

Interventions performed by the clinical pharmacist in the emergency department

Intervenções realizadas pelo farmacêutico clínico na unidade de primeiro atendimento

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ABSTRACT

Objective: To demonstrate the role and importance of the clinical pharmacist in the Emergency Department by means of identification, classification, and assessment of the number of interventions performed by this professional. **Methods:** This was a retrospective study conducted during the period of January 1st, 2010 to December 31st, 2010, at the Morumbi Emergency Department of *Hospital Israelita Albert Einstein*. The interventions were performed by the clinical pharmacists by means of his/her role along with the interdisciplinary team and active search in clinical charts, with daily analysis of medical prescriptions during the period of eight hours (10:00 to 19:00) from Monday to Friday. **Results:** A total of 3,542 medical prescriptions were written and there were 1,238 interventions. Classifications and quantities of interventions were as follows: administration route: 105 (8.48%); frequency: 73 (5.89%); dosage: 431 (35%); renal function: 14 (1.13%); compatibility: 50 (4%); dilution: 121 (9.77%); legibility: 39 (3.15%); pharmacovigilance: 7 (0.56%); adverse reaction to medications: 7 (0.56%); allergy: 35 (2.82%); infusion time: 76 (6.13%); indication: 52 (4.20%); medication reconciliation: 2 (0.16%); enteral medication administration: 38 (3%); scheduling: 7 (0.56%); specific anticoagulant protocol: 44 (3.55%); specific hypoglycemic agent protocol: 42 (3.99%). **Conclusion:** The study allowed the demonstration of the importance of the clinical pharmacist active in the Emergency Department. By the classification and by the number of interventions carried out, it was possible to observe that the Clinical Pharmacy Service had a great impact on the increased safety for the patient and prevention of adverse events.

Keywords: Pharmacists/utilization; Emergency medical services

RESUMO

Objetivo: Demonstrar a atuação e a importância do farmacêutico clínico na Unidade de Primeiro Atendimento por meio da identificação, classificação e do levantamento do número de intervenções

realizadas pelo farmacêutico clínico. **Métodos:** Foi realizado um estudo retrospectivo no período de 1º de janeiro de 2010 a 31 de dezembro de 2010, na Unidade de Primeiro Atendimento Morumbi do Hospital Israelita Albert Einstein. As intervenções foram realizadas pelo farmacêutico clínico por meio da atuação junto à equipe interdisciplinar e busca ativa nos prontuários, com a análise diária da prescrição médica no período de oito horas (10h00 e 19h00) de segunda à sexta-feira. **Resultados:** Foi avaliado o total de 3.542 prescrições médicas e ocorreram 1.238 intervenções. As classificações e as quantidades das intervenções foram: via de administração: 105 (8,48%); frequência: 73 (5,89%); dose: 431 (35%); função renal: 14 (1,13%); compatibilidade: 50 (4%); diluição: 121 (9,77%); legibilidade: 39 (3,15%); farmacovigilância: 7 (0,56%); reação adversa a medicamentos: 7 (0,56%); alergia: 35 (2,82%); tempo de infusão: 76 (6,13%); indicação: 52 (4,20%); reconciliação medicamentosa: 2 (0,16%); medicamentos via sonda: 38 (3%); aprazamento: 7 (0,56%); protocolo específico de anticoagulantes: 44 (3,55%); protocolo específico de hipoglicemiantes: 42 (3,99%). **Conclusão:** O estudo permitiu demonstrar a importância do farmacêutico clínico atuando na Unidade de Primeiro Atendimento. Pela classificação e pelo número das intervenções realizadas, foi possível observar que o Serviço de Farmácia Clínica teve grande impacto no aumento da segurança ao paciente e prevenção de eventos adversos.

Descritores: Farmacêuticos/utilização; Serviços médicos de emergência

INTRODUCTION

Emergency situations may occur in all sectors of the hospital, but their main location is the Emergency Department, which is one of the entrance doors for patients. This sector treats at the tertiary level of healthcare and is designed to receive people in crisis situations, with or without imminent risk of death, who need emergency treatment⁽¹⁾.

Study carried out at Hospital Israelita Albert Einstein – HIAE, São Paulo (SP), Brazil.

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Although a limited number of pharmacists are active in Emergency Medicine, the Emergency Clinical Pharmacy Service has been documented since 1970⁽²⁾, although few hospitals have a clinical pharmacist who is active in the Emergency Department (ED); in the United States, only 1 to 3% of hospitals offer this service⁽³⁾.

Few articles describe the role or effect of the clinical pharmacist at the Emergency Department. Such a lack of data has led to a grand debate as to the need to allocate resources for the Services of Clinical Pharmacy in the ED, and as to how to implant such services in order to promote quality and safety in the Emergency Department⁽⁴⁾.

Recently, some studies have demonstrated that pharmaceutical interventions in the ED may generate reduced costs, and that the clinical pharmacist may increase the quality of care to the patient and safety as to drug therapy; he/she can also identify and prevent errors in medication, since the greatest frequency of avoidable events in hospitals occur in the ED⁽⁵⁻⁷⁾. Errors in medication in the ED may be reduced significantly when the pharmacist revises the prescription, and it was also noted that almost all recommendations made by the pharmacist were accepted by the other healthcare professionals⁽⁸⁾.

Analysis of the medical prescription is one of the main activities of the clinical pharmacist in an ED, since with clinical knowledge of the patient it is possible to analyze the medical prescription and perform pharmaceutical intervention in cases of:

- medications that are not on the hospital's standardized list of drugs; the suggestion is made to the physician for substitution of another drug that is on the formulary of the hospital, and when this is not possible, the medication is bought.
- inexistent pharmaceutical formulation or a formulation inappropriate for administration;
- unsuitable administration route for the administration prescribed;
- inexistent dosage and/or a dosage greater or smaller than the usually prescribed dosage;
- unsuitable frequency of administration of the drug;
- unsuitable mode of administration relative to that described in literature;
- unsuitable or incompatible diluent for use with the prescribed medication, diluents and packaging;
- incompatibility among medications;
- prescription of medications with the same pharmacologic action;
- illegible medications or those with incomplete descriptions;

- other nonconformities that need to be clarified by the medical team.

Besides pharmaceutical interventions, other benefits related to the role of the clinical pharmacist in the ED include participation along with the interdisciplinary team, interaction with the patient in order to obtain a history of medications habitually used, provision of information about medications, including specific information on dosage adjustments of medications for renal insufficiency, age, or weight, toxicological and pharmacological information, instructions as to administration and substitution of medications, or any other questions regarding the use of the drugs⁽⁹⁾.

Pharmaceutical interventions are performed in order to obtain correct and safe use of the medications.

OBJECTIVE

The objective of this study was to demonstrate the role and importance of the clinical pharmacist in the ED by identification, classification, and investigation of the number of interventions performed by the clinical pharmacist.

METHODS

A retrospective study was conducted during the period of January 1st, 2010 to December 31st, 2010, at the Morumbi ED of *Hospital Israelita Albert Einstein* (HIAE). This unit sees adult and pediatric patients, daily treating approximately 400 cases in the clinical areas of obstetrics, clinical, surgical, psychiatric, pediatric, and trauma.

The Pharmacy Service initiated in the ED in March 2009. Interventions were performed by the clinical pharmacist by means of cooperation with the interdisciplinary team through an active search in clinical charts, with analysis of the daily medical prescription over an 8-hour period (10:00 – 19:00), from Monday to Friday. Interventions were referred to the clinical pharmacy coordinator daily by e-mail at the time of shift changing, and it was possible to acquire data using these records.

According to the analysis of the medical prescription, the clinical pharmacist made interventions as to the pertinence of the medication, its indication, dose, frequency, and route of administration (oral, tube, intravenous and intramuscular). For medications given by tubes, there was evaluation of a possible substitution when tablets or capsules prescribed are not to be broken, crushed or opened, and substitution of tablets or capsules with drops or oral suspensions. Medical prescription

evaluation for pediatric and neonatal patients was made as to dosage related to weight, adjustment of dosage or frequency for antimicrobials prescribed in cases of renal failure, therapeutic duplicity, real or potential allergies or sensitivities, drug-drug interactions, legibility, scheduling, compatibility, medication reconciliation, dilution, and time of infusion. Patients receiving anticoagulants and hypoglycemic agents were followed by means of specific protocols, in which the pharmacist assessed the prescription of intravenous heparin, warfarin, regular insulin and lispro insulin.

Nonconformities verified in prescriptions were previously consulted in specific literature. By means of technical consultation, the pharmacist made contact with the physician or care team for the resolution of the irregularity found and recorded on the clinical chart (prescription and multi-professional clinical progress) the change made or the position taken.

RESULTS

During the period from January 1st to December 31st, a total of 3,542 medical prescriptions were evaluated and there were 1,238 interventions. The classifications and quantities of interventions were related to route of administration 105 (8.48%), frequency 73 (5.89%), dosage 431 (35%), renal function 14 (1.13%), compatibility 50 (4%), dilution 121 (9.77%), legibility 39 (3.15%), pharmacovigilance 7 (0.56%), adverse

reaction to medications (ARM) 7 (0.56%), allergies 35 (2.82%), time of infusion 76 (6.13%), indication 52 (4.20%), medication reconciliation 2 (0.16%), enteral administration of medications 38 (3%), scheduling 7 (0.56%), specific protocol for anticoagulants 44 (3.55%) and specific protocol for hypoglycemic agents 42 (3.99%).

Figure 1 illustrates the classification and number of pharmaceutical interventions performed.

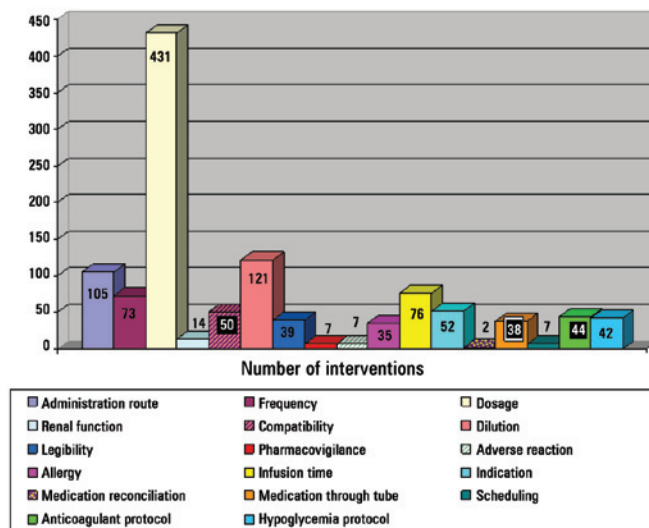


Figure 1. General classification of pharmaceutical interventions performed in the Emergency Department

Chart 1. Description of pharmaceutical interventions in the Emergency Department

Classification of the intervention	Description of case	Pharmaceutical intervention	Resolution
Not usual dose	Prescribed for 5-day-old newborn, 2,900 kg: cefotaxime 50 mg IV every 8 hours	Dose of cefotaxime lower than recommended in literature (100 to 150 mg/kg/day) divided into every 8 to 12 hours	Changed to: cefotaxime 150 mg IV every 12 hours
	Prescribed for 4-month-old infant, 7 kg: Clavulin® BD 400 mg/5 mL 3 mL PO now	Dose indicated for 7-kg child: 1.1 to 2.0 mL	Changed to: Clavulin® BD 400 mg/mL 2 mL PO now
	Prescribed for one elderly patient: clarithromycin 500 mg PO every 12 hours, patient with Clcr = 178 mL/min	Recommended adjustment of the dose of clarithromycin for patients with Clcr < 30 mL/min: half the dose or double the administration interval	Changed to: clarithromycin 250 mg PO every 12 hours
Inadequate dilution	Prescribed polymyxin B 500.000 IU + NS 250 mL IV every 12 hours	Recommended dissolution of polymyxin B sulfate 500.000 IU in 300 to 500 mL of 5% dextrose in water for continuous intravenous infusion	Changed to: polymyxin B 500.000 IU + 5% GS 300 mL IV every 12 hours
Not usual route of administration	Prescribed for 11-year-old child weighing 37 kg: NS 100 mL + Humalog® insulin (lispro insulin) 100 IU IV 3.7 IU/h (0.1 IU/kg/hour)	Humalog® insulin has no indication for intravenous administration; give subcutaneously only	Changed to: NS 100 mL + Humulin R insulin (regular insulin) 100 IU IV 3.7 IU/h (0.1 IU/kg/hour)
Inadequate infusion time	Prescribed: hypertonic solution (NaCl 3%): NS 450 mL + NaCl 20% 50 mL IV in 1 hour	Recommendation that for the administration of hypertonic solutions (3 or 5%), the maximal velocity should not exceed 100 mL/hour	Change of time of infusion of NS 450 mL + NaCl 20% IV in 1 hour to infusion in 5 hours
Inadequate frequency of administration	Prescribed: Fentanyl (Durogesic®) 25 mcg TD once a day	Recommendation that Durogesic® TD be changed every 72 hours	Changed to: Fentanyl (Durogesic®) 25 mcg TD once every 72 hours

IV: intravenous; PO: orally; Clcr: creatinine clearance; NS: normal saline; TD: transdermal; GS: glucose solution.

Seventeen types of interventions were classified. We selected the five that showed greatest incidence and that represent the majority of the cases: dosage (431), dilution (121), route of administration (105), time of infusion (76) and frequency (73). The descriptions of these five types of interventions are on chart 1.

DISCUSSION

This study demonstrates that pharmaceutical intervention can positively contribute to the reduction of problems related to medications (PRMs). The benefit of clinical pharmacist involvement in patient care was observed based on the number of interventions that occurred. Dose-related interventions represent 35% of the total number of interventions performed, for example, medications prescribed without the dosage, dosage higher or lower than usual, wrong dosage presentation or unavailable on the market, indicating a great impact on the prevention of medication errors. A similar study conducted at the Detroit Receiving Hospital, in Detroit, Michigan, points out two major classes of pharmaceutical interventions that consist in the appropriate selection of medications and in the most appropriate dosage of the medication prescribed⁽¹⁰⁾.

On the other hand, interventions classified in medication reconciliation represent the smallest number: only two interventions of the 1238 performed. This number may be justified considering that at HIAE there is a policy of medication reconciliation that may be performed within 48 hours after hospital admission, as it is not a priority in the Emergency Department.

Interventions classified as allergies are very important, due to the high risk of administration of medications prescribed to which the patient reports having an allergy, as well as in the case of allergic cross-reactions. Despite the number of interventions not being as significant as others that showed a higher incidence, the fact of avoiding the inadvertent use in cases of allergies is extremely important for the safety of the patient. The clinical pharmacists should be alert regarding allergies notified by the patient and recording the said allergy on the medical prescription. Problems with information about allergies have been reported in literature, and some studies suggest that the involvement of the pharmacist is fundamental for its identification⁽¹¹⁾.

Frequency for administration of medications represents a large part of the interventions performed; the clinical pharmacist present in the ED can identify any irregularity and if the frequency of dosing is not appropriate, that is, if it is higher or lower than what is

recommended, or if information is not provided on the medical prescription he/she is responsible for contacting the prescribing physician for confirmation and warning as to the correct frequency of the medication, avoiding administration at wrong intervals.

The clinical pharmacist should be integrated with the interdisciplinary 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⁽¹²⁾.

The ED offers a wide range of services, activities, and opportunities for the clinical pharmacist's participation. One should consider the need for services for the management of drug therapy, evaluation, and clarification as to allergy to medications, evaluation of the prescription as to medicinal interaction, and preparation of reports on pharmaceutical interventions related to errors of medication and adverse reactions to drugs⁽¹³⁾. These activities demonstrate the role of the clinical pharmacist in the ED and are directly related to the interventions described in this study.

One limitation to be considered is that the clinical pharmacist has not been present in the ED fulltime. Data demonstrate the importance of the presence of the professional in the ED in order to assure total patient safety and future participation of the clinical pharmacist in the Emergency Department.

The role of the pharmacist in the ED is rapidly evolving. Currently, it is estimated that less than 5% of the emergency departments have a clinical pharmacist; the expectation, however, is that there be an increase over the next few years. The presence of the clinical pharmacist in the ED will also be needed due to increased requirements of the Joint Commission related to the revision of the medical prescription by the pharmacist⁽¹⁴⁾. One study on the establishment of the Clinical Pharmacy Service in the ED suggests that the pharmacist may improve the fulfillment of safety goals for the patient as per the Joint International Commission, besides promoting safety and effective care to the patient, avoiding medication errors and offering support to healthcare professional by means of information on medications⁽¹⁵⁾.

Pharmaceutical interventions generate direct benefits for the patient and for the interdisciplinary team, besides affording an increment of the quality of patient treatment. The ED is a dynamic sector and

the interventions performed by the clinical pharmacist may bring better results, thus guaranteeing safety in drug therapy.

CONCLUSION

The study allowed the demonstration of the importance of the clinical pharmacist's role in an ED. Using the classification and number of interventions performed, it was possible to observe that the Clinical Pharmacy Service had a great impact on increased safety for the patient and prevention of adverse events.

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