An-Najah National University

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Evaluation of Rational Use of Medicines according to the World Health Organization Prescribing Indicators: A Cross-sectional Study from Palestine

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Dedication

This humble work is dedicated to all the people who supported me and stood beside me and helped me to achieve this accomplishment.

Specifically, I mention my family; my Dad, my Mom, my sisters Ghadeer and Massadah, my soul mate Ismael Abu rokba and my Uncle Khalid Abdul kader.

Also with all the gratitude to my supervisor Dr. Rowa Al-Ramahi, who was my source of inspiration and encouragement.

And finally, to my country Palestine.

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Last but not least, many thanks go to my second family; Alloush family, for their help and support during my whole years of study.

الإقرار

أنا الموقع أدناه، مقدم الرسالة التي تحمل العنوان:

Evaluation of Rational Use of Medicines according to the World Health Organization Prescribing Indicators: A Cross-sectional Study from Palestine

أقر بأن ما شملت عليه هذه الرسالة إنما هو نتاج جهدي الخاص، باستثناء ما تم الإشارة إليه حيثما ورد، وأن هذه الرسالة ككل، وأي جزء منها لم يقدم من قبل لنيل أي درجه أو لقب علمي لدى أي مؤسسة تعليمية أو بحثية أخرى

Declaration

The work provided in this thesis, unless otherwise referenced, is the researchers own work, and has not been submitted elsewhere for any other degree or qualification.

Student's name: **اسم الطالب:**

Signature: **التوقيع:**

Date: **التاريخ:**

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AIDS	Acquired Immunodeficiency Syndrome
B.C	Before Christ
BNF	British National Formulary
CI	Confidence Interval
CPA	Consumer Protection Act
EDL	Essential Drug List
EML	Essential Medicines List
EMLc	Essential Medicines List for Children
FDA	Food Drug Administration
GPs	General practitioners
HCs	Health Centers
HIV	Human Immunodeficiency Virus.
HSs	Health Stations
INRUD	International Network for the Rational Use of Drugs
IRDP	Index of Rational Drug Prescribing
KE	Kumbo East
KW	Kumbo West
NHIF	National Health Insurance Fund
NLEM	National List of Essential Medicines
NORGEP	Norwegian General Practice

NRs	Nepalese Rupees
PBF	Performance Based Financing
PHC	Primary Healthcare Centers
RUM	Rational Use of Medications
SD	Standard Deviation
SPSS	Statistical Package for SocialSciences
START	Screening Tool to Alert to Right Treatment
STOPP	Screening Tool of Older Person's Prescriptions
UAE	United Arab Emirates
USA	United State of America
WHO	World health Organization

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Abstract

Background: Rational use of medications is a global goal which is very important in achieving quality of health for patients and the whole population.

Objectives: To evaluate the rational use of medicines in Palestine according to the World Health Organization/International Network for the Rational Use of Drugs (WHO\INRUD) core drug use indicators using prescribing indicators and compare it with others.

Method: The study was a retrospective cross-sectional study. A sample of 2000 prescription was collected from 20 primary health care centers from 10 governorates in the West Bank of Palestine. Data collected included age, date, number of medications in every prescription, number of generics, number of medications from Essential Drug List (EDL), number of prescriptions containing injections and number of antibiotics. Data was analyzed using SPSS version 20.

Result: The 2000 prescriptions included 4380 medications. The average number of medications was 2.19±1.24 (WHO goal is ≤ 2), percent of antibiotics was 43.8% (WHO goal is ≤ 30%), percent of antibiotics in children was 59.9%, percent of generic name use was 26.44% (WHO goal

is 100%), percent of injections was 10% (WHO goal is ≤ 10%) and percent of drugs from EDL was 99.25% (WHO goal is 100%). There were significant differences between the 20 primary health centers studied in the WHO prescribing indicators.

Conclusion: Some indicators were close to the WHO goals while others were very far from the goals. Irrational use of medications was noticed. Overuse of antibiotics specially in children and low use of generic names were the most prominent manifestations of such irrational drug prescribing. Efforts are needed to improve the situation.

Chapter One

Introduction

Chapter One
Introduction

1.1 Definition of rational use of medications

Rational drug use is a very old concept as evident by statement made by the "Alexandrian physician Herophilus 300 B.C" who said: Medicines are nothing in themselves but are the very hands of God if employed with reason and prudence."(Shivhare et al., 2010).

In 1985 World Health Organization (WHO) defined rational (appropriate, proper, correct) use of medications when patients receive the appropriate medicines, in doses that meet their own individual requirements, for an adequate period of time, and at the lowest cost both to them and the community, anything but this in prescribing or dispensing is irrational use of medication (World Health Organization, 1985). This definition implies appropriate indication, appropriate drug, appropriate patient, appropriate information and appropriate monitoring (World Health Organization, 2004b).

The World Bank defined the rational use of medicines in two major principles: 1.Use of drugs according to scientific data on efficacy, safety and compliance 2. Cost-effective use of drugs within the constraints of a given health system (Almarsdo´ ttir and Traulsen, 2005).

WHO estimates that 50% of all medicines are prescribed, dispensed or sold inappropriately and half of the patients fail to take their medications correctly (World Health Organization, 2002).

Importance of rational use of medications is increasing significantly because of many factors such as: increase in number of medications; many complicated choices for each indication (drug explosion), development of antimicrobial resistance and the need of keeping new drugs effective, increased cost of treatment which can be decreased by rational use of medications and finally consumer protection act (CPA) (Shivhare et al., 2010).

Irrational use of medications is wasteful and harmful for individuals and population, in the United State of America (USA) adverse drug reactions is between the fourth and sixth cause of death. (Lazarou et al., 1998). Drug related morbidity costs as much as 7 billion US dollars. US Food Drug Administration (FDA) reports that 12000 deaths and 15000 cases of hospitalization in US are due adverse drug reaction (Shivhare et al., 2010).

The most common irrational use of medications are: the use of drugs when no drug therapy is indicated, the most common example is using antibiotics for viral upper respiratory infections, the use of wrong medication for example using tetracycline in children diarrhea requiring oral rehydration salts, the use of drugs with unproven efficacy, use of drugs of uncertain safety status, for example use of dipyrone, failure to provide available, safe, and effective drugs, the use of incorrect route of administration, dosages, and duration, the use of expensive drugs when cheaper are effective, for example the use of a third generation, broad spectrum antimicrobial when a first-line, narrow spectrum, agent is indicated, inappropriate self-medication, often of prescription only medicines, the use of too many

medicines per patient (polypharmacy) and over-use of injections when oral formulations would be more appropriate (World Health Organization, 2004b),(World Health Organization, 2002).

In general use of medications is a cycle between physicians, pharmacists, and patients; diagnosis and follow up, prescribing, dispensing and patients adherence. Irrational use of medications may start at any of these stages as shown in figure (1) (Ofori- Asenso, 2016).

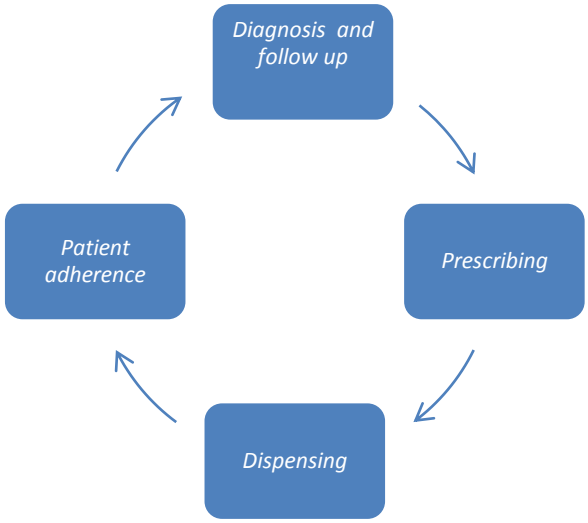


Figure 1: Cycle of medication use**.**

1.2 Polypharmacy

Polypharmacy is highly noticed in elderly because they have complicated drug therapy problems more medications, more adverse drug reactions, hospitalization and mortality. Adverse drug reactions cause loss of health, loss of life quality, loss of money so prevention of them must be a goal in healthcare providers' decision. The adverse drug reactions related

hospitalization is four times higher in elderly people than the younger ones (Beijer and Blaey, 2002).

More than one criteria was developed for quality of drug prescribing in elderly; Beers' Criteria, McLeod's Criteria, French Consensus Panel List, STOPP (Screening Tool of Older Person's Prescriptions) and START (Screening Tool to Alert to Right Treatment), Australian Prescribing Indicators Tool, NORGEP (Norwegian General Practice) Criteria, PRISCUS List, Swedish National Board of Health and Welfare which was developed in Sweden in 2004 and developed in 2010 since the polypharmacy prevalence there was increasing badly (18% in 1992 and increased to 42% in 2002), this criteria made very good improvement (Fastbom and Johnell, 2015).

In 2004, WHO developed a pharmacovigilance term and defined it as the science and activities related to the detection, assessment, understanding and prevention of adverse effects or any other medicine related problem, it is used to evaluate and promote the adverse drug reactions (World Health Organization, 2004a).

1.3 Essential medicines

Because of the huge number of medications available - more than 60000 formulations are available - essential drug list was necessary. In 1977 WHO developed the first Essential Medicines List, it has been updated every two years since 1977. The current versions are the

20th WHO (EML) and the 6th WHO Essential Medicines List for Children (EMLc), it was updated in March 2017.

They have core list which presents a list of minimum medicine needs for a basic health-care system, listing the most efficacious, safe and cost–effective medicines for priority conditions, and a complementary list which presents essential medicines for priority diseases, for which specialized diagnostic or

monitoring facilities, and/or specialist medical care, and/or specialist training are needed. In case of doubt medicines may also be listed as complementary on the basis of consistent higher costs or less attractive cost-effectiveness in a variety of settings (World Health Organization, 2017).

In every country, it is important to have an Essential Drug List (EDL). These medications should be available in public and private hospitals. In assessing the EDL usage, a copy of the list must be obtained in the health care units (Ofori- Asenso, 2016).

1.4 Irrational use of antibiotics

Antimicrobial resistance is one of the most serious public health problems, the great fear is returning back to before antibiotic time when many children died from infectious diseases and major surgery was impossible due to risk of infections. So rational use of antibiotics is important to keep their effectiveness. Antimicrobial resistance causes prolonged

hospitalization and so increases the cost of treatment (World Health Organization, 2005).

In developed and developing countries, many patients take antibiotics for viral upper respiratory tract infection (they get better because of the natural course of the illness not from the antibiotic), mothers feel safer when giving antibiotic than giving paracetamol and nebulizers alone, doctors prescribe antibiotics to prevent super infections which is approved wrong, pharmacists dispense antibiotics without prescription because their income depends on sales, patients take antibiotics for short courses, take them on their own accord with wrong doses and low adherence. All these things increase the resistance (World Health Organization, 2010). So it is important to limit the use of antibiotics to the situations when they are truly needed and to use the narrowest spectrum when possible.

1.5 Use of injections

Health workers and patients believe that injections are more effective than other dosage forms; injections may become source of infection; non-sterile injections may cause transmission of hepatitis, HIV/AIDS and other blood-borne diseases. Plus it is an invasive way of treatment and expensive (World Health Organization, 2002, Hardon et al., 2004). So in rational prescribing, we should limit the use of parenteral medications to the cases who cannot use other dosage forms or whose illness is very severe and a prompt effect is needed.

1.6 Selected WHO/International Network for the Rational Use of Drugs (INRUD) drug use indicators for primary health care facilities (World Health Organization, 1993)

Based on the previous data, the WHO put a group of indicators that can be used to evaluate rational use of drugs in primary healthcare facilities, they include the following:

1. Prescribing Indicators:

Average number of medicines prescribed per patient encounter

% medicines prescribed by generic name

% encounters with an antibiotic prescribed

% encounters with an injection prescribed

% medicines prescribed from essential medicines list or formulary

2. Patient Care Indicators:

Average consultation time

Average dispensing time

% medicines actually dispensed

% medicines adequately labeled

% patients with knowledge of correct doses

3. Facility Indicators:

Availability of essential medicines list or formulary to practitioners

Availability of clinical guidelines

% key medicines available

4. Complementary Drug Use Indicators:

Average medicine cost per encounter

% prescriptions in accordance with clinical guidelines

We focused on prescribing indicators in our study.

1.7 Rational use of medications in Palestine

In1998, the first WHO conference on rational use of drugs in Palestine was held. A group of health workers, nurses, pharmacists and doctors, worked together to raise the awareness of rational use of medication issues. Many important topics were discussed in this conference, it was held at Berzeit university (World Health Organization, 1998).

In Palestine rational use of medications is one of the most important goals of the Ministry of Health, so they have worked on creating EDL according to WHO recommendations, the first copy was found in 2000 and updated continuously until they reached the most recent one in 2013 (Ministry Of Health, 2013).

Across sectional descriptive study evaluated the compliance of the Palestinian physicians with the EDL in all government primary care clinics in Gaza strip found that 67.4% reported using the EDL, 51.2% of them had problems in using it (Fattouh and Abu Hamad 2010).

In 2005, the American public health association in its 133rd annual meeting and exposition in Philadelphia discussed the cost savings and rational use effects of implementing an essential drug list in Palestine.

In a cross sectional time series data to evaluate the effect of EDL on governmental drug expenditure in the West Bank, a random sample of 3570 prescriptions for each health center divided equally on 7 years for all main17 health centers and drug utilization quantities were collected, they found that the EDL was very effective in improving the rational drug use and reducing the drug expenditures (Hamidi et al., 2005).

1.8 WHO developed twelve core interventions to promote more rational use of medicines

1. A mandated multi-disciplinary national body to coordinate medicine use policies.

2. Clinical guidelines.

3. Essential medicines list based on treatments of choice.

4. Drugs and therapeutics committees in districts and hospitals.

5. Problem-based pharmacotherapy training in undergraduate curricula.

6. Continuing in-service medical education as a licensure requirement.

7. Supervision, audit and feedback.

8. Independent information on medicines.

9. Public education about medicines.

10. Avoidance of perverse financial incentives.

11. Appropriate and enforced regulation.

12. Sufficient government expenditure to ensure availability of medicines and staff.

1.9 Significance of the study

To the best of our knowledge, no previous studies regarding rational use of medications (RUM) according to WHO indicators are available in the West Bank, one study could be found in Gaza. Therefore, a follow up study is needed to investigate the current prescribing practices and subsequently evaluate the performance of healthcare providers in RUM. This could be useful for policy makers and practitioners. Training and educational programs could be developed based on these results.

1.10 Objectives of the study

The main objective is to evaluate the rational use of medicines in Palestine according to the WHO\INURD core drug use indicators using prescribing indicators.

1.10.1 Specific objectives

To calculate the average number of medicines prescribed per patient encounter.

To find the percentage of medicines prescribed by generic name.

To find the percentage of encounters with an antibiotic prescribed.

To find the percentage of encounters with an injection prescribed.

To find the percentage of medicines prescribed from essential medicines list or formulary.

To compare the previous indicators between included centers.

To compare our study with other countries.

Chapter Two

Literature Review

Chapter Two
Literature Review

2.1 Rational use of medications in Palestine

In a descriptive cross-sectional study evaluated the compliance of physicians with the Palestinian essential drug list (EDL) in all the government primary care clinics in the Gaza Strip. While 67.4% reported currently using the EDL 51.2% of these physicians reported problems in using it. The mean number of drugs per prescription was 1.92, the percentage of drugs prescribed from the EDL was 97.9% but the percentage of drugs prescribed by generic name was only 5.5%. A copy of the EDL was available in 28.3% of clinics and the availability of key drugs was 82.6% (Fattouh and Abu Hamad 2010).

2.2 Rational use of medications in Arab world

1. United Arab Emirates

In a study conducted in United Arab Emirates (UAE) aimed to evaluate RUM in main government hospitals in four emirates in UAE, using WHO prescribing indicators. Multicenter prospective cross-sectional comparative study was conducted in 4 hospitals in 4 different Emirates in UAE. Using consecutive random sampling method, a total of 1100 prescriptions (2741 prescribed drugs) were collected and analyzed from surveyed hospitals from April to October 2012. The main finding of the study was that, the mean values of prescribing indicators of RUM in the surveyed hospitals were estimated to be within the WHO optimal values for generics

(100.0 vs. 100.0), antibiotics (9.8 ± 4.8 vs. ≤30), injections (3.14 ±1.7 vs. ≤10) and formulary (EML) prescribing (100.0 vs. 100.0). However, the only discrepancy was reported regarding the number of drugs per prescription which was found to be more than the WHO optimal value (2.49 ± 0.9 vs. ≤ 2); respectively (Mahmood et al., 2016).

In another study in Sharjah, United Arab Emirates, 1239 prescriptions were collected from a governmental general hospital covering the month of April, 2011. The prescriptions were issued to outpatients. Prescribing patterns were analyzed using WHO indicators and focusing mainly on information related to patient, prescriber and the prescribed drugs. The average number of drugs per prescription was 2.2. Generic drugs were prescribed in 19.4% of all prescriptions (Sharif et al., 2013).

2. Saudi Arabia

In a study aimed to measure the drug prescribing performance of primary health care centers in Eastern province, Saudi Arabia, using the WHO/International Network of Rational Use of Drugs core drug prescribing indicators. In a retrospective cohort study 10 health centers were selected using systematic random sampling. A total of 1000 prescribing encounters were investigated from January to December 2010. Mean values were: number of drugs per encounter 2.4 (optimal ≤ 3), drugs prescribed by generic name 61.2% (optimal 100%), encounters with antibiotic prescribed 32.2% (optimal ≤ 30%), encounters with injection prescribed 2% (optimal ≤10%) and drugs prescribed from the national

essential drugs list or facility formulary 99.2% (optimal 100%) (El.Mahalli, 2012).

3. Egypt

In a study by Mansour and El_Hefnawy in 2017 to assess health care professionals' adherence to WHO prescribing indicators in order to identify areas in need for intervention and set recommendations regarding the rational use of medicines, a sample of 340 prescribing encounter were collected randomly from different health facilities (hospitals, health care centers, community pharmacies) in Egypt. All prescriptions were evaluated for adherence to WHO prescribing indicators and British National Formulary (BNF) prescribing patterns. They found that the average number of drugs prescribed per encounter was 3.14. The mean percentage of drugs prescribed by generic name was 16.07% with a significant difference in practice between different health facilities. The frequency of prescribed antibiotics was 18.97%; the percent of prescribed antibiotic in primary health care centers was 31.97. The frequency of prescribed injectable drugs was6.82% less than 10% (Mansour and El-Hefnawy, 2017).

In a previous study in Alexandria, Egypt aimed to measure the performance of 10 primary health care centers (PHCCs) regarding the use of drugs using the WHO/INRUD drug use indicators: prescribing, patient care and facility-specific indicators, 1000 prescribing encounters were investigated for a period from January to December 2010. Three-hundred patients and 10 pharmacists were interviewed. The average number of drugs was

2.5 ± .8. The percentage of drugs prescribed by the generic name was 95.4 ± 11.4. The percentage of encounters with an antibiotic was 39.2 ± 8.8. The percentage of encounters with an injection was 9.9 ± .9. The percentage of drugs prescribed from EDL/formulary was 95.4 ± 11.4. The difference between the PHCCs was statistically significant for all prescribing indicators. Among PHCCs, Elmafrouza center represented the highest rank for IRDP (Akl et al., 2014).

4. Jordan

In a retrospective study in Jordan to evaluate the pharmaceutical drug prescribing practices in 21 primary health care facilities in Irbid governorate, northern Jordan using world health organization recommended core indicators. The mean number of drugs prescribed was 2.3 overall, ranging from 1.9 to 3.The percentage of drugs prescribed by generic name was very low 5.1% in a range (0%_16.7%), as was the percentage of prescriptions involving injections 1.2% and ranged from 0% to 8.3%. The percentage of prescriptions involving antibiotics averaged 60.9% and drugs from the essential drugs list were 93%. So they concluded that the prescribing and use of drugs in Jordan requires rationalization (Otoom et al., 2002).

5. Sudan

Yousif and Supakankunti in 2016 used the World Health Organization (WHO) and International Network for the Rational Use of Drugs prescribing indicators to assess prescription quality among GPs in different

types of primary healthcare centers (PHCCs) within the National Health Insurance Fund (NHIF). A cross-sectional retrospective study was conducted in Gezira State, Sudan. The study was carried out over 6 months and involved 197 GPs with valid prescriptions, representing 90 % of the total study population of 220 GPs,100 prescriptions were randomly collected for each GP in total 19,700 prescriptions. The mean ± standard deviation number of medications was 2.55 ± 1.32 per patient; 46.32 % of drugs prescribed were generics; 54.71 % of prescriptions were for antibiotics and 12.84 % were for injectable formulations; and 81.19 % of prescribed medicines were from the NHIF medicines list. The overall Index of Rational Drug Prescribing (IRDP) indicator was 3.39, and the average cost per prescription was 40.57 Sudanese pounds (SDG) (Yousif and Supakankunti, 2016).

6. Bahrain

A study in Bahrain aimed to analyze drug prescribing practices in primary health care centers in Bahrain. They retrospectively evaluated 600 prescriptions selected randomly from all primary health care centers in Bahrain (n = 20) in 2004. Analysis followed WHO recommended prescribing core indicators. The mean number of drugs prescribed at each encounter was 3.3 (SD 0.7). A single drug was prescribed on 6.3% of prescriptions and drugs were prescribed by generic name on 10.2%. The percentage of total prescriptions for antibiotics was 45.8%, for injections was 9.3% and for vitamins was 12.5%. The concluded that prescribing pattern in primary health care centers in Bahrain is associated with

polypharmacy, over-prescribing of antibiotics and an under-prescribing of drugs by generic names (Otoom et al., 2010).

In a previous study in Bahrain, four out of 20 primary health care centers in Bahrain were selected and prescriptions of one day (July 30, 2003), were collected, reviewed and analyzed. The study showed that the average number of drugs per encounter was 2.6, while the percentage of prescriptions containing injections were 8.3% and antibiotics were 26.2%. The percentage of drugs prescribed by generic name was 14.3%, and those from the National Drug List were 99.8%. Parameters, such as average number of drugs prescribed, are in line with many countries. However, injection prescribing was higher than European countries, but low in comparison with many countries in Asia and Africa. Antibiotic prescribing was close to European countries, and lower when compared to some Asian and African countries (Naseeb and Nasser, 2005).

7. Lebanon

In a study conducted in Lebanon to describe prescribing practices of family physicians in a staff model health maintenance organization at a university health center and estimate costs of such practices for common diseases. All prescriptions issued between July 1, 1997, and June 30, 1998, were prospectively collected. The diagnoses made by physicians at each encounter were recorded, and the total price of medications prescribed was calculated. The core prescribing indicators as defined by the World Health Organization and the mean annual prescription price per person for the 25

most common diagnoses were calculated. Prescribing occurred in 27.1% of encounters, with a mean of 1.6 medications per encounter; 17.5% of all prescriptions included an antibiotic. Generic drugs and essential drugs each accounted for 2.9% of all medications. Approximately 50% of the consultations for either respiratory or ear infections resulted in a prescription. Cervical spine syndromes and lipid metabolism disorders cost most among recorded diagnoses, with mean annual prescription prices per person of US $2016 and $1128, respectively. They found low rate of generic and essential drug prescribing, as well as the frequency of prescribing in respiratory infections, highlight the need for initiatives to help rationalize prescribing in primary care in Lebanon. Together with the diagnostic categories incurring high cost per person, these issues can be part of physician education or treatment guideline development. These measures may aid the government in its subsidy of primary health care centers (Hamadeh et al., 2001).

8. Yemen

A descriptive cross-sectional survey was carried out from December 2002 to February 2003 in 20 health facilities from different areas of Hadramout governorate .Using WHO standard indicators of rational drug use, this study analyzed 550 prescriptions from 20 health facilities at different levels throughout Hadramout governorate, Yemen. A mean of 2.8 (SD 0.2) drugs were prescribed per prescription, with a low rate of prescribing drugs by generic name (39.2%). The proportion of prescriptions for antibiotics was 66.2%, for injectable drugs 46.0% and for vitamins/tonics 23.6%. The

essential drugs list was available in 78.9% of facilities and a high percentage of drugs were prescribed from the list (81.2%). Other official sources of local drug information were less available (Bashrahil, 2010).

9. Kuwait

A study in Kuwait aimed to investigate prescribing and dispensing practices at primary healthcare centers in Kuwait and compare them with those reported in other countries. It was a descriptive, quantitative and cross-sectional study involving 50 primary healthcare centers across five governorates of Kuwait. The sample was determined in accordance with the recommendations of the World Health Organization on methodology. Healthcare centers which were stratified according to governorates and selected by systematic random sampling. Prescribing indicators were investigated in each healthcare center by collecting data on 100 prescriptions for all age groups, determining consultation time and dispensing time for 50 patients, and interviewing 30 patients for an evaluation of dispensing practices. Data were collected prospectively using systematic random sampling. Their findings showed that the mean (standard deviation) number of drugs prescribed per prescription was 2.9 (1.2), 17.7% [95% confidence interval (CI) 17.1–18.4%] of drugs were prescribed by generic name, 39.1% (95% CI 37.8–40.5%) of prescriptions involved an antibiotic, and 9.1% (95% CI 8.9–9.4%) of prescriptions were for an injection. The mean (SD) consultation and dispensing times were 2.8 (1.9) min and 54.6 (33.5) s, respectively. Of the drugs prescribed, 97.9% (95% CI 97.4–98.3%) were actually dispensed, and 66.9%

(95% CI 65.5–68.3%) were adequately labeled. In total 26.9% (95% CI 24.7–29.2%) of patients demonstrated adequate knowledge of all drugs dispensed for them. This indicates problem areas in prescribing and dispensing practices at the healthcare centers in Kuwait. They concluded that cost-effective, multifaceted interventions to improve current prescribing and dispensing practices are needed (Awad and Al-Saffar, 2010).

2.3 Rational use of medication in other parts of the world

1. Iran

A study was conducted to determine patterns of prescribing in Iranian primary care, 4000 randomly selected prescriptions from 52 general practitioners (GPs) in Babol city during 1999–2000 were analyzed. The mean number of drugs prescribed per encounter was 4.4 ± 1.7, with 98% prescribed by generic name. The most commonly prescribed items were non-steroidal anti-inflammatory drugs (62.9% of encounters) and antibiotics

(61.9%), followed by central nervous system drugs, gastrointestinal tract drugs, corticosteroids, vitamins and cardiovascular system drugs respectively. Injections were prescribed in 58.0% of encounters. Female and male doctors had significantly different antibiotic prescribing patterns. This study confirms the tendency of GPs to overprescribe (Moghadamnia et al., 2002).

2. Pakistan

A study in Pakistan was conducted to assess the drug use patterns at four governmental hospitals from major cities of Pakistan by using WHO drug use indicators. Results showed that on average, 3.53 drugs were prescribed per encounter. Percentage of antibiotics prescribed was 69.9% and the use of injection was 34.95%. Only 39.5% drugs were prescribed by their generic names. Mean consultation time and dispensing time in the four hospitals were 3.64 minutes and 51.91 seconds respectively. Only about 73.47% of prescribed drugs were actually dispensed. On the average, only 3.96% prescriptions were adequately labeled and 54.98% of the patients were found to have adequate knowledge regarding drug dose. Availability of drugs was also not satisfactory though; many but not all drugs were being prescribed from EDL. The results indicate that there is urgent need for improving rational drug use, availability of drugs and educate the patients about drug use (Aslam et al., 2016).

In another study in Pakistan which aimed to assess drug use pattern at ten primary healthcare centers (PHCCs) of the Bahawalpur district of the Punjab province of Pakistan by employing the WHO/INRUD core drug use indicators. It was a descriptive, non-experimental and cross-sectional study. For the prescribing indicators, 1000 prescriptions (100 prescriptions per PHCC) were systematically sampled out of the total 290,000 prescriptions written during January to December 2014. A total of 300 randomly selected patients (30 per PHCC) and 10 pharmacy personnel (one per PHCC) were observed and interviewed to investigate the patient-care and facility-

specific indicators, respectively. They used published ideal standards for each of the WHO/INRUD indicators. Among the prescribing indicators, the average number of drugs per encounter was 3.4 (SD = 0.8) (optimal range = 1.6–1.8), the drugs prescribed by the generic name were 71.6% (optimal value = 100%), the encounters with an antibiotic prescribed were 48.9% (optimal range = 20.0–26.8%), the encounters with an injection prescribed were 27.1% (optimal range = 13.4–24.1%) and the drugs prescribed from the Essential Drugs List (EDL) were 93.4% (optimal value = 100%). Among the patient-care indicators, the average consultation time was 2.2 min (SD = 0.8) (optimal value ≥10 min), the average dispensing time was 38 s (SD = 12.1) (optimal value ≥90 s), the percentage of drugs actually dispensed was 90.9% (optimal value = 100%), the percentage of drugs adequately labeled was 100% (optimal value = 100%) and the patients' knowledge of correct dosage was 62.1% (optimal value = 100%). Among the facility-specific indicators, all PHCCs had a copy of the EDL and the key drugs available in the stock were 82% (optimal value = 100%). They concluded that irrational use of drugs was observed in all healthcare facilities. This study necessitates the need to implement the WHO/INRUD recommended 12 core interventions to promote rational use of medicines (Atif et al., 2016).

3. Nepal

A study in Nepal aimed to evaluate the drug dispensing practices and patients' knowledge on drug use among theoutpatients and to identify and analyze the problems in drug prescribing and dispensing. A prospective

cross-sectional descriptive study was conducted using World Health Organization (WHO) core drug use indicators from July 13, 2008 to August 15, 2008 in Manipal Teaching Hospital, Pokhara, Nepal. A total of 4231 prescriptions were encountered with the total of 10591 drugs prescribed. The average number of drug per prescription was 2.5. Only 13% (n= 10591) of drugs were prescribed by generic name. Percentage of drug prescribed from WHO model list of Essential drugs, Essential drug list of Nepal and Nepalese National Formulary was 21.7%, 32.8% and 42.3% respectively. Antibiotics and injections encountered were 28.3% and 3.1% respectively. Average cost per prescription was found to be Nepalese Rupees (NRs) 285.99 (US $ 3.73). Patient knowledge on correct use of drugs and appropriate labeling was found to be 81% and 1.4% respectively. Average dispensing time per prescription was 52 seconds. The finding from the study shows a trend towards irrational prescribing and dispensing (Ghimire et al., 2009).

4. China

A study in Western China was conducted to assess the drug prescribing patterns using World Health Organization Drug Use Indicators at village health clinics in rural areas of Western China. A total of 20 125 prescriptions were collected from 680 primary health clinics in villages from 40 counties in 10 provinces of Western China. Five measurements were used to assess the irrational drug use: percentage of encounters with an antibiotic prescribed, average number of drugs per encounter, percentage of encounters with an injection prescribed, percentage of drugs

prescribed by generic name and percentage of drugs prescribed from National Essential Medicines List or Formulary. Index of Rational Drug Prescribing (IRDP) was used as an indicator of rational drug use. The percentage of prescriptions containing antibiotics was 48.43%, while the average number of drugs per prescription was 2.36, and the percentage of injection prescriptions was 22.93%. The percentage of drugs prescribed by generic name was 64.12%, and the percentage of drugs prescribed from the National Essential Drug List was 67.70%. The IRDP of the present study was 3.32 with the optimal level of 5. There are also some regional variations in these measurements. The study provides some evidence of irrational use of drugs to a great extent in rural areas of Western China. Overuse of injection and overuse of antibiotics were the most prominent manifestations of such irrational drug prescribing (Dong et al., 2011).

5. Cameroon

A cross sectional retrospective study was conducted from April 2014 to April 2015 in Kumbo East (KE) and Kumbo West (KW) in Cameroon, 26 primary care facilities were randomly selected. Questionnaires were administered to 59 antibiotic prescribers to determine factors that predict antibiotic prescribing. Data on antibiotic prescription were collected by review of consultation registers. Prescription rates and demographics, prescriber and institution factors were analyzed using ANOVA. The best predictor of prescription was determined using multiple linear regression analysis. A total of 30,096 prescriptions were reviewed. Overall antibiotic prescription rate was 36.71%, with a mean of 1.14 antibiotics prescribed

per patient. Amoxicillin was the most prescribed (29.9%). The most prevalent indications for prescribing were respiratory tract infections (21.27%). All antibiotics prescribed were broad-spectrum. Antibiotics were prescribed for patients with malaria and also in situations where diagnosis was uncertain. Prescribing by generic name was 98.36% while 99.87% was from Essential Drug List. Use of laboratory results, patient turnout and Performance Based Financing (PBF) were significantly associated with antibiotic prescribing rates ($p < 0.05$) (Chem et al., 2018).

6. Nigeria

To evaluate the prescribing patterns and patients' opinions on healthcare practices in selected primary healthcare centers (PHC) in Ibadan, South-Western Nigeria, a prospective cross-sectional study was carried out among patients and healthcare workers in selected PHCs using semi-structured questionnaires. Also, patients' prescription records were reviewed using the WHO-prescribing indicators. About one-half (210; 52.5%) were very satisfied with convenience of obtaining prescribed medicines in the PHCs, accessibility of PHC to abode (158;39.5%) and affordable medications (136;34.0%). Patients were dissatisfied with follow-up of care (191; 47.8%), courtesy of workers (184; 46.3%) and non-availability of medicines (138; 34.5%). Number of drugs per encounter was 5.8±2.3 and % encounter with an antibiotic was >26.8% in each facility. Hematinics accounted for (814; 35.0%), analgesics (544; 23.4%), antimicrobials (303; 13.0%) and antihypertensive (5; 0.2%). Primary healthcare attendees were satisfied with medication costs affordability and accessibility of PHC

to abode but expressed dissatisfaction with follow-up of care and courtesy of workers. Also, inappropriate prescriptions characterized by polypharmacy and overuse of antibiotics were common underscoring the need for regular training of PHC workers on rational drug use and instituting appropriate measures for improvement (Adisa et al., 2015).

7. Ethiopia

A study on rational drug use was undertaken in nine health centers (HCs) and nine health stations (HSs) in Ethiopia. Prescribing, patient care and facility specific factors were measured using drug use indicators. Prescribing patterns of drugs were also assessed. With only few exceptions, the drug use indicators in HCs and HSs and between retrospective and prospective studies were similar despite differences in manpower and facilities. The average consultation time (in minutes) in HSs and HCs was 5.1 +/- 0.8 and 5.8 +/- 1.06, respectively. The dispensing time (in minutes) was 1.5 +/- 0.7 in HSs and 1.9 +/- 0.6 in HCs. Both patient care indicators seem to be adequate to influence patient satisfaction to the overall health service and patient knowledge of important dosage instructions. Most drugs (more than 89% in HCs and 71% in HSs) were actually dispensed from the health facilities and labeling was satisfactory. Prescribing by generic names (average: 75% in HCs and 83% in HSs) was encouraging. While the availability of key drugs was ensured, essential documents were missing in most facilities or they were unpopular for use, and those available required revision and updating. Polypharmacy in which the number of drugs/encounter was < 2.5 was minimal, but that a large proportion of the

prescriptions contained two or more drugs could result in adverse drug-drug interactions. The most frequently prescribed drugs were anti-infectives and analgesics accounting for over 76% in HCs and 82% in HSs and in most cases they are probably prescribed with little justification. The exposure of patients to antibiotics (average: 60% in HCs and 65% in HSs) was unacceptably high to justify epidemiological trends. The high exposure of patients to injections, especially in the HSs (over 37%), should be seen from the health and economic points of view. They concluded that the results revealed priority areas for intervention. They also provide standard references to compare drug use situations and their change over time in different settings, area and time in Ethiopia (Desta et al., 1997).

8. India

Irrational prescribing is a major contributing factor towards increase in mortality, morbidity and health costs. In this study,the inpatient case records of 200 patients were analyzed using the WHO/INRUD prescribing indicators and the data was presented using descriptive statistics. Results: The study showed average number of medicines prescribed/encounter 5.97±2.33, percentage encounters with antibiotic and injectables 23.64% and 47.46% respectively, percentage drugs prescribed from EDL-WHO was 29.33%, NLEM India 42.36% and Punjab State EDL 43.05%. So p olypharmacy, overuse of injectables and prescribing by brand names were the challenges identified (Randhawa et al., 2017).

Chapter Three

Methodology

Chapter Three
Methodology

3.1 Study design

The study was a retrospective cross sectional study. A convenient sample of prescriptions from primary health care centers (PHCs) in the West Bank were collected and analyzed.

3.2 Study setting

The study included 20 (PHCs) from all over the West Bank of Palestine, the 20 facilities were two centers from each governorate as follows:

1. Alobiedeh (Beit lahm)

2. Beit lahm al_markazya (Beit lahm)

3. Ramallah al tahta (Ramallah)

4. Beit reema (Ramallah)

5. Tulkarm al ganobiah (Tulkarm)

6. Tulkarm al shamalyah (Tulkarm)

7. Jericho al markazya (Jericho)

8. Yasoof and Skaka (Salfeit)

9. Salfeit al markazya (Salfeit)

10. Al_karantyna center (Hebron)

11. Al_ikhtisas (Hebron)

12. Nablus al wosta (Nablus)

13. Al makhfyah center (Nablus)

14. Tubas al gadedah al markazyah (Tubas)

15. Tubas al qademah (Tubas)

16. Qalqeiliah al markazya (Qalqeiliah)

17. Qalqeiliah algharbyah (Qalqeiliah)

18. Jenin al gharbyah (Jenin)

19. Jenin al markazyah (Jenin)

20. Al_dyok alfoqa (Jericho)

3.3 Sample size

According to the WHO recommendations on sample size for comparisons between individual facilities or prescribers, the size of samples drawn within each facility or per prescriber must be higher than 30 in order to get more reliable within-facility estimates of prescribing patterns and it is better to have at least 100 cases per health facility or per prescriber. They recommend to use retrospective data if possible and to include at least 10 facilities (better 20)(World Health Organization, 1993).

So these recommendations were followed for sample size. Twenty facilities were chosen with 100 prescriptions from each, the prescriptions were chosen by convenience sampling from the previous year to cover the four seasons; summer, autumn, winter and spring with 25 prescriptions from each season. So a total of 2000 prescriptions were collected.

3.4 Data collection

The encounters from the included primary health care centers were reviewed, the sample was selected conveniently from the patient encounters that took place through one year ago from August 2016 to July 2017, to minimize the bias, seasonal alteration was used; the encounters were uniformly divided into four quarters and equal number of each quarter was selected.

All the data needed to measure the patient care indicators were recorded on the patient care form .This included the date of the prescription, age of the patient, number of medication in each prescription, number of generics in each prescription, if injections were prescribed or not, if antibiotics were prescribed or not and number of drugs from Palestinian EDL. Data in some centers was computerized while paper files were used in others.

3.5 Data analysis

The WHO standard prescribing indicator form were used (World Health Organization, 1993). A pilot test was conducted to test the tool, ensured the availability of the required data, estimate the time and modify the data

collection form as appropriate. The five prescribing indicators which were evaluated included;

1. Average number of drugs per encounter, in order to measure the poly pharmacy, WHO goal is ≤ 2.

2. Percentage of drugs prescribed by generic name, WHO goal is 100%.

3. Percentage of encounters with injections, WHO goal is ≤ 10%

4. Percentage of encounters with an antibiotic prescribed, WHO goal is ≤ 30%.

5. Percentage of drugs prescribed from EDL, WHO goal is 100%.

All were calculated by dividing the number of encounters including them by the total number of encounters multiplied by 100%. (World Health Organization, 1993).

The current Palestinian EDL was used for this purpose (Ministry Of Health, 2013).

The Palestinian EDL was used also as a generic list since we do not have a generic list in Palestine according to WHO recommendation in this case.

3.6 Ethical Approval

Permissions from Institutional Review Boards (IRB) of An-Najah National University (Appendix 2) and Palestinian Ministry of Health (Appendix 3) were obtained before initiating the study.

3.7 Statistical analysis

Data was entered to the Statistical Package for Social Sciences program (SPSS version 20). Then data analysis was performed using this program. Continuous variables as age and number of medications were expressed as mean ±standard deviation (SD) and categorical variables (most data was categorical with yes and no answers) were expressed as frequencies and percentages. Categorical variable were compared using Chi-square test. A p-value of less than 0.05 was considered to be statistically significant for all analyses.

Chapter Four

Results

Chapter Four
Results

4.1 Sociodemographic data

The study included 20 primary health care centers from 10 governorates in the West Bank of Palestine, the mean age ± SD of the patients was 36.8±24.56 with a range from (0.08 to 97) years and were distributed as shown in (Table1).

Table (1): Age categories and their frequency

Age category (years)	Frequency
0.8-10	456
11-20	186
21-30	161
31-40	236
41-50	277
51-60	302
61-70	211
71-80	131
More than80	40

4.2 Results of WHO/INURD core drug use indicators

The results of the five included indicators were as the following:

4.2.1 Number of medications prescribed

We found that 4380 medications were prescribed among the 2000 studied prescription. The number of medications in the prescriptions was minimum one medication and maximum12 medications, the mean number of medications ± standard deviation was 2.19 ±1.24.

4.2.2 Use of generic names

Among 2000 prescriptions, 1404 included 0 generic names which means that all the medications were in the trade names, 258 prescriptions included one generic name, 208 prescriptions included two generics, 72 prescriptions included 3 generics, 39 prescriptions included 4 generics, 10 prescriptions included 5 generics, 5 prescriptions included 6 generics, 2 prescriptions included 7 generics, one prescription included 8 generics and one prescriptions included 10 generics as shown in (Table 2).

Table (2) number of generics in prescriptions

Drugs prescribed in generic name	No. of prescriptions
0	1404
1	258
2	208
3	72
4	39
5	10
6	5
7	2
8	1
10	1

In summary a total of 1158 generic names were prescribed from all 4380 medications which means that the percent of generics was 26.44% figure (2) shows these percents.

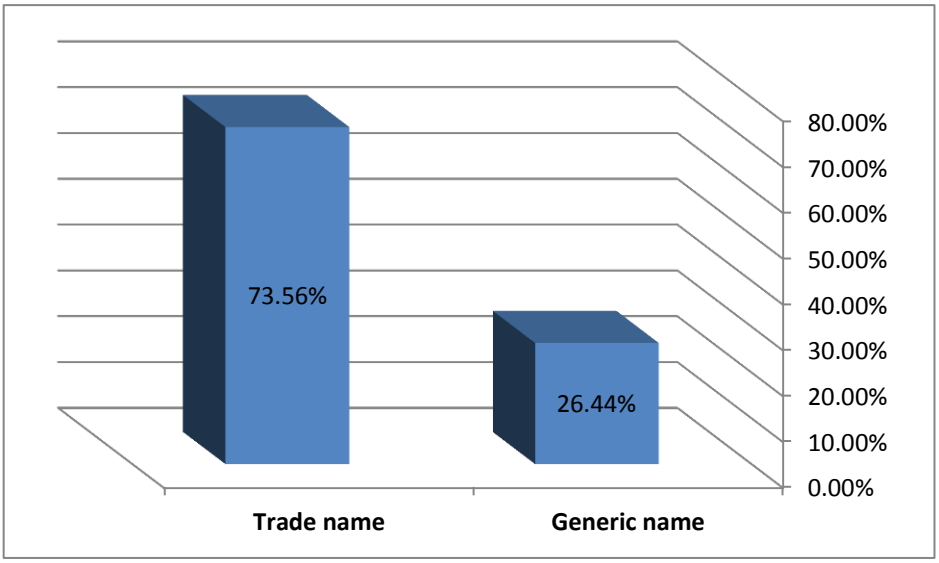


Figure (2): Percentage of medications prescribed in generic names.

4.2.3 Use of antibiotics

Among 2000 prescriptions, 875 included at least one antibiotic which accounted for 43.8% and 1125 prescriptions included no antibiotics which represent 56.2% as shown in figure(3).

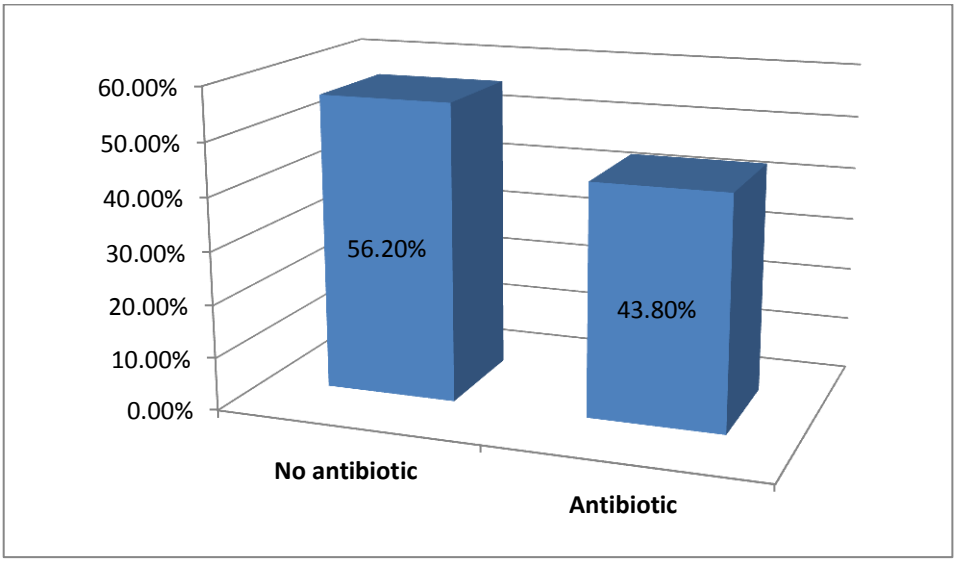


Figure (3): Percentage of prescriptions that included antibiotics.

4.2.4 Use of injections

Among 2000 prescriptions, 201 prescriptions included at least one injection which represents around 10% of the sample figure (4) shows this.

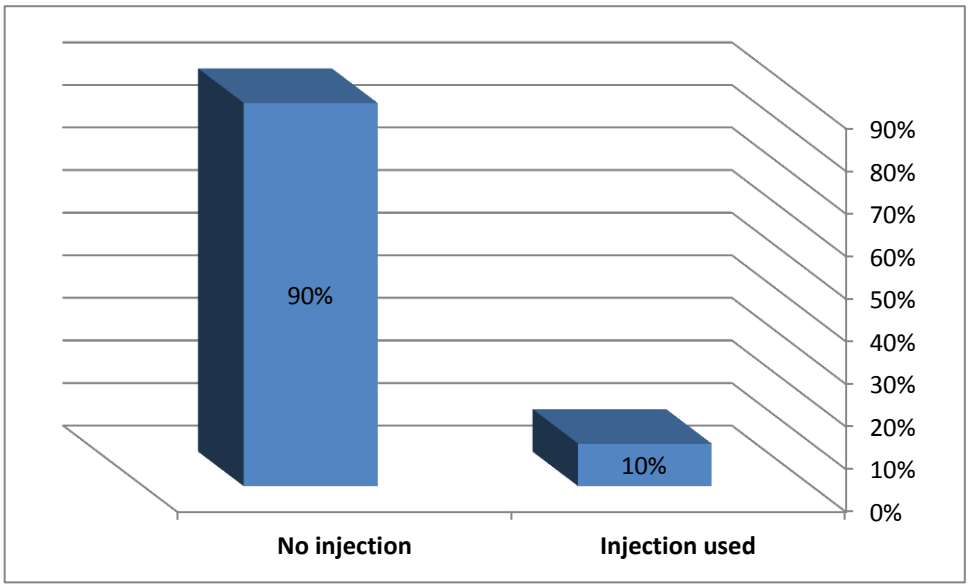


Figure (4): Percentage of prescriptions that include injections.

4.2.5 Essential Drug List (EDL) use

Almost all the medications prescribed were from the EDL, only 5 medications were not from the EDL and they were [crestor 10mg (rosuvastatin), exforge 5/160 (amlodipine/valsartan), blink eye drops, vitamin B12 sublingual tablet and ezomax (ezmoprazole)].

Among 2000 prescription and 4380 drug prescribed ,4347 were from EDL with 99.25% as shown in figure(5).

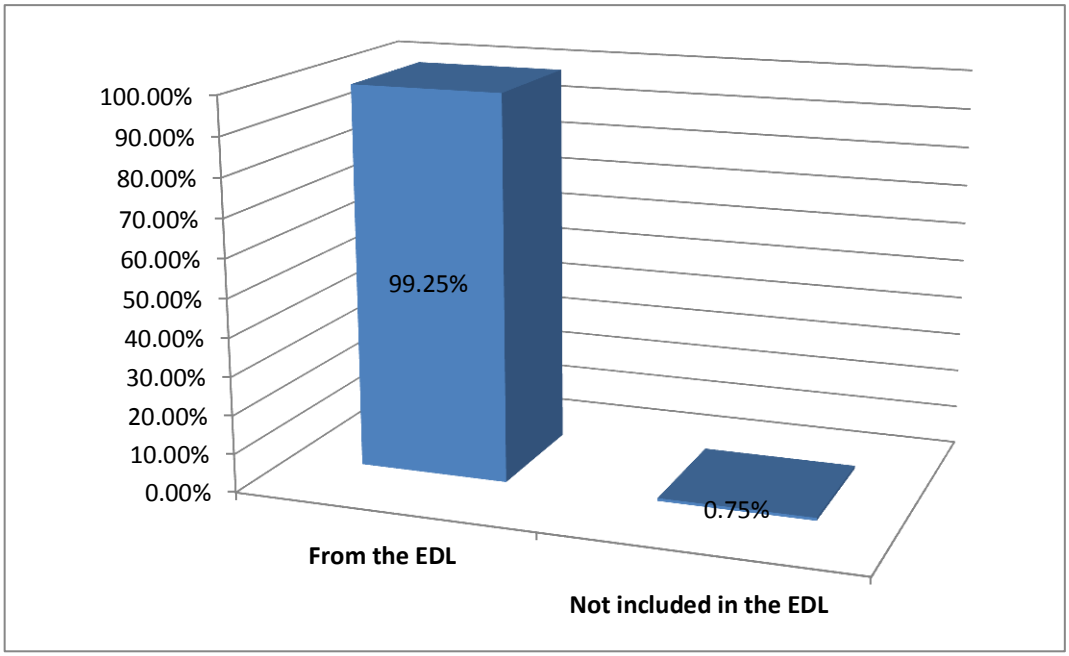


Figure (5): Percentage of using medications from the Essential drug list**.**

4.3 Comparing the indicators between the included centers

4.3.1 Number of medications prescribed and their average in the included centers

The mean number of medications ± SD in all centers was 2.19 ±1.24, the highest was in Jericho al markazya (Jericho) 2.69±0.33 and the lowest was in Tubas al qademah (Tubas) and Jenin al markazyah (Jenin) 1.69±0.33 (p-value < 0.001), so there is statistically significant difference between centers in number of medications prescribed (Table 3).

Table (3): Number of medications and their average in the included centers

Center no	Center	No of medications in 100 prescriptions	Average number
1.	Alobiedeh (Beitlahm)	222	2.22
2.	Beitlahm al_markazya (Beitlahm)	238	2.38
3.	Ramallah al tahta (Ramallah)	266	2.66
4.	Beitreema (Ramallah)	220	2.2
5.	Tulkarm al ganobiah (Tulkarm)	239	2.39
6.	Tulkarm al shamalyah (Tulkarm)	259	2.59
7.	Jericho al markazya (Jericho)	269	2.69
8.	Yasoof and Skaka (Salfeit)	239	2.39
9.	Salfeit al markazya (Salfeit)	203	2.03
10.	Al_karantyna center (Hebron)	265	2.65
11.	Al_ikhtisas (Hebron)	201	2.01
12.	Nablus al wosta (Nablus)	213	2.13
13.	Al makhfyah center (Nablus)	200	2.00
14.	Tubas al gadedah almarkazyah (Tubas)	200	2.00
15.	Tubas al qademah (Tubas)	169	1.69
16.	Qalqeiliah al markazya (Qalqeiliah)	237	2.37
17.	Qalqeiliah algharbyah (Qalqeiliah)	177	1.77
18.	Jenin al gharbyah (Jenin)	178	1.78
19.	Jenin al markazyah (Jenin)	169	1.69
20.	Al_dyok alfoqa (Jericho)	216	2.16

4.3.2 Percent of antibiotics used through the 20 centers

It was found that the highest percent was in Jericho al markazya (Jericho) with 57% and the least was in Al_karantyna center (Hebron) with 30% (Table 4). P-value was 0.001 which means there is a significant difference between the centers in antibiotic use.

Table (4): Number and percentage of antibiotics in the included centers

Center no	Center	Number of antibiotics	Percent within antibiotic	Percent of antibiotic
1.	Alobiedeh (Beitlahm)	54	6.2%	54%
2.	Beitlahm al_markazya (Beitlahm)	47	5.4%	47%
3.	Ramallah al tahta (Ramallah)	34	3.9%	34%
4.	Beitreema (Ramallah)	49	5.6%	49%
5.	Tulkarm al ganobiah (Tulkarm)	33	3.8%	33%
6.	Tulkarm al shamalyah (Tulkarm)	50	5.7%	50%
7.	Jericho al markazya (Jericho)	57	6.5%	57%
8.	Yasoof and Skaka (Salfeit)	41	4.7%	41%
9.	Salfeit al markazya (Salfeit)	43	4.9%	43%
10.	Al_karantyna center (Hebron)	30	3.4%	30%
11.	Al_ikhtisas (Hebron)	46	5.3%	46%
12.	Nablus al wosta (Nablus)	42	4.8%	42%
13.	Al makhfyah center (Nablus)	42	4.8%	42%
14.	Tubas al gadedah al markazyah (Tubas)	56	6.4%	56%
15.	Tubas al qademah (Tubas)	38	4.3%	38%
16.	Qalqeiliah al markazya (Qalqeiliah)	51	5.8%	51%
17.	Qalqeiliah algharbyah (Qalqeiliah)	44	5%	44%
18.	Jenin al gharbyah (Jenin)	41	4.7%	41%
19.	Jenin al markazyah (Jenin)	39	4.5%	39%
20.	Al_dyokalfoqa (Jericho)	38	4.3%	38%

4.3.3 The use of generic names in the included centers

We found that there is a great difference between the centers regarding the generic name use, the highest was 100% in 4 centers Beitreema (Ramallah), Al_karantyna center (Hebron), Al makhfyah center (Nablus) and Qalqeiliah al markazya (Qalqeiliah); since they use the computerized systems for prescribing and dispensing all medications, the lowest percent was Al_dyok alfoqa (Jericho) as no medication was written in the generic name (Table 5).

Table (5): Number and percentage of generic names in the included centers

Center no	Center	No of medications in 100 prescriptions	No of generics	Percent of generics
1.	Alobiedeh (Beitlahm)	222	5	2.25%
2.	Beitlahmal_markazya (Beitlahm)	238	9	3.78%
3.	Ramallah al tahta (Ramallah)	266	18	6.77%
4.	Beitreema (Ramallah)	220	220	100%
5.	Tulkarm al ganobiah (Tulkarm)	239	6	2.5%
6.	Tulkarm al shamalyah (Tulkarm)	259	12	4.63%
7.	Jericho al markazya (Jericho)	269	3	1.12%
8.	Yasoof and Skaka (Salfeit)	239	13	5.44%
9.	Salfeit al markazya (Salfeit)	203	11	5.42%
10.	Al_karantyna center (Hebron)	265	265	100%
11.	Al_ikhtisas (Hebron)	201	32	15.92%
12.	Nablus al wosta (Nablus)	213	32	15%
13.	Al makhfyah center (Nablus)	200	200	100%
14.	Tubas al gadedah al markazyah (Tubas)	200	10	5%
15.	Tubas al qademah (Tubas)	169	5	2.96%
16.	Qalqeiliah al markazya (Qalqeiliah)	237	237	100%
17.	Qalqeiliah algharbyah (Qalqeiliah)	177	10	5.65%
18.	Jenin al gharbyah (Jenin)	178	43	41%
19.	Jenin al markazyah (Jenin)	169	27	15.98%
20.	Al_dyok alfoqa (Jericho)	216	0	0%

4.3.4 Use of injections in the included centers

When we compared between the centers in the percent of injection use, there was a significant difference between the centers in injection use (P value <0.001).The highest use of injections was in al Al_ikhtisas center (Hebron) with 31% of prescriptions and the least use was in Al makhfyah center (Nablus) and Al_dyok alfoqa (Jericho) as 2% of prescriptions included injected drugs only. The average percent of using injections was 10% as a total of 201 injections were prescribed (Table 6).

Table (6): Number and percentage of injection use in the included centers

Center no.	Center	Number of injections	Percent of injections	percent within injections
1.	Alobiedeh(Beitlahm)	12	12%	6%
2.	Beitlahmal_markazya(Beitlahm)	15	15%	7.5%
3.	Ramallah al tahta(Ramallah)	4	4%	2%
4.	Beitreema(Ramallah)	9	9%	4.5%
5.	Tulkarm al ganobiah(Tulkarm)	19	19%	9.5%
6.	Tulkarm al shamalyah(Tulkarm)	9	9%	4.5%
7.	Jericho al markazya(Jericho)	19	19%	9.5%
8.	Yasoof and Skaka (Salfeit)	12	12%	6%
9.	Salfeit al markazya(Salfeit)	15	15%	7.5%
10.	Al_karantyna center(Hebron)	9	9%	4.5%
11.	Al_ikhtisas(Hebron)	31	31%	15.4%
12.	Nablus al wosta(Nablus)	6	6%	3%
13.	Al makhfyah center(Nablus)	2	2%	1%
14.	Tubas al gadedah al markazyah (Tubas)	8	8%	4%
15.	Tubas al qademah(Tubas)	6	6%	3%
16.	Qalqeiliah al markazya (Qalqeiliah)	7	7%	3.5%
17.	Qalqeiliahalgharbyah(Qalqeiliah)	8	8%	4%
18.	Jenin al gharbyah(Jenin)	4	4%	2%
19.	Jenin al markazyah(Jenin)	4	4	2%
20.	Al_dyokalfoqa(Jericho)	2	2%	1%

4.3.5 Using Palestinian EDL through the 20 centers

When we compared between the centers in using EDL, we found that there is no significant difference between the centers in using EDL (p value was 0.304 which is more than 0.001).

Almost all the medications prescribed were from the Palestinian EDL, the lowest percentage was in Ramallah al tahta (Ramallah) as 96.2% of mediations were from the EDL and in 9 centers all medications (100%) were prescribed from the EDL (Table 7).

Table (7): Number and percentage of EDL use in the included centers

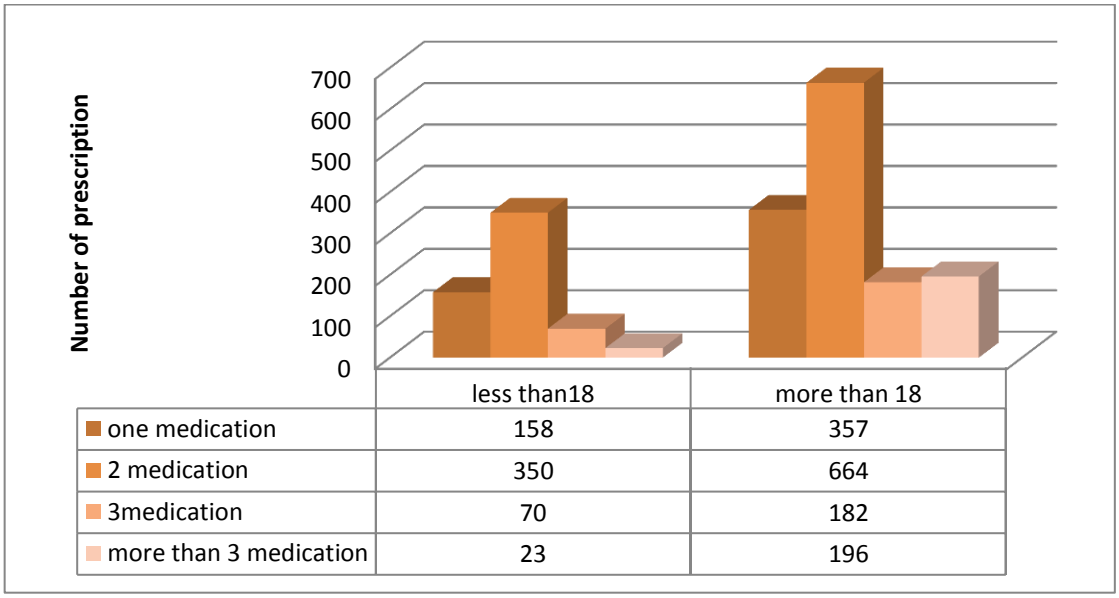
Center no	Center	No of medications in 100 prescriptions	No. of medications from EDL	Percentage of EDL use
1.	Alobiedeh(Beitlahm)	222	222	100%
2.	Beitlahmal_markazya (Beitlahm)	238	237	99.6%
3.	Ramallah al tahta (Ramallah)	266	256	96.2%
4.	Beitreema (Ramallah)	220	220	100%
5.	Tulkarm al ganobiah (Tulkarm)	239	236	98.7%
6.	Tulkarm al shamalyah (Tulkarm)	259	255	98.5%
7.	Jericho al markazya (Jericho)	269	269	100%
8.	Yasoof and Skaka (Salfeit)	239	238	99.6%
9.	Salfeit al markazy (Salfeit)	203	203	100%
10.	Al_karantyna center (Hebron)	265	265	100%
11.	Al_ikhtisas (Hebron)	201	201	100%
12.	Nablus al wosta (Nablus)	213	211	99.1%
13.	Al makhfyah center (Nablus)	200	200	100%
14.	Tubas al gadedah al markazyah (Tubas)	200	198	99%
15.	Tubas al qademah (Tubas)	169	167	98.8%
16.	Qalqeiliah al markazya (Qalqeiliah)	237	237	100%
17.	Qalqeiliah algharbyah (Qalqeiliah)	177	175	98.9%
18.	Jenin al gharbyah (Jenin)	178	174	97.8%
19.	Jenin al markazyah (Jenin)	169	167	98.8%
20.	Al_dyokalfoqa (Jericho)	216	216	100%

4.4 Relation between age groups and indicators:

4.4.1 Number of medications per encounter among different age groups

Figure 6 shows that the number of medications prescribed for adult patients (>18 years) were different from those for prescribed for children (< 18 years). In summary they were more as 3210 medications were prescribed in 1399 prescription for patients > 18 years which gives a mean of 2.295 medications per prescription, and 1166 medications were prescribed in 601 prescriptions for patients < 18 years with a mean of 1.94 medications per prescription. The P value was<0.001, so there is a

significant difference between different age groups (> 18 years and < 18) in the mean number of medications per encounter as shown in figure(6).



	less than18	more than 18
one medication	158	357
2 medication	350	664
3medication	70	182
more than 3 medication	23	196

Figure (6): Number of medications among different age groups**.**

4.4.2 Use of injections among different age groups

We found that 33 injections (16.42%of the whole injections) were prescribed in 601 prescriptions for patients < 18 years and 168 injections (83.58%of the whole injections prescribed) were prescribed in1399 prescription patients > 18 years. P-value< 0.001, which means there is significant difference in injections use through different ages as adults were prescribed injections more.

4.4.3 Use of antibiotics among different age groups

Three hundred sixty prescriptions contained at least one antibiotic in the 601 prescriptions prescribed for patients < 18 years and 515 prescriptions contained at least one antibiotic in1399 prescriptions prescribed for patients

> 18 years. So the percentages were 59.9% in children and 36.8% in adults (Figure 7). P-value was< 0.001, so there is significant difference in antibiotics prescribing as children were prescribed antibiotics more than adults.

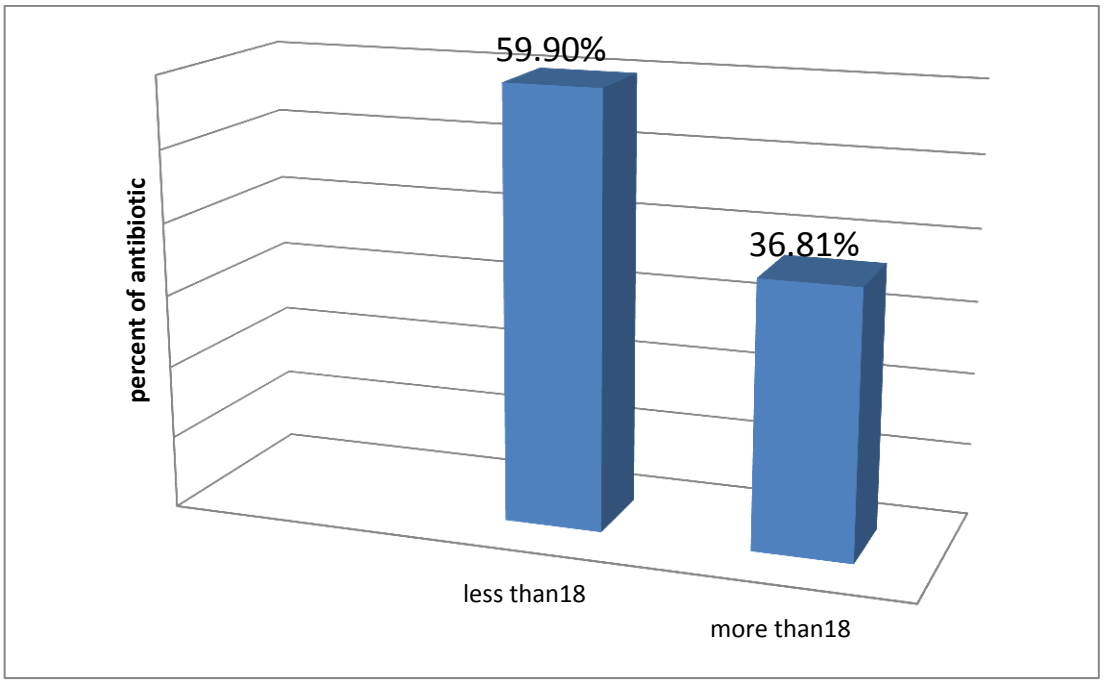


Figure (7): Use of antibiotics among different age groups.

4.5 Seasons and two indicators(injections, antibiotics)

4.5.1 Seasons and injection use

There was no significant difference between seasons in prescribing injections as we had the following percents: In Spring 51 injections were prescribed from whole201 prescriptions contained at least one injection (25.4%), in Summer 52 injections were prescribed from the 201 prescriptions contained at least one injection (25.9%), in Autumn, the number was 51 injections which equals (25.8%), while in Winter, 47

injections were prescribed which represents (23.4%). P-value was 0.955 which means there was no significant difference between seasons in prescribing injections.

4.5.2 Seasons and antibiotics use

We found that 211 prescriptions in Spring contained at least one antibiotic from the whole 875 prescriptions through the whole year which contained at least one antibiotics (24.1%) while 199 prescriptions in Summer contained at least one antibiotic (22.7%). In Autumn, 233 prescriptions contained at least one antibiotic (26.6%), similar to Winter as 232 prescriptions in winter contained at least one antibiotic (26.5%). The P-value was 0.081 which means there was no significant difference in antibiotic use through the four seasons.

4.6 Comparison of WHO prescribing indicators between this study and other studies

One of the objectives of the study was to compare our results with other countries; table (8) gives a summary of results from some other countries

Table (8): comparison of WHO prescribing indicators between this study and other studies

Country	Mean number of medications	Percent of generics	Percent of antibiotics	Percent of EDL usage	Percent of injections	Year of publication	Year of the data collection	Setting of the study
UAE (Mahmooda et al., 2016)	2.49±0.9	%100	9.8±4.8	100	3.14±1.7	2016	2012	4govermental hospitals
Bahrain (Otoom et al., 2010)	3.3±0.7	10.2	45.8	_	9.3	2010	2004	20primary health care center
India (Randhawa et al., 2017)	5.97±2.33	26.09	23.64	29.33	47.46	2017	2017	hospitalized patients in the Department of Surgery at Sri Guru Ram Das Institute
Pakistan (Atif et al., 2016)	3.4±0.8	71.67±15.7	48.9±20.2	93.4±7.1	27.1±9.8	2016	2015	Bahawalpur district of the Punjab Province of Pakistan in 10 primary health care centers
Sudan (Yousif and Supakankunti, 2016)	2.55±1.32	46.32	54.7	81.19	12.84	2016	2014-2015	Primary health care centers
Iran (Moghadamnia et al., 2002)	4.4±1.7	98	61.9	_	58	2001	1999-2000	52 general practitioner in Babol
Lebanon (Hamadeh et al., 2001)	1.6	2.9	17.5	2.9		2001	1997_1998	University Health Services (UHS) clinic at the American University of Beirut
Kuwait (Awad and Al-Saffar, 2010)	2.9±1.2	17.7	39.1	_	9.1	2010	2010	50primary health care centers through5 governorates

Egypt (Mansour and El-Hefnawy, 2017)	3.14	16.07	18.97	_	6.82	2016	2017	Primary health care centers pharmacies private hospitals
Saudi Arabia (El.Mahalli, 2012)	2.4	61.2	32.2	99.2	2	2012	2010	10primary health care centers in eastern province, Saudi Arabia
Jordan(Otoom et al., 2002)	2.3	5.1	60.9	93.3	1.2	1999	2002	21primary health care centers in Irbid
WHO(World Health Organization, 1993)	≤2.00	100%	≤30%	100%	≤10%	-	-	-
Palestine	2.19±1.24	26.44%	43.8%	99.25%	10%	2017	-	20primary health care units

Chapter Five

Discussion

Chapter Five
Discussion

The study aims were to evaluate the rational use of medications in Palestine according to the WHO /INURD core drug use indicators, compare them between included centers and to compare our results with other countries.

The first indicator was number of medications per prescription, the highest was in Jericho al markazya (2.69) then 2.66 in Ramallah al tahta and 2.65 in al_karantyna, the lowest were in Tubas al qademah, Jenin al markazya with 1.69 followed by Qalqeiliah al gharbyah, Jenin al gharbyah, Almakhfyah center and Tubas al gadedah almarkazya with 1.77, 1.78, 2.00 and 2.00 respectively, these four centers got the WHO goal which is ≤2.00.

This difference between the 20 primary health care centers might be due to the prescribers different education and knowledge and different diseases of the patients who visit the center.

Average number of medication per prescription was 2.19±1.24 which is one of the best values among our neighbors in the Arab world after Lebanon (1.6 drug per prescription) as they were 3.3 in Bahrain, 2.9 in Kuwait, 2.8 in Yemen and 2.5 in Egypt (Hamadeh et al., 2001, Otoom et al., 2010, Awad and Al-Saffar, 2010, Bashrahil, 2010, Akl et al., 2014).

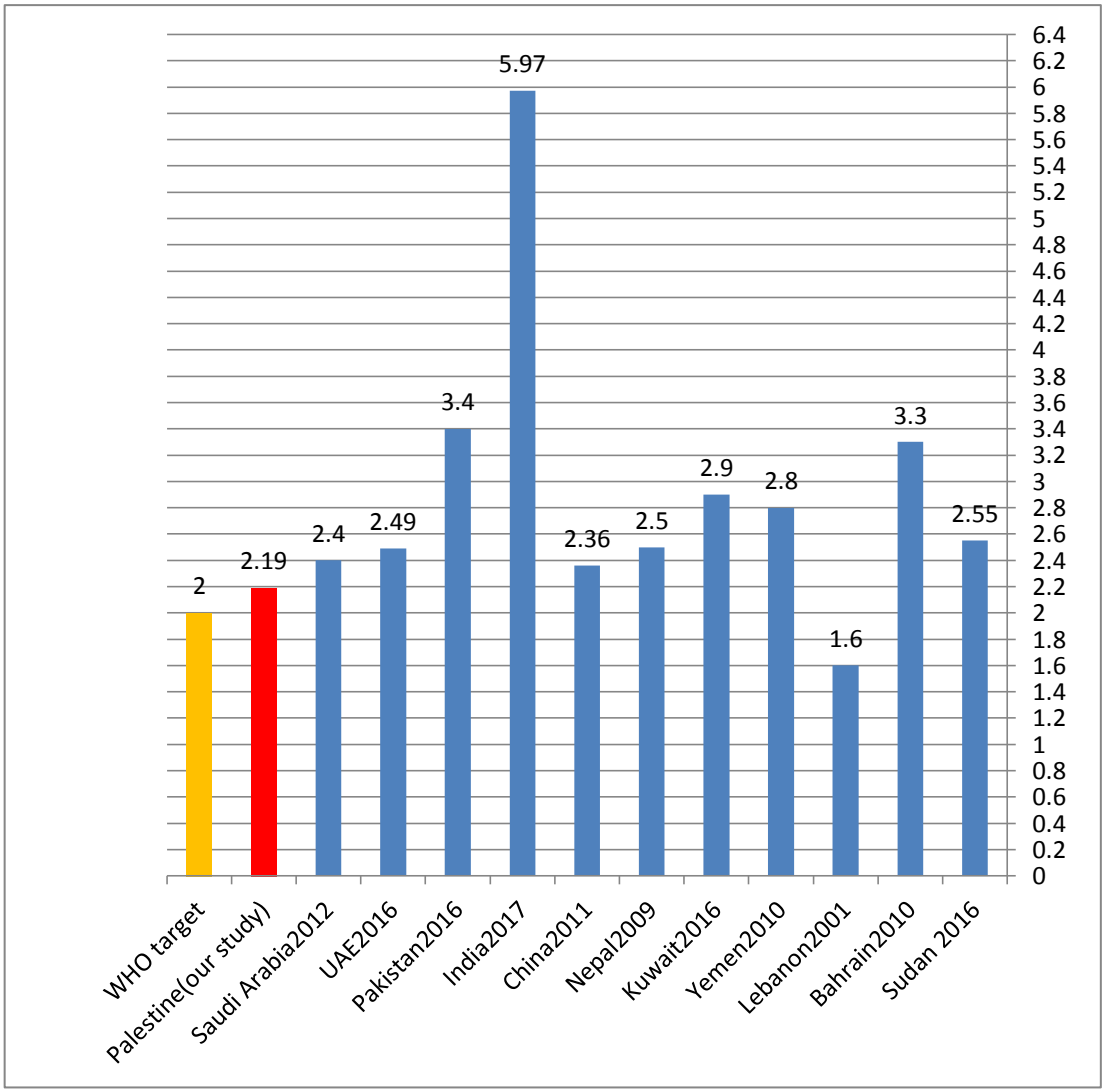


Figure (8): Comparison between our study and others in number of medications**.**

Rational use of antibiotics is one of the most important concerns, the WHO selected the target antibiotic use percent to be ≤ 30%. A significance difference was found between the centers regarding to antibiotic prescription percent. Al karantyna center was the only one which achieved the target (30%), followed by Tulkarm al ganobiah, Ramallah al tahta with 33% and 34% respectively. The highest was found in Jericho al markazya 57% followed by Tubas al markazya 56%, ALobiedya 54% and Qalqeiliah al markazya 51%. The average percent of antibiotic was 43.8% which is

less than the percent found in Yemen 66.2%, Pakistan 69.9% and much higher than United Arab Emarites 9.8% (Bashrahil, 2010, Atif et al., 2016, Mahmood et al., 2016). In general our percent is higher than the WHO target.

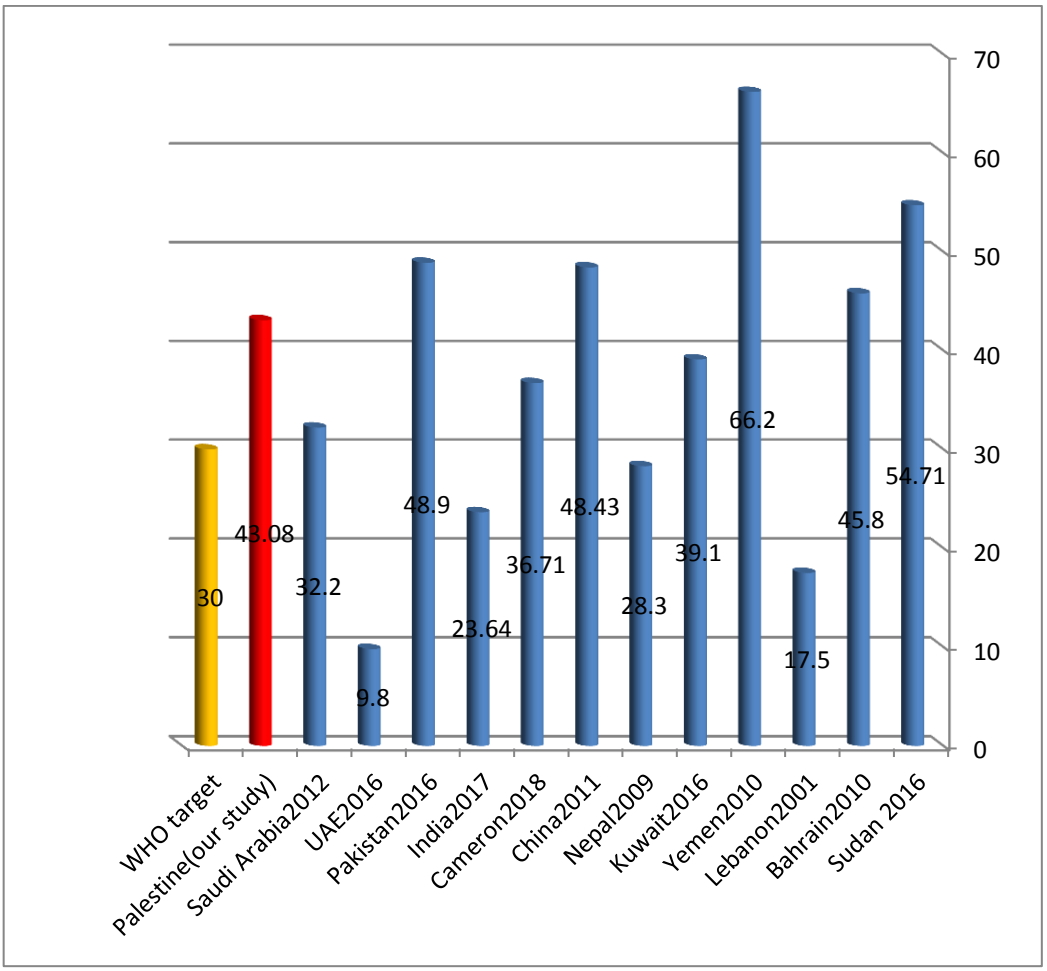


Figure (9): Comparison between our study and others in percent of antibiotics.

Since the use of generic name is important in decreasing the cost of the treatment, WHO selected 100% as targeted percent for generic use. Four centers had 100% generic name prescribing in this study, these centers use computerized system, so the drugs are entered by the Palestinian ministry of health in generic names, these centers are Beitreema, AL karantyna,

ALmakhfyah and Qalqeiliah al markazya. Abig problem in generic prescribing was found in other centers, for example the best between the other sixteen was AL ikhtisas 15.92% which is very low according to the WHO target (100%), the lowest were Aldyokalfoqa as zero generics were prescribed and 1.12% in Jericho al markazya.

Average percent of generics in general was 26.44% and it is very low, this may be explained by the physician limited knowledge of the importance of generic name use and their belief of higher efficacy of some brands.

Compared to other countries, 26.44% is higher than Bahrain (10.2%) and Kuwait (17.7%) and lower than United Arab Emirates which was 100% and Egypt (95.4%) (Otoom et al., 2010, Awad and Al-Saffar, 2010, Mahmood et al., 2016, Akl et al., 2014).

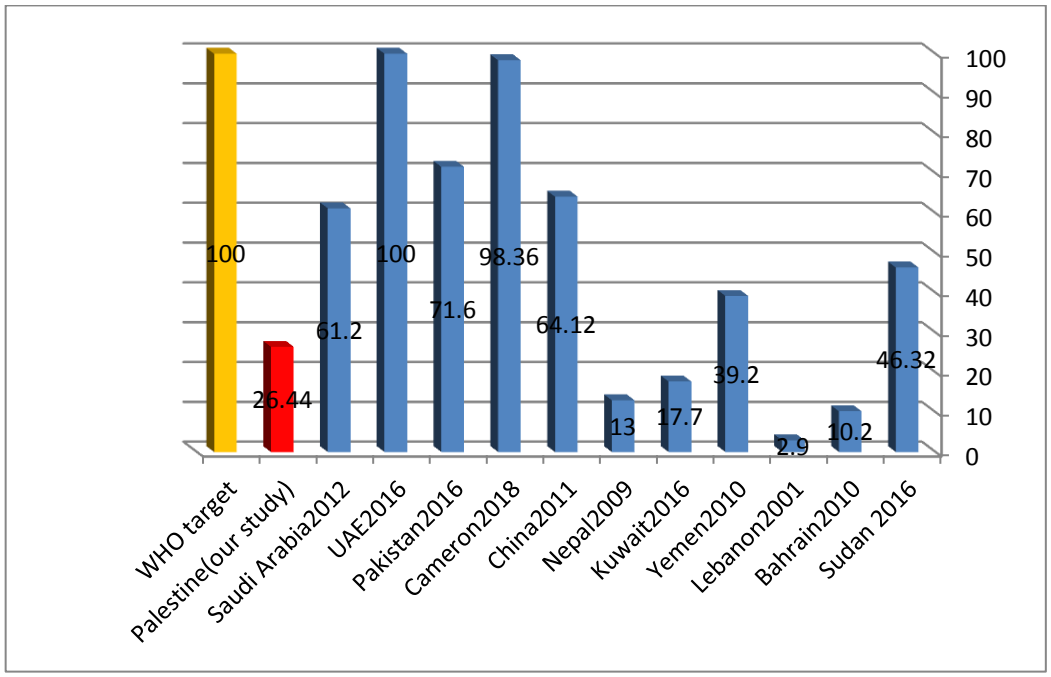


Figure (10): Comparison between our study and others in percent of generics use**.**

Use of injections in this study was 10% which applies the WHO target ≤10%, they averaged from 31%in AL ikhtisas and 2% in AL_dyokalfoqa and Almakhfya center.

This high percent of AL ikhtisas may be due to the diseases of the patients who visited this center as they had many brucellosis hepatitis patients. This goes with Palestinian ministry of health reports that 85% of brucellosis cases are reported in Hebron in 2007 and the cases in West Bank are increasing according to 2016 report (Ministry Of Health, 2016).

The 10% in Palestine is high in comparison with United Arab Emirates which was 3.14% and low in comparison with Iran and India (58% and 47.46% respectively) (Mahmood et al., 2016),(Moghadamnia et al., 2002),(Randhawa et al., 2017).

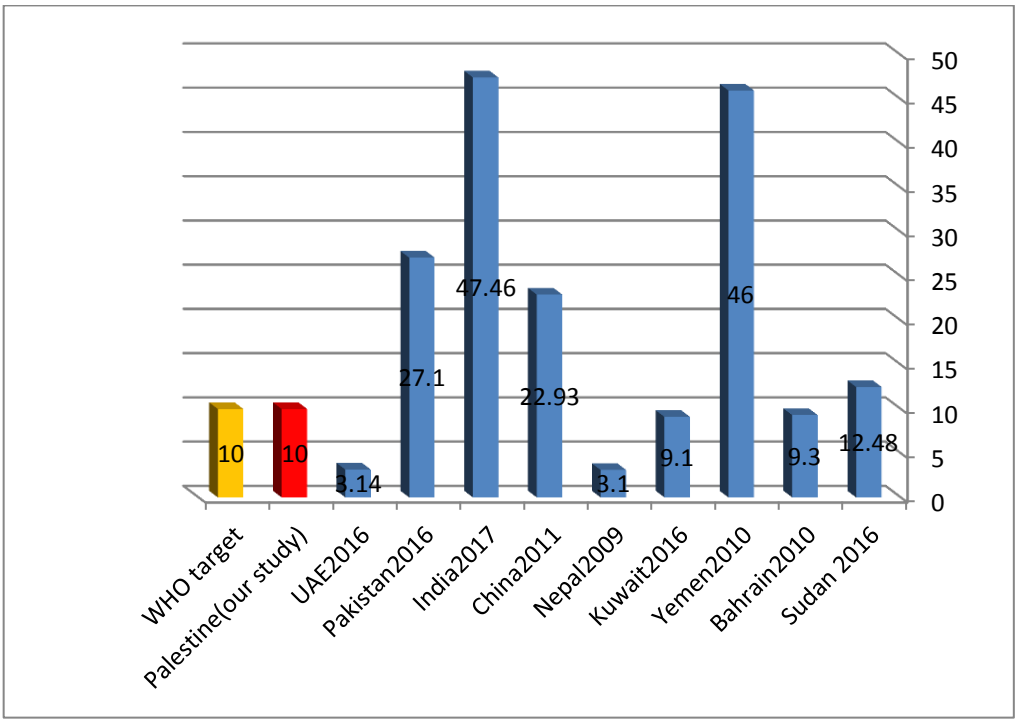


Figure (11): Comparison between our study and others in percent of injections.

Usage of medications from EDL was 99.25%, in 9 centers Alobiedeh, Beitreema, Jericho Al markazyam, Salfeit Almarkazya, Alkarantyna, Aldoykalfoqa, ALikhtisas ,Qalqeiliah Al markazya and Almakhfyah,100% of the drugs prescribed were from the EDL. In both centers in Jericho and Hebron medications were 100% prescribed from the EDL.

Our situation is good in using EDL, UAE was better than us with 100% drugs prescribed from EDL (Mahmood et al., 2016).

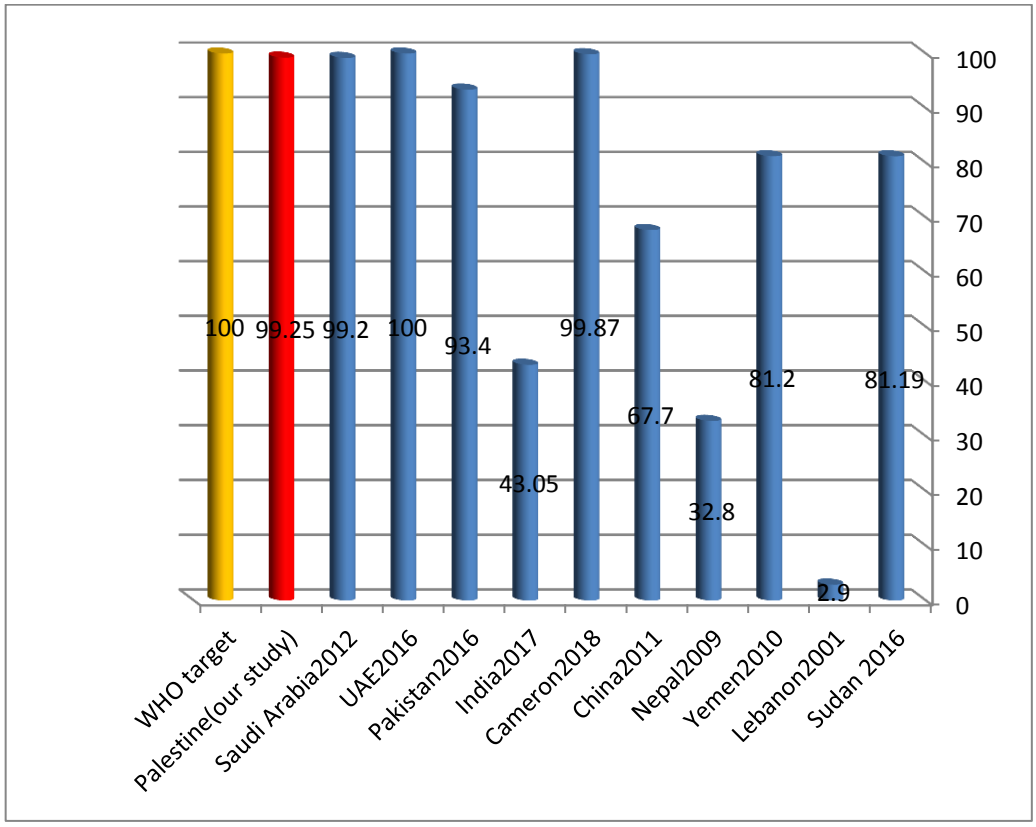


Figure (12): Comparison between our study and others in percent of EDL use**.**

In this study, we had significant difference between two age categories (>18 years and < 18 years) in number of medications as the mean was 2.295 for the first group and 1.94 for the second group. This difference is expected since older people have more medical problems and the current guidelines often require multiple medications to treat each chronic disease state for optimal clinical benefit (Maher et al., 2014).

Using of injections was different between the two age groups also with a significant difference, it was higher in patients > 18 years (83.58% from the whole injections prescribed). While antibiotic use among patients < 18 years was much higher (59.9% in those less than 18 years vs 36.81% in those more than18 years). This may be explained by the fact that most visits of children to outpatient clinics are due to infections.

In our study we found there was no difference between the four seasons in number of injections and antibiotics use.

5.1 Strengths and limitations

5.1.1Strengths

1. To the best of our knowledge, this was the first study in this field in Palestine.
2. Ten Governorates from Palestine were included.
3. The sample was large enough and representative.
4. All the WHO instructions were followed carefully.

5.1.2 Limitations

1. The study was in primary health care centers which may not be representative to the practice in private sector and public hospitals.
2. The study was retrospective but this was according to the recommendations of the WHO.

Despite these limitations we believe that this study provided a baseline about irrational use of medications in Palestine.

Chapter Six

Conclusion and Recommendations

Chapter Six
Conclusions and Recommendations

6.1 Conclusion

We could conclude that irrational use of medications which is a serious problem worldwide was found in Palestine according to the WHO prescribing indicators, using the generic name was very low, number of medications prescribed was slightly higher than the optimal one, percent of antibiotics prescribed was much higher than the optimal one, percent of EDL usage was almost optimal, percent of injection use was optimal, using antibiotics in children was very high. More education and interventions about rational use of medications in Palestine are necessary.

6.2 Recommendations

We recommend having workshops, training and continuous education for doctors about rational use of medications since it is effective in decreasing the cost of treatment, side effects, drug-drug interactions and theuse of antibiotics.

It is recommended to use generic names of medications, so the available and most suitable and cost effective brands can be chosen.

Using computerized systems in prescribing and dispensing process is recommended.

Activating the role of clinical pharmacist in promoting rational use of medications and solving drug related problems is highly recommended.

More research is needed in private sector and in Palestinian hospitals both private and public to optimize rational use of medications.

More awareness about prescribing antibiotics in children is highly recommended.

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Appendices

Appendix 1

Data Collection Form

PRESCRIBING INDICATOR FORM (World Health Organization, 1993)

Location: _____

Investigator: _____ Date: _____

Seq. #	Type (R/P)	Date of Rx	Age (yrs)	# Drugs	# Generics	Antib. (0/1)*	Injec. (0/1)*	# on EDL	Diagnosis (Optional)
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									

14									
15									
16									
17									
18									
19									
20									
Total									
Average									
Percentage					*% of total drugs*	*% of total cases*	*% of total cases*	*% of total drugs*	

* 0 = No 1 = Yes

Appendix 2

IRB Approval

An-Najah
National University
Faculty of medicine
&Health Sciences
Department of Graduate
Studies

جامعة النجاح
الوطنية
كلية الطب وعلوم الصحة
دائرة الدراسات العليا

IRB Approval Letter

Study Title:
Evaluation of Rational Use of Medicines according to the World Health Organization Prescribing Indicators: A Cross sectional Study from Palestine

Submitted by:
Maram Shadid,Dr.Rowa Al-Ramahi
Date Reviewed:
4/April/2016
Date Approved:
11/4/2017

Your Study titled: "**Evaluation of Rational Use of Medicines according to the World Health Organization Prescribing Indicators: A Cross sectional Study from Palestine**
" with archived number (1) April was reviewed by An-Najah National University IRB committee and was approved on 11/4/2017

Hassan Fitian, MD
IRB
IRB Committee Chairman
An-Najah National University

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Appendix 3

MOH Approval

State of Palestine
Ministry of Health - Nablus
General Directorate of Education in Health

دولة فلسطين
وزارة الصحة- نابلس
الإدارة العامة للتعليم الصحي

Ref.: .....
Date: .....

الرقم: ...
التاريخ: ...

الأخ مدير عام الإدارة العامة للرعاية الصحية الأولية المحترم،،،

تحية واحترام،،،

الموضوع: تسهيل مهمة – جامعة النجاح

تماشياً مع سياسة وزارة الصحة المتعلقة بتعزيز التعاون مع الجامعات والمؤسسات الأكاديمية برتاحة فرص التدريب أمام الطلبة والخريجين والباحثين في المؤسسات الوطنية وإسهاماً في تنمية قدراتهم

يرجى تسهيل مهمة **الطالبة: مرام شديد– ماجستير صيدلة سريرية/ جامعة النجاح، في عمل بحث** بعنوان " Evaluation of Rational Use of Medicines according to the World Health Organization Prescribing Indicators: A Cross Sectional Study From Palestine"

من خلال السماح للطالبة بجمع معلومات من خلال مراجعة ملفات مرضى العيادات (بإشراف الموظف المسؤول عن الملفات)، في مراكز الرعاية الأولية في مدن:

نابلس – طولكرم– جنين – طوباس – قلقيلية – رام الله– بيت لحم – الخليل – سلفيت – اريحا.

حيث سيتم جمع العينة من عيادتين على الأقل في كل محافظة في الفترة ما بين 7/10-2017/9/10

علما ان البحث تحت اشراف د. رولا ارمحي.

كما انه سيتم الالتزام بمعايير البحث العلمي والحفاظ على سرية المعلومات.

مع ضرورة تزويدنا بنسخة من نتائج الدراسة.

مع التحيات،،،

د. أمل أبو عوض
مدير عام التعليم الصحي

نسخة: نائب الرئيس للشؤون الأكاديمية المحترم/ جامعة النجاح الوطنية

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جامعة النجاح الوطنية
كلية الدراسات العليا

تقييم الاستعمال الرشيد للأدوية وفقا لمؤشرات وصف منظمة الصحة العالمية: دراسة مقطعية من فلسطين

إعداد
مرام رفقي شديد

إشراف
د. رواء الرمحي

قدمت هذه الأطروحة استكمالاً لمتطلبات الحصول على درجة الماجستير في الصيدلة السريرية، بكلية الدراسات العليا، في جامعة النجاح الوطنية، نابلس- فلسطين.

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تقييم الاستعمال الرشيد للأدوية وفقا لمؤشرات وصف منظمة الصحة العالمية:

دراسة مقطعية من فلسطين

إعداد

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الملخص

خلفية الدراسة: الاستخدام الرشيد للأدوية هو هدف عالمي مهم جدا في تحقيق جودة الصحة للمرضى ولسكان العالم.

الأهداف: تقييم الاستخدام الرشيد للأدوية في فلسطين وفقا لمؤشرات الشبكة الدولية للاستخدام الرشيد للأدوية/منظمة الصحة العالمية الخاصة باستخدام الأدوية من أجل رعاية المرضى ومقارنتها مع الآخرين.

المنهجية: كانت الدراسة دراسة مستعرضة بأثر رجعي. تم جمع عينة من 2000 وصفة طبية من 20 مركز للرعاية الصحية الأولية من 10 محافظات في الضفة الغربية لفلسطين. وشملت البيانات التي تم جمعها العمر والتاريخ وعدد الأدوية في كل وصفة طبية، ونسبة الأدوية الجنيسة ونسبة الأدوية من قائمة الأدوية الأساسية وعدد الوصفات الطبية التي تحتوي على الحقن وعلى المضادات الحيوية. تم تحليل البيانات باستخدام برنامج ال SPSS version 20.

النتيجة: تضمنت الوصفات الطبية التي تم جمعها 4380 دواءً. كان متوسط عدد الأدوية 2.19 ± 1.24 (هدف منظمة الصحة العالمية هو ≥2)، وكانت النسبة المئوية للمضادات الحيوية 43.8٪ (هدف منظمة الصحة العالمية هو ≥ 30٪)، وكانت النسبة المئوية لاستخدام الاسم العلمي 26.44٪ (هدف منظمة الصحة العالمية هو 100٪)، وكانت نسبة استخدام الحقن 10٪ (هدف منظمة الصحة العالمية هو≥10%) ونسبة الأدوية الموصوفة من قائمة الادوية الاساسية هي 99.25٪ (هدف منظمة الصحة العالمية هو 100%) وكانت نسبة صرف

المضادات الحيوية للأطفال 59.9%. كانت هناك فروق ذات دلالة إحصائية بين المراكز الصحية الأولية العشرين المدروسة في مؤشرات وصف منظمة الصحة العالمية.

الاستنتاج: كانت بعض المؤشرات قريبة من أهداف منظمة الصحة العالمية في حين أن البعض الآخر كان بعيدا جدا عن الأهداف. وقد لوحظ الاستخدام غير الرشيد للأدوية. وكان الإفراط في استخدام المضادات الحيوية وخاصة في فئة الأطفال وانخفاض استخدام الأسماء العلمية أبرز مظاهر وصف الأدوية غير العقلاني وبذلك يتضح أن هناك حاجة إلى جهود لتحسين الوضع.