

**Near East University**  
**Faculty of Pharmacy**  
**Nicosia, Northern Cyprus**  
**Clinical Pharmacy Department**



## **Master Thesis**

# ***The Role of Pharmacists in Preventing Drug-Related problems in Syrian Refugees Population in Jordan***

By:

**Alaa Wahoud**

Northern Cyprus, Nicosia

2017

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Adviser:

**Assoc. Prof. Arijana Meštrović**

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## **DEDICATION**

This research dedicated to the entire refugees' population who suffer around the World, especially to the Syrian refugees and their painful experience.

The thesis dedicated to my injured country Syria, to my family and my father and my mother.

Alaa Wahoud



## ACKNOWLEDGMENTS

I would like to thank **Basel Shammout** and his Molham's volunteering team for their trust and support throughout this research. Thanks also all the patients who gave me their time and much of love.

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## ABSTRACT

**Introduction:** The drug-related problems are one of the leading causes of morbidity and mortality. The pharmacists play a significant role in identifying, reducing, and preventing the DRPs events among populations. The refugees' populations are at high risks to having DRPs events.

**Aim:** This study aims to assess the role of the pharmacists who are working within non-governmental organizations in providing healthcare to the Syrian refugees and help in reducing the DRPs events in this specific population.

**Method:** The medical records were collected from Molham's Team Medical Archive. 1332 refugee patients' files were reviewed and 609 patients included in the study due to the inclusion criteria. The drug-related problems were documented and identified by using PCNE's DRPs classification system. All the destructive data were analyzed by using SPSS program.

**Result:** 16.8% of DRPs events were identified among 609 patients' cases that were included in the study. The most frequently reported drug-related problems were (P2.1) non-allergic adverse drug reaction (27.4%). Pharmacists identified 66.7% of the DRPs events.

**Conclusion:** Having at least one pharmacist in the healthcare system will help to reduce the incidence rate of the DRPs events. Establishing a follow-up and medication reviews' department in the health centers (that provide healthcare) to the refugees is a need to improve the health status and patient safety for this population.

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## **ABBREVIATIONS**

DRPs	Drug-Related Problems
ADE	Adverse Drug Events
ME	Medication Error
FDA	Food and Drug Administration
WHO	World Health Organization
NGOs	Non-Governmental Organization
MRs	Medication Reviews
CPOE	Computerized Physician Order Entry
Prn	Needed drugs use
HRQoL	Health-Related Quality of Life
PCNE	Pharmaceutical Care Network of Europe
CDs	Communicable Diseases
NCDs	Non- Communicable Diseases
SOPs	Standard Operating Procedures
SPSS	Statistical Package for the Social Sciences



# **1. INTRODUCTION AND BACKGROUND:**

## **1.1 Drug-Related Problems (DRPs):**

### **1.1.1 Definitions:**

Since the 1960s the health community starts to study adverse drug reactions, especially after Thalidomide disaster. (Olsson, 2015). Years later the concept of harmful and non-preventable adverse drug event (ADE) developed to the medication error concept including non-harmful and preventable ADE too. (CMS, 2015)

Nowadays, identifying the therapy problem is an essential part of the pharmaceutical care practice to improve the outcome and to reach the optimum goal of pharmacotherapy for each patient. (Cipolle, 2012)

This identification and documentation process needed to be more detailed-structure and improved to classify the errors into a human's errors (medication errors) and drug's errors (adverse drug event). And to focus on the causes and the interventions parts.

The drug-related problems concept was found in the recent decades to express the relationship between medication errors and adverse drug reactions. Moreover, it was widely used in the recent researches and studies. (ACG Egberts, 2007)

**Adverse drug event (ADE):** is an event that is “Noxious and unintended and occurs at doses used for prophylaxis, diagnosis, therapy, or modification of physiologic functions.” (WHOannex, 2009).

**Adverse drug reaction (ADR):** An undesirable response associated with the use of a drug that either compromise therapeutic efficacy, enhances toxicity, or both. (WHOannex, 2009)

**Medication error (ME):** Any preventable event that may cause inappropriate medication use or jeopardize patient safety. (WHOannex, 2009)

**Drug-related problems (DRPs):** is an event or circumstance involving drug therapy that actually or potentially interferes with desired health outcomes. (PCNE, 2017)

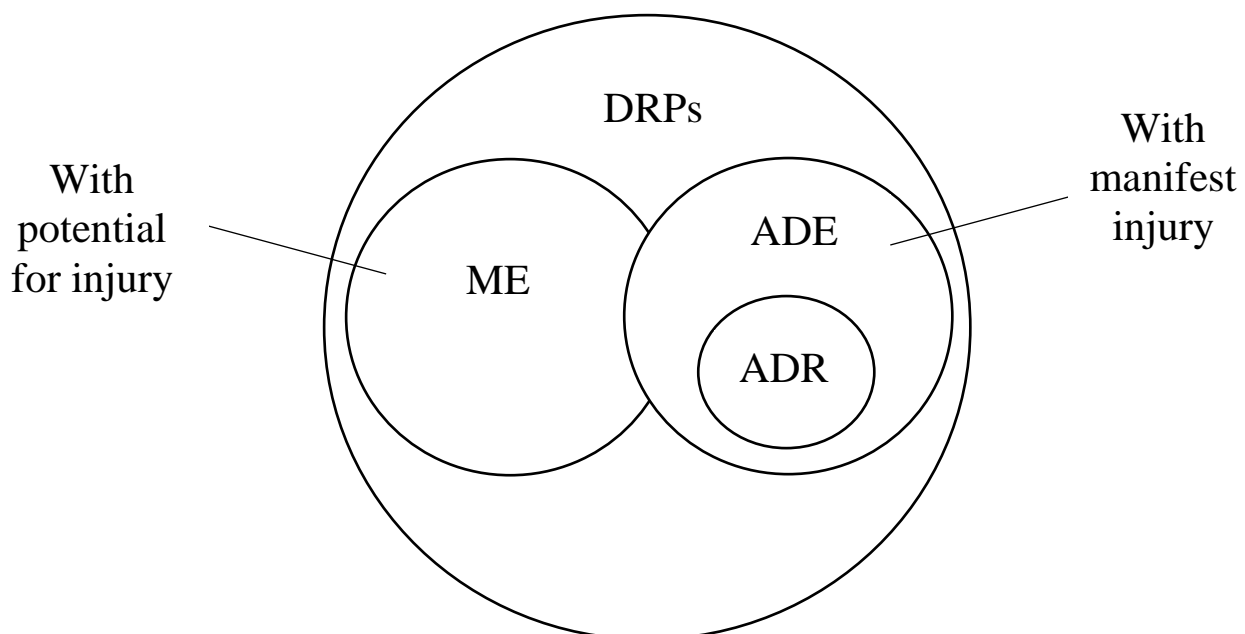


Figure 1: Relationship between Drug-related problems (DRPs), Medication error (ME), Adverse drug event (ADE), and adverse drug reaction (ADR).

### 1.1.2 DRPs classification systems

The DRPs classification system is an essential tool for clinical practice to contribute in identifying, to resolve, and to prevent such problem. (Ginny D. Crisp, 2011)

The validity of any classification system depends on its meeting to requirements such as being:

- Suitable for both scientific studies and clinician practice.
- Easy to use in daily routine.
- Suitable for the documentation.
- At least consist of three parts: problem, intervention, and the cause.
- Structured and detailed.
- Designed with a coding system.
- Each drug-related problem must be defined clearly and lead to a specific code.

Various classifications systems of DRPs were published in literature and studies. Those publications divided the drug-related problems into various categories. (Basger BJ1, 2014)

Most of the classification systems do only have *Problem* and *Intervention* parts, only a few of them include and focus on the *Causes* part separately.

The differences in the methodologies focus and definitions of DRPs caused the lack of the optimal classification system that could be universal and could meet all the criteria. (ADUSUMILLI PK, 2014)

In this study, the PCNE's DRPs classification system was chosen to identify the DRPs. It is described in details in the *Methodology chapter*.

### **1.1.3 Factors affecting DRPs**

#### **a) Polypharmacy**

Approximately the incidence of DRPs is increasing linearly with the number of drugs used by the patient. To reach of the desired health outcome during the duration of treatment is a real challenge to the clinician. (Viktil, 2006). The term “polypharmacy” express the use of multiple medications by one patient. Polypharmacy has variously defined depending on the number of medications used. However, there is no exact number of drugs used by a patient could be related to the increases in the incidence of drug-related problems. (Emily R. Hajja, 2007). Types 2 Diabetes Mellitus with dyslipidemia patients clearly represent this fact especially when those patients have liver or kidney impairments (which alter the pharmacokinetics of antidiabetic and anti-hyperlipidemia agents). An average of 4 DRPs per patient with those two comorbidities has appeared in a study. (Hasniza Zaman, 2013)

#### **b) Age**

Age is a critical factor in the occurrence of DRPs because the extreme ages (the elderly and pediatric ages) have variable and less predictable pharmacodynamics and pharmacokinetic characteristics.

Neonates are likely to develop drug-related problems. (Clavenna A, 2009) Due to factors:

- Low body weight and fat. (Ibáñez L, 2009)
- Immature renal tubular function. (De Gregori S, 2009)
- Immature blood-brain barrier. (Schoderboeck L, 2009)
- Physiological hypoalbuminemia. (Anderson GD, 2009)
- Immature baroreceptors. (Pellicer A, 2009)
- Immature immunity system. (T Strunk, 2011)

Elderly patients are at high risk to face DRPs due to several reasons. (Hajjar ER, 2003) They are most likely to have multiple diseases and health problems that often associated with flowing more than one prescription. The amount of the water inside the body decreases with age while the fat tissue relatively increases, thus the water-soluble drugs will reach higher concentration while the lipid-soluble drugs tend to accumulate inside the body. (Klotz, 2009) Also, as people are getting older their liver functions to metabolize the drugs decrease, as well as their kidney sufficiency to excrete the drugs and its metabolite. (Budnitz DS, 2007) (Jose J, 2006).

### **c) Gender**

The biological and physiological differences between females and males including body weight, liver metabolism, and renal function will affect the incidence rate of DRPs. (Ofotokun I, 2003)

For example Hepatic enzyme CYP3A4 (which affect the metabolism rate of the drugs) is more active in the females. (El-Eraky H, 2003)

### **d) Disease-Related Factors**

Health status of the patient is an essential factor that might increase the incidence of DRPs. For example, The Congestive Heart Failure patients might be at high risk to have drug-disease interaction if they have other diseases like Chronic Obstructive Pulmonary Disease (COPD) when they use beta-blocker. (Dipak Chandy, 2013)

Other factors like; race, alcohol intake, smoking, body weight, and allergies also play a significant role in the frequency of the incidence of DRPs. (Alomar, 2014)

## 1.2 Consequences of DRPs

The drug-related problem is one of the leading causes of morbidity and mortality in healthcare. (Lazarou J P. B., 1998) (Katja M. Hakkarainen, 2012). Even the non-harmful drug-related problems contribute in increasing the DRPs-cost on the healthcare system. In 1995 a study estimated the DRPs-cost in the United States of America by \$76.6 billion (Johnson JA, 1995). In 2001, the *Journal of the American Pharmacists Association* published an updated study that estimated the DRPs-cost by \$177.4 billion. (Ernst FR, 2001).

Another study was published in *the Journal of the American Medical Association* estimated that more than 2 million cases of death, hospitalization, and severe injury were associated with drug-related problems each year in the United States of America. (Lazarou J P. B., 1998)

According to the FDA, almost half of the death reports (49.4%) and 61% of the hospitalization reports resulted from adverse drug events were in the people younger than 60. (Knapp DE, 1987)

A study shows that 28% of the emergency room visits were drug-related including a large percentage of adverse drug reaction and inappropriate drug prescriptions. (Patel P, 2002)

Most of the studies about drug-related problems incidence rate are carried out on developed countries' population. We believe that all of the previous numbers represent the only small percentage of the real problem around the world. Many types of research and literature try to display how serious the problem is; only a few of them focus on the solution.

In a study about postmarketing drug-related problems reports, the physicians did only 1-10% of the significant DRPs reports. (Eran Klein, 2013). Including a well-educated and

experienced pharmacist in the health decision and sitting the therapy plans will help significantly to reduce and prevent the DRPs. (Zaal RJ1, 2013) (Bushra R, 2015).

### **1.3 Refugees' Health Issues**

The health system of any community is strongly associated with sustainable development, and the refugee's community is not an exception. We know that the refugees representing about 22.5 million people (UNHCR, 2017) and the majority of them are in working age. (UN, 2015). Despite this fact, the health impact of the refugees still low due to many factors. The poor and difficult environment in every stage of their journey reaching to the camps, their living conditions, and the inadequate health care access might be the major factors that contribute in causing multiple and complicated health problems. (Daynes L., 2016). However, the refugees' crisis affects the economic growth and development directly in both their homes and host communities. According to the World Health Organization (WHO) in 2014, the migrants and refugees from developing countries have sent to their home countries an estimated 436 billion US \$. (UN, 2015). Studies in Europe based on economic modeling of several health conditions have shown that enabling the migrants and refugees to access the healthcare of the host countries might be cost-saving for the healthcare system. The Europ, Fundamental Rights Agency, found that enabling pregnant migrant women in a legal situation to access prenatal care could save money up to 69% in Sweden and 48% in other European countries over two years period of pregnancy and breastfeeding. (EFRA, 2015)

The World Health Organization (WHO) and UN Refugees Agency (UNHCR) are the largest and major organizations that take care of the health system in about 700 refugees' camps worldwide. According to WHO the most frequent and common diseases among the refugees include injuries, Hypothermia, Burns, GIT Illnesses, Cardiovascular Diseases, Pregnancy and Delivery-related complications, Diabetes, and Hypertension.

However, WHO recommend not running any obligatory screening and research on refugees for diseases because there are no benefits and clear evidence or a cost-effectiveness for this type of screening. Furthermore; it can cause disturbance and anxiety among the refugees and their hosting communities. On the other hand, WHO also recommends providing a regular medical check-up for infectious diseases and non-infectious diseases, and ensure the access of all refugees to the healthcare system. The result of the medical check-up must never be used as a reason for ejection the refugees from their host countries. (WHOeuro, 2017)

- **Infectious Diseases among the Refugees**

The infectious diseases are the most prominent challenge in the health care system of the refugees, and there is a direct association between the infectious disease and refugees' communities, primarily associated with poverty. The refugees often come from communities affected by war and crisis which influence on their economic status. The contaminated food, water, animal, and insects are important vectors for the infectious disease among refugees. (WHOeuro, 2017)

According to World Health Organization the most frequently reported Infectious diseases are tuberculosis (TB), HIV/AIDS, Hepatitis, Measles And Rubella, Typhoid and Paratyphoid Fever, Cholera, Influenza and other frequent respiratory infections. Those diseases vary from area to area, for example, the rate of TB in Syria is 17 new cases for every 100 000 inhabitants while in Nigeria that number it is 338 cases.

- **The Non-Communicable diseases (NCDs)**

Cardiovascular diseases, Diabetes, Chronic Lung diseases, and Cancer are common causes of the preventable mortality and morbidity. The prevalence of those diseases is 25-30% in the adults of low and middle-income communities such as the refugees' communities. (WHOeuro, 2017).

The World Health Organization (WHO) recommended minimum standards to respond to the needs of the refugees with the Non-communicable diseases (NCDs):

- To identify the diseases of individuals and ensure continuing access to the healthcare system.
- To ensure treatment of refugees with acute, life-threatening exacerbation and complications of NCDs.
- To ensure that all of the essential diagnostic equipment, laboratory tests, and medications used for routine management of NCDs are available in the healthcare system.
- When the treatments of NCDs are not available, establishing standard operating procedures for referral is a must.

(WHOeuro, 2017).

## 1.4 FIP Guidelines for Responding to Disasters

Our world is suffering from the increasing number of environmental disasters, war-related crisis and a large number of refugees. The disasters resulted in more health needs and increased the responsibilities of the healthcare providers. For this context, the *International Pharmaceutical Federation* (FIP) published guideline document taking with consideration the national, regional, and individual pharmacist level during the disasters to help the pharmacists around the world to deal with emergency situations and provide safe and effective healthcare for the population.

The FIP guidelines organized via four phases of emergency situations: Prevention, Preparation, Response, and Recovery on different levels, as follows:

### - National level

**Prevention:** Governments and national pharmacy organizations should analyze the risk of the disasters. This assessment includes a critical evaluation of all-hazards, identification of any specific emergency that may occur during the disasters, evaluation of the national organizations' ability to provide aid and identify the information that must be submitted to the local pharmacies in the disasters' areas.

**Preparation:** As recommended in the guideline the governments should work cooperatively with pharmacy colleges to expand the pharmacy practice legislation based on the pre-training and competency of the pharmacist on the regional and national level. This legislation could include:

- The rights to prescribe medications that require physician's prescription in emergency situations
- Administration of vaccine and injectable medicine
- Providing first aid
- Organizing and control stockpiles.

- Authorization to make medicine substitution.

The guidelines recommend establishing a national pharmacist Team. This team should be a part of an emergency team including other healthcare professionals. Pharmacists can provide an alternative therapeutic plan based on resources available. The team should be able to be implanted within a short time of the declaration of the disasters.

**Response:** The government organizations should provide and determine the best alternative transport route to deliver the pharmaceutical when the disasters made the regular route not usable. The national organizations should also identify the mechanism of communication and information delivery to the pharmacy organizations, ensure that all regions receive the information, and provide precise information about the available resources and the access to it.

**Recovery:** The post-disaster analysis should be done on all level of the national emergency response which could effectively help to prevent and reduce risks of any future disasters.

- **Local and regional level**

**Prevention:** Regional hospitals and community pharmacies should:

- Analyze the local risk factors for potential disasters and emergencies that may occur based on their likelihood of occurrence.
- Provide that information to the national organization.
- Provide an emergency practice simulation.

**Preparation:** The pharmacies should create, provide and improve the guidelines of emergency standard operating procedure (SOPs) which should include:

- List of the staff involved.
- Disaster-specific emergency based on the previous analysis, list of a personal role for the staff.
- Pharmaceutical stockpile analysis and management.
- Communication management.
- Stockpile and staff protection.

Hospital pharmacies should also help in improving and promoting the pharmaceutical legislation and inform the staff of their specific role according to the disaster situation.

**Response:** Pharmacists and pharmacies should:

- Maintain the patient's' medical records with easy design and maximum information, while remaining accessible for healthcare personnel.
- Communicate with national organizations to manage and determine the best transportation route.
- Provide a local implementation of emergency SOPs.

**Recovery:** Pharmacies should corporate with national organizations to do an efficient post-disaster analysis, and use the lessons learned from using SOPs to

apply it in future emergency practice simulation. The short and long-term recovery operation must be maintained considering the health, psychological and economic impact of the disaster on the population and medical staff.

- Example of the list of medicines that should be in place emergency situations:

- 1) Non-steroidal Anti-inflammatory drugs (NSAIDs), and analgesics
- 2) Anti-Allergic drugs
- 3) Anti-infective drugs
- 4) Anti-septic drugs
- 5) Respiratory-related drugs
- 6) Oral rehydration and GIT related drugs

## **1.5 The Situation In Syrian Refugees' Community**

Estimates of 4.8 million refugees have fled from Syria causing an urgent crisis to their neighbor countries (Jordan, Lebanon, Iraq, and Turkey) (UNHCR, 2017). In 2016, the annual report of UNHCR estimates the health needs funding by \$300 million, and still 32% of their funding requirements not received. The health's problems are the major challenge that is facing the UNHCR, as it is the largest organization dealing with the refugees' crisis. (UNHCRreport, 2016). The priority health conditions that frequently reported among Syrian refugees and causing the morbidity and mortality among them are Diabetes, Anemia, Hypertension, and Mental Diseases. (Malkawi, 2013)

The access to health services for Syrian refugees will vary depending on the country. In Lebanon, the UNHCR registration is mandatory access to the healthcare system.

In Egypt, the Syrian refugees are having access to the health system, but they have to pay the same fee as Egyptians. In Iraq, there are only selected services offered for registered refugees. In Turkey all registered Syrian refugees who live inside or outside the camps accessing the healthcare system and are enrolled in Turkish General Health Insurance Program. In Jordan, the registered refugees can access the public healthcare system. (Sadek, 2014).

The UNHCR reported that the majority of primary health care visits in AL Zaatari camp in Jordan were due Communicable diseases (72.1%), while 21.8% were due Non-communicable diseases (NCDs), 4.8% were injured, and 1.3% Mental diseases. Those numbers are entirely different in other countries. For example, the majority of primary health care visits in Lebanon were due to NCDs while CDs estimated by only 8.3%. (Malkawi, 2013)

Most of the Syrian refugees, born and raised in Syria have received vaccination through the national Syrian Immunization Program. However, the majority of Syrian refugees have received vaccinations from non-governmental organizations (NGO) in the camps after the displacement. (DGMQ, 2016)

The Mental health illness increased recently due to the war crisis and displacement. The availability of mental illness service is still limited, and the quality of the founded service is now always and not meeting the needs of patients. There's no estimated number of the Mental illness patients due to the cultural beliefs and tradition, also due to the overcharge camps and living situations. 6,000 Syrian patients had received treatment from the

International Medical Corps (IMC). 700 of them had psychotic disorders. (Zeinab Hijazi, 2014)

The Syrian refugees in Jordan, Iraq, and Lebanon are often having parasitic intestinal health problems due to the contaminated soil and water. *The Centers for Disease Control and Prevention's* (CDC) guidelines recommend the use of Albendazole, and Vermectin for parasitic diseases frequently. (DGMQ, 2016) (CDC, 2013)

Overall, the incidence rate of Multi-drug Resistant Tuberculosis (MDR-TB) in Syrians is estimated by 17 new cases for every 100 000 inhabitants, but with the exception of the Syrian refugees in Iraq. According to the WHO, they have a high incidence rate of MDR-TB estimated by 40 new cases per year. (WHOprogrammes, 2016).

The NCDs in Syrian refugees' population include Anemia, Cancer, Hypertension, Diabetes, Malnutrition, Renal and Liver Diseases. A survey study on refugees who lives outside the camps in Jordan. Estimated that half of the members of the household have been diagnosed with at least one NCD. The prevalence of Hypertension among the adults was the highest (10.7%), followed by Arthritis (7.1%), Diabetes (6.1%), Cardiovascular disease (4.1%), and Chronic Respiratory disease (2.9%). (Shannon Doocyr, 2015).

The Anemia caused by malnutrition is seen to be the most common type among Syrian refugees. An evaluation study in Al Zaatari camp showed that 48% of the children younger than 5 years and 44% of the women aged 18-50, suffered from Anemia, indicates a severe health problem. (Oleg O. Bilukha, 2014)

The health needs of Syrian refugees are increasing over the time and since the end of this crisis is not appearing to be close more efforts should be done. The corporation and supports to the UNCHR and other NGOs is the best way to relieve some of the refugee's' health problem.

## **1.6 Pharmacists Role in Discovering and Preventing DRPs**

One of the goals of pharmaceutical care is to prevent drug-related problems that might interfere with patient safety and the desired health-outcome. Moreover; the pharmacists play an essential role in improving the public health around and in the disaster areas such as the refugees' areas. The pharmacists have specialized knowledge of drug-body interactions to optimize their pharmacological benefits with safe, rational, and liable use of medications. Clinical pharmacist contributes significantly to improving safety and cost-effectiveness of treatment, active monitoring and evaluation of drug therapy, patient understanding and compliance to the prescribed medication. (Shah Jainam V.a, 2016) (Mohamed Azmi Hassali, 2016).

The community pharmacists are in unique position to discover and prevent the incidence of DRPs among patients outside the hospitals. The analysis of prescriptions before the dispensing process helps potentially in increasing the quality of life and reduces therapeutic cost. The interventions of the community pharmacists help in relief vast numbers of DRPs in ambulatory patients. (Buurma, 2004) (Huysmans K, 2014)

Evidence had documented the pharmacists' role and their efforts in reducing the incidence of preventable adverse events and identifying and resolving the drug-related problems significantly in the health system. According to research published in 2013 in *International Journal of Clinical Pharmacy* showed that the clinical pharmacists could

combine current diagnoses, laboratory values, and medical history with the pharmacotherapy medications of a patient. Thus, the clinical pharmacist can detect and help in resolving more DRPs than any other computerized systems such as Computerized Physician Order Entry systems (CPOE). (Zaal RJ, 2013) (Hussain Al Rahbi, 2014)

However, more researchers are necessary to study the cost-effectiveness of clinical pharmacy services for the community. Establishing a continuing system of identification, intervention and preventing DRPs (that has been conducted by pharmacists) is a useful tool to improve the patient's healthcare system. (Zaal RJ, 2013).

## **1.7 Health Care for Refugees' Population**

According to UNHCR, there are about 22.5 million refugees around the world forced to flee their homes due to many serious such as the wars, and human rights violations. After six years of war in Syria, there are about 5 million refugees, half of them are children, have fled to neighboring countries (Jordan, Turkey, Lebanon, and Iraq). About 700 thousands of them are located in Jordan. The refugees' camps are the first point of escape. (UNHCR, 2017) However, in most cases, those camps are having a dangerous environment of epidemic diseases, violence, and the lack of medical support and access to medications. Refugees, in the same way, are left with inadequate education to handle such crises and the system may not fully meet their complex health needs. (UNHCR emergency, 2017) (Sight, 2017). The Non-governmental organization plays the major role in providing health care to the refugees inside and outside the camps. The majority of healthcare providers in NGOs are nurses (45%), physicians (25%), and the minority are the pharmacists (about only 9%) in all NGOs mission related to public health. (Solheim K, 2005)

Besides the important role of nurses and physicians in providing the health care to the refugees, but the missing role of the pharmacist-led for increasing the mortality rate (the highest among the human population) due to medication errors and Drug-related problems. (BALIDEMAJ, 2013)

An interesting example of those NGOs which they help in providing health care to the Syrian refugees is Molham's Volunteering Team. They receive patient's medical reports from all over the countries that have Syrians refugees study it and resend it to the specialist hospitals and doctors. Moreover, since they include pharmacists in their medical decision making and the follow-up process we found their medical archive is interesting to discuss and review in our study.

*“The Team seeks to secure relief for medical conditions, to prioritize support according to the patients' medical need and urgency, and to follow up on treatments until full recovery.”*

(Molham's Volunteering Team, 2017)

## **1.8. Previous Studies**

PubMed and Google scholar article is used to search for drug-related problems among refugees' population, no studies or researches similar to this study about the drug-related problem incidence in refugees' population found. However, the studies that assist the role of the pharmacists in preventing the DRPs events and discuss the incidence of DRPs events among various populations are numerous.

A study in Oslo, Norway (2017) runs over forty-one nursing homes to describe the drug-related problems (DRPs) identified during the medication reviews 6158 DRPs were identified with an average of 2.6 DRPs/patient, and only 17.3% had no DRPs. The rest of the patients who suffer DRPs are using unnecessary drugs, or excess drug dosing which were the most frequent DRPs identified. At the end of the study, the number of drug used decreased by an average of 6.8 for conventional drugs and from 3.0 for prn drugs. (Fog AF, 2017)

In 2008, 18-month prospective study of DRPs through a computerized physician order entry (CPOE) system was conducted by seven clinical pharmacists participating inward activity. The study Involve 8152 patients with 29 016 medication orders, 2669 DRPs were identified. There were 429 different drugs associated with these DRPs.

Cardiovascular drugs were the most frequently associated with DRPs events, followed by antibiotics, and analgesics/anti-inflammatory drugs. The DRPs are familiar even with using COPE system. (Bedouch P, 2008)

A cross-sectional correlation study was conducted in Jordan to estimate the impact of DRPs events on a group of hypertensive patients and evaluate their quality of life using a RAND-12 scale. These DRPs events were associated with reduced health-related quality

life (HRQOL) on both the physical and mental domain of the RAND-12 scale. The study suggests that the pharmaceutical care service delivered by clinical pharmacists is needed to identify, prevent and resolve DRPs, which may improve patients HRQOL. (Rana Abu Farha, 2017)

Since the pediatric population is easily affected by DRPs, due to their pharmacodynamics and pharmacokinetic behaviors of drugs in this population are usually different than in adults. A cross-sectional study was conducted on 285 randomly selected pediatric patients in Addis Ababa, Ethiopia. 1055 medication orders reviewed, a total of 106 DRPs were identified in 90 patients. The most frequently identified DRPs were dosing problems, followed by drug-drug interactions adverse drug reactions. The researchers recommend the healthcare organizations establishing a system for reporting DRPs and improving communication between the healthcare team members. (Birarra MK, 2017)

## **1.9. Aims of the Study**

This study has the following aims:

- To identify the Drug-related problems (DRPs) among the Syrian refugees in Jordan.
- To document the most common causes, problems, interventions and the outcomes of DRPs by using the PCNE classification V7. (PCNE P. C., 2017)
- To assess the role of the pharmacist as a part of the health provider system in NGOs.
- To assess the role of the pharmacist in identifying, reducing and preventing the DRPs incidence.

## **2. METHODOLOGY**

The prospective cross-sectional study was carried out on a group of Syrian refugees in Jordan who were registered in Molham's team medical archive. The data of the past two months were collected during one month from the 1<sup>st</sup> of July to 1<sup>st</sup> of August. The researcher met the patients, physicians, and the pharmacists in responsible for each case. Identifying the DRP cases was done by using the form of PCNE v7. That form has already been used in the Near East University hospital, to classify the causes, problems, interventions, and the outcomes of the DPRs. The descriptive statistics (Mean  $\pm$  SD, Percentage) represent the data.

The role of the pharmacist in improving the health care in NGOs, and in preventing and decreasing the DRPs incidence was observed by the number of DRPs cases that had been discovered by the pharmacists, comparing to the DRPs cases that had been discovered by the patients, the physicians, or anyone else. The descriptive statistics (Mean  $\pm$  SD, Percentage) represent the data.

### **2.1 PCNE's Drug-Related Problems Classification System**

The Pharmaceutical Care Network of Europe published in January 1999 a drug-related problem classification scheme. Over the years the PCNE's classification system was devolved and improved by experts, the latest version 8.1 has been published in the 5th of November 2017. This new version is not compatible with any old versions because all of the sections have been revised according to the PCNE. However, it was published after this study's time.

In this study, the 7<sup>th</sup> version was used. This classification version is hierarchical coded system and has three primary domains for problems (P-code), eight primary domains for causes (C code), and five primary domains for Interventions (I code). Moreover, on the more detailed level, there are seven subgroups for problems, 35 subgroups for causes and 16 subgroups for interventions, and ten subdomains for intervention acceptance.

The following form is the form that has been used in our study:

**PCNE DRP Classification Form<sup>1</sup>**

**Note:** There should be a completed sheet for every drug related problem of a patient (e.g. three drug related problems will lead to three fully filled classification forms).

Patient		2. Cause of problem (one problem can have more than one cause)		3. Type of intervention (one problem can lead to more than one intervention)		4. Outcome of Intervention (tick one box only)	
Male <input type="checkbox"/> Female <input type="checkbox"/>		<input type="checkbox"/> Drug selection	<input type="checkbox"/> Drug use / administration process	<input type="checkbox"/> No intervention	<input type="checkbox"/> Outcome of intervention unknown		
Medication and dosing regimen		<input type="checkbox"/> Inappropriate drug (incl. contra-indicated drug)	<input type="checkbox"/> Inappropriate timing of administration / dosing intervals	<input type="checkbox"/> No intervention performed	<input type="checkbox"/> Problem totally solved		
A		<input type="checkbox"/> No indication for drug	<input type="checkbox"/> Drug underused / under-administered	<input type="checkbox"/> At prescriber level	<input type="checkbox"/> Problem partially solved		
B		<input type="checkbox"/> Inappropriate combination of drugs or drug and food	<input type="checkbox"/> Drug overused / over-administered	<input type="checkbox"/> Prescriber informed only	<input type="checkbox"/> Problem not solved		
A: OTC <input type="checkbox"/> Rx <input type="checkbox"/> (B): OTC <input type="checkbox"/> Rx <input type="checkbox"/>		<input type="checkbox"/> Inappropriate duplication	<input type="checkbox"/> Drug not taken / administered at all	<input type="checkbox"/> Prescriber asked for information	<input type="checkbox"/> Lack of cooperation of patient		
DRP potential <input type="checkbox"/>		<input type="checkbox"/> Unnoticed indication	<input type="checkbox"/> Wrong drug taken / administered	<input type="checkbox"/> Intervention proposed, approved by prescriber	<input type="checkbox"/> Lack of cooperation of prescriber		
manifest <input type="checkbox"/>		<input type="checkbox"/> Too many drugs for indication	<input type="checkbox"/> Drug abused (unregulated overuse)	<input type="checkbox"/> Intervention proposed, not approved by prescriber	<input type="checkbox"/> Intervention not effective		
1. Type of problem (tick one box only)		<input type="checkbox"/> More cost-effective drug available	<input type="checkbox"/> Patient unable to use drug / form as directed	<input type="checkbox"/> Intervention proposed, outcome unknown	<input type="checkbox"/> No need or possibility to solve problem		
<input type="checkbox"/> Treatment effectiveness	<input type="checkbox"/> Synergistic or preventive drug required	<input type="checkbox"/> Logistics	<input type="checkbox"/> At patient / carer level				
<input type="checkbox"/> P1.1 No effect of drug treatment / therapy failure	<input type="checkbox"/> New indication presented	<input type="checkbox"/> Prescribed drug not available	<input type="checkbox"/> Patient (medication) counselling				
<input type="checkbox"/> P1.2 Effect of drug treatment not optimal	<input type="checkbox"/> Drug form	<input type="checkbox"/> Prescribing error (information wrong or missing)	<input type="checkbox"/> Written information provided only				
<input type="checkbox"/> P1.3 Wrong effect of drug treatment	<input type="checkbox"/> Inappropriate drug form	<input type="checkbox"/> Dispensing error (wrong drug or dose)	<input type="checkbox"/> Patient referred to prescriber				
<input type="checkbox"/> P1.4 Untreated indication	<input type="checkbox"/> Dose selection	<input type="checkbox"/> Patient	<input type="checkbox"/> Spoken to family member / caregiver				
<input type="checkbox"/> Adverse reactions	<input type="checkbox"/> Drug dose too low	<input type="checkbox"/> Patient forgets to take drug	<input type="checkbox"/> At drug level				
<input type="checkbox"/> P2.1 Adverse drug event (non-allergic)	<input type="checkbox"/> Drug dose too high	<input type="checkbox"/> Patient uses unnecessary drug	<input type="checkbox"/> Drug changed to ...				
<input type="checkbox"/> P2.2 Adverse drug event (allergic)	<input type="checkbox"/> Dosage regimen not frequent enough	<input type="checkbox"/> Patient takes food that interacts	<input type="checkbox"/> Dosage changed to ...				
<input type="checkbox"/> P2.3 Toxic adverse drug event	<input type="checkbox"/> Dosage regimen too frequent	<input type="checkbox"/> Patient stored drug inappropriately	<input type="checkbox"/> Formulation changed to ...				
<input type="checkbox"/> Treatment costs	<input type="checkbox"/> No therapeutic drug monitoring	<input type="checkbox"/> Other	<input type="checkbox"/> Instructions for use changed to ...				
<input type="checkbox"/> P3.1 Drug treatment more costly than necessary	<input type="checkbox"/> Pharmacokinetic problem requiring dose adjustment	<input type="checkbox"/> Other cause (specify in notes)	<input type="checkbox"/> Drug stopped				
<input type="checkbox"/> P3.2 Unnecessary drug treatment	<input type="checkbox"/> Deterioration/improvement of disease requiring dose adj.	<input type="checkbox"/> No obvious cause	<input type="checkbox"/> New drug started				
<input type="checkbox"/> Others	<input type="checkbox"/> Treatment duration		<input type="checkbox"/> Other				
<input type="checkbox"/> P4.1 Patient dissatisfied with therapy	<input type="checkbox"/> Duration of treatment too short		<input type="checkbox"/> Other intervention (specify in notes)				
<input type="checkbox"/> P4.2 Unclear problem / complaint (specify in notes)	<input type="checkbox"/> Duration of treatment too long		<input type="checkbox"/> Side effect reported to authorities				

**NOTE 8**

Figure 2: The PCNE's DRPs classification system form V7.

## **2.2 Inclusion Criteria**

- 1) Patients who are Syrian refugees had been registered in UNHCR of Jordan
- 2) Patients who had full medical records that had included the contact information.

## **2.3 Exclusion Criteria**

- 1) Patients who have Cancer, or Physical fractures.
- 2) Patients who were not able to be reached by the researcher.
- 3) Patients who were treated in other countries.

## **2.4 Sample Size and Data Collection**

Patient's age, gender, medical history, and the current medical condition were collected from Molham's Team Medical Archive. More details about the cases obtained by the visits to the physicians, patients, and the pharmacists

The total number of medical cases was 1332. About 723 cases were excluded because the patients couldn't reach up, or they had missing documents and information, or being Cancer patients, or being registered as Physical fracture patients. So, 609 cases were included to be analyzed.

## **2.5 Statistical Analysis**

The collected data were analyzed by using Statistical Package for the Social Sciences SPSS statistical software (version 20, IBM, SPSS).

The methods used to analyze the data included an analysis of descriptive statistic variables such as frequency, percentages, and crosstabs for the categorical variables.

## **2.6 Ethical Consideration**

Privacy of the patient was assured during the study. The study was approved by the Near East Institutional Review Board (IRB) of Near East University Hospital that assigned this research as being just an observational study. Private patient data were not recorded. Only the patient name, age, and gender were used during the study.

The medical record and patient's profile approved to be obtained from the health department of Molham's volunteering team.



Figure 3: Molham's volunteering team approval for the study proposal

## 2.7 Guidelines and references used

The guidelines and principals of health care is a valuable tool to improve health outcome of the patients. It is widely and routinely used by clinician around the world to identify the drug-related problems cases.

In this study, the following references and books have been used to review the medications' interactions and information:

- a) Lexi comp® mobile program
- b) AHRQ's National Guideline Clearinghouse and their website [www.rnao.ca](http://www.rnao.ca)
- c) National Guideline Clearinghouse (NGC) [www.guideline.gov](http://www.guideline.gov)
- d) Pharmacotherapy Handbook 9th Edition®
- e) Oxford's Handbook of Clinical Pharmacy 2nd Edition.

### 3. RESULTS

#### 3.1 Characteristics of The Patients

The Molham's Team Medical Department Archive had registered 1332 Syrian refugees' patient's medical cases. 609 patients were included in this research. 341 of the patients were male and 268 patients were female with and average age of 60.3 years and 54.6 years respectively.

102 patients were identified to have recent case of a drug-related problem. 55 of the patients were men, and 44 of them were women; the mean age (SD) was  $44.8 \pm 19.0$  years old, ranged from 1 year to 77 years old.

The patients who are included in this study had an average of 2.8 active medical conditions. For each patient, one medical condition was classified to be the primary disease of the case which was associated with the drug-related problem incidence and increased its complications.

39.2% of the drug-related problems cases were associated with cardiovascular diseases.

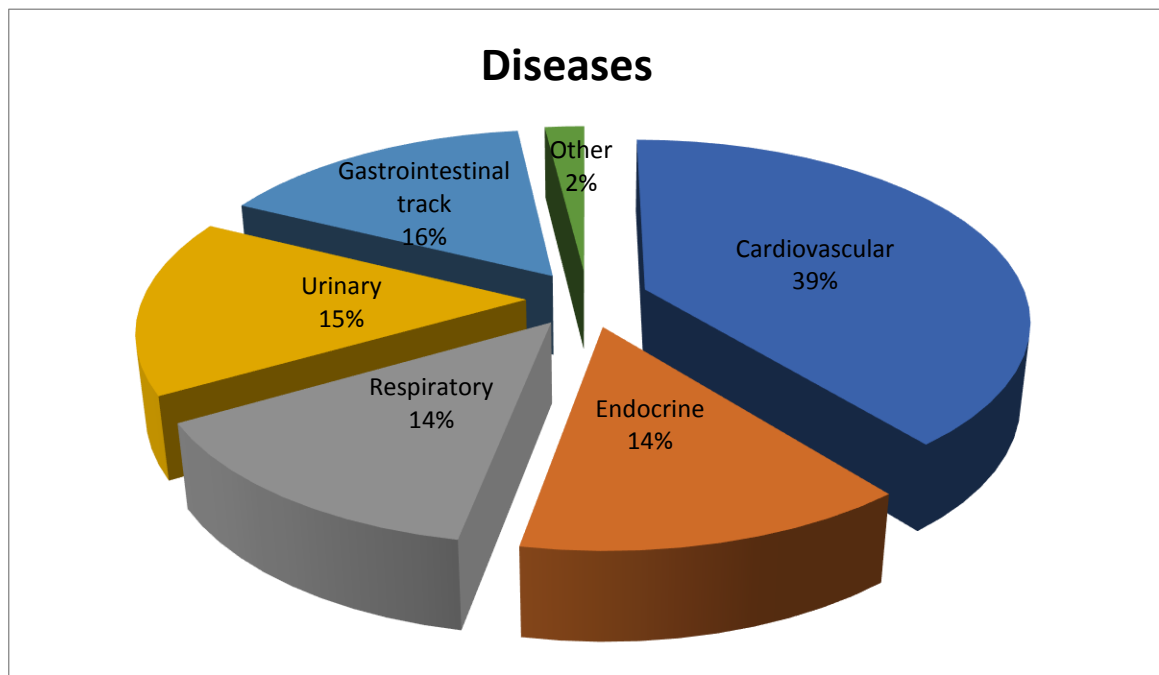


Figure 4: percentage of the diseases among patients in the study.

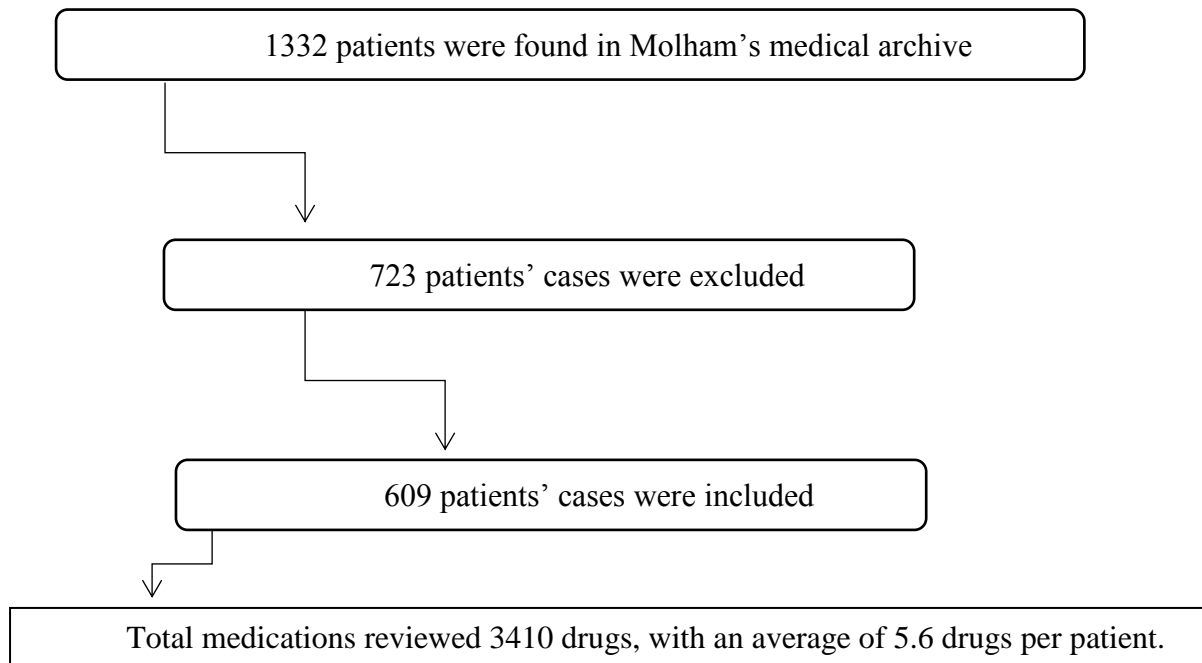


Figure 5: The patients' numbers included or excluded in this study.

### 3.2 Case examples

- A) 72 years old man feeling tired, unable to walk as usual, hard to take a full breath and having swelling feet. The patient suffers from Heart failure for six years ago Hypertension had been diagnosed 13 years ago. He was taking furosemide 20 mg twice daily and captopril 25 mg three times daily.

His physical appearance and examination confirmed that he had fluid retention and edema in the legs. The furosemide was not enough to reduce the fluid retention in his body.

**Problem:** The effect of drug not optimal (P1.2)

**Cause:** Synergetic drug required (C1.8)

**Intervention:** New drug started (I3.6), Spironolactone 25mg/day.

**Outcome:** The problem partially solved.

- B) 61 years old woman experienced blurred vision, headache, and tiredness. She takes Valsartan 160 mg / Hydrochlorothiazide 12.5 mg once daily for hypertension, Metformin 850 mg for type 2 DM; recently she was diagnosed with chronic kidney disease.

The over-dose of Valsartan due to kidney injury was the most apparent reason after the primary check-up, the intervention proposed to the physician to lower the dose of valsartan or change the drug to more suitable choice and check the blood pressure regularly.

**Problem:** Toxic adverse drug event (P2.3).

**Cause:** Drug dosage too high (C3.2)

**Intervention:** Intervention proposed, approved by prescriber (I1.3)

**Outcome:** Problem solved after the intervention.

**C)** 52 years old man noticed red-brown spots on his hands and legs, he thought he is having skin disease so he let it for a while before coming to the pharmacist. The patient starts taking warfarin two months ago. (see appendix 5)

The brown spots confirmed to be under-skin blood bruisers. The patient had no international normalized ratio (INR) monitoring, and the dose was too high. The pharmacist informed the physician to adjust the dose.

**Problem:** Toxic adverse drug event (P2.3)

**Cause:** No therapeutic drug monitoring (C3.5)

**Intervention:** Prescriber informed only (I1.1)

**Outcome:** The problem solved.

**D)** 59 years old man had a rash all over his body, as well as, severe headaches after taking the first dose of allopurinol for gout symptoms without prescription.

Allopurinol allergic reaction possible happened, the pharmacist stopped the drug.

**Problem:** Adverse drug event (Allergic) (P2.2)

**Cause:** Inappropriate drug (Contraindicated) (C1.1)

**Intervention:** Drug stopped (I3.5)

**Outcome:** Outcome unknown.

### 3.3 Drug-related problems data

Out of 609 total patient's cases were included, 102 cases (**16.8%**) of drug-related problems were identified, visited, and followed-up by the researcher.

The most frequently identified DRPs was non-allergic adverse drug reaction (**P2.1**) (27.4%), followed by the drug effect of either being not optimal (**P1.2**) (19.6%) or no effect at all (**P1.1**) (11.8%).

The untreated indication (**P1.4**) represented (13.7%), and toxic adverse effect (**P2.3**) (11.8%).

No DRPs cases identified for the Wrong effect of drug treatment (**P1.3**), or Drug cost more than necessary (**P3.1**), or Unclear problem (**P4.2**).

While the other DRPs subcategories represent small percentage as it summarizes in the following table with an example from the patients' cases for each subcategory:

DRPs Category	DRPs Subcategory	Frequency	Percent	Example of the cases
Drug effect (P1)	No effect of drug treatment (P1.1)	12	11.8%	GERD becomes more aggressive than usual because the patient underused omeprazole and stopped the treatment.
	Effect of drug treatment not optimal (P1.2)	20	19.6%	The patient has diabetes, and fasting blood sugar was not optimal (>135mg/dl) as a side effect of HCTZ.
	Untreated indication (P1.4)	14	13.7%	The patient diagnosed with heart failure but not receiving any beta-blocker therapy.
	<b>Total</b>	<b>46</b>	<b>45.1%</b>	
Adverse reactions (P2)	Adverse drug event(non - allergic) (P2.1)	28	27.4%	Gout acute attacks start to be more often after using Aspirin® (acetylsalicylic acid) by the patient as an anti-inflammatory drug.
	Adverse drug event(Allergic) (P2.2)	4	3.9%	The patient uses Capoten® (Captopril) for HTN, sudden rash, fever, and headache start after the first dose of Zyloprim® (Allopurinol) for gout.
	Toxic adverse drug event (P2.3)	12	11.8%	The patient had severe hypotension due to overuse of frusemide 40mg/2 times daily instead of 20mg/2 times daily with other anti-hypertensive agents.
	<b>Total</b>	<b>44</b>	<b>43.1%</b>	
Treatment costs (P3)	Unnecessary drug treatment (P3.2)	4	3.9%	The patients take codeine for his sleeping disturbance
Others (P4)	Patient dissatisfied with therapy (P4.1)	8	7.8%	The patient was feeling dehydrated all the time due to the use of furosemide 40mg daily.

Table 1: Drug-related problems classification

### 3.4 Causes of the problem

The cause “medication error” section domain is vital for identifying the type of errors (might be more than one) that caused the incidence of the drug-related problem. Identifying those causes was contributed significantly in resolving and preventing the problems.

Only one error was identified to be the leading cause of each drug-related problem registered.

The drug selection (C1) was the most identified error to cause a drug-related problem (49%), followed by drug use process (C4) (19.6%), and dose selection (C2) (15.7%).

The following chart displays the frequencies of DRPs causes' category:

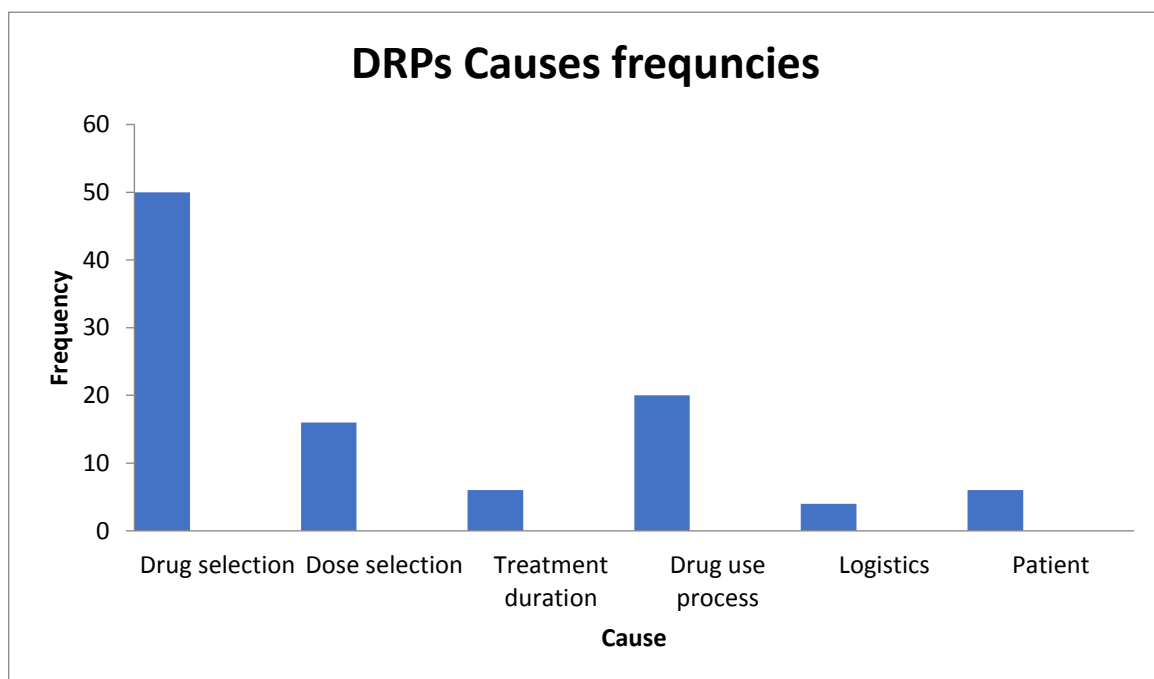


Figure 6: Causes of the drug-related problems frequencies.

The following table specifies the DRPs cause's subcategory frequencies:

Causes Category	Subcategory	Frequency	Percent
Drug selection	Inappropriate drug	12	11.8%
	No indication for drug	2	1.9%
	Inappropriate combination	12	11.8%
	Inappropriate duplication	2	1.9%
	Too many drugs for indication	2	1.9%
	More cost-effective drug available	6	5.9%
	Synergetic or preventive drug required	8	7.8%
	New indication presented	6	5.9%
	<b>Total</b>	<b>50</b>	<b>49%</b>
Dose selection	Inappropriate combination	2	1.9%
	Drug dose too low	4	3.9%
	Drug dose too high	6	5.9%
	Dosage regimen too frequent	2	1.9%
	No therapeutic drug monitoring	2	1.9%
	<b>Total</b>	<b>16</b>	<b>15.7%</b>
Treatment duration	Duration of treatment too short	2	1.9%
	Treatment duration too long	4	3.9%
	<b>Total</b>	<b>6</b>	<b>5.9%</b>
Drug use process	Patient gets/Takes drug on wrong times	4	3.9%
	Drug underused/Administered	8	7.8%
	Drug overused/Administered	4	3.9%
	Drug not taken/Administered at all	4	3.9%
	<b>Total</b>	<b>20</b>	<b>19.6%</b>
Logistics	Dispensing error (Wrong drug or dose)	4	3.9%
Patient	Patient forgets to take drug	4	3.9%
	Patient takes food that interacts	2	1.9%
	<b>Total</b>	<b>6</b>	<b>5.9%</b>

Table 2: Drug-related problems causes' frequency

### 3.5 Interventions

The interventions section is a vital part to resolve the problem. It is classified into three levels of interventions as follows: Prescriber level, Patient/Care level, and Drug level.

In most of the cases included in the study, the intervention part for each case had been done on more than one level. For example, in some cases, the pharmacists informed the specialized physician before making any change on the drug level, and then provide a medication consultation for the patient. However, one primary intervention for individual has been selected to represent the interventions data.

The following table shows the frequency of the primary interventions that had been done:

Intervention category	Intervention subcategory	Frequency	Percent
Prescriber level	Prescriber informed only	10	9.8%
	Prescriber asked for information	2	1.9%
	Intervention proposed, approved by prescriber	18	17.6%
	<b>Total</b>	<b>30</b>	<b>29.4%</b>
Patient/Care level	Patient (medication) counselling	<b>24</b>	<b>23.5%</b>
Drug level	Drug changed	12	11.7%
	Dosage changed	10	9.8%
	Formulation changed	4	3.9%
	Instruction for use changed	2	1.9%
	Drug stopped	14	13.7%
	New drug started	6	5.9%
	<b>Total</b>	<b>48</b>	<b>47.1%</b>

Table 3: Intervention category data

Most of the interventions were done primarily on the drug level (I3), followed by the prescriber level (I1). **17.6%** of the patients' cases interventions were done after the being approved of the prescriber (I1.3). in rare cases (**1.9%**) the prescriber asked for more information (I1.2).

The interventions have been done related to the problems:

**Treatment effectiveness (P1)**

**P1.1: No treatment effect:**

Patient counseling (I2.1): 4 interventions.

Drug changed (I3.1): 4 interventions.

Dosage changed (I3.2): 2 interventions.

New drug started (I3.6): 2 interventions.

**Total:** 12 Interventions.

**P1.2: Treatment effect not optimal**

Patient counseling (I2.1): 8 interventions.

Intervention proposed, approved by prescriber (I1.3): 4 interventions.

Dosage changed (I3.2): 4 interventions.

Drug changed (I3.1): 2 interventions.

Formulation changed (I3.3): 2 interventions.

**Total:** 20 Interventions.

**P1.4: Untreated indication**

Intervention proposed, approved by prescriber (I1.3): 6 interventions.

Prescriber informed only (I1.1): 2 interventions.

Patient counseling (I2.1): 2 interventions.

Drug stopped (I3.5): 2 interventions

New drug started (I3.6): 2 interventions.

**Total:** 14 Interventions.

## **Adverse reactions (P2)**

### **P2.1: Adverse drug event (Non-allergic)**

Prescriber informed only (I1.1): 4 interventions.

Prescriber asked for information (I1.2): 2 interventions.

Intervention proposed, approved by prescriber (I1.3): 6 interventions.

Patient counseling (I2.1): 6 interventions.

Drug changed (I3.1): 4 interventions.

Drug stopped (I3.5): 4 interventions.

New drug started (I3.6): 2 interventions.

**Total:** 28 Interventions.

### **P2.2: Adverse drug event (Allergic)**

Drug stopped (I3.5): 4 interventions.

**Total:** 4 Interventions.

### **P2.3: Toxic adverse drug event**

Prescriber informed only (I1.1): 2 interventions.

Intervention proposed, approved by prescriber (I1.3): 2 interventions.

Patient counseling (I2.1): 2 interventions.

Dosage changed (I3.2): 2 interventions.

Drug stopped (I3.5): 4 interventions.

**Total:** 12 Interventions.

### **Treatment costs (P3)**

#### **P3.2 Unnecessary drug treatment**

Prescriber informed only (I1.1): 2 interventions.

Dosage changed (I3.2): 2 interventions.

**Total:** 4 Interventions.

### **4 Others (P4):**

#### **P4.1 Patient dissatisfied with therapy:**

Patient counseling (I2.1): 2 interventions.

Dosage changed (I3.2): 2 interventions.

Formulation changed (I3.3): 2 interventions.

Instruction for use changed (I3.4): 2 interventions.

**Total:** 8 Interventions.

### **3.6 Outcomes of the interventions**

There were no precise data about the outcome because of the study limitations (see study limitation section in Chp.4). Almost half of the cases included in this study (47 cases) had unknown outcomes. Depending on that the outcome of the previous interventions couldn't be discussed as a result.

The other 55 cases had a clear outcome of the intervention during study time as follow:

The interventions were most successful on drug level (I3): 20 cases solved problems, 6 cases partially solved problems.

On prescriber level (I1): 9 cases solved problems, 10 cases partially solved problems.

On patient level (I2): 10 cases solved problems.

### **3.7 The Role of the Pharmacist in Reducing the DRPs**

In addition to the researcher, three pharmacists from Molham's team helped to review the medications and patient's health profile. They have directly contacted with the responsible physicians. In some cases, the physicians firstly discovered the DRPs and informed the pharmacists to follow their recommendations and interventions. However, this type of study is inconclusive about the pharmacist's role in reducing the incidence of DRPs. Randomized or cohort study types could be more conclusive.

In each drug-related problem case the researcher asked the patients and the healthcare providers (who are responsible for treating the patient), a simple question:

**“Who was the first to discover the problem?”**

We found that 68 (**66.7%**) of the total cases were discovered by the pharmacists, while 34 (**33.3%**) of the cases discovered by physicians and other healthcare providers such as the nurses.

## 4. DISCUSSION

The occurrence of drug-related problems identified among the refugees' population comparing to the other populations is probably higher due to many risk factors. Defining those factors is an important strategy for pharmacists to be able to discover, reduce the DRPs and improve health outcome in refugees' community. Some of those factors are the absence of specialized doctors and pharmacist inside the health system, uncontrolled drug, health literacy and more other factors that directly contribute to increase the incidence rate of DRPs.

The evidence that pharmacists are having a significant role in recognizing and treating DRPs is the primary outcome of our study. **16.8%** of the patients included in this study had suffered a case of a drug-related problem. Regarding the incidence rate of drug-related problems in previous studies (see previous study section in the introduction), the incidence rate in this study is significantly low. Such incidence rate might clarify how much is it important to include pharmacists in health decision and to establish a follow-up department for the patients' health status and medications (even outsides the hospitals and health centres).

The incidence rate of DRPs in this study is affected by factors such as:

- The reliance on different health centers' and hospitals' medical reports.
- The difficulty in contacting the patient during the following-up process.
- The report of adverse drug reactions is somehow related to the patient knowledge.
- The exclusion of associated with Cancer patients, and physically injured patients.

Cardiovascular diseases were associated with 39.2% of DRPs; this might be due to the complicity of the diseases either from the polypharmacy, or the interfering of lifestyle directly with therapy goals.

The Drug effect-related problems category (P1) includes drugs that have No treatment effect (P1.1) or No optimal treatment effect (P1.2) and also the untreated indications(P1.4). This category was the most identified drug-related problem with 45% of the total DRPs cases. The effectiveness of the drug in this study is mostly by the

compliance of the patient to the drug. Frequently, this happens due to lack of providing information to the patient about how to use the drug and the seriousness of the case.

The second most identified DRPs category was the adverse drug reaction-related problems (P2). 28 of DRPs cases were identified under the subcategory of non-allergic adverse drug reaction (P2.2). Commonly, this problem was associated with the overdose of the used drugs. The reason behind the overdose of the used drugs is the uncontrolled dispensing process and the minimizing role of the pharmacist.

Treatment cost category (P3) and patient dissatisfying about the therapy category (P4) were the least identified DRPs might be due to the limitations of the study and the difficulty to contact with patients frequently.

The outcome of the intervention (that had been done) couldn't be registered due to the limited time of the study.

#### **- Limitations of the study**

- This study is inconclusive to determine the role of the pharmacist in identifying and preventing the DRPs incidence. More time, and investigation should be done.
- This study included a group of patients who are followed-up by pharmacists for months ago before the scheduled study time, which might affect in a way or another the percentage of the drug-related problems.
- In this study, the majority of the patents are not hospitalized which making the identifying the adverse drug reactions rely on the patient's compliance and knowledge.
- Difficulty in communicating with patients after the first check-up, as it is needed to evaluate the outcomes of the interventions.
- The outcomes of the interventions needed more time to be evaluated.

## 5. CONCLUSION

The Drug-related problems and the other health problems could be avoided by including more pharmacists in NGOs which play a major role in providing health care to the refugee. Establishing a follow-up and medication reviews' department in the health centers that provide health care to the refugee will significantly increase the rate of the discovering drug-related problems. The identification and documentation of DRPs are an important part that will eventually lead to reduce and solve the frequently incidence drug-related problems.

The most frequently reported DRPs among this population were the Non-allergic adverse drug event (P2.2). The most apparent cause that contributed in the DRPs incidence was the Drug selection (C1). The majority of the interventions were done on the drug level (I3). Those interventions had often unknown outcome (47 case) due to the limitations of the study. 39 of the cases solved, and 16 cases were partially solved.

At least including one pharmacist in the health centers will increase the chance to avoid drug and dose selection-related problems. According to this study, the pharmacists identified **66.7%** of DRPs cases.

The refugees' populations are suffering from their low health status because of their difficult living environment and other factors. For that reasons, more studies and investigations should be done inside refugees' community to improve their health status.

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## APPENDIX

Appendix 1: Al-Zaatari Syrian refugees' camp in Jordan



Appendix 2: Al-Zaatari camp situation in winter



Appendix 3: Child patient suffered from untreated chronic obstructive pulmonary disease (COPD) complications



Appendix 4: Patient reviewing his medical records to the researcher



Appendix 5: The patient suffers from Warfarin toxicity; under-skin bleeding



Appendix 6: The patient suffers from diabetic foot ulcer



Appendix 7: Atlantic Humanitarian Relief Medical Mission Trip for Syrian  
Refugees 2017



Appendix 8: Child refugee

