A pharmacoepidemiological study of prescription pattern in outpatient clinics in Southwestern Saudi Arabia

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ABSTRACT

Objective: To study the pattern of prescriptions in outpatient clinics in a teaching hospital in Southwestern Saudi Arabia.

Methods: A total of 3796 prescriptions from outpatient clinics of Aseer Central Hospital, Abha, Kingdom of Saudi Arabia were screened randomly and systemically over one-year period (April 2000 to April 2001). The prescriptions were analyzed for the essential elements of the prescription order, and for the number and classes of drugs prescribed, source of prescription and appropriateness of prescription to the diagnosis.

Results: The source of prescriptions was not provided in 61.5% of prescriptions. The diagnosis was missing in 15.1% and not readable in 18.9% of prescriptions. Upper respiratory tract infection (URTI) was the most frequent diagnosis and was included in 21.6% of prescriptions. The average number of drugs per prescription was 2.1 ± 1.05 (Mean ± SD), with 90.8% of prescriptions containing 3 or fewer drugs. The most frequently prescribed drugs were nonsteroidal anti-inflammatory drugs (NSAIDs), including paracetamol which were included in 51.2% of prescriptions, followed by antibacterial agents (33.2%). Only 46.4% of prescriptions were appropriate to the diagnosis, while 11.1% were partially appropriate and 5.3% were inappropriate. For the rest (37.2%), it was difficult to evaluate appropriateness due to deficient information. General practitioners and specialists were more likely to prescribe appropriately than emergency room physicians (64.6% and 60.4% versus 35.7%). None of the prescriptions for antiplatelet and anticoagulant drugs and antihypertensive agents were inappropriate.

Conclusion: These results emphasize the need for continuing medical education on rational prescribing, and for periodic monitoring of physicians habits on drug utilization.

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Drug prescribing is often the end result of most medical consultations.[1,2] Because good quality prescriptions are extremely important for the accurate dispensing of medicines and contribute to minimizing medication errors, physicians should adhere to the guidelines of prescription writing for the advantage of the patient. Irrational prescribing by physicians is still practiced worldwide.[1-5] Inappropriate prescribing habits lead to ineffective and unsafe therapy, prolongation of illness or hospital stays and escalation of healthcare expenditure. They also make the prescriber vulnerable to undue pressure from patients, incompetent colleagues and representatives of the

pharmaceutical industry.[1,4] Therefore, it is important to periodically assess the prescribing behavior of physicians working in health facilities to identify any defects related to their prescribing habits, in order to undertake corrective measures effectively. Ongoing educational programs on rational prescribing, followed by reminders and feedback to physicians have greatly improved the prescription writing habits of physicians.[3] A number of such studies were performed in the Kingdom of Saudi Arabia (KSA) to tackle this problem in primary health care centers.[6-8] Unfortunately, only few studies addressed the problem in some Ministry of Health Hospitals.[4,9] The purpose of this study was to evaluate the prescribing habits of physicians working in a teaching hospital in Southwestern Saudi Arabia.

Methods. Aseer region lies in the Southwestern part of KSA and has an area of approximately 80,000 km^2 and a population of 1.2 million people. It is bordered from the west by the red sea and from the south by the Republic of Yemen. Unlike the rest of KSA, it receives a high annual rainfall (15-57 cm) and the temperature varies between 7°C and 30°C. Aseer Central Hospital is located in Abha City, and is the only referral hospital at the tertiary care level in Aseer region. It is utilized by the College of Medicine and Medical Sciences, King Khalid University for training of medical students.

All outpatient prescriptions from within the hospital, irrespective of the clinic of origin, received by and kept in the pharmacy were the target of the study. One-year prescriptions during the period from April 2000 until April 2001 were analyzed retrospectively. This period was divided into 4 seasons: spring, summer, fall and winter. Prescriptions of one week (5 working days) of each season was sampled randomly and systemically as every other prescription. The prescriptions were analyzed for the essential elements of the prescription order, and for the number and classes of drugs prescribed, source of prescription (clinic or specialty) and appropriateness of prescription to the diagnosis.[1,10,11] Concerning appropriateness of treatment to diagnosis, the observations were classified as "appropriate" when the drugs prescribed were related to the diagnosis, "partially appropriate" when some of the drugs but not all were related to the diagnosis, "inappropriate" when there was no relationship between the drug prescribed and the diagnosis, and "difficult to tell" when the diagnosis was missing or not clearly written, or when the prescribed drug was unreadable. The local Ethics Committee at Aseer Central Hospital approved the study.

The data generated were fed to the SPSS® program and simple descriptive statistics were used to analyze results.

Results. A total of 3796 prescriptions were reviewed randomly and systemically. Of these, 28.5% were from the winter, 22.7% from spring, 24% from summer and 24.9% from fall seasons. Prescriptions contained 1-7 drugs with a mean ± SD of 2.1 ± 1.05 drugs per prescription and a median of 2.0. The average number of antibacterial agents prescribed per individual was 0.33. In 35.4% of prescriptions, only one drug was prescribed, and 90.8% of prescriptions contained 3 or less drugs. The department of origin of the prescription was missing in 61.5% of prescriptions, whereas 6.7% of prescriptions were written by general practitioners, 17.3% by emergency room doctors (who are also general practitioners) and 14.4% by various other specialties. The diagnosis was missing in 15.1% and not written clearly in 18.9% of prescriptions. Upper respiratory tract infections (URTIs) constituted 21.6%, gastrointestinal tract (GIT) disorders (8.2%), trauma (5%), infections other than URTIs (4.9%) and cardiovascular diseases (4.7%) of all prescriptions.

Concerning appropriateness of treatment to overall diagnosis , only 46.4% of the prescriptions were "appropriate", whereas, 11.1% were classified as "partially appropriate", 37.2% "difficult to tell" and 5.3% "inappropriate". It is important to know that the source of prescription was given only in 38.5% of cases. Appropriateness of treatment to the diagnosis grouped according to the source of prescription is presented in **Table 1**. In this cohort, 50% of prescriptions were "appropriate" to the diagnosis. Of the appropriate prescriptions, 64.6% of general practitioners', 60.4% specialists' and 35.7% emergency room doctors' prescriptions were "appropriate". Emergency room doctors also did worse regarding "inappropriate", "partially appropriate" and "difficult to tell" prescriptions. There were significant differences among the various groups using the Pearson x^2 test ($p<0.05$).

The 10 most frequently prescribed classes of drugs, out of 35 items included in our coding key were: non-steroidal anti-inflammatory drugs (NSAIDs) including paracetamol occupied the top of the list being present in 51.2% of prescriptions, followed by antibacterial agents (33.3%), drugs for gastrointestinal disorders (17.8%), cough suppressants, expectorants and decongestants (14%), histamine H1-receptor blockers (13.9%), antiplatelet drugs and anticoagulants (5.6%), corticosteroids (5.5%), antihypertensive agents (5.5%), vitamins and minerals (5%) and antiasthmatic agents excluding corticosteroids (4.5%). The pattern of prescription for the top 10 most frequently prescribed drugs was analyzed further for the diagnosis given, the source of prescription and appropriateness of prescription to the diagnosis. Concerning NSAIDs, the diagnosis was missing in 10.4% and not written clearly in

17.4% of prescriptions. Upper respiratory tract infection was the most common diagnosis for which NSAIDs were prescribed, which constituted 34.8% of prescriptions of these drugs. Trauma followed at a frequency of 8.8%, bone and musculoskeletal disorders at 6.8%, other infections at 4.8% and GIT disorders at 4.1%. Gastrointestinal disorders for which NSAIDs were prescribed included, paracetamol for gastroenteritis, gastritis, colitis, diarrhea, abdominal pain or abdominal colic; ibuprofen for gastroenteritis and abdominal pain; and diclofenac for acute cholecystitis. The diagnosis for which antibacterial agents were prescribed was missing in 9.4% and not written clearly in 18.5% of prescriptions. The most frequent diagnosis for which antibacterial drugs were prescribed was URTI (43.8%), followed by other infections (10.8%), GIT disorders (4.2%) and trauma (3.2%). Gastrointestinal disorders for which antibacterial agents were prescribed included amoxicillin and clarithromycin for peptic ulcer disease or gastritis, and co-trimoxazole for gastroenteritis or abdominal colic. In addition, antibacterials were also prescribed for an alleged concomitant URTI. The diagnosis for which drugs for GIT disorders were prescribed was missing in 10.5% and not written clearly in 17.6% of prescriptions. The most frequent diagnosis for which these drugs were prescribed was GIT disorders (41.9%), followed by URTIs (9.7%), other infections (5%) and musculoskeletal disorders (3.8%). Frequently, these drugs were co-prescribed with NSAIDs. Concerning cough suppressants, expectorants and decongestants, the diagnosis for which they were prescribed was missing in 9.1% and not written clearly in 11.7% of prescriptions. Upper respiratory tract infections constituted the most frequent diagnosis for which these drugs were prescribed at a frequency of 64.2%, followed by

other respiratory disorders and other infections at a frequency of 4.5% each. The diagnosis for which antihistamines were prescribed was missing in 8.6% and not written clearly in 18% of prescriptions. The most frequent diagnosis for which these drugs were prescribed was URTIs, at a frequency of 47.2%, followed by dermatological disorders at 7.5%, other respiratory disorders at 4.4% and GIT disorders at 4%. In most cases, it was not apparent why antihistamines were prescribed for GIT disorders, and in few cases, they were prescribed for an alleged concomitant URTI. The diagnosis for which antiplatelet and anticoagulant drugs were prescribed was missing in 35.7% and not written clearly in 5.6% of prescriptions. The most frequent diagnoses for which these drugs were prescribed were cardiovascular diseases (40.8%) and thromboembolic disorders (12.2%). The diagnosis for which corticosteroids were prescribed was missing in 14.3% and not written clearly in 25.2% of prescriptions. The most frequent diagnoses for which corticosteroids were prescribed were dermatological diseases (24.8%) and respiratory disorders (18.1%). The diagnosis for which antihypertensives were prescribed was missing in 45.2% and not written clearly in 8.1% of prescriptions. Cardiovascular diseases were the main diagnoses for which antihypertensives were prescribed and occurred at a frequency of 39.5%. The diagnosis for which vitamins and minerals were prescribed was missing in 18.4% and not written clearly in 13.5% of prescriptions. Upper respiratory tract infections constituted the most frequent diagnoses for which these agents were prescribed (18.4%), followed by blood disorders (9.7%), musculoskeletal disorders (6.5%), GIT disorders (5.9%), central nervous system diseases (5.4%) and other infections (4.3%). The diagnosis for which antiasthmatic agents (other than corticosteroids)

Table 1 - Appropriateness of treatment to the diagnosis grouped according to the source of prescription.

Appropriateness	Emergency room n (%)		Specialties n (%)		General practice n (%)		Total n (%)	
Inappropriate	40	(6.1)	22	(4)	12	(4.7)	**74**	**(5.1)**
Appropriate	234	(35.7)	330	(60.4)	164	(64.6)	**728**	**(50)**
Difficult to tell	244	(37.3)	147	(26.9)	52	(20.5)	**443**	**(30.4)**
Partially appropriate	137	(20.9)	47	(8.6)	26	(10.2)	**210**	**(14.4)**
Total	**655**	**(100)**	**546**	**(100)**	**254**	**(100)**	**1455***	**(100)**

Pearson $x^2 = 107.445$, $p<0.05$. *grand total represents the 38.5% of prescriptions for which the source was known.

were prescribed was missing in 10.6% and not written clearly in 10% of prescriptions. The most frequent diagnoses for which antiasthmatics were prescribed were respiratory diseases (51.8%) and URTIs (17.1%). The source of prescriptions and the appropriateness of prescription to diagnosis for the 10 most frequently prescribed drug groups are presented in **Tables 2 and 3**.

Emergency room physicians and general practitioners were the main prescribers for NSAIDs; antibacterial agents; drugs for GIT disorders; cough suppressants, expectorants and decongestants; antihistamines and antiasthmatics. Internists and hematologists were the main prescribers for antiplatelets and anticoagulants. Dermatologists and internists were the main prescribers of corticosteroids. General practitioners and internists were the main prescribers for antihypertensive agents, while emergency room physicians and internists were the main prescribers of vitamins and minerals. Concerning appropriateness of prescriptions to the diagnosis (**Table 3**), none of the prescriptions for antihypertensive agents and antiplatelets and anticoagulants were inappropriate. However, approximately one tenth of prescriptions for vitamins and minerals and drugs for GIT disorders were inappropriate. Appropriate prescriptions ranged from as low as 35.1% for vitamins and minerals to as high as 60% for antiasthmatic agents, while the rest of drug groups came in between.

Discussion. This study describes the pattern of prescription in outpatient clinics of a teaching hospital in Southwestern Saudi Arabia. A total of 3796 outpatient prescriptions were selected systematically and randomly and reviewed for the number and classes of drugs prescribed, source of prescription (department of origin) and appropriateness of prescription to the diagnosis. The average number of drugs prescribed which was 2.1 was similar in magnitude to that reported by Bawazir[9] from Saudi Arabia and Ravi Shankar et al[12] from Western Nepal, Walker et al[13] from Yemen and Yap and Chan[14] from Singapore who reported 2.1 ± 0.95, 2.15 ± 1.71, 1.5 - 2.4, and 2.6, respectively, but lower than figures reported by Balbaid and Al-Dawood from Ministry of Health hospitals in Saudi Arabia,[4] Bosu and Ofori-Adjei[15] from Ghana, Rishi et al[16] from India and Chukwuani et al[17] from Nigeriawho reported 3 ± 1.4, 4.8, 3.65 and 3.16, respectively. Apparently physicians from our hospital have a less tendency to prescribe polypharmacy. Of all prescriptions reviewed, 90.8% contained 3 or less drugs, which are similar to the 93.2% reported by Bawazir[9] but it is in contrast to what has been reported by Balbaid and Al-Dawood[4] from KSA who found that one third of prescriptions contained more than 3 drugs per

prescription. The average number of antibacterial agents per prescription of 0.33 of our study was lower than what has been reported by Balbaid and Al-Dawood,[4] which was 0.5, Walker et al[13] 0.45-0.67 and Bosu and Ofori-Adjei[15] 0.6, and much less than the 1.1 figure reported by Chukwuani et al.[17] Therefore, physicians from our hospital also tended to prescribe less antibacterials than others.

The prescriptions that we have reviewed were surprisingly missing in certain information. The source of prescription was missing in 61.5% of prescriptions, and the diagnosis was missing in 15.1% and not written clearly in 18.9% of the prescriptions. This is in contrast to what have been reported by Balbaid and Al-Dawood[4] and Bawazir[9] who found that the diagnosis was missing in only 6.8% and 9.8% of prescriptions. In prescriptions were such information was included, emergency room doctors were the main prescribers (17.3% of all prescription), which was more than all specialties combined (14.5%) and general practitioners (6.7%). These observations are in contrast to those published by Yap and Chan[14] who reported 39% of prescriptions to come from the emergency and accident department, and the rest was from the various specialties. The 66% of prescriptions in which the diagnosis was mentioned clearly in our study was less than the 93.2% reported by Balbaid and Al-Dawood[4] and the 90.2% reported by Bawazir,[9] but much more than the 22.25% reported by Rishi et al.[16] Our finding that NSAIDs and paracetamol were on the top of the list of the most frequently prescribed drugs being present in approximately one half (51.2%) of prescriptions, is similar to that reported by Yap and Chan[14] and Rishi et al.[16] Others[2,9,12] have reported that NSAIDs were among the 5 top most frequently prescribed drugs. However, there are significant similarities among the various studies on the most frequently prescribed drug classes. Bawazir[9] reported that analgesics/antipyretics were the second most frequently prescribed drugs and were found in 14.1% of prescriptions, while anti-inflammatory drugs were found in 6.2% of all prescriptions. Ravi Shankar et al[12] reported that the most frequently prescribed drugs were in descending order, anti-ulcer drugs, antibiotics, antiasthmatics, antihypertensives and analgesics. Yap and Chan[14] reported that the most commonly prescribed drugs in descending order were, NSAIDs, antacids, analgesics (other than NSAIDs), antibiotics, topical medications, antidiarrheal agents, antihistamines, vitamins, antiemetics and promethazine cough syrup. Rishi et al[16] reported that NSAIDs, antibiotics and vitamins to be the most widely prescribed drugs. Blatt et al[2] reported that analgesics-antipyretics, antibiotics, antimalarials, NSAIDs and vitamins accounted for two thirds of prescriptions they reviewed. Since paracetamol was

Table 2 - Sources of prescriptions for the 10 most commonly prescribed drugs.

Drug class	Source of prescription				
	Missing %	Emergency room %	General practice %	Specialties %	Total %
NSAIDs	63.3	21.1	8.6	7	**100**
Antibacterial agents	58.8	23.3	8.3	9.6	**100**
Drugs for GIT	63.5	18.9	6.8	10.8	**100**
Cough suppressants, expectorants and decongestants	55.7	27.2	10.2	6.9	**100**
Antihistamines	62.5	25.4	5.5	6.6	**100**
Antiplatelet and anticoagulant drugs	52.1	0	1.4	46.5	**100**
Corticosteroids	59	3.3	3.3	34.4	**100**
Antihypertensives	72.9	1	2.4	23.7	**100**
Vitamins and minerals	67	11.9	3.8	17.3	**100**
Antiasthmatic agents	53.5	25.9	8.8	11.8	**100**

NSAIDs = non-steroidal anti-inflammatory drugs and paracetamol, GIT - gastrointestinal tract.

Table 3 - Appropriateness of treatment to the diagnosis for the 10 most commonly prescribed drugs.

Drug class	Appropriateness				
	Appropriate %	Partially appropriate %	Inappropriate %	Difficult to tell %	Total %
NSAIDs	52.5	13.4	4.2	30	**100**
Antibacterial agents	49.8	15.9	4.4	29.8	**100**
Drugs for GIT	35.5	23.8	9.9	30.9	**100**
Cough suppressants, expectorants and decongestants	55.3	18.1	4.2	22.5	**100**
Antihistamines	47.4	18.7	5	28.9	**100**
Antiplatelet and anticoagulant drugs	54.9	1.9	0	43.2	**100**
Corticosteroids	43.3	9	3.3	44.3	**100**
Antihypertensives	36.7	6.2	0	57.1	**100**
Vitamins and minerals	35.1	21.1	8.6	35.1	**100**
Antiasthmatic agents	60	13.5	3.5	22.9	**100**

NSAIDs = non-steroidal anti-inflammatory drugs and paracetamol, GIT - gastrointestinal tract.

included with NSAIDs in our coding key, it would be expected to find that URTIs were the most common diagnosis for which these drugs were prescribed. However, the situation is different with NSAIDs prescribed for GIT disorders. Some of the prescriptions contained paracetamol for an alleged concomitant URTI, others contained paracetamol or diclofenac for cholecystitis, some contained paracetamol or ibuprofen for gastroenteritis, others contained paracetamol for abdominal colic or gastritis. Although paracetamol may be appropriate for fever and musculoskeletal pain, we found no explanation for its prescription for gastritis or for the use of ibuprofen for gastroenteritis. Concerning antibacterial agents, also there are some strange findings. Gastrointestinal disorders were the third diagnosis for which these drugs were prescribed. One finding was appropriate which is prescribing amoxicillin and clarithromycin for peptic ulcer disease or some times for gastritis. However, we found it inappropriate to prescribe co-trimoxazole for gastroenteritis or abdominal colic. In most cases, it was not clear why antihistamines were prescribed for GIT disorders. In few cases they were prescribed for an alleged concomitant URTI. Antiplatelets and anticoagulants were appropriately prescribed for cardiovascular and thromboembolic disorders, and were prescribed mainly by hematologists and internists who included cardiologists. Anticoagulation service is carried out by hematologists in this hospital. Concerning vitamins and minerals, they were mostly prescribed for URTI and blood disorders including anemias, and were mostly prescribed by emergency room physicians and internists who included nephrologists. Some vitamins and minerals are commonly prescribed by nephrologists to patients with chronic renal failure. Also, other internists may prescribe certain vitamins and minerals for anemias. There is no clear reason for prescribing these agents for GIT disorders. Concerning appropriateness of prescription to the diagnosis, we found almost two thirds of prescriptions written by general practitioners and specialists were appropriate, while only about one third of emergency room physicians were so. Emergency room physicians also have more "inappropriate" prescriptions than general practitioners and specialists. Appropriateness of prescription to diagnosis could not be evaluated for all prescriptions because many lacked the diagnosis, or the diagnosis was not written clearly. In few cases, the drug prescribed was not written clearly and could not be identified. Of those including the diagnosis, there were no inappropriate prescriptions for antiplatelets and anticoagulants and antihypertensives, while almost one tenth of prescriptions for GIT acting drugs and vitamins and

minerals were inappropriate. Concerning appropriate prescriptions, 60% of prescriptions for antiasthmatic agents were appropriate, while only 35.1% of those for vitamins and minerals were appropriate. The rest of drug groups came in between.

In conclusions, prescriptions suffered from missing information, particularly the source of the prescription and the diagnosis. Non-steroidal anti-inflammatory drugs and antibacterial agents were the most frequently prescribed drug groups. Approximately one fifth of the prescriptions were either inappropriate or partially appropriate to the given diagnosis. Approximately one tenth of prescriptions for drugs for GIT disorders and for vitamins and minerals were inappropriate. Despite that, physicians have a lower tendency to prescribe polypharmacy and fewer antibacterial agents. These results indicate the need for continuing medical education of physicians on rational prescribing, and to take measures for the effective implementation of guidelines for drug utilization. Furthermore, periodic assessment and monitoring are needed to ensure that guidelines are adequately followed.

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