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Article in International journal of clinical pharmacology and therapeutics - January 2017
DOI: 10.5414/CP202733

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Evaluation of drug-prescribing patterns based on the WHO prescribing indicators at outpatient clinics of five hospitals in Jordan: a cross-sectional study

Ahmad Al-Azayzih, Sayer I. Al-Azzam, Kareem H. Alzoubi, Mohammad Shawaqfeh, and Majed M. Masadeh

1Department of Clinical Pharmacy and 2Department of Pharmaceutical Technology, Faculty of Pharmacy, Jordan University of Science and Technology Irbid, Jordan

Abstract. Background: Irrational drug prescribing is considered one of the major challenges for the healthcare sectors worldwide, leading to negative outcomes in patients including various drug-related problems, such as polypharmacy, adverse drug events, more demands on drug monitoring, and unwanted increase in treatment cost. Objective: The main objective of this study was to evaluate the trends and issues related to prescription at outpatient hospital pharmacies in Jordan and to contrast that to the WHO rational medication list and WHO drug use indicators. Method: This study was a cross-sectional study, conducted between January 2014 and May 2014. It involved a total number of 24,089 patient encounters from five teaching and referral hospitals in Jordan. The encounters included patients who were prescribed at least one medication during their visit to outpatient clinics in those hospitals. Results: The average number of drugs per prescription was 2.93. The percentage of encounters which had antibiotics or injections in the prescription was 17.7% and 8.1%, respectively. The top three most common prescribed antibiotics were amoxicillin (n = 2,129, 49.9%), ciprofloxacin (n = 609, 14.3%), and clarithromycin (n = 267, 6.3%), while the most common prescribed injections were insulin and insulin analogs (n = 766, 39.2%), cyanocobalamin (Vitamin B12) (n = 612, 31.3%), and erythropoietin (n = 80, 4.1%). The percentage of prescriptions by generic was 57.6%, whereas the prescribing from the essentials drug list (formulary) was close to optimal (99.8%). Conclusion: The average number of prescribed drugs per encounter was higher than what was considered ideal according to WHO standards; the other issue found was a lower percentage of generic prescribing compared to WHO ideal value. The rest of prescribing indicators including the injections prescribing, antibiotics prescribing, and prescribing from the essential drug list were within the optimal range of values recommended by the WHO.

Introduction

In 1985, a group of experts from the World Health Organization (WHO) held a conference meeting at Nairobi, Kenya to discuss the rationality of medication use and prescribing worldwide [1]. According to the WHO requirements, the rational use of medications necessitates that “patients receive medications appropriate to their clinical needs, in doses that meet their own individual requirements for an adequate period of time, and at the lowest cost to them and their community” [1].

The WHO has established three core elements to improve the rational use of drugs worldwide including prescribing indicators, patient care indicators, and healthcare facility-specific indicators. The prescribing indicators include a group of measured parameters represented as the average number of drugs per encounter, percentage of encounters with antibiotics or injection, percentage of drugs prescribed by generic, and the percentage of drugs from the essential drug list or formulary (EDL) [2, 3, 4].

There is a growing body of evidence suggesting that using the WHO drug use indicators has become an essential assessment tool to assess the rational drug use pattern in many countries, especially the developing ones [5]. Irrational drug prescribing is considered one of the major problems that healthcare sectors face worldwide, particularly due to the negative consequences on patients. Hence, such prescribing attitude may lead to various medication-related problems, such as polypharmacy, adverse drug events, more demands on drug monitoring, as well
as an increase in antibiotic resistance and an unwanted increase in treatment costs [6, 7, 8].

As of today, rational drug use and prescribing patterns have not been fully investigated in Jordan. However, the first report to describe the prescribing patterns by doctors in Jordan was published in 2002 [9]. In that study, the authors evaluated the prescribing attitudes in 21 primary healthcare centers located in the northern part of Jordan. Another study was conducted in 2008 to evaluate the use of antibiotics prescribed in the emergency and outpatient clinics of King Hussein Medical Center, Jordan [10]. Since then, there have been no comprehensive studies to describe the current prescribing practice in Jordan. Our study involved five major tertiary and referral centers in Jordan. The hospitals were chosen based on several criteria including geographic location (King Abdullah University Hospital (KAUH) and Princess Basma Hospital (PBH) in Irbid, North of Jordan, Prince Hamzah Hospital (PHH) and Albashir Hospital in Amman, Middle of Jordan, and Alkarak Hospital at Alkarak city, South of Jordan), being a major hospital in its area. In addition, a large number of prescriptions/encounters were evaluated in our current study (24,089 encounters).

Aim of the study

The main aim of this study was to evaluate the trends and issues related to prescription at outpatient hospital pharmacies in Jordan and to contrast that to the WHO rational medication list and WHO drug use indicators.

Inclusion criteria

All outpatient clinic prescriptions (encounters) with at least one or more prescribed medications were included in the assessment over the study period.

Reference population and study population

The reference population included all patients who visited the outpatient clinics at five major teaching and referral hospitals in Jordan during the period from January 2014 to May 2014.

According to the WHO guidelines on how to study and investigate the drug use pattern in health facilities, at least 600 encounters or more should be included in any study investigating the prescribing patterns in healthcare facilities [2]. A total number of 24,089 encounters were found to meet the inclusion criteria, thus were included in the study analysis.

Data source

The outpatient prescriptions (electronic and paper prescriptions) for all the included study subjects were collected, and information (patient age, gender, the name and number of the medications prescribed, frequency, route of administration, and duration) was gathered and entered using the Microsoft Excel program for further analysis.

Data analysis

The Statistical data analyses of means, standard deviations, frequencies, and percentages were performed using SPSS program version 17.0 software. Mann-Whitney U-test was performed to compare the average number of drugs per prescription for patients (≥ 65 years vs. < 65 years old).

Results

The total number of patients who met our criteria was 24,089 patients; males represented 49.1% of the total number of both
Table 1. Patients characteristics and demographics.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male</td>
<td>11,819</td>
<td>49.1</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>12,270</td>
<td>51.9</td>
</tr>
<tr>
<td></td>
<td>Both</td>
<td>24,089</td>
<td>100</td>
</tr>
<tr>
<td>Age (years)*</td>
<td>&lt; 10</td>
<td>468</td>
<td>1.90</td>
</tr>
<tr>
<td></td>
<td>10 – 30</td>
<td>3,834</td>
<td>15.9</td>
</tr>
<tr>
<td></td>
<td>31 – 50</td>
<td>6,904</td>
<td>28.7</td>
</tr>
<tr>
<td></td>
<td>51 – 70</td>
<td>9,803</td>
<td>40.1</td>
</tr>
<tr>
<td></td>
<td>71 – 90</td>
<td>3,052</td>
<td>12.7</td>
</tr>
<tr>
<td></td>
<td>&gt; 90</td>
<td>28</td>
<td>0.10</td>
</tr>
<tr>
<td>Number of patients per hospital</td>
<td>Albashir Hospital</td>
<td>4,150</td>
<td>17.2</td>
</tr>
<tr>
<td></td>
<td>KAUH</td>
<td>7,113</td>
<td>29.5</td>
</tr>
<tr>
<td></td>
<td>Al-Karak</td>
<td>1,819</td>
<td>7.60</td>
</tr>
<tr>
<td></td>
<td>PHH</td>
<td>5,221</td>
<td>21.7</td>
</tr>
<tr>
<td></td>
<td>PBH</td>
<td>5,786</td>
<td>24.0</td>
</tr>
</tbody>
</table>

KAUH = King Abdullah University Hospital; PHH = Prince Hamzah Hospital; PBH = Princess Basma Hospital. *Average age of patients was 49.76 years.

Table 2. Summary of the WHO prescribing indicators results collected from outpatient pharmacies of five teaching and referral hospitals in Jordan (Number of encounters = 24,089).

<table>
<thead>
<tr>
<th>Assessed WHO prescribing indicator</th>
<th>Total drugs/encounter</th>
<th>Average/percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average number of drugs per encounter</td>
<td>70,513</td>
<td>2.93</td>
</tr>
<tr>
<td>Percentage of encounters with antibiotics</td>
<td>4,269</td>
<td>17.7%</td>
</tr>
<tr>
<td>Percentage of encounters with injections</td>
<td>1,954</td>
<td>8.1%</td>
</tr>
<tr>
<td>Percentage of drugs prescribed by generic</td>
<td>40,616</td>
<td>57.6%</td>
</tr>
<tr>
<td>Percentage of drugs from the essential drug list</td>
<td>70,367</td>
<td>99.8%</td>
</tr>
</tbody>
</table>

The average age of patients was 49.76 years (Table 1). A total number of 7,113 patients encounters out of 24,089 (29.5%) were gathered from KAUH, and the rest were collected as follows: Albashir Hospital (n = 4,150, 17.2%), Al-karak Hospital (n = 1,819; 7.6%), PHH (n = 5,221, 21.7%), and PBH (n = 5,786, 24%). A total number of 24,089 of patient encounters from the outpatient pharmacies of the included study hospitals were collected and entered by 3 well-trained pharmacists for further analysis (Table 1).

A total number of 70,513 drugs were prescribed for all included encounters, and the average number of drugs per prescription was 2.93 (Table 2). We have noticed that Albashir Hospital had the highest average number of drugs per prescription (3.32) and the lowest value was at KAUH (2.47) (Table 3). In addition to that, the average number of drugs per prescription was higher among the elderly patients who were ≥ 65 years old (n = 5,916, 3.46) compared to those who were < 65 years old (n = 18,086; 2.75), (p < 0.0001). On the other hand, no differences in the polypharmacy index were found between males (2.94) and females (2.92). The total number of prescribed antibiotics and injections were 4,269 and 1,954 respectively. The total number of drugs prescribed by generic name was 40,616 (57.6%), and almost all drugs were prescribed from the EDL of each hospital (99.8%) (Table 2).

The most commonly prescribed antibiotics were amoxicillin including either amoxicillin itself or the combination of amoxicillin plus clavulanic acid (n = 2,129, 49.9%), ciprofloxacin (n = 609, 14.3%), clarithromycin (n = 267, 6.3%), metronidazole (n = 231, 5.4%), cefuroxime (n = 216, 5.1%), azithromycin (n = 185, 4.3%), doxycycline (n = 154, 3.6%), cephalexin (n = 88, 2.1%), sulfamethoxazole-trimethoprim (n = 82, 1.9%), chloramphenicol (n = 61, 1.4%), and others (n = 247, 5.8%) (Table 4). Evaluating each hospital separately with regard to the most common antibiotics prescribed at each hospital, amoxicillin and ciprofloxacin were the top two antibiotics prescribed in each hospital (Table 5).

The most commonly prescribed injections were insulin and insulin analogs (n = 766, 39.2%), cyanocobalamin (n = 612, 31.3%), erythropoietin (n = 42, 2.2%), diclofenac sodium (n = 41, 2.1%), iron sucrose (n = 34, 1.7%), PEGylated interferon-α (n = 18, 0.9%), etanercept (n = 18, 0.9%), adalimumab (n = 17, 0.9%), and methylprednisolone (n = 13, 0.7%) (Table 6).

**Discussion**

In our present study, the average number of drugs prescribed per encounter was 2.93, and this was higher than the WHO ideal number (1.6 – 1.8) (Table 2). All of the five hospitals were found to have higher average numbers of drugs per encounter compared to the optimum value when they were evaluated separately (Table 3). The average number of prescribed drugs was considered an index for polypharmacy; and thus, our report showed clearly that prescribing practice in Jordan needed to be changed in order to reduce the degree of polypharmacy, as such prescribed...
ing behavior could lead to various negative consequences on patients, especially elderly patients. Research reports have clearly established a strong correlation between the polypharmacy and various negative consequences on patients, such as drug-drug interactions [11, 12], adverse drug events [13, 14], problems with drugs adherence [15], functional decline [16], and the unwanted increase in the healthcare cost [17].

We compared our polypharmacy index value with those of other studies, which were conducted in various countries. Our polypharmacy value was higher than in most of the countries including European countries [18], United Arab Emirates (UAE) [19], Brazil [20], Sudan [21], Ethiopia [22], America Region [18], and China [23] where the average prescribed medications per encounter were: 2.5, 2.49, 2.2, 2.0, 1.9, 1.8, and 1.76, respectively. The mean value was lower in Jordan compared to Nigeria (3.2 – 5.6) [24, 25] and India (3.38) [26].

The polypharmacy prescribing pattern in Jordan might be due to different reasons. These reasons included the high number of elderly Jordanian patients with various chronic illnesses and co-morbidities, such as diabetes [27] and hypertension [28]. Thus, such patients required more than one medication to control their multiple medical problems, resulting in polypharmacy prescribing behavior [29]. Other reasons could be the lack of proper therapeutic knowledge among prescribers and the lack of patient education about their medications [30].

The percentage of prescribed medications by generic name among all the study hospitals was found to be 57.6%, which was lower than the ideal WHO value (100%). Similar studies were conducted in different countries and showed variable results. Studies in UAE [19], Ethiopia [22], Western Pacific Region [18], Nigeria [24], Sudan [21], Southeast Asian Regions [18], and Eastern Mediterranean regions [18] concluded that the percentages of prescribed generic drugs were 100%, 98.7%, 78%, 49.5%, and 49.3%, 48.9%, 27.7%, respectively.

The prescribing index according to generic names in individual hospitals was also variable, even though EDLs for all hospitals include only generic names instead of brand names. Many physicians still referred to drugs by their original brand names, even long after generic versions became available. So, even if the physician prescribed a brand name drug to a patient, the pharmacist would dispense the available alternative generic drug included in that center’s EDL. Hence, it was not surprising to find the generic prescribing in any of the hospitals to be lower than that recommended by the WHO while prescribing from EDL was close to 100%

Only KAUH was found to have an optimal value similar to the WHO ideal value while...
all other hospitals were found to have lower values: PHH 83%, Albashir Hospital 41.6%, PBH 20.5%, AlKarak Hospital 6.3%.

This variation in generic prescribing among Jordanian hospitals may be due to differences in the electronic systems used for drug prescribing. For example, KAUH was using a fully electronic prescription system for outpatient clinics to enter the prescriptions based on generic instead of brand names, while in some other hospitals, prescribers were still using the hand-written prescriptions where they could write freely either generic or brand name drug. Also, variability in generic prescribing could be attributed to the difference in prescriber’s adherence to prescribing guidelines and regulations of hospitals.

Generic prescribing could be crucially important as it is cost-effective and associated with less medication errors. Physicians were not required to specify the various brand names for the same drug products, which made it easier for the pharmacists to dispense the medications available in stock without contacting the prescribers.

The percentage of encounters with antibiotics was 17.7% for all hospitals, which was considered optimal according to the WHO ideal value (≤ 30%). PBH was found to have the highest percentage of prescriptions with antibiotics (26.0%), while other hospitals were found to have closer values to the overall number for all of them. These were similar to lower results reported in different countries including Saudi Arabia (15.6%) [31] and UAE (9.8%) [19]. On the other hand, studies in Eastern Mediterranean Regions [18], India [32], the Americas [18], China [23], and Europe [18] showed higher percentage of antibiotics prescribing exceeding the optimal recommended value by WHO (53.2%, 39.6%, 39.3%, 38%, and 33.5%, respectively).

Although prescribing behavior for antibiotics was considered optimal according to the WHO prescribing indicators recommendation, we have noticed an increased prescribing of broader spectrum agents, which could be due to increased antibacterial resistance among patients. It could also be due to the general belief that newer agents can control the infection faster in a shorter period of time. This issue should be investigated further to encourage the rational prescribing of antibiotics and to improve the awareness among physicians about the negative consequences of irrational antibiotics prescribing and emergence of resistance.

The index of injections prescribing in all the five hospitals included in this study was 8.1%, which was considered acceptable based on the WHO optimal value (≤ 10%). All five hospitals were found to have closer values to each other and to the overall value. Although the injections prescribing index value was lower than that reported in China (22.93 – 25%) [23, 33], West Pacific (23.2%) [18], Eastern Mediterranean (20.1%) [18], and European regions (17.2%) [18], our results indicated a higher use of injectable drugs when compared to results reported for UAE (3.14%) [19] and Nepal (3.1%) [34]. It was not surprising to find that more than 39% of the injections prescribed were insulin and insulin analogs. This was because various national studies conducted to evaluate the prevalence of diabetes melittus among the Jordanian population have shown that the prevalence of diabetes mellitus is ~ 17.1% among the studied sample [27]. Also, it was believed by the health officials that more than 30% of the Jordanians who are older than 25 years are living with diabetes.

Cyanocobalamin (Vitamin B_{12}) injections were the 2nd most commonly prescribed injections after insulin and insulin analogs. According to the most recent national study conducted to evaluate the prevalence of Vitamin B_{12} deficiency in Jordan, it was found that almost 30% of the adult Jordanian sub-

### Table 6. Most commonly prescribed injections at the outpatient pharmacies of five teaching and referral hospitals in Jordan.

<table>
<thead>
<tr>
<th>Commonly prescribed injections</th>
<th>Frequency (percentage %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulin</td>
<td>766 (39.2%)</td>
</tr>
<tr>
<td>Cyanocobalamin (Vitamin B_{12})</td>
<td>612 (31.3%)</td>
</tr>
<tr>
<td>Erythropoietin</td>
<td>80 (4.1%)</td>
</tr>
<tr>
<td>Interferon-β</td>
<td>42 (2.2%)</td>
</tr>
<tr>
<td>Diclofenac sodium</td>
<td>41 (2.1%)</td>
</tr>
<tr>
<td>Iron sucrose</td>
<td>34 (1.7%)</td>
</tr>
<tr>
<td>PEGylated-interferon-α</td>
<td>18 (0.9%)</td>
</tr>
<tr>
<td>Etanercept</td>
<td>18 (0.9%)</td>
</tr>
<tr>
<td>Adalimumab</td>
<td>17 (0.9%)</td>
</tr>
<tr>
<td>Methyprednisolone</td>
<td>13 (0.7%)</td>
</tr>
<tr>
<td>Others(^1)</td>
<td>313 (16%)</td>
</tr>
</tbody>
</table>

\(^1\)Dexamethasone, hydrocortisone, filgrastim, goserelin, cetrfioxone, gentamycin, and furosemide.
jects who were involved in the study have vitamin B₁₂ deficiency [35]. Also, it has been a common practice in Jordan to prescribe vitamin B₁₂ in individuals who present with any memory and cognitive problems.

Keeping the injections prescribing index below 10% could decrease the cost of treatment and decrease the risk of parenteral drug use complications, such as pain and discomfort. Also, a growing body of evidence showed that lower-cost oral vitamin B₁₂ could be as effective as injection forms for treatment of vitamin B₁₂ deficiencies [36, 37]. A recent budget analysis from Canada concluded there was a cumulative 5-year saving of $14.2 million to the health care systems from switching to oral vitamin B₁₂ [38]. Hence, raising the awareness among the prescribers about the importance of keeping the percentage of injections prescribing as low as possible is highly recommended.

The percentage of drug prescribing from the EDL was 99.8% and almost similar to the ideal value recommended by the WHO (100%). Similar results were reported in UAE (100%) [19], while lower values were revealed from studies in India and Nepal, (90.3% and 42.3, respectively) [32, 34].

Our present study had strengths as well as some limitations. Strengths included the large number of patients’ encounters that were involved in the study from hospitals covering a large geographical area of Jordan. These findings can be generalized to the general prescribing practices in Jordan. One of the study limitations is that data were gathered during only a 4-month period (from January 2014 – May 2014), which might exclude prescriptions specific for seasonal diseases. Furthermore, data were collected only from governmental hospitals in Jordan, and therefore private hospitals and centers were not included. Private hospitals in Jordan are expected to differ from governmental ones in various aspects related to prescribing indicators. Therefore, our next goal is to study the prescribing patterns in the private sector and compare it to the governmental sector.

Conclusion

Our study is the first to report the prescribing behavior according to WHO prescribing indicators among individuals who visited outpatient clinics of multicenter referral and teaching hospitals in Jordan. Therefore, based on the findings of our study, the average number of prescribed drugs per encounter was higher than the one considered ideal according to WHO standards, while the percentage of generic prescribing was lower than the WHO ideal value. The rest of prescribing indicators including prescribing of injections and antibiotics as well as prescribing from the EDL, were within the optimal range of values recommended by the WHO. Adoption of a better national strategy in Jordan would improve the prescribing practices by physicians, and there should be more regulations implemented by the health authorities in Jordan (e.g., Ministry of Health) to change the prescribing attitudes by physicians through requesting them to prescribe the generic drugs instead of the brand ones. Finally, physicians also should be urged not to prescribe medications that might raise the incidence of polypharmacy without offering extra benefit to patient conditions.

Acknowledgments

This work was funded by the Jordan University of Science and Technology – Deanship of Research. The results and contents of this work are solely the responsibility of the authors. The funders had no role in study design, data collection and analysis, and decision to publish. We would like to thank Dr. Karim A. Alkadhi, At University of Houston, Houston, TX, USA, and Dr. Paramita Pati, at the University of Alabama, Birmingham, AL, USA, for editing contribution to our manuscript.

Conflict of interest

The authors declare that no conflict of interest exists.

References

Prescribing indicators at outpatient clinics in Jordan


