Assessment of Drug Prescribing in Jordan Using World Health Organization Indicators

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ABSTRACT

Background: Irrational drug use is a major public health problem worldwide. Patterns of prescribing of pharmaceuticals by physicians in Jordan have been scarcely studied.

Objectives: To assess the drug prescribing patterns using World Health Organization Drug Use Indicators at 7 primary health care centers in Amman, the capital of Jordan.

Methods: We prospectively evaluated 1055 prescriptions over a period of 2 months from May/2017 to July/2017, using the WHO prescribing indicators recommended protocol. Core prescribing indicators assessed in this study included the average number of drugs per prescription, the percentage of drugs prescribed by generic name, the percentage of prescriptions containing injections, the percentage of prescriptions containing antibiotics, and the percentage of drugs from the essential drugs list.

Results: Our results showed that the average number of drugs per prescription was 3.0, the percentage of drugs written by generic name was 50.3%, the percentage of drugs written from essential drug list was 97.6%, and the percentages of prescriptions that contain injections and antibiotics were 7.1%, 61.0%, respectively.

Conclusion: Three of the 5 indicators, namely, the average number of drugs per prescription, the percentage of drugs written by generic name, and the percentage of prescriptions that contain antibiotics, fell short of WHO optimal values indicating that there is a room for improvement in prescribing.

Advances in Knowledge:

1. Irrational drug prescribing is still a major problem in Jordan.

2. Our study provides information on the prescribing indicators in Jordan that may be useful for policy makers and for comparison with other countries.

3. Findings of the present study showed a high rate of polypharmacy, a problem associated with many consequences for the patient as well as increased health costs.

4. Overprescribing of antibiotics especially among children < 12 years of age is still a problem in Jordan that needs attention from health authorities. Resistance to antibiotics is a serious worldwide problem associated with abuse of antibiotics.

5. Prescribing by generic name is important and should be encouraged to avoid the extra cost of using brand name drugs promoted by drug companies.

Applications to Patient Care:

1. Overuse of antibiotics and polypharmacy are common in Jordan.

2. Physicians need to be educated about the proper use of antibiotics and avoid unnecessary medications. In addition, they to know the importance of using generic names to prevent cross-prescribing and to avoid unnecessary costs of brand names.

3. Providing a basis for health authorities to develop legislations to encourage prescribing of generics and discourage brand prescribing in both public and private sectors.

4. National policies need to be developed and strictly implemented to support rational prescribing of medications.

Introduction

Inappropriate prescribing of drugs is very common worldwide.[1] Bad prescribing habits may lead to ineffective and unsafe treatment, exacerbation or prolongation of illness distress and harm to the patient, and increasedcosts.[2]

Changing existing prescribing habits is difficult. The WHO and the International Network of Rational Use of Drugs (INRUD) have developed a set of drug prescribing indicators to be used as measures of prescribing performance in primary care centers. Several well-established survey methods are available for this purpose.[3]

Prescribing indicators measure the general prescribing tendencies within a given setting, independent of specific diagnoses .[4]

The prescribing indicators include percentage of drugs prescribed by generic name, the percentage of prescriptions containing antibiotics, the percentage of prescriptions containing injections, the percentage of drugs prescribed from the national essential drug list and the average number of drugs prescribed per prescription.[4] Drug prescribing by physicians in Jordan have been scarcely studied .[5, 6]

Drug prescribing and use patterns by physicians and patients in Jordan have been scarcely studied. One study published in 2002 was found. The study was conducted in collaboration with the WHO and used the WHO indicators, namely, prescribing indicators, and patient care and health facilities indicators.[5]

In 2014, a study was conducted by a group of researchers in Jordan titled 'The evaluation of drug-prescribing patterns based on the WHO prescribing indicators in outpatient clinics of five hospitals in Jordan' and showed a high average number of prescribed drugs per encounter and a low percentage of generic prescribing.[6] In the present study, prescribing behavior has been assessed using the WHO recommended protocol.[5, 6]

GENERAL OBJECTIVE: To assess the health care professionals' adherence to WHO prescribing guidelines and to identify areas in need for intervention regarding the rational use of medicines in Amman.

SPECIFIC OBJECTIVES .[3]

- To determine the average number of drugs per encounter
- To determine the percentage of drugs prescribed by generic name
- To determine the percentage of encounters with an antibiotic prescribed
- To determine the percentage of encounters with an injection prescribed
- To determine the percentage of drugs prescribed from essential drugs list or formulary in Amman primary health care centers.

These WHO recommended indicators would be used to draw the attention of health professionals as well as health authorities and provide baseline data for any future corrective actions.

Methods:

Ethical considerations:

Before the commencement of the study, ethical approval for the study protocol was obtained from the Ministry Of Health in Jordan and the Institutional Review Board in Jordan University of Science and Technology. Since we are dealing only with prescriptions, our study carries no harm to patients. We did not collect any identifying information and data were kept strictly confidential and used by the investigators only for scientific purposes.

Selection of health centers:

Seven centers were selected out of the 70 primary health care centers in Amman based on their geographical distribution and accessibility. Cooperativeness of the staff of the centers, particularly the pharmacists was a factor in selection of these centers for the study. The centers were selected to represent the different geographical areas of Amman which, to an extent, reflects the range of socioeconomic variation in the city. Staffing differs from one center to another. Each health center is staffed by 2 or more physicians (general practitioners and family physicians) and at least 1 pharmacist and 2 or more assistant pharmacists. The selected centers were Shafa Badran and Abu-Nusair from North Amman, Tariq, Al-Marqab, and Al-Manarah from East Amman, Al-Zohour from South Amman and Al-Deraa from West Amman.

Data collection was carried out primarily by the researcher assisted by one pharmacist in each of the selected centers. Assistants were trained on the study procedures and forms by the researcher.

All data relevant to the present study were collected during the period from May/2017 to July/2017. All prescriptions in a given day at a given center were included in the study. We used the Jordan National Drug Formulary to find the essential drug list. Drugs were classified as an antibiotic or not based on WHO definition. The essential drug list of

Jordan is used as a basis to determine drugs as generic or brand name. Work in each center continued until a predetermined number of prescriptions was reached. The targeted number of prescriptions from each center was 100-180 and needed 4-7 days to complete.

Sample size calculation: According to the manual "How to investigate drug use in health facilities" at least 600 encounters should be included in a cross sectional survey.[3] A larger sample size would provide more precise estimates of the targeted indicators. Therefore, we decided to increase our sample size beyond the minimum required. It happened that the total number of prescriptions was 1055, which is well beyond the minimum recommended.

Data management and statistical analysis:

Data entry and analysis were conducted using SPSS version 20 we performed range and logical checks. Detected errors were corrected as appropriate. Prescribing indicators, overall and by health center, were obtained. Prescribing indicators by age were also obtained in order to assess any age-related patterns. The chi-square test was used to assess the statistical significance of observed differences for all indicators (percentages) except for polypharmacy where ANOVA was

Table1. Drug prescribing indicators in relation to optimal values in Amman, Jordan 2017

Prescribing Indicators	Our results	Optimal values
Average number of drugs prescribed per prescriptions	3.0	1.6–1.8
Percentage medicines prescribed by generic name	50.3	100
Percentage prescriptions with an antibiotic prescribed	61	20.0–26.8
Percentage prescriptions with an injection prescribed	7	13.4–24.1
Percentage drugs prescribed from essential drug list	97.6	100

Table2. Prescribing indicators by health centers in Amman, Jordan 2017

Center name (number of prescriptions)	Average number of drugs per prescription	prescriptions containing antibiotics %	prescriptions containing injection %	Drugs in generic name %	Drugs from essential drug list %
ABUNUSAIR (119)	2.7	60	8	4.8	98.4
AL-ZOHOUR(149)	3.4	52	11	70	99.4
AL- DERAA(150)	3.1	54	2	97	100
AL-MANARAH(120)	2.7	57	3	34.2	97.1
AL-MARQAB (151)	2.7	73	3	96.9	98.9
SHAFA BADRAN (185)	3.0	72	10	28.3	94.8
TAREQ(181)	3.0	56	11	19.6	95.9

Table3. Prescribing Indicators by age groups in Amman, Jordan 2017

Age group (years)	Average number of drugs per prescription	prescriptions containing antibiotic %	prescriptions containing injection %	Drugs in generic name %	Drugs from essential drug list %
<12 28.9%	2.23	78	4	49. 6	97.2
13-25 11.2%	2.59	70	4	59.4	98.3
26-50 26.4%	2.81	67	8	53	98.1
>50 33.6%	3.91	38	10	46	97.1
Calculated P-value	0.000	0.000	0.01	0.000	0.958

Table 4   Summary of available drug prescribing studies in Jordan using WHO indicators

Study location (year)	Average number drugs per prescription	prescriptions containing antibiotics %	prescriptions containing injections %	prescriptions by generic name %	Drugs from essential drug list %
Assessment of drug prescribing in 22 primary health care centers in Irbid (1999)[5]	2.2	60	1.2	5.1	93.0
The evaluation of drug- prescribing in outpatient clinics of five hospitals in Jordan (2014)[6]	2.9	17.7	8.1	57.6	99.8

used to compare the mean number of drugs among the different age categories. A p-value ≤0.05 was considered significant.

Results:

A total of 1,055 prescriptions were included. Table1 presents the drug prescribing indicators in relation to optimal values.[7]The overall average number of drugs prescribed per prescription in our study was 3.0. The percentage of drugs prescribed by generic name was 50.3%. The percentage of prescriptions that contained one or more antibiotics was 61% and the percentage of prescriptions that included injections was 7%. The overall percentage of drugs prescribed from essential drug list was 97.5%.

Table 2 shows the prescribing indicators by health center. Al-Zohour health center had 16the highest value in average number of drugs per prescription (3.4), compared to 2.7 drugs per prescription in each of Al-Marqab, Al-Manarah and Abu-Nusair health centers.

Prescribing using the generic name varied substantially between health centers from as

low as 4.8% in Shafa Badran health center to as high as 97% in Al-Deraa health center.

The percentage of prescriptions which contain antibiotics ranged from 52% in Al-Zohour

 health center to73% in Al-Marqab health center, while the percentage of prescriptions containing injections ranged from 2% in Al-Deraa health center to 11% in Al-Zohor health center. Prescribing from essential drug list was 97.54%.

Prescribing indicators by age group are shown in table 3. Polypharmacy was highest among people >50 years of age (3.9 drugs per prescription), (p value=0.000), while antibiotics were more likely to be prescribed for children <12 years (78% of prescriptions contain one or more antibiotic), (p value=0.000). Prescribing injections was generally low in all age groups. Prescribing using generic name was highest in patients 13-25 years of age (59.4%), (p value=0.000). Finally, prescribing from

essential drug list showed no association with age (p value=0.958).

Discussion:

Given the scarcity of studies of drug prescribing behavior in Jordan, the present study was an attempt to shed light on the current situation in Jordan and to provide baseline data for future action. The study was conducted in primary health care centers in Amman governorate; the capital of Jordan, using the WHO recommended protocol. The present study showed the values of five prescribing indicators, namely: the average number of prescribed drugs per outpatient encounter (3.0), the percentage of medicines prescribed by generic name (50.3%), the percentage of prescriptions with an antibiotic prescribed (61%), the percentage of prescriptions with an injection prescribed (7%) and the Percentage of drugs prescribed from essential drug list (97.6%). Poly-pharmacy, overuse of antibiotics and under-prescribing by generic name are still common in Jordan.

The overall average number of prescribed drugs per outpatient prescription (3.0) was substantially higher than the international average of 1.7 drugs per prescription, as shown in Table 1.[7] The range of number of drugs per encounter in different centers was from (2.7 to 3.4). Of particular concern was that 45% of prescriptions contained three or more drugs.

Poly-pharmacy has been defined as the use of more drugs than medically necessary.[8] There are many negative consequences associated with poly-pharmacy; it is associated with increased risk of adverse drug events (ADEs), drug interactions, medication's non-adherence, reduced functional capacity and multiple geriatric syndromes.[8] It also increases cost.[8]

Previous studies have shown increasing polypharmacy in Jordan. Indeed, the overall average number of drugs per prescription increased from 2.0 drugs per prescription in 1999[5] to 2.9 drugs per prescription in 2014[6], to reach 3.0 drugs per prescription in our study,

2017. Our study shows that polypharmacy in Jordan is higher than that in Pakistan,[7] United Arab Emirates,[9] and Saudi Arabia, [10] where the numbers of drugs per prescription were 2.3, 2.2 and 2.4, respectively.

As expected, polypharmacy was most common among people aged >50 years (3.9 drugs per prescription), as people consume more medications with increasing age .[11] Prescribing for older people is challenging. They are often prescribed unnecessary drugs, drugs that are contraindicated in their age group or the wrong dose for their age. Increasing age is associated with changes in pharmacokinetics and pharmacodynamics, so prescribing in this age group can be problematic and increasing number of their drugs complicate their situation.[8]

One of the reasons behind the high rate of polypharmacy in people > 50 was possibly the high prevalence of non- communicable diseases in Jordan, such as diabetes (17.4%) in 2008[12] and hypertension (32.3%) in 2009. [13] Only half of the prescribed drugs were written using the generic name, which was far away from the optimal of 100%. Writing prescriptions using brand names has multiple dangerous adverse effects. Drugs with similar names, such as Losec and Lasix, Pradaxa and Plavix or Lamictal and Lamisil, have been cross-prescribed. In addition, selecting the brand-name drug can increase the cost and the doctors' profit margin by a double-digit multiple (the influence of drug companies).[14]

The use of cheaper generic medicines is often promoted as a measure to reduce the healthcare expenditure on pharmaceutical products and provide savings to patients as well as governments.[15]

Authenticated recommendations by the WHO regarding generic prescribing provide a safety measure for patients.[3] Wide variation in this indicator exists between countries with Jordan ranking in the middle. Prescribing by generic name ranged from as low as 10% in India.[16] to as high as 98% in Ethiopia.[17]

The overall percentage of drugs prescribed by generic name was 50.3% in our study compared to 5.1% in 1999[5], but increased again to 57.6% in 2014[6] (table 4). This represents a huge improvement in this area of rational prescribing that may be attributed

to the introduction of the electronic health records (HAKEEM®) which restricts the

options of prescribing.[18] In 2016, 97 healthcare facilities including 16 Jordanian hospitals were using Hakeem® program. Hakeem® provides secure and patient-centered electronic lifetime record of individuals.[18] Physicians are able to order medications and various patient care orders electronically.[18] Pharmacists are also supported by a system that provides alerts in case of drug duplication, interaction or allergy.[18] The wide variation observed in the current study between centers regarding prescribing by generic name is mostly due to HAKEEM® use. The percentage of generic name prescribing was 97% in Al-Deraa health center and Al-Marqab health center where the staff use the electronic system and 4% in Abu-Nusair health center, where the staff don't, despite of its availability. Lack of knowledge, anxiety to use computers, absence of motivation and old age may have impeded usage of the system resulting in the wide variation observed in our study. [18] Legislation to encourage prescribing by generic name within both public and private sectors could be of great value.

Bacterial resistance to antibiotics is a serious health challenge worldwide. Overuse of antibiotics, often inappropriately for viral infections' is the major factor for inducing bacterial resistance.[19] Prescribing of antibiotics observed in our study was very high (61% of prescriptions contain one or more antibiotics) compared to the optimal range of (20.0-26.8), and compared to a previous report from Jordan in the year 2014 (17.7 %). [6] Our figure is also much higher than previous reports of approximately 32% from Saudi Arabia, [10] and 31.97% from Egypt.[20]

Antibiotic overuse is a real problem in Jordan particularly among children <12 years (78% of prescriptions contain one or more antibiotics). In addition to the absence of clinical guidelines for antibiotic prescribing in Jordan, physicians seem to overestimate the severity of illnesses.

Prescribing of injections was generally low (7% of prescriptions contain one or more injection) compared to the optimal range (13.4%-24.1%). The percentage of prescriptions with an injection ranged from 2% in Saudi Arabia[10] to 37% in Nigeria.[21] Injections are more costive than the oral forms and more difficult to administer.[22] Also the risk of hypersensitivity reactions is higher with injections.[22] However, some patients, particularly adults insist on injections because they falsely belief that they are more effective than the oral medications.[23]

As regards prescribing from essential drug list, our study found a high level (97.6%) which is consistent with previous studies from Jordan.[5, 6] This may be explained by the fact that medications not in the essential drug list are usually lacking in public primary health centers. The present study was limited to Amman and may not represent the country as a whole.

However, having similar physicians and resources in Amman health centers and centers in other regions provides assurance that the results of this study may not depart substantially from that in other regions of the country. Also, our study was limited to public primary health centers; private clinics may have different prescribing behavior and they were not represented in our study. A more comprehensive study involving all of Jordan and including public and private sectors is needed. Collecting more in-depth information regarding the reasons behind irrational drug use would be of great value to base any future policies to solve the problem. Qualitative research methods such as focus group discussions may be invaluable in this regard. More in-depth studies are needed to determine the reasons behind overusing of antibiotics and polypharmacy. Knowledge, attitudes, and beliefs of physicians and the public need to be thoroughly studied in this regard . Implementation of an electronic system in all health facilities would be a great step for improving the situation of rational use of medications in Jordan.

Conclusion: Three of the 5 indicators, namely, the average number of drugs per prescription, the percentage of drugs written by generic name, and the percentage of prescriptions that contain antibiotics, fell short of WHO optimal values indicating that there is a room for improvement in prescribing behavior.

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