

## DRUG INTERACTION IN ELDERLY INPATIENTS IN THE EMERGENCY DEPARTMENT OF A UNIVERSITY HOSPITAL

### INTERAÇÃO MEDICAMENTOSA EM IDOSOS INTERNADOS NO SERVIÇO DE EMERGÊNCIA DE UM HOSPITAL UNIVERSITÁRIO

### INTERACCIÓN MEDICAMENTOSA EN ADULTOS MAYORES INGRESADOS EN EL SERVICIO DE URGENCIAS DE UN HOSPITAL UNIVERSITARIO

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#### ABSTRACT

**Objective:** To identify the occurrence of potential drug interactions in prescriptions for elderly patients in the emergency department. **Methods:** Cross-sectional study with sample of 101 medical prescriptions of the first 24 hours of admission of elderly in the Emergency Room. Analysis of drug interactions was performed by Drugs.com database, which were classified as the potential for interaction: severe, moderate and mild. **Results:** The number of drug prescriptions ranged 2-14 with an average of 5.8 per prescription. 587 drugs were included. There were identified 7% of severe interactions, 26.8% moderate and 7% mild; 11.3% severe / moderate, 21.1% moderate / mild and 26.8% severe / moderate / mild. **Conclusion:** This study identified drug interactions in prescriptions for elderly patients in the Emergency Room. They were mainly classified as moderate interactions. It is emphasized the importance of health professionals to take heed to potential interactions, monitoring prescriptions, staff training and monitoring of cases in order to reduce its occurrence.

**Keywords:** Drug Interactions; Aged; Patient Safety; Health of the Elderly.

#### RESUMO

**Objetivo:** identificar a ocorrência de potenciais interações medicamentosas em prescrições médicas de idosos internados no Serviço de Emergência. **Métodos:** estudo transversal, amostra composta de 101 prescrições médicas das primeiras 24 horas de internação de idosos na sala de Emergências Clínicas do Pronto-Socorro. A análise das interações medicamentosas foi realizada pela base de dados Drugs.com, classificadas quanto ao potencial de interação em: grave, moderada e leve. **Resultados:** o número de medicamentos das prescrições variou de duas a 14, com média de 5,8 por prescrição. Foram incluídos 587 medicamentos e identificaram-se 7% de interações graves, 26,8% moderadas e 7% leves; 11,3% grave/moderada, 21,1% moderada/leve e 26,8% grave/moderada/leve. **Conclusão:** este estudo identificou interações medicamentosas em prescrições médicas de idosos no Serviço de Emergência, classificadas, sobretudo, como moderadas. Ressalta-se a importância de os profissionais de saúde atentarem para as potenciais interações, apazamento das prescrições, capacitação da equipe e monitoramento dos casos a fim de reduzir sua ocorrência.

**Palavras-chave:** Interações de Medicamentos; Idoso; Segurança do Paciente; Saúde do Idoso.

#### RESUMEN

Identificar la incidencia de potenciales interacciones medicamentosas en las recetas médicas para adultos mayores internados en el servicio de urgencias. Se trata de un estudio transversal en una muestra compuesta de 101 recetas médicas de las primeras 24 horas de internación de adultos mayores en emergencias clínicas. El análisis de las interacciones medicamentosas fue realizado por la base de datos Drugs.com; la interacción medicamentosa fue clasificada según su potencial de interacción como leve, moderada o grave. El número de medicamentos de las recetas variaba entre 2 y 14 con un promedio de 5,8 por receta. Fueron incluidos 587 medicamentos y fueron identificadas 7% de interacciones graves, 26,8% moderadas y 7% leves; 11,3% graves / moderadas; 21,1% moderadas / leves y 26,8% graves / moderadas / leves. Este estudio ha identificado interacciones medicamentosas en las recetas para pacientes de edad avanzada en el servicio de urgencias clasificadas principalmente como moderadas. Es sumamente importante que los profesionales de la salud tengan en cuenta las potenciales interacciones medicamentosas, el plazo de las recetas, la capacitación del personal y el seguimiento de los casos con miras a reducir la incidencia de dichas interacciones.

**Palabras clave:** Interacciones de Drogas, Anciano, Seguridad Del Paciente; Salud del Anciano.

## INTRODUCTION

Brazil in 2025, according to the World Health Organization, will be the sixth highest country in the world for the number of elderly people, around 32 million people. According to the Brazilian Institute of Geography and Statistics (IBGE in Portuguese), and based on the population census, a Brazilian demographic transition has been observed, with modification of the population structure. In 1980, there was a predominantly young population. In 1991 the elderly were 7.3% of the population in 2000 became 8.6% and in 2010 this percentage reached 10.8%.<sup>1-4</sup>

The United Nations (UN) classifies elderliness in a different way between developed and developing countries. In the first, older people are those aged over 65, while in developing countries, such as Brazil, are people aged 60 or older.<sup>2</sup>

The increase in life expectancy of the population is accompanied by the prevalence of chronic diseases, which are a major cause of disability and dependence among the elderly. About 80% of seniors have at least one chronic illness and need frequent medical care.<sup>5</sup>

In this population, the occurrence of polypharmacy (the use of several medications at the same time) is constantly seen, due to the exponential increase in the prevalence of chronic diseases and the consequences that go along with advancing age, accompanied by high number of prescriptions taught to a significant proportion of health professionals.<sup>6-7</sup>

The elderly consume about three times more medication than young people do, due to their various diseases.<sup>5</sup> Seniors between 65 and 69 years consume 13.6 medications per year and those between 80 and 84 years can consume up to 18.4 medications each year.<sup>6</sup> Polypharmacy is considered a risk factor for drug interactions and adverse reactions. The first occurs when the effects of some drugs are modified by another, altering their effectiveness and can increase it or decrease it, beneficially or harmfully.<sup>5,7</sup> Adverse reactions are adverse effects that occur during drug treatment and may be associated, in the elderly, to the change in the drug's ability to act arising from changes in physiological functions of these patients, which means, there may be changes in the absorption, distribution, metabolism and excretion of medication.<sup>7</sup>

Seniors also use more hospital services, treatment with longer duration of high cost and their recovery usually takes longer and it is more complex, mainly due to chronic diseases and their complications, which creates increased demand for emergency services by this population, revealing the need for further adaptation of that service to the new epidemiological profile of the population.<sup>8,9</sup>

One aspect that has also been studied in this population of older people is the fragility, understood as a multidimensional syndrome involving biological, cognitive, physical, social,

economic and environmental factors. Frailty is a risk factor for disability, falls, hospitalization and death among the elderly. According to the literature, the number of medications is associated with increased weakness of the elderly.<sup>10</sup>

The weakness can directly affect the lives of the elderly, it makes them dependent for activities of daily living (ADLs), such as answering the phone, performing household chores, purchasing groceries, using medication. Apart from the dependence to perform ADLs, the weakness may also be related to impairment of homeostatic mechanisms, disabling chronic illness, decreased muscle strength, mobility, balance, fall, disability, hospitalization and usage of four or more medications.<sup>10</sup>

In Brazil, the establishment of the National Patient Safety Program aims to prevent and reduce adverse events related to assistance in health services, offering quality service and free from damage to users. Ordinance MS / GM No 529/2013 provides that a set of basic protocols should be deployed to patient safety, including the safety protocol in prescription, use and administration of medications.<sup>11</sup>

Emergency services have special characteristics, units with frequent overcrowding of patients and insufficient human and physical resources. And when it comes to the specifics of care, it requires specialized team for the appropriate care of patients with diseases, in a quick and with quality manner, considering aspects such as security and emotional support to patients and family members.<sup>12</sup> Patient safety in drug therapy and assistance free of risks and failures are worth mentioning mainly by the use of several drugs, the severity and instability of patients, which make them more prone to drug interactions and errors. Nursing is important for drug patient safety, since it is directly involved in all stages of the drug regimen, and may play a key role in preventing mistakes.<sup>13</sup>

According to the judgment of COREN SP-036 / 2013,<sup>14</sup> it is understood that is private to nurse the medical prescriptions postponements because of the possibility of drug interactions that can result in damage to the therapeutic process of the patient. It is of nurses responsibilities the preparation, administration, postponements and monitoring of medication administered, so that they can prevent drug interactions and do proper planning of medications and their intervals, controlling any possible harm to the patient and their families.<sup>15</sup>

Emergency services in the immediate elder care in critical condition requires essential clinical reasoning of the physician, the pharmacist and the nurse on the use of drugs, avoiding possible interaction or decrease of the effectiveness of treatment.

Polypharmacy is common in the elderly, increasing the risk of drug interactions and adverse reactions<sup>16</sup>. Given the scarcity of publications on drug interactions in the elderly in the emergency department, this study aims to provide subsidies to improve the safety of the population in these services.

## OBJECTIVES

To identify the occurrence of potential drug interactions in medical prescriptions for elderly patients admitted to the Emergency Room.

## METHODS

Cross-sectional study conducted at the Sao Paulo Hospital. The sample was obtained by convenience and composed of 101 prescriptions for the elderly within the first 24 hours of admission in the Clinical Emergencies subdivision of the Emergency Room area in the period from March to June 2014.

Inclusion criteria were 60 years of age or older, be at least for 24 hours admitted to the emergency room and with prescriptions dated the day data was collected. Prescriptions for patients with only one item were excluded. Data collection was performed by full transcript of prescriptions for individual files. The recorded variables were: socio-demographic, date of hospitalization, medical history, drug name, dosage, dosage form and route of administration.

The analysis of drug interactions (DI) was performed based on data available at Drugs.com database, pairing up all existing drugs on the prescriptions and obtaining a list, which were classified according to the potential drug interactions in: severe, which may present a risk of death and / or require some urgent medical intervention to minimize these risks or their serious adverse effects; moderate, which can enhance the patient's clinical conditions and / or require exchange of drug therapy; and mild, classified as interactions with minimal clinical effects and may increase the frequency or severity of side effects but without the need to change in drug therapy.<sup>17</sup>

Data were analyzed using descriptive statistics and presented in tables. The study was conducted after review and approval by the Ethics Committee of the Federal University of Sao Paulo (CAAE: 28238814.8.0000.5505).

## RESULTS

In this study there was a predominance of female patients with white skin color, retirees or pensioners, low education level, most had family income between one and two minimum wages and had a caregiver (Table 1).

The most frequent items of personal medical history found in the elderly were hypertension (65.3%), diabetes mellitus (36.6%) and cardiovascular disease (27.7%).

The number of drug prescriptions ranged from two to 14; the average per prescription was 5.8 drugs of the total of 101 prescriptions. 587 drugs were included, the most common being omeprazole (7%), simvastatin (5.5%) and enoxaparin (5.4%).

Table 1 - Socio-demographic and economic characteristics of patients in the emergency room, from March to June, Sao Paulo, 2014

| Characteristics   | n (%)       |
|---|-------------|
| Age (years)(Average ± DP)                               | 75.0 (8.5)  |
| <b>Gender</b>   |             |
| Male  | 50.0 (49.5) |
| Female  | 51.0 (50.5) |
| <b>Skin color</b>                                       |             |
| White   | 61.0 (60.4) |
| Brown   | 21.0 (20.8) |
| Black   | 11.0 (10.9) |
| Yellow  | 8.0 (7.9)   |
| <b>Occupation</b>                                       |             |
| Retired/Pensioner                                       | 90.0 (89.1) |
| Employed  | 5.0 (5.0)   |
| Housekeeper   | 5.0 (5.0)   |
| Unemployed  | 1.0 (1.0)   |
| <b>Education</b>  |             |
| Illiterate/High School Incomplete                       | 79.0(78.2)  |
| Middle School   | 12.0 (11.9) |
| High School   | 7.0(7.0)    |
| College   | 3.0 (3.0)   |
| <b>Monthly family income (reais)</b>                    |             |
| Below minimum wage                                      | 7.0 (6.9)   |
| 1 to 2 minimum wage value                               | 91.0 (90.1) |
| 3 to 5 minimum wage value                               | 3.0 (3.0)   |
| Individuals depending from family income (Average ± SD) | 2.0 (1.0)   |
| <b>Presence of caregiver</b>                            |             |
| Yes   | 85.0 (84.2) |
| No  | 16.0 (15.8) |

\* Values expressed as number (%) and mean (SD).

The time of the day, dosage form and route of administration of the prescribed drug in the emergency room are shown in Table 2 (Table 2).

After analyzes made based on data available at Drugs.com database, potential drug interactions have been identified as, five (7%) serious interactions; 19 (26.8%) moderate interactions and five (7%) mild. Some prescriptions had more than one interaction: eight (11.3%) severe and moderate; 15 (21.1%) moderate and mild; 19 (26.8%) severe, moderate and mild. Table 3 shows the DIs classified as serious according to the Drugs.com site (Table 3).

Table 4 shows the DIs classified as moderate as found in Drugs.com website (Table 4).

Table 5 shows the DIs classified as mild as found in Drugs.com website (Table 5).

Table 2 - Period, dosage form and route of administration of medications prescribed to elderly patients admitted in the emergency room, from March to June, Sao Paulo, 2014

| Variables                        | n (%)                |
|----------------------------------|----------------------|
| <b>Time of the day</b>           |                      |
| Morning                          | 94.0 (16.1)          |
| Afternoon                        | 52.0 (8.9)           |
| Night                            | 106.0 (18.2)         |
| Morning/Afternoon                | 10.0 (1.7)           |
| Morning/Night                    | 122.0 (20.9)         |
| Afternoon/Night                  | 84.0 (14.4)          |
| Morning/Afternoon/Night          | 116.0 (19.9)         |
| <b>Dosage form</b>               |                      |
| Pills                            | 306 (52.4)           |
| Solutions                        | 277 (47.4)           |
| Ampoule                          | 28 (4.8)             |
| <b>Route of administration</b>   |                      |
| Intravenous                      | 189.0 (32.4)         |
| By mouth                         | 302.0 (51.7)         |
| Intramuscular                    | 4.0 (0.7)            |
| Subcutaneous                     | 62.0 (10.6)          |
| Inhalation                       | 11.0 (1.9)           |
| Topical                          | 1.0 (0.2)            |
| Gastrostomy/nasogastric catheter | 15.0 (2.6)           |
| <b>Total</b>                     | <b>584.0 (100.0)</b> |

Table 3 - Frequency of drug interactions classified as severe found on the prescriptions of elderly patients in the emergency room, from March to June, Sao Paulo, 2014

| Drug I                   | Drug II                | N    | (%)    |
|--------------------------|------------------------|------|--------|
| Acetylsalicylic acid     | Enoxaparin sodium      | 12.0 | (25.5) |
| Acetylsalicylic acid     | Warfarin sodium        | 1.0  | (2.1)  |
| Amiodarone hydrochloride | Ciprofloxacin          | 1.0  | (2.1)  |
| Amiodarone hydrochloride | Diltiazem              | 1.0  | (2.1)  |
| Amiodarone hydrochloride | Furosemide             | 2.0  | (4.3)  |
| Amiodarone hydrochloride | Simvastatin            | 2.0  | (4.3)  |
| Amlodipine besylate      | Simvastatin            | 2.0  | (4.3)  |
| Captopril                | Sodium chloride        | 1.0  | (2.1)  |
| Captopril                | Losartan               | 1.0  | (2.1)  |
| Carvedilol               | Formoterol fumarate    | 1.0  | (2.1)  |
| Ciprofloxacin            | Tramadol hydrochloride | 2.0  | (4.3)  |
| Clarithromycin           | Simvastatin            | 2.0  | (4.3)  |
| Clopidogrel              | Enoxaparin             | 3.0  | (6.4)  |

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Table 3 - Frequency of drug interactions classified as severe found on the prescriptions of elderly patients in the emergency room, from March to June, Sao Paulo, 2014

| Drug I                       | Drug II                | N         | (%)            |
|------------------------------|------------------------|-----------|----------------|
| Diltiazem hydrochloride      | Simvastatin            | 2.0       | (4.3)          |
| Dimenhydrinate               | Sodium chloride        | 1.0       | (2.1)          |
| Enalapril                    | Spirolactone           | 3.0       | (6.4)          |
| Enoxaparin                   | Warfarin sodium        | 2.0       | (4.3)          |
| Spirolactone                 | Losartan               | 1.0       | (2.1)          |
| Fluconazole                  | Simvastatin            | 1.0       | (2.1)          |
| Potassium chloride           | Losartan               | 1.0       | (2.1)          |
| Levofloxacin                 | Prednisone             | 1.0       | (2.1)          |
| Imipenem                     | Tramadol hydrochloride | 1.0       | (2.1)          |
| Metoclopramide hydrochloride | Tramadol hydrochloride | 2.0       | (4.3)          |
| Morphine                     | Tramadol hydrochloride | 1.0       | (2.1)          |
| <b>Total</b>                 | <b>-</b>               | <b>47</b> | <b>(100.0)</b> |

Table 4 - Frequency of drug interactions classified as moderate found on the prescriptions of elderly patients in the emergency room, from March to June, Sao Paulo, 2014

| Drug I               | Drug II             | N            | (%)            |
|----------------------|---------------------|--------------|----------------|
| Acetylsalicylic acid | Amlodipine besylate | 3.0          | (1.4)          |
| Acetylsalicylic acid | Captopril           | 7.0          | (3.2)          |
| Acetylsalicylic acid | Ciprofloxacin       | 6.0          | (2.7)          |
| Acetylsalicylic acid | Clopidogrel         | 4.0          | (1.8)          |
| Acetylsalicylic acid | Enalapril           | 7.0          | (3.2)          |
| Acetylsalicylic acid | Heparin sodium      | 3.0          | (1.4)          |
| Acetylsalicylic acid | Losartan            | 9.0          | (4.1)          |
| Acetylsalicylic acid | Nifedipine          | 4.0          | (1.8)          |
| Atenolol             | Hydrochlorothiazide | 3.0          | (1.4)          |
| Captopril            | Enoxaparin          | 6.0          | (2.7)          |
| Enalapril            | Enoxaparin          | 4.0          | (1.8)          |
| Enalapril            | Furosemide          | 3.0          | (1.4)          |
| Enalapril            | Heparin             | 3.0          | (1.4)          |
| Enalapril            | Hydrochlorothiazide | 5.0          | (2.0)          |
| Enalapril            | Metformin           | 3.0          | (1.4)          |
| Furosemide           | Omeprazole          | 4.0          | (1.8)          |
| Hydrochlorothiazide  | Omeprazole          | 6.0          | (2.7)          |
| Nifedipine           | Simvastatin         | 3.0          | (1.4)          |
| Omeprazole           | Simvastatin         | 14.0         | (6.4)          |
| Others*              | Others              | 123.0        | (56.0)         |
| <b>Total</b>         | <b>-</b>            | <b>220.0</b> | <b>(100.0)</b> |

\* Frequency < 1.4% were included in the Others category.

Table 5 - Frequency of drug interactions classified as light found on the prescriptions of elderly patients in the emergency room, from March to June, Sao Paulo, 2014

| Drug I               | Drug II             | N    | (%)     |
|----------------------|---------------------|------|---------|
| Acetylsalicylic acid | Atenolol            | 2.0  | (2.7)   |
| Acetylsalicylic acid | Carvedilol          | 4.0  | (5.3)   |
| Acetylsalicylic acid | Spironolactone      | 2.0  | (2.7)   |
| Acetylsalicylic acid | Furosemide          | 6.0  | (7.9)   |
| Acetylsalicylic acid | Omeprazole          | 13.0 | (17.1)  |
| Amlodipine besylate  | Hydrochlorothiazide | 3.0  | (3.9)   |
| Atenolol             | Levothyroxine       | 3.0  | (3.9)   |
| Ceftriaxone          | Heparin             | 2.0  | (2.7)   |
| Ceftriaxone          | Heparin             | 4.0  | (5.3)   |
| Ciprofloxacin        | Omeprazole          | 3.0  | (3.9)   |
| Clarithromycin       | Omeprazole          | 2.0  | (2.7)   |
| Enalapril            | Nifedipine          | 3.0  | (3.9)   |
| Phenobarbital        | Omeprazole          | 2.0  | (2.7)   |
| Heparin              | Piperacillin sodium | 2.0  | (2.7)   |
| Levothyroxine        | Simvastatin         | 5.0  | (6.6)   |
| Nifedipine           | Omeprazole          | 3.0  | (3.9)   |
| Others*              | Others              | 17.0 | (22.1)  |
| Total                | -                   | 76.0 | (100.0) |

\* Frequency < 1.4% were included in the Others category.

## DISCUSSION

In this study, there was a predominance of female patients with white skin color, retirees or pensioners, low education, the average age was of 75 years old, the majority had household incomes between one and two minimum wages and had a caregiver. Similar data were observed in a study in the service of emergency of a municipality of Belo Horizonte, where 13% of cases corresponded to people aged 70 or more and most matched the female population.<sup>9</sup> Low income can directly interfere in the access to health and education, and food and social care, which can compromise the quality of life for seniors of this research.<sup>18</sup>

Multiple diseases accompany the aging process. In this study the most common personal medical history were systemic arterial hypertension, diabetes mellitus and cardiovascular disease, as observed in another study in Sao Paulo.<sup>19</sup>

The number of drug prescriptions ranged from two to 14, while the average for prescription drugs was 5.8. 587 drugs were included, and the most prescribed were omeprazole, simvastatin and enoxaparin. In a study looking at potential drug prescriptions for patients admitted to an Intensive Care Unit, we identified more variation in the number of drugs, between 5 and 22, with an average of 10.9 medications per prescription.<sup>20</sup>

After an examination on the website Drugs.com, we identified potential drug interactions as: five (7%) severe, 19 (26.8%) moderate and five (7%) mild; eight (11.3%) severe / moderate; 15 (21.1%) moderate / mild, and 19 (26.8%) severe / moderate / mild. Another study showed that there was also a prevalence of moderate interactions (65%), followed by severe (24%) and mild (9%).<sup>20</sup> In relation to severe DIs, the most common was between aspirin and enoxaparin sodium, with a frequency of 25.5%. As evidenced in another study, DI between aspirin and enoxaparin sodium was also one of the most common, in about 10% of prescriptions.<sup>21</sup> According to the website Drugs.com, this interaction may cause the complications of increased bleeding, headaches, dizziness or weakness and even blood in the urine and feces during treatment.<sup>17</sup> Another study, conducted in Swiss hospitals with elderly patients, found that those with polypharmacy who used vitamin K antagonists showed higher risk of bleeding than patients without polypharmacy.<sup>22</sup>

In the case of DIs moderate, mostly were related to the use of omeprazole and simvastatin. This association may increase the effects of simvastatin, increasing the risk of side effects such as liver damage, kidney and skeletal muscle degradation. It is important to monitor for fever, chills, joint pain, nausea and vomiting, fatigue, jaundice of the skin or eyes, rash that could be signs and symptoms of hepatic injury.<sup>23</sup>

As for mild DIs, it is unusual for the DI to cause damage or require any change in drug therapy. It was observed that the most frequent DI was the association between aspirin and furosemide (7.9%). Some drug interactions may be clinically relevant in all patients.<sup>23</sup> In another study, mild DI accounted for 9% of prescriptions.<sup>20</sup>

Whereas polypharmacy is common in the elderly population<sup>22-24</sup>, this study draws attention to the nurses for the postponement of medical prescriptions in order to avoid medications to be administered simultaneously that can interact and/or interfere with the effectiveness of treatment.

In addition, this study contributes to the literature on the subject, emphasizing the importance of physicians, nurses and pharmacists tuned to reduce drug interactions and adverse events.

## CONCLUSION

This study identified the occurrence of possible drug interactions in medical prescriptions for elderly patients in the Emergency Room of the Sao Paulo Hospital, being most of them identified as moderate.

Therefore, we emphasize the importance of health professionals to be aware of the potential drug interactions, the postponement of judicious prescriptions, staff training and monitoring of cases of adverse effects and interactions, in order to

reduce its occurrence. However, some limitations of this study should be highlighted, such as the small sample size and the fact that it was conducted at a single center.

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