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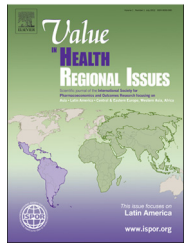

Economic Impact of Emergency Visits due to Drug-Related Morbidity on a Brazilian Hospital

Gabriel Rodrigues Martins de Freitas, MSc[1,*], *Mariana Younes Tramontina, MSc*[1], *Giacomo Balbinotto, MSc, PhD*[2], *Dyfrig Arwyn Hughes, MSc, PhD*[3], *Isabela Heineck, MSc, PhD*[1]

[1]*Faculty of Pharmacy, Federal University of Rio Grande do Sul, Porto Alegre, Brazil;* [2]*Faculty of Economics Sciences, Federal University of Rio Grande do Sul, Porto Alegre, Brazil;* [3]*Centre for Health Economics and Medicines Evaluation, Bangor University, Bangor, Wales, UK*

ABSTRACT

Objectives: To estimate the cost of managing drug-related morbidity (DRM) that leads to visits to the emergency department of a Brazilian hospital. **Methods:** This is a cost-of-illness study based on a retrospective cross-sectional analysis of patients' medical records. A questionnaire and analysis of medical records were used to identify patients who were being admitted to the emergency department because of DRM. The direct medical costs of patient management were estimated using a microcosting analysis, and a sensitivity analysis was conducted using the emergency department visit rates due to DRM reported in the literature. **Results:** Of the total patients interviewed, 14.6% sought emergency care because of DRM and 58.9% were considered preventable. Mean treatment costs were US $900 ± $1,569 (range US $18–$10,847). An extrapolation based on all emergency visits in the last year resulted in annual total treatment costs of US $7.5 million (US $1.1–$1.4 million). It was observed that 39.3% of the total cost of DRM was attributed to adverse drug reactions, 36.9% to nonadherence to treatment, and 16.9% to incorrect dosages. **Conclusions:** Adverse drug reactions and nonadherence to treatment are important causes of morbidity and cost to the health service. Much of this resource is spent to treat preventable cases of DRM, which represents a great waste of resources.

Keywords: costs, drug-related morbidity, emergency visits, microcosting.

Introduction

Drug-related morbidity and mortality (DRM) remains highly prevalent and burdensome to patients and health care systems. A recent systematic review estimated that 5% to 25% of all hospitalizations and more than 12% of visits to the emergency department are drug-related, of which 50% to 70% are preventable [1]. A systematic review with data from eight retrospective and four prospective studies indicated that problems involving pharmacotherapy are implicated in 28% of emergency cases, of which 24% result in hospital admission [2]. Almost 4 in 10 emergency visits due to adverse drug events (ADEs) are not attributed to medication-related problems by emergency physicians, and these patients are wrongly treated [3].

Another systematic review [4] of 39 studies, involving 62,480 patients, showed that adverse drug reactions (ADRs) are ranked between the fourth and sixth leading causes of death and serious adverse reactions result in 6.7% of all hospital admissions. Comparable figures are evident in England, where an estimated 6.5% of hospital admissions result from ADRs, which would lead to about 38,000 annual hospital admissions nationally [5]. A prospective survey indicated that ADEs account for up to 12% of visits to the emergency department in a tertiary hospital in Canada [6].

A study in Brazil [7] showed that one-third of patients who sought care in the emergency department of the researched hospital did so because of drug-related problems (DRPs). Another Brazilian study [8] identified ADRs to occur in 25.9% of patients admitted to a tertiary hospital, with 19.2% of the ADRs occurring before admission and 80.8% occurring during the hospital stay.

Baena et al. [9] conducted a study involving nine Spanish hospitals and 4611 patients. Service sought for problems with pharmacotherapy was observed to range between 17.9% and 41.2%, averaging 30.7%.

DRM is expensive to manage. Estimates have shown that for every US $1 spent on drugs, US $1.33 is consumed to treat DRPs [10].

Conflicts of interest: All authors declare that there are no conflicts of interest.

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* *Address correspondence to:* Gabriel Rodrigues Martins Freitas, Faculty of Pharmacy, Federal University of Rio Grande do Sul, Av Ipiranga 2752, Porto Alegre 90610-000, Brazil.

E-mail: grmf.pharma@gmail.com

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European studies have estimated that the management of ADRs leading to, or occurring during, hospitalization is responsible for an additional average cost of between €2250 and €2800 [11,12]. Studies from Germany estimated that the total annual cost of managing ADRs is €432 million, of which €87 million could be saved because 20% of the cases were considered preventable [12]. US studies have shown that depending on the severity of adverse effects, the cost per ADE varies between US $215 and US $35,459 [13–15].

The cost of DRM has grown every year and in 2008 it was estimated at US $289 billion in the United States [16].

Nevertheless, we are unaware of any studies in a Brazilian health care setting, and in the present study we aimed to estimate the cost of management of drug-related health problems that lead to visits to the emergency department of a hospital in southern Brazil. The estimates and calculations are presented from the perspective of the hospital studied, because of the greater practicality and reliability of the data.

Methods

Study Setting and Design

This is a cost-of-illness study that was made by a retrospective cross-sectional analysis of patients' medical records, using a microcosting approach. Medical chart and billing data obtained from the hospital were collected to determine the resources used. The study was conducted in the Emergency Service of Porto Alegre Clinical Hospital (E-HCPA), located in the city of Porto Alegre, southern Brazil. The HCPA is a university hospital with 850 beds and serves about 50,000 patients a year through the emergency department.

The participation of patients in the study occurred on a voluntary basis by signing the "Term of Free and Informed Consent," which was read and explained to the volunteers to ensure that it was fully understood. This study was approved by the Ethics Committee of the Porto Alegre Clinical Hospital under the identification number 14-0200.

Data Collection

Data were collected from October 2013 to March 2014. For inclusion in the study, individuals had to meet the following criteria: 1) adult older than 18 years, 2) waiting for medical care after the screening process and risk rating (Manchester protocol) conducted by nursing staff; 3) verbal communication skills and presence of a companion—family or caregiver—to demonstrate knowledge of the drugs used by the patient; 4) agreement with the signing of the informed consent; and 5) undergoing medical examination in the emergency department. Patients who sought treatment because of alcohol or drug abuse were excluded.

Each individual was included in the study only once, irrespective of the number of times the individual sought the service during the period of the interviews.

Classification of DRM

Problems involving pharmacotherapy are frequently discussed in the literature and described by different terms: ADEs, DRPs, ADRs, and DRM [17].

Hepler and Strand [18] classified DRPs into eight general categories, which include the following: 1) indication untreated, 2) treatment without indication, 3) improper selection of the product, 4) subtherapeutic dose, 5) supratherapeutic dose, 6) nonadherence to treatment, 7) ADR, and 8) drug interactions.

This study made a distinction between the injury (ADE) and the resulting illness (DRM). ADEs, just as DRPs, define unfavorable outcomes related to the use and misuse of medications [19].

The concept of DRM used here was the same appointed by Hepler and Strand [18]: "the phenomenon of therapeutic malfunction or miscarriage (the failure of a therapeutic agent) to produce the intended therapeutic outcome and the manifestation of unresolved drug-related problems." It is an undesirable clinical outcome (actual damage) arising from the use of drug therapy or the absence thereof, including adverse effects and treatment failures [20].

DRM Identification

Data were collected by administering a questionnaire to patients seeking treatment and by analyzing electronic medical records. The questionnaire was used to identify patients who were being admitted because of DRM, age, sex, race, educational level, reason of care, symptoms, and detailed information about the medicines used in the last 10 days (name, dosage, and date of beginning and end of drug use). The questionnaire also allowed adherence to treatment to be assessed. From patients' medical records, additional items of interest were selected, including symptoms, comorbidities, diagnosis, need for hospitalization, and resources consumed by patients during their hospital stay.

Databases, books, and clinical protocols were consulted for details of medications (dosage, route of administration, possible adverse reactions, and interactions) and disease (symptoms, diagnosis, and treatment) presented by the patients [21–24]. Thus, it was possible to determine whether an adverse event was a case of DRM and its possible cause. A trained pharmacist analyzed all data obtained from questionnaires and medical records.

One of the researchers assessed each case to identify emergency visits that were due to DRM and to assign a possible cause. When DRM was suspected, the clinical situation and possible cause of DRM were evaluated by one physician and two more trained pharmacists.

The DRM classification used in this study was adapted from the DRP classification presented by Hepler and Strand [18]. In other words, DRPs were considered the possible causes of DRM.

Because one of the existing DRPs in this classification is ADRs, the Naranjo algorithm [25] was applied to verify the causal relationship between the suspected drug and the clinical manifestation. When a possible case of DRP was considered, the adverse reactions were classified according to the ratings "definite (certain)," "probable," and "possible."

Determination of Costs

Confirmation of hospitalization was provided by the presence of an authorization form for hospitalization in the electronic medical records.

The cost perspective of the hospital was adopted, with direct medical costs, which are those resulting from interventions, estimated from drugs, laboratory tests, surgeries, and remuneration of health professionals [26,27]. Any subsequent outpatient costs were not considered, and neither were the costs of prescription medicines with directions to be taken "if necessary." The monetary values of medicines, examinations, and fees were provided by the HCPA accounting sector.

In this study, we used the "bottom-up" approach (microcosting) to estimate the actual costs of the services provided. Microcosting analysis assigns unit costs to each of the resources consumed as a result of providing health services. The total cost was thereby calculated by adding the aforementioned direct unit costs with respect to all patients [26,27].

All monetary values presented in this study were converted into US dollars using the 2014 exchange rate. Because of the