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ABSTRACT This study was carried out to analyse drug-prescribing practices in primary healthcare centres (PHCs) in the Gaza Strip. We retrospectively evaluated 2569 prescriptions from 22 PHCs during January–December 2014. Systematic random sampling was applied. Analysis followed the World Health Organization recommended core prescribing indicators. The mean number of drugs prescribed per encounter was 2 (standard deviation 0.9); the percentage of drugs prescribed by generic name was 10.1%; and 67.5% of prescriptions contained an antibiotic followed by analgesics (39.4%). Major omission errors were found in 89.5% of all prescriptions. For all drugs prescribed, drug duration, strength, frequency, dose and dosage form were not mentioned in 79.3%, 65.4%, 30.6%, 23.3% and 12.5% of prescriptions, respectively. Nonofficial abbreviations were used to write 87.4% of prescriptions. There is a clear need to develop standards for drug prescribing, standard treatment guidelines for drug use, along with continuing medical education programmes, and the implementation of monitoring systems to ensure that they are adhered to.

L’utilisation des médicaments dans les centres de soins de santé primaires

de la Bande de Gaza

RÉSUMÉ La présente étude a été réalisée pour analyser les pratiques de prescription de médicaments dans les centres de soins de santé primaires de la Bande de Gaza. Les chercheurs ont analysé rétrospectivement 2569 prescriptions provenant de 22 centres sur la période allant de janvier à décembre 2014. La méthode d'échantillonnage aléatoire systématique a été appliquée. L'analyse a utilisé les indicateurs fondamentaux de prescription recommandés par l'Organisation mondiale de la Santé (OMS). Dans l'ensemble, le nombre moyen de médicaments prescrits par visite était de 2 (Écart-type 0,9), le pourcentage de médicaments génériques prescrits étant de 10,1 % ; 67,5 % des prescriptions contenaient des antibiotiques suivis par des analgésiques pour 39,4 %. Des oublis majeurs ont été trouvés dans 89,5 % des prescriptions. Pour tous les médicaments prescrits, la durée, la puissance, la fréquence du traitement, la posologie et la forme galénique n'étaient pas mentionnées dans 79,3 %, 65,4 %, 30,6 %, 23,3 % et 12,5 % des prescriptions respectivement. Les abréviations officielles n'étaient pas utilisées dans 87,4 % des prescriptions. Il existe un besoin évident d'élaborer des normes pour la prescription de médicaments, des directives thérapeutiques standard sur l'utilisation des médicaments ainsi que des programmes de formation médicale continue, et de mettre en place de systèmes de suivi pour garantir l'observance thérapeutique.

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Introduction

Rational prescribing and rational drug use are important goals that all healthcare systems should endeavour to achieve, irrespective of a country's degree of development. Rational drug use means that appropriate medicines are prescribed in the correct dose and dosage form to the correct patient and at the lowest cost to the patient and the community. When one or more of these conditions is lacking, irrational use of drugs will arise (1). Worldwide, > 50% of all medicines are prescribed, dispensed or sold inappropriately, while 50% of patients fail to take them correctly (1,2). Unfortunately the availability and irrational use of drugs is a major problem in current medical practice and its consequences include the development of resistance to antibiotics, ineffective treatment, adverse effects, drug dependence and an economic cost to the patient and society. Irrational or misuse of drugs refers to the distribution or consumption of drugs in ways that negate or reduce their efficacy or in cases where they are unlikely to have the desired effect (1–3). To achieve optimal availability and appropriate use of drugs, a national drug policy is required to cover drug quality, safety, efficacy, availability and affordability (4,5). This drug policy should conform with the principles of primary health care (PHC), including the

availability of essential drugs and the promotion of the rational distribution and utilization of drugs (6).

The Palestine Ministry of Health (MoH) established the first Palestinian National Drug Policy in 1996. In 2000 an Essential Drug List (EDL) was developed. However, the EDL has not been updated since. Furthermore, the Gaza Strip lacks an appropriate policy, standard treatment guidelines and training programmes for health staff regarding prescribing, dispensing and use of drugs (7).

Officially, the General Administration of Pharmacy in the Gaza Strip is responsible for the procurement and supply of pharmaceuticals in public sector facilities. The MoH buys the majority of medicine and medical disposables listed on the EDL through an annual tender according to the requirements of clinics and hospitals in the West Bank and Gaza Strip. Since 2007, the MoH in Ramallah has been responsible for sending regular shipments of drugs and medical disposables to the central stores in the Gaza Strip in order to provide MoH facilities with their requirements. In practice, the shipments of medicines and medical disposables are neither regular nor contain sufficient quantities to meet those needs. This situation results in the steady deterioration of stocks of medicines and medical disposables in MoH facilities in the Gaza Strip (7). In general practice, the MoH in the Gaza Strip acquires pharmaceuticals in 3 ways: (1) it receives a significant part of its medicines through donations; (2) it procures some badly needed items itself to compensate for the shortage; and (3) it receives official shipments from the MoH in Ramallah (8,9).

Because prescribing and dispensing and the use of drugs by patients in the Gaza Strip is not well documented, the present study was conducted in PHCs to provide information about basic indicators of drug use in the context of patient treatment. These indicators are used to measure performance in 3 areas relating to the rational use of drugs in healthcare facilities: (1) prescribing indicators measure the performance of prescribers; (2) patient care indicators measure what patients experience in healthcare facilities; and (3) facility indicators measure whether the health personnel can function effectively (2). A detailed manual on their application is available from WHO (10). In addition, in this study the number of drugs prescribed, the percentage of antibiotics and analgesics prescribed for different age groups of patients, the reasons for attending a PHC, and the prescription writing skills in PHCs were measured to obtain preliminary data for promoting rational use and prescribing patterns in the PHCs.

Methods

This study was carried out during the siege of the Gaza Strip in 2014, when there was a drastic shortage of MoH EDL drugs. A cross-sectional study of 1-year duration was undertaken over the course of 2014. A form was designed for data collection adapted from the WHO manual "How to investigate drug use in health facilities: selected drug use indicators". Indicators relating to prescribing practice were selected, and the principle investigator visited government outpatient pharmacies in PHCs for data collection (10). The number of drugs prescribed per patient, the percentage of antibiotics and analgesics prescribed for different age groups, the reasons for attending a PHC, and the prescription writing skills in PHCs were documented. Prescribing errors were classified according to the following criteria: absence, vague, incomplete and/or illegibility of any component of the body of the prescription were considered to be major errors of omission. Absence of any of the prescription components such as date of prescription, patient's personal identifiers, physician's stamp, and/or direction for use were deemed to be minor errors of omission (11–14).

Sampling and data collection

The sampling frame consisted of 56 PHCs in the Gaza Strip using a systematic random sampling method. The sample was selected from the numbered list of all PHCs in the Gaza Strip arranged in order from north to south by using a regular interval starting from a random starting point as follows. (1) To calculate the sampling interval, we divided the size of the list by the desired sample size, so our sampling interval was 56/22 = 2.55. (2) Choose a random number between 0 and 1 (with at least 3 digits after the decimal point, such as 0.657), then multiply this random number by the sampling interval, and round this result upward to obtain the number of the first centre (0.657 × 2.55 = 1.67535 □ 2), so the second centre in the list was our first sample. (3) Later centres were selected by adding the sample interval to the previous result (1.67535), then the next centre selected would be 1.67535 + 2.55 = 4.22 □ 5, and so on. (4) Within the PHC the sample of prescriptions was selected using randomized systematic sampling where only 10 prescriptions were selected from each month throughout the year.

Sample size: the sample of prescriptions was selected by using a systematic simple random sampling technique. Twenty-two PHCs with 115–120 patient prescriptions per centre, with an average of 10 prescriptions per month throughout 2014 were selected.

Sample collection: the data were collected retrospectively. Two work teams, each consisting of 2 pharmacists, were trained to collect data by attending a workshop held at the General Administration of Pharmacy, Palestinian Ministry of Health, Gaza Strip. Prior to data collection, a pilot study was conducted at 2 centres to test the study design procedure and provide feedback about the positive and negative aspects of the form design.

Exclusion criteria: only prescriptions dispensed directly to patients by pharmacists were included in the study, whereas prescriptions containing injections to be given to patients by the nursing staff in PHCs were excluded.

Calculation of indicators

Throughout the study we followed the methodology recommended by the WHO. Indicators were calculated in the following way: (1) average number of drugs per encounter = total number of drugs prescribed/total number of encounters surveyed; (2) percentage of drugs prescribed by generic name = (number of drugs prescribed by generic name/total number of drug prescribed) × 100; (3) percentage of encounters with an antibiotic prescribed = (number of patient encounters with an antibiotic prescribed/total number of encounters surveyed) × 100; (4) percentage of encounters with an injection prescribed = (number of patient encounters with an injection prescribed/total number of encounters surveyed) × 100; and (5) percentage of drugs prescribed from the EDL = (number of drugs prescribed from the EDL/total number of prescribed drugs) × 100.

Statistical analysis

The data were analysed using IBM SPSS version 19, after manual verification and cleaning. Descriptive statistics [means, percentages and standard deviations (SDs)] were used to present the results.

Ethical consideration

Ethical approval for the study protocol was granted by the Palestinian MoH prior to commencement of the study.

Results

In this study, 2569 prescriptions from 22 PHCs were collected and analysed: 1226 (47.7%) of them were for male patients and 1343 (52.3%) for female patients. The mean age of the patients was 22.6 (SD 22.7) years, ranging across the PHCs from a mean of 15.4 to 33 years. Table 1
represents the results for each PHC and for all centres combined.

A total of 5074 drugs were prescribed. The overall mean number of drugs prescribed per encounter was 2 (0.9), with a range across the 22 PHCs from 1.7 to 2.4. From the total number of prescriptions, 23.7% specified ≥ 3 drugs, and only 6.2% specified ≥ 4 drugs (Table 2).

The percentage of drugs prescribed by generic name was 10.1% (3.2–19.1%), whereas the percentage of EDL drugs prescribed was 81% (68.6–90.2%). The percentage of prescriptions for antibiotics was 67.5% (53.3–78.3%), for analgesics 39.4% (28.3–56.7%) and for injections 1.3% (0–4.2%) (Table 1).

Studying the number of drugs prescribed for different age groups of patients, we found that the mean number of drugs per prescription for patients ≤ 3 years of age was [2.1 (0.9)], which is similar to that for patients aged ≤ 55 years [2.1 (1.1)]. The highest percentage of prescriptions containing 2, 3 and 4 drugs was for patients ≤ 3 years of age, followed by patients ≥ 55 years of age, whereas the highest percentage of prescriptions containing 4 and 5 drugs was for patients aged ≥ 55 years (Table 3).

Studying the percentage of antibiotics and analgesics prescribed for different age groups of patients, we found that for patients ≤ 3 years of age the percentage of prescriptions with analgesics was 43.1%, and the percentage of prescriptions with antibiotics was 39.9%, which is the highest percentage among all age groups (Table 4).

The most common reasons for attending a PHC were infectious disease (51.2%), followed by chronic disease (7.9%), and other diseases (4%) including anaemia, burns, fever, constipation and psoriasis. However, 28.1% of all prescriptions did not contain a diagnosis and therefore the reason for attendance was not known.

Infectious disease was distributed over the following categories: 28.9% respiratory tract infections (26.2% upper and 2.7% lower respiratory tract); 22.3% other infections, including gastroenteritis (6.6%), urinary tract infection (3.5%), skin infection (2.9%), conjunctivitis (1.3%) and auditory tract infection (1.2%). Patients with more than 1 infection accounted for 1.5% of prescriptions. A further 3.2% accounted for other microbial infections such as viral, fungal and other bacterial infections such as appendicitis, folliculitis, mastitis, pulpitis and stomatitis.

In our sample, 5074 drugs were prescribed, among which antibiotics were the most commonly

prescribed (40.9%), followed by analgesics (20.8%), dermatological preparations (5.6%) and antihistamines (4.5%) (Figure 1).

Regarding prescription writing skills in PHCs, 89.5% of prescriptions contained major omission errors: the length of treatment was omitted in 79.3%, the strength of medications was omitted in 65.4% of prescriptions, the dosing frequency was omitted in 30.6%, the dose was not specified in 23.3% and the dosage form was not specified in 12.5%. Nonofficial abbreviations were used in writing 87.4% of all prescriptions, while 18.7% were written in illegible handwriting. There were minor omission errors such as the absence of a physician's signature, date of prescription and patient's age, but the number of such cases was insignificant in comparison.

Discussion

Our study is an attempt to investigate current drug use patterns in PHC facilities in the Gaza Strip. Data for this study, 2569 prescriptions from 22 PHCs in the Gaza Strip, were collected and analysed retrospectively according to the recommended WHO core indicators (10). The mean age of patients identified in this study was 22.6 (22.7) years.

The WHO standard values for the average number of drugs per encounter is 1.6–1.8 (15), whereas in our study the mean number of drugs prescribed per encounter was 2 (0.9). This value falls near the midpoint of results reported by investigators from Sudan (1.4) (16), Zimbabwe (1.3) (17), Saudi Arabia (1.4) (18), Yemen (1.5) (10), Lebanon (1.6) (19), Jordan (2.3) (20), Bahrain (3.3) (21) and Nigeria (3.8) (10).

In this study, polypharmacy (≥ 3 drugs) was observed in only 23.7% of prescriptions, with only 6.2% of them specifying ≥ 4 drugs. This may be an apparent value and not a real value in the Gaza Strip. This low number of drugs per encounter may be related to drug shortage or the fact that some drugs are not actually prescribed because they are not on the EDL. In the latter case the patient may nevertheless be advised by the physician in the PHC to buy them directly from a community pharmacy.

The overall percentage of drugs prescribed by generic name was 10.1%, which is similar to that of Bahrain (10.2%) (21). Drugs prescribed by generic name vary widely between countries. In some it is high: Niger (100%) (22), Zimbabwe (94%) (17) and Tanzania (82%) (17). In others it is low, but still higher than in our study, as in Bangladesh (78%) (23), Sudan (19.5%) (16) and Saudi Arabia (15.1%) (24); whereas Jordan (5.1%) (20) and Lebanon (2.9%) (19) are even lower than in our study.

In practice, physicians in PHC facilities in the Gaza Strip almost always use trade names in prescribing. This explains the low percentage of drugs prescribed by generic name, which can be attributed to the influence of the marketing strategy of pharmaceutical sales representatives.

Palestinian MoH guidelines are required to enforce prescribing by generic name; particularly in the public sector.

In this study, antibiotics accounted for 40.9% of the total of medication expenditure, followed by analgesics (20.8%). The prescribing of antibiotics accounted for 67.5% of all prescriptions, ranging from 53.3 to 78.3%. This value is high, as the WHO expectation is 15–25% in most countries where infectious disease is more prevalent (10, 25). In comparison, this value (67.5%) is slightly higher than for Jordan (60.9%) (20) and Yemen (46.5%) (10) but it is extremely high when compared to that of Lebanon (17.5%) (19). The misapplication of antibiotics in clinical medicine is a global phenomenon and this misuse is sometimes related to underdosing, short duration and/or use for nonbacterial infections. This has led to the emergence of bacterial resistance.

In the Gaza Strip the excessive use of antibiotics is due to the lack of an appropriate policy, the absence of standard treatment guidelines and the lack of physician training regarding antibiotic use. Moreover, patients can obtain antibiotics from a community pharmacy without a prescription even when unnecessary or inappropriate. Furthermore, patients believe that antibiotic use is helpful in rapid amelioration of their symptoms.

In our study the percentage of prescribed injections was low (1.3%), compared with both the international average of 17% and that of other developing countries such as Nepal (5%) (17), Zimbabwe (11%) (17) and Bahrain (9.3%) (21), but similar to that for Jordan (1.2%) (20). This low percentage of prescribed injections in our study may have been due to the fact that the cost of injection therapy is higher than oral dosage form. Patients requiring parenteral therapy (except for insulin and emergency situations) should be referred to a hospital and prescriptions for injections administered in the PHC are not available in pharmacies.

In this study 81% of prescribed drugs were EDL drugs while the remaining 19% were non-EDL drugs. In general, non-EDL drugs are not allowed to be prescribed within PHC facilities. In reality, patients are advised to buy them directly from a community pharmacy, as it is still

possible in the Gaza Strip to obtain prescription-only medication without prescription (verbally or by illegal prescription). The non-EDL drugs illicitly prescribed by PHC facilities (19%) came from donations. Donations are not always well coordinated with the MoH and some donated items are not on the EDL. Because of the retrospective nature of our study it is difficult to determine the actual number of non-EDL drugs prescribed.

Studying the relationship between age and number of drugs per prescription, we found a clear tendency toward prescribing a greater number of drugs in the age group ≤ 3 years, with a mean number of drugs per prescription of 2.1 (0.9), which is similar to that for patients in the age group ≥ 55 years [2.1 (1.1)]

The highest percentages of antibiotics and analgesics were prescribed for patients aged ≤ 3 years. Multiple drug prescriptions for older patients can be explained by patients taking 1 or more prescription drugs plus several over-the-counter drugs, such as antacids and analgesics, whereas the high use of multiple drug prescriptions for patients in the age group ≤ 3 years is unclear. The latter may be due to the co-payment differences among different age groups. An insured patient has to pay 0.3 US$ for 2 medicines for children aged ≤ 3 years and 0.3 US$ for each extra medicine, but 0.8 US$ for each unit medicine for patients aged > 3 years. As a consequence, 1 or more drugs prescribed for patients aged ≤ 3 years may be intended for other family members (26).

A prescription is a legal document that may be used either for or against both physician and pharmacist in cases related to prescribing or dispensing errors. Prescribing errors may have serious consequences, therefore, all prescription components have to be clearly written, free of any nonofficial abbreviations, and fulfil the legal requirements. Incorrectly written components of the body of the prescription are considered an error of commission (27–29). Errors of integration or knowledge-based errors in prescribing include potential drug–drug interactions or drug allergies that may reflect a failure of the prescriber to integrate information about the patient or drug history. Other prescription errors include prescriptions with illegible handwriting or with nonofficial abbreviations (30).

One of the aims of our study was to recognize deficiencies in prescribing and to investigate the prescription writing skills of physicians, regardless of the nature of patients' conditions. We found that the prescription writing skills in PHCs were suboptimal. Even though diagnosis is 1 of the main components of the PHC prescription form, assisting the pharmacist to ensure that the prescribed drugs are suitable for the patients' conditions, the diagnosis was omitted in 28.1% of all prescriptions.

It is worth mentioning that the shortage of MoH EDL drugs may have affected the results of this study. Had more EDL drugs been available, perhaps more drugs and more antibiotics would have been prescribed. Our results illustrate the urgent need for extensive improvement in prescribing practice as a considerable proportion of prescriptions lacked essential information.

Conclusion and Recommendations

Our study of drug-prescribing patterns in PHCs in the Gaza Strip clearly demonstrates that there is an irrational use of drugs. It is our opinion that there is a need to develop standards for drug prescription as well as standard treatment guidelines for drug use and for supervision and monitoring systems to ensure that they are adhered to. Furthermore, continuing medical education programmes are required to develop awareness about polypharmacy, irrational drug use, good prescribing and the necessity of an auditing system. Finally, this study needs to be extended and repeated over time to assess the improvement in drug prescribing and use.

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