An-Najah National University
Faculty of Graduate Studies

Medication errors: Nurse's Perceptions of main types and leading factors, and reporting attitudes in North West Bank Governmental Hospitals.

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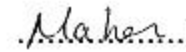
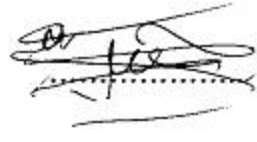
2. Dr. Maher Khadoor / External Examiner	
3. Dr. Hamzeh Alzabadi / Internal Examiner	

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Thanks are also expressed to my friends, for their help and encouragement.

With All Love and Respect.

Rana

الإقرار

أنا الموقعة أدناه مقدمة الرسالة التي تحمل العنوان:

Medication errors: Nurse's Perceptions of main types and leading factors, and reporting attitudes in North West Bank Governmental Hospitals.

الأخطاء الدوائية: أراء الممرضين والممرضات حول أكثر الأنواع انتشارا، العوامل المؤدية لها وسلوك التبليغ في المستشفيات الحكومية الفلسطينية

أقر بأن ما اشتملت عليه هذه الرسالة إنما هو نتاج جهدي الخاص، باستثناء ما تمت الإشارة إليه حيثما ورد، و أن هذه الرسالة ككل، أو أي جزء منها لم يقدم من قبل لنيل أي درجة علمية أو بحث علمي أو بحثي لدى أي مؤسسة تعليمية أو بحثية أخرى.

Declaration

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

Student's name: **اسم الطالبة:**

Signature: **التوقيع:**

Date: **التاريخ:**

List of Abbreviations

Abbreviation	Explanation
ME	Medication Error
AME	Administration Medication Error
ADR	Adverse Drug Reaction
IR	Incidence Report
IV	Intra- Venous
RN	Registered Nurses
MAR	Medication Administration Record
CCU	Cardiac Care Unite
ICU	Intensive Care Unite
WHO	World Health Organization
HIS	Health Information System
ADE	Adverse Drug Event

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Medication errors: Nurse's Perceptions of main types and leading factors, and reporting attitudes in North West Bank Governmental Hospitals.

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Abstract

Background: Medication errors are considered as public health problem due to the harm they cause to the patient through increasing the mortality and morbidity rates, to the healthcare system through increasing the cost, and to the healthcare provider who may loss his confidence in his capabilities and in the system, so considerable efforts have been directed to medication errors in the recent years globally, so this study had been conducted to describe nurse's perception about the main types, leading factors, reporting attitude and main obstacles against reporting medication errors.

Methods: This is a descriptive cross sectional study, total number 340 nurses in 6 governmental hospitals in north west bank, were approached in the hospitals where they work, during their work shifts, and asked to answer a self administer questionnaire of 6 parts developed according to the literature, 200 nurses completed it. Descriptive statistics were used for data analysis.

Results: The response rate was 59%, and the most common perceived type of medication errors was wrong time, were 79% of nurses reported that medication given one hour before or after intended time is occurs

frequently, more serious types of medication errors was reported to occur in less frequency. While heavy work load was reported as the first leading factor for medication error reported by 80% of the nurses followed by in adequate staff. 22% of the nurses said that they do not report their ME by any mean; however 78% of the nurses said that they report medication error they commit verbally and 59% of them said that they write an incidence report too if they commit a medication error, nurses working experience more than 5 years where associated with higher percent of the nurses who report their medication errors using incidence error, *p* value 0.014.Thinking that the error had been committed is not serious and not needed to be reported was the most common obstacle against reporting medication error, and while most of the nurses said that they know the exact definition of medication errors and when to report them, case scenarios showed that a big gap exists between actual knowledge and what is perceived.

Conclusion and Recommendations: Medication errors are committed in the Palestinian hospitals, personal factors and shortage of nurses and the heavy load on the governmental hospitals are the main contributing factors. More efforts should be paid by policy makers, and managers to identify and solve underlying causes and unified clear definition of ME should be more attention for reporting medication errors should be given.

Chapter One

Introduction

Chapter One
Introduction

1.1 Background

Although patient safety has always been a main concern for health care professionals, it is only within the past decade that studies have linked errors to medical-nursing personnel to adverse events and adverse outcomes for patients [1]

The institution of medicine (IOM) first report first Quality Chasm report, To Err Is Human: Building a Safer Health System [1], estimated 44.000- 98.000 deaths annually in the USA, attributed to medical errors [2,3], and even on the lower estimated number, they set before vehicle crashes and breast cancer as causes of death. The report categorized medical errors in different types, include: diagnostic errors like (error or delay in diagnosis, failure to employ indicated tests, use of outmoded tests or therapy, failure to act on results of monitoring or testing), treatment errors like (error in the performance of an operation, procedure, or test, error in administering the treatment, error in the dose or method of using a drug, avoidable delay in treatment or in responding to an abnormal test, inappropriate (not indicated) care), prevention errors like (failure to provide prophylactic treatment, inadequate monitoring or follow-up of treatment) and others i.e. (failure of communication, equipment failure, other system failure)

Medication errors (ME) alone account for an estimated 7,000 deaths annually, and ME is defined as: "any preventable event that may cause or

lead to inappropriate medication use or patient harm while the medication is in the control of the health care professional, patient, or consumer" and this error may be committed by physician, pharmacist or nurse [1,4]

ME could be occur during (ordering, transcribing, dispensing, administering, or monitoring) of medication process. In hospitals, three fourth of ME occurs at the prescribing and administration stages. However, prescription errors occur at rate 0.1- 0.3 errors per patient per day [5,6]. A major study in USA using direct observation of administration[7] carried out at 36 different health care facilities found that medication administration error (MAE) rate is 11 percent, even with excluding of doses administered outside the scheduled time (“wrong-time” errors). So since a hospital patient receives on average at least ten medication doses per day, this figure suggests that on average, a hospital patient is subject to one administration error per day. ME could be serious and lead to a preventable adverse drug event (ADE) which is a serious type of medication error, defined as any injury due to medication [6].

In hospitals, medication delivery passes through 3 steps, the physician orders the medication, a pharmacist prepares the medication, and the nurse administers it. So although medication delivery to the patient is not only the responsibility of the nurse, but this step should be paid more attention as; if the physician makes an error (prescription error), there are 2 chances to catch it. If a pharmacist makes an error (preparation error), there is 1 chance to catch it. If the nurse makes an error (administration error), it often reaches the patient [8].

Administration Medication Errors

In fact, the responsibilities of the nurses are to prepare the medications, administer them to the patient, monitor, evaluate and report any adverse drug reaction (ADR) due to medication [9]. It is estimated that 40% of the nurse's time is spent on medication preparation and administration to the patients [10] thus medication administration is a core role of the nurse's career. So while they are feeling worry about the patient's health and safety; committing a ME by a nurses has a negative impact on themselves, they will feel upset, guilty, terrified and they may loss the confidence in their abilities as clinical practitioner, and that may lead them finally to feel anger at themselves and at the system [11]. Add to this the more serious effect of the ME that may lead to mortality or disability for patients who seek the treatment in the first place to improve their health, ME may lead them to feel unsafe and they may loss their confidence in the healthcare system [1, 12].

When they occur

When it comes to Administration of the Medication, there are 5 rights, educated to the nurses as part of their education; they are; giving the right drug at the right dose, in the rout at the right time to the right patient. Despite the fact the nurses do their best to attach to those rights, sometimes, due to lack of knowledge about drugs and their adverse events, or systemic or personal factors, Administration Medication Error (AME) occurs [11],

and AME are defined as any “deviation from physician order” [13], and it was that the most sever harm or death due to ME caused by AME [14, 15].

Burden of the problem

The impact of ME on morbidity and mortality were assessed in a case-control analysis of ADR in hospitalized patients in USA for 3 years, the researchers found significant increases in the cost of hospitalization from increased length of stay, ranging from $677 to $9,022. Increase in patient mortality rate (odds ratio = 1.88 (1.3-3.7) and post-discharge disability [16].

Main types

When refer to the 5 rights of administration of drugs to the patients (right drug, right dose, right rate, right time, and right patient) we can conclude that not adhering to these elements will lead to committing ME. [11]

The most common types of ME are giving the dose at wrong time, missed dose, wrong rate – too fast or too slow, wrong duration, over/ under dosage, extra dose and wrong strength [17].

Leading Factors to medication errors

Although some ME may occur due to individual factors like lack of knowledge, yet system factors may contribute to committing medication errors and so the environmental factors.

It is known that there are two systems for drug dispense in hospital. The first one is stock based system, in which stock is kept in the wards, and nurse dispenses the drugs for each patient according to physician orders, prepare it and administer it. This system is associated with higher rate of MEs. The second system is the unit-dose dispensing system; drugs are dispensed in amounts that fulfill the needs of each individual patient for only 24 hours. This system is proved to be associated with less numbers of ME. In the Palestinian governmental hospital, the first system in dispensing the medication is adopted for most of drugs, and that makes the nurses responsible for dispensing, preparing and administrating of the medication to the patients [18]. In addition to heavy work load, lack of training and knowledge are main factors that lead to ME.

Reporting of ME

Despite the fact that reporting the ME is very important in order to control those errors and help to identify them and implement the policies and rules to control them and minimize their occurrence, however, studies showed that less than 25% of medication errors are reported using incidence report (IR).[19]

In Palestinian governmental hospitals, an incidence report (IR) form is available to report any medical error, (appendix 2), it's not used frequently, and usually nurses try to avoid filling it unless serious case of medical error had been committed [8].

When it comes to report an error many factors prevent nurses from reporting ME, they could be due to lack of knowledge about the ME in general, like when the nurse doesn't know the exact definition of the ME, or when it should reported, or due to fear from managers or peers, and could be to the personal judgment of the nurse for the ME he committed to be minor and doesn't deserve to be reported [9, 11, 20, 21].

1.2 Significance of the study

MEs are considered to be a major public health problem. Because of the harm it may cause to the patients, their families, and to the healthcare providers. Despite the fact that more and more attention is being paid for the ME in the world; in Palestine, ME receive little attention and for our knowledge no studies had been conducted to study ME.

In Palestine, as nurses finish their study in the university, limited number of education programs regarding medication are taking place, so nurses will depend on their previous study and learn from their experience. So errors continue to occur silently, and the ME problems are not highlighted, unless serious harm occurs.

Although ME is not committed by nurses only, studies showed that AMEs are the most serious type through the medication process. Identifying the main types, contributing factors and reporting attitude of the nurses, will be the first step to understand the extent of the problem and its scope in Palestine. This could be a base line for the stakeholders to set strategies and tactics to minimize and solve it.

Many studies have been conducted about MEs during the administration phase, to study the contributor's risk factors, the extent of the problem, the adverse drug events (ADE) resulted from ME, and the perception and attitudes of the nurses toward ME.

According to the Institute of Medicine's (IOM), medication-related errors were a significant cause of morbidity and mortality they accounted for one out of 854 inpatient deaths [1], and as it is hard to solve the medication error's problem, if we don't have enough, inaccurate, or contradictory information about them [6], WHO puts them in its 6 priority list for researches related to patient safety [22].

Nurses lie in the front line of administrating the medications to the patients, and they are considered to be the responsible for the patient safety; thus acquainting their knowledge about the issue, could be the first step to be able to set policies and strategies to focus on the problem, and build safer health system.

1.3 Aim and Objectives

1.3.1 Overall aim

The overall aim of this study is to identify the health quality situation in the Palestinian hospitals by understanding the MEs and so to prevent them and improve patient safety.

1.3.2 Specific Objectives

1. Determine the main perceived types of medication errors by nurses.
2. Identify the main factors leading to medication errors.
3. Describe the perceptions and reporting attitude of nurses regarding medication errors.

Chapter Two
Literature Review

Chapter Two
Literature Review

2.1 Types of medication errors

The types of ME commonly encountered in the medication process have been examined in various studies. Leape et al [23] reported more than 15 types of medication errors: wrong dose, wrong choice, wrong drug, known allergy, missed dose, wrong time, wrong frequency, wrong technique, drug-drug interaction, wrong route, and extra dose, failure to act on test, equipment failure, inadequate monitoring, preparation error, and others. According to studies made in the USA [24, 25, 26], the most common types of MEs were the following: omission error, improper dose/quantity, prescribing error, unauthorized drug,wrong time, extra dose, wrong patient, wrong drug preparation, wrong dosage form, wrong route, and wrong administration technique.

Benner et al (2002) [27] investigated errors made by nurses. They categorized 21 case studies of nursing errors from the disciplinary files of nine State Boards of Nursing in the USA. Eight categories represented the broad range of possible errors and their contributive or causative factors. One of the eight categories identified was MEs and constituted seven types of error: Missed doses of medication, wrong time of administration (60 minutes before or after the prescribed time), intra- venous (IV) rate too fast, or too slow, wrong concentration of dosage of medication delivered via IV route, wrong route of administration, wrong patient and wrong medications administered.

In Australia, a self-administer questionnaire had been used to get information about nurses perception for ME. Nurses said that dose at wrong time, missed dose, wrong rate (too fast or too slow), wrong duration, over and under dosage, extra dose and wrong strength are the main types of medication errors from the highest occurring to the least respectively [28].

In the developing countries, limited number of studies had been done in this regards. In a study conducted in Saudi Arabia in 2006, 10 000 patient's files were reviewed and 2627 medication errors were identified. The spectrum of these errors was variable; improper doses, over, under, or extra dose, wrong drug, wrong rout of administration, wrong duration, dose omission, wrong strength, or wrong dosage form [29].

In Jordan 200 registered nurses (RN) were asked to answer questionnaire about ME,126 nurses completed the questionnaire, and results showed that nurses perceived the following as the main types of AME: Wrong patient (26%), wrong dose (22%), no or wrong date (12%), wrong drug (9.5%), wrong time (8.7%), wrong documentation (6.3%), wrong route of administration (4.7%), no medication(omission of the dose) (4.7%), wrong frequency of the doses (3.1%) and finally changing of medication (1.5%) [30].

Limited number of studies had been conducted in Palestine. In a study had taken place in Gaza, to compare two types of medication dispensing systems, the researchers, in a part of the study, nurses were

observed while administrating the medication to the patients. The results revealed that wrong time errors were the most frequent one, followed by wrong dose and wrong drug. While, wrong patient and wrong route of administration errors were negligible [18].

2.2 Factors leading to ME

Osborne et al (1999) conducted a study in the USA to explore nurses' perceptions about MEs and their reporting attitude [31]. The main cause lead to ME was failure to identify the patient (35%), followed by fatigue and exhaustion (25%). Results also revealed the majority of nurses noted that most medication errors were not reported because of fear of reaction from nurse managers and co-workers.

Mayo and Ducan [11], conducted a survey for 983 American nurses and asked them to rank causes of medication errors as perceived by participants. Results showed the top three ranked (out of 10) perceived causes of drug errors were doctors' handwriting is difficult to read or illegible, nurses are distracted, and nurses are tired and exhausted.

In Australia [28],154 (RN), completed The Medication Error Questionnaire (MEQ) that was developed by the researcher, and the study revealed that ME occurs mostly when; the physician's hand writing on the doctor's order form is difficult to read or illegible, nurses are distracted by other patients, coworkers, or events on the unit, nurses are tired and exhausted, confusion between 2 drugs with similar names, dose

miscalculation by the nurse, the physician prescribes a wrong dose, the nurse fails to check the patient's name band with the Medication Administration Record (MAR), the nurse sets up or adjusts an infusion device incorrectly, the medication labels/packaging are of poor quality or damaged, and when nurses are confused by the different types and functions of infusion devices.

A descriptive cross-sectional study was conducted in Turkey in 2012 [21]. One hundred seventy four nurses were asked to report their views on the causes and reporting of ME. Results showed the main causes for ME were tiredness and exhaust, the seconds main reason was distraction by patients, other co-workers or events on the unit, nurse fails to check the patient's name band with the (MAR), confusion due to similarity of two drug names, dose miscalculation, physician prescribes the wrong dose, nurse sets up or adjusts an infusion device incorrectly, confusion of the different types and functions of infusion devices, physician's illegible hand writing, and finally ME occurs due to medication labels/packaging are of poor quality or damaged.

In the Middle East, two studies to study the ME were conducted in Jordan. In the first one, Mrayyan et al [20] used the Modified Gladstone's scale to collect data on rate, causes and reporting of medication errors. Results showed that the Jordanian nurses in an educational hospital classified causes of ME from the most to the least are: poor quality or damage of medication labels/packaging, confusion by the different types

and functions of infusion devices, nurses distraction by other patients, coworkers or events on the unit, difficulty in dealing or setting infusion devices, tiredness and exhaust by nurses, failure to check the patient's name band, when the physician prescribes the wrong dose, confusion between two medications with similar names, the physician's writing on the doctor's order form is difficult to read or illegible, and finally dose miscalculation. In the second study [30], 200 nurses in 3 different hospitals were asked to rank the main causes of ME according to their perception using a self-administer questionnaire. They ranked heavy workload (41%), new staff (20%), personal neglect (15%), unfamiliarity with medication (11.9%), insufficient training (4.8%), complicated prescription (4.8%), and unfamiliarity with patient's condition (1.6%) as the main causes of ME.

2.3 Reporting of ME

Accurate reporting is a very important issue when it comes to prevention of ME, and it depends on individual nurse's decision [32].

While 3.5% of the nurses in the study of Osborne et al[31] believed that all MEs are ever reported another study indicated that nurses themselves believe that only 25% of all MEs are reported using IR [17]. Nurse managers and physicians also believe that MEs are underreported by nurses [33]. Wakefield et al [33] study showed that errors of both commission and omission go unreported. Failure to administer a medication is the most underreported error because nurses perceive that patients will not be

harmed in this situation. Conversely, errors resulting in overmedication are the most frequently reported.

2.4 Factors for under-reporting

In order to be able to report ME, nurses should first be able to recognize an error has occurred, secondly to belief that the error deserves reporting, thirdly to be admit that she/he has committed a ME, and finally ability to overcome the embarrassment and fear of stigma for having committed a MAE [33].

Under reporting of ME, is resulted by many factors. In their study, Wakefield et al [33] said that disagreement over the definition of an error is a major cause of not reporting or under-reporting of ME. Many studies showed that about 95% of medication errors were not reported because of staff's fear of punishment [31, 34, 35]. Additionally, underreporting could be due to the lack of knowledge about the importance of adherence to the dose of medication, i.e. Kapborg & Svennson 1999[34] study found that nurses commonly report errors resulting in overmedication rather than under medication. Another major cause of under reporting of ME is that nurse managers reported that they are concerned about the reputation of their organizations, thus they may not report ME [34, 36].

Mayo et Duncan [11] asked nurses about their reporting attitude, "In your estimation, what percent of all drug errors are reported to the nurse manager by the completion of an IR?" 45.6% of the nurses said that all

MEs are reported using IR, although 92.6% indicated that they knew what constituted a ME, and 91.3% of them said that they know when to report ME using IR. And according to the nurses, the main causes behind not reporting ME, were "afraid of manager reaction"(76.9%), "afraid of coworkers' reactions" (61.4%), and "not thinking an error was serious enough" (52.9%). However, the majority of nurses (80.4%) do not seem to fear from disciplinary action (losing one's job) because of committing an error.

While in the Australian study [28], the RN who answered the anonymous self-report survey, reported that 12.7% of ME are reported, through verbal feedback, and only 5.1% of ME are reported using written feedback.

In the descriptive cross-sectional study that had been conducted in Turkey [21], 600 nurses filled the modified Gladstone questionnaire, to describe their reporting attitude; results showed that 41.6% of the MEs were reported. And when asked about the main obstacles against reporting ME, nurses arranged them: fear of supervisor nurses' reactions, and nurses said that they are usually sure how the medication errors occur, fear of their colleagues' reactions I am quite sure that the MEs are usually reported, I think that ME is not as important as it should be reported, fear of disciplinary punishment and losing the job.

In their study, *Khalifa et al* [15], Egyptian nurses were compared regarding their reporting attitude versus doctors, and pharmacists, results

revealed that frequency of reporting among nurses was (44%), compared to (15%) of doctors and (3%) of pharmacists. And the barriers against reporting MEs, were the absence of clear definition for ME, writing a report take a long time, and Focusing on individual punishment more than system improvement.

In Mrayyan et al study [20] in Jordan, (82.8%) of the RNs were usually sure what constitutes a medication error, and (78.8%) of RNS were usually sure when ME should be reported using IR, while (65.4%) of the nurses reported that they don't report ME because they are afraid of the reaction they will receive from the nurse manager, and 59.6% of them did not report ME because nurses are afraid of the reaction they will receive from their coworkers, (41.1%) of them failed to report a medication error because they did not think the error was serious to warrant reporting and finally (40.5%) of the RN reported that the main reason for not reporting ME, was afraid that they might be subject to disciplinary action or even lose their job.

Chapter Three

Materials and Methods

Chapter Three
Materials and Methods

This chapter involves the methodology of the study. It includes the methodological approach, research design and sample size, selection of the study population and methods of data collection.

3.1 Study Design

This study is a descriptive cross sectional study, carried out on nurses working in the governmental hospitals in North West Bank Bank (Nablus, Jenin, Qalqilya, Tulkarem, and Salfeet), in the period between July-November 2012.

- Rafidia and Al-Watani hospitals are the main governmental hospitals at Nablus city where most of the patient seek the health care,
- Darwish Nazal hospital; the only governmental hospital in Qalqilya city,
- Khalil Suleiman governmental hospital; the only governmental hospital in Jenin city,
- Thabet Thabet governmental hospital; the only governmental hospital in Tulkarem city, and
- Yasser Arafat hospital; the only governmental hospital in Salfeet city.

3.2 Study Population

The study population constitutes all nurses working at the above mentioned hospitals during the study period.

Inclusion criteria

- All nurses who work in the above listed hospitals.

Exclusion criteria

- Nurses who don't have the opportunity to deliver medication to patients in the above mentioned settings were excluded from the study, such as: nurses working in the administrative departments, out patients' clinics, and operation rooms.

- Nurses who are working in the above hospitals for less than 1 month, as new nurses are under supervision and not allowed to administer the medication alone.

3.3 Sampling and sample size

A total number of 340 nurses, consisting of all available nurses at the above mentioned governmental hospitals during study period who administer medication to the patients were approached.

Nurse's manager in each hospital of the above mentioned hospitals was visited by the researcher who explained the aim of the study and its objectives. The number of working nurses in each department during the study period was provided either by the nurse's manager or the supervisor

in each department. Out of 546 nurses reported in the MOH annual report as working in the above mentioned hospitals [37], a total number of 340 nurses met the inclusion criteria, were working in the above listed hospitals during study period as following; Rafedia governmental hospital 90 nurses; Al Watani governmental hospital 35 nurses; Thabet Thabet hospital 66 nurses ;Kalil Sulaiman hospital 77 nurses; Darwish Nazal Hospital 42 nurses; and Yaser Arafat hospital 30 nurses. All nurses meeting the inclusion criteria were asked to participate in the study.

3.4 Study Variables

Dependent Variables

AME which is defined as "deviations from a physician's order" [11]

- Types of ME: such as dose at wrong time (1 hour before or after the intended time), missed dose, wrong rate – too fast or too slow, wrong duration, over/ under dosage, extra dose and wrong strength or wrong rout of administration.

- Nurses perception and reporting attitude

  - Reporting of the medication errors: (Yes or no), type of report (written incident form or verbal feedback).

Independent Variables

- Socio-demographic information: Age (continuous), gender (male or female), and marital status (married or unmarried).

- Education and experience:
  - Level of education: 2 years college diploma, bachelor, master or other)
  - Years of working experience : continuous
  - Years of work experience in hospitals (continuous),
- The shift the nurse work in (morning, day night or rotating), and
- The ward the nurse is working in: maternity, CCU/CCU, internal, general surgery, pediatric, emergency department, etc).
  - Systemic Factors that include :poor physician's hand writing, inability to interpret physician order, drug name similarity, patient's name similarity, writing error, nurse are unable to understand abbreviation
  - Personal Factors that include: heavy work load, tiredness, stress, lack of sleep, calculation errors, low knowledge about drugs, lack of skills for administrating iv medication, difficulties in dealing with Cannula, personal neglect.
  - Environmental Factors that include*:* Inadequate staff, distraction, working with nurse has low experience, inadequate training, bad nurses- doctors' communication, disturbance, lack of instructions in the wards, bad nurse- nurse communication, bad lighting.
- Factors affecting non reporting:

- Fear of disciplinary action or lose the job (yes or no),
- The error was not serious to warrant reporting (yes or no).
- Fear of the reaction they will of the co-workers (yes or no).
- Fear of the reaction they will receive from the nurse manager (yes or no).

- Certainty of when medication errors should be reported using incident reports (yes or no).
- Certainty of what constitutes a medication error (yes or no)

3.5 Data Collection Tool and Process

A self-administered questionnaire for data collection was constructed by researcher based on the literature review (9, 28, 31). (Appendix 1) It was divided in six parts as the following:

- Part one: included nurses' socio-demographic characteristics.
- Part two: nurses were asked to classify the frequency of the types of ME, each ME was set and nurses were asked to classify each ME according to its occurrence frequency, from occur frequently, to not occur.
- Part three: it was about the factors leading to ME. A likert scale had been used again, to classify the nurses' perception to each factor, from strongly agree, to strongly disagree.

- Part four: examined the reporting of ME, and nurses asked to fill with the most common method of reporting they use; written, verbal, or not reporting ME.

- Part five: surveyed the main obstacle against reporting of ME. Nurses answered with either yes or no for each proposed factor using the Gladstone modified scale.

- Part six: nurses were presented 5 cases scenarios from the Gladstone modified scale and they were asked to answer 3 questions related to ME; to classify each scenario as a ME (yes or no responses) and if they would or would not report the situation to a physician or complete an incident report.

The Modified Gladstone's scale was used to collect data on rate, causes and reporting of MEs [11, 31]. This instrument measures: first, rate of MEs reported to nurse managers (one item); second, nurses' perceived causes of ME (10 items); and third, nurses' views about reporting medication errors (six items,), fourth, case scenarios (5 items). Like in other studies we didn't use all parts of the scale; we used the part of the scale related to nurses' views about reporting MEs, and the case scenarios [20, 21].

Tool Validation:

To validate the instrument "forward–backward" method was used to translate The Modified Gladstone's scale into Arabic language, and

Cronbach's Alpha was assessed and it was 0.79 for the translated Arabic version. And the constructed questionnaire was reviewed by experts in the field ; prior to data collection, the questionnaire had been pre-tested with a convenient sample of 40 nurses working in Arab specialized hospital (private hospital in Nablus city), to ensure the clarity, time, and ease of administration. Refinements had been made on the basis of feedback from the pretest on.

Finally Cronbach's Alpha was assessed for each set of questions, and the values were as following: the main types of medication errors: 0.79, for the leading factors to ME, personal factors group of questions Cronbach's Alpha was 0.83, the environmental factors Cronbach's Alpha was 0.79, and for the systemic factors Cronbach's Alpha was 0.7

Data Collection

The researcher visited the hospitals, met the nurses at the shifts they work, distributed the questionnaire, and made sure that nurses understand the objective of the research and explained how to fill the questionnaire and to encourage the nurses to fill it, researcher assured the confidentiality of the information, and the names of participants were not filled by nurses.

3.6 Data analysis

For the purpose of answering the objectives of the current study, we used the Statistical package for social sciences (SPSS) software version 17 for data entry and analysis. The following data analysis plan was followed:

- Frequency tables were used to describe categorical variables and mean and standard deviation were used to describe continuous variables.
- The proportion of each selected answer to items in the questionnaire was calculated.
- The relations between the dependent and independent variables were explored using Chi square.
- Significance level of 0.05 was considered in this study.

3.7 Ethical consideration

The following ethical considerations were ensured:

- Approval was obtained from the An Najah University- Institutional Review Board (IRB), graduated studies and MOH. (appendix 3)
- Hospital's managers and nurse's manager's consent were obtained, to conduct the study in their hospitals.
- Oral consents had been taken from the participants of the study.
- Data was collected anonymously and was kept confidential
- All collected data had been used for research purpose only.

Chapter Four
Results

Chapter Four
Results

This part is the core of the current study presenting the findings of the survey conducted at governmental hospitals. Out of 340 nurses were available during the study period in 6 hospitals working in the different wards of the hospitals, Out of 340 nurses, 200 nurses completed the questionnaire, the response rate was 59%

4.1 Demographics of the participants

The mean age for the surveyed nurses is 32 years old (SD 7.5), and the mean years of their working experience was 9.3 years, including 8.7 years of working in hospitals. For the working shift, 74% of them are working in different shifts, including morning, days and nights shift, 8 departments in each hospitals were approached (general surgery, internal, gynecology and obstruction, pediatrics, cardio surgery, emergency, orthopedic and neurology and ICC/ ICU) and then nurses working the different wards were classified according to the literature in 3 different groups, surgical includes (general surgery, internal, gynecology and obstruction, pediatrics, cardio surgery, orthopedic and neurology) and emergency or ICC/ ICU. Table 1 shows the socio demographic data of the research sample.

Table (1): Socio-demographic characteristics of the study participants (n= 200)

Variable	Frequency	Percent
Marital Status		
• Single	51	27.3%
• Married	136	72.7%
Department		
• Surgical	124	65.6%
• Emergency	28	15.5%
• CCU/ ICU	37	20.3%
Shift		
• Morning	32	17.1%
• Day	5	2.7%
• Night	10	5.3%
• All	140	74.9%

For gender, 44% of the study participants were males and 56% females (figure 1).

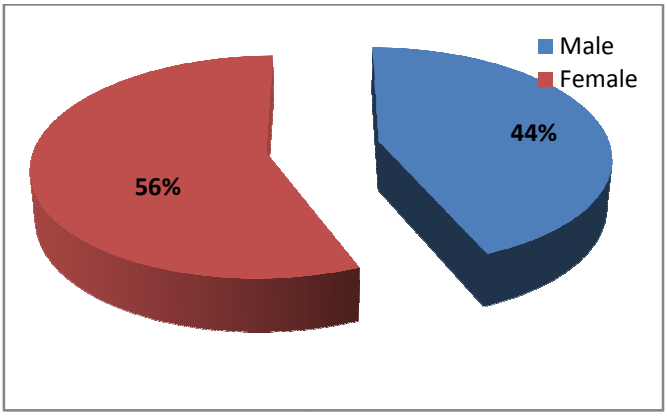

Figure (1): Distribution of study participants by Gender

Majority (55%) of the surveyed nurses completed their Bachelor degree, while 39% has diploma degree and 5% have a master degree (figure 2).

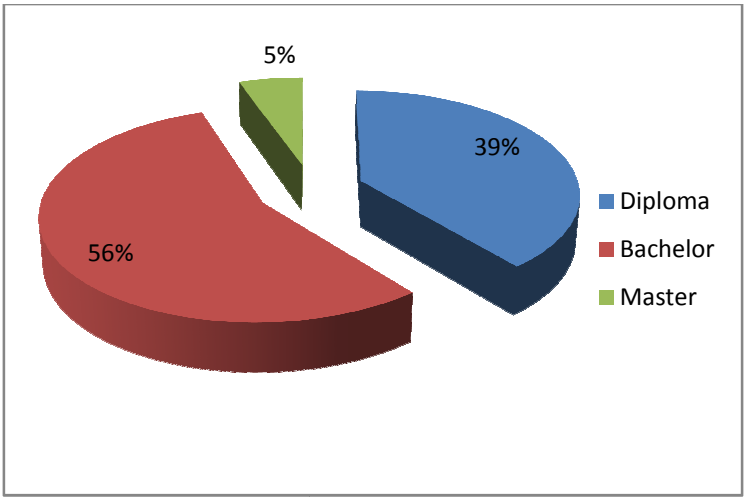

Figure (2): Distribution of Study Participants by Level of education

4.2 Types of medication errors

In order to assess the main types of medication errors, nurses were asked to answer a likert scale questions related to their opinion on the most common types of MEs the answers varied from occurs often to not occur at all, the answers of occurs often and sometimes, had been considered as the errors is committed, while answers of occurs seldom or not occur at all considered as not occur. The results showed that giving the medication in a wrong time (one hour before or after the prescribed time) was the most common ME reported by nurses with 76% of the surveyed nurses agreed that this error is frequently done. This was followed by giving the IV medication in a wrong rate, and wrong way of giving the medication “push or slow" to be the third most common error done by nurses. Table [2] shows the reported medication errors that are done by nurses.

Table (2): Type of common medication errors as perceived by nurses

Medication error	Frequency (%)
Wrong Time (one hour before or after the right time)	141 (75%)
Wrong Rate (too fast or too slow)	81 (43%)
Wrong Way (push or slow)	49 (26%)
Wrong Concentration (calculation error)	36 (19%)
Wrong Prescribed drug (prescription error)	32 (17%)
Omission of the Dose	29 (16%)
Wrong Amount of the Dose (more or less)	23 (12%)
Wrong Number of Doses (extra or lower)	22 (12%)
Wrong Patient	19 (10%)
Different Drugs	16 (8%)
Different Rout of Administration	14 (7%)

Trying to find any link between socio-demographic characteristics and the main reported types of ME, each character had been studied with the main 2 perceived types of ME, one significant relation had been found between giving the medication in wrong rate and gender, where female nurses said that error occurs more than male nurses, however, no other significant associations had been found between ME and socio-demographic characteristics, table (3) shows the main perceived types E in relation with socio-demographic characteristics.

Table (3): Main perceived types of ME in relation socio demographic characteristics

Giving the drug in the wrong time			
Characteristics	**Done**	**Not Done**	**P value**
Gender			
Male	72.5%	27.5%	0.39
Female	78.6%	21.4%	
Level of education			
Diploma	71%	29%	0.63
Bachelor and master	79%	21%	
Work experience			
Less than 5 years	72%	28%	0.47
More than 5 years	85%	15%	
Giving the drug in wrong rate			
Characteristics	**Done**	**Not Done**	**P value**
Gender			
Male	55%	45%	0.037
Female	62%	38%	
Level of education			
Diploma	43%	57%	0.45
Bachelor and master	43%	57%	
Work experience			
Less than 5 years	46%	54%	0.8
More than 5 years	40%	60%	

4.3 Factors contributing to medication errors

In order to determine the factors contribute to these errors, nurses opinions were explored in this regards, a likerts scale had been used, nurses were asked whether each factor contribute to ME or not, and answers divided from strongly agree to strongly disagree, and to analyze answers, results of strongly agree and agree considered as yes it contribute to ME, while answers of disagree and strongly disagree had been considered as no. Factors were classified into three groups; personal, systematic and environmental factors. It was noted that personal factors were the most

common leading factors for ME occurring in hospitals, followed by environmental factors and systematic factors respectively (Tables 4-6).

Table 4 shows the personal factors leading for ME occurring in hospital as perceived by nurses. Work load, tiredness, stress and lack of sleep were the most reported factors in this category.

Table (4): Personal factors leading to medication errors as perceived by nurses

Factors	Frequency (%)
Heavy work load	157 (79%)
Tiredness	143 (74%)
Stress	139 (73%)
Lack of Sleep	136 (68%)
Calculation Errors	76 (38%)
Low Knowledge about drugs	72 (36%)
Lack of Skills for Administrating Medication	61 (31%)
Difficulties in Dealing with Cannula	53 (27%)
Personal Neglect	49 (25%)

For the environmental factors; inadequate staff; distraction by others; and working with Nurse with low experience were the most common reported factors as perceived by nurses

Table (5): Environmental factors leading to medication errors as perceived by nurses

Factors	Frequency (%)
Inadequate staff	153 (77%)
Distract	135 (68%)
Working with Nurse with low experience	118 (59%)
Inadequate Training	117 (59%)
Bad Nurses- Doctors Communication	108 (54%)
Disturbance	99 (50%)
Lack of Instructions in the Wards	95 (48%)
Bad Nurse- Nurse Communication	94 (47%)
Bad lighting	52 (26%)

In the systematic factors category; poor physicians' hand writing, inability to interpret physician order and similarity in drug name were the most common leading factors for ME (Table 6).

Table (6): Systemic factors leading to medication errors as perceived by nurses

Factors	Frequency (%)
Poor Physicians' Hand Writing	122 (64%)
Inability to interpret physician order	90 (47%)
Similarity in drug name	78 (42%)
Patient's Name Similarity	71 (38%)
Writing Errors	67 (35%)
Nurse are unable to understand abbreviation	66 (35%)

Trying to find any link between socio-demographic characteristics and the main contributing factors leading to ME, each character had been studied with the first perceived leading factor from each category, two significant relations were found between the leading factors and the gender of the nurses, where males nurses perceived that MEs occur due to in adequate staff more than female nurses, and male nurses saw that MEs occur due poor physician hand writing more than female nurses. No other significant relations had been found between the main contributing factors and socio-demographic characteristics, table (7) shows the main contributing factors in relation with socio-demographic characteristics

Table (7): Contributing Factors in relation to socio-demographic characteristics

ME occurs due to heavy workload			
Characteristics	**Agree**	**Disagree**	**P value**
Gender			
Male	86%	14%	0.16
Female	75%	25%	
Level of education			
Diploma	75%	25%	0.7
Bachelor and master	83%	17%	
Work experience			
Less than 5 years	72%	28%	0.32
More than 5 years	83%	17%	
ME occurs due to inadequate staff			
Characteristics	**Agree**	**Disagree**	**P value**
Gender			
Male	90%	10%	0.005
Female	72%	28%	
Level of education			
Diploma	80%	20%	0.9
Bachelor and master	79%	21%	
Work experience			
Less than 5 years	74%	26%	0.47
More than 5 years	79%	21%	
ME occurs due to poor physician hand writing			
Characteristics	**Agree**	**Disagree**	**P value**
Gender			0.002
Male	79%	21%	
Female	54%	43%	
Level of education			
Diploma	72%	28%	0.2
Bachelor and master	59%	41%	
Work experience			
Less than 5 years	60%	40%	0.9
More than 5 years	69%	31%	

4.4 Nurses' reporting attitudes

Trying to describe the perceptions and reporting attitude of nurses regarding ME, we first asked them about the action they used to do if they

did a ME; nurses were asked do you complete an IR? do you report the ME verbally? And finally I don't do anything if I commit a ME. For each question a likert scale had been used, answers varied between often to never, often and sometimes be considered as they do, while seldom and never considered as no.

Twenty two percent of the nurses said that they do not report their ME by any mean; neither by IR nor verbally, while 78% of the nurses reported that they report ME they do verbally and 59% of them said that they write an IR and report ME verbally if they commit it.

Then the nurses were asked about their opinion of the barriers that prevent them from reporting ME. About half (48%) of nurses said that ME are not reported because they are thought to be not serious and there is no need to be reported. Table 8 shows the reasons behind not reporting medication errors as perceived by nurses.

Table (8): Barriers to the reporting of medication error as perceived by nurses (n=200)

Barrier to the reporting of medication error	Frequency (%)
I think the error I did is not serious and not needed to be reported	89(45%)
fear from the manager	80 (40%)
fear from disciplinary actions or even leaving my work	74 (37%)
fear from the peers	72 (36%)
I don't know the exact definition of Medication error	66 (33%)
I am not sure when should I report the medication error	66 (33%)

To find any link between socio-demographic characteristics and the barriers to reporting of ME, each character was examined with the most 3 barriers using chi square test. A statistically significant relation was found between reporting ME using IR, and years of hospital work experience, in this regard, nurses who worked in hospitals for more than 10 years, said that they report ME by IR more than nurses who worked for less years, (P = 0.014). No more association were found between socio-demographic characteristics and the studies outcomes all relations are in (table 9)

Table (9): Barriers to the reporting of ME in relation socio demographic characteristics

I think the error I did is not serious and not needed to be reported			
Characteristics	**Yes**	**No**	**P value**
Gender			
Male	56.1%	43.9%	0.086
Female	42.3%	57.7%	
Level of education			
Diploma	50.7%	49.3%	0.87
Bachelor and master	46%	54%	
Work experience			
Less than 5 years	45.1%	54.9%	0.47
More than 5 years	55.2%	44.8%	
I don't report ME because I am afraid of my manager			
Characteristics	**Yes**	**No**	**P value**
Gender			
Male	47.6%	52.4%	0.14
Female	38.4%	61.6%	
Level of education			
Diploma	42%	58%	0.9
Bachelor and master	42.6%	57.4%	
Work experience			
Less than 5 years	38.5%	61.5%	0.34
More than 5 years	49.2%	50.8%	
I don't report ME because I am afraid from disciplinary actions or even leaving my work			
Characteristics	**Yes**	**No**	**P value**
Gender			
Male	47%	53%	0.53
Female	34%	66%	
Level of education			
Diploma	37.7%	62.3%	0.23
Bachelor and master	38.6%	61.4%	
Work experience			
Less than 5 years	40.4%	59.6%	0.9
More than 5 years	36.2%	63.8%	

4.5 Medication scenario evaluation:

In the last part of the questionnaire, 5 different scenarios for ME - used in Gladstone survey [7, 11, 15, 27, 41] were presented to the nurses to

explore their opinions and to assess their knowledge. Nurses were asked to classify each scenario as a ME (yes or no responses) and if they would or would not report the situation to a physician or complete an IR.

In the first scenario, nurses were asked about an omission error, where the patient missed his dose of antibiotic, 70% of the nurses didn't consider it to be a ME, while 72% said that they will inform the physician, 54% said they will not write an IR. (Table 10)

Table (10): distribution of nurses answers on the first case scenario.

Case 1 *A patient misses his midday dose of oral Ampicillin because he was in x-ray for 3 hours*		
	Yes	No
Do you consider it a ME	58 (30%)	133 (70%)
Do you notify the physician	138 (72%)	53 (28%)
Do you complete an IR	92 (48%)	98 (52%)

The second case scenario, represented wrong time error, where the patient received his medication 4 hours later than prescribed time, 68% of the nurses judged it as ME, more than half of the nurses said that they will inform the physician, and less than half said that they will write an IR (table 11)

Table (11): distribution of nurses answers on the second case scenario.

Case 2 *Four patients on a busy surgical unit receive their 6 PM done of IV antibiotics 4 hours late*		
	Yes	No
Do you consider it a ME	130(68%)	60 (32%)
Do you notify the physician	133 (70%)	56 (30%)
Do you complete an IR	92 (48%)	98 (52%)

The third case study, represented wrong rate, where the patient received the dose in a faster rate, than prescribed, 72% of the nurses have a consensus on the case as a ME, and 79% said that they will notify the physician, and 57% said that they will complete an IR (table 12) represents the answers.

Table (12): distribution of nurses answers on the third case scenario

Case 3 *A patient receiving TPN feeding via an infusion pump is given 200 mL/h instead of the correct rate of 125 mL/h for the first 3 h of the 24-h infusion. The pump was reset to the correct rate after the change of shift at 7 AM when the oncoming nurse realized that the pump was set at the incorrect rate*		
	Yes	No
Do you consider it a ME	146 (77%)	43 (23%)
Do you notify the physician	132 (70%)	56 (30%)
Do you complete an IR	107 (57%)	81 (43%)

The fourth case study represented an omission error again, 62% of the nurses believe it to be a ME, while the rest; 38% didn't consider it to be a ME, and only half of the nurses said that they will report the case to the physician or by IR. (table 13) shows the answers of the nurses for this case study

Table (13): distribution of nurses answers on the fourth case scenario

Case 4 *A patient admitted with status asthmaticus on 08/13 at 2 AM is prescribed albuterol (ventolin) nebulizers every 4 h. The nurse omits the 6 AM dose on 08/13 as the patient is asleep.*		
	Yes	No
Do you consider it a ME	119 (63%)	71 (37%)
Do you notify the physician	100 (53%)	90 (47%)
Do you complete an IR	89 (47%)	102 (53%)

In the fifth and final case study, nurses were asked about an omission error again, nurses were divided in their answer, half of the nurses considered it to be a ME, 70% of the nurses said that they will notify the physician, and 64% of them said that they will report the case using IR, (table 14) represents the nurses answers

Table (14): distribution of nurses answers on the fifth case scenario

Case 5 *A patient is receiving a routine 9 AM dose of digoxin every day.Yesterday's digoxin level was 1.8 (the high side of normal). A digoxin level was drawn at 6 AM today. At 9 AM the nurse holds the digoxin because the lab value is not available yet*		
	Yes	No
Do you consider it a ME	103 (54%)	88 (46%)
Do you notify the physician	148 (78%)	42 (22%)
Do you complete an IR	122 (64%)	68 (36%)

Chapter Five
Discussion and Conclusion

Chapter Five
Discussion and Conclusion

The aim of this study was to specify the main types of AME committed by nurses in the hospitals, define the main factors that lead to those errors, determine the reporting attitude of the nurses when such errors occur, identify the barriers that prevents nurses from reporting the MEs, and to measure their knowledge about MEs. The results of this study have significant implications for the nursing instructors will help to provide baseline data in order to be able to control this problem through finding solutions by the hospital managers, healthcare providers and policy makers.

The response rate in our study was 59%, and that rate is acceptable in this type of studies, in Deans et al study [28] the response rate was 52%, and in Mryyan et al [20] study in Jordan, the response rate was 57%.

5.1 Types of ME

In our study, wrong time was perceived as the most frequent ME occurs in governmental hospitals; 76% of the nurses said that this error occurs always. this result contradict the study of Al-Shara in Jordan [30], where nurses reported wrong time as the fifth common type of ME, while it concurs with many studies like Australian study [28], and USA [11] where 70% of ME were wrong time error, and the results of Gaza study [18], where wrong time had been observed as the most common ME occurred. This could be related to the heavy work load and shortage of nurses, the main reported factors leading to ME, where nurses chose to administer the medications for the patients in the ward in specific round time. However,

nurses consider wrong time, as minor error, and they tend to report errors when they believe that patient safety may be compromised [38]. Wrong time in general is considered a minor and has few consequences, although it may cause serious error that sometimes could be life-threatening [18]. On the other hand the commonness of this error may lead nurses to accept it, and consider it as normal practice and stop reporting it [28]. Thus more attention should be given to ME including wrong time.

The second most common error is wrong rate (too fast or too slow), and that concurs with the Australian study[28], and the study by Al-Kaisi et al [39], which aimed for exploring the opinion of Palestinian nurses working at intensive care unit (ICU) and cardiac care unit (CCU) about medical errors. In this study, nurses reported error in dealing with droper machine when administering I.V solutions as part of teqnichal errors, which is one of the nine themes of the nurses' experiences of the most common medical errors in ICU and CCU. Nurses attributed this to the old fashion mashins they are using.

On the other hand, the following types of MEs were reported less frequentlt; wrong concentration due to calculation error, omission of the dose, wrong amount of the dose (more or less), wrong number of doses (extra or lower), giving the drug to the wrong patient and giving the patient a different drug of what had been prescriped. This is contrary to what have been reported in Al sharaa study[30]. Less frequent reporting of theses errors is a good indication, as they are having high potential for causing

harm and ADE, and its good to note here that nurses are paying more attention to the issues related to the more serious harm.

Finally, wrong rout of administration is perceived as the least common error, this result is similar to the finding in Gaza study [18], where wrong rout was a neglicable error, and that could be explained as nurses reported that they have good knowledge about drugs.

To explore any existing link between nurse's characteristics and main types of ME, nurse's gender was the only predictor, where female nurses perceived that wrong rate error occurs more frequent than male nurses. No such finding had been found in the literature, and that may be due specialty in the Palestinian hospital.

5.2 Factors leading to ME

In order to set policies and stratigies to eliminate the errors we need first to asess and treat the leading factors. So great attention had been given to this issue in our study, and factors were devided in 3 major categories, Personal factors, enviromental factors and systemic factors.

In the Personal factors category; heavy work load was agreed on by (80%) of the nurses as the most leading cause for ME, and this concurs with the finding of Gladestone[11], where heavy work load was reported to be the main cause of ME. Stress, tierdness, and lack of sleep were the following major factors leading to ME, and this is similar to results obtained from Austuralia[28] and Turkey[21] .Generally, fatigue, and lack

of sleep both led to stress and all together they were proven to be serious factors leading to ME [40]. From the socio-demographic data we see that most of the nurses are working in different shifts, and many of them are working for 2 consicutive shifts, that make them works for 16 hours, and make them more subjective to commit ME. This could be explained due to the shortage in working nurses in the hospitals. In addition, in the GH, nurses are responsible for drug preparation. The least personal factor perceived to be a leading factor for ME, was personal neglect, 25% of the nurses agreed on this factor to be present as cause for ME. This indicate that nurses are doing their best in order to prevent patient harm, and to adhere to the instuctions.

Regarding the Enviromental factors, inadequate staff was the main factor, and this is parallel with the reported heavy work load. Unlike the Ausuraliane study[28] where lack of staff was reported as the fourth cause of the enviromental factors, as Palesteniane governmental hospitals have a shortage of working nurses as reported in Abdelrahim study [44]. The second enviromental factor leading to MEs was distraction by patients or coworkers, or events in the ward. It had been reported in many studies [41, 42, 43] as the leading caus of ME, and it may be reflected in many ways; i.e, while nurses are busy doing several tasks, patients, co workers and others are talking to the nurses asking them questions or asking for their help . This highlights the value of different distraction elimination techniques, and suggests educating staff about the importance of not distracting a colleague who is in the middle of medication management.

Others, like working with nurse have low work experience and inadequate training, are the following leading factors. It is noted that the environmental factors had the highest percent of the agreement as leading factor of ME, those factors include: bad nurses- doctors communication, disturbance, lack of instructions in the wards, bad nurse- nurse communication and bad lighting.

In the systemic factors category, iligiable physiscion hand writing was reported by (65%) of the nurses as cause for ME. This is in agreement with the Mayo study [11], where illigiable hand writing was the main factor led to ME and unlike the Jordanian study[20], where physiscion hand writing was the least leading cause of ME. In Palestine, the health information system (HIS) that have been newly implemented in some governmental hospitals like Rafedia Hospital, will help to overcome and eliminate this factor, as all orders will be computerized. The second systemic factor was inability to interpret physician order, which was reported by 46% of the nurses, and the least leading factor was inability to understand the abbreviations, which was reported by 35% of the nurses. This is an important factor that needs to be given more attention, as misunderstanding of the abbreviation, means nurse could give extra dose or give the drug in different rout of administration or even in different concentration, and may lead to very serious ADE.

To explore any existing link between nurse's characteristics and leading factors to ME, findings linked nurse's gender to leading factor to ME, where males nurses perceived that poor physician hand writing and in

adequate staff are leading to ME more than female nurses. No such finding had been found in the literature, and that may be due specialty in the Palestinian hospital.

5.3 Reporting of ME

Trying to describe the reporting attitude of nurses regarding ME, we first asked them about the action they used to do if they did a medication error, and we asked them to identify their reporting method.

Our study showed that 22% of the nurses will not report committed ME by any mean. This is a very serious issue as reporting of ME is very important and failure to do this step may mislead the healthcare providers and will deviate their attention from the real cause of the deterioration of the patient's case which is not more than ADE caused by ME, and finally they take the wrong action and may harm the patient [45].

On the other hand, 78% of the nurses reported that they will inform about the ME they committed verbally. It is well known that nurses feel guilty and uncomfortable when committing a ME, and they are worry about the patient safety [11], at the same time they want to protect themselves from punishment and from the anger of their managers and patients, so they chose to inform about the error orally. Yet in addition that verbal report is not useful when it comes to preparing database for the ME to set strategies and policies to prevent them, they could go without taking any action if they reported during work, and simply forgotten due to the many tasks had to be done.

In our study, 59% of the nurses said that they write an IR if they commit a ME, and this is high percentage when compared to other studies. However, the percentage of reporting ME using written IR, is increasing over time, while Osbern et al study [31] showed that only 25% of the nurses report their errors using IR, in Jordanian study [20] in 2007, 42% of nurses said they will report ME using IR, and in Mayo study[11], 45% of nurses said they will report ME using IR this could be due to the increase awareness about ME over years [15].

Yet good to point here that during our meeting with nurses and nurses managers, some of them said that they know IR, but they never use it and they avoid using it unless serious case had been occurred, and instead they write their notes on the (MAR).

Results showed that nurses who worked for more than 10 years in hospitals report ME they committed by using IR, more than nurse who worked for less than 10 years, and this finding agrees with the finding of Mayo and Duncan, where a weak relationship between percentages of errors perceived reported and years of RN practice. No more relations with other socio demographic characteristics were found, and this concurs with the findings in Turkey [21] and Jordan studies [20].

5.4 Barriers to ME reporting

Like Marryan study [20], majority of the nurses (74%) reported that they know the exact definition of ME, and they are sure when they should

report it, this concur with California study[11] where most nurses said that they know the exact definition of ME.

The most reported barrier to reporting ME was nurses' believe that the error they did is not serious and not needed to be reported, if we go back to the main type of ME in this study, we will find wrong time is the most perceived one. So althogh nurses know it is a ME, yet they think its not serious error and no need to report it, add to this the frequent occurance of this error may lead nurses to accept it as normal habit [27].

The following leading obstacles of reporting ME were; fear from nurse's manager, coworkers and fear from being subjective to disciplianry action, those results are similar barriers reported by Jordanian nurses, while the disciplinary action was not the main obstacle of reporting ME of the American nurses [11], and as Marryan et al [20] conclude this could be due to the difference in health system services between Middle east and United states. Where the concentration of punishment of indevidual nurse would be applied instead of concentrating on the system development [15].

5.5 Classefying and reportin of ME

In the last part of the quesstionnare, 5 scinareos for ME were presented to the nurses and they were asked to calssify them and to detect their reporting attitude for each case,

In the first scenario, nurses were asked to evaluate it if it was a ME or not, it was an omission error, where the patient didn't take his antibiotic

dose because he was in x-ray for 3 hours, 30% of the nurses reported it as ME, while 70% didn't consider it to be ME, and that agrees with California study [11], and another Jordanian study [46], where 78% and 71% of nurses didn't consider it to be a ME respectively. This is striking that despite 74% of nurses reported that they know what is the definition of ME, 70% of them didn't consider dose omission as ME, and this is in agreement with Wakefield study [33] where nurses worry for over dose more than omission of the dose.

Higher than Jordanian nurses and the nurses in Mayo study, 72% of the nurses said that they will notify the physicians, while 42% said they will write a report of the incidence. It is good to point here that many nurses consider that writing the incidence in the MAR is enough and thus no need for IR [46, 11].

The second scenario, was for time error, where for patient on a busy surgical unit receive his 6 PM done of IV antibiotics 4 h late, 68% of the nurses classify it as a ME, and that agrees with the California study [11] where 69% of the nurses agreed on it as ME, while it was less than Jordanian CCU nurses [46] where 80% of the nurses classify it as ME, 70% of nurses in our study say they will notify the physician, the same in USA and Jordan, while 79% of nurses in Mayo study[11] said that they will write IR, 42% in our study reported that they will, and this is less than half and discord with the pre reported result regarding attitude where 59% of the nurses said that they will fill IR if they commit ME.

The third scenario was about rate error, too fast rate of infusion pump, in which the patient received TPN feeding via an infusion pump at 200 ml/h instead of the correct rate of 125 ml/h for the first 3 h of the 24-h infusion. The pump was reset to the correct rate after the change of shift at 7 AM when the oncoming nurse realized that the pump was set at the incorrect rate. less than Jordan study [46] 72% of nurses said that they consider it to be ME, while 84% in Jordan, this could be due to the nurses in Jordan study were CCU nurses, and IV medication is a very critical when it comes to their patients, while 95% of the nurses in USA [11] consider it to be ME, in our study, 78% of the nurses said they will notify the physician, while 57% said that they will fill IR.

The fourth scenario was an omission error again, this time results was different from the first omission error, the case presented was for a patient admitted with status asthmaticus on 08/13 at 2 AM is prescribed albuterol (ventolin) nebulizers every 4 h. The nurse omits the 6 AM dose on 08/13 as the patient is asleep. 62% of nurses consider it as ME, yet less than the first case study, 52% of nurses said that they will notify the physician and 46% said they will fill IR. Results are close to USA study [11], and more than Jordan study, that could be explained as nurses consider omission error is not serious as the patient's safety hadn't been compromised. But for our nurses difference could be explained due to the reality the nurses have their own judge on the case and they classify the error depending on the case not only on the ME definition.

The last scenario was A patient is receiving a routine 9 AM dose of digoxin every day.Yesterday's digoxin level was 1.8 (the high side of normal). A digoxin level was drawn at 6 AM today. At 9 AM the nurse holds the digoxin because the lab value is not available yet, when asking them to decide whether was it a ME or not, nurses split for 54% said it is ME, and 46% said it is not, while nurses in USA have a less split opinion as 76% consider it to be ME, on the opposite, most of the nurses in Jordan [46] didn't consider it to be ME, only 26.5% did. And 70% said they will notify the physician and 64% said they will fill IR.

From the five scenarios we can see that there wasn't strong agreement on the definition of ME, and although nurses said they know exactly what the definition of ME is, they split in identifying each case study if it is ME or not, and that assure the necessity of the hospitals to have a clear definition of ME, and in 3 of the five scenarios, less than half of the nurses said they will not report ME, and was striking that in the last case study, although 54% of the nurses didn't consider holding the dose as ME, 64% of them said they will report it in IR, which is could be explained that nurses are not sure when they should report ME, and what is the exact cases to be reported.

However, those cases studies mirrored the original classification and reporting attitude of the nurses regarding ME.

5.6 Limitations

This study had been conducted in the public hospitals; the private sector hadn't been studied, so this study can reflect better the situation in the governmental sector which is considered the major provider of healthcare services for Palestinian. In this study we used questionnaire which could be considered as not the most accurate method to identify the most common types of ME, yet using other methods like observation may cause the nurses to do their best to avoid committing ME in front of the researchers. Another issue is that additional types, causes and barriers to ME reporting may be unidentified in this survey. However, the most common from this study could be a starting point to give more attention and deal with the issues.

5.7 Conclusion

Because MEs are such a concern to the public health, healthcare organizations, and nurses themselves, this study was undertaken. Nurses perceived wrong time of administration of medication as the most common type of ME and this concurs with other studies, while the more serious types of MEs are of less frequent, any way we shouldn't ignore them. Heavy workload, and other personal factors were perceived to be the most leading causes for ME, and this is due to the shortage of the nurses, and due to the heavy request of the health services in the public hospitals. Reporting of ME is a crucial issue, most of the nurses said that they know what is the

exact definition of ME is, a gap had been identified between the nurse's perceived knowledge and their actual knowledge.

However, the knowledge gained from this study can contribute to educational programs that promote the recognition of MEs, and more researches should be conducted in participation with the nurses to find the best strategies to eliminate or minimize MEs.

5.8 Recommendations

Based on the findings of this study, we recommend the followings:

1- A unified clear definition of ME should be set by the healthcare managers in participation with the nurses.

2- Instructions of reporting ME should be set in the most comfortable way.

3- Factors that lead to ME, must be considered by policy makers and hospital managers to set policies and strategies to overcome those factors to build safer health care system.

4- As similar to other studies, no single or combination of nurse demographic characteristics were strongly associated with nurse attitude of reporting MEs. Thus, all nurses in an organization may need help in identifying what is a ME, when to report it, and to whom, in order to eliminate or minimize this public health issue.

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Appendices

Study Questionnaire:

تحية وبعد،،

دراسة مقطعية وصفية

الأخطاء الدوائية، آراء الممرضين حول أهم الأنواع، والعوامل ألمؤدية لهـا وسـلوك التبليغ في حالة وقوع خطأ دوائي

تعَرف الأخطاء الدوائية بأنها أي تغيير بطريقة إعطاء الدواء الموصـوف مـن قبـل الطبيب.

أو أنها أي خطأ يتعلق بالأدوية أو المحاليل الوريدية والتي قد تقع أثناء وصف الدواء أو صرفة، أو تحضيره أو توزيعه أو مرحلة إعطاءه للمريض.

تقسم الأخطاء الدوائية إلى قسمين: إما ارتكاب خطأ بإعطاء الدواء، أو إغفـال إعطـاء الدواء. وقد تكون أي من التالي:

إعطاء الدواء الخطأ، أو الجرعة الخطأ، أو المريض الخطأ، أو المكان الخطأ، أو الوقت الخطأ. وتصل نسبة هذه الأخطاء إلى ما يقارب 38%، معظمها يمكن الوقاية من وقوعه باتخاذ بعض الإجراءات البسيطة.

تهدف هذه الدراسة إلى التعرف على أكثر أنواع الأخطاء الدوائية شيوعا، التي يقوم بها الممرضين أثناء إعطاء الدواء للمرضى، وأهم الأسباب التي تؤدي لها، كما وتهدف إلى معرفة سلوك الممرضين عند وقوع مثل هذه الأخطاء في المستشفيات الحكومية فـي شـمال الضـفة الغربية، وقد تم اختياركم لتكونوا جزءاً من عينة الدراسة، لذا نأمل منكم الإجابـة بموضـوعية على أسئلة الاستبيان، بوضع إشارة على الإجابة التي ترونها مناسبة في المكان المخصص لها.

مؤكدين اقتصار استخدام المعلومات الواردة في هذه الاستبيان على أغـراض البحـث العلمي ، ومراعاة السرية التامة والحرية الكاملة بعدم الإجابة عن أية سؤال.

(شاكرين لكن حسن التعاون)

الباحثة / رنى الصروان

جامعة النجاح الوطنية

رقم الإستبيان ( )

الجزء الاول : انواع الاخطاء الدوائية:

الرجاء وضع اشارة X في مربع الاجابة الصحيحة:

من خلال خبرتك بالعمل في المستشفي، صنف الاخطاء الدوائية التالية حسب تكرار حـــدوثها بالمستشفى:

الخطأ الدوائي	تحدث غالبا	تحدث احيانا	تحدث نادرا	لا تحدث	لا اعلم
1- اعطاء الجرعة في الوقت غير المحدد لها (ساعة قبل او بعد الموعد المحدد)					
2- اغفال اعطاء الجرعة					
3- اعطاء الدواء بالوريد بمعدل أسرع\ أبطأ مما وصف الطبيب					
4- خطأ في طريقة اعطاء الدواء حسب التعليمـــات (push or slow)					
5- كمية الجرعة اقل\ اكثر مما وصف الطبيب					
6- خطأ في عدد الجرعات					
7- اعطاء دواء بتركيز خاطئ (حل الدواء بطريقة تخالف الموصوف)					
8- اعطاء دواء مختلف عن الدواء الموصوف					
9- اعطاء الدواء بطريقة خاطئة (في مكان غيـــر المكان المحدد).					
10-اعطاء الدواء للمريض الخطأ					
11-الطبيب وصف دواء خاطئ					

الجزء الثاني :هل تعتقداي أن أي من العوامل التالية تؤدي الى حدوث الاخطاء الدوائية:

العامل	موافق بشدة	موافق	غير موافق	غير موافق بشدة	لا اعرف
أ- العوامل المتعلقة بسوء التواصل بسبب الكتابة:					
1- عدم القدرة على قراءة التعليمات بسبب سوء خط الطبيب					
2- عدم تفسير تعليمات الطبيب بشكل صحيح.					
3- عدم فهم الاختصارات.					
4- التشابه بأسماء الادوية.					
5- التشابه بأسماء المرضى.					
6- خطأ بكتابة اسم او رقم المريض على الدواء.					
ب- العوامل المتعلقة بالأشخاص:					
1- التوتر .					
2- كثرة ضغط العمل .					
3- التعب.					
4- قلة النوم					
5- قلة المعرفة بالأدوية.					
6- خطأ بحساب الجرعة.					
7- عدم وجود المهارات اللازمة لإعطاء الدواء					
8- صعوبة التعامل بتركيب المحاليل و اعطاء الادوية بالوريد.					
9- اهمال شخصي					
ت- العوامل المتعلقة بالبيئة المحيطة:					
1- المقاطعة و التشتيت اثناء العمل من قبل شخص اخر.					
2-					
3- سوء التواصل بين الممرضين معا .					

العامل	موافق بشدة	موافق	غير موافق	غير موافق بشدة	لا اعرف
4- سوء التواصل بين الممرضين و الاطباء .					
5- عدم وجود طاقم كافي من التمريض.					
6- العمل مع ممرض \ ممرضة لا يملك الخبرة الكافية.					
7- عدم كفاية التدريب على اعطاء الدواء.					
8- عدم وجود تعليمات حول طريقة اعطاء الدواء داخل الاقسام					
9- الاضاءة غير كافية.					
10- وجود ازعاج بالقسم					

الجزء الثالث: سلوك الممرضين عند وقوع خطأ دوائي:

عند وقوع خطأ دوائي عادة أقوم بما يلي:	غالبا	احيانا	نادرا	لا افعل
1- أقوم بتعبئة تقرير بالحادث				
2- ابلغ عن الخطأ بطريقة كلامية				
3- لا أقوم بعمل شيئ				

الجزءالرابع المعوقات الرئيسية لعدم الإبلاغ عن الأخطاء الدوائية:

عند وقوع خطأ دوائي لا اقوم بالإبلاغ بسبب ما يلي:	نعم	لا
1- لأنني عادة غير متأكد من ماهية الخطأ الدوائي		
2- لأنني لا اعرف بالتأكيد متي يجب ان ابلغ عن الخطأ الدوائي عن طريق تقرير الحوادث		
3- بسبب الخوف من ردة فعل مدير/ة التمريض		
4- بسبب الخوف من ردة فعل الزملاء بالعمل		
5- لاعتقادي ان الخطأ الذي قمت به ليس خطير و لا يستدعي التبليغ عنه		
6- لأنني خفت من ان أتعرض لإجراءات تأديبية او حتى فقدان لعملي		

الجزء الخامس الرجاء اعطاءنا رأيك و طريقة تعاملك بمثل هذه الحالات:

مريض لم يعطى جرعة منتصف النهار من Ampicillin لأنه كان في قسم الاشعة لمدة 3 ساعات:		
	نعم	لا
برأيك هل هذا خطأ دوائيا؟		
هل تقوم بإعلام الطبيب؟		
هل تقوم بكتابة تقرير بالحادث؟		
4 مرضى في قسم الجراحة الذي كان مشغول جدا، تلقوا المضاد الحيوي بالوريد الموصوف لهم على الساعة 6 مساء بعد 4 ساعات من الموعد المحدد لاعطاءه		
برأيك هل هذا خطأ دوائيا؟		
هل تقوم بإعلام الطبيب؟		
هل تقوم بكتابة تقرير بالحادث؟		
مريض يأخذ TPN (تغذية كاملة بوسطة الوريد) اعطي الجرعة بمعدل 200 ملم\ للساعة بدل الجرعة الصحيحة الموصوفة له و هي بمعدل 125 ملم\ ساعة . للثلاث ساعات الاولى من جرعته المقررة ل 24 ساعة. المعدل تم تعديله للمعدل الصحيح عند تغيير الوردية الساعة 9 مساء، عندما لاحظ الممرض ان الدواء كان يعطى بمعدل غير صحيح (اسرع مما يجب).		
برأيك هل هذا خطأ دوائيا؟		
هل تقوم بإعلام الطبيب؟		
هل تقوم بكتابة تقرير بالحادث؟		
مريض ادخل المستشفى بحالة ازمة حادة يوم 8/13 الساعة 2 صباحا، وصف له تبخيرة فنتولين (*Ventolin*)كل 4 ساعات. الممرض اغفل جرعة الساعه 6 صباحا يوم 08/13 لان المريض كان نائما		
برأيك هل هذا خطأ دوائيا؟		
هل تقوم بإعلام الطبيب؟		
هل تقوم بكتابة تقرير بالحادث؟		
مريض يأخذ جرعة دايجوكسن (digoxin) الساعة 9 صباحا بشكل يومي. البارحة كان معدل digoxin 1.8 (الحافة العليا للجرعة الطبيعية) تم اخذ عينة لقياس digoxin الساعة 6 صباحا اليوم. الساعة 9 صباحا قام الممرضى بتعليق (ايقاف) اعطاء digoxin لان نتائج المختبر لم تصل بعد		
برأيك هل هذا خطأ دوائيا؟		
هل تقوم بإعلام الطبيب؟		
هل تقوم بكتابة تقرير بالحادث؟		

معلومات شخصية:

العمر

الجنس ذكر انثى

الحالة الاجتماعية متزوج أعزب مطلق أرمل

التحصيل العلمي دبلوم بكالوريوس ماجستير غير ذلك

عدد سنوات الخبرة بالعمل

عدد سنوات خبرة العمل بالمستشفيات

هل عملت سابقا بمستشفيات اخرى نعم لا

ما هو نوع المستشفيات التي عملت بها حكومية خاصة

القسم الذي تعمل به جراحة عامة باطنية نسائية و توليد أطفال

جراحة قلب الطوارئ عظام و اعصاب ICC/ICU

الوردية الذي تعمل به الصباحية النهارية الليلية غير محدد

Palestinian National Authority
Ministry of Health

السلطة الوطنية الفلسطينية
وزارة الصحة

Incident Report

Ward:.....

Date of incident...../...../.....Time:.....

Address:.....Phone number:.....

Age : ..... Sex :.....

Type of incident: .....

Details of incident:

.....

.....

.....

.....

Injury requires:
- ☐ Surgical Consult.
- ☐ Medical Consult.
- ☐ Hospitalization.

Name of Doctor on duty:.....
Signature : .....

Name of Injured Person: .....
Signature : .....

Signature and name of charged.....

جامعة النجاح الوطنية
كلية الدراسات العليا

الأخطاء الدوائية: أراء الممرضين والممرضات حول أكثر الأنواع انتشارا، العوامل المؤدية لها وسلوك التبليغ في المستشفيات الحكومية الفلسطينية

إعداد
رنى عبد الرزاق لطفي الصروان

إشراف
د. زاهر نزال

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

2014م

الأخطاء الدوائية: أراء الممرضين والممرضات حول أكثر الأنواع انتشارا، العوامل المؤدية لها وسلوك التبليغ في المستشفيات الحكومية الفلسطينية

إعداد

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الملخص

مقدمة: تعتبر الاخطاء الدوائية مشكله صحية لما لها من تأثير على المرضى بزيادة نسب الوفاة و المرض، و مشكلة للنظام الصحي لانها تزيد من الرعاية الطبية، و لها تأثير نفسي على مزودي الخدمات الصحية الذين يقومون بها من حيث ثقتهم بقدراتهم و قابليتهم كمزودي خدمة طبية. لذا الكثير من الاهتمام اعطي لهذه المشكله حول العالم مؤخرا.

الاساليب: هذه دراسة مقطعية وصفية، استطلاع رأي 340 و ممرضة في 6 مستشفيات حكومية بشمال الضفة العربية، قد قاموا بالإجابة على استبيان للرأي، مكون من 6 أجزاء تم تصميمه خصيصا لهذه الدراسة، و قد تم سؤال الممرضين حول أكثر أنواع الأخطاء الطبية انتشارا، و العوامل المسببة لها، و سلوك التبليغ و كتابة التقرير و المعيقات الرئيسية لعدم التبليغ.

النتائج: أظهرت النتائج أن عدم إعطاء الجرعة بالوقت المحدد لها هو أكثر الأنواع انتشار، و أن كثرة ضغط العمل هو السبب الرئيسي لحدوثها، و أن 22% من الممرضين و الممرضات لا يقوموا بالتبليغ عن الأخطاء تقرير بالحادث ولا يبلغوا عنه بطريقة كلامية، و 78% منهم يقوموا بالتبليغ بطريقة كلامية منهم 59% يقوموا بتعبئة تقرير بالحادث، و أظهرت الدراسة إن الممرضين و الممرضات الذين يعملون لمدة تزيد عن 5 سنوات يقومون بتعبة تقارير الحادث أكثر من الممرضين و الممرضات الذين عملوا لأقل من 5 سنوات، بينما كان الاعتقاد أن الخطأ الذي تم عمله ليس خطيرا ولا يستدعي التبليغ هو أكثر المعيقات لعدم التبليغ، و قد قال معظم الممرضين و الممرضات أنهم يعرفون ماهية الأخطاء الدوائية ومتى عليهم التبليغ عنها.

الخلاصة والتوصيات: تقع الاخطاء الدوائية بالمستشفيات الحكومية الفلسطينية، و الاسباب المتعلقة بالاشخاص بالاضافة الى قلة عدد الممرضين و الممرضات كانت اهم الاسباب المؤدية لها، المزيد من الجهود يجب ان تبذل لمنع الاخطاء من الوقوع.