



Original article

Medication dosing errors and associated factors in hospitalized pediatric patients from the South Area of the West Bank - Palestine



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ABSTRACT

Background: Medication dosing errors are a significant global concern and can cause serious medical consequences for patients. Pediatric patients are at increased risk of dosing errors due to differences in medication pharmacodynamics and pharmacokinetics.

Objectives: The aims of this study were to find the rate of medication dosing errors in hospitalized pediatric patients and possible associated factors.

Method: The study was an observational cohort study including pediatric inpatients less than 16 years from three governmental hospitals from the West Bank/Palestine during one month in 2014, and sample size was 400 pediatric inpatients from these three hospitals. Pediatric patients' medical records were reviewed. Patients' weight, age, medical conditions, all prescribed medications, their doses and frequency were documented. Then the doses of medications were evaluated.

Result: Among 400 patients, the medications prescribed were 949 medications, 213 of them (22.4%) were out of the recommended range, and 160 patients (40.0%) were prescribed one or more potentially inappropriate doses. The most common cause of hospital admission was sepsis which presented 14.3% of cases, followed by fever (13.5%) and meningitis (10.0%). The most commonly used medications were ampicillin in 194 cases (20.4%), ceftriaxone in 182 cases (19.2%), and cefotaxime in 144 cases (12.0%). No significant association was found between potentially inappropriate doses and gender or hospital (chi-square test p -value > 0.05). The results showed that patients with lower body weight, who had a higher number of medications and stayed in hospital for a longer time, were more likely to have inappropriate doses.

Conclusion: Potential medication dosing errors were high among pediatric hospitalized patients in Palestine. Younger patients, patients with lower body weight, who were prescribed higher number of medications and stayed in hospital for a longer time were more likely to have inappropriate doses, so these populations require special care. Many children were hospitalized for infectious causes and antibiotics were widely used. Strategies to reduce pediatric medication dosing errors are recommended.

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1. Introduction

Medication errors are a significant global concern and can cause serious medical consequences for patients. Pediatric patients are at increased risk for medication errors due to a complex medication

use process (Fortescue et al., 2003). Medicines can cure infectious diseases, prevent problems from chronic diseases, and ease pain. However, medicines can also cause harmful reactions if not used correctly or if they are prescribed in a wrong way (Al-Dahwailie, 2011). Infants and children constitute a large proportion of the population in the developing countries. They are especially vulnerable to contract illnesses and to the harmful effects of drugs due to differences in pharmacodynamics and pharmacokinetics (Shankar et al., 2006).

Despite all clinical strategies to avoid mistakes like training doctors and pharmacists to ensure that they have a full oversight in administering, dispensing, standardizing and identifying medications effectively, medication errors are still an important problem in all hospitalized populations (Kaushal et al., 2001) and may

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result in adverse drug events and contribute in mortality and morbidity of hospitalized patients (Classen et al., 1997).

The unique nature of children and pediatrics makes them at higher risk of experiencing medication errors than adults because they have an immature physiology as well as developmental limitations that affect their ability to communicate and self-administer medications (Kaushal et al., 2004). Another important factor is that the great majority of medications are developed in concentrations appropriate for adults, and pediatric indications and dosage guidelines are often not included with a medication, so it needs many calculations based on many factors (Lim et al., 2013).

In pediatrics medicine, drug doses are usually calculated individually based on the patient's age, weight and clinical condition. Therefore, there are increased opportunities for, and a relatively high risk of, dosing errors in this setting. Studies have shown that dosing errors are the most common type of medication errors among pediatrics (Lesar et al., 1997; Miller et al., 2007; Al-Jeraisy et al., 2011).

Pediatric patients are special population who need a special care. It is important to evaluate the appropriateness of doses according to patients' weight to avoid therapeutic failure or increase in side effects. To the best of our knowledge, this will be the first study in this field in Palestine, so we hope it can help in providing recommendations and education to decrease dosing errors.

The aims of this study were to assess the rate of medication dosing errors in hospitalized children and find any possible association between some factors (e.g. age, weight, number of medications and duration of hospital stay) and dosing errors.

2. Methodology

2.1. Overview of design

This study was an observational cohort study, and the data were collected during one month (August 2014) for all pediatric inpatients in three governmental hospitals: Bait Jala Governmental Hospital in Bethlehem, Alia Governmental Hospital in Hebron and Palestinian Medical Complex in Ramallah. The West Bank of

Palestine includes 12 governmental hospitals, so these three hospitals were randomly selected from them.

2.2. Study subjects and selection criteria

The medical records of all pediatric patients who were admitted to the pediatric units in the selected hospitals and prescribed at least one medication during the study period were reviewed until the required sample was collected.

2.3. Sample size

The minimum sample size for this study was calculated to be 400 patients from three hospitals according to Raosoft sample size calculator.

2.4. Data collection

The study protocol was authorized by the Institutional Review Boards (IRB) of An Najah National University (IRB approval number (253-7-14)) and the Ministry of Health before initiation of this study. Data collection form was prepared after literature review of previous studies. All information was collected from the governmental electronic health records of the governmental hospital (AviCenna HIS program). Pediatric patients' medical records were reviewed. Patients' weight, age, medical conditions, length of hospital stay, all prescribed medications, their doses and frequency were documented. Then the doses of medications were evaluated using [Drug Information Handbook \(2014\)](#).

2.5. Statistical methods

Statistical analyses were performed using Statistical Package for Social Sciences (SPSS version 16.0). Descriptive statistics were carried out for all variables. Mean \pm standard deviation was computed for continuous data. Frequencies (percentages) were calculated for categorical variables. Categorical variables were compared using Chi-square. When categorical and continuous variables were compared, independent student t test or Mann-Whitney test according to the normality was used. Kolmogorov Smirnov test was used for

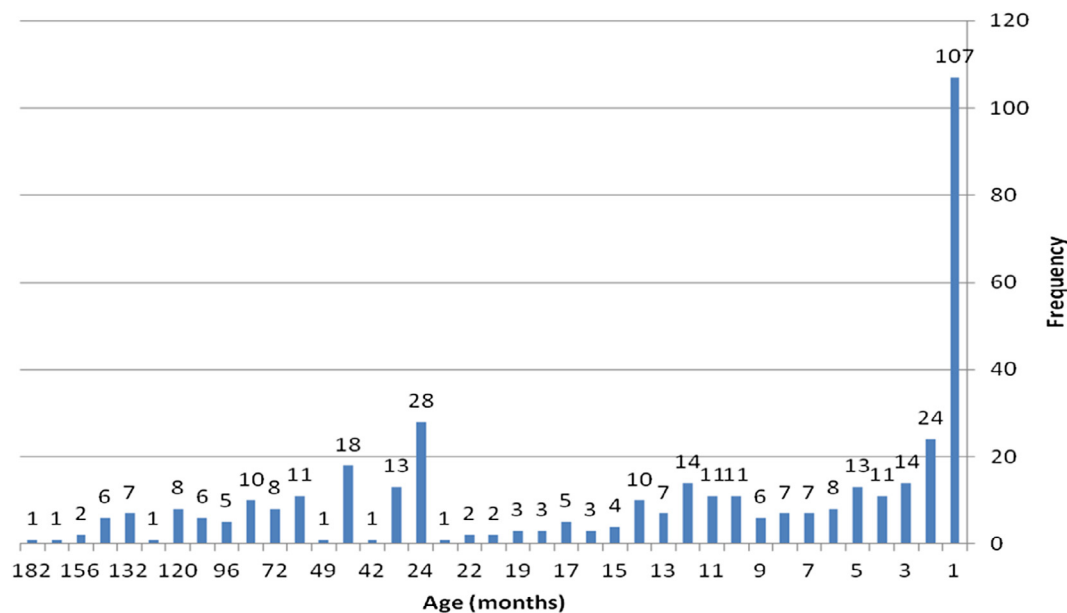


Figure 1. Age distribution of the patients.

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