

## Original Article

# Prescribing rationality in Khartoum state, Sudan: An update

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### Abstract

**Aim:** Rational prescribing is one of the essential components of good medical practice targeted to provide successful and relatively safe drug therapies. The present study was carried to assess the rationality of the current prescribing practices in Khartoum State. **Methodology:** A descriptive, observational, 1-time study was carried out in Khartoum State hospitals and community pharmacies, to evaluate the five main prescribing indicators adopted by the WHO. Data were collected using the WHO prescribing indicator form. **Results:** The total number of prescriptions collected and analyzed was 7377 prescriptions, 67% from Khartoum city, 22.5% from Khartoum North city and 10.5% from Omdurman city. The total number of drugs prescribed was 20,482, the average number of drugs per prescription: 2.776 drugs, percentage of generics: 37.3%, percentage of antibiotics: 54.3%, percentage of injections: 38.6% and the percentage of drugs on the essential drug list (EDL) was 72.8%. **Discussion:** The number of encounters included in this study is sufficiently large compared to other previously reported studies allowing us to consider the results obtained as an acceptable representative of the total population to describe the overall prescribing pattern. Except for the value obtained for the percentage drugs on the EDL, the values of the other four indicators are indicative of prescribing irrationality in the study population. **Conclusion:** The observed irrational prescribing behavior necessitates the development of certain policies as well as practical and effective implementation mechanisms to promote rational prescribing. We, therefore, recommend the conduction of one or more of three interventions namely, administrative, managerial and/or educational addressing the prescribers population.

**Key words:** Indicators, rational prescribing, Sudan

## INTRODUCTION

Good prescribing a term used widely by various users, a definition of it is different taking into account the one using it, for example government define good prescribing as the lowest cost prescribing that meets the public health need, taking into account the cost of medicine as their main focus. Pharmaceutical industries define good prescribing as

prescribing the latest and most effective drug for its proper diagnostic indication. Practitioners (prescribers) defines it as the use of the most effective drugs based on scientific evidence such as randomized control trials and standard treatment guidelines (STGs).<sup>[1]</sup>

Unfortunately in the real world, prescribing patterns do not always conform to these criteria, and what is observed is poor prescribing pattern and it's reflected in various ways one of which is that prescribers prefer quantity of treated patients over the quality of treatment, simply improving the number of treated patients without necessary improving their health.<sup>[2]</sup> The overuse of drugs in mild cases that could be treated by a simple lifestyle change in diet and exercise (e.g. mild hypertension) is an obvious sign of irrational prescribing. Many studies have shown most common drug use problems

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as being; over-use prescribing, multi-drug prescribing, misuse of drugs, use of unnecessary expensive drugs and overuse of antibiotics and injections.<sup>[3-6]</sup> The overuse of antibiotics and injectable are signs for irrational prescribing raising lots of serious consequences such as resistance to drugs, prolong duration of treatment, increase hospital stay and increased morbidity and mortality, plus financial implications and waste of resources as well.<sup>[7-9]</sup>

The WHO report stated that in developing countries; only 50-70% of peoples are treated with appropriate antibiotics, yet up to 60% of people with viral upper respiratory tract infection receive antibiotics inappropriately. The report also mentioned that <40% of patients in the public sector and 30% in the private sector are treated according to clinical guidelines.<sup>[6]</sup> Antibiotic requires that the prescription justifies its diagnosis (appropriateness), which includes assessment of prescription in both cases, the excess prescribing of antibiotic and the lack of prescription when it's needed.

While it is recognized that approximately one-third of the world's population has no access to essential medicines, the appropriate prescription and use of medicines. Rational drug use is a crucial part of a national health policy since medicines account for 20-60% and >50% of national health spendings in low-and middle-income countries.<sup>[10]</sup>

Khartoum is one of the 15 states of Sudan. It has an area of 22,122 km<sup>2</sup> and an estimated population of approximately 7,152,102 (2008). Khartoum, the national capital of Sudan, is composed of three towns, Khartoum the capital and the main commercial and cultural center, Omdurman residential town, and Khartoum North the main industrial city center. The three towns have grown differentially, with Khartoum constituting 43% of the total area of Greater Khartoum. In Khartoum state, the health system was till 2011 run by two directorates: The federal government which was used to run 18 hospitals mostly big specialized and central, e.g. Khartoum, Omdurman, Khartoum North and Ibn Sina hospitals. The Ministry of Health at the State level, on the other hand used to run the health centers and about 30 smaller hospitals in the outskirts of these cities. In 2013, the health system in Sudan was reforming that about 18 big hospitals were transferred from the federal level to the state level, this meant that 48 hospitals and over 300 health centers and few specialized centers should be run by the Ministry of Health, Khartoum State. It is estimated that 65% of all curative health care in Sudan is shouldered by the State of Khartoum, Ministry of Health.<sup>[11]</sup>

A Sudanese National Drug Policy was formulated in 1981 and updated 2005, which formed the foundation for the Sudan essential medicines list (EML) which is the basis for public sector procurement and public insurance

reimbursement.<sup>[12]</sup> The Federal Ministry of Health produces different STGs for the major disease conditions as well as the Sudan National Formulary, which was last updated in 2013.<sup>[13]</sup>

Antibiotics are frequently sold over the counter without a prescription, while the same occurs with injections that are occasionally sold over the counter.<sup>[14]</sup>

The present study was carried to investigate the current prescribing practices in Khartoum State and to compare the results with previous other studies conducted in Khartoum State as well as with a similar Yemeni study published in 2010.

## METHODOLOGY

A descriptive, observational, 1-time study was conducted in Khartoum state hospitals and community pharmacies, to evaluate the following prescribing indicators as described by the WHO:<sup>[15]</sup>

- Number of drugs prescribed: To quantify the degree of polypharmacy
- Number of drugs prescribed by generics: To measure the tendency for prescribing by generic names
- Percentage of drugs on EML: To measure the adherence to key strategies such as STG and EML
- Percentage of patients prescribed antibiotics: Address its contribution to antimicrobial resistance
- Percentage of injections prescribed: To measure the overused costly and unsafe forms of drug therapy.

Data were collected during the period from June 2012 to December 2012, using a WHO prescriber's indicator form. The data collected by well-trained master degree of pharmacy candidates. Each of the data collectors stayed at each healthcare service premises until the required numbers of prescription indicators forms had been filled. The specific types of data necessary to measure the prescribing indicators were recorded for each prescription encounter and entered directly on the prescribing indicator form. Each form included: Healthcare location, type of health care premises (whether it's a hospital or community pharmacy), type of prescription (perspective or retrospective), the date of the prescription, patients age, the diagnosis, numbers of drugs, number of drugs written by their generic names, availability of antibiotics and injections, number of drugs included in the essential drug list (EDL). Each single prescriber indicator form contains information from 90 prescriptions, which are not necessarily taken from the same geographical area.

The average number of drugs per prescription was calculated by dividing the total number of drugs by the total number of prescriptions.

The percentage of drugs on the EDL and generics were calculated from the total number of drugs, while the percentage of antibiotics and injections were calculated from the total number of prescriptions.

Data were entered into Statistical Package for Social Sciences version 16 SPSS Inc., 233s. Wacker Drive Chicago, IL. 60606-6412 USA) and descriptive analysis was conducted.

## RESULTS

The total number of prescriptions was 7377 prescriptions; 4940 (67.0%) of prescriptions collected from Khartoum city, 1665 (22.5%) from Khartoum North city and 772 (10.5%) from Omdurman city. 3875 (52.53%) prescriptions were collected from hospitals whereas 3502 (47.47%) collected from community pharmacies. Most of the hospital prescription forms were filled from governmental hospitals (18 different governmental hospitals) which constitute (71.43%) of prescriptions; while the private hospitals constitute (28.57%, 12 different private hospitals).

The majority of the prescriptions, 4763 (64.6%) were written prospectively and 2614 (34.6%) retrospectively. Only 33 (0.45%) of prescriptions did not include dates, and the majority 5236 (71%) of prescriptions were written in September 2012.

Age was not specified in 1281 (17.4%) encounters and the majority of prescriptions 4132 (56%) were written for adults patients aged between 19 and 60 years. Most of prescriptions 5739 (77.8%) had no diagnosis written on it. The written diagnosis was distributed between wide varieties of diseases and the 10 most frequent diagnosis encountered were in the order of; hypertension, diabetes mellitus, rheumatoid heart disease, pneumonia, urinary tract infections, malaria, asthma, tonsillitis, delivery and childbirth, diarrhea.

The total number of drugs prescribed was 20,482, average number of drug per prescription was 2.776 ranges (1-13). Table 1 shows the frequency and percentage of a number of drugs prescribed. Percentage of drugs prescribed by generic names was 37.29%, Table 2 shows the details of the number of generics prescribed per each prescription.

Percentage of prescriptions encounters with antibiotics prescribed was 54.26%, Figure 1 shows that the proportion of antibiotics increases as the number of drugs per prescription increases. Percentage of prescriptions encounters with injection prescribed 38.59%. Also the number of prescriptions containing injections

was directly proportional to the number of drugs per prescription [Figure 2].

Percentage of drugs on the Sudan EML was 72.83%.

Table 3 shows a comparison between our present results and that of a similar previous study<sup>[14]</sup> conducted in 2006 to investigate the drug use practice in teaching hospitals in Khartoum State and a recent survey<sup>[16]</sup> conducted 2 years later (2014) to this study to assess the pharmaceutical situation in health facilities in Khartoum State. The three studies were compared with a similar study<sup>[17]</sup> conducted in Hadramout, Yemen using WHO standard indicators of rational drug use for 550 prescriptions from 20 health facilities from different levels in the governorate and published 2010. The values for the average number of medicines per prescription, injection prescribed and adherence to EML was indicative of irrationality for those studies. The average value for the percentage antibiotics

**Table 1: The frequency of number of drugs prescribed per each prescription**

Number of drugs prescribed per prescription	Frequency of prescriptions	Percentage	Cumulative percentage
1	1642	22.3	22.3
2	2035	27.6	49.8
3	1760	23.9	73.7
4	992	13.4	87.1
5	517	7.0	94.2
6	236	3.2	97.4
7	95	1.3	98.6
8	58	0.8	99.4
9	31	0.4	99.9
10	2	0.0	99.9
11	4	0.1	99.9
12	3	0.0	100.0
13	1	0.0	100.0
Total	7377	100.0	

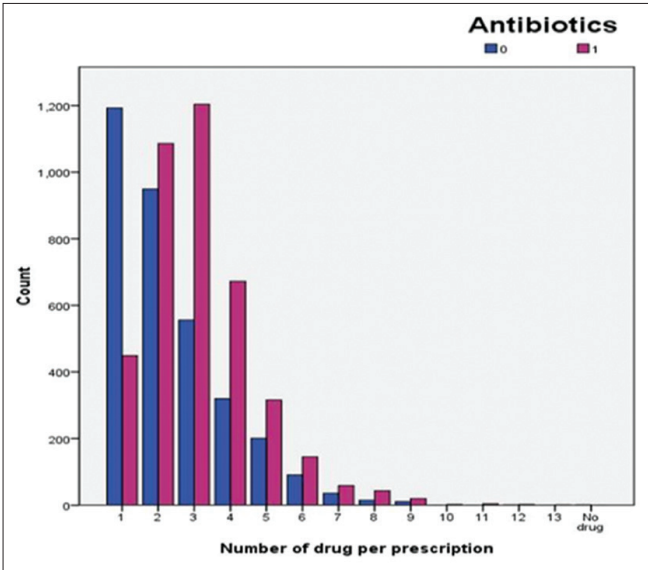
**Table 2: The frequency of number of drugs prescribed by generics**

Number of drugs prescribed by generic name per prescription	Frequency of prescriptions	Percentage	Cumulative percentage
1	2243	30.4	30.4
2	1321	17.9	48.3
3	546	7.4	55.7
4	132	1.8	57.5
5	77	1.0	58.5
6	24	0.3	58.9
7	7	0.1	100.0
8	1	0.0	100.0
No generic	3026	41.0	99.9
Total	7377	100.0	

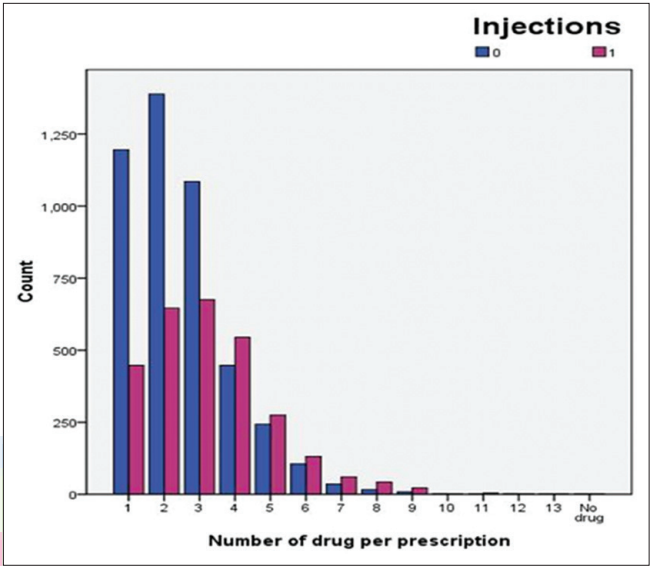
**Table 3: Comparison of our study with similar studies in Sudan and Yemen**

Indicator	Pervious Khartoum study	Present Khartoum study	Later Khartoum study	Hadramout Yemen study
Average number of medicines per prescription	1.9	2.776	3	2.8
Percentage medicines prescribed by generic name (INN)	43	37.29	53.9	39.2
Percentage patients prescribed antibiotics	65	54.26	78.3	66.2
Percentage patients prescribed injections	10.5	38.59	55	46.0
Percentage prescribed medicines on the EML	-	72.83	59.3	81.2

INN = International nonproprietary name; EML = Essential medicines list



**Figure 1:** Proportion of antibiotics per number of drugs prescribed



**Figure 2:** Proportion of injections per number of drugs prescribed

prescribed obtained in our study was higher than the WHO recommended value (30%) but better than that reported in the other studies. However, the average values obtained for the percentage prescribed in generic names in the previous studies was better than that reported in the present study. The Yemeni study showed closely less similar results to those of the present results for the average numbers of medicines per prescription and the percentage of medicines prescribed by generics, but the values for the percentage of antibiotics and injections prescribed were higher than those of the present study.

## DISCUSSION

This study was performed using the WHO drug-use indicators to examine the prescribing pattern at Khartoum State healthcare facilities. The present study included the largest population data to evaluate the prescribing behavior in Sudan and could, therefore, be taken as an update of the drug-use situation in Khartoum capital and a representative of the whole country. The value of 2.776 obtained in this study of the average number of drugs per prescription is within the WHO recommended rational range of 1-3.

The average value for the percentage antibiotics prescribed of 54.26% obtained in this study is significantly higher than the recommended rational values of 30-35%.

The present study results for the percentage drugs prescribed in generic names of 37.29 indicate the greater tendency of the prescribers to prescribe in brand names (62.7%), which could be considered as irrational behavior.

The finding of this study indicated unacceptable pattern of prescribing of injections and considered the highest indicator when compared with four previous studies conducted in Sudan.<sup>[5,14,15,18,19]</sup> Prescribing of drugs included in the (EDL, 72.83%) is considered an acceptable percentage and hence indicates that prescribers are following the respective guidelines.

However, internationally valid standards for other indicators, such as the average number of medicines per prescription, and the percentage use of antibiotics and injections are more complex and have not been empirically established. Targets may require modification over time and between countries, but are currently recommended



to be below 2, 30% and 20%, for the average number of medicines per prescription, percentage use of antibiotics and percentage use of injections, respectively. The optimal indicator values in these cases largely depend on disease patterns, policies and treatment guidelines and therefore may vary from country to country and over time. Similar results from other developing countries showed a higher average number of drugs per prescription of 3.5 in Nigeria, 4.1 in Ghana, in contrast to 1.4 in Zimbabwe.<sup>[3,15]</sup> The percentage of antibiotics prescribed ranged from a low average of 27% in Ecuador and Guatemala to a high average of 76% in Sind province of Pakistan.<sup>[15,20]</sup> Lower and higher results of percentage of injections prescribed (32–56% range) were shown in Uganda, Nigeria, Cameroon and Ghana.<sup>[3,15]</sup> Low percentage of generic prescription was reported from Nepal (37%) compared to the highest of 94% in Zimbabwe.<sup>[15]</sup>

## CONCLUSION

The negative impact of irrational prescribing on health points to the great need for efforts to be made towards changing the prescribing behavior of prescribers. To overcome irrational prescribing strict measures should be enforced through the introduction of policies that ensure rational prescribing behavior among physicians. It is of paramount importance to develop practical and effective strategies particularly with respect to training and conduction of educational, administrative and managerial interventional studies. It is also equally important to develop the appropriate implementation mechanisms to execute those strategic programs.

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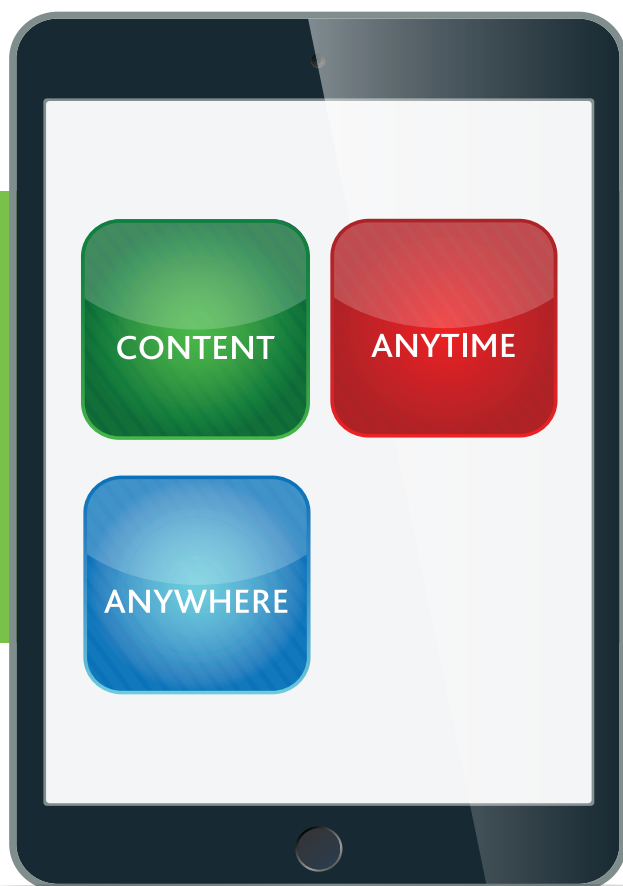
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