Evaluation of drug utilization and prescribing errors in infants: A primary care prescription-based study

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Abstract

The purpose of this study is to evaluate the drug utilization trends and to describe the prevalence and type of medication-related prescribing errors in infants treated at primary care health centers in Bahrain. Prescriptions issued for infants were collected over a 2-week period in May 2004 from 20 health centers. Prescribing errors were classified as omission (minor and major), commission (incorrect information) and integration errors. Medications were classified according to the British National Formulary. In infants with a mean age of 6.5 months ($\pm$3.1) drugs per prescription were 2.52 ($\pm$1.1). Paracetamol and sodium chloride nasal drops were the topmost prescribed systemic and topical drugs, respectively. In 2282 prescriptions, 2066 (90.5%) were with omission (major), commission, and integration errors. In 54.1% of prescriptions with omission errors, length of therapy was not specified in 27.7%, and in 12.8% the dosage form was not stated. In 43.5% of prescriptions with errors of commission, dosing frequency (20.8%) and dose/strength (17.7%)—related errors were most common. Errors of integration such as potential drug–drug interaction comprised 2.4% of all prescribing errors. The proportion of drugs prescribed irrationally were: contraindicated medications, notably chlorpheniramine, promethazine, and corticosteroids (16.1%); medications prescribed on a *p.r.n.* basis (13.3%); missed information regarding strength of medications (2.8%); medications prescribed over extended periods (2.7%); low dosing frequency (2.6%); supratherapeutic doses (2.3%); excessive dosing frequency (0.8%). Irrational drug therapy in infants, with prescribing errors were apparent in primary care practice, which may be related to a lack of drug information, pharmacovigilance programme, and nonadherence to basic principles of prescribing. Establishing a national drug policy and pharmacovigilance programme for promoting rational drug use are to be considered. There is also a need to evaluate the effectiveness of interventions by measuring the outcomes.
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1. Introduction

Infants and children are at a high risk for medication errors [1,2]. This may be attributed to several factors including the need for weight-based dosing, dilution

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of stock medicine and the vulnerability of infants, particularly those with immature renal and hepatic functions [1]. Although medication errors are a major cause of morbidity and mortality among hospitalized children [3], few studies have addressed the problem of medication errors and adverse drug events in the pediatric population [1,2]. Medication errors can happen at all stages of therapeutic process—prescribing, dispensing, dosage calculation, medication administration and patient compliance [4,5]. Most data concerning prescribing errors in pediatric practice were hospital based, although pediatric patients in such setting represent only a small proportion of population at risk for adverse drug events [2]. Studies on the prevalence and type of medication errors in pediatric ambulatory care are rare, even though the bulk of pediatric services including well-child care, and acute and chronic illness care are in ambulatory setting [2].

A third of all patients admitted to a general pediatric medical or surgical wards were reported to have received one or more unlicensed or off-label drugs during their hospital stay [6]. Emphasis on rational use of medications in the pediatric age group (infants and children) could attenuate the risk and enhance the quality of care [2]. We have conducted a nationwide, primary care-based study in infants to: (a) determine the trends in drug utilization including off-label drug prescribing and (b) to describe the prevalence, and the type of medication-related prescribing errors.

2. Methods

2.1. Setting

The Kingdom of Bahrain, located in the Arabian Gulf region, has an approximate population of 700,000; of these, 11.4% are children ≤4 years of age [7]. A network of 20 primary health care centers across the country provide free health care, including essential drugs. The number of primary care physicians in each health centers varied between 4 and 11. Patients requiring special investigations and specialist consultations or admission are referred to Salmaniya Medical Complex, a hospital which provides secondary/tertiary care. Drug-prescribing pattern and drug-related prescribing errors in infants (1–12 months old) were analyzed.

2.2. Data source and variability

Prescriptions dispensed for infants were collected on a daily basis by the pharmacists at 20 health centers between 9 May and 23 May, 2004, in response to a request from the chief pharmacist for primary care.

For the purpose of the present study, absence of prescription components such as date of prescription, any parameter of patient's personal identifiers, physician's stamp, and/or direction for use are deemed as minor errors of omission [8,9]. Absence, vague, incomplete and/or illegibility of any component of body of the prescription is considered as major errors of omission [8,9]. Incorrectly written component(s) of body of the prescription is considered as an error of commission [10,11]. Errors of integration [11] or knowledge-based errors [12] in prescribing include potential drug-drug interactions or drug allergies which may reflect a failure of the prescriber to integrate information about the patient or drug history. Skill-based errors of prescribing [12] such as illegible handwriting and/or prescriptions with non-official or unconventional abbreviations, were excluded. Prescriptions with non-drug items (syringes, needles, cotton, bandages, eye pads, surgical spirit, elastoplast, etc.) were also excluded. Based on the above definitions of errors and exclusion criteria, prescriptions with errors were identified. Medications were categorized as per the British National Formulary [13].

Before data entry and analysis, prescriptions were audited to confirm and classify errors using the criteria and classification described earlier [8–12]. The percentage of omission (both minor and major), commission, and integration-related errors were calculated. Data were analyzed using Statistical Package for the Social Science (SPSS/PC+, version 9.0). Descriptive statistics as percentage, mean and standard deviation were used to describe study variables.

3. Results

A total of 2282 prescriptions were dispensed to infants from 20 health centers during the study period. Paracetamol and sodium chloride 0.9% nasal drops were the most frequently prescribed systemic and topical drugs, respectively. Chlorpheniramine, an antihistamine, ranked the second most frequently prescribed