Arab American University
Faculty of Graduate Studies

Obstetric safety and quality at Istishari Arab Hospital: Where are we now and how can we improve?

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This thesis was submitted in partial fulfillment of the requirement for the Master's degree in Quality Management

September / 2019

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This thesis was defended successfully on 30/9/2019 and approved by:

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Declaration

This thesis was submitted in partial fulfillment of the requirement for the Master's degree in Quality Management.

I declare that the content of this thesis (or any part of the same) has not been submitted for a higher degree to any other university or institution.

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Date: 30/ 9/2019

Dedication

I endow this thesis to

My Soul mate, my husband, my brother, and my friend Dr. Saed Hamdan

The firstman in my life, my dear father Mohammad Al Aref

The Algerian striver, my mother Mazonia Minshum

The support of my life, my sisters Haneen, Sherien, Wa’ad and Aisha

My second family, Dr. Ghassan and Dr. Hala Hamdan.

And to those who are honored in Palestine as their land.

Raneem Mohammad

Acknowledgment

Praise be to Allaah who has given me blessing, strength, opportunity, and endurance to complete a master's degree in quality management.

Words cannot express my sincere gratitude to the respected supervisor, Dr. Shahenaz Najjar, whose instructions, guidance, helpful correction, moral support, and advice helped narrow my way and guide me to the right path in completing this letter.

I am very grateful to the assistants: Sina’a and Riham, who devoted their time to help me accomplish this study.

I deeply thank my beloved family who supported me throughout my study to accomplish this research.

I am very thankful for Dr. Atef Rimawi and Dr. Yousef Al Mimi for granting me the approval.

Finally, I would like to thank everyone who supported me in this beautiful period.

Abstract

Introduction*:* A variety of global-level monitoring initiatives has recommended indicators for tracking progress in maternal and newborn health. Quality of care is increasingly recognized as a critical aspect of the maternal and newborn health, mainly with respect to care around labor and delivery and in the immediate postnatal period.

Objectives: This study is conducted to estimate the incidence of obstetric complications. Moreover, assessing the safety and quality of obstetrical procedures at Istishari Arab hospital in 2018. And, identifying the risk factors contributed to the adverse events in obstetric department.

Methods*:* A retrospective study depends on using inpatient hospital electronic medical records. Research carried out in the field of inquiry in the electronic database and related studies. Maternal morbidity and adverse outcomes were identified by using International Classification of Diseases, 10th-Revision (ICD-10-CM) diagnosis and procedure codes within the health information system. In addition to the paper files. Descriptive, univariate and multivariate analysis were done using SPSS.

Results: There were 418 women participated in this study with 62.2 % of them delivered by CS. The mean women age in this study was 27.8±4.8 years with about 58.1 % of them from Ramallah. After a multivariate analysis using logistic regression, our study found a positive correlation between educational level and prior CS on one side and surgical site infection on the other side with P-value <0.05. Also, our study has a positive association between rate of CS on one side and maternal age, diabetes, hypertension, and gynecological factors (prematurity, multiple gestation).

Conclusion*:* Increased rate of surgical site infection and other complications in patients with less education level or with a previous history of CS regardless of the number. Focusing on these factors and increase awareness and education, might support reducing obstetric complication in the future.

Keywords: Cesarean section, surgical site infection, obstetric, Palestine, Istishari Arab Hospital

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List of Acronyms and Abbreviations

AHRQ	**Agency for Healthcare Research and Quality**
BMI	**Body Mass Index**
CS	**Caesarean Section**
DM	**Diabetes Mellitus**
EMR	**Electronic Medical Records**
GDM	**Gestational Diabetes Mellitus**
HIS	**Health Information System**
HTN	**Hypertension**
IAH	**Istishari Arab Hospital**
ICU	**Intensive Care Unit**
IOM	**Institute of Medicine**
JCI	**Joint Commission International**
LGA	**Large of Gestational Age**
MDG	**Millennium Development Goals**
MOH	**Ministry of Health**
SDG	**Sustainable Development Goals**
SGA	**Small of Gestational Age**
SSI	**Surgical Site Infection**
UN	**United Nation**
WHO	**World Health Organization**
ID	**Identity Document**
AAUP	**Arab American University of Palestine**

Chapter 1

General introduction

"It may seem a strange principle to enunciate as the very first requirement in a hospital that it should do the sick no harm"

(Note on Hospitals, Florence Nightingale, 1863)

1.1 Introduction

Nowadays, the quality of health care has become an important policy issue worldwide. The *Institute of Medicine (IOM)* defines the quality of healthcare as: *"the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge"* [1]. The same Institute of Medicine captures in its report 'Crossing the Quality Chasm' the most important aspects for quality improvement by providing six specific aims/dimensions of quality. These aims are built around the core need for health care to be:

1. *"Safe:* avoiding injuries to patients from the care that is intended to help them.
2. *Effective*: avoiding underuse (when proven, evidence-based practices are not followed), misuse (failure to provide appropriate care or use of inappropriate care, including medical errors), and overuse (the provision of medical services with no benefit or for which harms outweigh benefits).
3. *Patient-centered*: providing care that is respectful of and responsive to individual patient preferences, needs, and values and ensuring that patient values guide all clinical decisions.
4. *Timely*: reducing waits and sometimes harmful delays for both those who receive and those who give care.
5. *Efficient*: avoiding waste, including waste of equipment, supplies, ideas, and energy.
6. *Equitable*: providing care that does not vary in quality because of personal characteristics such as gender, ethnicity, geographic location, and socioeconomic status."

To meet patients' needs the researcher have to achieve the optimal outcomes on each of these six aims. Clinicians and other health workers would need to work hard to achieve improving health and personal productivity, minimizing patient suffering from harm, and enhancing patient safety.

The recent research on the quality of care is directed to measure the quality of services in health care systems. As consumers, payers, and regulatory agencies there is a need to provide evidence on health care quality. Health care decision-makers need tools that will help them to assess the effects of health care program and policy choices and to guide future health care policymaking.

Patient safety is the first dimension/aim for the quality of healthcare. Charles Vincent defined patient safety as the avoidance, prevention, and amelioration of adverse outcomes or injuries stemming from the process of healthcare. The defining characteristics of patient safety imply that safety does not exist in a device, person or department, however, it emerges from the healthcare system interactions [2].Therefore, improving patient safety depends on understanding these interactions. In the following sections, the researcher elaborate more on patient safety and safety measurement.

1.2 Patient safety and safety measurement

Patient safety is a growing need because of the increasing complexity of the healthcare system. Every day the researcher face a series of tragic harm to patients that point out the need to make healthcare safer. The impact of the problem is large, with many thousands of people being harmed worldwide and a huge amount of money being wasted due to unsafe medical care [3].

In late 1999, the IOM's report 'To Err is Human: Building a Safer Health Care System' put safety further in focus for researchers and healthcare policymakers. Based on Harvard Medical Practice Study (1991) studies, the IOM authors came up with the estimate that 44.000 to 99.000 Americans died each year from medical errors. This report generated remarkable public and media attention worldwide and set a stage for a novel effort to improve patient safety. Patient harm and death are not the only consequences of unsafe healthcare. There is a growing body of evidence that shows that unsafe healthcare also results in lost productivity, prolonged hospital stays, and disability, all of these being costly for society [1].

According to WHO [4] and in low-income and middle-income countries, unsafe health practices lead to 134 million adverse events per year that are accounting to 2·6 million unnecessary deaths including misdiagnosis, hospital-acquired infections, and medical errors adverse events. Up to 80% of adverse events are preventable medical accidents. "One *in ten patients suffer an injury while receiving health care, and 15% of all hospital expenses are incurred as a result of treating failures in patient safety"* [4]. Wilson et al. reported that

8.2% of hospitalized patients experienced adverse events across eight developing countries, ranging from 2.5% to 18.4% [5].

Regarding the costs associated with hospital adverse events Medicare estimated $324 million in October 2008. Costs associated with preventable events accounted for an estimated $119 million of the $324 million additional costs, equating to 1.3 percent of the $9.2 billion Medicare inpatient expenditures for the month or about $1.8 billion annually [6]. In the Netherlands, Hoonh Bout et al reported that the annual direct costs were estimated at a total of 355 million Euros for all adverse events and 161 million Euros for preventable adverse events [7].

In general, given the recent worldwide transformations in healthcare systems, many initiatives can be implemented to protect patients from avoidable harm, improve the quality of healthcare, and reduce personal and organizational healthcare costs.

Measuring the level of safety and identifying the factors that influenced patient safety is critical to enhancing improvement. Safety is the responsibility of everyone working in the health system. It is not the only responsibility of clinicians but also the organizational responsibility. “You cannot manage what you cannot measure” is certainly a familiar management mantra [1]. Studying the magnitude of patient safety, identifying factors associated with adverse events, learning from mistakes, are essential to start and support improvement efforts based on scientific findings.

Understanding errors is crucial to design initiatives that will prevent and reduce system errors from happing. Safety literature defines an error as “an act of commission (doing something wrong) or omission (failing to do the right thing) leading to an undesirable

outcome or significant potential (they are often not linked to the injury of the patient) for such an outcome" [8]. However, events of harm are clearly clinical outcomes; they are particularly likely to engage both clinicians and administrators in a thorough review of the system factors that led to the adverse event causing this harm, with a clear focus on improving patient outcomes [9]. In our study we focus on the identification of patient harm or injury that was defined as "an unintended physical injury resulting from or contributed to by medical care that requires additional monitoring, treatment or hospitalization, or that results in death" [9].

To assess the patient safety level, different methods can be used to estimate the indicators of patient safety. Each method has advantages and disadvantages. Thomas and Peterson described different methods and the advantages and disadvantages (see table 1) [10]. According to them the best way to estimate the rate of adverse events depends on the question being addressed, the context of the study and the resources available. For most questions, review of records is seen as the most reliable and feasible method.

Study method	Advantages	Disadvantages
Records review/chart review	• Uses readily available data • Commonly used	Judgments about adverse events not reliable Medical records are incomplete Hindsight bias Labor intensive
Administrative data analysis	• Uses readily available data • Inexpensive	May rely upon incomplete and inaccurate data (coding accuracy) The data are divorced from clinical context (administrative and financial database) Diagnoses are not dated or time stamped
Review of electronic medical record	• Inexpensive after initial investment • Monitors in real time • Integrates multiple data sources	Susceptible to programming and/or data entry errors Expensive to implement Not good for detecting latent errors
Observation of patient care	• Potentially accurate and precise	Time consuming and expensive Difficult to train reliable observers

	• Provides data otherwise unavailable • Detects more active errors than other methods	Potential concerns about confidentiality Possible to be overwhelmed with information
Clinical surveillance	• Potentially accurate and precise for adverse events	Time consuming and expensive

Table 1: Methods of measuring errors and adverse events [10]

1.3 **Obstetrics quality and safety**

Maternal health and wellbeing is a global health priority. It had been an integral part of the Millennium Development Goals (MDGs) and has continued to be a fundamental part of the Sustainable Development Goals (SDGs) that were adopted by more than 150 leaders from around the globe [11].

The number of women with cesarean sections is growing rapidly in both developed and developing countries. Concerns have been expressed about these increasing rates of delivery in this way, although they are safe and may reduce maternal and infant morbidity and mortality, but remain a major surgical procedure with serious implications for maternal and child health [12].Number of studies have been undertaken on this subject, particularly in countries with rapid demographic and health transitions, such as those in South America, where the rate of cesarean sections is very high compared with those in developed societies

[13].Caesarean deliveries require the use of more medical and health care resources than natural births, making it a real burden on health systems with limited budgets [14].

The international healthcare community and the World Health Organization (WHO) in 1985 recommended, that the rate of C-section not to exceed “5% to 15%"of total deliveries and according to the medical necessity [15]. This high rate can be of true concern given the higher risk of maternal morbidity and mortality associated with cesarean deliveries. Villar and his colleagues found a significant association between cesarean delivery and length of hospital stay (more than 7 days), postpartum hemorrhage and admission intensive care units (ICU) admissions [16].

The childbirth accounts for the largest category of hospital admissions and as a result, the quality of the health institutions and hospitals serving these populations are of special importance as they are directly related to the maternal as well as the neonatal outcomes [17]. Maternal health issues, mainly childbirth safety and unintended complications that are caused by health care management rather than the patient’s disease, represent recently a significant challenge in healthcare. The labor and delivery are the most common causes of hospitalization worldwide [18,19,20]. During childbirth, potential adverse events may arise and this can have an effect not only on the mother but also on the baby. Moreover, these adverse events or complications have a direct effect on the healthcare costs due to in-patients’ disability, death or prolong hospitalization [21].

Adverse outcomes and complications can take place during or after childbirth regardless of the type of delivery. Most of the maternal morbidities and costs related to medical management are:

1. Cesarean section wound infection
2. 3rd and 4th degree of laceration due to vaginal delivery (with or without instrument)
3. Neonatal injury

Obstetric complications found to be a global issue. About 9% to 13% of mothers have suffered from complications related to labor and delivery [22, 23, 24] .A study was conducted in Canada in 2006 reported that up to 87% of obstetric harms are preventable [25]. According to the latest data from 150 countries, 18.6% of all births occur by CS, ranging from 6% to 27.2% in the least and most developed regions. Latin America and the Caribbean have the highest rates (40.5%), followed by North America (32.3%), Oceania (31.1%), Europe (25%), Asia (19.2%) and Africa (7.3%). Based on data, trend analysis showed that between 1990 and 2014, the global average CS rate increased by 12.4% with an average annual rate of 4.4% [26].The largest absolute increases occurred in Latin America and the Caribbean by 19.4%, followed by Asia (15.1%), Oceania (14.1%), Europe (13.8%), North America (10%) and Africa (4.5%). Asia and North America regions had the highest and lowest annual increase rate (6.4% and 1.6%, respectively) [27].

Most of the maternal morbidities and complications that are related to medical management of Cesarean section (CS) wound infection (surgical site infections (SSI)) and 3rd and 4th degree of laceration due to vaginal delivery (with or without instrument). Surgical site infections after CS are preventable complications but impose a significant burden in terms of patient morbidity and mortality and increase the cost of treatment [28]. Patients with SSIs are likely to spend up to 60% of their time in the intensive care unit, are admitted to hospital

again and are more likely to die compared to patients with no infections at the surgical site, especially in the postpartum period [29].

Looking at the factors associated with the SSI, the number of cesarean deliveries can lead to an infection rate of more than 55%. They play a role in infection, especially since surgical site infections (SSIs) are infections that occur at or near a surgical incision within 30 days of the operation or after one year or more if the examination is not well [30]. In 2013 a study was done in England, showed an increased risk of infection was associated with high Body Mass Index (BMI), tobacco consumption, chronic hypertension, diabetes and increased white blood cells. In Cuba 2014, the main factor associated with increased risk for infection was anemia followed by hypertension. However, in Mexico, diabetes, hypertension, and immune thrombocytopenia were associated with infection in 6.9%, 4.1%, and 1.3%, respectively [30].

Regarding the pregnancy-related deaths, previous studies proved that several interventions can be done that are directly associated with the provider (clinical care), the system (functioning of the health care system) and the patient herself (accessibility to health care facilities or the compliance to the treatment [31]. Internationally, many strategies have been implemented by the institutions and by the governments to reduce the maternal mortality rates and to improve the health care systems [32].

1.3.1 **Quality measurement in the obstetric department**

To assess the quality of healthcare in the obstetric department, several indicators can be used. Cesarean section rates (the process) and the size of the unit are widely used and are considered among the most important indicators to be measured [33]. Draycott et al stated that the measurement of quality of care should move away from emphasizing the process (Cesarean sections for example) towards the health outcomes and patients' experiences as they are direct measures of quality and are the issues that concern the patient as a health care service receiver [34] . In other words, poor outcomes reflect poor process and should alert the decision-makers to check for their process in depth. Collins et al suggested that the process measures should be implemented altogether with the other clinical indicators to get highly valuable insight into the hospital, or other health care providers' service [35].

Among the earliest clinical indicators, maternal mortality rate is one of the quality measurement indicators that is still an important indicator and is used as a tool for national and international comparisons [36]. Many other national organizations have developed their indicators, as you see below [37]:

Joint commission on accreditation of healthcare organizations

- Vaginal birth after cesarean section for patients with previous cesarean section
- Inpatient neonatal mortality
- Third- or fourth-degree perinatal lacerations.

Maryland hospital quality indicator project

- Cesarean section rates
- Readmission rates

National Perinatal Information Center

- Cesarean section rates
- Vaginal birth after cesarean section rate
- The operative vaginal delivery rate
- Uterine rupture
- Length of stay
- Readmission rate
- Obstetrical quality measures—birth trauma

The health care systems were asked for more transparency regarding their performance as the Institute of Medicine has called for making the results available for the public and professionals, many organizations adopted this challenge [38].

The study reported that 43% of the deliveries experienced obstetric complications/maternal morbidity.The most common complications associated with maternal morbidity were third and fourth-degrees lacerations (5%) followed by cervical lacerations and pelvic trauma (38%) according to the same study [39].

Cesarean delivery has a special concern as the rate has increased dramatically worldwide over the past century. For example, the cesarean delivery rate in the United States rose from 4.5% in 1965 to 33% in 2009 [40,41]. This is attributed to the decrease in the rate of vaginal delivery after cesarean delivery and the increase in the rates of primary cesarean delivery [42] .Jeffery et al mentioned some points that might help to reduce the rate of cesarean delivery such as: avoiding non-medical indications and avoiding amniotomies [42].

US cesarean delivery rates rose dramatically from 4.5% in 1965, when measured for the first time, to 32% in 2007. This proportion continues to increase due to the increased prevalence of diseases associated with the risk of cesarean delivery (advanced age of the mother, obesity, multiple pregnancies, diabetes and high blood pressure/preeclampsia). According to the study, there is no relationship between the increase in the rate of Cesarean rate and the reduction of the mortality rate for both mothers and newborn children [43].

Operative vaginal delivery, using either vacuum or forceps, is considered an alternative to cesarean delivery in case of maternal medical benefit from shortening the second stage of delivery or maternal exhaustion [44, 45]. However, despite its benefits, operative vaginal delivery is associated with both maternal and neonatal adverse outcomes [44]. Friedman et al reported that operative vaginal delivery, as well as shoulder dystocia, are directly related to increased risk of third- and fourth-degree vaginal tears and their consequences such as persistent anal sphincter defects and as a result urgency and incontinence[45] .

In the United States, the trends of operative vaginal delivery have declined according to one study between the years 2005 and 2013 [46]. The use of vacuum has declined from 5.8% in

2005 to 4.1% in 2013, and the forceps use declined from 1.4% in 2005 to 0.9% in 2013 [46,47]. The third and fourth vaginal lacerations are considered as patient safety indicators by the Agency for Healthcare Research and Quality [48] as well as quality measure indicator [46-47].

As known, maternal care outcomes should be tracked and used for quality improvement purposes. Nationally recognized organizations have adopted some maternity-care measures. The measurement and results process serves as a basis for these improvements, which enable organizations to evaluate their performance, as well as to compare them with the performance of other similar enterprises. Using evidence-based protocols, reminders and checklists can facilitate standardized care processes that can improve outcomes [49].

The study will contribute to the limited literature on this topic in Palestine. Moreover, it will raise the awareness of obstetric safety, inform policymakers to improve services, initiate interventions and allocate resources for enhancing safety and quality.

Problem statement

The Palestinian Ministry of Health (MoH) started 1994, had relatively limited resources. The MoH has made a significant improvement in several areas. However, the health information system and quality of the data are still an area that needs strengthening. All health system levels, public, and private (profit and non-profit) hospitals lack adequate, reliable and timely data. Most of the existing incident reporting data are related to non-direct care events and are very limited regarding patient safety. Classen states that the identification and measurement of adverse medical events are central to patient safety. It constitutes a

foundation for accountability, to prioritize problems to work on and to generate ideas for safer care and for testing which interventions work [50].

According to the 2017 annual health record of Palestinian Ministry of Health, childbirth rates reported in Palestine were 136,349 of which 78,046 were born in West Bank, as 57.2% of all births and 58,303 in Gaza Strip, which 42.8% of all reported births in 2017. The percentage of home births in Palestine (2017) was only 0.1% of the total number of births. According to the Palestinian Ministry of Health, 60% of total patients in private hospitals (2017) were C-sections [51]. These statistics showed an impression of the importance of delivery and its related complication. Several articles have been published worldwide on obstetric safety and quality. Unfortunately, there are no studies related to this subject in the West Bank Palestine.

Study objectives

The study aims to estimate the incidence and type of obstetric complications as well as assessing the safety and quality of obstetrical procedures among women who delivered at Istishari Arab hospital in 2018 using the hospital electronic medical records.

Specific Objectives:

1. Estimate the rate of 3rd and 4th-degree laceration after:
    - Vaginal delivery with the assessed instrument
    - Vaginal delivery without instrument
2. Estimate the rate of cesarean section (CS) delivery
3. Estimate the rate of surgical site infection (SSI) after CS

4. Estimate the rate of maternal readmission within 48 hours due to SSI
5. Determine the socio-demographic characteristics of mother harm during delivery
6. Determine the clinical profile of mother and child

The following chapter discusses the study design and methodology which the researcher used for the study.

Chapter 2

Methodology and study design

Methodology and study design

2.1 Research Strategy: Hospital selection, study setting and data collection

To measure maternal safety within IAH the researcher reviewed retrospectively all birth and women electronic medical records in 2018. Birth records provided users with information about the number of natural, Caesarean deliveries and general information about the patient such as age, date of birth, place of residence, educational attainment, etc. Most of the women's electronic files were consulted for information about disease history and some missing information in the paper record. Moreover, we made interviews with doctors and midwives at the hospital to clarify missing data and understand complicated concepts.

2.1.1 Hospital selection motivation

The IAH Hospital is the largest private hospital in the West Bank ,which was established aiming to serve Palestinian community and to be the alternative referral hospital in West Bank and dispense with the transfer of cases to Israel. It is a general hospital with different departments and specialties that provides good quality services to the public. Cases are referred from all hospitals in the West Bank and Gaza Strip, especially in the field of obstetrics and gynecology.

Recently, IAH decides to work on getting the Joint Commission International (JCI) certificate. Getting the JCI has to improve patient safety and quality of health care through the provision of education, publications, advisory services, international accreditation, and certification. For this purpose, standards are developed in each period to include the best international standards from the conditions or requirements of the certificate. The JCI certified hospitals are a global recognition that the hospital or health facility offers strict

standards of care and solutions to achieve the highest possible performance in place [52].Measurements of quality and patient safety and providing a continues baseline data are important requirements to get the JCI certificate. In addition to initiating interventions to improve the provided healthcare services. An assessment of the obstetric safety level will help in identifying areas that are more challenging than others.

2.1.2 Study Area/Setting:

The study was conducted in the labor section of Istishari Arab Hospital. IAH began working in 2016 with an operational capacity amounted to 100 beds as an initial operational phase. Operational capacity is 230 beds now and it will be followed by a gradual run to a larger number of beds, bringing the total number of hospital's operating beds to 330 beds. The hospital contains 12 medical departments as follows: general surgery, internal medicine, cardiology, and cardiac surgery, obstetrics and gynecology, orthopedic surgery, intensive care, cardiac care, neurosurgery, pediatric and pediatric ICU, oncology. In addition to sub-specialties such as maxillofacial surgery and thoracic diseases, endocrine, outpatient clinics, radiology and laboratory, and administrative departments. The department contains the labor department and the postpartum. The labor department has three rooms equipped for natural deliveries or can be prepared if it is determined to be a Caesarean. In addition to the nurses and 6 doctors, there are 7 legal midwives, 6 qualified midwives.

2.1.3 Data collection methods

The study is descriptive study on the current perspectives of quality of obstetric health care in Palestine. To address the goals of this study, the researcher employed a multi-method research strategy that supports the nature of the research. The overall study design, data collection methods, and data analysis activities used to collect sufficient data to meet the objectives mentioned before.

Preliminary Activities

To justify and initiate the study:

- Conducted a literature review on tools for assessment of quality and safety of obstetrics services and the selection of criteria already used. The review provided support for the selection of indicators used in the study. The researcher reviewed the international formal published literature regarding obstetrics quality assessment in other countries like the USA, Belgium, Scotland, and the UK. The researcher also made a review containing formal published and unpublished literature (grey literature) regarding the quality assessment of obstetrics departments in Palestine. The result of the literature study allowed us to define our indicators and to set the design of the data collection forms (Appendices A) for study.

- The reviewed documents were collected from different sources:
    - Pub Med: this source is used to search the International published literature. We used keywords like Caesarean section, normal delivery, expected complications after birth, postpartum infection, quality, quality assessment in Palestine.

- International sources: international obstetrics indicators reports and the recommendation over the use of indicators.
- National sources: national health and statistical reports, health activity reports for the government, and grey literature from documentation sections:
    - The Ministry of Health (MOH)
    - The Palestinian Central Bureau of Statistics
    - Information from the archive section
- Face to face interviews with the midwives, infection prevention and control officer, quality supervisors at the hospital. A semi-structured interview was used to ensure that each interviewee is presented with the same questions in the same order; the questions are developed in advance (see appendix B). The interview was conducted between Jan 2018- Jun 2018 the interviews in this phase took on average 20 minutes.

The managers showed interest in the project and they gave us the opportunity to implement our research at the hospital. Being a new topic at our hospital, we introduced and illustrated an overview of the objectives of our study to the interviewed managers.

2.2 Study Design

Our study is a descriptive study used to “describe” the quality and safety level of obstetric services in IAH hospital. Descriptive studies attempt to gather quantifiable information that can be used to statistically analyze a target audience or a particular subject. It is usually used to observe and describe a research subject or problem without influencing or manipulating

the variables in any way [53]. Hence, these studies are really correlational or observational, and not truly experimental.

2.2.1 Sample Size

All women were taken in the labor and delivery department for the year 2018 from 1/1/2018 to 31/12/2018. We selected all-natural and cesarean deliveries during that period. The total was about 418 patients. The cases were verified through a paper-based midwife register where each case was recorded with all the relevant information.

2.2.2 Data collection measurements

Data collection is an important step towards answering our main research question; and its sub-questions. Multiple methods of data collection have been used to answer this question.

A retrospective review of electronic medical records (EMR) was done. EMR is the digital equivalent of paper records or patient charts. An electronic medical record includes information about a patient’s health history, such as diagnoses, medicines, tests, allergies, immunizations, and treatment plans.

Implementation of HIS system was introduced since 2011 in Palestine [54]. The IHA hospital implemented the health information system since the beginning of February 2016. It consists of a patient's medical history and has a unified database. To ensure a better quality of the data, specialized staff within the IAH hospital are conducting continues internal audits to control the content and the completeness, validity, and reliability of the collected data.

Where the information is written by doctors and nurses from the moment of entry to the moment of exit. The patient has the right to get a copy of the report and the information kept in his/her records. In addition to the electronic record, there is a paper record containing the patient's entire file as a backup type.

Data collection indicators

The Agency for Healthcare Research and Quality (AHRQ) developed a list of obstetric patient safety indicators to assess maternal morbidity associated with obstetrical care. The first four indicators listed below are the rates of obstetric injury (third- and fourth-degree lacerations, cesarean section and surgical site infection after CS) after instrument-assisted vaginal delivery, spontaneous vaginal delivery, and cesarean delivery [48]. Moreover, there is one more indicator of neonate injury during delivery and one on maternal readmission within 48 hours due to SSI. The validity of these patient safety indicators has been established before through the AHRQ [48].

Based on the literature, the researcher identified 6 adverse outcomes (patient harm) that can be coded based on HIS dataset. Four of these outcomes apply to obstetric discharges:

1. 3rd and 4th-degree lacerations for vaginal delivery(with or without instrument)
2. Cesarean section delivery
3. Surgical site infection after C-Section
4. Maternal readmission within 48 hours due to SSI.

Adapting the selected indicators to the Palestinian hospitals

Indicator sets were evaluated, reviewed and adapted for applicability to the Palestinian situation. Some terms and notes were added in indicator definitions to explain the used terms and the exclusion criteria. For example, in the terms part of the "management of labor" domain, the researcher have added that:

- Multiple deliveries count as a single birth
- Multiple deliveries that involve both vaginal delivery and C-section are considered to be C-sections.

All the data that could be taken from the EMR were reviewed but some information did not exist such as weight of the pregnant woman, education, employment and city. Most of the missing information was taken from the paperwork record of midwives. The following variables were collected from patients' records:

- Length of stay (LOS)
- Time of delivery (start and end time)
- Maternal age
- Maternal medical conditions (eg. Diabetes mellitus, hypertensive, obesity)
- Obstetrical history (eg. Number of deliveries, Prior cesarean, Number of CS)
- Present Obstetrical complications (eg. Multiple gestations, premature labor with delivery, excessive fetal growth)
- Type of medication (Antibiotic prophylaxis versus no prophylaxis ……..)

- Epidural for vaginal deliveries

Medical records review

The data was extracted from the eligible files. Eligibility was assessed based on:

- Medical records from inpatients, with at least a 24-hour length of stay.
- Their records were administratively complete and included a complete discharge summary.

The data collection team composed of three persons: two experienced nurses and a physician. The team members were selected based on their interest and experience especially their relevant clinical experience, their experience on medical record review, their availability, and adequate knowledge of English as it is the language of the medical records. Several meetings were done with the team to familiarize them with the data collection. To validate the quality of our collected data comparison between EMR and paper files results was done.

2.3 Data management and analysis plan

Data were extracted from all inpatient obstetric hospital charts from IAH Hospital. The selected records included inpatients admitted to IAH hospitals between January 2018 and December 2018. In line with the aim of our research questions, descriptive statistics were calculated based on the underlying negative event/outcome (3rd and 4th-degree lacerations for a vaginal delivery with/without the instrument, cesarean section delivery, surgical site

infection after C-Section, maternal readmission within 48 hours due to SSI). The results summarize the patient sample characteristics, complications, and adverse events (AE) rate and AE type in the obstetrics department. Univariate and multivariate analysis (logistic regression) was conducted to detect the associations between the patients' demographic factors, medical factors and safety outcomes of the obstetric department. Data entry, cleaning, and analysis were done using IBM SPSS version 23.0 (SPSS Inc., Chicago, IL, USA).

2.4 Ethical considerations

Informed consent is not applicable, as this is a retrospective chart review study. Privacy and confidentially was completely protected, No identifiers or personal information was collected or stored including participants' name, ID's and others. Approval to use HIS data was taken from responsible authorities at IAH hospital and AAUP.

The following chapter presents the results of our study.

Chapter 3

Results

Where are we now?

Results

This chapter presents the analysis of the data collected to identify and assess the safety and quality of care at the gynecological department and other factors including demographic, medical history, and maternal were analyzed too.

First, this chapter presents the descriptive results part, then univariate analysis to detect the relationship between variables and safety outcomes (ex. CS and SSI). Finally, a multivariate analysis using logistic regression is presented in this chapter.

3.1 Demographic characteristics of the women

Out of 418 total sample, the majority of women 247(59.1%) were from Ramallah city, followed by women from Jericho 40 (9.6%) and Hebron 40 (9.6%). Very few women were from Qalqelia, Tubas and Gaza (3 (0.7%), 2 (0.5%), and 1(0.2%) respectively). For more details follow table2.

All Women were married and the average age of women participated was 27.8±4.8 years old and ranged between 17 to 42 years old and most (67%) of them between 25to 35 years old. Regarding women education level and work, most of women had bachelor degree education but most of them (71.1%) were not working and only 28.9 were working. For more details see table 2 and figure 1.

Table 2: Demographic characteristics of women

Variable		Frequency	Percent
Residency	Ramallah	247	59.1
	Hebron	40	9.6
	Jericho	40	9.6
	Nablus	29	6.9
	Jerusalem	23	5.5
	Tulkarem	11	2.6
	Jenin	8	1.9
	Salfit	8	1.9
	Bethlehem	6	1.4
	Qalqilia	3	.7
	Tubas	2	.5
	Gaza	1	.2
Maternal age (years)	**Mean**= 27.8	**Min**=17	**Max**= 42
Work	No	297	71.1
	Yes	121	28.9
Educational level	Elementary	4	1.0
	Secondary	100	23.9
	Diploma	17	4.1
	Bachelor	276	66.0
	Master	21	5.0

The following histogram (figure 2) presents the distribution of mothers' age. Most of them were between the age of 25 years and 35 years. Very few cases were below the age of 20 years or above the age of 40 years. For more details see figure 1.

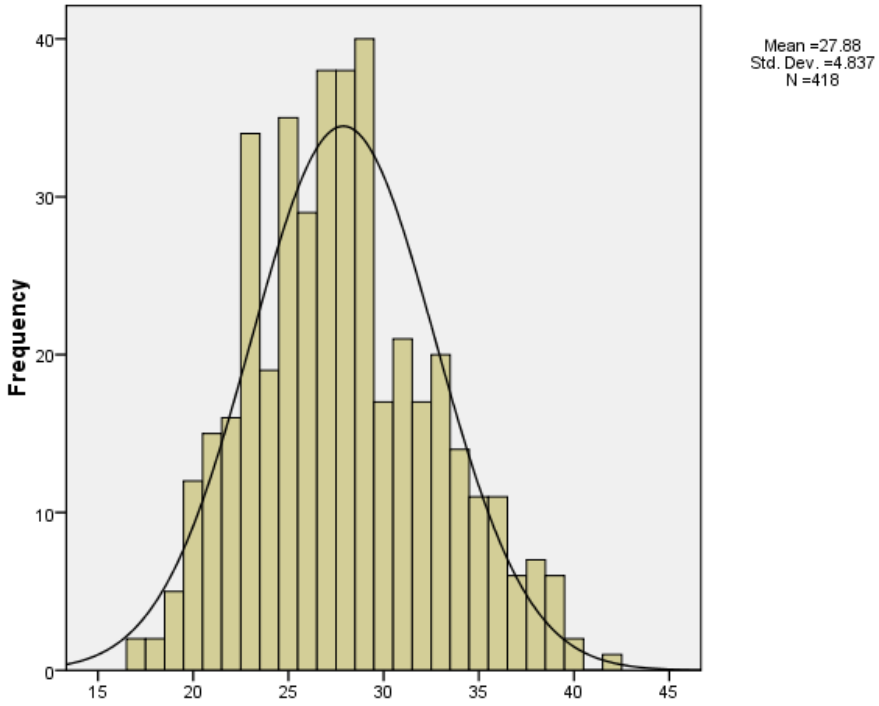


Figure 1: Histogram presents the participants maternal age distribution

Although most mothers are educated and more than 70 percent of them have bachelor's degrees or more, most of them do not work, especially among mothers who have a diploma or less. On the other hand, most working mothers have had a bachelor's degree or more. For more details see figure 2.

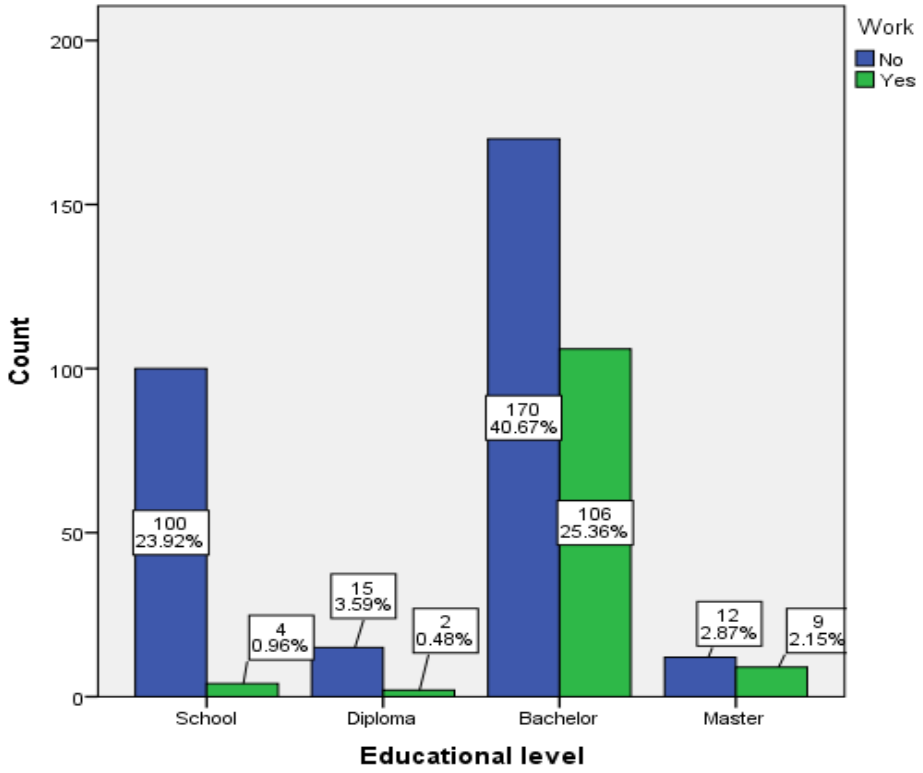


Figure 2: The distribution of level of education and working status among mother.

3.2 Obstetrics complications and outcomes findings (univariate analysis)

3.2.1 Cesarean section (CS) findings

Two hundred sixty 62.2% (260) of the women in this study delivered through CS and almost 38% delivered by normal vaginal delivery. In terms of maternal history, 13.6% of the women had a multiple gestations, and approximately 65% of our studied population had a previous one birth.

As for premature labor, 25% of women were exposed to that experience. Assisted vaginal birth with instrument was not exceeding 2% of the total number of birth, while vaginal

childbirth using epidural was almost 11%. Nearly 74% of women did not undergo a previous caesarean section operation. For more details see table 3.

Table 3: Gynecological history of mothers

		Frequency	Percent
Multiple gestation	No	358	85.6
	Yes	57	13.6
Number of deliveries	0	150	35.9
	1	123	29.4
	2	82	19.6
	3	37	8.9
	4	14	3.3
	5	5	1.2
	6	6	1.4
	7	1	.2
Premature labor with delivery	No	313	74.9
	Yes	105	25.1
Type of delivery	CS	260	62.2
	Normal	158	37.8
Epidural for vaginal deliveries	No	373	89.2
	Yes	45	10.8
Vaginal delivery with instrument	No	409	97.8
	Yes	9	2.2
Prior cesarean section	No	159	38.0

	Yes	259	62.0
Number of CS	0	308	73.7
	1	72	17.2
	2	28	6.7
	3	7	1.7
	4	1	.2

Regarding the medical profile of recruited women, most women did not have diabetes or high blood pressure. Only 2.4% and 3.6% of women had a history of diabetes and hypertension respectively. For more details see table 4.

Table 4: Medical history

		Frequency	**Percent**
Diabetes mellitus	No	407	97.4
	Yes	10	2.4
Hypertension	No	402	96.2
	Yes	15	3.6

3.2.2 Other complications findings

With regards to other complications and outcomes**,** the prevalence of surgical site infection was almost 2%, third to fourth laceration was 15%, and readmission was 2%. The length of stay varies between women. Most of women (97.8%) stayed less than three days in hospital, 1.7% of them stayed 3 days in hospital and only one woman (0.2%) stayed 7 days in hospital.

The prevalence of large for gestational age) baby weight more than 4000 g) was 13.2 %. For more details see table 5.

Table 5: Complications

		Frequency	Percent
Surgical site infection	No	410	98.1
	Yes	8	1.9
3rd or 4th degree lacerations	No	354	84.7
	Yes	63	15.1
Readmission within 48 hours	No	410	98.1
	After 9 Days	8	1.9
Length of stay	1	161	38.5
	2	248	59.3
	3	7	1.7
	12	1	.2
Large of Gestation Age (LGA).	No	361	86.4
	Yes	55	13.2

3.3 Bivariate and multivariate analysis: Cesarean section and surgical site infection

To quantify the patient's characteristics and its effect on quality outcomes (surgical site infections), Bivariate analysis was carried out. Then, multivariate analysis was conducted with the covariates. Significance level was considered on the level *P*-value < 0.05.

3.3.1 Bivariate analysis

Cesarean section and women demographic, medical history and gynecological variables

Two hundred sixty (62.2%) of the women participated in this study delivered through CS. By analyzing the relationship between demographic variables and previous medical history with cesarean delivery, the researcher found the coming results. Maternal age, diabetes and hypertension variables had positive statistical significant correlation with cesarean section. The educational level had negative statistical significant correlation with cesarean section. Other demographic variables (residency and work) have no statistical significant correlation with cesarean section. For more details see table 6.

Table 6: Correlations of women demographic and medical history variables with cesarean section by Bivariate analysis

Variable		Maternal Age	Residency	Educational Level	Work	DM	HTN
Cesarean section	**Correlation coefficient**	.179**	-.048	-.098*	-.007	.124*	.099*
	P value	**< .001**	.291	.045	.879	**.012**	**.043**
	Total	418	418	418	418	417	417

DM: Diabetes mellitus; **HTN**: Hypertension; **CS**: Cesarean section

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Moreover, positive statistical correlations (P-value < 0.05) were found between cesarean delivery and some gynecological factors as; number of cesarean section, prior Cesarean

section, multiple gestation, and premature labor. On the other hand, other gynecological variables (ex. number of deliveries) have no statistical significant correlation with cesarean section. For more details see table 7.

Table 7: Correlations of women gynecological variables with cesarean section by Bivariate analysis

Variable		Number of deliveries	Number of CS	Prior CS	Multiple gestation	Premature labor
Cesarean section	**Correlation coefficient**	-.007	.427**	.995**	.282**	.252**
	P value	.882	**<.001**	**<.001**	**<.001**	**<.001**
	Total	418	416	418	415	418

CS: Cesarean section

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Surgical site infection and women demographic, medical history and gynecological variables

At the Bivariate level, the associations revealed that educational level of mothers had a statistical significance relationship with surgical site infection (r= 0.14, *p*= 0.004). Other demographic variable had no any statistical significance relationship with surgical site infection.

Regarding the gynecological variables of mothers (number of cesarean and prior cesarean) had a statistical significance relationship with surgical site infection(r= 0.10, p= 0.04 & r=0.10, p= 0.025 respectively). Other gynecological variable had no any statistical

significance relationship with surgical site infection. Moreover, medical history variables had neither statistical significance nor correlation with surgical site infection ($p > 0.05$).

By looking to the educational level of mothers, the researcher found a statistical significance relationship with surgical site infection; the occurrence of surgical site infection was highest among diploma and school age (14.8%) comparing with bachelor and master degree (1.1%).

Although other demographic variables had no any statistic significance relation with surgical site infection, but the occurrence of surgical site infection was higher among non-working (2.4% vs 0.8%), or resident in Tulkarm area (18.2%)

Regarding medical history, the occurrence of surgical site infection was higher among non-diabetic women (2.0% vs 0.0%), and non-hypertensive women (2.0% vs 0.0%). For more details see table 8.

Table 8: Demographic variable & medical history of women with surgical site infection by Bivariate analysis

		Surgical Site Infection		**%**	X^2	***P***
		No	**Yes**			
Residency	Ramallah	243 (58.1%)	4 (1.0%)	1.6	17.83	.206
	Hebron	39 (9.3%)	1 (0.2%)	2.5		
	Jericho	40 (9.6%)	0 (0.0%)	0.0		
	Nablus	28 (6.7%)	1 (0.2%)	3.4		
	Jerusalem	23 (5.5%)	0 (0.0%)	0.0		

	Tulkarem	9 (2.2%)	2 (0.5%)	18.2		
	Jenin	8 (1.9%)	0 (0.0%)	0.0		
	Salfit	8 (1.9%)	0 (0.0%)	0.0		
	Bethlehem	6 (1.4%)	0 (0.0%)	0.0		
	Qalqilia	3 (0.7%)	0 (0.0%)	0.0		
	Tubas	2 (0.5%)	0 (0.0%)	0.0		
	Gaza	1 (0.2%)	0 (0.0%)	0.0		
Educational level	School	101 (24.2%)	3 (0.7%)	3.0	10.72	.013*
	Diploma	15 (3.6%)	2 (0.5%)	11.8		
	Bachelor	273 (65.3%)	3 (0.7%)	1.1		
	Master	21 (5.0%)	0 (0.0%)	0.0		
Work	No	290 (69.4%)	7 (1.7%)	2.4	1.07	.447
	Yes	120 (28.7%)	1 (0.2%)	0.8		
Diabetes Mellitus	No	399 (95.7%)	8 (1.9%)	2.0	.200	.654
	Yes	10 (2.4%)	0 (0.0%)	0.0		
HTN	No	394 (94.5%)	8 (1.9%)	2.0	.304	.581
	Yes	15 (3.6%)	0 (0.0%)	0.0		
Total		409 (98.1%)	8 (1.9%)	1.9		

** significance is declared at alpha less than 0.05*

Mothers who had a prior cesarean section had a statistical significance relationship with surgical site infection; the occurrence of surgical site infection was highest among diploma and school age (14.8%) comparing with bachelor and master degree (1.1%).

Although other demographic variables was not significantly associated with surgical site infection, the occurrence of surgical site infection was higher among women with previous CS (3.1% vs. 0.0%). Moreover, number of previous cesarean section was marginally significant with occurrence of surgical site infection.

Other gynecological variables had no statistical significance with surgical site infection but women with multiple gestation, delivered vaginally with instrument, and delivered with epidural had low rate of surgical site infection (0.0%, 0.0%, and 0.0 % vs. 2.2%, 2.0%, and

2.1% respectively). Furthermore, the occurrence of surgical site infection was higher with women who had premature labor (2.9% vs. 1.9%). For more details see table 9.

Table 9: Gynecological variables with surgical site infection by Bivariate analysis

		Surgical Site Infection		%	X^2	*P*
		No	**Yes**			
Number of CS	0	305 (73.3%)	3 (0.7%)	1.0	7.59	.062
	1	69 (16.6%)	3 (0.7 %)	4.2		
	2	26 (6.2%)	2 (0.5%)	7.1		
	3	7 (1.7%)	0 (0.0%)	0.0		
	4	1 (0.2%)	0 (0.0%)	0.0		
Prior CS	No	159 (38.0%)	0 (0.0%)	0.0	5.00	.027*
	Yes	251 (60.0%)	8 (1.9%)	3.1		
Multiple Gestation	No	350 (84.3%)	8 (1.9%)	2.2	1.29	.606
	Yes	57 (13.7%)	0 (0.0%)	0.0		
Vaginal Delivery With Instrument	No	401 (95.9%)	8 (1.9%)	2.0	179	.672
	Yes	9 (2.2%)	0 (0.0%)	0.0		
Epidural For Vaginal Deliveries	No	365 (87.3%)	8 (1.9%)	2.1	984	.321
	Yes	45 (10.8%)	0 (0.0%)	0.0		
Premature Labor With Delivery	No	308 (73.7%)	5 (1.2%)	1.6	0.66	0.42
	Yes	102 (24.4%)	3 (0.7%)	2.9		
Total		410 (98.1%)	8 (1.9%)	1.9		

** significance is declared at alpha less than 0.05*

3.3.2 Multivariate analysis

Although the educational level of mothers had statistical significant relation at univeriate analysis, but at the multivariate level, it did not have a statistical significance relation with surgical site infection. Educated mothers, employed, and long duration of labor were less likely to develop surgical site infection. Women with higher number of deliveries, premature labor, and longer length of stay were more likely to develop surgical site infection. For more details see table 10.

Table 10: Participants demographic, medical history and gynecological variables with surgical site infection by logistic regression

	B	**Wald**	**Sig.**	**Exp(B)**	**95% C.I. for EXP(B)**	
					Lower	Upper
Maternal age	-.085	.802	.370	.919	.764	1.106
Residency	.265	3.466	.063	1.304	.986	1.724
Level of education	-.435	1.098	.295	.647	.287	1.460
Work	-.138	.124	.725	.871	.404	1.879
Duration of labor	-.368	2.164	.141	.692	.424	1.130
Number of deliveries	.309	1.228	.268	1.362	.789	2.353
Premature Labor Delivery	.169	.711	.399	1.184	.800	1.752
Length of stay	.439	2.74	0.098	1.55	0.92	2.60

** Significance is declared at alpha less than 0.05*

Diabetic mothers had statistical significant relation at univeriate analysis and multivariate level; it did have a statistical significance relation with undergoing cesarean section. Educated mothers and women with higher number of deliveries were less likely to undergo cesarean section. Diabetic and hypertensive women were more likely to underwent cesarean section. For more details see table 11.

Table 11: Participants demographic, medical history and gynecological variables with undergoing cesarean section by logistic regression

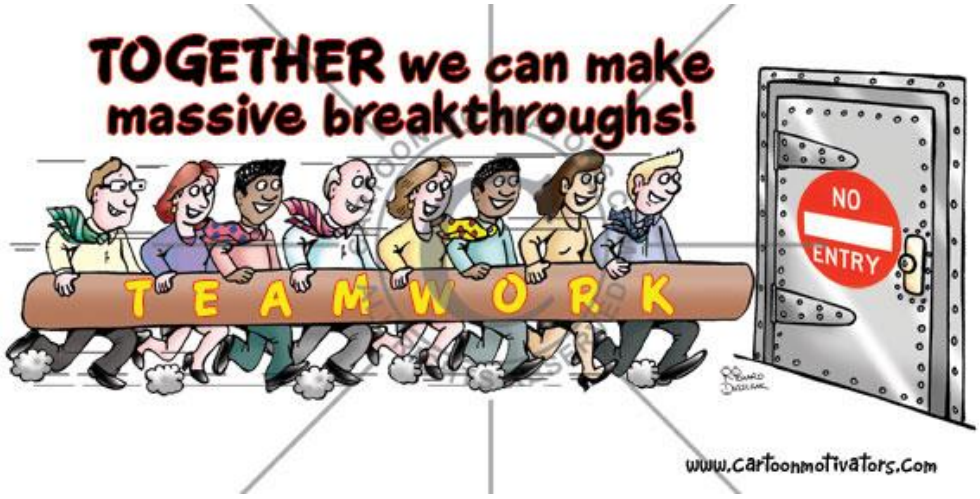
	B	**Wald**	**Sig.**	**Exp(B)**	**95.0% C.I .for EXP(B)**	
					Lower	Upper
Maternal age	.104	18.653	.000**	1.109	1.058	1.163
Residency	-.019	.378	.539	.981	.922	1.043
Level of education	-.227	3.221	.073	.797	.621	1.021
Work	-.030	.136	.713	.970	.826	1.140
HTN	.392	.928	.335	1.479	.667	3.283
DM	10.017	6.37	.012*	2.241	0.56	0.65
Duration of labor	-.009	.112	.738	.991	.938	1.046
Number of deliveries	-.274	6.235	.013*	.760	.613	.943

** Significance is declared at alpha less than 0.05*

*** Significant correlation is declared at alpha less than 0.01 level*

Chapter 4

General discussion



4.1 General discussion

The aim of this retrospective study was to assess the quality and safety level of obstetric department and the relationship between the different demographic and the gynecological variables on one side and the delivery-associated complication in terms of surgical site infection and vaginal lacerations on the other side.

In this chapter, the study findings are discussed in relation to other literature and previous studies. Afterwards, the researcher address the possible strengths and theoretical contributions of this dissertation. And assessed limitations of the study designs. Then, we discuss the overall conclusion. Finally, we end this chapter by describing the importance and implications for practice and health policy and formulate recommendations for practice and future research.

In the present study, the average age of women participated in this study was 27.8 ± 4.8 years old. Most of them (67%) were between 25 and 35 years old. Our data revealed 74 % of women participating in this study had at least one previous CS, which exceeds the WHO recommendation on the globally accepted CS rate (19% of total births). CS rates increased worldwide that caused increasing on the number of diseases, abnormalities, maternal mortality and risk of uterine loss [55]. In the Betrán et al study, a global study about increasing rate of cesarean deliveries, showed that the highest rate of CS in Latin America, the Caribbean with a rate of with a rate of 40.5 %. The study reported an increase in the rate of CS between (1990-2014) from 22.8 % to 40.5%. And showed different rates of CS in different continent as the following: Northern America (32.3%), Oceania (31.1%), Europe (25%), Asia (19.2%) and Africa (7.3%) [53]. Our study reported much higher rate of CS

(62%) comparing to the international literature. Possible explanation that IAH hospital receives complex cases from all areas where the last solution is cesarean delivery, or some cases were births twin, the position of the fetus plays a role in determining the type of birth, some diseases related to maternal health or child health request Caesarean section intervention, the lack of expansion in women with the presence of pain request for the birth of caesarean section.

Regarding the significant positive association between advanced maternal age and the rate of CS. Our results were in line with a cohort study in London 2013. The results of that study showed that advanced maternal age is a risk factor for miscarriage, pre-eclampsia, SGA, GDM and Cesarean section, but not for stillbirth, gestational hypertension, spontaneous preterm delivery or LGA [56].

By comparing our results, with international studies, we found similar results on the positive correlation of CS on one side and diabetes mellitus and hypertension on the other side. Ehrenberg et al. found that obesity and diabetes mellitus (Type I, II) were independently increased the rate of CS in USA [57]. Hedderson found that maternal cardiometabolic risk factors (hyperglycemia, pre-existing hypertension and high body mass index) were independently associated with increased risk for primary cesarean delivery. Effective strategies to increase the proportion of women entering pregnancy at an optimal weight with normal blood pressure and glucose before pregnancy could potentially eliminate up to 20% of cesarean deliveries [58]. Good management of DM and hypertension is highly recommended in order to reduce the rate of CS and its complication. Moreover, continuous

education and awareness on management of DM and hypertension during the pregnancy might have an impact on reducing CS option.

In line with other studies, we found a significant positive association between CS rate and some gynecological factors (Number of Cesarean section, Prior Cesarean section, multiple gestation, and premature labor) [59, 60].

Coming to the surgical site infection, we found a statistical significance relationship between surgical site infection (SSI) and number of CS & prior CS (r= 0.10, p= 0.04 & r=0.10, p= 0.025 respectively). Our results were close to those reported previously [61]. Hence, attention should be given to take care of those patients who have more risk to develop SSI. A strong significant relationship was found between the educational level and the presence of previous history of cesarean delivery on one hand and the incidence of surgical site infections on the other hand. Our study revealed that the educational level of mothers had a statistically significant correlation with SSI (r = 0.14, p = 0.004). The lower the level of education, the greater incidence of SSI. This is in line with the World Health Organization, where they noted that the level of education for women affected the understanding of the caesarean section output and how to prevent and care for the wound after the operation [62]. Using tools (forceps but not the suction, 2%) to remove the fetus was similar to those studies conducted in other healthcare setting [50].

The incidence of infection at the surgical site was higher but not significant among non-diabetic women (2.0% vs. 0.0%), and non-hypertensive women (2.0% vs. 0.0%), suggesting no direct correlation between chronic disease and infection. This is in line with the study

conducted by England in 2013 and in another study conducted in Cuba in 2014 that showed that diabetes and blood pressure are indirectly related to infection [28].

In our study we found that lacerations is one of the complication that affects 15 % of women in this study. Another important complication after delivery is lacerations. Lacerations are common after vaginal birth. Trauma can occur on the cervix, vagina, and vulva, including the labial, periclitoral, and periurethral regions, and the perineum. Most of these lacerations do not result in adverse functional outcomes. Severe perineal lacerations, extending into or through the anal sphincter complex, although less frequent, are more commonly associated with increased risk of pelvic floor injury, fecal and urinary incontinence, pain, and sexual dysfunction with symptoms that may persist or be present many years after giving birth [63].

4.2 Strengths of the study

Our study is the first study in Palestine, and in IAH hospital, to assess the patient safety and obstetric-related complications in terms of infection at the surgical site and vaginal wounds. Moreover, we assessed the relationship between demographic variables, various gynecological diseases, and obstetric complications. By having our study results we provide the baseline data any future studies.

Another strength of the study was the process of reviewing medical records in terms of delivery by the researcher, midwives and supervising physicians. The validation process that we used with another data source, the electronic system, where the system is the best way to protect the file from loss or damage and to protect the patient's record with all the details of

medical and public information. In addition to the paper files that used to validate the EMR results and find missing data.

4.3 Limitations of the study

Due to a limited budget, our study was not representative of the entire Palestinian hospitals. Thus we cannot directly generalized our results to all Palestinian hospitals. Our observations and conclusions should be interpreted within the limits of the retrospective review of the records. Some features of the study may be biased to the results. We relied on the judgments of doctors and midwives during the records review and on information written in the patient records which may have contributed to biases.

Coming to the original proposal where we suggested other variables like weight, we faced obstacles in finding this information in the patient's medical records. This information and other demographic data should be part of the usually collected data.

4.4 Recommendation

- Our study reveals that monitoring of quality and safety through medical records is possible in Palestine. Efforts should be made through hospital administrations to encourage and document continuous monitoring of obstetric patient safety and to inform official bodies.
- Initiatives to improve safety like training and education, communication techniques, and leadership walk round. Hospital should word policy to reduces the demand of CS.

- Medical records and event reporting should be improved, there is need to improve the quality of medical file documentation.
- The electronic system (health information system) within the hospital should be developed in terms of a feature that helps to show information more clearly and accurately such as presenting data on a dashboard where the number of natural births, cesarean deliveries, and SSI can be seen directly and continuously not only when we extract them.
- Community awareness programs.

4.5 Future research

Future research is needed on:

- Expanding this exploratory study in terms of ascertaining the CS and SSI rate, as well as using an observational study.
- The level of patient involvement in healthcare and the importance of that in reducing the risk of adverse events in the obstetrics department.
- The effectiveness of mothers' education and awareness on reducing the negative outcomes for obstetric patients.

4.6 Conclusion

Our study is the first study in West Bank (Palestine) to present information about obstetric safety and quality. Our study has a conclusion of the increasing rate of CS in women with increased age, previous medical history of DM or HTN, or women with some gynecological factors (number of previous cesarean section, multiple gestation, or premature labor). Moreover, we conclude that an increased rate of surgical site infection and other obstetrical complications in women with a state of less education level in comparing with women with high education level, or in the state of women with the previous history of CS regardless of the number. Focusing on these factors and increase awareness and education, might support reducing obstetric complication in the future.

Appendices A : Data collection form

Serial number: [ ]

Date of birth: [ ]/[ ][ ]/[ ][ ][ ][ ]

Maternal age: --------

City / region ---------

Marital status: □ Single □ Married □ Separated □ Divorced □ Widow

Educational level: □ Illiterate □ Primary □ Secondary□ High school □ Diploma □ Graduate □ Post graduate

Employment: □ Student □ Unemployed □ Employed □ Free work □ Retired

Primary diagnosis: [ ]

Length of stay: ----- days

Duration of labor: ----- (start time -----, end time ------)

Differential diagnosis: [ ]

Maternal medical conditions:

- **Diabetes mellitus:** □ No □ Yes
- **Hypertensive:** □ No □ Yes
- **Obesity:** □ No □ Yes

Obstetrical history:

- **Number of deliveries:** --------
- **Prior cesarean section (CS):** □ No □ Yes
- **Number of CS:** ----------

Present Obstetrical complications:

- **Multiple gestation:** □ No □ Yes
- **premature labor with delivery:** □ No □ Yes
- **excessive fetal growth:** □ No □ Yes

3rd or 4th degree lacerations: □ No □ Yes

Vaginal delivery with instrument: □ No □ Yes

Vaginal delivery without instrument: □ No □ Yes

Epidural for vaginal deliveries: □ No □ Yes

Surgical site infection: □ No □ Yes

Readmission within 48 hours: □ No □ Yes. **Was the readmission due to CS**: □ No □ Yes

Medication: □ No □ Yes, specify [------ , Antibiotic prophylaxis versus no prophylaxis]

Appendices B: Interview question

- **Is caesarean section chosen on medical matters or what?**
- **What are the tools used to bring out the fetus in cases of natural delivery?**
- **Why is there no case using suction?**
- **The number of third and fourth wound cases almost non-existent Why?**
- **Infected cases Why not write it down?**
- **Do you refer to the patient to inquire about her health status after birth if she does not attend the review?**

References

1. Kohn KT, Corrigan JM, Donaldson MS. To err is human: building a safer health system. Washington, DC, USA, National Academy Press 2000. Ref Type: Report.

2. Vincent C.Patient safety, Elsevier Churchill Livingstone, Edinburgh. 2006.

3. The Research Priority Setting Working Group of WHO Patient Safety. Summary of the evidence on patient safety: Implications for research. Geneva: WHO 2008. http://whqlibdoc.who.int/publications/2008/9789241596541_eng.pdf

4. Patient safety: too little, but not too late. The Lancet, Vol 394 September 14, 2019. https://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736(19)32080-X.pdf.

5. Wilson R.M., Michel P., Olsen S., et al. Patient safety in developing countries: retrospective estimation of scale and nature of harm to patients in hospital. British Medical Journal 2012; 13, 344:e832, doi: 10.1136/bmj.e832.

6. Daniel Levinson. Department of Health and Human Services. Office of inspector general. Adverse events in hospitals: national incidence among medicare beneficiaries. November 2010, OEI-06-09-00090.

7. Hoonhout, L. H., de Bruijne, M. C., Wagner, C., Zegers, M., Waaijman, R., Spreeuwenberg, P., … van Tulder, M. W. (2009). Direct medical costs of adverse events in Dutch hospitals. BMC health services research, 9, 27. doi:10.1186/1472-6963-9-27.

8. Robert M. Wachter.Understanding patientsafety. The McGraw-Hill companies, the United States of America. 2008.

9. Griffin FA, Resar RK. IHI Global Trigger Tool for Measuring Adverse Events (Second Edition).IHI Innovation Series white paper. Cambridge, MA: Institute for Healthcare Improvement, 2009. Available on www.IHI.org.

10. Thomas EJ and Petersen LA: Measuring errors and adverse events in healthcare. Journal of General Internal Medicine 2003; 18(1), 61-67.

11. World Health Organization and UNICEF, 2015. The H4+ partnership joint support to improve women's and children's health: progress report 2016.

12. Howell, E.A., Zeitlin, J., Hebert, P., Balbierz, A. and Egorova, N., 2013. Paradoxical trends and racial differences in obstetric quality and neonatal and maternal mortality. Obstetrics and gynecology, 121(6), p.1201.

13. Kung A1, Pratt SD. Patient safety in obstetrics and obstetric anesthesia. Int Anesthesiol Clin. 2014 Spring;52(2):86-110. doi: 10.1097/AIA.0000000000000017.

14. Pettker CM, Thung SF, Norwitz ER, Buhimschi CS, Raab CA, Copel JA, Kuczynski E, Lockwood CJ, Funai EF. Impact of a comprehensive patient safety strategy on obstetric adverse events. Am J Obstet Gynecol. 2009 May;200(5):492.e1-8. doi: 10.1016/j.ajog.2009.01.022. Epub 2009 Feb 27.

15. Pettker CM1, Grobman WA. Obstetric Safety and Quality. Obstet Gynecol. 2015 Jul;126(1):196-206. doi: 10.1097/AOG.0000000000000918.

16. Najjar S1, Hamdan M, Euwema MC, Vleugels A, Sermeus W, Massoud R, Vanhaecht K. The Global Trigger Tool shows that one out of seven patients suffers harm in Palestinian hospitals: challenges for launching a strategic safety plan. Int J Qual Health Care. 2013 Dec;25(6):640-7. doi: 10.1093/intqhc/mzt066. Epub 2013 Oct 17.

17. Nielsen PE1, Goldman MB, Mann S, Shapiro DE, Marcus RG, Pratt SD, Greenberg P, McNamee P, Salisbury M, Birnbach DJ, Gluck PA, Pearlman MD, King H, Tornberg DN, Sachs BP. Effects of teamwork training on adverse outcomes and process of care in labor and delivery: a randomized controlled trial. Obstet Gynecol. 2007 Jan;109(1):48-55.

18. Pratt SD, Mann S, Salisbury M, Greenberg P, Marcus R, Stabile B, McNamee P, Nielsen P, Sachs BP. John M. Eisenberg Patient Safety and Quality Awards. Impact of CRM-based training on obstetric outcomes and clinicians' patient safety attitudes. Jt Comm J Qual Patient Saf. 2007 Dec;33(12):720-5.

19. Roberts CL, Ford JB, Algert CS, Bell JC, Simpson JM, Morris JM. Trends in adverse maternal outcomes during childbirth: a population-based study of severe maternal morbidity. BMC Pregnancy and Childbirth. 2009;9:7. doi:10.1186/1471-2393-9-7.

20. Forster AJ1, Fung I, Caughey S, Oppenheimer L, Beach C, Shojania KG, van Walraven C. Adverse events detected by clinical surveillance on an obstetric service. Obstet Gynecol. 2006 Nov;108(5):1073-83.

21. Betrán AP, Ye J, Moller AB, Zhang J, Gülmezoglu AM, Torloni MR. The Increasing Trend in Caesarean Section Rates: Global, Regional and National Estimates: 1990-2014, journal.pone.0148343,Published: February 5, 2016.

22. Eveline G. Epidemiology of Maternal Mortality in Malawi.2006 Dec; 18(4): 206–225.PMC.

23. Hoque,M. Incidence of Obstetric and Foetal Complications during Labor and Delivery at a Community Health Centre, Midwives Obstetric Unit of Durban, South Africa. 2011 Jul 31. doi: [10.5402/2011/259308].PMC

24. Rozzet J,Marwan K. Caesarean section rates in the Arab region: a cross-national study. 2004 Mar; 19(2): 101–110.PMC.

25. Organization WH. WHO Statement on Cesarean Section Rates. World Health Organization;2015.

26. Villar J, Valladares E, Wojdyla D, et al. Caesarean delivery rates and pregnancy outcomes: the 2005 WHO global survey on maternal and perinatal health in Latin America. The Lancet. 2006;367(9525):1819-1829.

27. Hoque,M. Incidence of Obstetric and Foetal Complications during Labor and Delivery at a Community Health Centre, Midwives Obstetric Unit of Durban, South Africa. 2011 Jul 31. doi: [10.5402/2011/259308].PMC

28. Haque M, Sartelli M, McKimm J, and Abu Bakar M. Health care-associated infections – an overview. Infect Drug Resist. 2018; 11: 2321–2333.Published online 2018 Nov 15. doi: 10.2147/IDR.S177247.

29. Vallejo M, Attaallah A, Shapiro R, Elzamzamy O, Mueller M. Independent risk factors for surgical site infection after cesarean delivery in a rural tertiary care medical center. J Anesth. 2017 Feb; 31(1): 120–126. Published online 2016 Oct 12. doi: 10.1007/s00540-016-2266-2.

30. Geller, S.E., Cox, S.M., Callaghan, W.M. and Berg, C.J., 2006. Morbidity and mortality in pregnancy: laying the groundwork for safe motherhood. Women's health issues, 16(4), pp.176-188.

31. World Health Organization and UNICEF, 2015. Trends in maternal mortality: 1990-2015: estimates from WHO, UNICEF, UNFPA, World Bank Group and the United Nations Population Division

32. El Arifeen, S., Hill, K., Ahsan, K.Z., Jamil, K., Nahar, Q. and Streatfield, P.K., 2014. Maternal mortality in Bangladesh: a Countdown to 2015 country case study. The Lancet, 384(9951), pp.1366-1374.

33. Draycott, T., Sibanda, T., Laxton, C., Winter, C., Mahmood, T. and Fox, R., 2010. Quality improvement demands quality measurement. BJOG: An International Journal of Obstetrics & Gynaecology, 117(13), pp.1571-1574.

34. Collins, K.J. and Draycott, T., 2015. Measuring quality of maternity care. Best Practice & Research Clinical Obstetrics & Gynaecology, 29(8), pp.1132-1138.

35. Drife, J., 2001. Quality measures for the emergency obstetrics and gynaecology services. Journal of the Royal Society of Medicine, 94(Suppl 39), p.16.

36. Mann, S., Pratt, S., Gluck, P., Nielsen, P., Risser, D., Greenberg, P., Marcus, R., Goldman, M., Shapiro, D., Pearlman, M. and Sachs, B., 2006. Assessing quality in obstetrical care: development of standardized measures. The Joint Commission Journal on Quality and Patient Safety, 32(9), pp.497-505.

37. Drife, J., 2001. Quality measures for the emergency obstetrics and gynaecology services. Journal of the Royal Society of Medicine, 94(Suppl 39), p.16.

38. Danel, I., Berg, C., Johnson, C.H. and Atrash, H., 2003. Magnitude of maternal morbidity during labor and delivery: United States, 1993–1997. American journal of public health, 93(4), pp.631-634.

39. Centers for Disease Control and Prevention. Births: final data for 2010. Natl Vital Stat Rep. 2012;61(1):1-71. http://www.cdc.gov/nchs/data/ nvsr/nvsr61/nvsr61_01.pdf. Accessed October 20, 2012.

40. Menacker F, Hamilton BE. Recent trends in cesarean delivery in the United States. NCHS Data Brief. 2010;(35):1-8.

41. Jeffrey Q and Murphy, N.J., 2015. Cesarean delivery: counseling issues and complication management. American family physician, 91(3).

42. Gregory, K.D., Jackson, S., Korst, L. and Fridman, M., 2012. Cesarean versus vaginal delivery: whose risks? Whose benefits?. American journal of perinatology, 29(01), pp.07-18.

43. Merriam, A.A., Ananth, C.V., Wright, J.D., Siddiq, Z., D'alton, M. and Friedman, A.M., 2017. Trends in operative vaginal delivery, 2005–2013: a population-based study. BJOG: An International Journal of Obstetrics & Gynaecology, 124(9), pp.1365-1372.

44. American Congress of Obstetricians and Gynecologists. Operative Vaginal Delivery. ACOG Practice Bulletin 17. Washington, DC: ACOG, 2012.

45. Friedman, A.M., Ananth, C.V., Prendergast, E., D'Alton, M.E. and Wright, J.D., 2015. Evaluation of third-degree and fourth-degree laceration rates as quality indicators. Obstetrics & Gynecology, 125(4), pp.927-937.

46. Obstetric trauma rate—vaginal delivery with instrument: technical specifications. Patient safety indicators No. 18.

47. Obstetric trauma rate—vaginal delivery without instrument: technical specifications. Patient safety indicators No. 19

48. AHRQ Quality Indicators_Guide to Patient Safety Indicators. Rockville Agency for Healthcare Research and Quality. Version 2.1, revision 3 (January 17, 2005). AHRQ Publication 03-R203;2003.

49. American College of Obstetricians and Gynecologists, Quality Patient Care in Labor and Delivery: A Call to Action, December 1, 2011.

50. Timmel J, Kent PS, Holzmueller CG, Paine L, Schulick RD, Pronovost PJ. Impact of the Comprehensive Unit-based Safety Program (CUSP) on safety culture in a surgical inpatient unit. Jt Comm J Qual Patient Saf 2010; 36(6):252-60.

51. Palestinian Health Information Center PHIC. Health Annual Report 2017. Ministry of Health.

52. Facts about Joint Commission International. December 14, 2018. https://www.jointcommission.org/facts_about_joint_commission_international/

53. Anup Surendran. Quantitative Research: Definition, Methods, Types and Examples.QuestionPro .2018.

54. Marwan K. A Study of Palestinian Health Sector in Gaza Strip and its Performance Improvement using Electronic Management. April, 2017.

55. Relationship Between Cesarean Delivery Rate and Maternal and Neonatal Mortality, George Molina et al., JAMA, doi:10.1001/jama.2015.15553, published 1 December 2015

56. Khalil A, Syngelaki A, Maiz N, Zinevich Y, and Nicolaides KH. Maternal age and adverse pregnancy outcome: a cohort study. Ultrasound Obstet Gynecol. 2013; 42(6):634-43.

57. Ehrenberg HM, Durnwald CP, Catalano P, and Mercer BM. The influence of obesity and diabetes on the risk of cesarean delivery. Am J Obstet Gynecol. 2004;191(3):969-74.

58. Hedderson MM, Xu F, Sridhar SB, Han ES, Quesenberry CP, and Crites Y. A cohort study of maternal cardiometabolic risk factors and primary cesarean delivery in an integrated health system. PLoS One. 2018;13(7):e0199932.

59. Monson M, and Silver RM. Multifetal Gestation: Mode of Delivery. Clin Obstet Gynecol. 2015;58(3):690-702.

60. Lorthe E, Quere M, Sentilhes L, Delorme P, and Kayem G. Incidence and risk factors of caesarean section in preterm breech births: A population-based cohort study. Eur J Obstet Gynecol Reprod Biol. 2017;212:37-43.

61. Zejnullahu VA, Isjanovska R, Sejfija Z, Zejnullahu VA. Surgical site infections after cesarean sections at the University Clinical Center of Kosovo: rates, microbiological profile and risk factors. BMC Infect Dis. 2019;19(1):752. Published 2019 Aug 28.

62. Wildman, K., Bouvier-Colle, M.H. and MOMS group, 2004. Maternal mortality as an indicator of obstetric care in Europe. BJOG: An International Journal of Obstetrics & Gynaecology, 111(2), pp.164-169.

الملخص

المقدمة: تعتبر صحة الأم و طفلها من أهم الأمور المتعلقة بالصحة العامة، و في الفترة الاخيرة يوجد اهتمام متزايد في هذا الموضوع و لذلك فهنالك العديد من المعايير الدولية التي تم اعتمادها من أجل الاعتناء بصحة الأم و طفلها و خاصة في فترة الولادة باختلاف انواعها (ولادة طبيعية ، ولادة عبر الجراحة القيصرية) و فترة ما بعد الولادة.

الأهداف: يهدف هذا البحث الى لتقدير مضاعفات التوليد واضافة الى ذلك تقييم سلامة وجودة الاجراءات المتابعة في قسم الولادة بالمستشفى الاستشاري العربي في عام 2018 وتعريف العوامل الخطرة التي تؤدي الى حدوث الحوادث السلبية في قسم الولادة.

وسائل البحث: هذا البحث عبارة عن مراجعة وصفية من خلال مراجعة ملفات المرضى من النظام الالكتروني تم إجراء البحوث في مجال البحث في قاعدة البيانات الإلكترونية والدراسات ذات الصلة. تم تحديد مراضة الأمهات والنتائج السلبية باستخدام التصنيف الدولي للإمراض النسخة العاشرة في نظام المعلومات الصحية. بالإضافة إلى الملفات الورقية. أجريت التحليل الوصفي، المتغير والمتغير المتغير باستخدام.SPSS

النتائج: عدد النساء المشاركات في هذا البحث حوالي 418 امرأة، نسبة الولادة عن طريق الجراحة القيصرية حوالي 62.2%، معدل أعمار النساء المشاركات في البحث حوالي 27.8±4.8 سنة ، أكبر شريحة مشاركة كانت من منطقة رام الله و كانت النسبة حوالي 58.1%. بعد تحليل البيانات تبين أن هنالك علاقة ايجابية بين المستوى التعليمي للمرأة أو المرأة التي خضعت لجراحة قيصرية سابقة من جهة و بين نسبة المضاعفات المرافقة للولادة و بخاصة التهاب موضع الجراحة ، أيضا ، وجدت دراستنا علاقة إيجابية بين معدل الولادة القيصرية من جهة وعمر الأم ، ومرض السكري ، وارتفاع ضغط الدم ، وعوامل أمراض النساء (الخداج ، الحمل المتعدد).

الخلاصة : زيادة معدل الإصابة بعدوى موضع الجراحي والمضاعفات الأخرى في المرضى الذين يعانون من مستوى تعليمي أقل أو لديهم تاريخ سابق في الولادة القيصرية بغض النظر عن العدد. التركيز على هذه العوامل وزيادة الوعي والتعليم، قد يدعم الحد من مضاعفات التوليد في المستقبل.