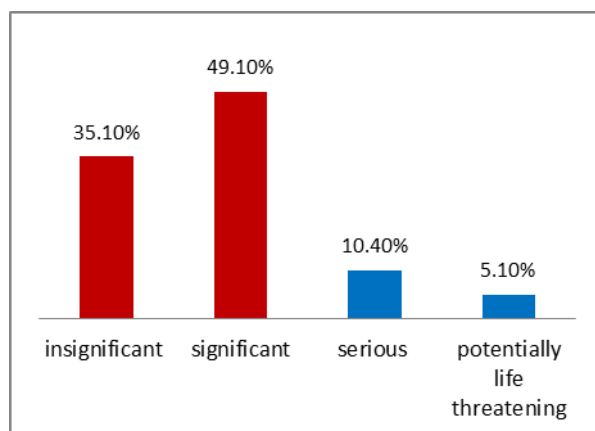
Figure 1. General classification and percentage of pharmaceutical intervention performed in emergency department



-The percentage in red color represents the greatest incidence of intervention.

The severity of medication errors that was shown in figure (2), judged as potentially life threatening (67; 5.1%), serious (135; 10.4%), significant (634; 49.1%), and insignificant (454; 35.1%).

Figure 2. Classification of medication error severity in ED



The acceptance to the presence and intervention of pharmacist shown in figure (3) , was as follow: senior physicians 75%, permanent physicians 20%, resident physicians 77%, and nurses 30%.

Figure 3. The acceptance of medical staff to the presence and intervention of clinical pharmacist in ED.

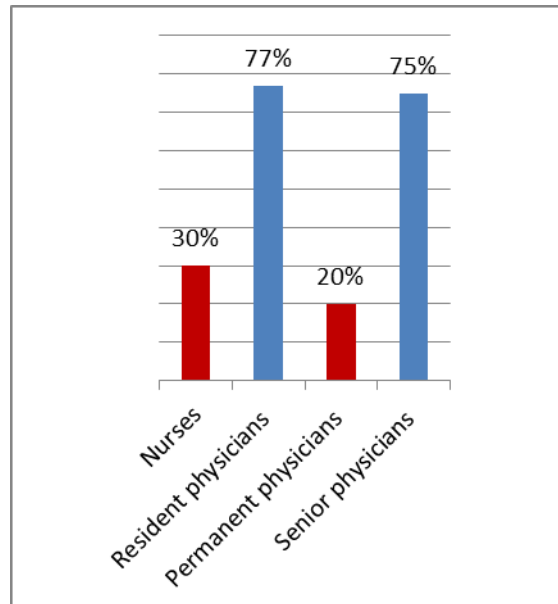


Table 1. Description of pharmaceutical intervention in ED

Classification of intervention	Description of the case	Pharmaceutical intervention
Wrong route of administration	Prescribed 10 U subcutaneous regular insulin for severe hyperkalemia patient	change to intravenous route must
incompatibility	Prescribed hydralazine ampoule in G/W for hypertension crisis	Hydralazine protocol (given in N/S)to prevent clumping in G/W
Drug omission	Prescribed Ca_gluconate +insulin for hyperkalemia ,blood glucose 100mg/dl	Adding 50g I.V dextrose to prevent hypoglycemia.
Wrong dose	Prescribed aminophyllin continuous infusion as usual dose 0.5mg/kg/hr.for asthmatic liver cirrhosis patient.	Adjustment the dose to 0.2mg/kg/hr. to prevent life treating arrhythmia
Unusual time of infusion	Prescribed dopamine infusion for shocked patient as 5 drops/mint. Regardless patient weight and dopamine protocol.	Change the dose according to eq:rate of administration in(mls/hr)= $\frac{\text{dose (mcgs)} \times \text{pt's weight (kg)} \times 60\text{mins}}{\text{Volume (mls)}}$ 1000 mcgs X strength (mg)
allergy	Prescribed ampiclox vial for patient allergic to penicillin.	Change to cefotaxim as recommended dose
Wrong indication	Prescribed inderal infusion post MI for asthmatic patient	Prevent that (contraindication).
Unusual frequency	Physician ordered amoxil vial 500mgx3but nurse prescribed to 500mg x 2	Recommended to give at the right interval to prevent therapy failure.
Unusual anticoagulant protocol	Prescribed for treating thromboembolism (loading dose 80 units/kg and maintenance dose 18 units/kg/h) for a patient with an acute coronary syndrome	corrected the error to the acute coronary syndrome schedule/protocol (loading dose 60 units/kg and maintenance dose 12 units/kg/hr

Discussion:

The present study demonstrates that clinical pharmacist intervention can positively contribute to the reduction of problems related to medications in ED.

The benefit of clinical pharmacist involvement in patient care was observed based on the number of interventions he made, and the severity of discovered medication error. Four classes represent the highest number of total intervention performed by the clinical pharmacist, which are (dosage, frequency, route of administration and incompatibility).

This result is in agreement with study conducted by Lada⁽¹¹⁾, who points out these are the four major classes of pharmaceutical interventions had the greatest incidence in ED. In the present study, regarding the frequency and route of administration, it has been found that

administration error done by nurses represent (80%) of the causes that lead to wrong frequency and wrong route of administration. This result are consistent but higher than the study done by Pham JC⁽¹²⁾ that was (65%) and (62%) respectively. Pham JC⁽¹²⁾ explained the reasons that lead to administration error which are due to overcrowded and high stress environment of ED, and absence of rechecked to verbal order given by the physician to nurse. Beside these reasons we found that other factors which are: the nursing staff in ED have scheduled administration time for medication, that might lead to give the patient's dose too earlier or too late, and most of nursing staff depend on their experience that occurred over the years which not necessary to be correct or scientific, some of them have low performance skills due to lack of development and education

program. For all above, our results was higher than expected. Concerning incompatibility , it has been found that types , causes and their occurrence are similar to the study conducted by Brown JN⁽¹³⁾ who also found that the drug - fluid incompatibility represent the most occurring type, while the main cause of incompatibility was due to administration errors .

The severity of medication errors were grouped into categories based on NCC of Medication Error Reporting and Prevention error classification system. Result is in agreement with study done by Jellinek⁽¹⁴⁾ which showed most errors in ED has been fell into two categories : significant and non-significant.Regarding to the senior and resident physician's acceptance results, were in concordance with the study by Fairbanks⁽¹⁵⁾, who reported that (79%) was the acceptance of the senior's, and (82%) was of resident. On the other hand, the result of permanent physician's acceptance were very low in compared with the study conducted by Fairbanks⁽¹⁵⁾, that reported (80%) of permanent accepted the presence and intervention of clinical pharmacist in ED, while our result was only 20%. According to our observation, the permanent physician has high self-confidence, considering his information fresh and updated that make him feel there is no need to the pharmacist in the ED. However , the acceptance of nurse to the presence of clinical pharmacist in our study was 30% that is extremely low when compared with study done by Paparella⁽¹⁶⁾ who shown (90%) of nurses accepted the pharmacist intervention . The reason behind this was due to that nursing staff don't consider drug administration to be challenging because it is the area of expertise for them, and there is no need for further education teaching check - point by the pharmacist to reach excellence in their area, and they neglected the fact that nurse are legally responsible for applying and ensuring the five rights of drug administration which are (the right patient, the right drug, the right dose, the right route, and the right time).

The clinical pharmacist should be integrated with the interdisciplinary of ED team, accompanying daily the work carried out and seeking to add his/her pharmaceutical knowledge as an assistant. It is also possible to verify the promotion of patient safety, since the majority of medication errors occur during the prescription phase and in the process of administration of the medication; thus, the pharmacist has a greater influence for appropriate prescription and use of the medication⁽¹⁷⁾.

References:

- 1.Rothschild JM, Churchil W, Erickson A, Munz K, Schuur JD, Salzberg CA, et al. **The role of clinical pharmacist in ED.** *Ann Emerg Med.* 2010; 55(6):513-21.
2. National Coordinating Council for Medication Error Reporting and revention NCCMERP. **The classification of medication error.**[cited on August 17th 2000].
3. Cobaugh J, Schneider S. **Medication use in the emergency department: Why are we placing patients at risk?** *Am J Health-Syst Pharm.* 2005; 62:1832-4.
4. Pedersen, C. A., P. J. Schneider and D. J. Scheckelhoff. ASHP. **National survey of pharmacy practice in hospital settings: dispensing and administration-2008.** *Am J Health Syst Phar,* (2009).66(10):926-46
5. Institute of Medicine. **Hospital-based emergency care at the breaking point.** Washington, DC: National Academies Press; 2006
6. Croskerry P, Shapiro M, Campbell S, et al. **Profiles in patient safety.** Medication errors in the emergency department. *Acad Emerg Med.* 2004; 11:289-299.
7. ASHP. **Statement on pharmacy services to the emergency department.** *Am J Health Syst Pharm.* 2008; 65:2380-2383.
8. Elenbaas RM,1977, 34:843-6., Powell MF,. 1985, Kohn LT, Corrigan JM, Donaldson MS, eds. **To err is human: building a safer health system.** Washington, DC: National Academy Press; 1999.
9. Joint Commission. Joint Commission rescinds interim action to MM.4.10. **Hospitals still trying to**

comply with prospective pharmacist reviews. Brief Jt Comm 2005;11:2-5., 2007;18:1-3.

10. Idrees, U. and E. Clements. The state of U.S. emergency care: a call to action for hospital pharmacists. Ann pharmacother, (2006) .40 (12) : 2251-3

11. Lada, P and G. Jr. Delgado, Documentation of pharmacists interventions in an emergency department and associated cost avoidance. Am J Health Syst Pharm. (2007). 64(1):63-8

12. Pham JC, Story JL, Hicks RW, et al. National study on the frequency, types, causes, and consequences of voluntarily reported emergency .2009, 513-21

13. Brown JN, Barnes CL, Beasley B, et al. Effect of pharmacists on medication errors in an emergency department. Am J Health Syst Pharm. 2008; 65:330-333.

14. Jellinek S, Cohen V, Fancher L, Likourezos A, Peterson K, Lashley E, et al. Pharmacist improves timely administration of medications to boarded patients in the emergency department. J Emerg Nurs. 2010; 36:105-10.

15. Fairbanks RJ, Hildebrand JM, Kolstee KE, Schneider SM, Shah MN. Medical and nursing staff highly value clinical pharmacists in the emergency department. Emerg Med J. 2007; 24(10):716-9.

16. Paparella S, ENA's. ED Safety Workgroup. Avoid verbal orders. J Emerg Nurs 2004; 30: 157-159.

17. Carter MK, Allin DM, Scott LA, Grauer D. Pharmacist-acquired medication histories in a university hospital emergency department. Am J Health Syst Pharm. 2006; 63(24):2500-3.