

Antibiotic prescribing in a pediatric emergency setting in central Saudi Arabia

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Antibiotics were found to be the most commonly prescribed and used class of drugs in several national and international studies.¹ The emergence of antibiotic resistant bacterial pathogens on a large scale over the last 2 decades is taken as an inevitable consequence of the over use of antibiotics worldwide.² Strategies that optimize antibiotic use are therefore, essential to minimize this microbial threat to suffering, as well as to treat world community. Prescribing indicators are one of the core drug use indicators developed by the World Health Organization (WHO) in a collaborative work with the International Network for Rational Use of Drugs (INRUD).³ The indicators can be used efficiently in many settings of studying drug use in order to detect problems in drug prescribing such as: polypharmacy, inclination for branded products, over use of antibiotics, or injections, and prescribing out of formulary or essential drugs list.³ The study of prescribing practices using prescribing indicators enables us to detect these problems and to prioritize and focus on subsequent efforts to correct them. In the Kingdom of Saudi Arabia (KSA), antibiotics are one of the most frequently prescribed drugs.^{4,5} A number of studies were performed in KSA to address this problem in the primary health care centers.⁴ Unfortunately, only a few studies addressed this problem in the hospitals of the Ministry of Health.⁴ The purpose of this study is to investigate the use of antibiotics prescribed in the Children's Hospital at King Fahad Medical City (KFMC), Riyadh, Kingdom of Saudi Arabia using WHO prescribing indicators.

King Fahad Medical city is a Ministry of Health medical city that has 5 different hospitals, and it is located in the capital city, Riyadh, Kingdom of Saudi Arabia. The study was conducted in the emergency pharmacy of the Children's Hospital at KFMC. This retrospective cross-sectional study was planned to investigate all prescriptions in a certain period to increase the precision of the parameters. We retrospectively surveyed a total of 4433 prescriptions obtained from the pharmacy in the Children's Hospital at KFMC, written between January 8 and January 31, 2007. The inclusion criteria are prescriptions written during the study period, and include oral antibacterial, and the patients should be children up to 12 years of age. The WHO indicators of drug use⁶ to improve the rational use of drugs were used to monitor antibiotic prescribing. These indicators include: the average number of drugs prescribed per encounter, the average number of antibiotics prescribed per encounter, and the percentage of encounters with an antibiotic prescribed.³ An additional indicator, the percentage share of each antibiotic, that is,

the proportionate distribution of prescribed antibiotics, was included to identify the frequency with which antibiotics are prescribed. In our study, we chose to measure the antibiotic prescribing indicators and the percentage shares of individual antibiotics. The WHO model list of essential drugs tenth list was used to define the drugs names that were counted as "generic".⁶ We classified antibiotics as: penicillin, cephalosporin, amoxicillin/clavulanate, macrolides, co-trimoxazole, lincosamides, and sub-classes such as: amoxicillin, cefuroxime, cephalexin, Augmentin, erythromycin, azithromycin, clarithromycin, and others. We also considered the dose, frequency, and duration of the therapy, as well as the number of drugs per prescription, and the diagnosis as it appeared on the prescription. The study proposal was approved by the Research Committee and Institutional Review Board of KFMC (Application number is 08-048).

Data analysis. The antibiotic-prescribing indicators were calculated as follows: I) the percentage of encounters with an antibiotic prescribed = (number of patients encounters with an antibiotic prescribed/total number of surveyed encounters) x 100%. II) The percentage share of an individual antibiotic = (number of patients encounters with an individual antibiotic/total number of encounters with antibiotic prescriptions) x 100%. III) The average number of antibiotics prescribed per encounter. The data collected was entered, reviewed and processed using the Statistical Package for Social Sciences version 17 (SPSS Inc, Chicago, IL, USA) software. Rates with the corresponding 95% confidence interval (CI) for indicators of antibiotic prescribing were estimated.

Of the 4433 surveyed prescriptions, 822 antibiotic prescriptions were counted out, with an average percentage of prescriptions involving antibiotics of 18.5% (Table 1). The average number of drugs per prescription was 2.8 ± 0.94 , with 20.6% containing more than 3 drugs, 41.7% containing 3 drugs, and 37.7% containing less than 3 drugs. The most frequent diagnosis was upper respiratory tract infection (URTI). In patients less than one year of age, the most frequent diagnosis was pneumonia. Overall, the average rates of the different diagnoses were as follows: URTI 28.7%, otitis media (OM) 18.1%, pneumonia 16.2%, and tonsillitis 10.8%. Diagnosis was missed in 2.3% of the prescriptions involving antibiotics. Cephalosporin was the most frequent prescribed antibiotic for infants below one year (44.6%), while amoxicillin clavulanate was the most frequent one prescribed for the age groups 1-5 years (35.4%), and 5-12 years (35.8%).

The average number of drugs per encounter is the most commonly measured index that is used to assess the extent of polypharmacy. The value of this index observed in our study was 2.8. The same value for this index was observed in previous studies in Nepal, the Kingdom of Saudi Arabia, and the United States of America.³ Our observed value represents a better figure in comparison with those reported in the studies of eastern Nepal (5.3), India (3.75),

Table 1 - Indicators of drug use as estimated from 4433 prescriptions of the Children's Hospital at King Fahad Medical City, Riyadh, Kingdom of Saudi Arabia.

Drug use indicators	n (%)	95% confidence interval
Average number of drugs per encounter (mean±SD) (n=822)	2.8±0.94	2.77-3.13
Percentage of encounters with a prescribed antibiotic (n=4433)	822 (18.5)	17.44-19.64
<i>Antibiotic categories (n=822)</i>		
Penicillins	205 (24.9)	21.9-27.9
Cephalosporins	262 (31.9)	28.7-35.1
Amoxicillins clavulanate	267 (32.5)	29.3-35.7
Macrolides	80 (9.7)	7.7-11.7
Co-Trimoxazole	6 (0.7)	0.1-1.3
Lincosamides	2 (0.2)	-0.2-0.6

Bangladesh (3.8), Iran (3.4), and Nigeria (3.5).³ However, these figures are not better than those reported in the studies of Pakistan (2.7), Kingdom of Saudi Arabia (2.1), Lebanon (1.6), and Sudan (1.9).⁷ Our observed value is higher than the limit of 2.0 recommended by the WHO.⁶ Therefore, this observed value may be taken as evidence of the existence of polypharmacy. This index should be kept as low as possible to avoid the unfavorable outcomes of polypharmacy such as: the increased risk of drug interaction, increased cost of the therapy, non-compliance, and emergence of resistance in case of antimicrobials. In the present study, 3 or more drugs were prescribed in 62.3% of prescriptions. Again, this trend increases the risk of drug interactions, dispensing errors, and confusion in the dosage schedules.⁶ The average percentage of encounters for which antibiotics were prescribed was 18.5, which is good in the context of the suggestion made by the WHO in which less than 30% of encounters should include one or more antibiotics.⁶ This figure is better than the figures reported in previous studies in Bangladesh (72.5%), Pakistan (52%), Nigeria (54.8%), India (39.6%), United Kingdom (77%) and Jordan (35.6%), but higher than that observed in Lebanon (17.5%).³ Importantly, our percentage is lower than that reported by Irshaid et al,⁴ in the Kingdom of Saudi Arabia (33.2%). These findings reflect that prescribers in the Emergency Department at the Children's Hospital of KFMC seem to be rational regarding the use of antibiotics.

This is an audit carried over a very short time in one hospital in which the central region and seasonal variation are not represented. It is known that the most URTI's are caused by viruses, and the Winter season, as the only month in the study, would mask any other illnesses, actual workload, and therefore antibiotic use. Moreover, the rational use of antibiotics should also indicate whether the actual diagnosis was correct or not. Therefore, this study can be used as a quality project to monitor the use of antibiotics in the same hospital. It is necessary to record data for over a year or more, to obtain a more accurate idea

of the prescribing habits of antibiotics. It is important to do this prospectively and electronically using the hospital data base or pharmacy records.

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