Deanship of Graduate Studies
Al-Quds University

Magnitude and Correlates of Drug-Drug Interactions among Prescriptions for Patients Discharged from the Internal Medicine Departments of the Governmental Hospitals

Hanaa Younis Deeb Moussa

M. Sc. Thesis

Jerusalem-Palestine

1441-2020

Magnitude and Correlates of Drug-Drug Interactions among Prescriptions for Patients Discharged from the Internal Medicine Departments of the Governmental Hospitals

Submitted by:
Hanaa Younis Deeb Moussa

Bachelor of Pharmacy - Al Azhar University
Gaza – Palestine

Supervisor: Prof. Dr. Yehia Abed

A Thesis Submitted in Partial Fulfillment of Requirements for the Degree of Master of Public Health/ Trac Health Management Al Quds University

1441-2020

Al- Quds University
Deanship of Graduate Studies
School of Public Health

Thesis Approval

Magnitude and Correlates of Drug-Drug Interactions among Prescriptions for Patients Discharged from the Internal Medicine Departments of the Governmental Hospitals

Prepared by: Hanaa Younis Deeb Moussa
Registration No: 21711115

Supervisor: Prof. Dr. Yehia Abed

Master thesis submitted and accepted date: 19/8/2020
The names of signatures of the examining committee members are as follows:

1. Head of committee: Prof. Dr.Yehia Abed Signature:…
2. Internal examiner: Dr. Khitam Abu Hamad Signature:…
3. External examiner: Dr. Shereen Ayoub Signature:….

Jerusalem-Palestine

1441-2020

Dedication

To my mother and father to whom I owe my life and success.

To my dear husband who has been a great source of motivation and inspiration.

To my lovely children; Amjad, Hala, Mira and Mohammed.

To my brothers and sisters for giving me the faith and the passion to complete this work.

To all those who encouraged, supported and helped me all the way

This effort is dedicated to those surrounding treasures.

Hanaa Younis Moussa

Declaration

I certify that this thesis submitted for the degree of master is the result of my own research, except where otherwise acknowledged and that this thesis or any of its parts has not been submitted for higher degree to any other university or institution.

Signed: ….. 

Hanaa Younis Deeb Moussa

Date: 19 /8/2020

Acknowledgment

My high appreciation and recognition is to Prof. Dr.Yehia Abed, my academic supervisor, I thank him deeply for continuous inspiration to do my best, unlimited encouragement and I am grateful for his advice, patience and support. My special thanks go to Dr. Bassam Abu Hamad and Dr. Khitam Abu Hamad for their help, useful and rich comments.

Many thanks to the experts who helped me in reviewing and revising the questionnaire and abstract data sheet and the key informants who gave me from their time and energy.

I would like also to thank all of my colleagues and pharmacists for their help in facilitating the data collection.

Many thanks to caregivers who participated in the study and without them this work could not be completed.

With respect,

Hanaa Y. Moussa

Abstract

With the increasing availability of complex therapeutic agents and widespread polypharmacy, the rate of drug-related problems and DDIs with medical and financial consequences have been enormously increasing. This study aims to assess the magnitude and factors that correlate with DDIs in prescriptions of patients discharged from the internal medicine departments of the Governmental Hospitals in the Gaza Strip.

This study utilized a mixed-method, it involved collecting quantitative and qualitative data. The quantitative data were collected by two tools, first is the abstraction sheet of 600 discharged prescription sheets from the two hospitals were chosen by random sampling technique and the second is a semi-structured questionnaire to collect data from physicians of internal medicine departments and all pharmacists working in the two hopsitals, with a response rate of 75%. The qualitative data were collected through conducting 10 in-depth interviews with policymakers from the Ministry of Health. Quantitative data were analyzed by using the SPSS software and the qualitative data were analyzed using the open coding thematic technique.

Findings revealed that the average age for participants (physicians and pharmacists) is 42.03 years. Only 16% of participants received training about DDIs. Most of the participants agree that the best sources of information for DDIs are online sources. The average score for participants in DDIs test of 10 pairs of drugs was 45%, the higher pair of drugs which answered correctly were Amoxicillin and Acetaminophen with an average score of 74.7%, however, the lowest score was for Digoxin and Clarithromycine with an average score 24%. Most of the participants had a positive attitude towards the importance of DDIs to manage and to the danger of DDIs for patient health. Few participants agree that the clinical pharmacist has fulfilled their role in the Gaza hospitals, also few agree that physicians actually consult a pharmacist before prescribing and physician trust of the pharmacist as a consultant of DDIs information. Only 51.3% of the participants had awareness regarding the availability of therapeutic protocols in Ministry of Health, 37.7% always adhere to the Ministry of Health protocols and most of the participants agree that the application of an electronic prescribing program will help in the detection of DDIs. About 54.8% of participants (patients) were female, the mean age is 51.66 years. The diseases most diagnosed are diseases of the circulatory system, which were diagnosed in 28.1% of prescriptions. The most prescribed drug was Acetylsalicylic acid (100 mg). The average number of drugs per prescription was 3.84 drugs. About 54.3% of prescriptions had 2 to 4 drugs and 34.3% had 5 and more drugs. The study also revealed that 22.3% of the prescriptions had minor DDIs, 56.5% had significant DDIs, 13% had serious DDIs and 60.8% had one type of DDIs at least. DDIs issue was statistically significantly associated with the setting, number of prescribed drugs, and age of the patient.

The majority of healthcare providers working in the MOH hospitals are not knowledgeable enough about DDIs. There is a need for training and monitoring programs accompanied by supervision and incentives. Strengthening the role of the pharmacist. Prescription behavior requires further follow up and auditing. The necessity of a computerized prescribing alerting system.

Table of Contents

List of Tables

List of Figures

List of Annexes

List of abbreviations

ADE	Adverse Drug Event
ADRs	Adverse Drug Reactions
DDIs	Drug-Drug Interactions
EDL	Essential Drug List
GDP	Gross Domestic Product
GG	Gaza Governorate
GS	Gaza Strip
ICD-10	International Classification of Disease-Tenth Edition
ICU	Intensive Care Unit
IMD	Internal Medicine Department
KI	Key Informant
MD	Median
MOH	Ministry of Health
NGO's	Non-Governmental Organizations
OCHA	United Nations Office for the Coordination of Humanitarian Affairs
OTC	Over-The-Counter
PCBS	Palestinian Central Bureau of Statistics
PDDIs	Potential Drug-Drug Interactions
PHC	Primary Health Care
PNA	Palestinian National Authority
PNAT	Palestinian National Authority Territories
SD	Standard Deviation
UN	United Nations
UNRWA	United Nations Relief and Works Agency for Palestine Refugees in the Near East
WB	West Bank
WHO	World Health Organization

Chapter One
Introduction

1.1 Background

Healthcare systems are considered the corner stones in preventing and treating diseases. As mentioned by the World Health Organization (WHO), a well-functioning health care system should develop the health status of persons, families and communities, defending the population against what threatens their health, protecting individuals against the financial consequences of ill-health, providing equitable access to people-centered care. Health system is composed of six building blocks: leadership and governance, health information system, health financing, human resources for health, service delivery and affordable essential drug medical products (WHO, 2010).

According to WHO, medical products should have a regulatory system, national essential lists, treatment protocols, a good supply and distribution system, a drug availability and price monitoring system and a rational use promoting programs. Economically, spending on drugs is the largest expenditure on health after personnel costs in low income countries (WHO, 2013).

Drugs can treat and cure many health problems. However, they should be taken appropriately to ensure that they are safe and effective. Drugs should be extremely specific in their effects, have the same predictable effect for all patients, never be affected by concomitant food or other medications, exhibit linear potency, be completely non-toxic in any dosage and necessitate only a single dose to affect a permanent cure. However, this ideal medication is still to be discovered.

Drug-Drug interactions (DDIs) have received a great recent attention from regulatory, scientist and healthcare communities over the world. A large number and different types of drugs are introduced every year and new interactions between medications are increasingly reported.

DDIs occurs when two or more drugs react with each other and cause the patient to experience an unexpected side effect, it may make patient drug less effective, cause unexpected side effects or increase the action of a particular drug. The more drugs a person needs, the in-creased risk of a drug–drug interaction.

Polypharmacy has been known as the single most essential risk factor for DDI. There is no universally agreed definition of polypharmacy, but most researchers describe it as the concurrent use of five or more medications. The probability of interactions increases with the number of drugs taken (Khandeparkar & Rataboli, 2017).

DDIs may cause morbidity, mortality and financial costs. If it can be prevented might be considered a form of medication error. However, DDIs are considered important because they are often predictable and therefore avoidable or manageable. Their frequency may be related to the age of the patient, the number of drugs prescribed, the number of physicians involved in the patient's care and the pharmacist role. Patient's safety is an increasingly recognized challenge and opportunity for stakeholders to improve healthcare delivery.

The magnitude of drug–drug interactions (DDI) involving prescription drugs for patients discharged from Gaza Strip hospitals is not known. Therefore, this study is an attempt to explore the current situation of DDI in these hospitals

1.2 Research problem

Today, with the increasing availability of complex therapeutic agents and widespread of polypharmacy, the rate of drugs related problems and DDIs with medical and financial consequences are enormous. The efficacy of drug may be reduced, increased or potentiation of adverse reactions as result of drug-drug DDIs produced by polypharmacy prescriptions. Prescribing errors include irrational, inappropriate drug use and ineffective prescribing, under prescribing and over-prescribing (Hovstadius, 2010).

In general, treatments are used in ways that undermine their value: they are prescribed when they should not be; they are not prescribed when they should be; and patients often take them wrongly or combine them with over the counter (OTC) drugs or supplements in ways that give potential harm and give drug-drug interaction then adverse drug reactions.

DDIs occurs when two or more drugs react with each other and cause the patient to experience an unexpected side effect, it may make your drug less effective, cause unexpected side effects or increase the action of a particular drug. DDIs may cause morbidity, mortality and financial cost.

Harmful interactions may cause irreversible effects including organ damage as renal or hepatic failure. Also, the costs of certain drugs can be prohibitive because a lot of patients cannot afford them.

Taking a multitude of medicines, whether they are prescription drugs, OTC treatments, herbal or dietary supplements identified as polypharmacy is not only a burden for patients, it can be dangerous. We need a way to alleviate the danger of unwanted drug interactions and improve drug adherence to essential medicines. It is imperative that patients are empowered to make informed decisions about the medicines they are taking and pharmacists and other healthcare providers have an important role in educating patients to make these decisions (Medicines, 2015).

As for as the researcher known, this study will be the first to handle the topic about the magnitude and related factors of drug–drug interactions (DDI) which is involved in prescribed drugs for patients discharged from hospitals in Gaza Strip. So the study could help policymakers for awareness about magnitude and factors related to this issue.

1.3 Justification

There is a global interest to issues of excessive use of medication, polypharmacy, DDIs. Polypharmacy also push patient to buy drugs that costly is high, hence increasing the financial burden on the patients and their families and decreasing financial protection and satisfaction with health services. Palestine like other developing countries, face irrational drug use problem due to prescribing pattern as one reason (WHO, 2011).

In Palestine, most research studies focused on DDIs issue in primary healthcare and on elderly patients. There are limited studies that were conducted to explore the issue in hospital and for all stages of age, especially on discharged prescription for drugs. So, this study will be among the first studies that concentrate on discharged prescription on hospitals.

The researcher will explore the magnitude of the problem regarding the errors occur in prescriptions according to DDIs. The study will also try to explain the factors that help in the presence of this issue and affect in the prescription pattern, so it will provide signals that could help to identify best ways to promote rational use of drugs and avoid harmful DDIs and that may help decision makers in thinking about apply solutions to minimize this

issue. The researcher hopes that results of research may help healthcare system in organizing this issue and minimizing prescription errors regarding DDIs issue.

1.4 General objective

To assess the magnitude and factors that correlate with DDIs in prescriptions of patients discharged from the internal medicine departments of the Governmental Hospitals.

1.5 Specific objectives

- To estimate the rate of polypharmacy in prescription among patients discharged from the internal medicine departments of governmental hospitals.
- To assess prescriptions for potential of harmful DDIs and see association if any with the number of drugs prescribed for the patients.
- To explore factors that potentiate the magnitude of DDIs.
- To propose recommendations about factors that could minimize DDIs magnitude.

1.6 Context of the study

1.6.1 Geographic context

The state of Palestine is located in the west of Asia; it lies between longitudes 33’15” and 29’30” and between latitudes 35’40”. The entire area of Palestine stretching from Ras Al-Nakoura in the north to Omme-reshrash in the south. Occupied Palestine is a small country, its area about 27,009 sq.km. Now Palestinian National Authority Territory (PNAT) is composed of two areas separated geographically, the West Bank (WB) and the Gaza Strip (GS), with total area 6,020 sq.km, 5,655 sq. km for (WB) and 365 sq. km for (GS) (PCBs, 2017). GS is a narrow band of land located on the south of Palestine, constituting the coastal zone of the Palestinian Territory along the Mediterranean Sea between Egypt and green line. It is 45 Kilometers long and 6-12 Kilometers wide (History et al., 2018). GS have five governorates: North Gaza, Gaza, Mid Zone, Khan Younis and Rafah (PCBs, 2017).

1.6.2 Demographic context

According to Palestinian Central Bureau of Statistics (2017), the total estimated population of the Palestinian National Authority Territories at mid-2017 was about 4.95 million; 2.52 million of males and 2.44 of females. The total estimated population of GS was 1.94 million; 0.99 million of males and 0.96 million of females. Data revealed that the

population of the PANT is a young population; as the percentage of individuals aged 0 to 17 constituted 47% of the total population at mid of 2017 but 47.5% in WB and 48% in GS. The elderly population aged 60 years and over constituted 5.2% of the total population but 5.9% in WB and 4.3% in GS at mid-2017. Population density is generally high at GS; 5,423 person/km (Palestinian Central Bureau of Statistics, 2017). The average household size in PNA was 5.2; 4.8 in WB and 5.7 in GS, the natural rate of increase of population was 2.8%; 2.5% in WB and 3.2% in GS. In 2016, Palestinian refugees constituted 41.5% of the total population: 26.2% in the West Bank and 65.3 % in GS. Life expectancy at birth in PNA was 73.8: 72.3 years for males and 75.4 years for females. (PCBS, 2017).

1.6.3 Socio-Economic Context

The economic status in Gaza is difficult where poverty affecting 38.8% of the total population (Courbag, Abu-Hamad & Zagha, 2016). Of the population of Gaza 48.2% of youth are unemployed (PCBS, 2018).

For many years, there are mobility restrictions imposed on GS and almost all movements controlled by the Israelis, which makes a few people and a limited number of goods are allowed to across in and out. The main sources of livelihood in the GS are employment in the services sector which lately was affected by decreasing salaries of the employees. The proportion of Palestinians in Gaza who had a monthly income below the national poverty line is 76.1% (Courbag, Abu-Hamad & Zagha, 2016).

According to the United Nations Office for the coordination of Humanitarian Affairs (OCHA, 2014), the current poverty and unemployment rates are very high; In GS, unemployment rate has increased dramatically since mid-2013, following halt of the illegal tunnel trade with Egypt, soaring from 28% in the third quarter of 2013 to 45% in the second quarter of 2014; almost 70% of the youth aged 20-24 were unemployed in GS in the second quarter of 2014 and further deterioration is highly expected (OCHA, 2014).

1.6.4 Health indicators

According to PCBS, the crude birth rate was 31.9 per 1000 population: 29 in WB and 36.3 in GS and crude death rate was 3.6 per 1000 population: 3.7 in WB and 3.4 in GS (PCBS, 2015).

In GS 2017, infant mortality rate is 9 per 1000. The major cause of death in GS is cardiovascular diseases 58.9% of total deaths, the second cause of death is cancer with 9.8% of total deaths (MOH, 2017)

According to the data of Palestinian Health Information Center (PHIC), the reported crude birth rate in 2018 was 28.9 per 1000 of population; 28.2 per 1000 of population in West Bank and 29.8 per 1000 of population in Gaza Strip. The reported crude death rate in the same year was 2.6 per 1000 of population; 2.8 per 1000 of population in West Bank and 2.3 per 1000 of population in Gaza Strip (MOH, 2018).

1.6.5 Health care system

Healthcare system is composed of five sectors that provide health care services in Palestine: Ministry of Health (MOH), United Nations Relief and Works Agency for Palestine Refugees in the Near East (UNRWA), Medical Military Services, Non-Governmental Organizations (NGOS) and Private Sector. The main provider for health care in Palestine is MOH, it provides services: primary, secondary and tertiary. It also purchases some services from private sector, may be locally or abroad. The main roles of MOH are providing and controlling immunizations scheme, Public health activities, licensing and registration of health facilities (MOH, 2017).

There are 147 primary health center in the GS: 22 are UNRWA centers and 50 are Governmental centers. The number of hospitals in the GS is 30 hospitals, 13 of them operated by MOH. Total no of beds is 2960, 74.7% of beds are operated by MOH. Bed occupancy rate for MOH beds is 90.2% with an average of residency reach 2.8 days (MOH, 2017).

UNRWA provides primary health services to the refugee population and have 22 PHC centers in GS. The NGOS sector is extensive: from missionary hospitals (As, Al-Ahli Arab hospital and Al- Awda Hospital) to facilities supported by international organizations to community health centers, NGOs sector has 57 centers (WHO, 2009).

Healthcare system in Palestine has faced many difficulties since the PNA assumed the authority for healthcare in 1994, because of continuous occupation, blockade, geographical division, political rift, shortage in basic supplies, lack of financial resources and economic opportunities, all of previous causes affect badly on the sustainability of Palestinian health care system (WHO, 2016).

1.6.6 Governmental hospitals

The number of hospitals in the Ministry of Health is 27 hospitals, with a capacity of 3,462 beds, or 53.8% of the total number of beds in Palestine. The beds of the Rehabilitation a managed by non-governmental organizations. There are 14 MoH hospitals in West Bank, with a capacity of 1,664 beds, equivalent to 48.2% of the total hospital beds of MOH, while there are 13 MoH hospitals in GS 1,794 beds or 51.8% of the total MoH hospital beds in Palestine (MOH, 2018).

There are some details about hospitals for five governorates of Gaza Strip according to MOH (2018):

- In North Gaza, there is two hospitals (El-Andonisi and Bet Hanon)
- In Gaza, there is six hospitals (Al Shifa, Al Rantisi, Al Nasr, Al Ouon, Al Dora and Al Harazeen)
- In Mid Zone, there is one hospital (Al-Aqsa)
- In Khan Younis, there is two hospitals (Nasser and European Gaza Hospital)
- In Rafah, there is two hospitals (Al-Najar and Al-Hilal Al-Imarati)

GS governmental hospitals have approximately 1794 beds as total number; 439 in Al Shifa, 269 in Nasser, 248 in European Gaza Hospital, 160 in Al-Aqsa and the residual number is distributed between the other hospitals. Only eight of these hospitals have internal medicine departments;108 beds in Al Shifa Internal medicine department, 93 in European Gaza Hospital Internal Medicine Department, 62 beds in Nasser Internal Medicine Department and the residual beds distributed between the others (MOH,2018) (Annex 2).

Total number of physicians in internal medicine departments of governmental hospitals is 266; 95 in Al Shifa, 43 in Nasser and the rest physicians distributed between other hospitals. The total number of pharmacists in the 13 hospitals is 167; 35 in Al Shifa, 27 in Nasser and the other pharmacists are distributed between the other hospitals (MOH, 2018) (Annex 2).

The total number of in-patients of internal medicine departments is 37226; 10063 at Al Shifa, 6992 at Nasser, 6835 at European Gaza Hospital and the other in-patients are distributed between the other hospitals (MOH,2018) (Annex 3).

1.6.7 Pharmacy status

Significant economic disruptions related to the enormously complex political situation have caused the economic status to deteriorate. Deteriorating economic situation has already influenced health status and especially pharmaceutical services. The pharmaceutical sector is regulated and administered by the General Administration of Pharmacy. There are 480 drugs on the updated essential drugs list and 902 items on the essential medical disposable list considered by the Palestinian Ministry of Health as necessary for the provision of essential health care. Although drug quality is satisfactory, Drug supply and availability is usually in shortage. These shortages of the essential drug and disposable items has been a chronic problem and zero stock levels have been depleted steadily in Gaza since 2007 (General Directorate of Pharmacy, 2019).

According to MOH (2017), the average of population for every pharmacy is 2835. Average spending of MOH on drugs and medical devices is 29.1%. Total need of medicine and medical devices 41 million $, but actually the total price for what reach for central stores in GS is 22 million $, the percentage of zero items of drugs is 38% and medical devices is 31%, that means lack of drugs and medical device in MOH. According to Gaza Central Drug Store, the shortages for essential drugs and disposables for non-communicable diseases (NCDS) was 60% and maternal and child health was 69% (WHO, 2019). By comparing with neighboring countries at the same level of economic condition, consumption of drugs in WB and GS is very high (Obeidallah et al., 2000). Absence of appropriate drugs policy and inadequate source for drugs information, led to high demand and over prescription (Obeidallah et al., 2000).

1.7 Operational definition of terms

Drug

Any material acknowledged registered in the pharmacopeia, also any material which is used to diagnose, cure, treat or to help any human or animal disease, or any non-food

material intended to effect the human body or an animal with respect to environment or vital functions of any of them (Public Health Law, 2004).

Essential Drug List (EDL)

Is the list of drugs that satisfy the priority healthcare needs of the population (WHO, 2013).

Prescription

A prescription, often has abbreviation as Rx, is a health care program implemented by physician or other qualified health care practitioner in the form of instructions that govern the plan of care for an individual patient (Belknap, et al., 2008).

Polypharmacy

It is defined as using of multiple drugs by patient, but there is differences in the definition, but generally ranges from 5 to 10 (Nomura, Mendelsohn, Kusama, Igarashi, & Akazawa, 2011).

Drug-Drug interactions

Modification in drug response when the drug is taken with another one, may be administered simultaneously or in quick succession (Nidhi, 2012).

Clinically relevant drug–drug interaction

A clinically relevant DDI is defined as two or more medications interacting with each other in such a manner that the effectiveness or toxicity of one or more drugs is highly likely to be changed when taking into account individual patient factors (age, gender, diagnosis, comorbidities) and medication order factors (dose and route of potentially interacting medications) (Baysari et al., 2019).

Adverse drug reactions

An Adverse Drug Reaction (ADR) result from intentional use of medicinal product and cause harmful or unpleasant reaction, which predicts hazard from future administration and warrants prevention or specific treatment, alteration of dosage regimen or withdrawal of the product (Edwards & Aronson, 2000).

Chapter Two

Literature review

2.1 Conceptual frame work and Literature review

In this chapter, the researcher starts by the conceptual framework that is developed as a result of reviewing the literature review. Conceptual framework is the map of the study that guides design and implementation and summarizes all the study variables so it describes all the study domains which is important regarding the issue of interest, thus it provides comprehensive understanding of it.

2.1.1 Conceptual framework

The conceptual framework is shown in **figure (2.1)**. It shows the main issue of DDIs and major groups of factors that related to it. The first group of factors is linked to patient, the second group is linked to health providers, the third is linked to healthcare system and the last is linked to polypharmacy.

2.1.2 Patient related factors

Different factors are related to patient may affect the magnitude of DDIs like sex, Age and the disease.

2.1.3 Health Providers related factors

Health care providers should present safe prescribing for different types of drugs, so they should practice a good prescribing practices, for example: contact time, number of patients is followed per day, knowledge of professionals, practices of prescribing, nature of communications between physician and pharmacist and role of pharmacist in this issue.

2.1.4 Health system related factors

The role of health system will be examined in regarding to the DDIS issue, first role is providing protocols and policies and the second role supervision and monitoring within the second health care facilities.

2.1.5 Polypharmacy related factors

Polypharmacy is defined as administration of more than one medication for the patient. The precise minimum number of used medications to define polypharmacy is variable.

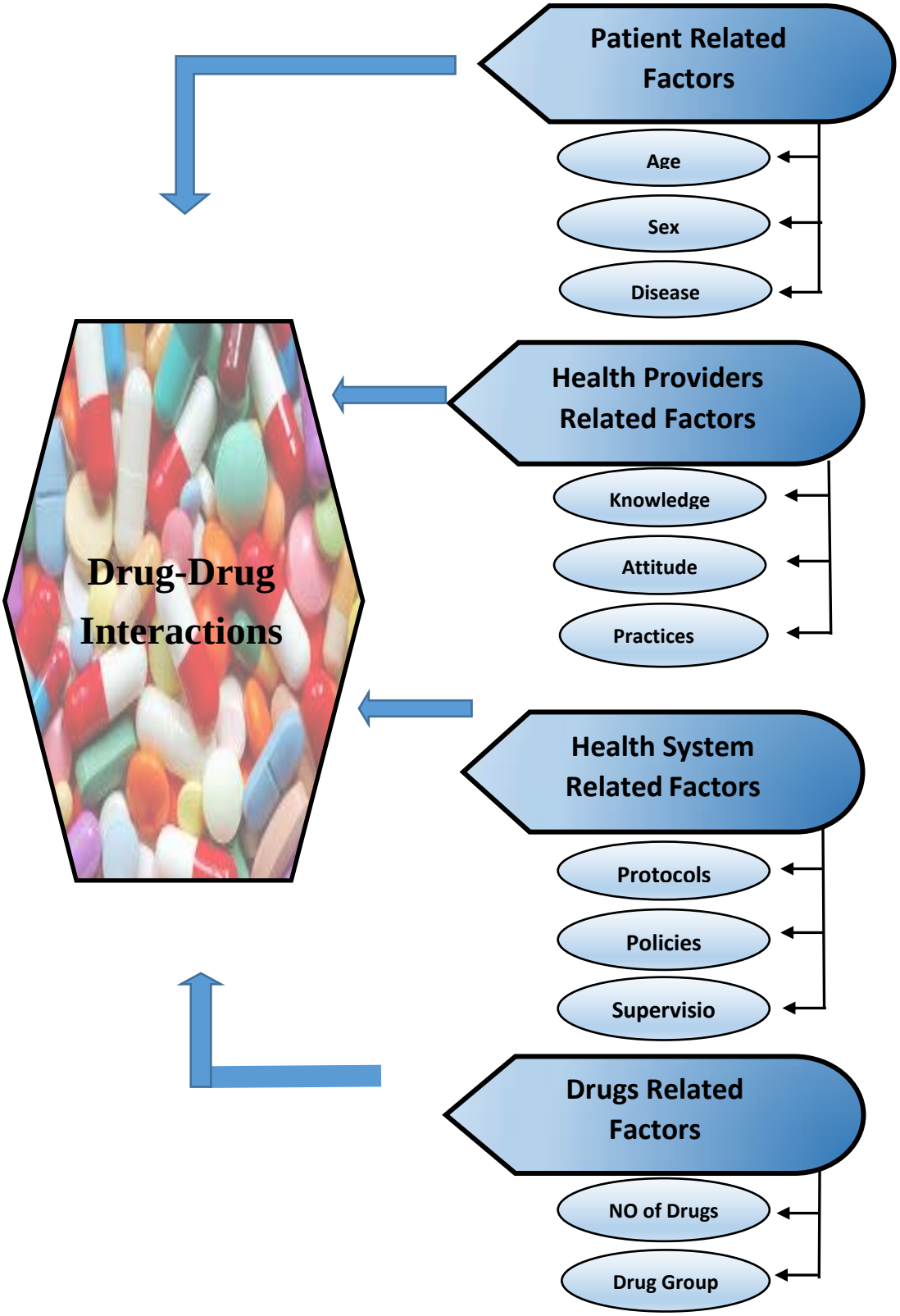


Figure (2.1): Conceptual framework

2.2 Literature Review

2.2.1 Drug-Drug interactions

2.2.1.1 Definition of DDIs

Drug-drug interactions (DDIs) are one of the most considerable problems in drug prescriptions, the consequences of these interactions range from no harmful effect to drug associated morbidity and mortality (Ahmed et al., 2020).

DDIs is defined as a change in a drug's influence on the body when the drug is used together with a second drug. A drug-drug interaction be able to delay, decrease, or enhance absorption of either drug. This be able to decrease or increase the action of either or both drugs or cause adverse effects" (AidsInfo, 2019).

A drug-drug interaction (DDI) is defined as an association between two drugs where the pharmacological effects of a drug are influenced by another drug. Positive DDIs can usually improve the therapeutic effects of patients, but negative DDIs cause the major cause of adverse drug reactions and even result in drugs withdrawal from market and the patient death (Yan et al., 2020).

The drug-drug interaction is the primary cause of irrationality prescriptions mostly due to polypharmacy. Drug interactions have caused by the two or more drugs or other substances taken by the same patient. Due to widespread of therapeutic medications and polypharmacy, drug interactions are enormous (Jagadeesan et al., 2018).

2.2.1.2 Prevalence of DDIs

A Retrospective study has conducted by enrolling the prescriptions of outpatients in the hospital who came for patient counselling to Drug information centre in India, about 31.43% of prescriptions were found to have drug-drug interactions, in that 21% were found to be minor, 70% moderate, 9% significance major interactions which may require some therapeutic interventions or monitoring (Jagadeesan et al., 2018).

In Ayub Teaching Hospital in Pakistan, the prevalence of overall potential drug-drug interactions (pDDIs) in department of cardiology was 91.6% of patients had a minimum of one pDDIs regardless of severity. 86.3% and 84.5% patients were having at least one

pDDIs of major and moderate severity, respectively (Murtaza, Khan, Azhar, Khan, & Khan, 2016).

An approximately quarter (25.8%) of prescriptions that were dispensed for medications for elderly patients contained serious DDIs in the South African private health sector (Van Heerden, Burger, Gerber, & Vlahović- Palčevski, 2018).

In meta-analysis study is revealed that DDIs of 33% of the general patients and 67% of Intensive Care Unit (ICU) patients. If exclude poor quality papers, the DDIs prevalence for general inpatients increased to 44%, while the prevalence of ICU patients decreased slightly to 63% (Zheng et al., 2018).

In Slovenia, the total number of potential DDIs cases between outpatients was 15.6% were potentially clinically relevant. Altogether, 9.3% of the total population is exposed to clinically relevant potential DDIs, and the proportion is higher among women and the elderly (Jazbar, Locatelli, Horvat, & Kos, 2018).

In a public hospital in Al-Kharj in Saudi Arabia, 36.25 % of prescriptions have at least one drug-drug interaction. The majority of the DDIs in this study were of moderate severity. The prevalence of potential DDIs is high among patients in the outpatient settings (Ahmed et al., 2020).

In Jordan, 96% of polypharmacy patients at outpatient clinics have at least one pDDI. Almost half of the detected interactions involved cardiovascular medications. The majority of these pDDIs had moderate severity, with no more than 10% of the interactions requiring therapy modification (Nusair et al., 2020).

In Gaza strip at UNRWA clinics, among elderly clients there is 93.9% of prescription with five drugs or more had DDIs. High rate of minor, significant and serious DDIs; the results were 72%, 77.8% and 69.2% respectively (Satoom, 2017).

2.2.1.3 Mechanism of DDIs

A drug-drug interaction (DDI) occurs when one drug alters the clinical effect of another. Drug interactions occur on pharmacodynamic and pharmacokinetic levels. In the first case, one drug may alter the sensitivity or responsiveness to another drug. Pharmacokinetic DDIs occur when a drug alters the absorption or disposition (distribution and elimination) of a concomitantly administered

drug. This change can lead to an altered quantity of drug at the site of action affecting the magnitude and duration of the effect. In this scenario, a drug is a perpetrator referring to the one that causes an effect on the substrate drug, for example, by inducing or inhibiting drug-metabolizing enzymes. Although DDIs are often associated with toxicity or therapeutic failure, sometimes they can produce beneficial effects to the patient (i.e., improving the bioavailability of a drug and producing additive or synergistic effects). In any case, clinicians must be familiar with DDIs in order to improve prescribing tools (Vazquez et al., 2020).

The action and interaction of drugs are dependent on their pharmacokinetics and pharmacodynamics. Physiological changes, alterations in homeostatic regulation, and diseases modify pharmacokinetic and drug response in older patients. Hence, many medications need to be used with special caution. Most drug interactions are pharmacokinetic and can be classified as alterations in absorption, distribution, and protein-binding effects, changes in drug metabolism, or alterations in elimination (Gujjarlamudi et al., 2016)

Pharmacokinetic drug-drug interaction is a situation wherein one drug affects (inhibits or induces) the absorption, distribution, metabolism, and/or excretion of another drug (Zhang et al., 2016).

Pharmacodynamic drug–drug interactions occur when the pharmacological effect of one drug is altered by that of another drug in a combination regimen. DDIs often are classified as synergistic, additive, or antagonistic in nature, albeit these terms are frequently misused. Within a complex pathophysiological system, the mechanism of interaction may occur at the same target or through alternate pathways (Niu et al., 2019).

Simultaneous oral intake of herbs, supplements, foods and drugs with other drug(s) may result in pharmacokinetic or pharmacodynamic interactions with the latter. Although these interactions are often associated with unwanted effects such as adverse events or inefficacy, they can also produce effects that are potentially beneficial to the patient. Beneficial pharmacokinetic interactions include the improvement of the bioavailability of a drug (i.e., by enhancing absorption and/or inhibiting metabolism) or prolongation of a drug's plasma level within its therapeutic window (i.e., by decreasing excretion), whereas beneficial pharmacodynamic interactions include additive or synergistic effects. Mechanisms by which pharmacokinetic interactions can cause beneficial effects include enhancement of membrane permeation (e.g., structural changes in the epithelial cell membranes or opening of tight junctions), modulation of carrier proteins (e.g., inhibition of

efflux transporters and stimulation of uptake transporters) and inhibition of metabolic enzymes (Gerber et al., 2018).

2.2.1.4 Severity of DDIs

The severity of each reported DDI was classified according to Medscape drug checker definitions, described as follows in increasing order of severity (Medscape, 2020):

- Minor interaction is unlikely to be clinically significant and it is supported by limited and/or conflicting data.
- Significant DDIs is defined as any unexpected, unintended, undesired or excessive response for drugs that require discontinuing one drug or the combination (therapeutic or diagnostic), requires to change the drug therapy, modifying the dose (except for minor dosage adjustments), admission to a hospital is necessary, diagnosis complicates significantly, prognosis is affected negatively or temporary or permanent harm, disability or death.
- A strong or serious DDIs defined as any interaction that is unexpected, undesired or excessive response to a combination of drugs that requires to discontinue the drugs (Avoid or use alternate combination).

The severity of DDIs can vary from minor and undetectable to severe enough to negatively affect health and significantly increase treatment costs (Olsen & Sletvold, 2018).

Frequency and severity of potential drug interactions in a cohort of HIV-infected patients, 70% of patients took comedication, and 44.7% had ≥ potential DDI. About comedicated patients, 4.6% had severe and 59.2% moderate PDDIs (Molas et al., 2018).

2.2.1.5 Drug classification and DDIs

About 96% of polypharmacy patients at outpatient clinics in Jordan have at least one potential DDI. Almost half of the detected interactions were involved with cardiovascular medications (Nusair et al., 2020).

Opioids were involved in 25% of all PDDIs of hospitalized infants, children, and adolescents, followed by antiinfective agents (17%), neurologic agents (15%), gastrointestinal agents (13%), and cardiovascular agents (13%). One-half of all PDDI

exposures were due to specific drug pairs occurring in ≤3% of patients per hospital day (Feinstein et al., 2015).

The frequently occurring drug interactions are seen in Antihypertensive drugs, Diuretics, Proton pump Inhibitors and Antibiotics (Jagadeesan et al., 2018).

2.2.1.6 Impact of DDIs

Monitoring patients' active medication lists and deprescribing any unnecessary medications to reduce pill burden, the risks of adverse drug events, and financial hardship. Physicians should view deprescribing as a therapeutic intervention similar to initiating clinically appropriate therapy. When deprescribing, physicians should consider patient/caregiver perspectives on goals of therapy, including views on medications and chronic conditions and preferences and priorities regarding prescribing to slow disease progression, prevent health decline, and address symptoms (Halli-Tierney, 2019).

The prevalence of DDIs substantially high among adults treated with antipsychotics. The factors such as polypharmacy influenced the occurrence of DDIs. A significant relationship between the exposure to the DDI and higher total health care expenditures were found (Almalki, 2017).

Cardiovascular disease patients are highly exposed to adverse DDIs; about one in ten patients hospitalized with cardiovascular disease might have a DDI contributing to the hospitalization. The high prevalence of DDI harm might be a significant burden worldwide (Kovacevic et al., 2019).

Comorbidities can mask the symptoms of pulmonary arterial hypertension, which can lead to a delayed diagnosis and deleterious consequences for disease progression and survival. Similarly, the presence of comorbidities increases the difficulty of evaluating disease progression and treatment effects by confounding prognostic assessments. The management of comorbidities in addition to pulmonary arterial hypertension should consider drug interactions, polypharmacy, adherence and evidence-based strategies.

DDIs may cause a lack of clinical effect or adverse drug reactions. Irrespectively, they might increase morbidity and mortality (Andersson, Böttiger, Kockum, & Eiermann, 2018).

The burden of DDIs is highest with combinations of drug that increase risk of bleeding, enhance CNS depression or anticholinergic effects or cause cardiovascular complications (Jazbar et al., 2018).

A significant proportion of admissions (10%) of kidney transplant patients were related to possible ADRs. Almost of these patients had at least one drug interaction that could have potentially contributed to the probable ADR. Clinically significant (i.e. severe) drug interactions were more frequent between patients with ADRs (29% vs. 15%, $p<0.01$). Also, patients with ADRs were more likely to have started a drug 30 days before admission (38.5% vs. 10.4%, $p < 0.01$) (Bril et al., 2016).

Polypharmacy increase risk of mortality and adverse drug events in patients with a 4-fold (Jongbloed, Duijnhouwer, & Dijk, 2019). DDI is associated with number of prescribed medications, increased duration of stay in the hospital and cost, which recommend that DDI are a significant clinical and economic problem. Probable damage to patients could be avoided (Moura, Acurcio, Belo, 2009).

2.2.2 Drug utilization

2.2.2.1 Rational drug use

With excessive and inappropriate use of medicines, an unforeseen medicine safety problem can rapidly escalate to become a large-scale, major public health hazard. Problems stemming from frequent adverse drug reactions, medication errors, poor self-medication practices, medicines misuse and abuse, use of substandard and counterfeit medicines, combined use of traditional and herbal medicines, and recurring shortages of many life-saving and essential medicines is aggravating drug safety (Atif et al., 2020).

The use of medicines in a disease condition is necessary, but unnecessary load of drugs to patient will increase the safety problems. To improve drug safety in this high-risk population, appropriate prescribing might be more important than simply reducing the number of prescribed drugs (Salwe et al., 2016).

Inappropriate prescribing is the use of medications that have more risk than benefit when safer alternatives exist, that is highly prevalent in older patients which is approximately 50% of older adults who take one or more medications that are not medically necessary

(Maher, Hanlon, & Hajjar, 2014). Prescription and use of inappropriate medications have been identified as a major cause of morbidity among the elderly (Fadare et al., 2019).

Challenges to ensure the rational use of drugs; polypharmacy and complex drug regimen which may lead to adverse drug reaction, drug interactions and medication non adherence, professionals may have limited opportunities and capabilities to search and evaluate drug information and clinicians have difficulties in searching the best evidence and translating study findings in meaningful information applied to patient (Amundstuen Reppe, Spigset, & Schjott, 2016).

Many factors contribute of polypharmacy among patients over 65. Professionals prescribed extra drugs for elderly patients compared to the past, because more and more drugs offered for treatment. The detection of huge number of medicines for a wide variety of conditions has assisted many patients. Inappropriately, this new development led to overuse and inappropriate use of prescription medications (Wooten & Galavis, 2005).

Inappropriate prescribing (IP) in elderly inpatients is prevalent and is associated with an increased risk for adverse drug events (ADEs), morbidity, and utilization of health care resources. The elderly is more likely to have ADEs because of the physiological and pathological changes which occur with aging and affect both the pharmacokinetic (PK) and the pharmacodynamic (PD) status of drugs. Besides, they usually have multiple diseases which need several drugs. This further increases the risk of ADEs, drug-drug interactions (DDIs) and drug-disease interactions. In Gaza, beers' criteria drugs were frequently prescribed by the doctors at Al Shifa hospital. The majority of inappropriate prescribing was DDIs. Age, polypharmacy, morbidity and departments influenced the occurrence of inappropriate prescribing (Massoud, 2015).

2.2.2.2 Polypharmacy

2.2.2.2.1 Definition of polypharmacy

There is heterogeneity in the definition of polypharmacy; ranging from numerical counts, numerical counts for a given duration of therapy or setting or descriptive, which included terms such as minor, moderate, major and excessive polypharmacy. The most reported category of definitions for polypharmacy was numerical. The most frequently used term

was polypharmacy which was defined as five or more medications by 46.4% of studies. There was a wide-ranging of numerical only definitions of polypharmacy, ranging from two or more medications to 11 or more medications. The basis for polypharmacy definition is simply more drugs being prescribed or taken than are clinically appropriate in the context of a patient's comorbidities. It is commonly informed that as the number of prescribed drugs increases, so do the chances of DDIs and likelihood of harm. However, the number of drugs taken is not itself indication for appropriateness of therapy as all of the drugs may be clinically necessary and appropriate for the patient. There is a clear need for the term 'appropriate polypharmacy' in order to differentiate between the prescribing of 'many' and 'too many' drugs instead of a simple numerical count of medications, which is of limited value in practice, while the addition of duration of therapy to account of medicines for the definition of polypharmacy provides more specific definition. The use of duration in the definitions to identify those patients with longer term or chronic use of drugs, potentially identifying those patients who might be at greatest risk of medication-related problems. The number of medications can be a starting point, medications should be assessed in relation of their indication, efficacy and potential for harm with each other (not in isolation) given pharmacokinetic and pharmacodynamics interactions, in order to facilitate de-prescribing of inappropriate medications. Medications should be assessed for risks and benefits and also combination of medications should be based on benefits outweighing the risks (Masnoon, Shakib, Kalisch-Ellett, & Caughey, 2017).

Polypharmacy definitions vary from measuring total number of medications to the use of high-risk or unnecessary medications. For research purposes, the most shared definition identifies polypharmacy as use of five or more medicines. While this approach may be considered random, there is evidence to support the use of this threshold when assessing if polypharmacy is appropriate or potentially inappropriate. (Gnjidic, Tinetti, & Allore, 2017).

Although the definition of polypharmacy is not yet clear today, it is generally regarded as drug use more than the patient needs. Advanced age is the most important risk factor for polypharmacy. In addition, other risk factors are loss of current cognitive functions, low socioeconomic level and nursing care. Incorrect drug use, drug side effects and drug-drug interaction lead to unwanted hospitalizations (Yildirim & Kilinc, 2017). Polypharmacy, defined as regular use of at least five medications, is common in older adults and younger

at-risk populations and increases the risk of adverse medical outcomes (Halli-Tierney et al., 2019).

2.2.2.2.2 Prevelance of polypharmacy

A study made in 2015, that 35.8% of adults in the United States were taking five or more medicines. Statistics are similar elsewhere – in 2014, Scotland's electronic primary healthcare records showed that 16.9% of adults used four to nine medications. That number rose to 28.6% for adults aged 60–69 years and to 51.8% of the population aged over 80 years (Barrett, Lucas, & Alexander, 2016).

Polypharmacy is an international phenomenon and the prevalence of polypharmacy continues to rise and rise. Polypharmacy (five drugs and more) is 37.7% of older Australian adults living in the community. Among older Americans aged 65 years and older, from 1999–2000 to 2011–2012, polypharmacy enlarged from 24% to 39%. Because of increasing trends in medication use over the last decade, researchers now quantify hyper polypharmacy exposure, which refers to the use of ≥10 medications. Among older Australian adults living in the community, hyper polypharmacy prevalence is 4.8% compared to 23.8% among patients admitted to acute general medical hospital services (Gnjidic, Tinetti, & Allore, 2017).

The prevalence of clinically relevant drug interactions between elderly patients admitted in department of medicine of a tertiary care hospital in Puducherry is about 6% in patients taking two to four medications, 50% in those taking five and 100% in those taking 10 medications. Potential drug-drug interaction in more than 50% of patients as mean drugs prescribed to both admitted and discharged patients were more than five (Salwe et al., 2016).

Polypharmacy and potentially inappropriate medication use were found to be very prevalent in the Korean geriatric cancer population. Nearly half and one third of older adults with cancer were exposed to potentially inappropriate and major DDIs, respectively. These drug measures were not associated with chemotherapy-related toxicity, although polypharmacy significantly increased the risk of hospitalization during chemotherapy and was associated with poorer overall survival in older patients with cancer (Hong et al., 2020).

The mean number of drugs prescribed daily between hospitalized patient undergoing systemic chemotherapy was an independent risk factor for major DDIs, and the risk increased by 12 % for each additional drug. Probably in contrast, the lower rates of additional risk of major DDI should occur in patients using a fewer number of drugs (Stoll & Kopittke, 2015).

Polypharmacy is associated with an increased risk of re-hospitalization among older patients discharged from acute care hospitals (Sganga et al., 2015). Approximately half of the prescriptions in comprehensive specialized hospital in Northern Ethiopia contained DDIs; from the prescriptions with DDIs majority of them had moderate DDIs. Polypharmacy also could have an influence on the rate of DDIs (Gebretsadik et al., 2017).

Despite the reported advances in health care systems, patients with polypharmacy are still at elevated risk for DDIs with significant clinical impact. At outpatient clinics in Jordan, 96% of polypharmacy patients have at least one potential DDI. Almost half of the detected interactions were involved with cardiovascular medications. The majority of these potential interactions had moderate severity, with no more than 10% of the interactions requiring therapy modification (Nusair et al., 2020).

Polypharmacy is most frequently observed among elderly people in GS UNRWA clinics, the prevalence of polypharmacy was 27.6% with age group 60 - 69 and 25.9% with the age group of 70 - 79 years, whereas this percent drops to 18.2% among elderly patients aged 80 years or more. The prevalence of polypharmacy among very old individuals (>80 years of age) was somewhat lower than among the elderly in general. A higher prevalence of drug use among women was found in this study. The prevalence of polypharmacy between females (27.9%) was higher than males (24.2%), although it was not statistically significant. Among the elderly, however, there were no differences between the sexes in the prevalence of polypharmacy (Taleb, Abed, Dahudi, Najim, & Ahmed, 2014).

2.2.3 Healthcare provider and DDIs

2.2.3.1 Role of physician

The health care professionals are responsible to confirm safe dispensing and use of drug combinations that may interact and cause adverse events. In the last 40 years' huge

amounts of information about drug interactions has been published. Nonetheless, while potential drug interactions are probably common, only rare of them manifest thoughtful adverse events and often only in predisposed clients. Thus, health care professionals' sense inundated with hints for potential drug interactions of questionable clinical significance provided by their drug interactions information sources. Computerized alerts systems allow important assistance but their performance is not satisfying (Tamblyn et al., 2003).

In Iran, physicians may have poor skill to prevent clinically relevant pDDI rate, and they perceive the necessity for performance feedback. The majority of the respondents (n = 268, 95.4%) wanted to receive performance feedback on co-prescription of in their prescriptions (Nabovati et al., 2017).

Prescribers may have insufficient knowledge to avoid potential life-threatening DDIs. In Malaysia general hospital, knowledge level is associated with healthcare specialty ($p < 0.001$), with 100% houseman officer having low knowledge, years of experience ($p < 0.05$) (50% of the HCPs with11–15 years of experience had high knowledge) and postgraduate study ($p < 0.05$), which 78.2% of HCPs without postgraduate studies had a low knowledge level (Abdo et al., 2020).

When prescribing medications, physicians should recognize clinically relevant potential drug–drug interactions (DDIs). Prescribers in Iran may have poor ability to prevent clinically relevant potential DDI occurrence, and they perceive the need for performance feedback (Nabovati et al., 2017).

2.2.3.2 Role of pharmacist

The health care system without pharmacists is unable to work effectively with most medicine-related issues, so skillful and authoritative pharmacists existence is necessary to improve appropriate use of medicines, eliminate medication errors, make appropriate use of the medicine budget by efficient management (to ensure maximum access) and ensure the implementation of National Essential Medicine List (Azhar et al., 2009).

The specific role of a pharmacist in the health setting is altering and varies significantly from country to country. In contrast developed world, pharmacists in developing countries are not fully executing their potential role. They are still stressed for the recognition of their role (Kafeel et al, 2014).

Health care professionals' skill to recognize potential drug-drug interactions is important in decreasing the risk of potential DDIs and their adverse consequences (Ko, et al., 2008).

The role of pharmacists at Polokwane hospital is confined to just stock management and dispensing. There are promising avenues for future development of their role during patient care, which can be achieved by addressing the barriers. The expansion of the role of pharmacists within the medical team will require improved partnership between health care professionals, resources, legislations and guidance from formal standard treatment guidelines. Having a national framework for pharmacy practice from Ministry of Health, supported by educational opportunities and a pro-active professional association would be key to incorporating pharmacists within the medical team (Moloto, 2019).

About community pharmacists around Lebanon, there is a large gap in the knowledge about drug interactions with other drugs, food, and herbs. When searching for interactions, pharmacists were found to refer mostly to the internet, drug applications, or colleagues. Their attitudes were positive and coherent with understanding their role in clarifying interactions when prescribing drugs; nevertheless, their practices were suboptimal (Makkaoui et al., 2020).

Physicians and nurses in Riyadh in Saudi Arabia have positive perceptions of the role of clinical pharmacists, but they are aware that the role of clinical pharmacist needs to be defined and recognized for effective integration into health-care teams. Most participants appreciated the proactive involvement and recommendations suggested by clinical pharmacists and indicated that their engagement has enhanced the safety and quality of patient care (Alsuhebany et al., 2019).

Inadequate knowledge of several forms of drug interactions may lead to inappropriate patient counseling and result in adverse medical consequences. Most of the community pharmacists surveyed in Sudan study confirmed a lack of knowledge about DDIs (Tokka & Ahmed, 2017).

2.2.3.3 Physician and pharmacist coordination

In the Sudanese study, there is poor collaboration between physicians and pharmacists (Tokka & Ahmed, 2017). South Africa study ensured that pharmacists play important roles in the identification, prevention, detection and management of DDIs, drug-food interactions and ADRs (Bushra, Baloch, Jabeen, Bano, & Aslam, 2015). Other study which is promoted by Zeenny et al, (2017) in Lebanon which clarified that uncoordinated care which is provided by multiple professionals is a factor of high incidence of DDIs.

There is limited communication and collaboration between primary care providers and pharmacists in Canada when managing medications. Pharmacists were missing key information around reason for use, and physicians required accurate information around adherence. Electronic health records are a potential tool to help clinicians communicate information to resolve this issue. Electronic health records need to be designed to facilitate interprofessional medication management so that pharmacists and physicians can move beyond task-based work toward a collaborative approach (Mercer et al., 2018).

Medication discrepancies and errors arising from lack of care coordination for healthcare consumers seeing multiple healthcare providers is a very real problem. A patient-centred approach is key to improvement, along with strategies including integrated care pathways facilitated by technology and shared accountability. All healthcare providers need to commit to the consumer being central to the goal of medications accuracy (Wheeler et al., 2018).

Collaborative practice between physicians and pharmacists in Kuwait has a positive effect on healthcare outcomes. More than half of the physicians (52.1%) and pharmacists (55.7%) had never practiced collaboratively. Both groups preferred to communicate face-to-face (76.7%) or via telephone (76.5%). Both professions showed good agreement on pharmacists' roles related to managing side effects, improving adherence, assisting in dosage adjustment, providing advice regarding drug interactions, and providing drug information to physicians. They indicated disagreements on the importance of dispensing of prescriptions and providing advice to physicians regarding modification of drug therapy. Both groups expressed overall positive perceptions of the potential for further collaboration in areas related to the clinical roles of pharmacists. The top four perceived

barriers to collaborative practice were lack of time (84.1%), lack of financial compensation (76.3%), lack of face-to-face communication (68.9%), and the possible fragmentation of patient care by the involvement of multiple healthcare professionals (68.9%) (Albassam et al., 2020).

2.2.3.4 Development of healthcare provider

Insufficient knowledge of different forms of DDIs may lead to inappropriate patient treatment and result in adverse medical consequences. Therefore, additional training and incorporation of knowledge and expertise about DDIs among community pharmacists is essential to provide suitable patient counseling and optimal therapeutic outcomes. Proper and rational undergraduate training courses and integration of knowledge among healthcare professional is useful to rationalize the use of drugs in Sudan. It, as well, may elevate the dispenser's awareness about the different problems and the associated patient's risks (Tokka & Ahmed, 2017).

Community pharmacists in Lebanon are aware of their role and responsibility about drug interactions though only a few do so in their everyday work so, proposed interventions include additional training and workshops to refresh the memories of the pharmacists on different interactions, and applying software programs in pharmacies to discover these interactions on the spot. (Makkaoui et al., 2020).

The application of educational pharmacotherapy programs reduced the number of Major DDI in the Cardiology department of Emergency Hospitals in Aktobe city (Kazakhstan), the reduction in the indicators of drug interactions of the Major DDIs by 18.2% (Mussina, Smagulova, Veklenko, and et al., 2019). Continuing education and observation by prescribers towards drug selection may decrease the problem of potential adverse DDIs (Mistry et al., 2017).

A major number of outpatients have been exposed to the adverse effects linked with these DDIs. To improve prescribed drugs safety, it is necessary that the prescription of medication combinations which their concomitant use may lead to clinically relevant DDIs is prohibited. Therefore, it is recommended to carry out training for physicians and

pharmacists and effective interventions such as computerized alerting systems be designed and applied (Nabovati et al., 2017).

Documentation of DDIs is an important for health professionals when prescribing or administering drug combinations. Despite the considerable number of DDIs detected in this study, half (50.5 %) was based only on theoretical knowledge of drug pharmacology or on a few clinical trials. The computer program used to identify interactions has a specificity of 80–90 %, which may have overestimated the frequency of DDIs (Stoll & Kopittke, 2015).

Poor documentation for ADR as a history for patient can lead to re-exposure of the offending drug causing experience for the same ADR again for the same patient. Previous occurrence for ADR is considered a risk factor to develop ADR. So accurate documentation of the ADR at the time of reaction can give relevant information to the patient about ADR and prevent re-occurrence (Tangiisuran, Wright, Van der Cammen, & Rajkumar, 2009).

Appropriate documentation of drug warnings in the electronic health record delivers timely and accurate communication to other members of the health care team. Alert acknowledgment and documentation are also vital to timely and appropriate clients care (Horn et al., 2013).

Although evidence based computerized drug interaction checker programs that deliver rapid access is insufficient alone, they can aid health care professionals in preventing pDDIs. The use of this program in the community pharmacies could reduce pDDIs during the dispensing of medicine (Simsek, Taner, Macit, Berk, & Mercanoglu, 2019). The use of electronic interaction software towards drug selection may decrease the problem of potential adverse DDIs (Mistry et al., 2017).

It is unrealistic to expect clinicians to memorize the thousands of DDIs and their clinical significance, especially considering the high rate of introduction of novel drugs and the escalating appreciation of the importance of pharmacogenomics. Reliable regularly updated decision support systems and information technology are essential to help alert dangerous drug combinations (Kafeel et al, 2014).

DDIs are the cause of many adverse effects in the patients, and, hence, they have an important impact in health care. Improvements in systems related to clinical decision-making are necessary to decrease the negative impact caused by DDIs in the clinical practice. On the other hand, improvements in the methods used to detect novel DDIs are also needed to discover interactions that are causing harm to the population earlier (Vilar, Friedman and Hripcsak, 2018).

Adverse drug events have a negative impact on the provision of health care in the United States. A common method to solve this problem has been the adding of medication-related clinical-decision-support software to pharmacy information systems. For decades, pharmacy information systems have utilized large databases of medicine alerts, often supporting multiple alert types. One kind of alert signals a DDIs When revising patients' medication profiles, pharmacists are often presented with interactions to review and integrate into drug treatment management decisions. However, a large number of clinically insignificant alarms are often displayed during the review process. The application of medication-related clinical-decision-support software in practice often permits multiple members of the health care team to see these alerts. For example, an alert might be reviewed by a prescriber at the time of order entry, a pharmacist at the time of dispensing, and a nurse at the time of medication administration (Horn et al., 2013).

Well-designed computerized warning systems and delivering performance feedback to develop patient safety is very important, most of healthcare providers in Iran selected information technology-based tools (i.e. short text message and email) as their preferred method of receiving feedback (Nabovati et al., 2017).

2.2.4 Patient and DDIs

Polytherapy is often mandatory in the management of most of the common ailments affecting geriatric patients. Drug prescription in elderly is a serious challenge as there is an increased possibility of drug interaction resulting in toxicity, treatment failure, or loss of drug effect. Duplicative prescribing within the same drug class often occurs, and unrecognized drug side effects are treated with more drugs. The drug prescriptions for Italian patients reached the highest values in the 65–69 and 70–74 age groups ($p = 0.005$ and $p = 0.008$ vs age 14–64 respectively). An overall amount of 6,094,373 DDIs were

detected, of which 47,173 were contraindicated. Median number of DDIs was higher in 65–69 and 70–74 age groups ($p = 0.008$ and $p = 0.012$ vs age 14–64, respectively). Regarding contraindicated DDIs a significant difference was detected comparing 14–64 vs ≥65 age groups ($p = 0.010$ vs 65–69 group, $p = 0.005$ vs 70–74 group and ≥75 group) (Gujjarlamudi, 2016).

This study demonstrated a high prevalence of potential DIs among hospitalized cardiac patients in medical wards in Jimma University Medical Center in Southwest Ethiopia due to the complexity of pharmacotherapy. The prevalence rate is directly related to age, number of prescribed drugs, and length of hospital stay. Older age (adjusted odds ratio (95% confidence interval): 1.067 (2.33–27.12), $p = 0.049$), long hospital stay (⩾7 days) (adjusted odds ratio (95% confidence interval): 2.80 (1.71–4.61), $p = 0.024$), and polypharmacy (adjusted odds ratio (95% confidence interval): 1.64 (0.66–4.11), $p = 0.041$) were independent predictors for the occurrence of potential drug–drug interactions (Diksis et al., 2019).

Older patients are often more sensitive than their younger counterparts to the effects of medications because of alteration in pharmacodynamics responses. for examples excessive sedation and confusion with morphine, increased anticoagulant effect with warfarin, greater sensitivity to central nervous system effects of anticholinergic drugs and increased confusion with neuroleptics even if it is used at standard doses. Such pharmacodynamics responses are generally predictable and can be minimized if we starting at the lowest possible dose and titrating to response (Lavan & Gallagher, 2016). In other study revealed that higher number of medications and older age are associated with higher odds for clinically relevant potential DDIs (Jazbar et al., 2018).

The majority of patients admitted in department of medicine are between age 65-75 years. In admitted elderly patients mean number of drugs prescribed was increased as age of patients increased but this was not right for discharged patients in which older elderly patients have less number of drugs in their prescriptions (Salwe et al., 2016).

For cardiac patients the pDDIs is 55% with moderate severity but 45% with major severity. Also in this study revealed no significant association between pDDIs and specific gender (Murtaza et al., 2016).

Patients aged 60 years had a 48 % higher risk of being exposed to at least one drug combination with a potential for major DDI, regardless of the number of drugs prescribed and presence of comorbidities. Elderly patients most frequently used mood stabilizers, drugs for heart failure, antihypertensive, and antiarrhythmic drugs which are commonly involved in major DDIs. Also, the metabolism and excretion decrease in elderly patients for certain substances, so that increase the risk of drug-related problems (Stoll & Kopittke, 2015).

Receipt of ≥10 drugs was very strongly associated with increasing age, but was also independently more common in women, in persons living in more deprived areas, and in care home residents (Guthrie, Makubate, Hernandez-Santiago, & Dreischulte, 2015).

Gender and age were not found to be predictors of possibly serious DDIs. But there was a trend of an increase in the prevalence of potentially serious DDIs by age. Secondly, the most frequent interacting combinations were CNS medicines (30.6%), antihypertensive medicines and NSAIDs (23.5%), diuretics and NSAIDs (8.2%), ACE inhibitors and potassium supplements (4.9%) and NSAIDs/aspirin and corticosteroids (4.8%) (Gerber, & Vlahović- Palčevski, 2018).

Women have a 1.5 to 1.7 fold increased risk of developing an ADR compared with men (Rademaker, 2001). This can be attributed to gender differences in immunological and hormonal physiology which influence pharmacodynamics and pharmacokinetic response, particularly in relation to cardiac and psychotropic medications (Soldin, Chung, & Mattison, 2011).

Genetic factors may be to play a role in serious ADRs that have been usually classified as idiosyncratic, as drug-induced liver injury, statin-induced myotoxicity and drug-induced long QT syndrome (Wilke et al., 2007). Genotyping at an individual level has the potential to optimize drug therapy and reducing ADRs (Meyer, 2000). Genotyping technology can be used to predict ADR risk in patients who need phenytoin, a widely used antiepileptic drug with a narrow therapeutic index and large variability in patient response. Such variability is partly due to variant in expression of the gene encoding the cytochrome P450 2C9 enzyme that metabolizes phenytoin. Recently published guidelines about the interpretation of genotyping are useful for drug dosing and could reduce the occurrence of

severe ADRs, for example Stevens Johnson syndrome (Caudle et al., 2014) . Genetic predisposition has a pronounced role in determining the magnitude of drug–drug interactions (DDIs) and drug–drug–gene interactions (DDGIs) and Generalization in drug interaction management can lead to inappropriate administration (Bahar, Setiawan, Hak, & Wilffert, 2017).

Chapter Three

Methodology

This chapter presents in detail the methods that used in this study by the researcher. It describes the design of the used approach (methodology), study setting, period of the study, target population, sample selection, sample size, data collection tools, eligibility criteria, scientific rigor. It also presents the data collection process, response rate and entry and analysis method for data. In addition to that, give information about study instrument, its reliability and validity, ethical and administrative considerations and limitation of the study.

3.1 Study design

The design which was used by the researcher is triangulated, analytical descriptive, cross sectional approach (Quantitative and qualitative). The quantitative data assessed the extent of the drug-drug interaction issue; first it examined the awareness of health providers to DDIs issue in prescribing practices, as well as it measured specific indicators that reflected the prescribing practices. Cross sectional design is practical, relatively simple, cheap, easy, reflect the existing facts at the same point in of data collection and enables the researcher to meet study objectives in a short time. It also give some possible indications about causation relationships (Burns & Groves, 1997). In this study, methodological triangulation provided combination between quantitative (Self-administered questionnaire with physicians and pharmacists), (abstract data from discharge sheet for patients in Internal Medicine Departments) and qualitative paradigms (in depth interviews with key informants) to validate findings from one method with another, or to enhance understanding of the facts on the ground (Donovan & Sanders, 2005).

3.2 Study settings

This was applied at two governmental hospitals in GS. Al Shifa Medical complex and Nasser medical complex (Nasser). Which were choosen by random sample from the total number of governmental hospitals (8 hospitals), these hospitals had internal medicine departments.

3.3 Study Period

The study consumed about one year and a half; it would start in March, 2019 and completed by August 2020.

3.4 Study population

For quantitative design, the first population had discharged from internal medicine departments of governmental hospitals. The total number of governmental hospitals is 13, the study population is only for eight hospitals which has internal medicine departments, so we excluded hospitals which have not internal medicine department. Total number of the study population for the eight hospitals is 37,226 by the year of 2018.

The second population was physicians who are working in internal medicine departments for the eight hospitals, the total number for physicians' population was 286. And the other study population is pharmacists who are working in the eight hospital, they were 141.

For qualitative design; population was ten key informant interviews, ten key managers who represent the views of health care providers.

3.5 Target population

The first population included prescriptions for discharged patients randomly selected from internal departments of the study settings, in both Al Shifa Medical Complex and Nasser Medical Complex, its number was 17055 by the year of 2018. The second population included all physicians who work in the internal departments in the two targeted settings, their number was 138. The third population included all pharmacists working at the two mentioned hospitals who practice dispensing and reviewing drugs, their number was 62. The forth population was ten key informant of managers and policymakers who are related to the issue.

3.6 Sampling

3.6.1 Sample calculation

According to the electronic files of patients in internal medicine departments of the two study settings, the estimated population was 17055 patients during one year of 2018 (MOH, 2018). According to the context of the study, Hospital is a facility, If the number of facilities less than 20, so the minimum sample size to be collected is 600 divided by the

number of targeted facilities (WHO, 1993). A target sample size was approximately 600 prescriptions; 300 prescriptions from Al Shifa hospital and 300 from Nasser hospital.

As shown in Table (3.1), preliminary information from MOH web site for the hospitals indicated that the two settings usually have an average of 138 physicians who work in internal departments; 95 in Al Shifa hospital and 43 in Nasser hospital, all of them were targeted. An estimated pharmacists number of 62 for the study settings; 35 in Al Shifa hospital and 27 in Nasser hospital, all of them were targeted (MOH, 2018).

Table (3.1) number of calculated samples

No	Item	No of target population	Sample size
1	Admission in Al Shifa hospital (Internal department)	10063	300
2	Admission in Nasser hospital (Internal department)	6992	300
3	Physicians in Al Shifa hospital (Internal department)	95	95
4	Physicians in Nasser hospital (Internal department)	43	43
5	Pharmacists in Al Shifa hospital	35	35
6	Pharmacists in Nasser hospital	27	27

3.6.2 Sampling process

Arandom sampling technique was used to select two hospitals from the 8 hospitals (had internal medicine department) which exist in GS. The two chosen hospitals were Al Shifa hospital and Nasser hospital.

A simple random selection was done for electronic scanned files for patients who had discharged from internal medicine departments. The sample of the 600 patients was divided between the two hospitals equally. 300 of the sample were from Al Shifa hospital and 300 were from Nasser hospital. Then, a probability systematic selection for patients was done depending on electronic files schedules per each hospital during the year of 2018.

Apurposive sample of ten key informants was selected. The key informants sample included ten managers to reflect the facts regarding the issue. The idea of including this sample is to dig deeply and understand in-depth the perspectives about the DDIs issue.

The qualitative component was carried out after the quantitative one in order to explore issues that emerge from the idea of including this sample is to dig deeply and understand in-depth the perspectives about the DDIs issue.

3.7 Eligibility criteria

3.7.1 Inclusion criteria

For the quantitative study, prescriptions for patients discharged from study settings internal departments which had at least one prescribed drug and clear written prescription. Regarding the physicians, all of them who practice prescribing drugs in internal departments and all pharmacists who dispense or review prescriptions in any department of the two study settings. For the qualitative data, key informant interviews with ten policymakers or managers, they were selected purposefully from front line and they are related to DDIs issue.

3.7.2 Exclusion criteria

Subjects who are not eligible to be participant in the study include:

- Patients who died during staying at the hospital.
- Unclear or incomplete prescription.
- Patients escaped from the hospital before having the discharge permit.

3.8 Sampling technique

Quantitative data

According to availability of patients' scanned files on computer in the two hospitals, the researcher selected the sample randomly from all the available electronic files from targeted settings (300 from Al Shifa and 300 from Nasser) as following:

- Files for patients discharged from internal medicine department of each setting.
- The retrospective data should be twelve-month of 2018.

The researcher applied physician's questionnaire on all physicians who work in internal departments in the study settings and he will apply pharmacist questionnaire on all pharmacists who work in the two study settings.

Qualitative data

The second component of the data collection was ten in-depth interviews with ten key informants. Semi-structured questions were designed and questioned for five hospital managers and five pharmacists' managers by the researcher. Notes were taken through the interviews and they were recorded to allow further capturing of information. Interviews were conducted after the end of quantitative data collection.

3.9 Ethical consideration

The researcher followed the international research ethical and administrative principles. The Helsinki approval was obtained. Also administrative approval was obtained from Al-Quds University and MOH relevant authorities: General Directorate of Hospitals and General Directorate of Pharmacy directorates of hospitals. Every participant in the study received a complete explanation about the research purpose and confidentially and about the participation in the study. All considerations were observed. Respect for people and human rights, respect for the truth and confidentiality was obtained.

3.10 Study instruments

3.10.1 Quantitative instrument

This study used two instruments for quantitative data collection:

1. Abstract data sheet, the researcher collected data from patient files and register these data on abstract data sheet. Patient file had several parts mainly to be extracted:

- Hospital name.
- Demographic information: Age and sex.
- Type of disease: such as DM, HTN, DM and HTN and other diseases.
- The name of drugs which is prescribed.
- Number of prescribed drugs.
- The duration of staying by day in the hospital, from the moment of admission to the moment of discharge.
- Classification of the drug.

The researcher depended on Medscape drug checker service for category the ADRs which it is combined with DDIs. Medscape is online global destination for physicians and healthcare professionals worldwide, offering the latest medical news and expert perspectives; essential point-of-care drug and disease information and relevant professional education (Medscape, 2019). Medscape drug checker service categories the reactions into three classifications: serious, significant and minor.

2- Self-administered questionnaire was developed and utilized to collect data from physicians who work in internal department in targeting settings and for pharmacists who work in the same settings. The main items that the questionnaire will cover:

- General information and demographic variables
- Communication between health providers
- Knowledge and continue development for healthcare providers
- Attitudes for physicians and pharmacists
- Prescribing practices
- Adherence to protocols and policies
- Role of pharmacists in prescribing practices
- Supervision role in the issue
- Importance of computerized alert program in DDIs

3.10.2 Qualitative instrument

The researcher conducted ten in key informants' interviews for policymakers who were related to the topic. In depth interviews guiding questions prepared; it was validated by technical experts. The main items that the interview covered:

- Importance of DDIs issue to manage
- The steps are taken by MOH to manage the issue
- Importance of training and electronic prescription program
- Difference between MOH hospitals regarding the DDIs issue.

3.11 Scientific rigor

3.11.1 Content validity

The purpose of content validation to assess the relevance of each domain of questions, the importance of each particular item and to check if the contents of the questions seem appropriate to the intended purpose and overall aim, to ensure the statistical consistency and capability to analyze data properly.

The content validity was done for the quantitative and qualitative part. The questionnaire was evaluated by experts to assess its relevance, and their comments was taken in consideration. Also, a pilot study was conducted for questionnaire before the actual data collection to examine physicians and pharmacists' responses to the questionnaire and how they understand it. That improved the validity of the questionnaire after modifying it.

The content validity for the in-depth interview guiding questions was to assess the relevance and appropriateness of the in-depth interviews guiding questions. Feedback and comments from health experts was incorporated into a revised version of the guiding questions. Also, recording the in-depth interviews enhanced tracking up information and re-check the accuracy of the transcripts.

3.11.2 Reliability

To assure instruments reliability during review of medical records for patients so some steps were done: data entry at the same day of the data collection. This step minimizes possible errors by checking the quality of data. Then, the researcher made re-entry of 5% of the data after finishing data entry to assure a correct entry process and to decrease entry errors.

3.12 Pilot study

To examine the appropriateness of data collection instruments and standardize the suitable way for data collection.

Quantitative part

- For self- administered questionnaire: a pilot study was conducted on 20 physicians and pharmacists. Two questions were added and a few rephrasing or explanations were added to some other questions.
- For abstract data sheet: a pilot study was conducted on 20 patients to collect data and filled on abstract data sheet, some modification added to abstract data sheets to be consistent with hospitals situation.

Qualitative part

A pilot interview was done with one interview, which allow for further improvement of the study validity and reliability. On the light of the light of the result of this stage; the questions were ordered and the way of asking questions was improved to be more deeply.

3.13 Data collection

The researcher reviewed medical records for patients at the study settings also revised relevant documents and made some observations that helped in exploring the reality, the researcher collected data from questionnaire which was applied on physicians and pharmacists and data which was collected by face to face in-depth interview from key informants who are related to study issue and short notes were taken through the interviews and were recorded to allow further capturing of information.

3.14 Response rate

Regarding questionnaire data collection: The total number of distributed questionnaires were 200; they were physicians and pharmacists. 150 of distributed questionnaire was filled so, the response rate was 75%

Regarding interviews: all who invited to participate in this study had positively respond.

3.15 Data entry and analysis

3.15.1 Quantitative data

Abstract data sheets and questionnaires were over viewed. Then, entry of data to statistical package for social sciences version 21 by the researcher himself. The coded variables was

entered to the computer. Data cleaning was conducted to check for any missing or error data during entry (through running frequency analysis).

Also, the researcher used Statistical Package of Social Science (SPSS) program for analysis. Frequency tables that show sample characteristics (patient, physicians and pharmacists related variables) from abstract data sheet, study questionnaire. Moreover, cross tabulation for main findings and advanced statistical tests such as Chi square test to compare categorical variables, and T test or One-way ANOVA test to compare means of numeric variables was done when required to analyze questionnaire data. The exploratory variables included: sex, age, diagnosis, length of stay, mean number of drugs prescribed (continuous variable) and other factors. P value equal or less than 0.05 was considered statistically significant, with confidence interval (CI) of 95%.

3.15.2 Qualitative data

Open coding thematic analysis method was used to analyze the transcripts of the in-depth interviews. The researcher obtained the main findings from the transcripts of the interviews. Then, categorization of related ideas, and comparison and integration between the quantitative and the qualitative findings was done to create rich items for discussion and representation.

3.16 Limitation of the study

The researcher reported the following constraints:

- Probability of in-clear writing for prescriptions.
- Probability of un-complete discharged files for patients who had admission but no closed file for discharging.
- All the questions in the questionnaire are close-ended which may hinder some important points on knowledge and practice of the participating physicians and pharmacists.
- Personal interview questionnaire is expensive and time consuming.

Chapter Four

Results and Discussion

4.1 Introduction

This chapter presents the main findings of the quantitative and qualitative data. The quantitative data illustrates the results of statistical analysis of the data and the interpretation of the main results. It begins with descriptive analysis that presents the sociodemographic characteristics of the study sample and the answers to the questions of the study. The researcher used statistical tests including frequencies, percentages, and using mean, median and standard deviation to analyze the variables questionnaire. Then inferential analysis was used to focus on examining the relationship between selected variables and other selected covariates. The qualitative data were used to support and argue the quantitative data.

4.2 Analysis of questionnaire data

4.2.1 Descriptive statistics

The researcher collected the quantitative data through well-structured questionnaire. The study participants were from Al Shifa and Nasser hospitals. The total number of distributed questionnaire was 200; they were physicians and pharmacists. 150 of distributed questionnaire was filled so, the response rate was 75%

4.2.1.1 Distribution of the study participants according to the socio-demographic data

The total number of participants in this study was 150 participants (physicians and pharmacists). All of them work in MOH hospitals in GG. As shown in Figure (4.1), about 53.3% of them were from Al Shifa hospital and about 46.7% were from Nasser hospital.

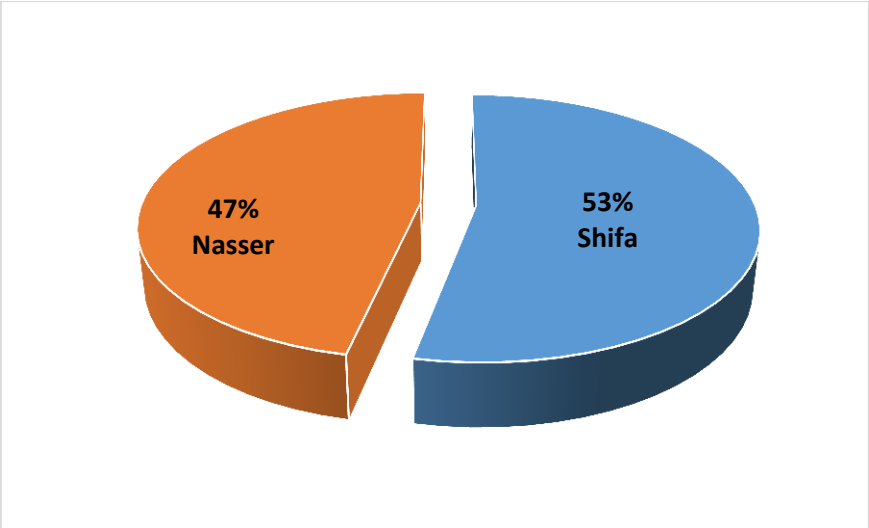


Figure (4.1): Distribution of the study participants by hospitals

Table (4.1): Distribution of the study participants according to the socio-demographic variables

Socio-demographic variables	No	%
Gender		
Male	99	66.0
Female	51	34.0
Total	**150**	**100.0**
Age		
< 36	32	21.3
36-40	29	19.3
40-45	38	25.3
>45	51	34.1
Total	**150**	**100.0**
Mean= 42.03, MD= 43.00, SD= 7.393		
Level of education		
Diploma	8	5.3
Bachelor	63	42.0
High Diploma	7	4.7
Master	49	32.7
Doctorate, Board or Fellowship	23	15.3
Total	**150**	**100.0**

Table (4.1) showed that about two thirds of the study participants (66%) were male and about one third (34%) were female. The ages of the study participants ranged between 23-59 years with mean age 42.03 (SD 7.39) years. Breakdown of study participants by age groups shows that; 32 participants (21.3%) aged less than 36, 29 participants (19.3%) aged

between 36-41 years, 38 participants (25.3%) aged between 41-45 years and 51participants (34.1%) aged above 45 years. Participants with age above 45 years are the largest proportion of the study participants. These findings is consistent with Al-Khodary (2016), the age mean of governmental Gaza hospitals physicians is 41.8 years and about 19% of them were younger than 35 years old.

According to Table (4.1) the level of education; the study results show that near half of the study participants (42%) have completed the bachelor degree, about 5.3% of them had diploma, (4.7%) had high diploma, (32.7%) had master degree, and about (15.3%) had Doctorate, board or fellowship. Participants with bachelor are the largest proportion and participants with diploma and high diploma are the smallest proportion of the total participants.

Table (4.2): Distribution of the study participants by gender and their job

Gender * Job Cross tabulation						
Gender	**Job**				**Total**	
	Physician		**Pharmacist**			
	No	%	No	%	No	%
Male	76	84.4	23	38.3	99	66
Female	14	15.6	37	61.7	51	34
Total	90	100	60	100	150	100

Regarding the job of the study participants as shown in Table (4.2). Most physicians (84.4%) were male and the other physicians (15.6%) were female. While most pharmacists (61.7%) were female and the other pharmacists (38.3%) were male and this is consistent with the findings of Tokka & Ahmed (2017) who found that majorities (57.2%) of Sudanese community pharmacists were females (Tokka & Ahmed, 2017).

4.2.1.2 Distribution of the study participants according to the country of graduation and experience

4.2.1.2.1 Country of basic graduation

Table (4.3) showed that among physicians 14 (15.9%) were graduated from Palestine, 22 (25%) were graduated from Arab countries and 52 (59.1%) were graduated from foreign countries. While among pharmacists, about 53 (88.3%) were graduated from Palestine, 4

(6.7%) were graduated from Arab countries and 3 (5%) were graduated from foreign countries. The researcher notices that most of physicians were graduated from foreign countries, but most of pharmacists were graduated from Palestine. These findings which is regarding the pharmacists is consistent with the findings of Tokka & Ahmed (2017) who found most of Sudanese community pharmacists (91.2%) were graduated from their country (Tokka & Ahmed, 2017).

Previous results can be explained as the Faculty of Pharmacy is existing from long time in Palestine, and the Faculty of Medicine is a recent establishment.

Table (4.3): Distribution of the study participants according to the country of basic graduation and their job

Country of basic graduation * Job Cross tabulation				
Country of basic graduation	**Job**			
	Physician		**Pharmacist**	
	No	%	No	%
Palestine	14	15.9	53	88.3
Arab Countries	22	25	4	6.7
Foreign Countries	52	59.1	3	5.0
Total	88	100	60	100

4.2.1.2.2 Country of post-graduation

According to Table (4.4), about two-thirds of the physicians (70%) were post-graduated from foreign countries, 20% of them were post-graduated from Arab countries and the rest of them (10%) were from Palestine, while among the pharmacists there were 61.5% post-graduated from Palestine, 23.1% were from Arab countries and 15.4% were post-graduated from foreign countries. The findings have revealed that most of physicians were post-graduated from foreign countries but most of pharmacists were post-graduated from Palestine. That is because of no colleges for physicians to have master degree in medicine in Palestine but there are colleges for pharmacists to have master degree in Palestine.

Table (4.4): Distribution of the study participants according to the country of post-graduation and their job

Country of post-graduation * Job Cross tabulation				
Country of post-graduation	**Job**			
	Physician		**Pharmacist**	
	No	%	No	%
Palestine	6	10	8	61.5
Arab Countries	12	20	3	23.1
Foreign Countries	42	70	2	15.4
Total	60	100	13	100

4.2.1.2.3 Experience

As shown in Table (4.5), the findings revealed that the distribution of study participants experience in internal medicine department with overall mean 9.61 years (median 9, SD 7.645). In general, about three quarters of participants (75.3%) have experience in internal medicine department for 15 years or less and about one quarter (24.7%) of them have experience for more than 15 years.

Also the researcher notice Only 24% of the participants have more than 15 years of experience, because most of the MOH employees have been appointed and worked in the Ministry since 2016 and this is due to the political rift that occurred this year due to the internal political division, as most of the employees left their work and new employees were appointed.

Table (4.5) also showed the distribution of total study participants experience with overall mean 14.5 years with (MD 15, SD 7.005). In total, about half of participants (55.6%) have totally experience for 15 years or less and the other half (43.4%) have totally experience more than 15 years.

The previous findings are explained by that physicians' participants already work in the internal medicine departments at sampling gathering but the pharmacists work at different departments of the hospitals.

Table (4.5): Distribution of the study participants according to the experience

Item	No	%
How many years have been serving in internal medicine department		
5 years or less	55	36.7
From 6 to 10 years	38	25.3
From 11 to 15 Years	20	13.3
More than 15 Years	37	24.7
Total	**150**	**100.0**
Mean = 9.61, MD= 9.00, SD = 7.645		
Total Number of Experience		
Less than 10 years	35	23.3
From 10 to 15 years	50	33.3
From 16 to 20 years	40	26.7
More than 20 years	25	16.7
Total	**150**	**100.0**
Mean = 14.50, MD= 15.00, SD = 7.005		

Table (4.6): Distribution of the study participants regarding the experience in internal medicine department and their job

Experience in Internal Medicine	Job			
	Physician		Pharmacist	
5 years and less	20	22.2%	35	58.3%
From 6 to 10 years	23	25.6%	15	25.0%
From 11 to 15 Years	18	20.0%	2	3.3%
More than 15 Years	29	32.2%	8	13.3%
Total	90	100.0%	60	100.0%
	Mean= 12.09		Mean= 5.88	

As mentioned in table (4.6), regarding the physicians; about half of them (52.2%) have more than 10 years' experience working in internal medicine department, and the other half of them (47.8%) have less than 10 years of experience. While for pharmacists; most of

pharmacists (83.3%) have less than 10 years' experience working in internal medicine department. The results showed that the practical experience of the physicians in the departments of internal medicine is higher than that of the pharmacists.

Table (4.7): Distribution of the study participants according to the total years of experience and their job

Total Number of Experience	Job			
	Physician		Pharmacist	
Less than 10 years	22	24.4%	13	21.7%
From 10 to 15 years	30	33.3%	20	33.3%
From 16 to 20 Years	22	24.4%	18	30.0%
More than 20 Years	16	17.8%	9	15.0%
Total	90	100.0%	60	100.0%
	Mean= 14.4		Mean= 14.65	

As shown in Table (4.7), The results of the study showed that the total years of practical experience for both physicians and pharmacists are almost equal. Approximately in total, half of physicians' participants (56.7%) and also like of them pharmacists' participants (56%) have total experience 15 years or less. The total experience mean for physicians is 14.4 years and for pharmacists is 14.65 years, and these findings is consistent with a study which is conducted on physicians of governmental Gaza hospitals, revealed that the average of work experience of the participants was 13.3 years (Al-Khodary, 2016).

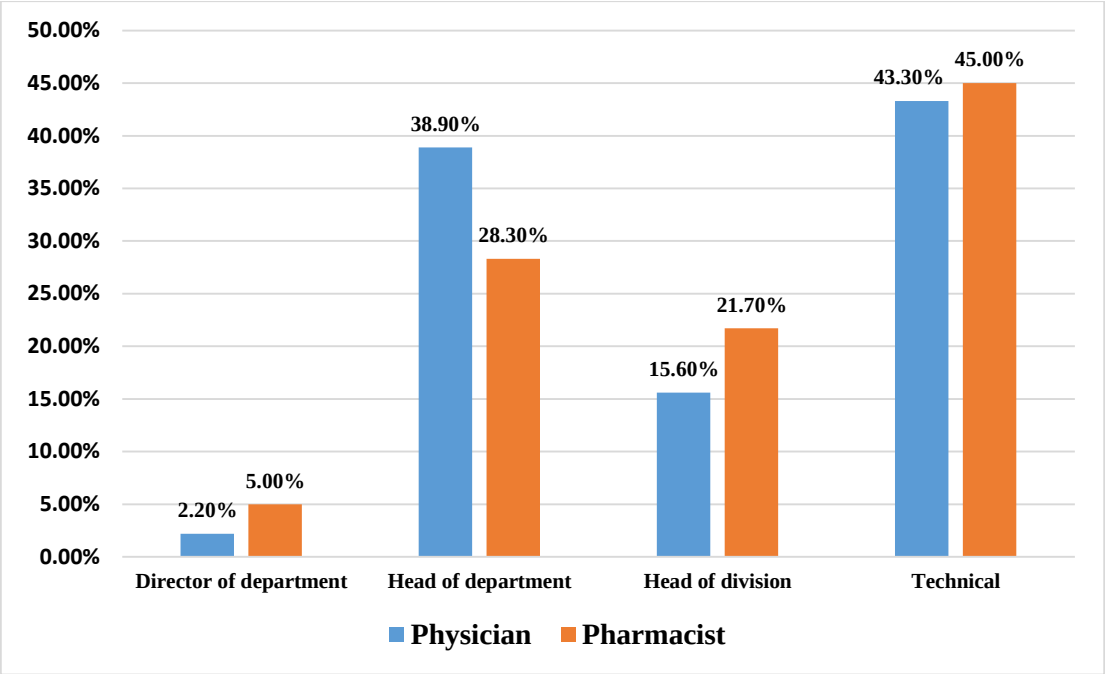


Figure (4.2): Distribution of participants according to their position in MOH and their job

Concerning the distribution of study participants according to their position in MOH and their job. As shown in Figure (4.2), the study found that the percentages of technicians are close to each other, (43.3%) for physicians and (45%) for pharmacists. The rates of pharmacists were higher (21.7%) for heads of divisions than physicians (15.6%) also, higher rate of pharmacists (5%) as director of departments than physicians (2.2%). On the other hand, there is a higher percentage of physicians (38.9%) heading departments compared to pharmacists (28.3%).

4.2.1.3 Distribution of study participants according to the training that they received during employment

Concerning of obtaining training during employment, as shown in figure (4.3), most of the study participants (84%) did not receive any type of training during employment and about a quarter (16%) of them got training. This means that the training provided by the Ministry of Health is not sufficient and does not cover th emost numbers that work in the Ministry of Health so, low level of information updating and that affect negatively on the knowledge of study participants.

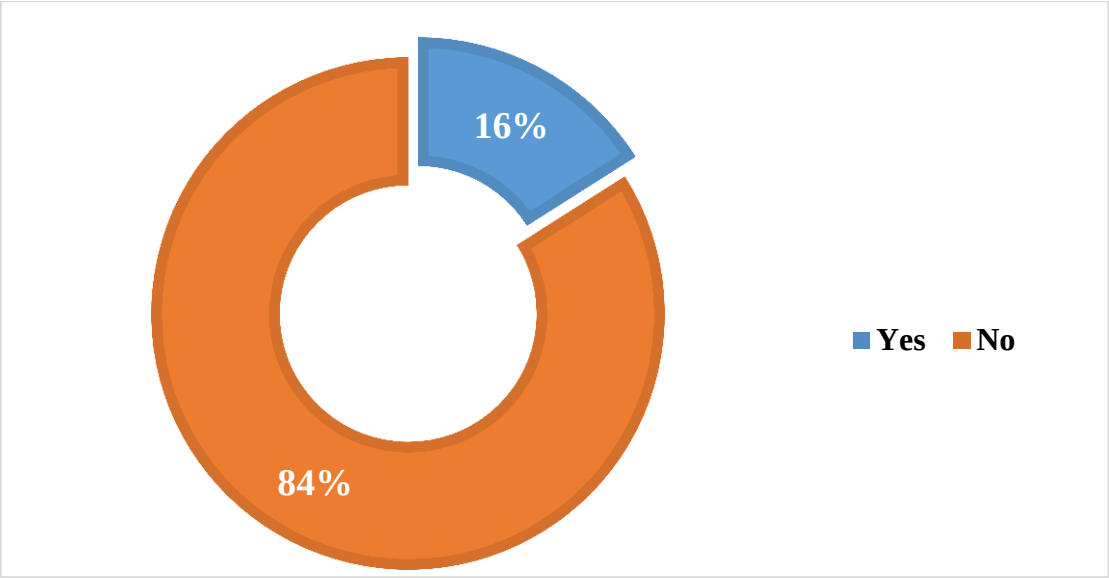


Figure (4.3): Distribution of study participants according to receive training

As shown in table (4.8), among the study participants who received training; 58.3% received one-time training, 29.2% received twice training, 12.5% received three times training and more.

It also shows the distribution of participants according to the last year of getting training; 20.8% a year ago, 20.8% from 2 to 5 years, 20.8% from 6 to 10 years and 37.6% more than 10 years.

It is noticeable that only half of the number who trained during his work in the Ministry of Health received his training during the previous five years, and the rest of the number of trainees had been trained before more than five years. Knowing that it is assumed that with regard to drugs, especially the subject of drug-drug interactions, continuous and repeated training shuld be done for most healthcare providers at the MOH is required to be sufficient and effective, also to be aware of the latest studies related to drugs and their clinical researchs.

Table (4.8): Distribution of study participants according to receiving training during employment

Item	No	%
Number of training times participated in		
Once	14	58.3
Twice	7	29.2
Three and more	3	12.5
Total	**24**	**100.0**
Last Year of Training		
One Year ago	5	20.8
From 2 to 5 Years	5	20.8
From 6 to 10 Years	5	20.8
More than 10 Years	9	37.6
Total	**24**	**100.0**

4.2.1.4 Distribution of the study participants according knowledge of Health care providers

The questionnaire contained three sub domains regarding healthcare provider knowledge, the first sub domain focused on the common source of knowledge and the most used source of information by healthcare providers when they need to learn or search information about drugs and their interactions and it contains 9 sources of information, the second sub domain focused on level of knowledge and their attitudes to DDIs information and it contains 13 questions and the last sub domain test the information of healthcare providers regarding DDIs between 10 pairs of drugs that may be prescribed by physicians.

4.2.1.4.1 Distribution of the study participants according to sources of Knowledge use

Likert scale is used to measure the level of study participants' approval on the source of which is more used in order to facilitate access to DDIs information sources.

As shown in Table (4.9), the overall percentage of the study participants about the source of knowledge is 67.13% (SD 10.93, MD 68.89%).

The results indicated that the most frequently used sources of information among the study participants were the Internet and programs on computers or mobile phones (participants who agree and strongly agree were about 86.6% and 86.7%, respectively). These findings are similar to the results of study carried in Iran where the internet, software on mobile phone or tablet and books were the most commonly references for DDIs (Nabovati et al., 2017). A possible explanation for these results might be due to the ease and speed of using the internet and software in searching.

On the other hand, the lowest sources of information used were guidelines and protocols and less than half of the participants (45.3%) who agree or strongly agree, training courses that only half of the participants (50.3%) benefited from, while advertisements and drug agents were the least sources of knowledge (20.8%) agree and strongly agree.

Astudy was conducted on physicians who worked in governmental Gaza hospitals which revealed that the most used drug information source is pharmacist then internet and the least used drug information source is medical representative (Al-Khodary, 2016).

Table (4.9): Distribution of the study participants according to the source of knowledge mostly used

Source of knowledge mostly used	Strongly disagreed		Disagree		Neutral		Agree		Strongly agree		Wt. Mean %
	No	%	No	%	No	%	No	%	No	%	
Colleague (pharmacist).	10	6.7	11	7.3	36	24.0	75	50.0	18	12.0	70.60
Colleague (physician).	12	8.1	24	16.1	33	22.1	74	49.7	6	4.0	65.20
Training courses you take.	33	22.1	6	4.0	35	23.5	66	44.3	9	6.0	61.60
Guidelines and protocols in your hospital.	30	20.0	16	10.7	36	24.0	63	42.0	5	3.3	59.60
Electronic program used in your hospital.	32	21.5	14	9.4	17	11.4	59	39.6	27	18.1	64.60
Internet.	3	2.0	8	5.4	9	6.0	83	55.7	46	30.9	81.60
Software on your computer or mobile.	4	2.7	3	2.0	13	8.7	78	52.0	52	34.7	82.80
Product package instructions.	8	5.3	13	8.7	31	20.7	88	58.7	10	6.7	70.60
Advertising agents for medicines.	30	20.1	49	32.9	39	26.2	30	20.1	1	0.7	49.60
Mean = 67.13, MD =68.89, SD= 10.93											

Wt.: Weighted mean

4.2.1.4.2 Distribution of the study participants according to knowledge Level of Health care providers

Table (4.10): Distribution of the study participants according to knowledge Level of Health care providers

Items	Strongly disagreed		Disagree		Neutral		Agree		Strongly agree		Wt. Mean
	No	%	No	%	No	%	No	%	No	%	%
DDIs take a valuable part of your undergraduate course studies.	5	3.3	21	14.0	25	16.7	71	47.3	28	18.7	72.80
You have sufficient knowledge about drugs and DDIs.	3	2.0	13	8.7	26	17.3	100	66.7	8	5.3	73.00
DDIs may increase or decrease, due to gender variation.	7	4.7	24	16.0	28	18.7	84	56.0	7	4.7	68.00
DDIs may increase or decrease, due to the age.	3	2.0	13	8.7	22	14.8	91	61.1	20	13.4	75.00
DDIs may increase or decrease, due to food taken.	1	0.7	3	2.0	6	4.0	112	75.2	27	18.1	81.60
Presence of multiple pharmaceutical products increase the problem of DDIs.	0	0.0	11	7.4	27	18.1	88	59.1	23	15.4	76.60
DDIs may increase, due to polypharmacy.	2	1.3	1	0.7	14	9.3	88	58.7	45	30.0	83.00
Over-the-counter medications (OTC) can increase DDIs.	1	0.7	3	2.0	11	7.4	83	55.7	51	34.2	84.20
Dosage form and route of administration, may increase or decrease DDIs.	0	0.0	7	4.7	22	14.8	94	63.1	26	17.4	78.60
Dose of drug, may increase or decrease DDIs.	0	0.0	7	4.7	14	9.3	103	68.7	26	17.3	79.80
Dose frequency, may increase or decrease DDIs.	2	1.3	4	2.7	15	10.0	110	73.3	19	12.7	78.60
Duration of usage for drug, may increase or decrease DDIs.	0	0.0	9	6.0	29	19.3	94	62.7	18	12.0	76.20
Spacing between drugs, may increase or decrease DDIs.	2	1.3	9	6.0	21	14.0	94	62.7	24	16.0	77.20
Mean = 77.07, MD =76.92, SD= 8.61											

As shown in Table (4.10), the overall percentage mean of the study participants of the level of knowledge is 77.07% (SD 8.61, MD 76.92%).

The highest three weighted mean were for the questions; DDIs may increase or decrease, due to food intake (81.6), DDIs may increase due to polypharmacy (83), Over-the-counter

medications (OTC) can increase DDIs (84.2) and study participants who agree and strongly agree in the order 93.3%, 88.7% and 89.9%.

However, on the other hand, the three lowest weighted mean were for the questions; DDIs may increase or decrease due to gender variation (68), DDIs take a valuable part of your undergraduate course studies (72.8), having sufficient knowledge about drugs and DDIs (73). So, study participants who agree and strongly agree in the order 60.7%, 66% and 72%.

Moreover, the rest of the questions of the level of knowledge domain are approximately close to each other in the weighted mean and they are between 75 - 80%.

In a Gazian study on secondary healthcare settings revealed that physicians do not respond to pharmacists recommendations as more than two thirds of the study participants (67.5%) said that they do not respond to pharmacists recommendations on prescribing drugs (Al-Khodary, 2016). Also another study revealed lower level of awareness and knowledge of DDIs in comparison to the Sudanese community pharmacists' study with 82.9%. (Tokka & Ahmed, 2017). around (89.9%) of the study participants agree with Over-the-counter medications (OTC) can increase DDIs, a similar study conducted by Tokka and Ahmed (2017), reported that 75.6% agree with that OTC can increase DDIs.

Also, results showed that around 66% of the study participants agree with DDIs take a valuable part of undergraduate course studies, a similar study conducted by Tokka & Ahmed (2017), reported that 81.9% agree with DDIs take a valuable part of undergraduate studies.

4.2.1.4.3 Distribution of the study participants according to test for healthcare provider knowledge

In this section there is ten pairs of drugs to evaluate participants DDIs information by depending on their information without backing to the textbook or internet. The participant should choose one of the four choices (should not be used together, may be used together but with monitoring, no interaction or not sure). The ten drug pairs are the more common prescribed pairs in governmental hospitals.

Table (4.11) shows the answers of knowledge test of DDIs for study participants, include ten questions of two drug combinations with four answers for each combinations (should not be used together, may be used together but with monitoring, no interaction and not sure).

Table (4.11): Distribution of the study participants according to test for healthcare provider knowledge

Drugs	Should not be used together		May be used together but with monitoring		No interaction		Not sure	
	No	%	No	%	No	%	No	%
Ciprofloxacin and Theophylline.	78	52.0	47	31.3	15	10.0	10	6.7
Captopril and Simvastatin.	14	9.3	54	36.0	61	40.7	21	14.0
Diclofenac and Dexamethasone.	6	4.0	55	36.7	80	53.3	9	6.0
Amoxicillin and Acetaminophen.	4	2.7	19	12.7	112	74.7	15	10.0
Atenolol and Ranitidine.	8	5.3	32	21.3	91	60.7	19	12.7
Digoxin and Clarithromycin.	36	24.0	78	52.0	13	8.7	23	15.3
Losartan and Isosorbide dinitrate.	12	8.0	61	40.7	43	28.7	34	22.7
Esomeprazole and Clopidogrel.	67	44.7	48	32.0	14	9.3	21	14.0
Warfarin and Verapamil.	7	4.7	51	34.0	64	42.7	28	18.7
Alprazolam and Ketoconazole.	68	45.3	25	16.7	16	10.7	41	27.3

Table (4.12): Distribution of the study participants according to the right answers of the test for healthcare provider knowledge

Items	Right answers	
	No	%
Ciprofloxacin and Theophylline.	78	52.0
Captopril and Simvastatin.	61	40.7
Diclofenac and Dexamethasone.	55	36.7
Amoxicillin and Acetaminophen.	112	74.7
Atenolol and Ranitidine.	91	60.7
Digoxin and Clarithromycin.	36	24.0
Losartan and Isosorbide dinitrate.	43	28.7
Esomeprazole and Clopidogrel.	67	44.7
Warfarin and Verapamil.	64	42.7
Alprazolam and Ketoconazole.	68	45.3
Mean = 45.00, MD= 40.00, SD = 23.79		

Regarding results of knowledge test of DDIs for study participants, Table (4.12) shows, the overall percentage mean for test score is 45% (SD 23.79, MD 40). In totally this mean score is lower than 50% and this gives bad impression about level of knowledge for participants. These results are consistent with Tokka & Ahmed, (2017) study, they reported that the mean for correct answers for DDIs test was (53.3%) also, with Nabovati et al., (2017) study, they reported that the mean of correctly drug pairs of DDIs was (41.5%).

And in detail the questions which was answered rightly by more than 50% of participants are (Ciprofloxacin and Theophylline), (Atenolol and Ranitidine) and (Amoxicillin and Acetaminophen) with percent orderly 52%, 60.7% and 74.7%. By comparison with Nabovati et al., (2017) study, their results showed amoxicillin and acetaminophen was most correctly (87.2%)

On the other hand, which was answered rightly by less than 40% of participants are (Digoxin and Clarithromycin), (Losartan and Isosorbide dinitrate) and (Diclofenac and Dexamethasone) with score orderly 24%, 28.7% and 36.7%. A similar result in Iran study, participants who correctly answered (Digoxin and Clarithromycin) pair were 32% and who correctly answered (Losartan and Isosorbide dinitrate) pair were 37.4% (Nabovati et al.,

2017). And the other study showed that participants with correctly answers for (Digoxin and Clarithromycin) pair was 39.9% (Alrabiah et al, 2019).

The rest of the questions are answered correctly by 40-50% of study participants. Unlike our study, in the study of Nabovati et al., (2017), the results showed that correctly answers for ciprofloxacin and theophylline pair was 17.4% and for alprazolam and ketoconazole pair was 11%. And the other study showed that participants with correctly answers for (ciprofloxacin and theophylline) pair was 35% (Alrabiah et al, 2019).

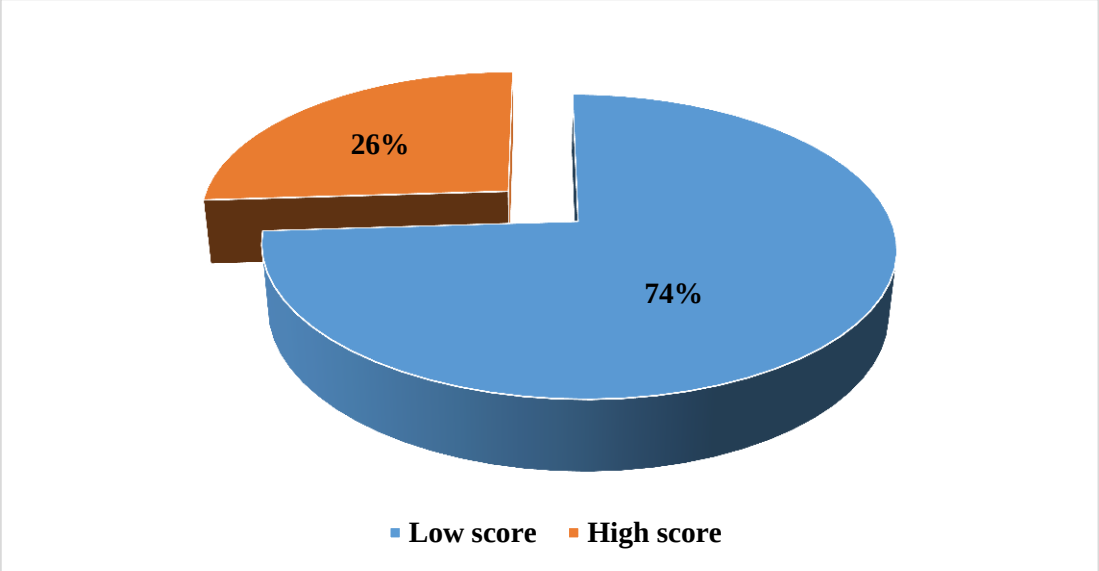


Figure (4.4): Total score of DDIs test for participants

As shown in Figure (4.4), low score means 50% or less and high score means more than 50%. About three quarters of the study participants (74%) had a low total score in the DDIs test and about a quarter of the study participants (26%) had a high total score in the DDIs test. The researcher noted that the majority of participants had a low level of knowledge in DDIs.

The researcher comments on the previous findings, the level of study participants' knowledge on DDIs is insufficient. A study that similar to our results, there was a large insufficiency in the knowledge of the community pharmacists about drug interactions with other drugs, food, and herbs (Makkaoui et al., 2020).

4.2.1.5 Distribution of the study participants according to attitude of healthcare provider

This section focus on attitudes of participants mainly towards the importance of DDIs issue, role of clinical pharmacist and compliance to the therapeutic protocols.

As mentioned in Table (4.13), the overall mean percentage of the study participants according to attitude of healthcare providers' domain is 80.63% (SD 8.18, MD 80%).

Table (4.13): Distribution of the study participants according to attitude of healthcare provider

Items	Strongly disagree		Disagree		Neutral		Agree		Strongly agree		Wt. Mean
	No	%	No	%	No	%	No	%	No	%	%
You have high confidence in your medication information.	1	0.7	5	3.3	17	11.3	87	58.0	40	26.7	81.40
DDIs is important issue to manage.	0	0.0	2	1.3	6	4.0	75	50.0	67	44.7	87.60
As you know, DDIs are dangerous to the patient's health.	0	0.0	3	2.0	8	5.3	69	46.0	70	46.7	87.40
As you know, DDIs increase deaths.	1	0.7	4	2.7	21	14.0	70	46.7	54	36.0	83.00
As you know, DDIs are important in determining the dosage of the drug.	0	0.0	2	1.3	13	8.7	86	57.3	49	32.7	84.20
The presence of clinical pharmacist is important in the hospital.	0	0.0	2	1.3	18	12.0	62	41.3	68	45.3	86.20
The clinical pharmacist is able to minimize DDIs.	1	0.7	1	0.7	25	16.7	68	45.3	55	36.7	83.40
The clinical pharmacist has fulfilled his role in Gaza hospitals.	15	10.0	45	30.0	49	32.7	37	24.7	4	2.7	56.00
Compliance with therapeutic protocols reduces the occurrence of drug DDIs.	3	2.0	12	8.0	50	33.3	60	40.0	25	16.7	72.20
The MOH therapeutic protocols need to update.	0	0.0	0	0.0	24	16.0	65	43.3	61	40.7	85.00
Mean = 80.63, MD =80.0, SD= 8.18											

In Table (4.13), the highest four weighted mean were for the questions: DDIs is important issue to manage (87.6%), DDIs are dangerous to the patient's health (87.4%), the presence of clinical pharmacist is important in the hospital (86.2), the MOH therapeutic protocols need to update (85%) and study participants who agree and strongly agree in respectively are 94.7%, 92.7%, 86.6% and 84%. In general, the majority of participants believed that the DDIs issue is important and dangerous and also most of them have positive opinion on need of updating of protocols and the importance of clinical pharmacist in the hospital. However, on the other hand, the two lowest weighted mean were for the questions (The clinical pharmacist has fulfilled his role in Gaza hospitals; 56%/ Compliance with therapeutic protocols reduces the occurrence of drug DDIs; 72.2%). According to the previous results, a low percent of participants was 27.4% believed that clinical pharmacists have fulfilled their role and only about half of participants (56.7%) have positive attitude that compliance with therapeutic protocols reduces the occurrence of DDIs.

The findings of in-depth interview for key informants revealed that clinical pharmacist presence is very important, one of the KI said " *clinical pharmacist is considered the first and important line for follow up the prescription behavior and errors in the discharge sheet also they have important role in feedback and correcting drugs prescription mistakes but the participation of clinical pharmacist in this time is approximately weak and that is linked to low level of trust from physicians toward pharmacist"*. The hospitals pharmacy department director stated " *the initial idea to activate the role of clinical pharmacist and saving one clinical pharmacist at least in every hospital was proposed in 2009, but the development in this subject is very slow. Now there is twenty pharmacists are under training for clinical pharmacist diploma, the clinical pharmacist will be attending the morning round with iPad and DDIs program application to follow up and give feedback"*.

According to our study results, majority of study participants (83.7%) had awareness that DDIs are increase deaths, similar findings in South Africa study which applied on pharmacists to identify and manage DDIs that showed the majority of participants that aware of some DDIs and ADRs could be fatal (Baksh et al, 2019).

4.2.1.6 Distribution of the study participants according to Practices

Table (4.14): Distribution of the study participants according to practices

Items	Never		Seldom		Sometimes		Usually		Always		Wt. Mean %
	No	%	No	%	No	%	No	%	No	%	
Have you ever come across cases of DDIs during your practice.	6	4.0	3	2.0	87	58.0	31	20.7	23	15.3	68.2
Before Prescribing drugs, the physician consider its potential DDIs.	8	5.3	19	12.7	30	20.0	55	36.7	38	25.3	72.8
You ask the patient about other prescribed or over the counter drugs (OTC) he is using or intends to use.	6	4.0	9	6.0	31	20.8	61	40.9	42	28.2	76.6
You ask the patient if he has past sensitivity to any drug.	8	5.3	4	2.7	22	14.7	51	34.0	65	43.3	81.4
You give the patient the full and detailed information about using the drug to minimize DDIs.	3	2.0	18	12.1	32	21.5	57	38.3	39	26.2	74.8
You make follow up for patient after drug use.	20	13.3	21	14.0	27	18.0	50	33.3	32	21.3	67.0
The physicians consult the pharmacist before prescribe the drugs.	26	17.3	47	31.3	53	35.3	19	12.7	5	3.3	50.6
The physicians trust of a pharmacist as a consultant of DDIs information.	11	7.4	35	23.5	58	38.9	36	24.2	9	6.0	59.6
The physicians accept the pharmacist opinion when pointing to a DDIs in their prescriptions.	4	2.7	27	18.1	65	43.6	44	29.5	9	6.0	63.6
The physicians communicate and coordinate with other physicians if there is another prescription from them to the same patient.	5	3.4	35	23.5	49	32.9	53	35.6	7	4.7	63.0
The pharmacists call the physician to alarm him if he prescribes drugs have DDIs.	3	2.0	22	14.8	46	30.9	58	38.9	20	13.4	69.4
The pharmacists suppose alternatives if the physician prescribes drugs have DDIs.	3	2.0	22	14.8	51	34.2	51	34.2	22	14.8	69.0
Pharmacists check the drugs prescribed and detect DDIs to optimize therapy.	11	7.4	36	24.2	50	33.6	34	22.8	18	12.1	61.6
The pharmacists participate in morning meeting and give opinion in drugs which prescribed.	6	4.0	26	17.4	54	36.2	41	27.5	22	14.8	66.4
Mean = 67.16 , MD =68.57, SD= 13.58											

This section focus on the practices of participants mainly towards the prescription behavior that related to DDIs, relationship between physicians and pharmacists and feedback and follow up.

Table (4.14) showed that, the overall percentage mean of the study participants of the practice of healthcare provider domain was 67.16% (SD 13.58, MD 68.57%). These findings showed lower level of good practices towards DDIs in comparison to the Sudanese community pharmacists study (Tokka & Ahmed, 2017).

In Table (4.14), the most questions have the highest weighted mean are asking patient about other prescribed drugs or (OTC) is using or intend to use and the other question is asking patient if he has sensitivity to any drug, the percent of participants who answered usually or always for first question is about two thirds (69.1%) and for the other is more (77.3%). A study was carried by Nabovati et al., (2017) reported that 48.7% of participants asked patients about use of (OTC) and 81.8% asked about use of prescription drugs.

In contrast, most of the questions that had the lowest likely weighted mean were (physicians trust of a pharmacist as a consultant of DDIs information, pharmacists check the drugs prescribed and detect DDIs to optimize therapy, the physicians communicate and coordinate with other physicians if there is another prescription from them to the same patient, physicians accept the pharmacist opinion when pointing to a DDIs in their prescriptions), the percent of participants who agree and strongly agree for questions in orderly 30.2%, 34.9%, 35.5% and 40.3%.

To sum up the previous results, the practice domain shows that there must be good communication between health service providers and patients and asking about the medications the patient takes and their sensitivity to any other drug is a type of communication that should be to avoid any complications that may occur, but it is clear that there is a defect in communication between the physcian and the pharmacist on the one hand, and the patient on the other side, in addition to the lack of confidence in the pharmacist towards the physician and the physician not examining the prescription carefully. so, the results of the current study showed poor collaboration between physicians and pharmacists and that is consistent with the Al-Khodary (2016) study which conducted on governmental Gaza hospitals, revealed that 21.4% of physicians answered that physicians always communicate with pharmacists. And Sudanese study results is consistent with previous results (Tokka & Ahmed, 2017). South Africa study ensured that pharmacists play important roles in the identification, prevention, detection and

management of DDIs, drug-food interactions and ADRs (Bushra et al, 2015). Other study which is promoted by Zeenny et al, (2017) in Lebanon which clarified that uncoordinated care which is provided by multiple professionals is a factor of high incidence of DDIs.

The qualitative data is consistent with the result findings, it revealed that the physicians is not accept the presence of clinical pharmacist and also not accept his opinion and comments. This side is not the priority of MOH for development. Most of KI clarified that the relationship between physician and pharmacist is weak, there is difference between hospitals and also between departments in the same hospital in the communication and coordination between physician and pharmacist due to personal relationship so, if there is good personal relationship then good communication and coordination. Some of the KI stress on that no system organize the communication and coordination regarding DDIs follow up.

4.2.1.7 Availability of Therapeutic protocols in MOH

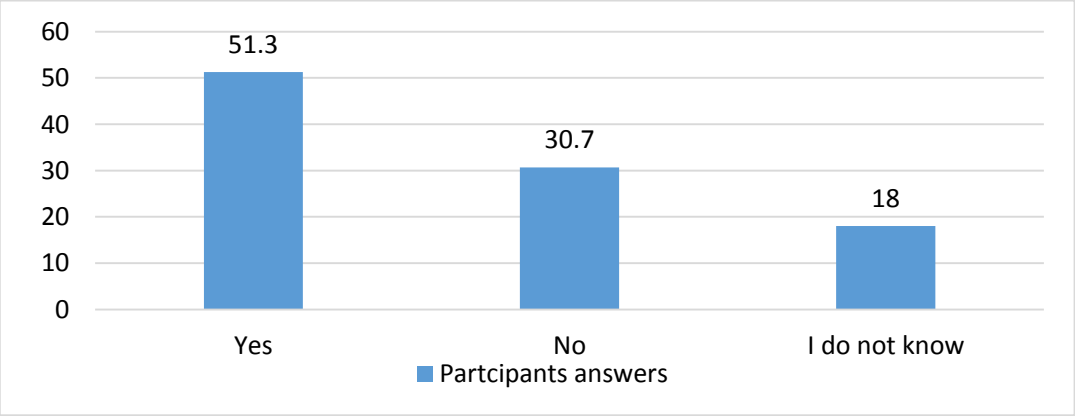


Figure (4.5): Availability of therapeutic protocols in MOH

As shown in figure (4.5), with regard to having an idea about the existence of written and approved protocols in MOH; half of the study participants (51.3%) reported the availability of written and approved protocols, while about a third of the participants (30.7%) denied the existence of any kind of protocols among the employees of the MOH and about 18% of them reported that they did not know whether it existed or not.

Al-Khodary (2016) study which applied on physicians of governmental Gaza hospitals, revealed that 38.1% of study participants answered yes when they asked if there are prtocols in governmental hospitals.

Table (4.15): Distribution of the study participants according to awareness towards therapeutic protocols in MOH

Items	No	%
You have a copy of the MOH therapeutic protocols		
Hard Copy	18	23.4
Soft Copy	10	13.0
Hard & Soft Copy	31	40.3
No Copies	18	23.4
Total	**77**	**100.0**
Are therapeutic protocols in the ministry updated		
Yes	34	44.2
No	8	10.4
I do not know	35	45.5
Total	**77**	**100.0**
Have you participated in updating therapeutic protocols		
Yes	14	18.2
No	63	81.8
Total	**77**	**100.0**
You are adhering with the MOH protocols		
Always	29	37.7
Often	39	50.6
Sometimes	6	7.8
Seldom	3	3.9
Total	**77**	**100.0**
The MOH therapeutic protocols include		
EDL	40	51.9
Non EDL	1	1.3
EDL & Non EDL	28	36.4
I do not know	8	10.4
Total	**77**	**100.0**
These protocols cover drug interactions issue and how to manage		
Yes	31	40.3
No	22	28.6
I do not know	24	31.2
Total	**77**	**100.0**
Your ministry obliges you for adherence with therapeutic protocols		
Yes	46	59.7
No	17	22.1
I do not know	14	18.2
Total	**77**	**100.0**

As shown in table (4.15), among the study participants (51.3%) who know the existence of therapeutic protocols in MOH, most of them (76.6%) have a copy of protocols (soft, hard or both of them). Regarding updating therapeutic protocols, about half of participants (44.2%) confirmed the update of therapeutic protocols but the other half (45.5%) confirmed that there was no update of protocols and the least (10.4%) had no idea about update. Also participating in updating of therapeutic protocols, most of study participants (81.8%) are not involved in updating the treatment protocols. If we talk about adhering w the MOH protocols, the majority of study participants (88.3%) are mostly adhering.

As shown in Table (4.15), regarding the protocols including of EDL or Non EDL, about half of participants (51.9%) answered including of EDL. Regarding covering of protocols for DDIs issue and how to manage, most participants (59.8%) reported the answer No or do not know. On the other hand, in regard to ministry obligating the participants to adhere with MOH protocols, around half of the participants (40.3%) have No or do not know if there is obligating.

In general, the researcher noted from the previous results: that a low percentage of participants are aware of the existence of the protocols, in addition to the low level of commitment to MOH protocols and lack of interest in updating the protocols continuously.

Al-Khodary (2016) study which applied on physicians of governmental Gaza hospitals, revealed that about quarter of participants that agree and strongly agree when they were asked if there is a monitoring system for measuring physicians compliance with protocols. A bout 18.8% of physicians agree and strongly agree when they are asked if there are performance indicators for protocols compliance in governmental hospitals. And most of participants agree and strongly agree that the current treatment protocols needs update and about half of participants agree and strongly agree that treatment protocols are obligatory for participants in their work (Al-Khodary, 2016).

4.2.1.8 Distribution of the study participants according to supervision and auditing

As shown in table (4.16), the overall mean of the study participants about the supervision and auditing domain is 29.29% (SD 22.73).

More of half participants that answered yes for these items (the hospital has pharmacy and therapeutic committee, an electronic program will help to detect and identify DDIs, the program will contribute to reduce the magnitude of the problem of DDIs) with percentage

in orders are 83.3%, 61.3% and 68.7%. That is a good thing the presence of pharmacy and therapeutic committee but also the presence of electronic program is important according to participants' opinion.

On the other hand, the results indicate, in general, a low degree of supervision and auditing and this is evident in the findings listed in the table (4.16), where very few participants answered yes when asked about if there is regulatory body that make follow up for prescriptions, MOH ongoing training program, effectivity for MOH training courses in reducing DDIs, periodic reports for DDIs, filling an adverse drug rection reporting form, effective and efficient follow-up and auditing, indicators to measure healthcare providers compliance with therapeutic protocols, feedback on healthcare providers compliance with therapeutic protocols and presence of electronic prescription programs.

A study was conducted in governmental Gaza hospitals which revealed that 42.7% of physicians answered yes when they were asked if there is pharmacy & therapeutic committee in governmental hospitals, also only 18.5% of particpants agree and strongly agree when they were asked if audit directorate monitors drugs that were prescibed (Al-Khodary, 2016).

One study was conducted in Iran, their findings underlined the importance of designed computerized alerting system (Nabovati et al., 2017). And in other study was conducted in Sudia Arabia, their findings about knowledge of community pharmacists regarding DDIs was inadequate and continues education and electronic system can help easily in detection of DDIs (Alrabiah et al., 2019). Also, a study conducted in Istanbul and applied on community pharmacies revealed, even though evidence based computerized drug interaction checker programs that offer rapid access is insufficient alone, they can help healthcare providers in preventing pDDIs. The use of this program could minimize pDDIs through the dispensing of medicine (Simsek et al., 2019).

Table (4.16): Distribution of the study participants according to supervision and auditing

Items	Yes		No		I don't Know		Total	
	No	%	No	%	No	%	No	%
Is the hospital have pharmacy and therapeutic committee.	125	83.3	7	4.7	18	12.0	150	100.0
Is there a regulatory body make follow up for drugs that prescribed?	40	26.7	50	33.3	60	40.0	150	100.0
The MOH is implementing an ongoing training program regarding DDIs.	35	23.3	69	46.0	46	30.7	150	100.0
Training courses of the MOH are effective and have a major impact in reducing DDIs.	50	33.6	36	24.2	63	42.3	149	100.0
Your hospital gives periodic reports regarding problems have been got of DDIs.	15	10.1	71	47.7	63	42.3	149	100.0
Healthcare provider fill an adverse drug reaction reporting form.	20	13.3	65	43.3	65	43.3	150	100.0
Your hospital management review your prescriptions and point to you if there is drug DDIs.	30	20.0	74	49.3	46	30.7	150	100.0
Your hospital make audit for the prescriptions and point to you if there is DDIs.	29	19.3	65	43.3	56	37.3	150	100.0
There is an effective and efficient hospital follow-up and audit system for DDIs.	25	16.7	65	43.3	60	40.0	150	100.0
The hospital has indicators to measure healthcare provider compliance with the therapeutic protocols.	20	13.3	67	44.7	63	42.0	150	100.0
You are provided with feedback on your compliance with the therapeutic protocols.	18	12.1	91	61.1	40	26.8	149	100.0
Is an electronic prescription program for detection DDIs applied in your hospital.	13	8.7	91	60.7	46	30.7	150	100.0
An electronic program will help to detect and identify DDIs.	92	61.3	29	19.3	29	19.3	150	100.0
The program will contribute to reduce the magnitude of the problem of DDIs.	103	68.7	20	13.3	27	18.0	150	100.0
Mean = 29.29, MD= 21.43, SD = 22.73								

Also as shown in table (4.16), the percentage of participants is less than one third who answered yes for all other questions. Mainly for three items (giving periodic reports for DDIs problems, providing with feedback on compliance with therapeutic protocols and presence of electronic program for detection DDIs), the percent of participants who answered yes in orderly are 10.1%, 12.1% and 8.7%. In general, that is very weak system

of auditing and supervision, because most of questions of this domain have low percent of participants that answer low.

The in-depth interview for key informants reflected that most of KI stressed on the weakness of supervision and auditing system, one of the KI stated *"feedback from hospitals management and prescription reviewing is not present in general so the supervision and auditing for the prescriptions behavior especially for discharged sheet is not systematic"*. The other of KI said " *in the present time, the pharmacist may be the only line for reviewing prescriptions and pointing if there are errors in prescription or DDIs presence and the way of intervention for modification but this role may be good or weak according to the relationship between pharmacist and physician"*.

Qualitative data also revealed that there is DDIs program already applied as a pilot in two hospitals (European Gaza hospital and El Emarati hospital) but this program applied on in-patient, not on discharge sheet. This program give alarm if there is DDIs in the prescription and not allow for inserting drugs if there is serious DDIs. Director of hospital pharmacy department said *" E hospital program will help in detection of DDIs and the intervention to deal with it. No evaluation for the effectivity of this piloted program for this moment, and it will be applied in all MOH hospitals in the next step"*. All KI that stressed on that the program only detect DDIs between pairs of drugs of Essential Drug List and they clarify that high percentage of drugs that prescribed in discharge sheet are Non Essential Drug List so the program will not be applied on drugs which prescribed on discharge sheet.

4.2.2 Inferential Statistics for questionnaire data

The inferential analysis is made to examine important variations among study participants' characteristics such as gender, hospital, age, professionals, etc., and other related variables in relation to the study domains.

4.2.2.1 Differences between domains and hospital

Table (4.17): Differences between domains and hospital

Domain	Hospital	No	Mean	SD	T	Sig.
Source of Knowledge	Al Shifa	80	63.2	11.5	5.088	0.001
	Nasser	70	71.6	8.2		
Level of Knowledge	Al Shifa	80	77.2	8.3	0.190	0.849
	Nasser	70	76.9	9.0		
Attitude of healthcare provider	Al Shifa	80	81.2	8.6	0.837	0.404
	Nasser	70	80.0	7.7		
Practices of healthcare provider	Al Shifa	80	62.8	14.0	4.481	0.001
	Nasser	70	72.2	11.3		
Supervision and Auditing	Al Shifa	80	27.6	21.5	0.977	0.330
	Nasser	70	31.2	24.1		
Test for Healthcare provider knowledge	Al Shifa	80	42.3	24.0	1.520	0.131
	Nasser	70	48.1	23.3		

As demonstrated in Table (4.17), an independent sample t-test was conducted to examine whether there was a statistically significant differences between the study settings in relation to source of knowledge. The test revealed a statistically difference between Al Shifa hospital and Nasser hospital ($t = 5.088$, $p = 0.001$). Nasser hospital ($M= 71.6$, $SD= 8.2$) reported significantly higher levels of source of knowledge rate than the rate sources of Al Shifa ($M= 63.2$, $SD= 11.5$).

As shown in table in the same table, the mean of level of knowledge domain for Al Shifa hospital is 77.2, while the mean for Nasser hospital is 76.9, means are closely to each other and there is no statistical difference (≥0.05) between level of knowledge domain and hospitals (t= 0.190, Sig. = 0.849).

Also as recorded in the table, the mean of attitude of healthcare provider domain for Al Shifa hospital is 81.2, while the mean for Nasser hospital is 80, and there is very small difference between them. There is no statistical difference (≥0.05) between attitude of healthcare provider domain and hospital (t= 0.837, Sig. = 0.404).

The results clarified, the mean of practices of healthcare provider domain for Al Shifa hospital is 62.8, while the mean for Nasser hospital is 72.2. The mean of Nasser hospital for this domain is higher than Al Shifa hospital. There is statistical difference (≤0.05) between practices of healthcare provider domain and hospitals (t= 4.481, Sig. = 0.001). The researcher notices that more adherence to good practices for Nasser hospital than Al Shifa hospital.

As shown, the mean of practices of supervision and auditing domain for Al Shifa hospital is 27.6, while the mean for Nasser hospital is 31.2, despite the mean of Nasser hospital for this domain is higher than Al Shifa hospital but, there is no statistical difference (≥0.05) between supervision and auditing domain and hospitals (t= 0.977, Sig. = 0.330).

Also, the mean for test of knowledge domain for Al Shifa hospital is 42.3, while the mean for Nasser hospital is 48.1. The mean of Nasser hospital for this domain is higher than Al Shifa hospital. There is no statistical difference (≥0.05) between test of healthcare provider knowledge domain and hospitals (t= 0.977, Sig. = 0.330).

4.2.2.2 Differences between domains and gender

As shown in Table (4.18**)**, independent sample t-test was conducted to examine the presence of statistically significant differences among the study gender concerning the mean of the different domains of the questionnaire. the mean of source of knowledge domain for male is 67.3, while the mean for female is 66.8, there is very small difference and there is no statistical difference (≥0.05) between source of knowledge domain and gender (t= 0.228, Sig. = 0.82).

As same as, the mean of level of knowledge domain for male is 77.3 and the mean for female is 76.7 and they are very closely together. There is no statistical difference (≥0.05) between level of knowledge domain and gender (t= 0.423, Sig. = 0.673).

Table (4.18): Differences between domains and gender

Domain	Gender	No	Mean	SD	T	Sig.
Source of Knowledge	Male	99	67.3	10.8	0.228	0.820
	Female	51	66.8	11.3		
Level of Knowledge	Male	99	77.3	9.2	0.423	0.673
	Female	51	76.7	7.4		
Attitude of healthcare provider	Male	99	80.1	8.2	1.098	0.274
	Female	51	81.6	8.1		
Practices of healthcare provider	Male	99	67.0	14.6	0.168	0.866
	Female	51	67.4	11.5		
Supervision and Auditing	Male	99	33.2	25.9	3.008	0.003
	Female	51	21.7	11.9		
Test for Healthcare provider knowledge	Male	99	43.6	23.6	0.978	0.330
	Female	51	47.6	24.1		

The results which recorded in the table regarding attitude domain, the mean of attitude for male is 80.1 and the mean for female is 81.6, the two means are very closely together. There is no statistical difference (≥0.05) between attitude of healthcare provider domain and gender (t=-1.098, Sig. = 0.274). Also for practices domain, the mean of practices of for male is 67.0, and the mean for female is 67.4, the mean of male and female for this domain is nearly equal. There is no statistical difference (≥0.05) between practices of healthcare provider domain and gender (t= 0.168, Sig. = 0.866).

Unlike the previous results, the mean of supervision and auditing domain for male is 33.2, while the mean for female is 21.7, there is noticeable difference between male and female

in this domain, there is statistical difference (≤0.05) between supervision and auditing domain and gender (t= 3.008, Sig. = 0.003). The researcher see our hospitals male are more satisfied on supervision and auditing level than female.

But for test of knowledge domain, the mean for male is 43.6, while the mean for female is 47.6. The mean of female for this domain is higher than male, there is no statistical difference (≤0.05) between test for healthcare provider knowledge domain and gender (t= 0.978, Sig. = 0.33). These findings are consistent with the findings of Tokka & Ahmed (2017) who found that no significant difference in the correct answers between males and females.

4.2.2.3 Differences between domains and age

As shown in Table (4.19), one-way ANOVA test was conducted to examine the presence of statistically significant differences among the study age groups concerning the mean of the different domains of the questionnaire.

Firstly, the overall mean of source of knowledge domain among age groups is 67.1; the highest mean for age group 41 to 45 years is 68.6, the lowest mean for age group 35 or less is 65. There is no statistical difference (≥0.05) between source of knowledge domain and age groups (F= 0.422, Sig. = 0.737).

As shown also, the overall mean of level of knowledge domain among age groups is 77.1; the highest mean for age group 41 to 45 years is 78, the lowest mean for age group 36 to 40 years is 74.9. There is no statistical difference (≥0.05) between level of knowledge domain and age groups (F= 0.843, Sig. = 0.472).

Unlike the previous results, the overall mean of attitude domain among age groups is 80.6; the highest mean for age group more than 45 year is 82.3, the lowest mean for age group 36 to 40 years is 77.1, in general there is statistical difference (≤0.05) between attitude of healthcare provider domain and age groups (F= 2.878, Sig. = 0.038).

The results mentioned give us, the overall mean of practices of healthcare provider domain among age groups is 67.2; the highest mean for age group 36 to 40 years is 69.8, the lowest mean for age group more than 45 years is 65.4, there is no statistical difference (≥0.05) between practices of healthcare provider domain and age groups (F= 0.627, Sig. = 0.599).

Table (4.19): Differences between domains and age

Domain	Age by year	No	Mean	SD	F	Sig.
Source of Knowledge	35 or less	32	65.8	11.2	0.422	0.737
	36 to 40	29	67.4	10.7		
	41 to 45	38	68.6	10.0		
	More than 45	51	66.7	11.7		
	Total	150	67.1	10.9		
Level of Knowledge	35 or less	32	76.9	7.5	0.843	0.472
	36 to 40	29	74.9	9.6		
	41 to 45	38	78.0	7.4		
	More than 45	51	77.7	9.5		
	Total	150	77.1	8.6		
Attitude of healthcare provider	35 or less	32	79.9	8.5	2.878	0.038
	36 to 40	29	77.1	10.2		
	41 to 45	38	81.7	6.7		
	More than 45	51	82.3	7.3		
	Total	150	80.6	8.2		
Practices of healthcare provider	35 or less	32	67.4	14.8	0.627	0.599
	36 to 40	29	69.8	12.2		
	41 to 45	38	67.3	10.3		
	More than 45	51	65.4	15.6		
	Total	150	67.2	13.6		
Supervision and Auditing	35 or less	32	18.8	10.8	5.584	0.001
	36 to 40	29	24.6	19.5		
	41 to 45	38	30.3	24.8		
	More than 45	51	37.8	25.3		
	Total	150	29.3	22.7		
Test for Healthcare provider knowledge	35 or less	32	50.6	23.0	1.289	0.280
	36 to 40	29	40.7	25.6		
	41 to 45	38	47.4	20.4		
	More than 45	51	42.2	25.3		
	Total	150	45.0	23.8		

As shown in the Table (4.19), the overall mean of supervision and auditing domain among age groups is 29.3; the highest mean for age group more than 45 years is 37.8, the lowest mean for age group 35 or less years is 18.8, there is statistical difference (≤0.05) between supervision and auditing domain and age groups (F= 5.584, Sig. = 0.001). Scheffee post hoc test revealed that is a statistically significant difference in the supervision and auditing and between participants of age group 35 or less group and with participants of age group more than 45 years with a score of (mean difference -19.065).

In general, the researcher notices that the higher age gives the higher scoring in this domain, so older participants have more awareness on the importance of supervision and auditing domain.

As shown, the overall mean of test for healthcare provider knowledge domain among age groups is 45.0; the highest mean for (35 or less) is 50.6, the lowest mean for (36 to 40) is 40.7, there is no statistical difference (≥0.05) between test for healthcare provider knowledge domain and age groups (F= 1.289, Sig. = 0.280). A study carried in Sudia Arabia and applied on pharmacists, that revealed the same results of our study that no significant differences between age groups and DDIs test (Alrabiah et al, 2019).

4.2.2.4 Differences between domains and profession

Table (4.20): Differences between domains and profession

Domain	Profession	No	Mean	SD	T	Sig.
Source of Knowledge	Physician	90	67.8	10.8	0.894	0.373
	Pharmacist	60	66.1	11.1		
Level of Knowledge	Physician	90	77.2	7.4	0.196	0.845
	Pharmacist	60	76.9	10.2		
Attitude of healthcare provider	Physician	90	79.2	7.9	2.758	0.007
	Pharmacist	60	82.8	8.2		
Practices of healthcare provider	Physician	90	67.4	13.9	0.311	0.756
	Pharmacist	60	66.7	13.1		
Supervision and Auditing	Physician	90	32.9	26.6	2.449	0.016
	Pharmacist	60	23.8	13.6		
Test for Healthcare provider knowledge	Physician	90	44.7	22.4	0.209	0.834
	Pharmacist	60	45.5	25.9		

As mentioned in Table (4.20), t-test was applied to examine whether there were statistically significant differences among participants between the two professionsin relation to different domains of questionnaire. the mean of source of knowledge domain for physicians is 67.8, while the mean for pharmacists is 66.1, there are very small differences between two means. There is no statistical difference (≥0.05) between source of knowledge domain and professions (t= 0.894, Sig. =0.373). Also very small differences in the level of knowledge domain and the two professionals; for physicians is 77.2, while for pharmacists is 76.9. There is no statistical difference (≥0.05) between level of knowledge domain and professions (t= 0.196, Sig. = 0.845).

As clearly mentioned in the table, there is differences in attitude domain and the two professions, the mean for pharmacists (82.8) is higher than physicians (79.2). There is

statistical difference (≤0.05) between the two professions this domain (t= 2.758, Sig.=0.007).

In contrast, there is small differences for the practices domain between the two professions; physicians (67.4) and pharmacists (66.7). That is revealed no statistical differences between two professions in this domain (t =0.11, Sig= 0.756).

If we notice, despite supervision and auditing domain mean for the two professions is low but there are high differences between them, the mean for physicians (32.9) is higher than pharmacists (23.8). ANOVA test indicated a statistically significant variance between participants in reference to their professions (t =2.449, Sig= 0.016).

The last domain in this table is the test of knowledge, it clarifies there is no statistical differences in relation to professions (t =0.209, Sig= 0.834). The researcher notices the score for this test is low for physicians (44.7) and pharmacists (45.5) and the differences is very low.

4.2.2.5 Differences between domains and scientific degree

As shown in Table (4.21), a one-way ANOVA test was conducted to examine whether there are statistically significant differences among participants in different scientific degrees. The results revealed, there is no statistically significant across the five scientific degrees and source of knowledge domain (F= 0.748, Sig.= 0.561). Diploma degree study participants reported the highest mean (70) and high diploma degree study participants reported the lowest mean (61.9). The researcher opinion that diploma degree study participants have not enough information in their undergraduate course studies in regard to DDIs, so they need more going back for different sources than other scientific degrees.

Despite of the findings revealed that the level of knowledge domain is highest for high diploma and PhD, Board or Fellowship (79.1) and lowest for bachelor (76.1) but the difference statistically is not significant (F= 0.748, Sig.= 0.561). And the same for attitude domain, the difference between scientific degrees is statistically not significant (F= 1.307, Sig.= 0.27), with highest mean for diploma (85.3) and lowest for bachelor and master (79.8). Furthermore, the mean for practices domain is highest for bachelor (68.8) and lowest for PhD and board or fellowship (62.3) and there is no significant difference between scientific degrees (F= 1, Sig.= 0.41).

Table (4.21): Differences between domains and scientific degree

Domain	Scientific degree	No	Mean	SD	F	Sig.
Source of Knowledge	Diploma	8	70.0	7.9	0.748	0.561
	Bachelor	63	67.6	10.4		
	High Diploma	7	61.9	11.8		
	Master	49	67.6	10.8		
	PhD, Board or	23	65.3	13.2		
	Total	150	67.1	10.9		
Level of Knowledge	Diploma	8	77.1	12.3	0.553	0.697
	Bachelor	63	76.2	8.4		
	High Diploma	7	79.1	6.0		
	Master	49	76.9	9.4		
	PhD, Board or	23	79.1	6.5		
	Total	150	77.1	8.6		
Attitude of healthcare provider	Diploma	8	85.3	8.8	1.307	0.270
	Bachelor	63	79.8	8.8		
	High Diploma	7	81.4	10.2		
	Master	49	79.8	8.0		
	PhD, Board or	23	82.7	5.3		
	Total	150	80.6	8.2		
Practices of healthcare provider	Diploma	8	67.7	16.1	1.000	0.410
	Bachelor	63	68.8	11.8		
	High Diploma	7	65.7	14.2		
	Master	49	67.4	13.1		
	PhD, Board or	23	62.3	17.6		
	Total	150	67.2	13.6		
Supervision and Auditing	Diploma	8	25.0	12.7	5.032	0.001
	Bachelor	63	23.8	17.1		
	High Diploma	7	30.6	22.1		
	Master	49	40.4	29.8		
	PhD, Board or	23	21.7	11.5		
	Total	150	29.3	22.7		
Test for Healthcare provider knowledge	Diploma	8	38.8	20.3	0.711	0.586
	Bachelor	63	46.7	22.9		
	High Diploma	7	34.3	15.1		
	Master	49	46.7	24.7		
	PhD, Board or	23	42.2	27.5		
	Total	150	45.0	23.8		

On the other hand, Table (4.21) explored, the supervision domain had highest mean for master degree (40.4) and lowest mean for PhD and board or fellowship (21.7). The difference between scientific degrees is statistically significant (F= 5.032, Sig.= 0.001). Scheffe post hoc test revealed that there is a statistically significant difference in the

overall level of supervision and auditing score and between participants of bachelor degree and with participants of master degree with a score of (mean difference -16.569).

Regarding the test for knowledge domain, the highest scoring for bachelor and master degree with mean (46.7) and the lowest scoring for high diploma with mean (34.3). The difference between scientific degrees scoring is not statistically significant (F= 5.032, Sig.= 0.001).

4.2.2.6 Differences between domains and country of basic graduation

As demonstrated in Table (4.22), one-way ANOVA test was conducted to examine whether there are statistically significant differences among participants in different country of basic graduation. The domain of source of knowledge clarifies that the highest scoring for foreign country as basic graduation is 68.9 and the lowest scoring for Arab country as basic graduation is 65.2, there is no significant differences between countries of basic graduation (F= 1.293, Sig.= 0.278).

Regarding level of knowledge domain, there is very low differences between different countries of basic graduation. There is no statistical difference (≥0.05) between countries of basic graduation regarding of this domain (F= 0.142, Sig. = 0.868).

As the previous domain, the domain of attitude revealed there is very low differences between different countries of basic graduation. There is no statistical difference (≥0.05) between countries of basic graduation regarding of this domain (F= 0.151, Sig. = 0.86).

In regard to the practices domain, the highest scoring for Arab country of basic graduation (68.9) and the lowest scoring for foreign country (65.7). There is no statistical difference (≥0.05) between countries of basic graduation regarding of this domain (F= 0.58, Sig. = 0.561).

However, the results explore in supervision and auditing domain that the highest scoring is for foreign country (38.4) and the lowest scoring for Palestine country (21.5). The difference between countries of basic graduation is statistically significant (F= 5.032, Sig.= 0.001). Scheffe post hoc test revealed that there is a statistically significant difference in the overall level of supervision and auditing score and between participants who were graduated from Palestine and with participants who were graduated from foreign countries with a score of (mean difference -16.906).

The researcher opinion in this difference between Palestine and foreign country of basic graduation, that in our universal studies there is no courses about supervision or auditing and their importance, also the MOH has no focus in her training courses on this subject.

Table (4.22): Differences between domains and country of basic graduation

Domain	Country of basic raduation	No	Mean	SD	F	Sig.
Source of Knowledge	Palestine	67	66.3	10.4	1.293	0.278
	Arab	26	65.2	12.6		
	Foreign	55	68.9	10.8		
	Total	148	67.1	11.0		
Level of Knowledge	Palestine	67	77.3	8.5	0.142	0.868
	Arab	26	77.8	6.2		
	Foreign	55	76.7	9.9		
	Total	148	77.1	8.6		
Attitude of healthcare provider	Palestine	67	81.1	8.4	0.151	0.860
	Arab	26	80.2	8.5		
	Foreign	55	80.4	8.0		
	Total	148	80.7	8.2		
Practices of healthcare provider	Palestine	67	67.8	12.2	0.580	0.561
	Arab	26	68.9	11.1		
	Foreign	55	65.7	16.3		
	Total	148	67.2	13.7		
Supervision and Auditing	Palestine	67	21.5	13.4	9.332	0.000
	Arab	26	28.8	20.0		
	Foreign	55	38.4	28.9		
	Total	148	29.1	22.7		
Test for Healthcare provider knowledge	Palestine	67	47.2	24.4	0.558	0.574
	Arab	26	44.2	23.4		
	Foreign	55	42.7	22.3		
	Total	148	45.0	23.4		

Despite that in the last domain of knowledge test, there is no statistically significant between the country of graduation (F= 0.558, Sig.= .574), but the Palestine has the highest scoring in this domain (47.4) and foreign country has the lowest scoring (42.7). From the researcher's point of view, the previous results indicate in somewhat education in Palestine is at good level comparing to other countries. The similar findings in Sudian Arabian study, that revealed there is no significant differences between country of graduation and score of DDIs test (Alrabiah et al, 2019).

4.2.2.7 Differences between domains and experience years in internal medicine department

As mentioned in Table (4.23), there is no significant differences in the study participants between experience in internal medicine department groups (F= 0.186, Sig= 0.906). However, we can notice very small differences between experience groups but the experience group from 11 to 15 years has the highest mean (67.9).

With regard to level of knowledge domain, there is significant differences between internal medicine experience (F= 2.633, Sig= 0.05), the highest scoring is recorded for more than 15 years experience (80) and lowest scoring is recorded for 11 to 15 years' experience (75.2).

As reported in the table regarding attitude domain, although the participants with experience more than 15years have the highest mean (82.3) comparing to the lowest mean (79.3) for 6 to 10 years and 11 to 15 years but, the difference between them is not significant (F= 1.083, Sig= 0.358). Also when comparing the groups of experience in practices domain, the researcher notice that the highest mean (68.2) is for more than 15 years' experience and the lowest mean (65.8) is for 5 or less years' experience and there are no significant differences between different experience in internal medicine groups ((F= 0.315, Sig= 0.814).

In contrast, the results of supervision and auditing domain revealed that the mean for the two groups which have higher experience also have higher mean; IMD experience from 11 to 15 years (41.4) and more than 15 years (35.9). The two groups which have lower experience also have lower mean; 5 or less years IMD experience (23.5) and from 6 to 10 years (24.8). There is significant difference between different IMD experience (F= 4.995, Sig= 0.003). Scheffe post hoc test revealed that there is a statistically significant difference in the overall level of supervision and auditing score and between participants who had experience 5 years or and with participants who had experience 11 to 15 years with a score of (mean difference -17.922).

According to the previous, the researcher notice; study participants who have higher IMD experience also having the higher scoring in supervision and auditing domain, in my opinion that is caused by the awareness for more experienced participants for the importance of the supervision and auditing.

Table (4.23): Differences between domains and experience years in internal medicine department

Domain	Experience years in Internal Medicine Department	No	Mean	SD	F	Sig.
Source of Knowledge	5 or less	55	67.3	11.0	0.186	0.906
	From 6 to 10	38	67.6	10.6		
	From 11 to 15	20	67.9	7.5		
	More than 15	37	66.0	12.9		
	Total	150	67.1	10.9		
Level of Knowledge	5 or less	55	75.4	9.7	2.633	0.050
	From 6 to 10	38	77.7	8.4		
	From 11 to 15	20	75.2	7.8		
	More than 15	37	80.0	6.6		
	Total	150	77.1	8.6		
Attitude of healthcare provider	5 or less	55	80.9	9.3	1.083	0.358
	From 6 to 10	38	79.3	8.1		
	From 11 to 15	20	79.3	7.1		
	More than 15	37	82.3	7.0		
	Total	150	80.6	8.2		
Practices of healthcare provider	5 or less	55	65.8	14.1	0.315	0.814
	From 6 to 10	38	68.2	11.2		
	From 11 to 15	20	67.2	16.6		
	More than 15	37	68.1	13.7		
	Total	150	67.2	13.6		
Supervision and Auditing	5 or less	55	23.5	17.3	4.995	0.003
	From 6 to 10	38	24.8	19.1		
	From 11 to 15	20	41.4	27.8		
	More than 15	37	35.9	26.7		
	Total	150	29.3	22.7		
Test for Healthcare provider knowledge	5 or less	55	44.5	23.6	1.117	0.344
	From 6 to 10	38	49.2	22.3		
	From 11 to 15	20	48.0	23.8		
	More than 15	37	39.7	25.4		
	Total	150	45.0	23.8		

For test of knowledge domain, despite there is a noticeable difference between IDM experience groups; the highest mean (49.2) from 6 to 10 years and the lowest mean (39.7) more than 15 years but there is no significant difference between IDM experience groups (F= 1.117, Sig= 0.344)

4.2.2.8 Differences between domains and total years' experience

The study results in Table (4.24) showed, a one-way ANOVA test was conducted to examine the presence of statistically significant differences among the study participants total experience regarding of different domains of the questionnaire. Regarding source of knowledge domain, group of total experience (16 to 20) years reported the highest mean (68.6) while the participants group of total experience (more than 20) years reported the lowest mean (64.7), there is no statistical difference between total experience groups (F= 0.656, Sig= 0.58).

The findings reported in regarding of the level of knowledge, there is significant difference between total experience groups (F= 2.814, Sig= 0.041); higher means is reported for the two groups (16 to 20) and (more than 20) years and the lower means is reported for the two groups (less than 10) and (10 to 15) years. In general, more experience gives more scoring in this domain.

In Table (4.24), attitude domain like the previous domain, there is significant difference between total experience years (F= 2.634, Sig= 0.05); higher means is reported for the two groups (16 to 20) and (more than 20) years and the lower mean is reported for the two groups (less than 10) and (10 to 15) years. In general, more experience gives more scoring in this domain.

As shown in the table, regarding the practices domain, there is very small differences between the groups of total experience, mean for the total experience groups from low experience to high experience respectively are (66.3, 67.2, 67.4,68), there is no statistical difference between total experience groups (F= 0.083, Sig= 0.969).

However, the table explore in the supervision and auditing domain that the highest scoring for more than 20 years' experience is 34.6 and the lowest scoring for less than 10 years' experience is 19.2. The difference between total experience groups are statistically significant (F= 3.269, Sig.= 0.023). The researcher notices that in general the higher total experience for participants gives higher scoring in this domain.

Finally, the table explore in the test of knowledge domain that the highest scoring for less than 10 years' experience (51.7) and the lowest scoring for 16 to 20 years' experience (41.8). The difference between total experience groups is statistically significant (F= 1.304, Sig.= 0.275). The researcher notice that in general the lower total experience for

participants gives higher scoring in this domain. These findings are consistent with the results of a study by Adisa & Fakeye (2006), showed that community pharmacists (less than 10) years who had in-job experience and practice also had better knowledge than pharmacists who had more than 10 years of professional practice. By contrast in the other study, that revealed there is no significant differences between years of practice and score of DDIs test (Alrabiah et al, 2019).

Table (4.24): Differences between domains and total years' experience

Domain	Total years' experience	No	Mean	SD	F	Sig.
Source of Knowledge	less than 10	35	66.9	11.5	0.656	0.580
	From 10 to 15	50	67.3	10.3		
	From 16 to 20	40	68.6	10.7		
	More than 20	25	64.7	12.0		
	Total	150	67.1	10.9		
Level of Knowledge	less than 10	35	75.1	8.8	2.814	0.041
	From 10 to 15	50	75.6	9.2		
	From 16 to 20	40	79.9	8.5		
	More than 20	25	78.2	6.1		
	Total	150	77.1	8.6		
Attitude of healthcare provider	less than 10	35	78.5	7.4	2.634	0.050
	From 10 to 15	50	79.9	9.5		
	From 16 to 20	40	83.5	6.8		
	More than 20	25	80.6	7.5		
	Total	150	80.6	8.2		
Practices of healthcare provider	less than 10	35	66.3	13.1	0.083	0.969
	From 10 to 15	50	67.2	13.4		
	From 16 to 20	40	67.4	14.4		
	More than 20	25	68.0	14.0		
	Total	150	67.2	13.6		
Supervision and Auditing	less than 10	35	19.2	12.3	3.269	0.023
	From 10 to 15	50	32.3	22.9		
	From 16 to 20	40	31.1	27.9		
	More than 20	25	34.6	21.4		
	Total	150	29.3	22.7		
Test for Healthcare provider knowledge	less than 10	35	51.7	23.3	1.304	0.275
	From 10 to 15	50	44.2	24.7		
	From 16 to 20	40	41.8	22.7		
	More than 20	25	42.4	23.9		
	Total	150	45.0	23.8		

4.2.2.9 Differences between domains and position

As shown in Table (4.25), one-way ANOVA test was conducted to examine whether there are statistically significant differences among participants in different position degrees. The results revealed, there is statistically significant across the four position degrees and

source of knowledge domain (F= 5.789, Sig.= 0.001) Scheffe post hoc test revealed that there is a statistically significant difference in the overall level of source of knowledge score and between participants who had head of division position and with participants who had technican postion degree with a score of (mean difference 8.395).

Despite of the test revealed that the level of knowledge domain is highest for head of departments (78.1) and lowest for director of department (75.4) but the difference statistically is not significant (F= 0.508, Sig.= 0.677). And the same for attitude domain, the difference between positions statistically is not significant (F= 0.667, Sig.= 0.574), with highest mean for director of department (83.2) and lowest for head of division (78.8). Furthermore, the mean for practices domain is highest for head of division (71.4) and lowest for director of department (61.4) and there is no significant difference between positions (F= 1.977, Sig.= 0.12).

On the other hand, Table (4.25) explored, the supervision and auditing domain have highest mean for head of department (35.3) and lowest mean for technical (23.7). The difference between positions is statistically significant (F= 2.707, Sig.= 0.048). Also, Regarding the test for knowledge domain, the highest scoring for technical with mean is 50.5 and the lowest scoring for head of department with mean is 37.9. The difference between positions is statistically significant (F= 2.813, Sig.= 0.041), the researcher concludes that technical have the highest scoring in DDIs test because they are more practicing pharmaceutical information than other managerial degrees. Scheffee post hoc test revealed that is a statistically significant difference in the test of DDIs and between participants of head of departments and with participants of technical position with a score of (mean difference -12.57).

Table (4.25): Differences between domains and position

Domain	Position	No	Mean	SD	F	Sig.
Source of Knowledge	Director of ddedepartment	5	77.3	11.2	5.789	0.001
	Head of department	52	66.6	12.3		
	Head of division	27	72.8	5.7		
	Technical	66	64.4	10.3		
	Total	150	67.1	10.9		
Level of Knowledge	Director of department	5	75.4	21.9	0.508	0.677
	Head of department	52	78.1	7.3		
	Head of division	27	75.9	7.6		
	Technical	66	76.8	8.6		
	Total	150	77.1	8.6		
Attitude of healthcare provider	Director of department	5	83.2	5.8	0.667	0.574
	Head of department	52	81.1	7.7		
	Head of division	27	78.8	7.8		
	Technical	66	80.8	8.8		
	Total	150	80.6	8.2		
Practices of healthcare provider	Director of department	5	61.4	19.4	1.977	0.120
	Head of department	52	68.4	14.8		
	Head of division	27	71.4	10.9		
	Technical	66	64.9	12.8		
	Total	150	67.2	13.6		
Supervision and Auditing	Director of department	5	32.9	10.8	2.707	0.048
	Head of department	52	35.3	25.9		
	Head of division	27	30.7	28.8		
	Technical	66	23.7	16.1		
	Total	150	29.3	22.7		
Test for Healthcare provider knowledge	Director of department	5	44.0	27.0	2.813	0.041
	Head of department	52	37.9	22.7		
	Head of division	27	45.6	18.9		
	Technical	66	50.5	25.2		
	Total	150	45.0	23.8		

4.2.2.10 Differences between domains and receiving training

As mentioned in table (4.26), t-test was applied to examine whether there were statistically significant differences among participants who received training and others who did not receive training in relation to different domains of questionnaire. The mean of source of knowledge domain for participants who received training is 71.6, while the mean for who did not receive training is 66.3, there is statistical difference (≤0.05) between patients who received training and who did not receive training regarding source of knowledge domain (t= 2.203, Sig. =0.029).

In contrast, there is no differences for the level of knowledge domain between who received training or not, the mean for them is the same (77.1). The results revealed no statistical differences between two professions in this domain (t =0.03, Sig= 0.976).

Table (4.26): Differences between domains and receiving training

Domain	Training	No	Mean	SD	T	Sig.
Source of Knowledge	Yes	24	71.6	7.8	2.203	0.029
	No	126	66.3	11.3		
Level of Knowledge	Yes	24	77.1	11.5	0.030	0.976
	No	126	77.1	8.0		
Attitude of healthcare provider	Yes	24	83.2	7.0	1.670	0.097
	No	126	80.1	8.3		
Practices of healthcare provider	Yes	24	71.4	16.0	1.666	0.098
	No	126	66.4	13.0		
Supervision and Auditing	Yes	24	42.6	25.5	3.217	0.002
	No	126	26.8	21.4		
Test for Healthcare provider knowledge	Yes	24	43.8	24.6	0.280	0.780
	No	126	45.2	23.7		

As mentioned in Table (4.26), Regarding attitude, there is small differences for the attitude domain between who received training or not; received training mean is 83.2 and who did not receive training mean is 80.1. These results revealed no statistical differences between them in this domain (t =1.67, Sig= 0.097).

Despite, there is differences in the practices domain between who received training or not; received training mean is 71.4 and who did not receive training mean is 66.4 but, there is no statistical differences between them in this domain (t =1.666, Sig= 0.097).

As mentioned regarding supervision and auditing domain, higher mean is noticed for who received training (42.6) and lower mean for who did not receive training (26.8). There is statistical difference (≤0.05) in relation to receiving training or not (t= 3.217, Sig. =0.002). According to previous results, the researcher concludes the study training who received training have more awareness regarding the importance of supervision and auditing domain.

The last domain in this table is the test of knowledge, it clarifies there is no statistical differences in relation to receiving training (t =0.28, Sig= 0.78). The researcher notices the score of this test for them is close together and the difference is very low.

4.2.2.11 Association between availability of approved and written therapeutic protocols at the MOH and Hospital

Table (4.27): Association between availability of approved and written therapeutic protocols at the MOH and hospital

Hospital	Yes		No		I do not know		X^2	Sig.
	No	%	No	%	No	%		
Al Shifa	31	40.3	30	65.2	19	70.4	11.047	0.004
Nasser	46	59.7	16	34.8	8	29.6		
Total	77	100.0	46	100.0	27	100.0		

Table (4.27) shows association between availability of approved and written therapeutic protocols at the MOH and Hospital, among study participants who answered Yes; the higher proportion (59.7%) of them are from Nasser hospital and the lower proportion (40.3%) are from Al Shifa hospital, despite the higher proportion of study from Al Shifa hospital but the results are more positively for Nasser hospital. There is statistical correlation between availability of approved and written therapeutic protocols at the MOH and Hospitals ($\mathbf{X^2}$ = 11.047, Sig. = 0.004 ≤ 0.005).

4.2.2.12 Association between availability of approved and written therapeutic protocols at the MOH and personal data

As recorded in Table (4.28), by comparing two gender regarding awareness of study participants with the availability of approved and written therapeutic protocols at the MOH, the result revealed higher male percent (59.7%) who answer yes compared with female who answer yes (40.3%). There is statistical correlation between the awareness of availability of approved and written therapeutic protocols at the MOH and gender ($\mathbf{X^2}$= 8.312, Sig= 0.016≤ 0.005).

As recorded in Table (4.28), By comparing the age groups regarding awareness of study participants with the availability of approved and written therapeutic protocols at the MOH, the result recorded yes answer; the highest percent (28.6%) at age more than 45 years and the lowest percent (19.5%) at age 35 years or less. There is no statistical correlation between the awareness of availability of approved and written therapeutic

protocols at the MOH and age (X^2= 5.534, Sig= 0.477≥ 0.005). The researcher notices, despite no significant correlation but, the higher age group give higher percent of study participants who aware about the availability of MOH protocols and this is logical results.

There is statistical correlation between availability of approved and written therapeutic protocols at the MOH and profession (X^2= 17.624, Sig. = 0.001 ≤0.005). Highlighting on results, among study participants who answer No; 84.8% of them are physicians and 15.2% are pharmacists.

As the same as the previous for scientific degree, there is significant statistical correlation between availability of approved and written therapeutic protocols at the MOH and scientific degree (X^2 = 27.366, Sig. = 0.001 ≤0.005). Highlighting on results, among study participants who answer Yes; the highest percent (46.8%) for bachelor and the lowest percent for high diploma (2.6%), as we notice there is high difference between the two mentioned percent but that is due to higher number with bachelor participants compared to high diploma participants.

In Table (4.28), there is statistical correlation between availability of approved and written therapeutic protocols at the MOH and country of basic graduation (X^2 = 19.326, Sig. = 0.001 ≤0.005.

Moreover, there is statistical correlation between availability of approved and written therapeutic protocols at the MOH and country of basic graduation (X^2 = 19.326, Sig. = 0.001 ≤0.005). Among study participants who answer Yes, the highest proportion (57.9%) of them are Palestine basic graduation.

Also, there is statistical correlation between availability of approved and written therapeutic protocols at the MOH and number of years in IMD (X^2 = 17.555, Sig. = 0.007 ≤0.005). Among study participants who answer Yes, the highest proportion (46.8%) of them are 5 years or less and the lowest proportion are more than 15 years.

Table (4.28): Association between availability of approved and written therapeutic protocols at the MOH and personal data

Demographic Data	Yes		No		I do not know		X^2	Sig.
	No	%	No	%	No	%		
1. Gender								
Male	46	59.7	38	82.6	15	55.6	**8.312**	**0.016**
Female	31	40.3	8	17.4	12	44.4		
Total	**77**	**100.0**	**46**	**100.0**	**27**	**100.0**		
2. Age								
35 years and less	15	19.5	11	23.9	6	22.2	**5.534**	**0.477**
36 to 40 years	20	26.0	5	10.9	4	14.8		
41 to 45 years	20	26.0	12	26.1	6	22.2		
More than 45 years	22	28.6	18	39.1	11	40.7		
Total	**77**	**100.0**	**46**	**100.0**	**27**	**100.0**		
3. Profession								
Physician	36	46.8	39	84.8	15	55.6	**17.624**	**0.001**
Pharmacist	41	53.2	7	15.2	12	44.4		
Total	**77**	**100.0**	**46**	**100.0**	**27**	**100.0**		
4. Scientific degree								
Diploma	6	7.8	1	2.2	1	3.7	**27.366**	**0.001**
Bachelor	36	46.8	15	32.6	12	44.4		
High Diploma	2	2.6	5	10.9	0	0.0		
Master	30	39.0	10	21.7	9	33.3		
Doctorate and Board or Fellowship	3	3.9	15	32.6	5	18.5		
Total	**77**	**100.0**	**46**	**100.0**	**27**	**100.0**		
5. Country of basic graduation								
Palestine	44	57.9	9	19.6	14	53.8	**19.326**	**0.001**
Arab countries	8	10.5	14	30.4	4	15.4		
Foreign Countries	24	31.6	23	50.0	8	30.8		
Total	**77**	**100.0**	**46**	**100.0**	**27**	**100.0**		
6. Number of experience years in Internal Medicine Department								
5 years and less	36	46.8	13	28.3	6	22.2	**17.555**	**0.007**
From 6 to 10 years	20	26.0	11	23.9	7	25.9		
From 11 to 15 Years	11	14.3	3	6.5	6	22.2		
More than 15 years	10	13.0	19	41.3	8	29.6		
Total	**77**	**100.0**	**46**	**100.0**	**27**	**100.0**		
7. Number of total experience years								
Less than 10 years	16	20.8	11	23.9	8	29.6	**7.721**	**0.259**
From 10 to 15 years	33	42.9	11	23.9	6	22.2		
From 16 to 20 years	19	24.7	14	30.4	7	25.9		
More than 20 years	9	11.7	10	21.7	6	22.2		
Total	**77**	**100.0**	**46**	**100.0**	**27**	**100.0**		
8. Receiving training								
Yes	21	27.3	3	6.5	0	0.0	**15.498**	**0.001**
No	56	72.7	43	93.5	27	100.0		
Total	**77**	**100.0**	**46**	**100.0**	**27**	**100.0**		

In contrast, there is no statistical correlation between availability of approved and written therapeutic protocols at the MOH and number of total experience years ($\mathbf{X^2}$ = 7.721, Sig. = 0.259 ≥0.005).

Finally, there is statistical correlation between availability of approved and written therapeutic protocols at the MOH and receiving training ($\mathbf{X^2}$ = 15.498, Sig. = 0.001 ≤0.005). Among study participants who answer Yes, the higher proportion (72.7%) of them did not receiving training and the lowest proportion received training.

4.3 Analysis of abstract data sheet

This chapter presents the basic results of the study by organized tables and figures in a comparative way; it shows the descriptive analysis for study participants characteristics to reflect the real situation of patients and their prescriptions in the MOH hospitals. Furthermore, it includes the relationships between different studied variables concerning polypharmacy.

4.3.1 Descriptive analysis for abstract data sheet

4.3.1.1 Characteristics of the study population according to socio-demographic characteristics

This study assessed a total of 600 prescriptions of patients who discharged from internal medicine departments of Al Shifa and Nasser hospitals, these prescriptions had one or more drugs. The prescriptions sample size of the study was determined by WHO standard which is reported regarding drug utilization studies in health facilities and this is the minimum sample size according to the standard (WHO, 1993).

As shown in Table (4.29), the results showed that 275 (45.8%) of paients were males and 325 (54.2%) were females, a similar study was conducted in Gaza strip at primary health care centers in UNRWA that revealed the female patients (61.8%) were higher than male patients as the current study (Satoom, 2017) and also similar to the Northern Ethiopia study results which reported higher female (52.2%) than male (Gebretsadik et al, 2017).

The study participants age mean is 51.66±21.94 (MD 56). According to age groups; 34% aged 40 years and less, 33.3% aged 41 to 65 years and 32.7% aged above 65 years.

As recorded in the Table (4.29) that half of participants (50.2%) were from Gaza and the other half (49.8%) were from South area, that results because the participants are staying at

the same area of the hospital, Gazian patients attended to Al Shifa hospital but, the south patients attended to Nasser hospital.

Table (4.29): Distribution of the abstract data sheet according to personal data

Items	No	%
Hospital		
Al Shifa	300	50.0
Nasser	300	50.0
Total	**600**	**100.0**
Gender		
Male	275	45.8
Female	325	54.2
Total	**600**	**100.0**
Age		
40 years and less	204	34.0
From 41 to 65 years	200	33.3
Above 65 years	196	32.7
Total	**600**	**100.0**
Mean= 51.66, MD= 56.00, SD= 21.94		
Governorates		
Gaza	301	50.2
South	299	49.8
Total	**600**	**100.0**

4.3.1.2 Diagnosis of cases based on ICD-10 classification

As mentioned in Table (4.30), the results indicated that most frequently diseases which appeared in the prescriptions for our study participants from the all diagnosed diseases which are over 10%; Circulatory System (28.1%), Respiratory System (18.9%), Endocrine, Nutritional and Metabolic (10.9%).

On the other hand, the least frequency diseases which diagnosed in the prescriptions for our study participants from the all diagnosed diseases; Eye and adnexa (0.1%), Pregnancy, Childbirth, and puerperium (0.1%) and Neoplasms (0.7%).

Table (4.30): Frequency of diagnosed diseases for cases

Diseases	ICD10	Diagnosis I		Diagnosis II		Diagnosis III		Total of diagnosis frequency/ 600 prescription	
		No	%	No	%	No	%	No	%
Certain infectious and parasitic	A00-B99	53	8.8	8	6.2	2	5.1	63	8.2
Neoplasms	C00-D48	4	0.7	1	0.8	-	-	5	0.7
Blood and Blood – Forming organs and certain disorders	D50-D89	24	4.0	2	1.5	-	-	26	3.4
Endocrine, Nutritional and Metabolic	E00-E90	48	8.0	27	20.8	9	23.1	84	10.9
Mental and behavioral disorder	F00-F99	5	0.8	3	2.3	-	-	8	1.0
Nervous System	G00-G99	20	3.3	3	2.3	1	2.6	24	3.1
Eye and adnexa	H00-H59	1	0.2	-	-	-	-	1	0.1
Circulatory System	I00-I99	146	24.3	55	42.3	15	38.5	216	28.1
Respiratory System	J00-J99	131	21.8	11	8.5	3	7.7	145	18.9
Digestive System	K00-K93	58	9.7	7	5.4	2	5.1	67	8.7
Skin and subcutaneous tissue	L00-L99	8	1.3	-	-	-	-	8	1.0
Musculoskeletal system and connective tissue	M00-M99	5	0.8	2	1.5	-	-	7	0.9
Genitourinary System	N00-N99	50	8.3	6	4.6	6	15.4	62	8.1
Pregnancy, Childbirth, and puerperium	O00-O99	0	0.0	1	0.8	-	-	1	0.1
Symptoms. Signs and abnormal clinical and laboratory findings	R00-R99	25	4.2	4	3.1	1	2.6	30	3.9
Injury, Poising and certain other consequences of external cause	S00-T98	16	2.7	-	-	-	-	16	2.1
Factors influencing health status and contact with health services	Z00-Z99	6	1.0	-	-	-	-	6	0.8
Total		**600**	**100.0**	**130**	**100.0**	**39**	**100.0**	**769**	**100**

4.3.1.3 Distribution of prescribed drugs according to their classification groups

Table (4.31): Distribution of prescribed drugs according to their classification groups

Drug group	No	% of total No of prescriptions	Most frequent drugs examples in prescriptions	
Antibiotic	446	74	Cefuroxime, Azithromycin,Levofloxacin, Ciprofloxacin	
Cardiovascular Drugs	903	151	Beta adrenergic blocking	Bisoprolol
			Calcium channel blocker	Amlodipine
			ACE inhibitors	Enalapril
			Nitrates	Isosorbide mono-nitrate
			ARBs	Valsartan
			Anti-Platelets	Acetylsalicylic acid, Clopidogrel
			Diuretics	Furosemide, Spironalactone
			Anti-Lipidemic	Atorvastatin, Rousvastatin
			Anti-Coagulants	Warfarin
Drugs acting on GIT diseases	284	47	Anti-Acidity	Omeprazole, Esomeprazole
			Laxatives	Lactulose
			Anti-Spasmodic	Hyoscine-N-butyl bromide
Anti-inflamatory and analgesics	198	33	Corticosteroids	Prednisone, Budesonide
			Anti-Gout	Allopurinol, Colchicin
Drugs acting on respiratory system	124	21	Bronchodilators	Formoterol fumarate, Salbutamol
			Anti-Tussive	Dried Ivy leaf extract, Ammonium chloride, Acetylcysteine
Drugs acting on endocrine system	106	18	Anti-Diabetics:	Insulin, Metformin
Food supplement	106	18	Multivitamins	Vitamins
			Minerals	Ferrous sulphate
Drugs acting on CNS	29	5	Anti-Convulsant	Carbamazepine, Valproic acid
Anti-Allergic drugs	16	3	H1 Antagonist	Chlorpheneramine, Loratidine
Others	69	12	Immunosuppresant, Anti-malarial, …	

Table (4.31) showed that the most prescribed drug group which had the higher frequency in the prescriptions was Antibiotics 446 (74%) of total prescriptions, followed by

Cardiovascular drugs which is recorded in 392 (65.3%) prescriptions, then Anti-Acidity which is recorded in 245 (40.8%) prescriptions also, Anti-Platlets which is recorded in 202 (33.7%) prescriptions and Duretics which is appeared 135 (22.5%) times.

4.3.1.4 Distribution of the most common prescribed drugs

This section shows the frequency of the most drugs that prescribed in discharge sheet, the annex (10) shows the frequency of all drugs which prescribed for all patients who are participated in this study

Table (4.32): Distribution of the most prescribed drugs

No	Drugs	No	% of total no of prescriptions
1	Acetylsalicylic acid	159	26.5
2	Bisoprolol	140	23.3
3	Cefuroxime	118	19.7
4	Omeparzole	106	17.7
5	Atorvastatin	92	15.3
6	Furosemide	86	14.3
7	Esomeparzole	84	14.0
8	Amlodipine	77	12.8
9	Azithromycin	66	11.0
10	Acetaminophen	62	10.3
11	Insulin	58	9.7
12	Levofloxacin	55	9.2
13	Prednisone	55	9.2
14	Ciprofloxacin	51	8.5
15	Enalapril	47	7.8
16	Pantoprazole	45	7.5
17	Minerals	43	7.2
18	Spironalactone	40	6.7
19	Clopidogrel	38	6.3
20	Isosorbide-5-monoitrate	34	5.7

Table (4.32) showed that the five prescribed drugs which had the higher frequency in the prescriptions were Acetyl salicylic acid 100mg 159 (26.5%) of total prescriptions, followed by Bisoprolol which is recorded in 140 (23.3%) prescriptions, then Cefuroxime which is recorded in 118 (19.7%) prescriptions also, Omeprazole which is recorded in 106 (17.7%) prescriptions and Atorvastatin which is appeared 92 (15.3%) times.

A similar study was performed at UNRWA primary healthcare clinics in Gaza Strip which revealed the most five drugs which were prescribed Acetylsalicylic Acid 100mg, Enalapril, Acetaminophen, Insulin and Atenelol with frequency in the prescriptions respectively 87.5%, 63.7%, 59.4%,52.9% and 45%. The cause of differences that in UNRWA study, the

prescriptions with less than 5 drugs were excluded, the study conducted on elderly patients also, the prescribed drugs are related to what is available in UNRWA clinics (Satoom, 2017).

Another study was conducted at MOH clinics in Gaza Strip that recorded the most five drugs between chronic eldely were Enalapril, Acetylsalicylic Acid 100mg, Atorvastatin, Glibenclamide and Metformin with frequency in respectively 39.3%, 37.3%, 31.9%, 26.8% and 25.4% (Taleb et al., 2014). In general, the three Gaza studies showed the most prescribed drugs between patients regardless who are the targeted group was Anti-Platelets drug (Acetylsalicylic Acid100mg).

4.3.1.5 Distribution of the study participants by number of diseases, drugs and length of stay

Table (4.33): Distribution of the study participants by number of diseases, drugs and length of stay

Items	No	%
Number of Diseases		
One Disease	454	75.7
More than One	146	24.3
Total	**600**	**100.0**
Mean= 1.32, MD= 1.00, SD= 0.61		
Number of prescribed drugs		
One drug	68	11.3
From 2 to 4 drugs	326	54.3
Five or more	206	34.3
Total	**600**	**100.0**
Mean= 3.84, MD= 4.00, SD= 1.91		
Length of Stay (day)		
1-3	309	51.5
>3	291	48.5
Total	**600**	**100.0**
Mean= 4.06, MD= 3.00, SD= 2.45		

As recorded in Table (4.33), the findings show that patients who diagnosed with one disease were about three quarters (75.7%) but, patients who diagnosed with more than one disease were about one quarter (24.3%).

Regarding number of prescribed drugs in the prescriptions, among the prescriptions included in this study, the minimum number was one drug and the maximum number was 9 drugs, with a mean number of drugs per prescription was 3.84 (MD 4.00, SD 1.91), the results show that patients who were prescribed one drug (11.3%), patients who were prescribed drugs 2 to 4 were (54.3%) and about third of patients (34.3%) were prescribed 5 drugs or more. The average number of prescribed drugs (3.84) of this study is higher than the result reported from Northren Ethiopia which revealed average number of prescribed drugs is 2.73 (Gebretsadik et al, 2017).

Some studies that applied in Palestine regarding patterns of prescribing revealed that the number of prescribed drugs in prescription was within WHO standards (< 2 drugs for the prescription). The number of the prescribed drugs was 2.7 per prescription (Elbaba ,2012), 1.9 per prescription (Khatib et al., 2008), 1.92 prescribed drugs per prescription (Fattouh & Abu Hamad, 2010) and 2.55 drugs per prescription (Obeidalla et al., 2000). Also a study was conducted in governmental Gaza hospitals which revealed that average number of prescribed drugs in the in-patient medication sheet is 5.21 (Al-Khodary, 2016).

Regarding length of stay for patients the table shows that the total mean for length of stay is 4.06 days (MD 3.00, SD 2.45). About half (51.5%) of patients who stayed one to three days and the other half (48.5%) stayed more than three days.

4.3.1.6 Distribution of the prescriptions according to presence of DDIs and their types.

The researcher used Medscape drug checker services to categorize DDIs, this program is the major online global destination made for physicians, pharmacists and other healthcare providers worldwide, providing the newest medical information and expert perspectives regarding drugs, diseases and relevant professional education. Also it offers a lot of health services and tools, as example of these tools is drug-drug interaction checker. The drug interaction checker program does not endorse drugs, diagnoses the disease or suggests therapy. The service which provided is informational source designed to help different healthcare providers in providing good care for patients and providing them with drugs

specific information. Healthcare providers should use their experience and professional judgment in using the provided information.

The drug interaction checker explores the mechanism for each drug interaction and makes classification for it into (minor, significant and serious). It may provide in some cases recommended course of action to enable healthcare provider to manage the exist interaction. The mentioned program also displays if there are any interactions between chosen drugs and between drugs and food (Medscape, 2020). A significant DDIs is defined as any unexpected, unintended, undesired or excessive response for drugs that require discontinuing one drug or the combination (therapeutic or diagnostic), requires to change the drug therapy, modifying the dose (except for minor dosage adjustments), admission to a hospital is necessary, diagnosis complicates significantly, prognosis is affected negatively or temporary or permanent harm, disability or death. A strong or serious DDIs defined as any interaction that is unexpected, undesired or excessive response to a combination of drugs that requires to discontinue the drugs (Avoid or use alternate combination). But minor interaction is unlikely to be clinically significant and it is supported by limited and/or conflicting data (Medscape, 2020).

Table (4.34): Distribution of the prescriptions according to presence of DDIs and their types

Classification of DDIs	**Yes**		**No**		**Total**	
	No	**%**	**No**	**%**	**No**	**%**
Minor Interaction	134	22.3	466	77.7	600	100
Significant	339	56.5	261	43.5	600	100
Serious	78	13.0	522	87	600	100
DDIs result	**365**	**60.8**	**235**	**39.2**	**600**	**100**

As shown in Table (4.34), the majority of prescriptions in the study clarifies different types of DDIs. As recorded that about (60.8%) of patient prescriptions had at least one DDI and about (39.2%) of patient prescriptions had not any type of interaction. Among prescriptions which had DDIs; 22.3% of prescriptions had at least one minor DDI, 56.5% of prescriptions had at least one significant DDI and 13% of prescriptions had at least one serious DDI.

Generally, the researcher notices that high percentage of prescriptions had DDIs and he explained that these results due to low awareness of physicians, pharmacists and healthcare providers regarding drugs and their interactions. And they need continuous training to elevate their information and awareness.

From the current study, prescriptions with DDIs is higher in comparison to similar study performed in Northern Ethiopia that 45.9% of the medication orders had DDIs from major to minor (Gebretsadik et al, 2017). On the other hand, study that applied on elderly clients at UNRWA primary healthcare centers in Gaza strip that revealed 93.9% had DDIs (Satoom, 2017), also study from Iran that revealed 91.43% of patients have shown DDIs; in fact, the study of Gaza strip targeted elderly patients and Iran study targeted the ICU (Hasanloei et al, 2014). Other study from India published 69.3% of prescribed medications had potential DDIs in tertiary care hospitals, yet this results is higher than our current study (Rajani et al, 2016). However, study which applied on community and hospital pharmacy in Pakistan revealed that 40% of the prescriptions had DDIs, this is lower by comparing with findings of current study, the difference between two studies might be due to difference in the targeted institutions: the study of Pakistan involved community pharmacies but in current studies they were not considered (Kafeel et al, 2014).

From the current study findings for percentages of prescriptions with minor, significant and serious DDIs, in comparison to findings from Northern Ethiopia provided higher in minor and significant DDIs but lower in serious DDIs; the results of Northern Ethiopia study 24.65%, 59.5% and 9.3% minor, significant and serious DDIs (Gebretsadik et al, 2017). But comparing with Gaza strip study which applied on UNRWA primary health care centers which revealed higher rate of minor, significant and serious DDIs; the results were 72%, 77.8% and 69.2% respectively. In fact, the difference in results of current study and the UNRWA study because the study of UNRWA targeted elderly patients but current study targeted all ages groups (Satoom, 2017).

4.3.2 Inferential Statistics of Abstract data sheet

4.3.2.1 Association between DDIs and hospital.

Table (4.35): Association between DDIs and hospital

Interaction		Minor N = 134		Significant N= 339		Serious N = 78		DDIs result N = 365	
		No	**%**	**No**	**%**	**No**	**%**	**No**	**%**
Al Shifa		77	57.5	196	57.8	54	69.2	206	56.4
Nasser		57	42.5	143	42.2	24	30.8	159	43.6
Test	X^2	**3.840**		**19.049**		**13.263**		**15.452**	
	Sig.	**0.031**		**0.001**		**0.001**		**0.001**	

As mentioned in table (4.35), Analysis of DDIs in each study setting showed that minor, significant, serious and DDIs result were higher in Al Shifa hospital (57.5%,57.8%,69.2% and 56.4% respectively), and lower in Nasser hospital (42.5%, 42.2%,30.8 and 43.6% respectively).

A chi square test was conducted to examine whether there was a statistically significant differences between the study settings in relation to DDIs results. The test revealed a statistically difference between Al Shifa hospital and Nasser hospital (X^2=3.84, Sig.=0.001) in minor DDIs, also there is a statistically difference between the study settings (X^2=19.049, Sig.=0.001) in significant DDIs, there is a statistically difference between the study settings (X^2=13.263, Sig.=0.001) in serious DDIs and there is a statistically difference between the study settings (X^2=13.263, Sig.=0.001) in DDIs result.

These results may have attributed to previous results which were mentioned in table (4.17), as shown by comparing between Nasser hospital and Al Al Shifa hospital, we find that Nasser has better use of different sources of information with significant differences comparing with Al Shifa hospital, better practicing behavior for healthcare providers with significant difference, also better supervision and auditing and better scoring for the knowledge test which is applied on healthcare providers.

In general, the previous mentioned results may help in elevate the level of healthcare providers' knowledge and better practicing so the resulting DDIs in discharge sheet is lower for Nasser hospital than Al Shifa hospital.

4.3.2.2 Association between DDIs and gender

As demonstrated in table (4.36), although the analysis of DDIs by gender showed no significant differences between gender and minor, significant, serious or DDIs result (Sig.= 0.507,0.462,0.15,0.486 respectively) but, the percentage of minor, significant, serious and result DDIs were higher in female (54.5%, 53.7%, 60.3%, 54% respectively) than in male (45.5%,46.3%,39.7%,46% respectively).

Table (4.36): Association between DDIs and Gender

Interaction		**Minor N = 134**		**Significant N= 339**		**Serious N = 78**		**DDIs result N = 365**	
		No	**%**	**No**	**%**	**No**	**%**	**No**	**%**
Male		61	45.5	157	46.3	31	39.7	168	46.0
Female		73	54.5	182	53.7	47	60.3	197	54.0
Test	X^2	**0.007**		**0.072**		**1.339**		**0.041**	
	Sig.	**0.507**		**0.462**		**0.150**		**0.486**	

In a study that applied on elderly in Gaza Strip in primary health care centers in UNRWA revealed a similar result of current study that female patients have higher DDIs than male patients and the difference between the two gender not significant (Satoom, 2017).

4.3.2.3 Association between DDIs and number of diagnosed diseases

Table (4.37): Association between DDIs and number of diagnosed diseases

Interaction		Minor N = 134		Significant N= 339		Serious N = 78		DDIs result N = 365	
		No	**%**	**No**	**%**	**No**	**%**	**No**	**%**
One Disease		79	59.0	234	69.0	45	57.7	254	69.6
More than One		55	41.0	105	31.0	33	42.3	111	30.4
Test	X^2	**26.169**		**18.662**		**15.732**		**18.696**	
	Sig.	**0.001**		**0.001**		**0.001**		**0.001**	

As recorded in Table (4.37), results of DDIs by number of diagnosed diseases in prescriptions for participant patients showed that minor, significant, serious and DDIs result were higher for one disease group (59%,69%,57.7% and 69.6% respectively), and lower for more than one disease group (41%, 31%,42.3 and 30.4% respectively).

A chi square test was conducted to examine whether there was a statistically significant differences between the number of diseases groups in relation to DDIs results. The test revealed a statistically difference between the two groups (X^2=26.169, Sig.=0.001) in minor DDIs, also there is a statistically difference between the study settings (X^2=18.662, Sig.=0.001) in significant DDIs, there is a statistically difference between the study settings (X^2=15.732, Sig.=0.001) in serious DDIs and there is a statistically difference between the study settings (X^2=18.696, Sig.=0.001) in DDIs result.

According to the previous results, polypharmacy is practiced by physicians as regardless of the importance of the need for prescribed medications so, if the patient has one or more than one disease then physicians prescribed many drugs (polypharmacy) in the prescription then polypharmacy increase the prevalence of DDIs.

4.3.2.4 Association between DDIs and length of stay

Table (4.38): Association between DDIs and length of stay

Interaction		Minor N = 134		Significant N= 339		Serious N = 78		DDIs result N = 365	
		No	%	No	%	No	%	No	%
Three days or less		61	45.5	170	50.1	43	55.1	185	50.7
More than 3 days		73	45.5	169	49.9	35	44.9	180	49.3
Test	X^2	2.468		0.571		0.473		0.248	
	Sig.	0.070		0.250		0.286		0.339	

Regarding association between length of stay and DDIs, the Table (4.38) showed that minor DDIs for patients who stay three, less or more days were the same (45.5%) but for significant, serious and general DDIs result were higher for three days or less (50.1%, ,55.1% and 50.7% respectively), and lower for more than three days (49.9%, 44.9% and 49.3 respectively).

A chi square test was conducted to examine whether there was a statistically significant differences between the days of stay length in relation to DDIs results. The test revealed no statistically difference between different periods of stay for minor, significant, serious or DDIs result (Sig.= 0.07,0.25,0.86,0.339 respectively).

4.3.2.5 Association between DDIs and number of drugs prescribed

Table (4.39): Association between DDIs and number of drugs prescribed

Interaction		Minor N = 134		Significant N= 339		Serious N = 78		DDIs result N = 365	
		No	%	No	%	No	%	No	%
Less than drugs		38	28.4	148	43.7	20	25.6	168	46
5 or more drugs		96	71.6	191	56.3	58	74.4	197	54
Test	X^2	110.926		214.617		65.580		222.141	
	Sig.	0.001		0.001		0.001		0.001	

As reported in Table (4.39), examining the DDIs in relation to the number of prescribed drugs between study participants, the results showed that minor, significant, serious and DDIs result were higher for 5 or more prescribed drugs (71.6%, 56.3%, 74.4% and 54% respectively) and lower in less 5 drugs respectively (28.4%, 43.7%, 25.6 and 46% respectively).

A chi square test was conducted to examine whether there was a statistically significant differences between the number of prescribed drugs in relation to DDIs results. The test revealed a statistically difference between the two groups ($\mathbf{X^2}$=110.926, Sig.=0.001) in minor DDIs, also there is a statistically difference between the two groups ($\mathbf{X^2}$=214.617, Sig.=0.001) in significant DDIs, there is a statistically difference between the two groups ($\mathbf{X^2}$=65.580, Sig.=0.001) in serious DDIs and there is a statistically difference between the two groups ($\mathbf{X^2}$=222.141, Sig.=0.001) in DDIs result.

A similar study was conducted in the Northern Ethiopia revealed that high likehood significant association between polypharmacy and DDIs in the prescriptions, the lower DDIs in the lower prescribed drugs number (Gebretsadik et al, 2017). Another study was performed in India also reported that increasing in DDIs with the higher number of prescribed drugs (Rajani et al, 2016).

A study was conducted on elderly patients, revealed that the prevalence of clinically relevant drug interactions is about 6% in patients taking two to four drugs, 50% in those taking five and 100% in those taking 10 drugs. Potential DDIs in more than 50% of patients as mean drugs prescribed to admitted and discharged patients were more than five (Salwe et al., 2016).

4.3.2.6 Association between DDIs and age group

Table (4.40) showed that DDIs is the highest as minor, significant, serious and total result in the higher ages specially at the group which is more than 65 years and the percentages respectively were 47%, 39.8, 44.9% and 38.6%. on the other hand, the lowest DDIs in age group which 40 years and less and the percentages respectively for minor, significant, serious and total result were 18.7%, 21.2%, 21.8% and 23.3%.

The results of Chi square revealed that there is a significant relation between different groups ages and the results of DDIs and their types. In minor DDIs (X^2=22.871,

Sig.=0.001), in significant DDIs (X^2=56.887, Sig.=0.001), in serious DDIs (X^2=8.017, Sig.=0.001) and in DDIs result (X^2=47.903, Sig.=0.001).

Astudy was conducted on primary and secondary health settings in Brazil that revealed that age is a factor in predicting the number of prescribed drugs, a greater risk of DDIs for older age groups is expected due to increased polypharmacy with age, especially because of increased comorbidity in older patients, one in every four patients over 55 is likely to be face DDI when if two or more drugs dispensed. The risk of interaction for older age groups reaching more than 30% for adults over 70 years of age in comparison to younger age groups (Correia et al., 2019). Also similar study was conducted in the Northern Ethiopia showed significant association between age groups and DDIs in the prescriptions, the lower DDIs in the lower age category (Gebretsadik et al, 2017). Age were not found to be predictors of possibly serious DDIs, but there was a trend of an increase in the prevalence of potentially serious DDIs by age (Gerber & Vlahović- Palčevski, 2018).

Another study was conducted on primary and secondary health settings in Brazil that revealed that age is a factor in predicting the number of prescribed drugs, a greater risk of DDIs for older age groups is expected due to increased polypharmacy with age, especially because of increased comorbidity in older patients, one in every four patients over 55 is likely to be face DDI when if two or more drugs dispensed. The risk of interaction for older age groups reaching more than 30% for adults over 70 years of age in comparison to younger age groups (Correia et al., 2019).

So Therefore, there are two important factors associated with increasing age, the first is that increasing age is associated with an increase in the number of diseases and thus an increase in the number of prescribed drugs, and the other factor is that the nature of drug groups that are prescribed to the elderly like antiarrhythmics, antihypertensives and others, these groups have higher DDIs.

Table (4.40): Association between DDIs and age groups

Interaction		Mainor N = 134		Significant N= 339		Serious N = 78		DDIs result N = 365	
		No	**%**	**No**	**%**	**No**	**%**	**No**	**%**
40 years or less		25	18.7	72	21.2	17	21.8	85	23.3
From 41 to 65 years		46	34.3	132	38.9	26	33.3	139	38.1
More than 65		63	47.0	135	39.8	35	44.9	141	38.6
Test	X^2	**22.871**		**56.887**		**8.017**		**47.903**	
	Sig.	**0.001**		**0.001**		**0.018**		**0.001**	

Chapter Five

Conclusion and Recommendations

5.1 Conclusion

The study included 600 prescriptions of discharge sheet and at least one drug is prescribed, randomly selected from internal medicine departments of Al Shifa hospital and Nasser hospital (Governmental hospitals). In addition to 150 self-administered questionnaires which applied on physicians of the IMD and on pharmacists of Al shifa and Nasser hospitals. Also in-depth interview for ten key informants

Within the context of Gaza Strip, this study aimed to assess DDIs in discharge sheet within internal medicine departments of governmental hospitals and the factors that increase the magnitude of this issue. The physicians and pharmacists surveyed in this study demonstrated a lack of knowledge about DDIs. Inadequate knowledge of DDIs may lead to inappropriate patient counseling and result in adverse medical consequences. Therefore, additional training and integration of knowledge and expertise about DDIs among healthcare providers is essential to provide optimal therapeutic outcomes. The study findings affirm the necessity of well-designed computerized alerting systems that applied on electronic prescription for discharge sheet, in addition to highlighting on pharmacists' role as the important source of drug information. To promote good pharmacy practices, it should make regular monitoring of the correct use of drugs and monitoring of DDIs.

Regarding the semi-structured self-administered questionnaire witch applied on physicians and pharmacists, about 53% of participants were from Al Shifa hospital and the others were from Nasser, 66% of them were male with mean age 42.03 years. Only 16% of participants received training about DDIs. Most of participants agree that the best sources of information for DDIs were internet and software on computer or mobile. The average for participants score in DDIs test of 10 pairs of drugs was 45%, the higher pair of drugs which answered correctly was Amoxicillin and Acetaminophen with average score 74.7% followed by Atenolol and Ranitidine with average score 60.7%. however, the lowest score was for Digoxin and Clarithromycine with average score 24% followed by Losartan and Isosorbide dinitrate with average score 28.7%.

The findings of the study have shown that the best sources of DDIs information are internet and software on computer or mobile on the other hand the least used sources for more information are advertising agents for medicines and guidelines and protocols so, that

encourage to apply an electronic program that help healthcare providers to minimize DDIs. Findings also give positive indication about awareness of participants regarding the importance of DDIs issue and positive attitude towards the importance of the presence of clinical pharmacists, on the other side they have negatively attitude towards the role of clinical pharmacist in the present time. In general, the prescription behavior assessment has low level; communication and coordination between pharmacist and physician is approximately low and low follow up for patient after drug use. Regarding protocols, findings revealed low awareness of participants towards availability of therapeutic protocols and their adherence to these protocols is not high. The level of supervision and auditing is very low, an electronic prescription program is the best way for follow up and auditing prescription behavior and DDIs.

The study results revealed that 54.8% of participants' patients were female, the mean age is 51.66 years. The most diagnosed diseases in discharged sheet were in circulatory system: 28.1% of the prescriptions, followed by respiratory system :18.9% of prescriptions. The most drug was prescribed was Acetylsalicylic acid 100mg that in 26.5% of prescriptions, followed by Bisoprolol that in 23.3% of prescriptions. The average total number of drugs that prescribed in the discharged medication sheet was 3.84 drugs per prescription, 54.3% of prescriptions had 2 to 4 drugs and 34.3% of prescriptions had 5 or more drugs. The study also revealed; 22.3% of the prescriptions had minor DDIs, 56.5% had significant DDIs, 13% had serious DDIs and 60.8% had at less one type of DDIs.

Qualitative data which collected by in-depth interview is consistent with quantitative findings, the main findings stressed on that the MOH should do harder efforts towards manage DDIs issue in effectively way and the best ways to manage this issue is by in-job training for healthcare staff and then follow up and auditing so, the best way to reach a good result beside training is applying electronic prescriping program. And they clarify the reason of difference between two hospitals (Al Shifa and Nasser) is due to the higher load of work in Al Shifa in comparing to the Nasser and also the more effective role for pharmacist in Nasser comparing to Al Shifa.

5.2 Recommendations

1- Providing information resources for physicians and pharmacists to develop their knowledge, mostly internet.

2- Encourage communication and coordination between healthcare providers to reduce DDIs and their consequenses.

3- Development continuous training programs for healthcare professionals with efficient supervision and follow up on good prescribing behavior especially DDIs.

4- Strengthening the role of the pharmacist and its participation as an important source of information.

5- Engagement of pharmacists in the development, maintenance and ongoing evaluation of discharge prescription.

6- Providing committees to follow up patient files to get optimal use of drugs and assessment of the extent to which service providers adhere to the treatment protocols

7- Necessity of well-designed computerized alerting systems that applied on electronic prescription.

5.3 Recommendations for new area of research

1- Studying the impact of emerging technologies on medication errors and DDIs.

2- Studying the incidence of fatal adverse reactions which is related to DDIs.

3- Evaluation for DDIs issue for different departments in the same setting.

4- Conduct comparative studies to compare the magnitude of DDIs issue in the NGOs private hospitals with that in the governmental hospitals.

References

Abdo, M. S., Hammad, M. A., Harun, S. N., Eusoff, T. M., & Ghadzi, S. M. S. (2020). Evaluation of Knowledge, Attitude and Practice of Healthcare Providers Towards Life-Threatening Drug-Drug Interactions in Penang General Hospital, Malaysia. *Clinical Epidemiology and Global Health*.

Adisa, R., & Fakeye, T. (2006). Assessment of the Knowledge of Community Pharmacists Regarding Common Phytopharmaceuticals Sold in South Western Nigeria. *Tropical Journal of Pharmaceutical Research*, 5(2), 619-625.

Ahmed, N. J., Alamri, S. T., Balaha, M., Al Matrafi, B., Haseeb, A., Hassali, M. A., & Khan, A. H. (2020). Evaluation of prescriptions drug-drug interactions in a public hospital in Al-Kharj, Saudi Arabia. *Lat Am J Pharm*, 39(1), 203-207.

AIDSinfo, (2019). Drug Drug Interactions. Retrieved April 06/2019 from https://aidsinfo.nih.gov/understanding-hiv-aids/glossary/213/drug-drug-interaction.

Albassam, A., Almohammed, H., Alhujaili, M., Koshy, S., & Awad, A. (2020). Perspectives of Primary Care Physicians and Pharmacists on Interprofessional Collaboration in Kuwait: a Quantitative Study. *PloS one*, 15(7).

Al-Khodary, A., (2016). *Assessment of Physicians Compliance with the Essential Drug List at Goernmental Hospitals – Gaza Governorates*. MPH thesis, Al-Quds University, Palestine.

Almalki, Z. S. (2017). *Prevalence, Predictors, and Economic Impact of Drug-Drug Interaction Associated with Antipsychotic Medications among Adults in United States* (Doctoral dissertation, University of Cincinnati).

Alrabiah, Z., Alhossan, A., Alghadeer, S. M., Wajid, S., Babelghaith, S.d., & Al-Arifi, M. N. (2019). Evaluation of Community Pharmacists Knowledge about Drug-Drug Interaction in Central Sudia Arabia. *Saudi Pharmacutical Journal*, 27(4),463-466.

Alsuhebany, N., Alfehaid, L., Almodaimegh, H., Albekairy, A., & Alharbi, S. (2019). Attitude and Perception of Physicians and Nurses Toward the Role of Clinical Pharmacists in Riyadh, Saudi Arabia: A Qualitative Study. *SAGE Open Nursing*.

Amundstuen Reppe, L., Spigset, O., & Schjott, J. (2016). Drug Information Services Today: Current Role and Future Perspectives in Rational Drug Therapy. *Clinical Therapeutics*, *38*(2), 414–421.

Andersson, M. L., Böttiger, Y., Kockum, H., & Eiermann, B. (2018). High Prevalence of Drug–Drug Interactions in Primary Health Care is Caused by Prescriptions from other Healthcare Units. *Basic & Clinical Pharmacology & Toxicology*, *122*(5), 512–516.

Atif, M., Malik, I., Asif, M., Qamar-Uz-Zaman, M., Ahmad, N., & Scahill, S. (2020). Drug Safety in Pakistan. *Drug Safety in Developing Countries* (pp. 287-325). Academic Press.

Azhar, S., Hassali, M. A., Ibrahim, M. I. M., Ahmad, M., Masood, I., & Shafie, A. A. (2009). The Role of Pharmacists in Developing Countries: the Current Scenario in Pakistan. *Human Resources for Health*, *7*(1), 54.

Bahar, M. A., Setiawan, D., Hak, E., & Wilffert, B. (2017). Pharmacogenetics of Drug–Drug Interaction and Drug–Drug–Gene Interaction: a Systematic Review on CYP2C9, CYP2C19 and CYP2D6. Pharmacogenomics, 18(7), 701-739.

Baksh, M. A., Perumal-Pillay, V. A., & Oosthuizen, F. (2019). An Investigation Into the Knowledge of South African Pharmacists on the Identification and Management of Drug-Drug Interactions. *Global Journal of Health Science*, 11(12).

Bank, W. (2014). *Gaza: Fact Sheet* August 1, 2014. Retrieved from http://www.worldbank.org/content/dam/Worldbank/gaza-fact-sheet-final140801-ECR.pdf

Barrett, K., Lucas, E., & Alexander, G. C. (2016). How Polypharmacy has Become a Medical Burden Worldwide. *Clinical Pharmacist*, *8*(6).

Baysari, M. T., Zheng, W. Y., Li, L., Westbrook, J., Day, R. O., Hilmer, S. and Doherty, P. (2019). Optimising Computerised Decision Support to Transform Medication Safety and Reduce Prescriber Burden: Study Protocol for a Mixed-Methods Evaluation of Drug–Drug Interaction Alerts. BMJ open, 9(8).

Belknap, S, M., Moore, H., Lanzotti, S. A., Yarnold, P. R., Getz, M., Deitrick, D. L., & Storm, G. A. (2008). Application of Software Design Principles and Debugging Methods to an Analgesia Prescription Reduces Risk of Severe Injury from Medical Use of Opioids. *Clinical Pharmacology & Therapeutics*, 84.3:385-392.

Brath, H., Mehta, N., Savage, R. D., Gill, S. S., Wu, W., Bronskill, S. E., Rochon, P. A. (2018). What Is Known About Preventing, Detecting, and Reversing Prescribing Cascades: A Scoping Review. *Journal of the American Geriatrics Society*, *66*(11), 2079–2085.

Bril, F., Castro, V., G Centurion, I., Espinosa, J., A Keller, G., D Gonzalez, C., Pujol, G. (2016). A Systematic Approach to Assess the Burden of Drug Interactions in Adult Kidney Transplant Patients. *Current Drug Safety*, *11*(2), 156–163.

Burns, N., & Groves, K. (1997). *Practice of Nursing Research*. WB Saunders company Philadelphia, PA.

Bushra, R., Baloch, S. A., Jabeen, A., Bano, N., & Aslam, N. (2015). Adverse Drug Reactions (ADRS): Factors and Role of Pharmacist in Their Prevention. *Journal of Ayub Medical College Abbottabad*, 27(3), 702-706.

Caudle, K. E., Rettie, A. E., Whirl- Carrillo, M., Smith, L. H., Mintzer, S., Lee, M. T. M., Callaghan, J. T. (2014). Clinical Pharmacogenetics Implementation Consortium Guidelines for CYP2C9 and HLA- B Genotypes and Phenytoin Dosing. *Clinical Pharmacology & Therapeutics*, *96*(5), 542–548.

Correia, R. B., de Araújo Kohler, L. P., Mattos, M. M., & Rocha, L. M. (2019). City-Wide Electronic Health Records Reveal Gender and Age Biases in Administration of Known Drug–Drug Interactions. *NPJ Digital Medicine*, 2(1), 1-13.

Courbage, Y., Abu-Hamad, B. & Zagha, A. (2016). Palestine 2030 Demographic Change: Opportunities for Development. Palestine: United Nations Population Fund; Prime Minister's Office.

Diksis, N., Melaku, T., Assefa, D., & Tesfaye, A. (2019). Potential Drug–Drug Interactions and Associated Factors among Hospitalized Cardiac Patients at Jimma University Medical Center, Southwest Ethiopia. *SAGE Open Medicine*.

Donovan, J., & Sanders, C. (2005). Key Issues in the Analysis of Qualitative Data in Health Services Research. *Handbook of Health Research Methods*, *515*, 532.

Edwards, I. R., & Aronson, J. K. (2000). Adverse Drug Reactions: Definitions, Diagnosis, and Management. *The Lancet*, *356*(9237), 1255–1259.

El Baba, M. (2012). *Drugs Prescribing Patterns and Practices at UNRWA Health Centers – Gaza governorates*. MPH thesis, Al-Quds University, Palestine.

Fadare, J. O., Obimakinde, A. M., Enwere, O. O., Desalu, O. O., & Ibidapo, R. O. (2019). Physician's Knowledge of Appropriate Prescribing for the Elderly—A Survey Among Family and Internal Medicine Physicians in Nigeria. *Frontiers in Pharmacology*, 10, 592.

Fattouh, R. and Abu Hamad, B. (2010). *Impact of Using Essential Drug List: Analysis of Drug Use Indicators in Gaza Strip*. Eastern Mediterranean Health Journal, 16 (8), 886-892.

Feinstein, J., Dai, D., Zhong, W., Freedman, J., & Feudtner, C. (2015). Potential Drug− Drug Interactions in Infant, Child, and Adolescent Patients in Children's hospitals. *Pediatrics*, 135(1), e99-e108.

Gebretsadik, Z., Gebrehans, M., Getnet, D., Gebrie, D., Alema, T., & Belay, Y. B. (2017). Assessment of Drug-Drug interaction in Ayder Comprehensive Specialized Hospital, Mekelle, Northern Ethiopia: a Retrospective Study. *BioMed research international.*

General directorate of pharmacy, 2019. Annual Report of pharmacy: Gaza-MOH

Gerber, W., Steyn, J. D., Kotze, A. F., & Hamman, J. H. (2018). Beneficial Pharmacokinetic Drug Interactions: a Tool to Improve the Bioavailability of Poorly Permeable Drugs. *Pharmaceutics*, 10(3), 106.

Gnjidic, D., Tinetti, M., & Allore, H. G. (2017). *Assessing Medication Burden and Polypharmacy: Finding the Perfect Measure*. Taylor & Francis.

Gujjarlamudi, H. B. (2016). Polytherapy and Drug Interactions in Elderly. *Journal of Mid-Life Health*, 7(3), 105.

Guthrie, B., Makubate, B., Hernandez-Santiago, V., & Dreischulte, T. (2015). The Rising Tide of Polypharmacy and Drug-Drug Interactions: Population Database Analysis 1995–2010. *BMC Medicine*, *13*(1), 74.

Halli-Tierney, A. D., Scarbrough, C., & Carroll, D. (2019). Polypharmacy: evaluating risks and deprescribing. *American family physician*, 100(1), 32-38.

Hasanloei, V., Amin, M., Hamdolah, S., & Aysa, H. (2014). Drug–Drug Interactions Prevalence in Intensive Care Unit Patients of a University Hospital in Iran. *Bulletin of Environment, Pharmacology and Life Sciences*, vol. 3, pp. 87–91.

History, B., Status, L., Blockade, T. I., Strip, G., Bank, W., Jerusalem, E., Box, P. O. (2018). *Understanding Gaza*. (July).

Hong, S., Lee, J. H., Chun, E. K., Kim, K. I., Kim, J. W., Kim, S. H., ... & Ko, Y. H. (2020). Polypharmacy, Inappropriate Medication Use, and Drug Interactions in Older Korean Patients with Cancer Receiving FirstLine Palliative Chemotherapy. *The oncologist*, 25(3), e502-e511.

Horn, J. R., Gumpper, K. F., Hardy, J. C., McDonnell, P. J., Phansalkar, S., & Reilly, C. (2013). Clinical Decision Support for Drug–Drug Interactions: Improvement Needed. *American journal of health-system pharmacy*, 70(10), 905-909.

Hovstadius, B. (2010). *On Drug Use, Multiple Medication and Polypharmacy in a National Population*. Linnaeus University Press.

Jagadeesan, M., Manikandan, R., & Sudha, N. S. S. (2018). The Drug-Drug Interactions: Affecting the Rationality of Prescriptions. *Research Journal of Pharmacy and Technology*, 11(7), 3077-3080.

Jazbar, J., Locatelli, I., Horvat, N., & Kos, M. (2018). Clinically Relevant Potential Drug–Drug Interactions Among Outpatients: A Nationwide Database Study. *Research in Social and Administrative Pharmacy*, *14*(6), 572–580.

Jongbloed, M. R. M., Duijnhouwer, A. L., & Dijk, A. P. J. Van. (2019). High Burden of Drug Therapy in Adult Congenital Heart Disease: Polypharmacy as Maker of Morbidity and Mortality. *European Heart Journal-Cardiovascular Pharmacotherapy*.

Kaelber, D. C., & Bates, D. W. (2007). Health Information Exchange and Patient Safety. *Journal of Biomedical Informatics, 40*(6), S40–S45.

Kafeel, H., Rukh, R., Qamar, H., Bawany, J., Jamshed, M., Sheikh, R., ... & Saleem, Y. M. (2014). Possibility of Drug-Drug Interaction in Prescription Dispensed by Community and Hospital Pharmacy. *Pharmacology & Pharmacy*.

Khandeparkar, A., & Rataboli, P. V. (2017). A study of harmful drug–drug interactions due to polypharmacy in hospitalized patients in Goa Medical College. *Perspectives in clinical research*, 8(4), 180.

Khatib R. Daoud A. Abu-Rmeileh N. et al. (2008). Medicine Utilization Review in Selected Non-Govermental Organization Primary Health Care Clinics in the West Bank in Palestine. *Pharmacoepidemiology and Drug Safety*, 17: 1123-1130.

Ko, Y., Malone, D. C., D'Agostino, J. V., Skrepnek, G. H., Armstrong, E. P., Brown, M., & Woosley, R. L. (2008). Potential Determinants of Prescribers' Drug-Drug Interaction Knowledge. *Research in Social and Administrative Pharmacy*, 4(4), 355-366.

Kovacevic, M., Vezmar Kovacevic, S., Radovanovic, S., Stevanovic, P., & Miljkovic, B. (2019). Adverse Drug Reactions Caused by Drug–Drug Interactions in Cardiovascular Disease Patients: Introduction of a Simple Prediction Tool Using Electronic Screening Database Items. *Current Medical Research and Opinion*, 35(11), 1873-1883.

Lavan, A. H., & Gallagher, P. (2016). Predicting Risk of Adverse Drug Reactions in Older Adults. *Therapeutic Advances in Drug Safety*, *7*(1), 11–22.

Maher, R. L., Hanlon, J., & Hajjar, E. R. (2014). Clinical Consequences of Polypharmacy in Elderly. *Expert Opinion on Drug Safety*, *13*(1), 57–65.

Makkaoui, N., Halaoui, A., Atoui, Z., Siblini, H., Habib, S., Awada, H., & Zgheib, N. K. (2020). Knowledge Attitudes and Pracices Rgarding Drug Interactions among Community Pharmacists. *Journal of Public Health*, 1-7.

Mangoni, A. A., & Jackson, S. H. D. (2004). Age-Related Changes in Pharmacokinetics and Pharmacodynamics: Basic Principles and Practical Applications. *British Journal of Clinical Pharmacology*, *57*(1), 6–14.

Masnoon, N., Shakib, S., Kalisch-Ellett, L., & Caughey, G. E. (2017). What is polypharmacy? A systematic review of definitions. *BMC Geriatrics*, *17*(1), 230.

Massoud, L. (2015). *Evaluation of Inappropriate Prescribing to the Hospitalized Elderly Patients in Al Shifa Hospital Gaza-Palestine* (Doctoral dissertation, Al Azhar University Gaza).

Medicines, E., & Lists, E. M. (2015). *Essential medicines and health products Essential medicines*. Retrieved from

http://www.who.int/medicines/areas/traditional/congress/beijing_declaration/en/

Meyer, U. A. (2000). Pharmacogenetics and adverse drug reactions. *The Lancet, 356*(9242), 1667–1671.

Medscape (2019). Drug Interaction Checker. http://reference.medscape.com/drug-interactionchecker. Retrieved in March 2019.

Medscape (2020). Drug Interaction Checker. http://reference.medscape.com/drug-interactionchecker. Retrieved in April 2020.

Mercer, K., Burns, C., Guirguis, L., Chin, J., Dogba, M. J., Dolovich, L., ... & McMurray, J. (2018). Physician and Pharmacist Medication Decision-Making in the Time of Electronic Health Records: Mixed-Methods Study. *JMIR human factors*, 5(3), e24.

Ministry of Health, (2013). Annual Report of Hospitals in Gaza, the Palestinian Health Information System Center, Gaza.

Ministry of Health, (2017). Annual Report, the Palestinian Health Information System Center, Gaza.

Ministry of Health, (2018). Annual Report, the Palestinian Health Information System Center, Gaza.

Mistry, M., Gor, A., & Ganguly, B. (2017). Potential Drug-Drug Interactions among Prescribed Drugs in Paediatric Outpatients Department of a Tertiary Care Teaching Hospital. *Journal of Young Pharmacists*, 9(3), 371.

Mnnesse, C. K. & Van Der Cammen, T. J. (2003). Adverse Drug Reactions in Three Older Patients, even Without Changes in Medication. *Ned Tijdschr Geneeskd*, 147, 585-7.

Molas, E., Luque, S., Retamero, A., Echeverría-Esnal, D., Guelar, A., Montero, M., ... & Knobel, H. (2018). Frequency and Severity of Potential Drug Interactions in a Cohort of HIV-Infected Patients Identified through a Multidisciplinary Team. *HIV clinical trials*, *19*(1), 1-7.

Moloto, B. N. (2019). *Development of strategies to increase participation of pharmacists in the renal multidisciplinary health care team at Polokwane Hospital, Limpopo Province* (Doctoral dissertation).

Moura, C. S., Acurcio, F. A., & Belo, N. O. (2009). Drug-Drug Interactions Associated with Length of Stay and Cost of Hospitalization. *Journal of Pharmacy & Pharmaceutical Sciences*, 12(3), 266-272.

Murtaza, G., Khan, M. Y. G., Azhar, S., Khan, S. A., & Khan, T. M. (2016). Assessment of Potential Drug–Drug Interactions and its Associated Factors in the Hospitalized Cardiac Patients. *Saudi Pharmaceutical Journal*, *24*(2), 220–225.

Mussina, A. Z., Smagulova, G. A., Veklenko, G. V., Tleumagambetova, B. B., Seitmaganbetova, N. A., Zhaubatyrova, A. A., & Zhamaliyeva, L. M. (2019). Effect of an Educational Intervention on the Number Potential Drug-Drug Interactions. *Saudi Pharmaceutical Journal*, 27(5), 717-723.

Nabovati, E., Vakili-Arki, H., Taherzadeh, Z., Saberi, M. R., Abu-Hanna, A., & Eslami, S. (2016). Incidence Rate and Pattern of Clinically Relevant Potential Drug-Drug Interactions in a Large Outpatient Population of a Developing Country. *Research in pharmaceutical sciences*, 11(3), 233.

Nabovati, E., Vakili-Arki, H., Taherzadeh, Z., Saberi, M. R., Abu-Hanna, A., & Eslami, S. (2017). A Survey of Attitudes, Practices, and Knowledge Regarding Drug–Drug Interactions among Medical Residents in Iran. *International journal of clinical pharmacy*, 39(3), 560-568.

Nebeker, J. R., Barach, P., & Samore, M. H. (2004). Clarifying Adverse Drug Events: a Clinician's Guide to Terminology, Documentation, and Reporting. *Annals of Internal Medicine*, *140*(10), 795–801.

Nidhi, S. (2012). Concept of Drug Interaction. *International Research Journal of Pharmacy*, *3*(7), 120–122.

Niu, J., Straubinger, R. M., & Mager, D. E. (2019). Pharmacodynamic Drug–Drug Interactions. *Clinical Pharmacology & Therapeutics*, 105(6), 1395-1406.

Nomura, K., Mendelsohn, A. B., Kusama, M., Igarashi, A., & Akazawa, M. (2011). Drug Use Patterns and Predictors of Polypharmacy among Elderly, Community-Residing Persons in Hiroshima, Japan. *Pharmacoepidemiology and Drug Safety*, *20*, 301–302.

Nusair, M. B., Al-Azzam, S. I., Arabyat, R. M., Amawi, H. A., Alzoubi, K. H., & Rabah, A. A. (2020). The Prevalence and Severity of Potential Drug-Drug Interactions among Adult Polypharmacy Patients at Outpatient Clinics in Jordan. *Saudi Pharmaceutical Journal*, 28(2), 155-160.

Obeidallah, W., Mahariq, M., Barzeq, H., Zemli, M., Piva, P., & Velásquez, G. (2000). *Drug situation analysis for the West Bank and Gaza Strip*. Geneva: World Health Organization.

OCHA. (2014). *Occupied Palestinian Territory: Gaza Emergency Situation Report (as of 18 August 2014, 0800 hrs)*. *30*(29), 1–8.

Olsen, R. M., & Sletvold, H. (2018). Potential Drug-to-Drug Interactions: a Cross-Sectional Study among Older Patients Discharged from Hospital to Home Care. *Safety in Health*, 4(1), 8.

Palestinian Central Bureau of Statistics (2013). *National Health Accounts 2011-2012: Main Findings, Ramallah Palestine*. palestine.

Palestinian Central Bureau of Statistics (2015). *Palestinian Population Status in Palestine*. Palestine.

Palestinian Central Bureau of Statistics (2017). *Statistical Year Book of Palestine*. 1–398.

Rademaker, M. (2001). Do Women Have More Adverse Drug Reactions? *American Journal of Clinical Dermatology*, *2*(6), 349–351.

Rajani, T., Biradar, S. M., Sravanthi, K. et al., (2016). Assessment of Potential Drug-Drug Interactions in Patients of A Medicine Ward of A Tertiary Care Hospital. *International Journal of Research in Biosciences*, 5(1), 76–82.

Rochon, P. A., Lane, C. J., Bronskill, S. E., Sykora, K., Anderson, G. M., Mamdani, M. Dhalla, I. A. (2004). Potentially Inappropriate Prescribing in Canada Relative to the US. *Drugs & Aging*, *21*(14), 939–947.

Salwe, K. J., Kalyansundaram, D., & Bahurupi, Y. (2016). A study on Polypharmacy and Potential Drug-Drug Interactions among Elderly Patients Admitted in Department of Medicine of A Tertiary Care Hospital in Puducherry. *Journal of Clinical and Diagnostic Research*, *10*(2), FC06-FC10.

Satoom, A., (2017). *Adverse Drug Reactions among Elderly Clients at UNRWA-PHC Centers, Gaza Strip*. MPH thesis, Al-Quds University, Palestine.

Schmader, K. E., Hanlon, J. T., Pieper, C. F., Sloane, R., Ruby, C. M., Twersky, J., Artz, M. (2004). Effects of Geriatric Evaluation and Management on Adverse Drug Reactions and Suboptimal Prescribing in the Frail Elderly. *The American Journal of Medicine*, *116*(6), 394–401.

Sganga, F., Landi, F., Ruggiero, C., Corsonello, A., Vetrano, D. L., Lattanzio, F., Onder, G. (2015). Polypharmacy and Health Outcomes among Older Adults Discharged from Hospital: Results from the Crime Study. *Geriatrics & Gerontology International*, *15*(2), 141–146.

Simsek, A., Taner, N., Macit, C., Berk, B., & Mercanoglu, G. (2019). *The Importance of Computerized Drug Interaction Checker Programs Used in Community Pharmacies to Avoid Potential Drug Interactions: a Preliminary Study with Clarithromycin.*

Soldin, O. P., Chung, S. H., & Mattison, D. R. (2011). Sex Differences in Drug Disposition. *BioMed Research International*.

Stoll, P., & Kopittke, L. (2015). Potential Drug–Drug Interactions in Hospitalized Patients Undergoing Systemic Chemotherapy: a Prospective Cohort Study. *International Journal of Clinical Pharmacy*, *37*(3), 475–484.

Taleb, M., Abed, A. A. K., Dahudi, A. R., Najim, A., & Ahmed, A. (2014). Polypharmacy in Primary Care Practices among Chronic Elderly Patients in Gaza Strip. *Pharmacology & Pharmacy*.

Tamblyn, R., Huang, A., Perreault, R., Jacques, A., Roy, D., Hanley, J., Laprise, R. (2003). The Medical Office of the 21st Century (MOXXI): Effectiveness of Computerized

Decision-Making Support in Reducing Inappropriate Prescribing in Primary Care. *Cmaj*, *169*(6), 549–556.

Tangiisuran, B., Wright, J., Van der Cammen, T., & Rajkumar, C. (2009). *Adverse Drug Reactions in Elderly: Challenges in Identification and Improving Preventative Strategies*. Oxford University Press.

Tokka, A. S. A., & Ahmad, K. A. M. (2017). *Assessment of the Awareness, Knowledge, Attitude, and Practice of Sudaneese Community Pharmacists, in Khartoom State, about Drug Interactions.*

Van Heerden, J. A., Burger, J. R., Gerber, J. J., & Vlahovic- Palcevski, V. (2018). Prevalence of Potentially Serious Drug–Drug Interactions among South African Elderly Private Health Sector Patients Using the Mimica Matanovic/Vlahovic-Palcevski Protocol. *International Journal of Pharmacy Practice*, *26*(2), 156–164.

Vazquez, M., Guevara, N., Maldonado, C., Guido, P. C., & Schaiquevich, P. (2020). Potential Pharmacokinetic Drug-Drug Interactions between Cannabinoids and Drugs Used for Chronic Pain. *BioMed Research International*.

Vilar, S., Friedman, C., & Hripcsak, G. (2018). Detection of Drug–Drug Interactions Through Data Mining Studies Using Clinical Sources, Scientific Literature and Social Media. *Briefings in Bioinformatics*, 19(5), 863-877.

Wheeler, A. J., Scahill, S., Hopcroft, D., & Stapleton, H. (2018). Reducing Medication Errors at Transitions of Care is Everyone's Business. *Australian prescriber*, 41(3), 73.

WHO, (1993). *How to investigate drug use in health facilities: selected drug use indicators*. Geneva: World Health Organization. Retrieved April 06/2019 from https://apps.who.int/iris/bitstream/handle/10665/60519/WHO_DAP_93.1.pdf .

WHO (2009). *Gaza Strip Initial Health Needs Assessment*.

WHO (2010). Key Components of A Well Functioning Health System. In *Geneva: WHO Health System*.

Retrieved in April 06/2019 from:
http://www.who.int/healthsystems/publications/hss_key/en/

WHO (2011). The world medicines situation: rational use of medicines. *The World Medicines Situation*, *2*(2), 24–30. Retrieved in April 06/2019 from http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0102-311X2013000800013&lng=pt&nrm=iso&tlng=en

WHO (2013). *Essential Medicines And Health Products: Essential Medicines*. Retrieved in April 2019 from http://www.who.int/medicines/services/essmedicines_def/en/.

WHO (2016). *Health Conditions in the Occupied Palestinian Territory, Including East Jerusalem, and in the Occupied Syrian Golan*. WHO Geneva

WHO (2019). *Situation Report; occupied Palestinian territory.*

Wilke, R. A., Lin, D. W., Roden, D. M., Watkins, P. B., Flockhart, D., Zineh, I., Krauss, R. M. (2007). Identifying Genetic Risk Factors for Serious Averse Drug Reactions: Current Progress and Challenges. *Nature Reviews Drug Discovery*, *6*(11), 904.

Williams, C. M. (2002). Using Medications Appropriately in Older Adults. *American Family Physician*, *66*(10), 1917–1930.

Wooten, J., & Galavis, J. (2005). Polypharmacy: Keeping the Elderly Safe: Because they Take More Medications than Younger Patients, the Elderly Have A Higher Risk of Adverse Reactions. Here's How to Help Your Older Patients Avoid Trouble. *RN*, *68*(8), 44–52.

Yan, C., Duan, G., Zhang, Y., Wu, F. X., Pan, Y., & Wang, J. (2020). Predicting Drug-Drug Interactions Based on Integrated Similarity and Semi-Supervised Learning. *IEEE/ACM Transactions on Computational Biology and Bioinformatics*.

Yıldırım, A. B., & Kılınç, A. Y. (2017). Polypharmacy and drug interactions in elderly patients. *Turk Kardiyoloji Dernegi arsivi: Turk Kardiyoloji Derneginin yayin organidir*, 45(Suppl 5), 17-21.

Zeeh, J., & Platt, D. (2002). The Aging Liver. *Gerontology*, *48*(3), 121–127.

Zeenny, R., Wakim, S., & Kuyumjian, Y.M. (2017). Potentially Inappropiate Medications Use in Community-Based Aged Patients: a Cross-Sectional Study Using 2012 Beers Criteria. *Clinical Interventions in Aging*, 12,65.

Zhang, Y., Wu, H. Y., Xu, J., Wang, J., Soysal, E., Li, L., & Xu, H. (2016). Leveraging

Syntactic and Semantic Graph Kernels to Extract Pharmacokinetic Drug Drug Interactions from Biomedical Literature. *BMC systems biology*, 10(3), 67.

Zheng, W. Y., Richardson, L. C., Li, L., Day, R. O., Westbrook, J. I., & Baysari, M. T. (2018). Drug-Drug Interactions and Their Harmful Effects in Hospitalised Patients: A Systematic Review and Meta-Analysis. *European Journal of Clinical Pharmacology*, *74*(1), 15–27.

Annexes

Annex (1) Study activities time table

Activity	Duration/ Month	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Review literature	2																	
Tool development	2																	
Tool validation and piloting	1																	
Data collection	3																	
Data entry	2																	
Data analysis	2																	
Thesis writing	3																	
Dissemination	1																	

Annex (2): Map of Gaza Strip

http://www.jbcnews.net/mobile/article/126917

Annex (3): Map of Palestine

Annex (4) Hospitals of MOH

Hospital name	Number of hospital beds	Internal medicine departments beds	Number of human resources	Number of physicians	Number of physicians in internal medicine department	Number of pharmacists
El Andonisi	110	46	442	103	32	10
Bet Hanon	66	13	226	49	12	4
Al Shifa	439	108	1758	574	95	35
Al Rantisi	86	30	284	42	7	16
Al Nasr	110	0	291	54	0	6
Al Ouon	40	0	139	27	0	4
Al Dora	92	0	207	38	0	8
Al Harazeen	7	0	42	8	0	1
Al Aqsa	160	32	583	149	30	14
Nasser	269	62	964	249	43	27
European Gaza	248	93	841	164	29	23
Al Najar	65	19	312	59	13	8
Al Hilal Al Imarati	42	0	234	43	0	7

Annex (5) Hospitals of MOH

Hospital name	Number of yearly in-patients	Yearly internal medicine departments in-patients	Number of yearly out-patients for clinics	Number of yearly emergency patients	Number of surgery
El Andonisi	9102	4824	42396	102978	3233
Bet Hanon	6085	1106	22206	63045	2033
Al Shifa	54494	10063	166551	264595	10769
Al Rantisi	5684	1668	45817	8437	0
Al Nasr	7772	0	4593	71855	0
Al Ouon	4713	0	53137	87746	5825
Al Dora	6082	0	7975	70000	0
Al Harazeen	2364	0	14329		611
Al Aqsa	24412	3008	40380	154501	4717
Nasser	38074	6992	78067	220821	3914
European Gaza	20014	6835	88018	111241	8339
Al Najar	7647	2730	18633	102035	1462
Al Hilal Al Imarati	8198	0	5363	18352	2874

Annex (6): Questionnaire in English

1- Serial Number: ……

2- Hospital: ……

I- Demographic Data	
3- Age (…….)	4- Gender □ Male □ Female
5- Job □ Physician □ Pharmacist	6- Speciality …….
7- Scientific degree (can you choose more than one). □ Bachelor □ High Diploma □ Master □ Doctorate □ Board or Fellowship □ Others ……	
8- Country of basic graduation …… 9- Country of post-graduation ……	
10- Number of experience years in Internal Medicine Department (……).	
11- Total number of experience years (……).	
12- Your position in MOH. □ Director of department □ Head of department □ Head of division □ Technical	
13- Have you ever got training about drug-drug interactions (DDIs). □ Yes □ No	
14- How many times are you get DDIs training (……).	
15- Last year of getting DDIs training (…….).	

Knowledge of healthcare provider					
A- Source of knowledge					
Question	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
The best source of knowledge when you want to learn more about DDIs.					
16- Colleague (pharmacist).					
17- Colleague (physician).					
18- Training courses you take.					
19- Guidelines and protocols in your hospital.					
20- Electronic programme used in your hospital.					
21- Internet.					
22- Software on your computer or mobile.					
23- Product package instructions.					
24- Advertising agents for medicines.					
25- Others……					

Please choose appropriate answer that reflect reality and tick by (X):

B- Knowledge of healthcare provider	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
26- DDIs take a valuable part of your undergraduate course studies.					
27- You have sufficient knowledge about drugs and DDIs.					
28- DDIs may increase or decrease, due to gender variation.					
29- DDIs may increase or decrease, due to the age.					
30- DDIs may increase or decrease, due to food taken.					
31- Presence of multiple pharmaceutical products increase the problem of DDIs.					
32- DDIs may increase, due to polypharmacy (Multiple medication).					
33- Over-the-counter medications (OTC) can increase DDIs.					
34- Dosage form and route of administration, may increase or decrease DDIs.					
35- Dose of drug, may increase or decrease DDIs.					
36- Dose frequency, may increase or decrease DDIs.					
37- Duration of usage for drug, may increase or decrease DDIs.					
38- Spacing between drugs, may increase or decrease DDIs.					

Attitude of healthcare provider					
Question	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
39- You have high confidence in your medication information.					
40- DDIs is important issue to manage.					
41- As you know, DDIs are dangerous to the patient's health.					
42- As you know, DDIs increase deaths.					
43- As you know, DDIs are important in determining the dosage of the drug.					
44- The presence of clinical pharmacist is important in the hospital.					
45- The clinical pharmacist is able to minimize DDIs.					
46- The clinical pharmacist has fulfilled his role in Gaza hospitals.					
47- Compliance with therapeutic protocols reduces the occurrence of drug DDIs.					
48- The MOH therapeutic protocols need to update.					

Practices of healthcare provider					
Question	**Always**	**Usually**	**Sometimes**	**Seldom**	**Never**
49- Have you ever come across cases of DDIs during your practice.					
50- Before Prescribing drugs, the physician consider its potential DDIs.					
51- You ask the patient about other prescribed or over the counter drugs (OTC) he is using or intends to use.					
52- You ask the patient if he has past sensitivity to any drug.					
53- You give the patient the full and detailed information about using the drug to minimize DDIs.					

Practices of healthcare provider					
Question	**Always**	**Usually**	**Sometimes**	**Seldom**	**Never**
54- You make follow up for patient after drug use.					
55- The physicians consult the pharmacist before prescribe the drugs.					
56- The physicians trust of a pharmacist as a consultant of DDIs information.					
57- The physicians accept the pharmacist opinion when pointing to a DDIs in their prescriptions.					
58- The physicians communicate and coordinate with other physicians if there is another prescription from them to the same patient.					
59- The pharmacists call the physician to alarm him if he prescribes drugs have DDIs.					
60- The pharmacists suppose alternatives if the physician prescribes drugs have DDIs.					
61- Pharmacists check the drugs prescribed and detect DDIs to optimize therapy.					
62- The pharmacists participate in morning meeting and give opinion in drugs which prescribed.					

Protocols

A- Therapeutic protocols in MOH

63- There are approved and written therapeutic protocols at the MOH.

□ Yes □ No □ I do not know

64- You have a copy of the MOH therapeutic protocols.

□ Hard copy □ Hard and soft copy □ Soft copy □ No copies

65- Are therapeutic protocols in the ministry updated.

□ Yes □ No □ I do not know

66- Have you participated in updating therapeutic protocols.

□ Yes □ No

67- You are adhere with the MOH protocols.

□ Always □ Often □ Sometimes □ Seldom □ Never

68- The MOH therapeutic protocols include.

□ EDL □ Non EDL □ Both EDL and Non EDL □ I do not know

69- These protocols cover drug interactions issue and how to manage.

□ Yes □ No □ I do not know

70- Your ministry obliges you for adherence with therapeutic protcols

□ Yes □ No □ I do not know

Supervision and Auditing

Question	Yes	No	I do not know
71- Is the hospital have pharmacy and therapeutic committee.			
72- Is there a regulatory body make follow up for drugs that prescribed?			
73- The MOH is implementing an ongoing training program regarding DDIs.			
74- Training courses of the MOH are effective and have a major impact in reducing DDIs.			
75- Your hospital give periodic reports regarding problems have been got of DDIs.			
76- Healthcare provider fill an adverse drug reaction reporting form.			
77- Your hospital management review your prescriptions and point to you if there is drug DDIs.			
78- Your hospital make audit for the prescriptions and point to you if there is DDIs.			

79- There is an effective and efficient hospital follow-up and audit system for DDIs.			
80- The hospital has indicators to measure healthcare provider compliance with the therapeutic protocols.			
81- You are provided with feedback on your compliance with the therapeutic protocols.			
82- Is an electronic prescription program for detection DDIs applied in your hospital.			
83- An electronic program will help to detect and identify DDIs.			
84- The program will contribute to reduce the magnitude of the problem of DDIs.			

Please do not use any reference:

Test for Healthcare provider knowledge				
Question	Should not be used together	May be used together but with monitoring	No interaction	Not sure
85- Ciprofloxacin and Theophylline.				
86- Captopril and Simvastatin.				
87- Diclofenac and Dexamethasone.				
88- Amoxicillin and Acetaminophen.				
89- Atenolol and Ranitidine.				
90- Digoxin and Clarithromycin.				
91- Losartan and Isosorbide dinitrate.				
92- Esomeprazole and Clopidogrel.				
93- Warfarin and Enalapril.				
94- Alprazolam and Ketoconazole.				

Annex (7): Abstract data sheet

Number: ----------	Hospital: ----------

Admission date		Discharged date	
Age		Gender	Male Female
Governorate	□North □ Gaza □ Middle □ Khanyounis □ Rafah		

Diagnosis	…… ……	ICD-10	

No	Drug name	Active ingredient
1		
2		
3		
4		
5		
6		
7		
8		

Number of **diseases**	
Length of **stay**	
Number of **prescribed drugs**	
Number of **minor** DDIs	
Number of **significant** DDIs	
Number of **serious** DDIs	
Total number of DDIs	
Result DDIs	□ No interaction □ Minor □ Significant □ Serious

Notes:
……
……
……

Annex (8): Interview questions

1- Is our hospitals have a system for drug management in discharge sheet prescription, especially DDIs?

2- Do physicians received feedback on the prescription behavior? If yes, what do the physicians do or behave regarding this feedback?

3- Are therapeutic protocols regulating prescription of drugs? If yes, are protocols are available for all healthcare providers and how committed and adherent are the healthcare providers in our hospitals to these protocols?

4- Do you expect that there are differences between MOH hospitals regarding prescription behavior, especially DDIs? If yes, why?

5- What DDIs mean to you? Is it a health issue that needs intervention and follow up?

6- What is your expectation about the best ways to minimize the magnitude of DDIs issue and its effect in the medical prescription of the discharge summary?

7- What is about electronic prescription program with DDIs detection? And to what extent it will help on reducing the size of the problem?

Annex (9): Questionnaire in Arabic

Self-Administered Questionnaire

حضرة الدكتور ..... المحترم

تحية طيبة وبعد

أنا الباحثة هناء يونس ديب موسى، من كلية الصحة العامة – جامعة القدس– أبو ديس، أقوم بإجراء دراسة حول:

"Magnitude and Correlates of Drug-Drug Interactions among Prescriptions for Patients Discharged from the Internal Medicine Departments of the Governmental Hospitals"

حيث أضع بين أيديكم الإستبانة التي صممت بهدف جمع المعلومات اللازمة لتقييم وضع التداخلات الدوائية (Drug-Drug Interactions) والعوامل المؤدية لذلك في الوصفة الطبية (Discharge sheet) في مستشفى الشفاء وناصر والذي أقوم به كمساق بحثي ضمن خطة دراستي لنيل درجة الماجستير في الإدارة الصحية من كلية الصحة العامة في جامعة القدس أبو ديس.

يحتوي كل سؤال من الإستبانة على عدة خيارات للإجابة، يرجى اختيار الإجابة الأقرب لرأيك وخبرتك الواقعية في العمل، حيث لا توجد اجابة صحيحة أو خاطئة. كما أن المشاركة في هذا البحث تطوعية ولك حق الانسحاب متى شئت.

تستغرق تعبئة الاستبانة مدة ربع ساعة تقريبا. ونؤكد على أن المعلومات الواردة في الإستبانة تعتبر سرية ولن يكون لها استخدامات أخرى خارج نطاق الدراسة، كما أن نتائج الدراسة سوف تقدم لوزارة الصحة كمقترح لتطوير العمل بما يحقق تحسين جودة الخدمة المقدمة في وزارة الصحة.

وتفضلوا بقبول فائق الاحترام والتقدير

الباحثة

هناء يونس ديب موسى

I- البيانات الديموغرافية	
3- العمر (.....)	4- الجنس □ ذكر □ أنثى
5- المهنة □ طبيب □ صيدلي	6- التخصص .....
7- الدرجة العلمية (يمكن اختيار أكثر من إجابة) □ بكالوريس □ دبلوم عالي □ ماجستير □ دكتوراة □ بورد أو زمالة □ أخرى حدد/	
8- بلد التخرج للشهادة الأساسية ..... 9- بلد التخرج للشهادة العليا	
10- عدد سنوات الخبرة في قسم الباطنة (.....)	
11- عدد سنوات الخبرة الاجمالي (.....)	
12- المسمى الوظيفي في وزارة الصحة. □ مدير دائرة □رئيس قسم □ رئيس شعبة □ فني	
13- هل حصلت على تدريب عن التداخلات الدوائية Drug-Drug Interactions (DDIs) □ نعم □ لا	
14- عدد المرات التي تلقيت بها تدريب عن التداخلات الدوائية (.....)	
15- اخر سنة تلقيت بها تدريب عن التداخلات الدوائية (.....)	

II- المعرفة لدى مقدمي الخدمة الصحية					
أ- مصدر المعرفة					
السؤال	لا أوافق بشدة	لا أوافق	محايد	أوافق	أوافق بشدة
أفضل مصدر للمعرفة عندما تريد أن تعرف المزيد عن التداخلات الدوائية.					
16- زميلك الصيدلي					
17- زميلك الطبيب					
18- الدورات التدريبية التي تتلقاها					
19- بروتوكولات المستشفى					
20- برنامج الكتروني يستخدم في المستشفى					
21- الانترنت					
22- تطبيق أو برنامج على الحاسوب أو الجوال الخاص بك					
23- التعليمات الموجودة داخل أو على غلاف الدواء					
24- مندوبي دعاية الأدوية					
25- مصادر أخرى					

اختار الإجابة التي تراها الأنسب للواقع وذلك بوضع اشارة X :

ب- مستوى المعرفة لدى مقدمي الخدمة					
السؤال	لا أوافق بشدة	لا أوافق	محايد	أوافق	أوافق بشدة
26- تعتبر التداخلات الدوائية جزءًا أساسيا من دراستك الجامعية.					
27- لديك معرفة كافية بالأدوية والتداخلات الدوائية بينها.					
28- قد تزيد التداخلات الدوائية أو تنقص تبعًا لجنس المريض.					
29- قد تزيد التداخلات الدوائية أو تنقص تبعا لعمر المريض.					
30- قد تزيد التداخلات الدوائية أو تنقص تبعا لنوع الطعام الذي يتناوله المريض.					
31- التنوع والزيادة المستمرة في الإنتاج الدوائي تزيد من مشكلة التداخلات الدوائية.					
32- زيادة عدد الأدوية في الوصفة الطبية (Polypharmacy) يزيد من التداخلات الدوائية					
33- الأدوية التي توصف من دون وصفة طبية (OTC) ممكن أن تزيد من التداخلات الدوائية.					
34- الشكل الصيدلاني وطريقة إعطاء الدواء للمريض، ممكن أن تزيد أو تقلل من التداخلات الدوائية					
35- جرعة الدواء (Dose) ممكن أن تزيد أو تقلل من التداخلات الدوائية.					
36- عدد مرات تكرار الجرعة (Dose frequency)، ممكن أن يزيد أو يقلل من التداخلات الدوائية.					
37- مدة الاستخدام للدواء (Duration of usage) ممكن أن تزيد أو تقلل من التداخلات الدوائية.					
38- التباعد بين الأدوية (Spacing between drugs) ممكن أن يزيد أو يقلل من التداخلات الدوائية					

III- سلوكيات وانطباع مقدمي الخدمة الصحية					
السؤال	لا أوافق بشدة	لا أوافق	محايد	أوافق	أوافق بشدة
39- انت على ثقة عالية بمعلوماتك الدوائية.					
40- تعتبر التداخلات الدوائية مشكلة ذات أهمية كبيرة وتحتاج لتدخل.					
41- على حسب معرفتك، التداخلات الدوائية خطيرة على صحة الإنسان.					
42- على حسب معرفتك، التداخلات الدوائية تزيد من حالات الوفاة.					
43- على حسب معرفتك، التداخلات الدوائية لها أهمية في تحديد الجرعة الدوائية.					
44- يعتبر وجود الصيدلي الاكلينيكي في المستشفى له أهمية كبيرة.					
45- الصيدلي الاكلينيكي قادر على تقليل التداخلات الدوائية.					
46- يقوم الصيدلي الاكلينيكي دوره بشكل كامل في مستشفيات قطاع غزة.					
47- الالتزام بالبروتوكولات العلاجية لوزارة الصحة يقلل من حدوث التداخلات الدوائية.					
48- بروتوكولات وزارة الصحة العلاجية تحتاج لتحديث.					

IV- الممارسات لمقدمي الخدمة الصحية					
السؤال	دائما	عادة	أحيانا	قلما	أبدا
49- هل مرت عليك حالات من التداخلات الدوائية أثناء الممارسة.					
50- يأخذ الطبيب بعين الاعتبار التداخلات الدوائية قبل وصف الأدوية.					
51- تسأل المريض عن الأدوية ذات الوصفة الطبية أو الأدوية بدون وصفة طبية(OTC) التي يستخدمها المريض أو ينوي استخدامها.					
52- تسأل المريض إذا كان لديه حساسية لأي دواء.					
53- تعطي المريض المعلومات الكافية والمفصلة عن الدواء للتقليل من التداخلات الدوائية.					
54- تقوم بعمل متابعة للمريض بعد استخدام الدواء.					
55- الطبيب يستشير الصيدلي قبل وصف الدواء.					
56- الطبيب يثق في الصيدلي كمستشار في المعلومات الخاصة بالتداخلات الدوائية.					
57- الطبيب يتقبل رأي الصيدلي عندما يشير إلى تداخل دوائي في وصفته الطبية.					
58- الطبيب يتواصل وينسق مع الأطباء الاخرين، في حال وجود وصفات أخرى لنفس المريض .					
59- الصيدلي يتواصل مع الطبيب لينبهه في حال وجود تداخلات دوائية في الوصفة الطبية.					
60- الصيدلي يقترح بدائل دوائية للطبيب في حال وجود تداخلات دوائية في الوصفة الطبية.					
61- الصيدلي يشارك وبشكل فعال في فحص الوصفة الطبية والكشف عن التداخلات الدوائية للوصول إلى أفضل علاج.					
62- الصيدلي يشارك في اللقاء الصباحي ويعطي رأيه في الأدوية الموصوفة.					

V- البروتوكولات العلاجية
البروتوكولات العلاجية في وزارة الصحة
63- يوجد بروتوكولات علاجية مكتوبة ومعتمدة في وزارة الصحة. □ نعم □ لا □ لا أعرف
64- يوجد لديك نسخة من البروتوكلات العلاجية الخاصة بوزارة الصحة. □ ورقية □ الكترونية □ ورقية والكترونية □ لا يوجد
65- البروتوكولات العلاجية الخاصة بوزارة الصحة يتم تحديثها. □ نعم □ لا □ لا أعرف
66- شاركت في تحديث البروتوكولات العلاجية. □ نعم □ لا
67- أنت تلتزم بالبروتوكولات العلاجية الخاصة بوزارة الصحة. □ دائما □ عادة □ أحيانا □ قلما □ أبدا
68- البروتوكولات العلاجية الخاصة بوزارة الصحة تتضمن. □ قائمة الأدوية الأساسية □ قائمة الأدوية غير الأساسية □ قائمة الأدوية الأساسية وغير الأساسية □ لا أعرف
69- البروتوكولات العلاجية تتناول مشكلة التداخلات الدوائية وكيفية التعامل معها. □ نعم □ لا □ لا أعرف
70- وزارتي تجبرني بالالتزام بالبروتوكلات العلاجية. □ نعم □ لا □ لا أعرف

VI- المتابعة والتدقيق			
السؤال	نعم	لا	لا أعرف
71- يوجد في المستشفى لجنة صيدلة وعلاجيات.			
72- يوجد هيئة تنظيمية تقوم بمتابعة الأدوية الموصوفة.			
73- تقوم وزارة الصحة بتنفيذ تدريب مستمر حول التداخلات الدوائية.			
74- الدورات المقدمة من وزارة الصحة فعالة ولها أثر كبير في الحد من التداخلات الدوائية.			
75- يقدم المستشفى تقارير دورية بخصوص التداخلات الدوائية.			
76- مقدم الخدمة الصحية يملأ نموذج الإبلاغ عن التداخلات الدوائية الضارة.			
77- تقوم إدارة المستشفى بمراجعة الوصفات الطبية وتشير لك اذا وجدت التداخلات الدوائية.			
78- يقوم المستشفى بالمراقبة والتفتيش على الوصفات الطبية وتشير للتداخلات الدوائية إن وجدت.			
79- نظام المتابعة والتدقيق الموجود في المستشفى فعال وذو كفاءة عالية لمتابعة التداخلات الدوائية.			
80- يوجد بالمستشفى مؤشرات لقياس مدى التزام مقدمي الخدمة الصحية بالبروتوكلات العلاجية.			
81- يتم تزويدك بتغذية راجعة عن مدى التزامك بالبروتوكولات العلاجية.			
82- يوجد في المستشفى برنامج الكتروني مطبق للوصفة الطبية للكشف عن التداخلات الدوائية.			
83- وجود برنامج الكتروني سوف يساعد على الكشف والتعرف على التداخلات الدوائية.			
84- وجود برنامج الكتروني سوف يساهم في تقليل حجم مشكلة التداخلات الدوائية.			

الرجاء اختيار الإجابة التي تراها مناسبة دون الرجوع إلى المراجع العلمية:

VII- اختبار معرفي لمقدمي الخدمة الصحية				
السؤال	لا تستخدم معا	ممكن أن تستخدم معا ولكن مع المراقبة	لا يوجد تداخل دوائي	غير متأكد
85- Ciprofloxacin and Theophylline				
86- Captopril and Simvastatin				
87- Diclofenac and Dexamethasone				
88- Amoxicillin and Acetaminophen				
89- Atenolol and Ranitidine				
90- Digoxin and Clarithromycin				
91- Losartan and Isosorbide dinitrate				
92- Esomeprazole and Clopidogrel				
93- Warfarin and Enalapril				
94- Alprazolam and Ketoconazole				

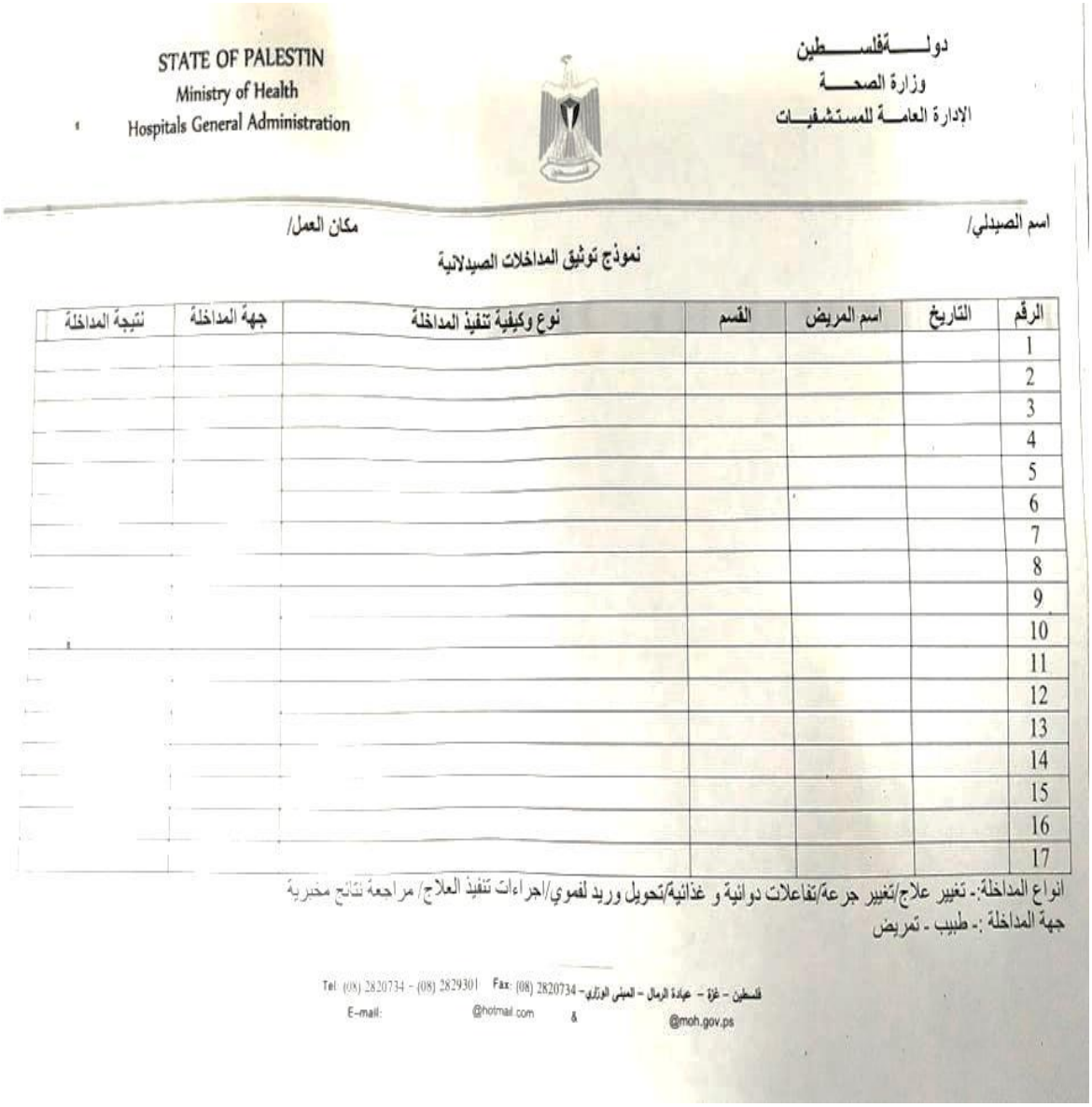
Annex (10): List of all prescribed drugs in discharge sheet

Drugs	No. of prescriptions	% of total no of prescriptions
Acetylsalicylic acid	159	26.5
Bisoprolol	140	23.3
Cefuroxime	118	19.7
Omeparzole	106	17.7
Atorvastatin	92	15.3
Furosemide	86	14.3
Esomeparzole	84	14.0
Amlodipine	77	12.8
Azithromycin	66	11.0
Acetaminophen	62	10.3
Insulin	58	9.7
Levofloxacin	55	9.2
Prednisone	55	9.2
Ciprofloxacin	51	8.5
Enalapril	47	7.8
Pantoprazole	45	7.5
Minerals	43	7.2
Spironalactone	40	6.7
Clopidogrel	38	6.3
Isosorbide-5-monoitrate	34	5.7
Vitamins	34	5.7
Metronidazole	33	5.5
Rosuvastatin	33	5.5
Warfarin	33	5.5
Budesonide	32	5.3
Formoterol fumarate	32	5.3
Salbutamol	30	5.0
Metformin	27	4.5
Dried Ivy leaf extract	25	4.2
Lactulose	22	3.7
Amoxicillin & clavulanic acid	20	3.3
Doxycycline	19	3.2
Valsartan & hydrochlorothiazide	17	2.8
Carbamazepine	16	2.7
Amoxicillin	14	2.3
Valsartan	13	2.2
Alfacalcidol	12	2.0
Beclomethasone	12	2.0
Trimetazidine	12	2.0
Cefdinir	11	1.8
Vitamins & Minerals	11	1.8
Ammonium chloride, diphenhydramine	10	1.7
Candesartan	9	1.5
Cefpodoxime	9	1.5
Hyoscine-n-butyl bromide	9	1.5
Ibuprofen	9	1.5
Levothyroxine	9	1.5
Allopurinol	8	1.3
Clarithromycin	8	1.3
Clindamycin	8	1.3
Gemifloxacin	7	1.2
Glibenclamide	7	1.2
Sitagliptin	7	1.2
Budesonide & Formoterol fumarate	7	1.2

Drugs	No. of prescriptions	% of total no of prescriptions
Hydroxychloroquine sulfate	7	1.2
Ipratropium bromide	7	1.2
Moxifloxacin	7	1.2
Betahistine	6	1.0
Carvedilol	6	1.0
Herbals	6	1.0
Ramipril	6	1.0
Rivaroxaban	6	1.0
Famotidine	6	1.0
Propranolol	6	1.0
Amiodarone	5	0.8
Chlorpheniramine	5	0.8
Glimepiride	5	0.8
Isosorbid dinitrate	5	0.8
Loratidine	5	0.8
Mesalazine	5	0.8
Metronidazole, Diloxanide furoate	5	0.8
Prasugrel	5	0.8
Valproic acid	5	0.8
Azathioprine	4	0.7
Domperidone	4	0.7
Losartan	4	0.7
Metolazone	4	0.7
Phenytoin	4	0.7
Acetylcysteine	4	0.7
Dexamethasone	3	0.5
Digoxin	3	0.5
Ezetimibe	3	0.5
Hydrocortisone	3	0.5
Lorazepam	3	0.5
Metalazone	3	0.5
Nitrofurantoin	3	0.5
Nystatin	3	0.5
Oseltamvir	3	0.5
Vancomycin	3	0.5
Amitriptyline	2	0.3
Betamethasone	2	0.3
Colchicin	2	0.3
Desloralidine	2	0.3
Doxazosin	2	0.3
Fexofenadin	2	0.3
Fusidic acid	2	0.3
Glycopyronium	2	0.3
Guaifenisin	2	0.3
Heparin sodium	2	0.3
Levodopa	2	0.3
Ranitidine	2	0.3
Sildenafil	2	0.3
Topiramate	2	0.3
Tranexamic acid	2	0.3
Triprolidine	2	0.3
Vildaglibin, metformin	2	0.3
Aluminium hydroxide, Magnesium carbonate	2	0.3
Penicillin	2	0.3
Candesartan & Hydrochlorothiazide	2	0.3
Metoclopramide	2	0.3

Drugs	No. of prescriptions	% of total no of prescriptions
Phenobarbital	2	0.3
Thymus vulgaris	2	0.3
Acetaminophen, Diclofene potassium	1	0.2
Acetylsalicylic Acid + caffeine	1	0.2
Ambroxol HCL	1	0.2
Ampicillin	1	0.2
Atenolol	1	0.2
Bisacodyl	1	0.2
Cefixime	1	0.2
Ceftazidime	1	0.2
chlordiazepoxide, clidinium	1	0.2
Cinnarizine	1	0.2
Glycerin	1	0.2
Codeine, Pseudoephedrine, Triprolidine	1	0.2
Codiene, Acetaminphon	1	0.2
Colestipol	1	0.2
Dabigatran	1	0.2
Dalteparin	1	0.2
Dextromethorphan, Triprolidine	1	0.2
Diclofenac potassium	1	0.2
Diclofenac sodium	1	0.2
Enoxaparin	1	0.2
Etoricoxib	1	0.2
Fluxetine	1	0.2
Furazolidone, kaolin, pectin	1	0.2
Homatropine Methylbromide	1	0.2
Hydrochlorothiazide	1	0.2
Hyoscine, acetaminophen	1	0.2
Ibuprofen, Pseudoephedrin	1	0.2
Indacterol & glycopyronium	1	0.2
Indapamide	1	0.2
Ketoprofen	1	0.2
Macrogol (polyethylene)	1	0.2
Methyl dopa	1	0.2
Monose, probiotic blend	1	0.2
Montelukast	1	0.2
Mycophenlate	1	0.2
Norfloxacin	1	0.2
Orphenadrine citrate	1	0.2
Orphenadrine citrate & acetaminophen	1	0.2
Oxycodone, acetaminophen	1	0.2
Panthenol	1	0.2
Paroxetine	1	0.2
Phenazopyridine	1	0.2
Piroxicam	1	0.2
propolis tincture, benzoic acid	1	0.2
Sacubitril & valsartan	1	0.2
Simethicone, vegum	1	0.2
Simvastatin	1	0.2
Sodium Alginate, Bicarbonate	1	0.2
Sodium benzoate hexamine	1	0.2
Sulfamethoxazole, trimethoprim	1	0.2
Tretinoin	1	0.2
Valsartan, amlodipine, hydrochlorothiaze	1	0.2
Total	2281	

Annex (11): Drug interaction documentation form



STATE OF PALESTIN
Ministry of Health
Hospitals General Administration

دولـــــةفلســـــطين
وزارة الصحـــــة
الإدارة العامـــة للمستشفيـــات

اسم الصيدلي/ مكان العمل/

نموذج توثيق المداخلات الصيدلانية

الرقم	التاريخ	اسم المريض	القسم	نوع وكيفية تنفيذ المداخلة	جهة المداخلة	نتيجة المداخلة
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						

انواع المداخلة:- تغيير علاج/تغيير جرعة/تفاعلات دوائية و غذائية/تحويل وريد لفموي/اجراءات تنفيذ العلاج/ مراجعة نتائج مخبرية
جهة المداخلة :- طبيب - تمريض

Tel: (08) 2820734 - (08) 2829301 Fax: (08) 2820734 فلسطين - غزة - عيادة الرمال - المبنى الوزاري
E-mail: @hotmail.com & @moh.gov.ps

Annex (12): Clinical pharmacist patient follow up pharmacist form

Palestinian National Authority
Ministry Of Health
Hospitals General Administration

السلطة الوطنية الفلسطينية
وزارة الصحة
الإدارة العامة للمستشفيات

Clinical Pharmacist Patient Follow Up Form

Department:.....	Date: / / Pharmacist:.....

Patient Data

P. Name:..... File No:.....
Room:.....Bed: ..... Gender:..... Age:.....
Wt.(kg):.....Ht(cm):..... BMI:.....
Pregnancy/Lactation:..... Allergy:.....
Admission Date: / / Admission from:.. .....

Medication Hx.: (prescribed & OTC)

Drug	Dosage regimen	Duration	Drug induced problem

Chief Complaint	
Diagnosis	
Past Medical Hx.	
Family history	
Social Habits	
Physical examination	

Culture/ Other investigations	Therapeutic Plan

Vital signs/ Date														N. Value	Progress Note
B.P															
Heart Rate															
Respiratory Rate															
Temperature															

Drug Therapy Problem

Palestinian National Authority
Ministry Of Health
Hospitals General Administration

السلطة الوطنية الفلسطينية
وزارة الصحة
الإدارة العامة للمستشفيات

Current medications

Indication	Drug/ strength	Dose	Frequency	Route	Regimen and timing (diet, sleep and daytime)	Start and stop dates (duration)	Monitoring

Once Only Medications				Intravenous Infusion Therapy		
Date/Time	Drug/Dose	Route	Interaction	Date/Time start	IV Fluids+ Drugs/dose	Rate

Discharge ☐ Home ☐ Other Department:..... ☐ Other Hospital:..... ☐ Died

Clinical Pharmacist interventions

Date/ Time	Pre/During/Post Prescribing	Drug-Therapy Problem	Therapeutic Goals	Recommendations	Follow-Up Plan (monitoring parameters and frequencies)	Result

2

Palestinian National Authority
Ministry Of Health
Hospitals General Administration

السلطة الوطنية الفلسطينية
وزارة الصحة
الإدارة العامة للمستشفيات

Laboratory Data

Test/Date													N. Value	Progress Note
Cr													0.5-1.5 mg/dl	
BUN													8-25 mg/dl	
Na^+													135-145 meq/l	
K^+													3.5-5.1 meq/l	
Cl^-													92-109 meq/l	
$HCO3^-$													24-31 meq/l	
Uric acid														
PT/INR													11-13 sec /2.0-3.0	
PTT													25-35 sec	
WBC													4.5-10 $10^3/\mu l$	
Hgb													14-18/12-16 g/dl	
Hct													40-52/37-47%	
MCV													80-95 μm^3	
Plt													150-400 $10^3/\mu l$	
Glc													80-110 mg/dl	
Ca^{++}													8.0-10.5 mg/dl	
P													2.5-5 mg/dl	
Mg^{++}													1.5-2.4 mg/dl	
TPr													6-8 g/dl	
Chol														
TG														
CPK													4-6g/dl	
Alb													30-120 U/L	
Alk P													0-35 IU/L	
AST/													0-35 U/L	
ALT/													0-1 mg/dl	
Tbili													4-6g/dl	
T.T													30-120 U/L	
Drug levels														
Others														

3

Notes

Annex (13): Patient advice form

Palestinian National Authority
Ministry Of Health
Hospitals General Administration

السلطة الوطنية الفلسطينية
وزارة الصحة
الإدارة العامة للمستشفيات

نموذج تقديم المشورة للمرضى

الاسم:..... تاريخ الخروج من المستشفى: / / التشخيص:.....

اسم الطبيب:..... اسم الصيدلي:.....

العلاج الموصوف	الجرعة اليومية	مدة العلاج	سبب وصف العلاج	أوقات تناول العلاج	الأعراض الجانبية المتوقعة	تعليمات خاصة

Annex (14): List of experts

No	Name	Position
1	Dr. Bassam Abu Hamad	School of Public Health Al Quds University
2	Dr. Khitam Abu Hamad	School of Public Health Al Quds University
3	Dr. Muneer El Bursh	General Directorate of Pharmacy
4	Dr. Shereen Ayub	Director of Planning and Information Department in General Directorate of Pharmacy (MOH)
5	Dr. Alaa Helis	Director of Hospitals Pharmaceutics Department in General Directorate of Pharmacy (MOH)
6	Dr. Nael Skaik	Director of Pharmaceutical Department in Al Shifa Hospital (MOH)
7	Dr. Alaa El Masri	Physician in Nasser hospital
7	Dr. Khalid Abu Elaish	Ministry of Health
8	Dr. Nahed Hejazi	Ministry of Health
9	Dr. Abed Al Karim Abed	Ministry of Health
10	Dr. Jehad Okasha	Ministry of Health
11	Dr. Areej Musalem	Ministry of Health
12	Dr. Raafat Abu Redwan	Ministry of Health
13	Dr. Ayman Abu Mustafa	Ministry of Health
14	Dr. Hala El Aghaa	Al Azhar University
15	Dr. Lina Massoud	Community Pharmacist

Annex (15): MOH approval

المجلس الفلسطيني للبحث الصحي
Palestinian Health Research Council

تعزيز النظام الصحي الفلسطيني من خلال مأسسة استخدام المعلومات البحثية في صنع القرار
Developing the Palestinian health system through institutionalizing the use of information in decision making

Helsinki Committee
For Ethical Approval

Date: 2019/06/17 **Number:** PHRC/HC/577/19

Name: Hanaa Moussa الاسم:

We would like to inform you that the committee had discussed the proposal of your study about:

نفيدكم علماً بأن اللجنة قد ناقشت مقترح دراستكم حول:

Magnitude and correlates of drug-drug interactions among prescriptions for patients discharged from the internal medicine departments of the Governmental Hospital

The committee has decided to approve the above mentioned research. Approval number PHRC/HC/577/19 in its meeting on 2019/06/17

و قد قررت الموافقة على البحث المذكور عاليه بالرقم والتاريخ المذكوران عاليه

Dr. Yehia Abed

Signature

Member **Member**

Chairman

Genral Conditions:-

1. Valid for 2 years from the date of approval
2. It is necessary to notify the committee of any change in the approved study protocol.
3. The committee appreciates receiving a copy of your final research when completed.

Specific Conditions:-

E-Mail:pal.phrc@gmail.com
Gaza - Palestine غزة - فلسطين
شارع النصر - مفترق العيون

Annex (16): Helsinki approval

State of Palestine
Ministry of health

دولة فلسطين
وزارة الصحة

السيد : رامي عبد سليمان العبادله المحترم

التاريخ 20/11/2019
رقم المراسلة 397041

مدير عام بالوزارة //الإدارة العامة لتنمية القوى البشرية – /وزارة الصحة

السلام عليكم ...

الموضوع/ تسهيل مهمة الباحثة// هناء موسى

التفاصيل //
بخصوص الموضوع أعلاه، يرجى تسهيل مهمة الباحثة/ هناء يونس موسى
الملتحقة ببرنامج ماجستير الصحة العامة – مسار الإدارة الصحية – جامعة القدس أبوديس في إجراء بحث بعنوان:-
"Magnitude and Correlates of Drug-Drug Interactions among Prescriptions for Patients Discharged from the Internal Medicine Departments of the Governmental Hospitals"
حيث الباحثة بحاجة لمراجعة تذكرة الخروج لعدد من مرضى الباطنة في مجمع الشفاء الطبي ومجمع ناصر الطبي وتعبئة استبانة من عدد من الأطباء والصيادلة في تلك الأقسام، إضافة لعقد مقابلة معمقة مع عدد من أصحاب الوزارة في الإدارة العامة للمستشفيات والإدارة العامة للصيدلة، بما لا يتعارض مع مصلحة العمل وضمن أخلاقيات البحث العلمي، ودون تحمل الوزارة أي أعباء أو مسئولية.
وتفضلوا بقبول التحية والتقدير...
ملاحظة / تسهيل المهمة الخاص بالدراسة أعلاه صالح لمدة 6 أشهر من تاريخه.

محمد ابراهيم محمد السرساوي
مدير دائرة/الإدارة العامة لتنمية القوى البشرية –

التحويلات

محمد ابراهيم محمد السرساوي(مدير دائرة)	← رامي عبد سليمان العبادله(مدير عام بالوزارة)	إجراءاتكم بالخصوص(20/11/2019)
رامي عبد سليمان العبادله(مدير عام بالوزارة)	← منير عبدالله عطيه المرش(مدير عام بالوزارة)	إجراءاتكم بالخصوص(20/11/2019)
رامي عبد سليمان العبادله(مدير عام بالوزارة)	← عبد السلام محمد عبد صباح(مدير عام بالوزارة)	إجراءاتكم بالخصوص(20/11/2019)
عبد السلام محمد عبد صباح(مدير عام بالوزارة)	← محمد خليل محمد زقوت(مدير)	إجراءاتكم بالخصوص(20/11/2019)
عبد السلام محمد عبد صباح(مدير عام بالوزارة)	← محمد محمد عبد الحليم ابوسلمية(مدير مستشفى)	إجراءاتكم بالخصوص(20/11/2019)
محمد محمد عبد الحليم ابوسلمية(مدير مستشفى)	← نائل هشام محمد سكيك(مدير صيدلية)	إجراءاتكم بالخصوص(20/11/2019)
محمد محمد عبد الحليم ابوسلمية(مدير مستشفى)	← حسن محمد خليل حافظ اللوح(مدير)	إجراءاتكم بالخصوص(20/11/2019)

Gaza Tel. (+970) 8-2846949 Fax. (+970) 8-2826295
غزة تلفون. (+970) 8-2846949 فاكس. (+970) 8-2826295

Abstract in Arabic

عنوان الرسالة : تقييم حجم التداخلات الدوائية والعوامل المؤدية إليها في الوصفات الطبية في تقرير الخروج للمرضى من أقسام الباطنة في المستشفيات الحكومية.

إعداد الباحثة: هناء يونس ديب موسى

إشراف: بروفسور د. يحيى عابد

ملخص الدراسة

إن التوافر المتزايد للمركبات العلاجية المعقدة وانتشار الوصفات ذات الأدوية المتعددة ، ومعدل المشاكل المتعلقة بالأدوية و التداخلات الدوائية ذات العواقب الطبية والمالية الهائلة. تهدف هذه الدراسة لتقييم الحجم والعوامل التي ترتبط بالتداخلات الدوائية في وصفات المرضى الذين خرجوا من أقسام الباطنة في المستشفيات الحكومية.

استخدمت هذه الدراسة طريقة مختلطة تضمنت بيانات كمية ونوعية. تم جمع البيانات الكمية بواسطة أداتين، الأولى هي تلخيص البيانات لـ 600 وصفة طبية تم اختيارها بشكل عشوائي من مستشفيين تم أيضااختيارهما بطريقة أخذ العينات العشوائية والثاني هو استبيان شبه منظم لجمع البيانات من أطباء أقسام الباطنة وجميع صيادلة الدراسة، بنسبة استجابة 75٪. تم جمع البيانات النوعية من خلال 10 مقابلات متعمقة مع المخبرين الرئيسيين مع صانعي السياسات من وزارة الصحة. تم تحليل البيانات الكمية باستخدام برنامج SPSS وتم تحليل البيانات النوعية باستخدام تقنية الترميز المفتوح الموضوعي.

كشفت النتائج أن متوسط عمر المشاركين (أطباء وصيادلة) بلغ 42.03 سنة. تلقى 16٪ فقط من المشاركين تدريب حول التداخلات الدوائية. يتفق معظم المشاركين على أن أفضل مصادر للمعلومات عن التداخلات الدوائية هو الإنترنت. كان متوسط الدرجات للمشاركين في اختبار التداخلات الدوائية لعشرة أزواج من الأدوية 45٪ ، وكان أعلى زوج من الأدوية الذي تمت اجابته بشكل صحيح هو أموكسيسيلين وأسيتامينوفين بمتوسط 74.7٪ ، ومع ذلك ، كانت أقل درجة لديجوكسين وكلاريثروميسين بمتوسط درجة 24٪ . كان لدى معظم المشاركين انطباع ايجابي اتجاه أهمية التداخلات الدوائية و إدارتها وكذلك اتجاه خطر التداخلات الدوائية على صحة المريض. قلة من المشاركين يوافقون على أن الصيدلي الإكلينيكي قد أدى دوره في مستشفيات غزة ، كما أن القليل منهم يتفقون مع أن الطبيب يستشير الصيدلي قبل الوصف وأيضاً وجود ثقة من الطبيب اتجاه الصيدلي كمستشار للمعلومات التي تخص التداخلات الدوائية. فقط 51.3٪ من المشاركين لديهم وعي فيما يتعلق بتوافر البروتوكولات العلاجية في وزارة الصحة ، و 37.7٪ يلتزمون دائمًا ببروتوكولات وزارة الصحة ويوافق معظم المشاركين على أن تطبيق برنامج الوصفات الإلكترونية سيساعد في اكتشاف التداخلات الدوائية.

حوالي 54.8٪ من المشاركين (المرضى) كانوا من الإناث ، متوسط عمر المرضى 51.66 سنة. أكثر الأمراض التي تم تشخيصها هي أمراض الدورة الدموية ، تم تشخيصها في 28.1٪ من الوصفات الطبية. كان أكثر الأدوية التي تم

وصفها هو حمض أسيتيل ساليسيليك 100 مجم. كان متوسط عدد الأدوية لكل وصفة 3.84 دواء. حوالي 54.3 ٪ من الوصفات الطبية تحتوي على 2 إلى 4 أدوية و 34.3 ٪ من الوصفات تحتوي 5 أدوية وأكثر. كشفت الدراسة أيضا ؛ 22.3٪ من الوصفات تحتوي على تداخلات دوائية ثانوية ، 56.5٪ تحتوي تداخلات دوائية هامة ، 13٪ تحتوي تداخلات دوائية خطيرة و 60.8٪ لديها نوع واحد من التداخلات الدوائية على الأقل. كانت قضية التداخلات الدوائية ذات دلالة إحصائية مرتبطة بالمكان المقدم به الخدمة وعدد الأدوية الموصوفة وعمر المريض.

غالبية مقدمي الرعاية الصحية العاملين في مستشفيات وزارة الصحة ليسوا على دراية كافية بالتداخلات الدوائية و هناك حاجة لبرامج التدريب والمراقبة مصحوبة بالإشراف والحوافز. تعزيز دور الصيدلي كما أن سلوك الوصفات الطبية يتطلب مزيدًا من المتابعة والتدقيق. ضرورة وجود نظام إنذار محوسب لوصف الأدوية.