PRESCRIBING PATTERNS OF AMBULATORY CARE PHYSICIANS IN SAUDI ARABIA

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قمنا بدراسة أنماط وصف العقاقير من قبل الأطباء لمراجعي مستشفيات وزارة الصحة وذلك من خلال مراجعة عينة مؤلفة من ١٠,٢٩١ من الوصفات الطبية التي حصلنا عليها من اثنين وعشرين مستشفى عاما تغطي مناطق مختلفة للخدمات الطبية في المملكة العربية السعودية. أظهر تدقيق هذه الوصفات أن التوثيق بصفة عامة لم يكن كاملاً. فالمعلومات المتعلقة بسن المرضى والتشخيص كانت غائبة في ١٨,٦٪ و ٩,٨٪ من الوصفات على التوالي. كان معدل عدد العقاقير في كل وصفة ٢,١ ± ٠,٩٥ كانت أكثر العقاقير وصفًا هي مضادات الأخماج والمسكنات/مضادات الحمى ومستحضرات الفيتامينات على التوالي. وبالتحديد، كان الباراسيتامول والأمبيسيلين والمستحضرات المضادة للحموضة وفيتامين ب أكثر العقاقير وصفًا. تشير الأنماط الملاحظة لاستعمال العقاقير في هذه الدراسة إلى ميل نحو الإفراط في وصف فئات معينة من العقاقير. ناقشنا في هذه الدراسة ضرورة تحسين السياسة الحالية للعقاقير ووصفها ورفعنا توصية لإنشاء وحدة الوبائيات الدوائية لمراقبة استعمال العقاقير في المملكة.

The drug prescribing patterns of ambulatory care physicians in the Ministry of Health (MOH) hospitals were studied by examining 10,291 systematically sampled prescriptions obtained from 22 general hospitals covering the various health regions within Saudi Arabia. An audit of prescription information revealed that documentation was not generally complete. Information relating to patient age and diagnosis was missing in 18.6% and 9.8% of the prescriptions, respectively. The average number of drugs per prescription was 2.1 ± 0.95. The most frequently prescribed drug categories were systemic anti-infectives, analgesics/antipyretics, and vitamin preparations, respectively. Paracetamol, ampicillin, antacid preparations, and vitamin B complex were the specific drugs that ranked high in the frequency of prescription. The patterns of drug use observed in this study indicate a trend for the overprescribing of certain categories of drugs. The need to improve current drug policy and drug prescribing is discussed with a recommendation for the establishment of a Pharmacoepidemiology Unit to monitor drug use in Saudi Arabia.

Since its establishment in the mid 1950s, the health care system within the Kingdom of Saudi Arabia (KSA) has undergone tremendous changes. The process of modernization and expansion of the system was very rapid by all standards [1]. Although the Ministry of Health (MOH) is the main authority responsible for the provision of health care in the country, other government sectors such as the Ministry of Defense, National Guard, and the Ministry of Interior have started providing health care for their employees and dependents. The government health care policy is to provide free health service, including drugs, to all its citizens and resident expatriates. The provision of drugs on a large scale, in addition to ensuring their subsequent proper use, is a massive undertaking for the MOH. Due to this, proper guidelines and adequate controls for drug distribution and appropriate usage need to be developed.

The need to develop a national drug policy and promote rational drug use in Saudi Arabia was recognized early and effective measures to address these issues were undertaken by the passage of two important laws governing the profession of pharmacy and the registration of pharmaceuticals in 1978 [2]. Legislation alone, however, cannot ensure the proper use of drugs. Documentation of drug utilization

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information is an essential step in the process of instituting rational drug use. This issue is a global priority.

The rapid expansion of the pharmaceutical industry in the developed countries in the late 1960s has been responsible for developing countries being flooded with products of both proven and questionable qualities. This, coupled with the industry's intensive advertising campaign in these countries which have weak health education programs, has adversely influenced the pattern of drug use among the population. There is strong evidence of overprescribing and drug misuse with all its societal consequences [3-5]. Overprescribing may be controlled by adhering to basic principles or standards of prescribing drugs. All drug therapy should be effective, safe, appropriate, and economic for the individual being treated. In setting these criteria, there is the understanding that drug therapy constitutes a balance of benefits and risks for the individual receiving treatment [6].

Through proper documentation of prescribing information, identification of healthy and unhealthy drug prescribing practices may be possible and the frequency and importance of adverse drug reactions may also be effectively assessed. Physicians can also use the system to carry out self-audits while health planners can utilize the information to design cost-effective health strategies. The subject of drug prescribing patterns in Saudi Arabia has not been sufficiently studied. The few studies reported to date are limited in their scope and do not reflect the nationwide trend [7-9]. In this report, we discuss the results of prescribing patterns of ambulatory care physicians in general medical and surgical MOH hospitals.

Material and Methods

For the survey, a total of 22 major general medical and surgical hospitals were selected from all the health regions within Saudi Arabia. The selection of these sites was designed to provide a fair reflection on both geographical distribution and population density. The number of samples to be collected was pre-estimated using the standard statistical method to detect any differences in probability value to be within 5% of the true value [10]. This estimate was based on mean drug cost per prescription as a determinant variable, estimated from a pilot study carried out in Riyadh. From these hospitals, a total of 10,291 prescriptions were systematically and continually sampled over a period of 12 months, (January 1988-December 1988), taking into account any seasonal variations in prescribing. To avoid prescriber bias, it was decided to sample prescriptions dispensed during the previous two weeks prior to the researcher's visit. The relative contributions of the different sites to the final sample size were predetermined by proportional allocation method using the number of physicians per hospital as the determinant parameter for size of institution.

After collection, the sampled prescriptions were audited for information relating to patient demography, diagnosis of patient's illness, physician speciality, prescribed drug, dosage form, its strength, dose, frequency, and usage instructions. The resulting data together with unit drug cost were recorded on a specially designed form in numerical codes to facilitate data analysis. The data were fed into the computer and checked for errors. The data were analyzed using the Statistical Package for the Social Sciences (SPSS/PC+). Chi-square test was used to test the differences between parameters.

Results

Out of 10,291 prescriptions analyzed, the ratio of male to female was 1.4. The mean age was 30±16 years (±S.D.) and the difference between male and

TABLE 1. *Age and sex distribution.*

Age of patient	Male		Female		Total	
	No.	%	No.	%	No.	(%)
<10	736	15.3%	531	15.0%	1267	15.1%
10 - 19	570	11.8%	448	12.6%	1018	12.2%
20 - 29	1230	25.5%	884	24.9%	2114	25.3%
30 - 39	983	20.4%	731	20.6%	1714	20.5%
40 - 49	601	12.5%	458	12.9%	1059	12.7%
50 - 59	352	7.3%	271	7.6%	623	7.4%
>60	351	7.3%	225	6.3%	576	6.9%
Total	4823	100.0%	3548	100.0%	8371	100.0%

Chi-square = 4.79; D.F. = 6; $P = 0.5$.

TABLE 2. *Documentation of prescription information.*

Information Recorded	No.	(%)
Patient Name and Sex		
Present	10269	99.8
Missing	22	0.2
Age of Patient		
Present	8377	81.4
Missing	1914	18.6
Provisional Diagnosis		
Present	9287	90.2
Missing	1004	9.8
Dose		
Specified	20893	95.9
Not Specified	892	4.1
Frequency of Drug Intake		
Specified	20897	95.9
Not Specified	906	4.2
Route of Drug Administration		
Specified	21755	99.9
Not Specified	28	0.1
Dosage Form		
Specified	21767	99.9
Not Specified	18	0.1
Physician Specialty		
Specified	7014	68.2
Not Specified	3277	31.8

female patients was not statistically significant (P = 0.6) (Table 1). Table 2 shows the documentation accuracy of prescription information. Physician speciality, patient age, and diagnosis were missing in 31.8%, 18.6%, and 9.8% of prescriptions, respectively. In 4% of the prescriptions, dose of drug and instructions for its use were unspecified. The average number of drugs per prescription was 2.1 ± 0.95. A total of 29% of the prescriptions contained one item, 38.7% contained two items, 25.4 % contained three items, 5.5% contained four items, and 1.3% contained more than four items. The differences between males and females were not statistically significant (P = 0.5) (Table 3).

The 20 most commonly prescribed drugs, representing 61.2% of the total prescription items, are shown in Table 4. Paracetamol with 11.2% was at the top of the list followed by ampicillin and antacid preparations with 5.4% and 4.9%, respectively. Table 5 shows the drug category of

TABLE 3. *Number of drugs per prescription.*

Number of drugs	Male		Female		Total	
	No.	%	No.	%	No.	(%)
1	1769	29.5%	1211	28.3%	2980	29.0%
2	2280	38.1%	1697	39.7%	3977	38.7%
3	1535	25.6%	1074	25.1%	2609	25.4%
4	331	5.5%	237	5.1%	568	5.5%
5	56	.9%	48	1.1%	104	1.0%
6	14	.2%	8	.2%	22	.2%
7	5	.1%	4	.1%	9	.1%
Total	5990	100.0%	4279	100.0%	10269	100.0%

Chi-square = 4.36; D.F. = 6; P = 0.6.

TABLE 4. *The 20 most commonly prescribed drugs.*

Rank	Drug Name	No.	(%)	Cumulative (%)
1	Paracetamol	2444	11.2	11.2
2	Ampicillin	1182	5.4	16.7
3	Antacid	1067	4.9	21.6
4	Vitamin B complex	1002	4.6	26.2
5	Chlorpheniramine	817	3.8	29.9
6	Ibuprofen	800	3.7	33.6
7	Cough mixture	599	2.7	36.3
8	Aspirin	594	2.7	39.1
9	Multi-vitamin	571	2.6	41.7
10	Hyoscine-N-butybromide (Buscopan)(R)	500	2.3	44.0
11	Erythromycin	446	2.0	46.0
12	Vitamin C	445	2.0	48.1
13	Nephazoline and chlorpheniramine eye drops	433	2.0	50.1
14	Co-trimoxazole	391	1.8	51.9
15	Iron preparations	361	1.7	53.5
16	Spasmo-cibalgin(R)*	343	1.6	55.1
17	Indomethacin	338	1.6	56.7
18	Chloramphenicol eye ointment	337	1.5	58.2
19	Amoxicillin	328	1.5	59.7
20	Actifed syrup (R)+	322	1.5	61.2

R = registered trade name; * = propyphenazone 220mg, allobarbitone 30mg, hexahydroadiphenine HCL 20mg;
+ = triprolidine HCL 2.5mg/10ml, pseudoephedrine HCL 60mg/10ml.

TABLE 5. *Drug category and percent of drug category cost.*

Drug category	No.	%	Percent of drug category cost
Systemic anti-infectives	3358	15.4%	19.9%
Analgesics/Antipyretics	3064	14.1%	1.9%
Vitamins/Minerals	2185	10.0%	4.6%
Eye, ear and nose drugs	1860	8.5%	4.6%
Dermatological drugs	1664	7.6%	10.6%
Antiulcer drugs	1462	6.7%	14.1%
Anti-inflammatory drugs	1343	6.2%	5.6%
Expectorants and antitussives	1103	5.1%	2.9%
Antihistamines	1015	4.7%	1.9%
Antispasmodics	873	4.0%	2.4%
Cardiovascular drugs	676	3.1%	12.4%
Other drugs	636	2.9%	3.1%
Anti-anemics	518	2.4%	1.7%
Anti-asthmatics	427	2.0%	3.9%
Antidiabetics	408	1.9%	5.0%
Laxatives	272	1.2%	.6%
Diuretics	250	1.1%	1.0%
Anti-emetics	214	1.0%	.2%
Antidiarreal drugs	131	.6%	.2%
Antihemorrhoidal drugs	106	.5%	1.9%
Systemic steroids	100	.5%	.3%
Anticoagulants	74	.3%	.8%
Anti-epileptics	46	.2%	.6%
Total	21785	100.0%	100.0%

prescribed drugs and percentage of total drug cost per category. Systemic anti-infectives, analgesics/antipyretics, and vitamins were the most common drug categories prescribed with 15.4%, 14.1%, and 10.0%, respectively. A financial analysis of drug costs revealed that systemic anti-infective drugs accounted for 20%, with anti-ulcer and cardiovascular drugs taking 14% and 12.4% of the total cost, respectively. Moreover, the top three drug categories prescribed represented 26.4% of total drug cost.

Discussion

The results of the present study need to be viewed in light of certain inherent limitations. First, the survey protocol could have been modified to accommodate inter-regional variation and possible seasonal differences within a particular region studied. Practical limitations of finance and manpower have, however, precluded the inclusion of this option in the study. Second, the lack of previous study models on the subject makes it difficult to produce a sound comparative assessment of the present findings. Nevertheless, the study does provide a preliminary data base for the initiation of future comprehensive studies on this subject.

Audits for completeness of prescription information revealed that documentation of information such as patient age, provisional diagnosis, and instructions were incomplete. These findings confirm previous results reported by other investigators [9,11]. An increase in the daily patient load for physicians and the lack of national standards for prescription writing may be responsible for such a practice. A study on prescribing patterns in primary health care in Saudi Arabia have shown that the nursing staff contribute positively to the thoroughness of demographic data for patients and physicians on prescriptions [9].

A total of 32% of prescriptions studied contained three or more drugs and the average number of items prescribed per prescription was 2.1 $\pm$ 0.95. This agrees closely with the figures reported for primary health care centers in Saudi Arabia [9], India [11],Yemen [12], and Zimbabwe [13]. However, this figure is lower than the average described in studies conducted in 1980 (3.0) for Saudi Arabia and Ghana [7,14], but greater than that for Singapore (1.8) [15], Italy (1.9) [16], and United States (1.1) [17].

A number of factors have been shown to influence prescribing patterns [16,18-20]. The average number of items prescribed by individual physicians in Saudi Arabia was positively related to the physician's age, average daily patient load, and negatively to the physician's educational background [21]. Although there is a trend toward decreasing the

number of drugs prescribed per prescription, current figures remain relatively high, especially when compared with an average of 2-3 medications per patient prescribed for elderly patients with multiple and chronic conditions in the United States [22]. This polypharmacy may be explained by a governmental system which provides free medical service including drugs, a view which is substantiated by a positive correlation between prescription frequency and free medication for the public in the United Kingdom [23] and third-party insurance patients in the United States [24].

Analysis of the 20 most frequently prescribed drugs (Table 4) showed that two-thirds of these drugs are used for symptomatic relief. Paracetamol, ampicillin, antacid, and vitamin B complex were the top four drugs prescribed in Saudi Arabia. In the United States, hydrochlorothiazide, paracetamol, amoxicillin, and erythromycin were the top four drugs prescribed [17]. Seven of the top 20 drugs in this study are also listed among the top 20 drugs prescribed in the United States. The top 20 drugs prescribed comprise 61.1% of drugs prescribed. A similar figure was reported from the United Kingdom and the percentages for Italy, Spain, France, and West Germany varied from 47-35.5% [25].

Furthermore, Table 5 shows that systemic anti-infectives (mostly antibiotics) and analgesics/antipyretics are widely prescribed. This finding confirms a similar pattern reported by researchers in developed [17,25,26] and developing [8-9,11,14] countries. The consequences of overuse and indiscriminate prescribing of antibiotics are well known and have been emphasized extensively in the literature [27-29]. In addition, unwise selection, overprescribing, chronic consumption, and improper storage of analgesics/antipyretics may result in serious adverse reactions [30,31] and accidental poisoning [32].

One may be able to identify prescriptions of developing countries from those of developed countries by the presence of vitamins. Vitamins and minerals ranked third in this study which makes Saudi Arabia no exception to other developing countries [11,14]. Furthermore, three of the 20 most frequently prescribed drugs in this study were vitamins (Table 4). This may indicate that malnutrition is prevalent in Saudi Arabia or vitamins are overprescribed by physicians. The latter seems to be more likely the case. However, it is encouraging to observe that vitamins and minerals ranked third in this study while ranking first in a study conducted in 1985 [8].

Two observations regarding the prescribing patterns of MOH physicians are worth mentioning. The first observation is that ibuprofen is more frequently prescribed as an analgesic/antipyretic in replacement for paracetamol. The second observation relates to the level of prescribing of antacids, antispasmodic, multi-enzyme products which may indicate an increase in the prevalence of gastrointestinal diseases, inadequate eating habits in the general public, or simply overprescribing of medications.

The management of drug expenditure is of great concern to health administrators in developed and developing countries [33,34]. Analysis of drug cost per drug category (Table 5) showed that 20% of the total drug cost is spent on systemic anti-infectives, 14% on anti-ulcer, 12.4% on cardiovascular drugs, 10.6% on dermatological preparations, and 5.6% on anti-inflammatory drugs. Furthermore, 25% of the total drug cost in this study was spent on dermatological preparations and 5.6% on anti-inflammatory drugs. The successful implementation of a specific program or strategy to reduce drug costs at the hospital or national levels will not succeed if it does not consider social, cultural, and market forces, and/or backed up by effective legislation [35]. The process of drug utilization evaluation, which provides feedback regarding personal prescribing patterns to the clinician, offers a way of relaying information which has been subjected to peer judgment and may improve the quality of care. This can be achieved only if the prescriber recognizes that there is a problem and is willing to change his/her prescribing habits [36].

Conclusion

The results of the present study may be of benefit to MOH officials in their overall health policy planning. Such data collection provides baseline data for the drug prescribing patterns in Saudi Arabia. Taking advantage of this insight into current prescribing patterns may provide the possibility of evaluating prescribing practices and in developing policies for drug use. The information and experience gathered from this study are useful elements, serving as a feedback for continuing

education programs, which are suitable for integration in daily practice. This study was conducted prior to the full implementation of the primary health care concept designed by MOH, which may allow us to measure the effect of applying such a program on the pattern of drug use in ambulatory care clinics in MOH hospitals. Furthermore, cost analysis figures are imperative for the projection of future drug expenditure. Establishing a sound national drug policy is an integral part of any health care system. Such policy will not serve its purpose if implemented without sufficient information regarding morbidity and mortality data. These data need to be collected and analyzed on a continuous basis and the recommendations and feedback provided to policy makers. To achieve this, MOH and other institutions providing health care services in Saudi Arabia may be able to establish a pharmacoepidemiology or drug utilization unit in cooperation with the Colleges of Pharmacy and Medicine at King Saud University and King Abdulaziz City for Science and Technology (KACST).

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