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Assessment of Infection Prevention and Control Practices at Operating Rooms in Nongovernmental Organizations Hospitals - Gaza Governorates

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Assessment of Infection Prevention and Control Practices at Operating Rooms in Nongovernmental Organizations Hospitals - Gaza Governorates

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Declaration

I certify that this entire thesis submitted for the degree of master is my own work and has not been written to me in whole or in part, by any other person(s), and this thesis (or any part of the same) has not been submitted for a higher degree or qualification to any other university or institution.

Signed

Jehad Nasri Elmadhoun

……..

Date ……..

Dedication

To my mother and my father to who I owe my life and success

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

To my kids; Noor, Wasim, Hala, Mohammad and Amr for their encouraging smiles.

To my brothers and sisters

And

To everyone who contributed to make this study a reality

Jehad Nasri Elmadhoun

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Abstract

Hospital Acquired infections are considered one of the most serious problems in the world. The problem of infection prevention and control in our Palestinian hospitals becomes more serious especially with scarcity of resources and materials; also the lack of supportive policies and direction can exaggerate the situation. The Center for Disease Prevention and Control recommended that educating healthcare workers regarding infection control measures is the highest priority to prevent and control nosocomial infections.

The overall aim of this study is to assess the healthcare workers practices at the operating rooms in Nongovernmental Organizations hospitals in Gaza governorates on the light of infection prevention and control protocols. The design of this study is a descriptive analytical cross sectional with mainly quantitative approach and supported by in-depth interviews. The instruments used in this study were self-administered questionnaire, observation checklist for the physical environment of the operating rooms, observation checklist for the health care workers practices and in-depth interviews with the key persons. Six of the Nongovernmental hospitals in Gaza Governorates were included in the study according to eligibility criteria. The study included 169 participants, out of them 154 responded and completed the self-administered questionnaire with a response rate of 91%. Four hundred seventy seven observation checklists were done to assess the healthcare workers practices and 18 observation checklists were done to assess the physical environment of these operating rooms. General measures of validity and reliability were administered.

The research findings show that 81.6% of the respondents were exposed to sharp injuries, 88.7% stated that they need more training, 63% don't know about the Palestinian infection prevention and control protocols, 84.4% stated that there are no copies of the protocols in their operating rooms, 81% of the respondents said that the lack of knowledge and education regarding infection prevention and control is the main obstacle that prevents them of using the protocols, about 78.4%, 62.7% attributed the cause to the insufficient training and lack of supportive policy respectively. Only 39.6% of the respondents stated that their management policies support the infection control practices, 46.1% stated that there is no infection control committee in their hospitals, and 72.1% stated that they were never assessed regarding infection prevention and control.

The results of observation checklists show the unavailability of the protocols at the operating rooms in the six hospitals and the general adherence to all items of the protocols is weak, about 48.7% for hands washing, 43.5% for surgical scrub, 56.4% for wearing gloves, 41.9% for skin preparation and 51% for sharp disposals.

The study revealed statistically significant relationship between the practice and the knowledge, attitudes, training, air quality, flow system, operating room design and materials.

The researcher recommends that Nongovernmental Organizations hospitals need to increase their efforts towards improving healthcare workers compliance to protocols by increasing their awareness, knowledge through training and education programs and to disseminate the protocols to make it available to every healthcare worker or at least to be accessible in each department.

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List of Abbreviations

CDC	Center for Disease Control and Prevention
GDP	Gross Domestic Product
GS	Gaza Strip
HAI	Hospital Associated Infection
HCP	Health Care Provider
HCW	Health Care Worker
HEPA	High Efficiency Particulate Air
HIV	Human Immunodeficiency Virus
ICU	Intensive Care Unit
IPC	Infection Prevention and Control
IPCC	Infection Prevention and Control Committee
MCH	Maternity and Child Health
MOH	Ministry of Health
MRSA	Methicillin-resistant *Staphylococcus aureus*
NGOs	Non-Governmental Organizations
NHMRC	National Health and Medical Research Council
NHS	National Health Service
ORs	Operating Rooms
PPE	Personal Protective Equipment
PCBS	Palestinian center bureau of statistics
SPs	Standard Precautions
SPSS	Statistical Package for Social Sciences
SSI	Surgical Site Infection
UHWC	Union of Health Work Committees
UNRWA	United Nation Relief and Work Agency for Palestine Refugees
USA	United States of America
WB	West Bank
WHO	World Health Organization

Chapter 1: Introduction

1.1 Research background

People receiving health and medical care, whether in a hospital or a clinic, are at risk of becoming infected unless precautions are taken to prevent infection. Nosocomial (hospital-acquired) infections are a significant problem throughout the world and are continually increasing (Alvarado, 2000). In low and middle income countries this challenge is more highlighted because disease prevention and control policies are nonexistent, poorly adapted or insufficiently funded by governments. The rates of hospital acquired infections (HAIs) within a hospital represent the best indicator for the quality of services offered, where a high frequency of HAIs is evidence of a poor quality of health service delivery (Raka, 2010).

Most of these infections can be prevented with readily available, relatively inexpensive strategies such as: Adhering to recommended infection prevention practices, especially hand hygiene and wearing gloves; Paying attention to well-established processes for decontamination and cleaning of soiled instruments and other items, followed by either sterilization or high-level disinfection; and improving safety in operating rooms (ORs) and other high-risk areas where the most serious and frequent injuries and exposures to infectious agents occur (Tietjen et al, 2003).

Recent studies suggest that at least 20% of Health care-Associated Infection (HAIs) could be prevented through infection prevention and control strategies. Infection prevention and control (IPC) programs have been shown to be both clinically effective and cost-effective, providing important cost savings in terms of fewer HAIs reduced length of hospital stay, less antimicrobial resistance and decreased costs of treatment for infections (Ontario Ministry of Health and Long-Term Care, 2011).

The ORs in any hospital are considered the most important departments for their important services which contribute in the reputation and marketing of the hospital's health services that give the hospital the competitive advantage against other hospitals. So the IPC is a very important goal for all health care facilities. It comes in

the context of quality improvement process which aims to provide a safe and effective healthcare to the clients in order to minimize the morbidity and mortality during the provision of health procedures. It is anticipated that all healthcare workers (HCWs) adhere to standards in their practices. The standards must be part of the knowledge, attitude, and practice of all the health facilities to obtain the client's safety and protection.

Infection control activities must be integrated into the routine activities of the hospital. The management of these activities should be through a Hospital Infection Control Committee (IPCC) with a full time Infection Control Nurse who should coordinate various activities. The Committee should identify priorities, implement the plan and continuously monitor the situation for assuring quality and its continuous improvement (World Health Organization (WHO), 2002a).

The ORs is a very important place that provides a large segment of health service, it's very essential to the ORs to adhere to IPC protocols to grantee the safety of the clients subjected to different types of surgeries. There are a lot of infected cases that can be easily prevented by using the proper sterilization techniques according to the IPC guidelines and protocols.

This study aims to assess the IPC practices in ORs at Nongovernmental Organizations (NGOs) hospitals in Gaza governorates. So it's important for every health facility to have an IPCC to monitor and enhance the good practices of IPC. The ORs is clearly one of the most hazardous environments in the healthcare delivery system. By definition, surgery is invasive. Instruments that are designed to penetrate patients' tissue can just as easily injure the provider. Blood is everywhere. Speed is essential. Emergencies can occur at any time and interrupt routines. Preventing injuries and exposures [to infectious agents] under these circumstances is indeed challenging (Davis, 2001).

Preventing infections following an operation is a complex process that begins in the OR by preparing and maintaining a safe environment for performing the surgery. Surgical aseptic techniques are designed to create such an environment by controlling the four main sources of infectious organisms: the patient, surgical staff, equipment and the OR environment. Although the patient is often the source of surgical

infections, the other three sources are important and should not be overlooked (Tietjen et al. 2003).

1.2 Research problem

Hospital associated infections (HAIs) are an important public health problem because they occur frequently, cause morbidity and mortality and represent a significant burden among patients, HCWs and health systems. HAI occur worldwide and affect all countries, irrespective of their degree of development (WHO, 2008).

A prevalence survey conducted under the supervision of WHO in 55 hospitals Of 14 countries representing four WHO regions (South-East Asia, Europe, the Eastern Mediterranean and the Western Pacific) revealed that, on average, 8.7% of hospitalized patients suffer nosocomial infections. At any time, over 1.4 million people worldwide suffer from infectious complications associated with healthcare. HAIs rank as major killers of patients of all ages, particularly among the most vulnerable members of the population. The more sick the patient, the higher the risk of acquiring a HAIs and dying from it. In developed countries, about 5–10% of patients admitted to acute care hospitals acquire an infection that was not present or incubating on admission (WHO, 2005).

The Palestinian healthcare system including the NGOs sector are suffering from a lack of standardization of all managerial and technical procedures which cause a problem in work performance, and lead to absence of consensus regarding all aspects of health services and procedures. The clients in ORs are vulnerable to the risk of surgical site infection (SSI) as a result of unstandardized practices. In Palestine, Needs assessment of maternity and newborn units in the West Bank and Gaza revealed severe deterioration of safety within maternity and newborn units in terms of the occurrence of HAIs. In July 2008, cases of infection with Klebsiella were detected in Ramallah newborn unit and further investigations revealed an increased risk for such outbreak in other Palestinian hospitals (United Nations Population Fund (UNFPA), 2008). In a study at Al-Shifa hospital in Gaza, eighty six complications related to gunshot wound of the abdomen has occurred; the most common complication were wound infections 39(17.0%) patients were infected (Kandil, 2005).

There are a series of practices in the operating theatre that aim to minimize the possibility of developing any infection of wounds. These practices are done by different persons with different education level and sometimes without any attention to the proper sterilization methods which usually lead to serious post-operative complications, This complications lead to increase the average length of stay in hospital which leads to increase in the cost of treatment, so it's essential to assess the HCWs practices at ORs to know the real situation and then modify these practices according to the standards to maintain high quality of healthcare services.

1.3 Justification

The compliance to IPC protocols in ORs leads to high quality of health service and maintenance of the client's safety and health. In the ORs, there are different types of practices related to infection control and sterilization techniques which are considered as basic principles in ORs procedures. Everyone is doing his or her own thing; one of the biggest problems is inconsistent implementation of proven IPC measures (Infection Control Today, 2010).

The adherence to IPC protocols in the ORs is considered the key element of the success of the surgical procedures and safety of the patients. In previous study conducted in Gaza in governmental pediatric hospitals revealed that the compliance to IPC protocols and guidelines was poor and the majority of HCWs hadn't knowledge about it (El-Dalow, 2011). Another study conducted in the neonatal intensive care units in the Ministry of Health (MOH) hospitals in Gaza governorates clarifies that the practice of IPC is very low; while the attitude is high. The reasons of incompliance to IPC according to the HCWs perception were the absence of a training program and lack of knowledge and education (Awad, 2009).

The infection control practices in ORs must be consistent with protocols and guidelines. The HCWs in the ORs must be alert to all measures that keep the sterilization techniques and compliance to infection control protocols. After reviewing the health information sources in Nongovernmental hospitals the researcher found no statistics concerning the health care practices in the ORs.

This research is the first of its kind that examines the IPC practices at the ORs and one of the few studies that have addressed the healthcare in the ORs at both governmental and NGOs hospitals in Gaza Governorates. The study is expected to determine the real situation regarding IPC compliance and to answer the questions about the organization and physical environment role and the extent to which they are complying with the standards. It is expected that this research will contribute effectively to the development and quality improvement of the health services at the ORs in NGOs hospitals.

1.4 Aim of the study

The overall aim of this study is to assess the healthcare workers practices at the operating rooms in NGOs hospitals in Gaza governorates on the light of the Palestinian infection prevention and control protocols.

1.5 Research objectives

- To determine the relationship between the individual factors (knowledge, attitudes and, training and education) and the infection prevention and control practices at the operating rooms.
- To determine the relationship between the organizational factors (availability of the protocols, availability of materials and equipment, supportive policies, evaluation, monitoring and supervision and workload and workforce) and the infection prevention and control practices at the operating rooms.
- To explore the relationship between the physical environmental factors (the operating room design, traffic flow and air quality) and the infection prevention and control practices at the operating rooms.
- To explore the differences in the answers of the respondents concerning their infection prevention and control practices due to (age, gender, education, profession and years of experience).
- To develop suitable and applicable recommendations to encourage the healthcare workers compliance with infection prevention and control protocol.

1.6 Context of the study

This study was conducted at the ORs in the NGOs hospitals in Gaza governorates. The NGOs are one of the main four major health care providers (HCPs) in Palestine. They provide primary and secondary healthcare in addition to other social and rehabilitation services.

1.6.1 Demographic Context

The entire area of historical Palestine is about 27,000 Km^2, Palestine stretching from Ras Al-Nakoura in the north to Rafah in the south. Palestine is bordered by Lebanon in the north, the Gulf of Aqaba in the south, Syria and Jordan in the east and by Egypt and the Mediterranean Sea in the west (Annex 1). Palestine was placed under the British mandate in 1919 which had been terminated by Israel establishment in 1948 in implementing the Balfour Declaration of 1917 had promised a homeland for Jews. The result of implementation of that promise was the uprooting of most of the Palestinians from their cities, towns, and Villages and the migration to the West bank, Gaza strip, Jordan, Lebanon, Syria, and many other countries (Abu-Lughod, 1971).

Based on estimates prepared by Palestinian Central Bureau of Statistics (PCBS) according to the results of the Population, Housing and Establishment Census of 2007, the total population of the Palestinian territory at mid-2011 was about 4.17 million; 2.12 million males and 2.05 million females. The estimated population of West Bank was 2.58 million of which 1.31 million males and 1.27 million females, while the estimated population of Gaza Strip (GS) totaled 1.59 million of which 806 thousand males and 782 thousand females. The percentage of urban population mid-2011 was about 73.8%, while the percentage of population in rural and camps areas was 16.9% and 9.3% respectively.

Data revealed that the population of the Palestinian territory is a young population; the percentage of individuals aged (0-14) constituted 40.8% of the total population at mid 2011of which 38.9% in West Bank and 44.1% in GS. The elderly population aged (65 years and over) constituted 2.9% of the total population of which 3.3% in the West Bank and 2.4% in GS of mid-2011. Population density of The Palestinian territory is generally high at 693 persons/ Km^2, particularly in GS is 4,353

persons/km^2 compared to lower population density in West Bank at 456 persons / Km^2 at mid-2011 (PCBS, 2011).

Gaza Strip

GS is a narrow land, located on the southwest of Palestine on the coast of the Mediterranean Sea (Annex 2). GS is a high crowded area, where approximately 1.6 million live in 378 km^2, with an estimated density of about 4,000 people per square kilometer. The population is concentrated in 7 towns, 10 villages and 8camps (PCBS, 2011). GS is divided into five governorates, North of Gaza, Gaza city, Mid-Zone, Khan-younis and Rafah. The population under 15 years old in GS represents 49% and those of 65 years and more represent 2.5% (MOH, 2006).

1.6.2 Socio-economical context

The Palestinian economy is severely depressed compared with the pre-intifada period. Real growth of the gross domestic product (GDP) was estimated at 9.3 per cent for 2010, consisting of 7.6 per cent in the West Bank and 15.1 per cent in Gaza. While the gradual easing of movement restrictions contributed to economic growth in the West Bank, the main drivers were public expenditure by the Palestinian Authority and donor support, and also higher private sector confidence and reforms by the Authority. Growth in Gaza was in part attributed to the relaxation of the closure by Israel. Unemployment rates fell slightly in 2010, compared with 2009, from 17.8 to 17.2 per cent in the West Bank, and from 38.6 to 37.8 per cent in Gaza (United Nations, 2011).

According to the national account the real GDP per capita in year 2010 was 1924, 6 US$ in West Bank and 876.7 US$ in Gaza strip (PCBS, 2010).

1.6.3 Palestinian healthcare system

The health care system in Palestine is complex and unique under Israeli occupation that strongly influences the healthcare system in Palestine. The consequences of closures and separation formed a great challenge for the Ministry of Health (MOH) by

creating obstacles regarding the accessibility to health care services and affect the unity of the health care system in all Palestinian Governorates (MOH, 2004). There are four major HCPs: the MOH, UNRWA, NGOs, and the private sector (non- and for-profit hospitals). The MOH is the main HCP; it provides primary, secondary, and tertiary care and purchases some services from private providers domestically and abroad. The Palestinian's overall health is relatively good compared to several countries of the region, major outbreaks of diseases are prevented and health indicators also improved by effective health services (WHO, 2006).

1.6.4 NGOs hospitals

NGOs in Gaza Governorates have played a very important role at all levels of the Palestinian healthcare system during both, the Israeli and Palestinian administrations. Although some international NGOs operate in Palestine, the role of indigenous NGOs is at least as great. NGOs include organizations with social, political, and religious motivations. Historically and today, NGOs in Palestine have provided services including outpatient and inpatient care, psychosocial support, rehabilitation, health education, and emergency care. They have also been active in health promotion and health education, consumer activism, health planning, infrastructure development, human resource development, and other aspects of the health system (Schoenbaum et al, 2005).

NGOs development was particularly significant during the first intifada and the period immediately preceding the Oslo agreement (1987–1993), when NGOs were one feasible outlet for developing national institutions. Following the transfer of the health system to the MOH, international donors shifted substantial resources from the NGO sector to the government sector, a trend that was somewhat reversed following the start of the second intifada (Schoenbaum et al, 2005).

The NGOs own and operate 31 hospitals with 1,489 beds constituting 31.8% of the total hospital bed pool in Palestine. In GS, the NGOs own and operate 10 hospitals at total bed capacity of 416 beds. The NGOs beds in Gaza Strip constituted 27.9% of the total NGOs bed capacity and equivalent to 21.7% of the total bed pool in the region.

About 55.3% of the NGOs bed capacity in GS was available in Gaza City (MOH, 2004).

Al-Awda Hospital

AL-Awda hospital is affiliated to the Union of Health Work Committees (UHWC) established in 1992 and inaugurated in April 1997 with a 53 bed capacity and community contributions of more than 75% of the construction cost. In 2007, the number of beneficiaries was 107093 constituting 35% of the total population in North Gaza Strip. Furthermore, the new hospital building is being furnished and equipped increasing the number of beds to 67 hopefully by midyear 2008. Al Awda hospital employs a qualified efficient technical staff which works around the clock to improve the people's health status and respond to their needs. The staff is composed of 150 employees (UHWC, 2007).

Public Aid Hospital

Public aid hospital non-profitable association established in 1993 in difficult economic circumstances to provide distinctive health service to serve the more crowded areas in Gaza city that suffering difficult economic situation where the percentage of these areas are about 47% of the population of Gaza city.

About 126 employees are working in the hospital in different administrative and technical jobs. The number of beneficiaries was 6000 patients per month, 25-30% of them were from the poor and marginalized families who receive service for free.

The hospital provides different aspects of health care like out clinics, obstetric services and general surgery operations (PAH, 2011).

Patient's Friends' Benevolent Society

Patient's friends' benevolent society was established in 1980 to help the people of Gaza strip and provide the healthcare services to poor and marginalized families. There are about 169 employees in the society work in all branches and departments of the society. The society provides primary and secondary healthcare and seeking to develop the provided services to meet the beneficiaries' needs. There are 45 beds in

the hospital's departments serve the obstetric and general surgery patients. There are 4 ORs in the hospital which equipped to provide general surgery. (Patient's Friends' Benevolent Society, 2011)

Yafa Hospital

Yafa hospital is a Nongovernmental hospital, established in 2001 in the center of Deir-Albalah city to provide health care services to about 250000 Palestinian people in the middle zone in Gaza strip, most of them live below the poverty line. The hospital provides medical services in different specialties including pediatric, orthopedic, obstetric and urology. Also the hospital include laboratory, radiology services and has two ORs and recovery beds to provide the services of general surgery which reach about 120 operation per month (Yafa hospital,2011).

Dar Essalam Hospital

Dar Essalam hospital is a non-profitable association. It was established in 1995 and it's the unique benevolent hospital providing people in the southern zone of GS with distinguished medical services. Offering medical services including surgical operations, promoting health awareness among citizens and the advancement of Palestinian health in the framework of transparency and good care (Dar Esslam hospital, 2011).

Al-Kuwait Hospital

Al-Kuwait hospital is non-profitable established in 2007 by the donation of mercy international association in Al-Kuwait, to provide the health care services for 200000 people in Rafah governorate in southern zone of GS. About 70 employees are working in the hospital in different administrative and technical jobs. The hospital has 30 beds used to serve patients in different specialties. The number of beneficiaries was 65000 patients in the past four years, most of them were from the poor and marginalized families who receive service for free. The number of operation per month is about 120 operations in different surgeries (Al-Kuwait hospital, 2011).

1.7 Operational Definitions

Infection prevention and control: Evidence-based practices and procedures that, when applied consistently in health care settings, can prevent or reduce the risk of transmission of microorganisms to health care providers, other clients, patients, residents and visitors(Ontario Ministry of Health and Long-Term Care Provincial Infectious Diseases Advisory Toronto, Canada, 2010).

Compliance: It is defined as 'the extent to which the healthcare workers practices and performance matches the Palestinian infection prevention and control protocols recommendations.

Hand hygiene: It is a general term referring to any action of hand cleaning. Hand hygiene relates to the removal of visible soil and removal or killing of transient microorganisms from the hands. Hand hygiene may be accomplished using soap and running water or an alcohol-based hand rub. Hand hygiene also includes surgical hand antisepsis (Ontario MOH Canada, 2011).

Nosocomial infection or HAIs: Hospital Associated Infections (HAI) or nosocomial infections are those infections that were neither present nor incubating at the time the patient was admitted to the health care facility. The majority of HAI become evident 48 hours or more following admission. However, it may not become clinically evident until after discharge (WHO, 2006).

Sterilization: describes a process that destroys or eliminates all forms of microbial life and is carried out in health-care facilities by physical or chemical methods. Steam under pressure, dry heat, ethylene oxide gas, hydrogen peroxide gas plasma, and liquid chemicals are the principal sterilizing agents used in health-care facilities (CDC, 2008).

Disinfection: describes a process that eliminates many or all pathogenic microorganisms, except bacterial spores (CDC, 2008).

Health Care Workers : Any person delivering care to a client's who subjected to surgical operation at NGOs hospitals including surgeons, nurses, anesthesiologist , anesthesia technicians and other health professionals.

Personal Protective Equipment (PPE): Clothing or equipment worn for protection against hazards (Ontario Ministry of Health and Long-Term Care, 2011).

Standard Precautions (SPs): are evidence based clinical work practices published by the Centre of Disease Control (CDC) in 1996 and updated in 2007 that prevent transmission of infectious agents in healthcare settings.

Flow system: The meaning of flow system in this research is the way of enter and exit of HCWs and patients trolleys movement in the ORs, beside the general movement between the rooms and other restricted and unrestricted areas.

On – the –job training: Employee training at the place of work while he or she is doing the actual job. Usually a professional trainer (or sometimes an experienced employee) serves as the course instructor using hands-on training often supported by formal classroom training (Business Dictionary,2011a).

Chapter 2: literature Review

2.1 Conceptual Framework

The conceptual framework guides the research process, organizes the work and makes the research findings meaningful. The researcher builds up the conceptual framework (figure 2.1) to address the main domains of the study in accordance with previous studies. It includes three aspects which affect the infection prevention and control practices at the operating rooms. The domains are individual factors, organizational factors and physical environmental factors. Each domain consists of a number of variables that affect the research subject.

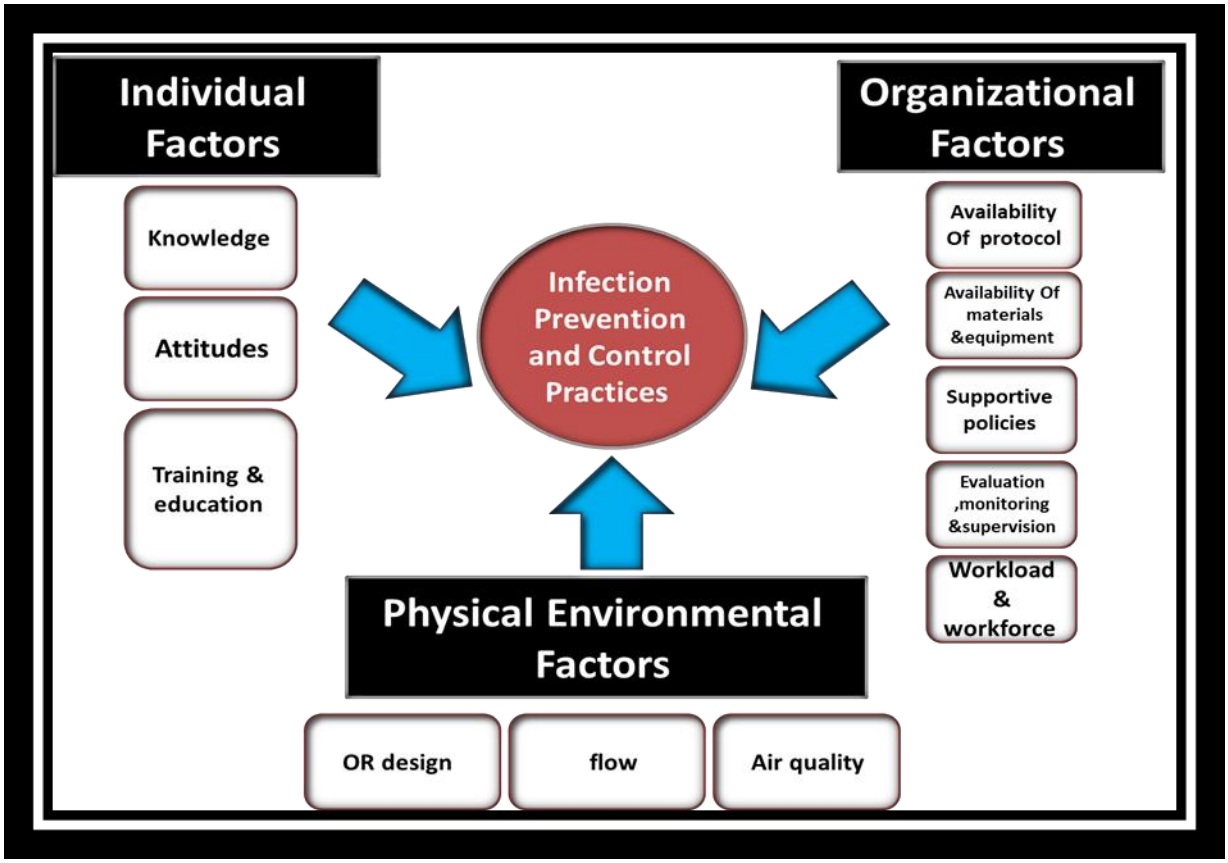

Figure 2.1: Infection prevention and control practices framework

Individual factors: They are categorized into knowledge, attitude, training and education. The knowledge and attitude play an essential role in HCWs practices according to IPC protocols and guidelines. The researcher explored the relationship

between knowledge, attitudes, training and education and the performance of the HCWs. The researcher examined and assessed the different procedures that are implemented at ORs regarding infection control and its adherence to protocols. Also the researcher has concluded results related to HCWs level of knowledge and their attitudes towards IPC practices in addition to training and education activities. The HCWs differ in their perception of IPC measures and they also differ in their understanding of the risk that may result from incompliance to IPC protocols.

Organizational Factors: They consist of five variables which are: availability of protocols, availability of materials and equipment, supportive policy, evaluation, monitoring and supervision and workload and workforce. The availability of the protocols in every health care facility is essential to be accessible to anyone who wants to use it. Also the availability of the materials and equipment is essential to proper practice of the infection control and sterilization techniques of the ORs; Supportive policies and regulation are the main element to encourage the proper practice and performance. The management of OR must practice the supervision and monitoring of the HCWs regarding IPC implementation.

Physical Environmental Factors: These are divided into three variables; OR design, traffic flow and air quality (ventilation and filtration). The ORs design must rely on the principle of infection control and minimize the movement of persons from outdoor to indoor and regulate the traffic flow in the operating theatre. The air conditioning and ventilation must be designed according to the international standards of OR. A clean environment plays an important role in the prevention of HAIs. Many factors, including the design of patient care areas, ORs, air quality, water supply and the laundry, can significantly influence the transmission of HAIs (WHO, 2004).

2.2 Infection Prevention and Control

Infection prevention and control refers to measures, practices, protocols and procedures aimed at preventing and controlling infections and transmission of infections in health care settings. Such infections may be pre-existing on admission or may be acquired in a health care facility (nosocomial). HAIs need to be properly managed in order to prevent transmission of organisms amongst patients, HCWs and

visitors. HCWs and visitors may be sources of infections that may result in facility-based outbreaks (Health Department of South Africa, 2007).

IPC guidelines are aimed at providing a safe health care environment for patients and staff alike. Good infection control practice should be established to improve health outcomes and prevent negative outcomes such as morbidity, mortality, increased health care costs and possible litigation. IPC measures are a combination of interventions and activities, ranging from hand hygiene, aseptic technique, waste management, rational antibiotic use, cleaning and the use of chemical cleaning agents, pest and rodent control, food handling, linen handling and management, isolation, surveillance, risk management, the use of PPE, employees' immunization programs and personnel hygiene. Laxity in application of any of these dimensions can result in significant negative public health consequences (Health Department of South Africa, 2007).

Emerging and re-emerging diseases, and the increase of resistant organisms, which undermine advances and progress made in the fight against diseases, are posing serious challenges to health care systems in both the developed and developing countries. An IPC policy is required to provide guidance to HCWs as to ensure safe management of infectious conditions (Health Department of South Africa, 2007).

2.3 History of infection prevention and control

The value of IPC programs and practices cannot be underestimated; when the human safety is the most important goal for the countries and health providers the care must be maximized and duplicated to conserve the client's safety. Healthcare had its first IPC champion in Florence Nightingale. While she had no scientific understanding of asepsis, her research into hospital sanitary problems made her a firm believer in pure air, pure water, efficient drainage, cleanliness, and light. Some of her writings described the putrid condition she found in hospitals during her travels. She once stated, "It may seem a strange principle to enunciate as the very first requirement in a hospital that it should do the sick no harm." Nightingale's firm belief in preventive medicine led to an established standard of formalized cleanliness and sanitation in hospitals and the military. She observed that open windows interfered with the ventilation of hospital wards and allowed air from the wards to pass into the corridors.

Nightingale believed that respiratory secretions were potentially dangerous, especially among the sick and that the sick should be isolated (AJIC, 2007).

Around the same time period, an obstetrician in Vienna, Dr. Ignaz Semmelweis, Demonstrated more formally that routine hand washing could prevent the spread of puerperal fever. He noted that maternity patients were dying at such an alarming rate that they begged to be sent home from the hospital to deliver with a midwife. The death rate was five times higher for mothers who delivered in the hospital than for mothers who delivered at home. Semmelweis' analysis of the outbreaks of puerperal fever in his hospital revealed that medical students, who were responsible for deliveries in Division I, often performed autopsies before assisting in deliveries, while midwives, who worked in Division II, did not. He theorized that disinfecting hands could prevent transmission of infection from a diseased cadaver to a pregnant (AJIC, 2007).

Joseph Lister, a professor of surgery at Glasgow, Scotland, was troubled by high mortality rates from post-surgical sepsis. He was the first to see the connection between Pasteur's discoveries of the fermentation process and the suppuration of wounds. In April 1867 he published his ground-breaking paper on antisepsis, stating that "all the local inflammatory mischief and general febrile disturbance which follow severe injuries are due to the irritating and poisoning influence of decomposing blood or sloughs".

Lister is credited with the beginnings of sterilization in the ORs. Before surgery, he sprayed the ORs with carbolic acid, because he thought that the infections were caused by dust particles in the air. Later, he began applying carbolic acid to compound fracture wounds. The wounds healed, amputation was averted, and the mortality rate from amputation plummeted from 45% to 15 % (AJIC, 2007).

2.4 Hospital Associated Infection (HAIs)

HAIs or nosocomial infections are those infections that were neither present nor incubating at the time the patient was admitted to the health care facility. The majority of HAIs become evident 48 hours or more following admission. However, it may not become clinically evident until after discharge (WHO, 2002a).

HAIs remain a major issue of patient safety. It complicates a significant proportion of patient care deliveries, adds to the burden of resource use, and contributes to unexpected deaths. Early infection control pioneers showed that surveillance and prevention programs can be successful and have set the scene for today's infection control activities. Parameters for success include those to recognize and explain HAIs and implement interventions to decrease infection rates and limit antimicrobial resistance spread. Current major challenges facing infection control programs are reviewed with an emphasis on recent trends in health care delivery systems, together with some vision on future activities and interactions toward such changes. Benchmarking of infection rates is considered inevitable, and, thus, surveillance strategies, adapted to changing health care systems, should improve and emphasize intervention and standardization (Pittet, 2005).

HAIs are considered as major causes of mortality, emotional stress and enhanced morbidity in hospitalized patients. These also account for significant economic loss and additional burden on health care institutions. In a study conducted by WHO, the highest frequencies of HAI were reported from hospitals in the Eastern Mediterranean Region (11.8%) followed by South-East Asia, where it was 10%. It has also been estimated that at any time over 1.4 million people worldwide suffer from infectious complications acquired in hospital. The infections acquired in the hospitals may be due to resistant organisms that further accentuate the problem. It has also been estimated that these infections cost more than US$ 40 million every year in Thailand alone (WHO b, 2002).

2.4.1 Surgical Site Infection

Surgical Site Infections (SSI) is either an incision or organ/space infection occurring within 30 days after an operation or within 1 year if an implant is present.

Before the work of Joseph Lister and others in the 1860s, surgical patients commonly developed postoperative fever followed by purulent drainage from their incisions, sepsis and often death. The introduction of the principles of antisepsis by Lister and the acceptance of Pasteur’s germ theory in the late nineteenth century led to a marked decrease in wound infection rates. These discoveries also radically changed surgery from an activity associated with infection and death to one of preventing suffering and prolonging life. In the twentieth century, the two key factors that have enabled

surgical advances, such as open heart surgery and kidney transplants to become routinely possible and safe are improved anesthesia and scientifically sound infection prevention practices.

Despite improvements in OR practices, instrument sterilization methods, better surgical technique and the best efforts of infection prevention practitioners, SSIs remain a major cause of nosocomial HAIs and - rates are increasing globally (Alvarado 2000). Moreover, in countries where resources are limited, even basic life-saving operations, such as appendectomies and cesarean sections, are associated with high infection rates and mortality. In these countries, therefore, it makes sense to focus on preventing SSIs in those procedures most frequently performed and/or those having the highest SSI rates (Tietjen, et al, 2003).

SSIs can have a significant effect on quality of life for the patient. They are associated with considerable morbidity and extended hospital stay. In addition, surgical site infections result in a considerable financial burden to healthcare providers. Advances in surgery and anesthesia have resulted in patients who are at greater risk of surgical site infections being considered for surgery. In addition, increased numbers of infections are now being seen in primary care because patients are allowed home earlier following day case and fast-track surgery (NHS, 2008).

2.5 Surgical Hand Antisepsis

Microorganism transfer from the hands of HCWs to patients is an important factor in health care-associated (i.e., nosocomial) infections and has been recognized since the observations of Semmelweis and others more than 100 years ago. (1) Skin is a major potential source of microbial contamination in the surgical environment. Hand hygiene is a critical step in preventing infections and the spread of infections, is of critical importance for the entire health care team, and remains the most effective and least expensive measure to prevent the transmission of microorganisms and HAIs. It is the single most important step in the prevention of infections. (2) The term general hand hygiene refers to decontamination of the hands by one of two methods: a- hand washing with either an antimicrobial or plain soap, and b- water or use of an antiseptic hand rub. (3) The term surgical hand antisepsis refers to the antiseptic surgical scrub or antiseptic hand rub performed before donning sterile attire preoperatively.

Although scrubbed members of the surgical team wear sterile gloves, the skin of their hands and forearms should be cleaned preoperatively to significantly reduce the number of microorganisms. The moist environment underneath surgical gloves can promote microorganism proliferation on the hands of the wearer. (4) The purpose of surgical hand antisepsis/hand scrubs is to remove debris and transient microorganisms from the nails, hands, and forearms; reduce the resident microbial count to a minimum; and inhibit rapid rebound growth of microorganisms (AORN Journal, 2004).

2.6 Standard precautions

Standard Precautions (SPs) are evidence based clinical work practices published by the CDC in 1996 and updated in 2007 that prevent transmission of infectious agents in healthcare settings.

SPs require all HCW's to:

A. assumes that every person is potentially infected or colonized with an organism that could be transmitted in the healthcare setting.

B. apply a set of work practices to blood, all body fluids except sweat, mucous membranes and non-intact skin including:

- Hand hygiene
- Use of PPE
- Management of spillages of blood and body fluids
- Appropriate patient placement
- Management of sharps
- Safe injection practices
- Respiratory hygiene and cough etiquette
- Management of needle sticks injuries
- Management of waste
- Management of laundry
- Decontamination of reusable medical equipment
- Decontamination of the environment.

The purpose of SPs is to break the chain of infection focusing particularly but not exclusively on the mode of transmission, portal of entry and susceptible host sections of the chain. Aseptic technique and antibiotic prophylaxis while not components of SPs are other key practices used to break the Chain of Infection at the infectious agent, reservoir and portal of exit sections of the chain (CDC, 2007).

2.7 Socio Economic burden

The HAIs burden the health system a high cost, instead of recovery of clients in a few days it takes long days and affect the health system and clients at the same. HAIs do place a high burden of cost upon health services by prolonging hospitalization, increasing the use of antimicrobial treatment and increasing the number of surgical and medical interventions per patient (Health department of South Africa, 2007).

In the USA, the risks of acquiring these infections have risen steadily over the last decades with accompanying extra costs estimated at US$ 4500–5700 million a year. In England, HAIs are estimated to cost £1000 million annually to the National Health Service. The costs of HAIs vary from country to country, but are substantial everywhere. In Trinidad and Tobago they represent 5% of the annual budget of a country hospital, and in Thailand some hospitals spend 10% of their annual budget on the management of infections. In Mexico, these costs represent 70% of the entire budget of the ministry of health (WHO, 2005).

HAIs add to functional disability and emotional stress of the patient and may, in some cases, leads to disabling conditions that reduce the quality of life. Nosocomial infections are also one of the leading causes of death. The economic costs are considerable. The increased length of stay for infected patients is the greatest contributor to cost. One study showed that the overall increase in the duration of hospitalization for patients with surgical wound infections was 8.2 days, ranging from 3 days for gynecology to 9.9 for general surgery and 19.8 for orthopedic surgery. Prolonged stay not only increases direct costs to patients or payers but also indirect costs due to lost work. The increased use of drugs, the need for isolation, and the use of additional laboratory and other diagnostic studies also contribute to costs (WHO, 2002b).

2.8 Palestinian infection prevention and control Protocol

A formal set of rules and procedures to be followed by HCWs during health services provision in the Palestinian hospitals, The aim of this curriculum is to provide uniformity and standardization of practices and ensure the best appropriate IPC practices based on each setting needs through the improvement of the performance of staff and their adherence to set standards of quality. The MOH supported the idea of developing service delivery protocols and training curricula as essential to strengthening the health care system in Palestine This curriculum was drafted by a local consultant, reviewed by MARAM technical teams and additional local consultants, reviewed/validated by USAID based international consultants/ organizations. The comments and recommendations from the reviews were integrated as appropriate in the document by local consultants and MARAM technical teams before the protocols were tested, edited and formatted. Although these protocols have been developed for primary health care settings, the same principles and procedures apply to general health setting including hospitals. However certain specialized units such as operating rooms and intensive care units will require more specific procedures not included in this document (MOH, 2004).

2.9 Domains affecting infection prevention and control practices

2.9.1 Individual Factors

2.9.1.1 Knowledge and Attitudes

The knowledge, skills and attitudes of the HCWs are very important to achieve the proper practice of IPC at ORs. Knowledge includes the facts that the participants need to know to perform their jobs (MOH, 2005). Many researchers conducted this factor and revealed the relations between the knowledge and attitudes and the IPC protocol.

A study conducted in Gaza by El-Dalow, (2011) showed that 34.2% of the participants know about the IPC protocol, while another study conducted by Awad (2009) found that most of HCWs (73%) did not have knowledge about the existence

of Palestinian IPC protocol, and not have knowledge of its contents and 73% of HCWs have knowledge about the SPs.

In a study conducted at Nigeria about the awareness, knowledge, attitudes and practice of blood and body fluid precautions among radiographers the study explores the awareness, knowledge, attitude and practice of SPs among radiographers as well as their sensitivity towards the possibility of being occupationally exposed and extent of their exposure to infections. 20.8% of radiographers knew about SPs through books, 8.4% knew through someone, 58.3% through seminar/ symposium, while 12.5% knew through mass media. Only 37.5% was against recapping of needles and 29.2% rated their knowledge very good. 45.8% of the radiographers have received occupational training on SPs. The attitude radiographers towards patients with blood and body fluid-borne pathogens were positive. No radiographer was identified to have been occupationally infected (Okaro et al, 2010).

Another study was conducted in Iran to assess the level of knowledge, attitudes, and practices among Iranian dental healthcare professionals towards standard isolation precautions in Shiraz, Iran. Practice of standard isolation precautions was poor among dental professionals in Shiraz University of Medical Sciences. This study showed that knowledge of infection control measures and a positive attitude towards them alone do not have an impact on adherence to recommendations (Askarian, 2009).

Three previous studies were conducted in Gaza; regarding compliance to IPC protocols, Abu zaid, (2010) showed that 56% of the respondents were familiar with the concept of SPs. Awad, (2009) revealed that 73% of HCWs have knowledge about SPs and the study of El-Dalow, (2011) showed that 59.3% know about SPs

Another study conducted at the endoscopy units in El-Kasr El-Ani Hospital, to assess the knowledge of health team in relation to infection control measures as well as their level of practice in the application of infection control measures. The study results revealed that 5% of physicians and 10% of nurses had satisfactory knowledge, and 30% of physicians and just 4% of nurses had adequate level of performance, while none of the workers had satisfactory level of knowledge or practice. The study recommended an educational program for the endoscopy staff about infection and

infection control measures application for the protection of staff and patients. The researcher found that the factor affecting infection control measures in endoscopy department regarding endoscopy health team level of knowledge and practice is the lack of knowledge in addition to insufficient level of performance during and post procedure as disinfection of endoscope, hand washing, and cleaning of environment post procedure, and few written Arabic protocols for universal precautions (El Shamaa, 2010).

2.9.1.2 Training and Education

Training and education is an important function of any organization as a method to develop the human resource and enrich their experience and knowledge. It directly affects the IPC practice and performance and hence the improvement of healthcare services and outcome. Training is an organized activity aimed at imparting information and/or instructions to improve recipient's performance or to help him to attain a required level of knowledge or skill (Business Dictionary, 2011b).

The prevention of HAIs requires an organized education and training program regarding proper IPC procedures in the health care setting, aimed at health care providers, clients/patients/residents and their caregivers. A coordinated, effective educational program will result in improved IPC activities. Education programs should be flexible enough to meet the diverse needs of the range of HCWs and other staff who work in the health care setting. The local public health unit and regional Infection Control Networks may be a resource and can provide assistance in developing and providing education programs for all health care settings. IPC education should be provided to all staff, especially those providing direct client/patient/resident care, at the initiation of employment as part of their orientation and as ongoing continuing education (Ontario Ministry of Health and Long-Term Care, 2011).

Health administrators should be oriented towards the importance of the infection control program. HCWs should be equipped with requisite knowledge, skills and attitudes for good infection control practices.

The infection control team should:

- Assess training needs of the staff and provide required training through awareness program, in-service education and on-the-job training;
- Organize regular training programs for the staff for essential infection control practices that are appropriate to their job description;
- Provide periodic re-training or orientation of staff; and review the impact of training (WHO, 2004).

Staff working in the sterilizing service department and are responsible for the reprocessing of instruments and equipment must have undergone formal training in how to clean, disinfect and sterilize instruments and equipment. The level of training must be appropriate for the level of responsibility that the staff member is expected to undertake (WHO, 2004).

A study was conducted in India, about the impact of education on knowledge, attitudes and practices among various categories of HCWs on nosocomial infections showed an increase in the number of subjects in each category scoring good and excellent in the post-education questionnaire; however this had declined with the progress of time. It was observed that the compliance level to hand washing practices differed among the different HCWs. Total compliance was 63.3% and ward aides were most compliant 76.7%. Education has a positive impact on retention of knowledge, attitudes and practices in all the categories of staff. There is a need to develop a system of continuous education for all the categories of staff. In order to reduce the incidence of nosocomial infections, compliance with interventions should be mandatory (Suchitra JB, 2007).

Education has an essential influence on the ORs team practices and improves their adherence to the protocols and guidelines therefore they all are in need for continuous education. In a study conducted at Barnes-Jewish Hospital in Washington an Observation of surgical personnel in four specialties (Cardiothoracic, General, Gynecologic, and Orthopedic) in the ORs was performed prior to implementation of an educational intervention designed to improve compliance with SPs and at 1- and 2-years post-intervention. Use of protective eyewear and double gloving increased following the intervention, whereas the incidence of documented blood and body fluid exposures decreased (Kim et al, 2001).

In a study under the topic of assessment of an educational training program for nurses working in maternal and child health (MCH) centers in Assiut city regarding infection control conducted in Assiut in Egypt. All nurses lacked knowledge related to the concept of epidemiology only 40.2% of the nurses under the study had sufficient knowledge regarding the concept of epidemiology before exposure to the program. The percentage increased to 88.9% after administration of the program. Also the majority of nurses had proper hand washing techniques on the post-test with a statistical significant difference of <0.01.As for nurses' knowledge of the occupational hazards to which they may be exposed during work in MCH centers, the majority of nurses mentioned needle stick, followed by the amount of blood splattering from the patient on their hands, patient sneezing or coughing and touching patient skin. Nurses play an important role in MCH centers to minimize and prevent infection through providing the nurses with adequate and appropriate supplies which include protective clothes and equipment in health care settings (Hassan,et al., 2004).

Training and education are very important to improve the HCWs practices and adherence to infection control measures and protocols, in a study conducted in Nepal the researcher designed infection control program and assessed their effectiveness to improve infection control at peripheral health care facilities in Nepal. It was found that after training, infection control practice increased significantly. Environmental cleanliness improved from 24% to 52%. Similarly hand washing compliance increase from 36% to 88% and waste disposal practice improved from 27% to 52%. Decontamination of items and equipment increased from 21% to 45%.it can be concluded that education and training are effective in improving the safety of patients and providers (Gurung, 2009).

According to the research of ' knowledge, attitude, and practice of standard and transmission-bases precautions in tertiary and secondary health care settings of Maldives" the only socio demographic factor shown a significant association was marital status, who are single reported better practice. Training on infection control practices was just marginally significant with p value of 0.9. The level of knowledge was in the low category, attitude was neutral to negative ' practice was moderate to high '. The analysis of correlation between attitude and practice discovered a direct significant association at the level 0.01 which is plausible. No significant correlation between knowledge and practice was found. The relationship tend to be negative

signifying that increase in knowledge may decrease performance of practice (Najeeb, 2007).

2.9.2 Organizational factors

The role of any organization (health facility) is to promote the IPC practices to be consistent with the IPC protocols and guidelines and provide the health services that conserve and attain the better outcomes of client's health and safety.

Egbu (2005) conducted a study in National Health Services (NHS) in Scotland and found that the integration of health facility management in the control of HAI and other core services is vital in avoiding duplication of work carried out by the HCWs. Continuous measurement and management of performance of facility management services is also vital in the control of HAI. In addition, it was identified that managing knowledge is important to retain, develop, organize, and utilize the organization's capability of managing HAI. Overall, an increased concerted effort; better integration of processes and practices between clinical and non-clinical activities in the healthcare sector and effective dissemination of knowledge are all vital in controlling HAI to achieve “quality” in healthcare provisions.

2.9.2.1 Availability of protocols and guidelines

A HAIs prevention manual containing instructions and practices for patient care is an important tool. The manual should be developed and updated by the infection control team and reviewed and approved by the committee. It must be made readily available for HCWs, and updated in a timely fashion (WHO, 2004).

Protocols handouts must be available to HCWs at the ORs to enhance the use and implementation and practices of IPC. A study conducted in Gaza by El-Dalow, (2011) showed that most of respondents did not have a copy, and another study conducted in Gaza by Awad (2009) revealed that most of HCWs (73%) did not have knowledge about the existence of Palestinian IPC, and not have knowledge of its contents.

A study conducted in 13 Dutch hospitals on the adherence to local hospital guidelines revealed that overall adherence to all aspects of the guideline was achieved in only 28%. The most important barriers to local guideline adherence were lack of awareness due to ineffective distribution of the most recent version of the guidelines, lack of

agreement by surgeons with the local hospital guidelines, and environmental factors, such as organizational constraints in the surgical suite and in the ward (Kasteran et al, 2003).

In a study conducted in Zambia about the compliance to guidelines, Eighty six percent (86%) of respondents had heard about IPC guidelines. Several other studies have indicated that the majority of HCWs in Zambia have heard about IPC, Almost all (95%) indicated that they had heard about HAIs. Despite such as a response, when asked to give examples of HAIs, most mentioned conditions such as malaria, scabies and mumps with only 9.8% mentioning Post-operative wound infections even though they were common at the institution averaging 15.5% per year20. This implied that, a very small percentage of HCWs at the institution knew that Post-operative wound infections are nosocomial. The study also revealed that, high compliance was associated with inclusion of Guidelines in the Curricular (Katowa, 2007).

Compliance to infection prevention and control protocols

Compliance is the extent to which certain practices are in accordance with the IPC instructions and advice. Compliance can be influenced or controlled by a variety of factors like culture, economic and social factors, self-efficacy, and lack of knowledge or means. Guidelines that guide an individual's behavior exist in a variety of settings (including health care settings), but people do not always comply with them. (Efstathiou et al, 2011).

Two studies conducted in Gaza regarding the compliance of IPC protocols and its obstacles, Awad, (2009) reported that the main barrier was absence of training programs, followed by the lack of knowledge and education, lack of time and work overload , insufficient supplies and finally no accountability and feedback of performance. El-Dalow, (2011) ranked the causes was the absence of education, lack of knowledge, lack of required supplies and workload and insufficient

Yassi et al. (2007) conducted a study about determinants of HCWs' compliance with infection control procedures; the purpose of this study was to assess determinants of HCWs self-reported compliance with infection control procedures. A survey was conducted of HCWs in 16 healthcare facilities. A strong correlation was found

between both environmental and organizational factors and self-reported compliance. No relationship was found with individual factors. Another factor that has been associated with compliance is incorporation of IPC Guidelines in the HCWs' curricular and in-service training on IPC protocols (Katowa et al, 2007).

Compliance with hand washing procedures by HCWs continues to be at 20-50%.Studies have shown that deterrents to hand hygiene compliance include the amount of time required for soap-and-water hand washing with heavy workloads, skin irritation, and dryness caused by frequent hand washing with soap and water, and poor access to sinks (Fendler & Groziak, 2001).

Use of waterless alcohol-based hand sanitizers instead of soap-and-water hand washing has been demonstrated to overcome these barriers to compliance. Alcohols, in the form of both rinses and gels, are one of the most effective agents for reducing the number of viable pathogens on the hands including under artificial fingernails. Hand disinfection with an alcohol gel hand sanitizer containing emollients causes less skin irritation and dryness of the hands than hand washing. Introduction of easily accessible dispensers with an alcohol-based waterless hand washing antiseptic also has been demonstrated to lead to significantly higher hand hygiene rates among HCWs. Improving compliance of HCWs with recommended hand hygiene measures can reduce transmission of hospital-acquired pathogens and result in decreased infection rates (Fendler & Groziak, 2001).

Many researchers focused on the factors that contribute to non-compliance with SPs. Reported factors were lack of knowledge, lack of time, forgetfulness, lack of means, negative influence of the equipment on nursing skills.

2.9.2.2 Availability of materials and equipment

HCWs in the ORs need many types of materials and equipment. They are in need for sterilization equipment as autoclave, boilers, ultraviolet, ultrasonic washing machine and gas sterilizer. They also need different kinds of materials as antiseptic, disinfectant materials, personal precaution materials as gowns, gloves, masks in order to keep the high sterilization techniques to prevent any HAIs.

Hsia et al, (2011) in their research about the access to emergency and surgical care in sub-Saharan Africa found that the percentage of hospitals with dependable running water and electricity ranged from 22% to 46%. In countries analyzed, only 19–50% of hospitals had the ability to provide 24-hour emergency care. For storage of medication, only 18% to 41% of facilities had unexpired drugs and current inventories. Availability of supplies to control infection and safely dispose of hazardous waste was generally poor (less than 50%) across all facilities. As few as 14% of hospitals (and as high as 76%) among those surveyed had training and supervision in place.

Availability of infection prevention materials has been cited as important determinants of compliance. Another study reported that inadequate supply of gloves in southern province based health facilities lead to incorrect routines; for example, the average number of vaginal examinations for each woman at the University Teaching Hospital where supply of gloves was adequate was 3.5 compared to 2 in Southern Province based health facilities (Katowa et al, 2007). In another study conducted it was reported that general hygienic measures taken in hospitals to reduce the risk of HIV infection were insufficient and that many inadequacies stemmed from lack of supplies (Katowa et al, 2007).

2.9.2.3 Supportive policies

Many factors affect HCWs compliance to IPC including, personal variables, knowledge and training about the importance of infection prevention, administrative support and punishment used for non- compliant persons, and the accessibility of materials used in disinfection (Pittet, 2002).

The role of government is to promote and encourage minimization of HAIs through appropriate and effective programs, working with hospitals, their staff and consumers. Health policy promote a safety climate, develop policies to facilitate infection control measures , provide leadership, conformity with measures , provide adequate staff and supplies , and provide education to HCWs, patients and visitors (Griffiths et al, 2008).

2.9.2.4 Supervision, monitoring and evaluation

As managerial responsibility the health care facility must have a supervision monitoring, and evaluation activities to direct the employee to do the things right. Continuous monitoring and evaluation will encourage the best practice and service.

Every health facility should have infection control team as a supervision body; the infection control team is responsible for the day-to-day activities of the infection control program. Health care establishments must have access to specialists in infection control, including physicians and infection control practitioners (WHO, 2004).

In some countries, these professionals are specialized teams working for a hospital or a group of health care establishments; they may be administratively part of another unit (e.g. a microbiology laboratory, medical or nursing administration, public health services). The optimal structure will vary with the type, needs, and resources of the facility (WHO, 2004).

The reporting structure must, however, ensure the infection control team has appropriate authority to manage an effective infection control program. In large facilities, this will usually mean a direct reporting relationship with senior administration. The infection control team or individual is responsible for the day-to-day functions of infection control, as well as preparing the yearly work plan for review by the infection control committee (IPCC) and administration (WHO, 2004).

These teams or individuals have a scientific and technical support role, E.g. Surveillance and research, developing and assessing policies and practical supervision, evaluation of material and products, the overseeing of sterilization and disinfection, ensuring the sound management of medical waste and the implementation of training programs. They should also support and participate in research and assessment programs at the national and international levels.

The infection control team should consist of at least an infection control practitioner who should be trained for the purpose of carry out the surveillance program, develop and disseminate infection control policies, monitor and manage critical incidents and coordinate and conduct training activities (WHO, 2004).

2.9.2.5 Workload and workforce

There are many barriers that affect the practice and compliance to IPC protocols like absence of training and education programs, workload and workforce and loss of motivation.

Hospitals with low nurse staffing levels and patient overcrowding leading to poor adherence to hand hygiene have been associated with higher adverse outcome rates and hospital outbreak investigations. In an intensive care unit (ICU) setting it was demonstrated that understaffing of nurses can facilitate the spread of Methicillin-resistant *Staphylococcus aureus* (MRSA) through relaxed attention to basic infection control measures (e.g., hand hygiene). In a neonatal ICU outbreak, the daily census was above the maximum capacity (25 neonates in a unit designed for 15), and the number of assigned staff members was fewer than the number necessitated by the workload, which resulted in relaxed attention to basic infection control measures (use of multidose vials and hand hygiene). During the highest workload demands, staff washed their hands before contacting devices only 25 percent of the time, but hand washing increased to 70 percent after the end of the understaffing and overcrowding period. Ongoing surveillance determined that being hospitalized during this period was associated with a fourfold increased risk of acquiring an HAI. These studies illustrate an association between staffing workload, infections, and microbial transmission from poor adherence to hand hygiene policies (Collins, 2008).

Hugonnet et al (2007) conducted a narrative review of seven multi-center studies to assess the association between understaffing and HAIs. The authors concluded there is sufficient evidence for a relationship between staff downsizing and an increase in nosocomial infections. However, the authors concluded that there is insufficient evidence on absolute numbers for optimal staffing.

McCutcheon et al, (2005) conducted a systematic review on the evidence relating nurse staffing to three infection outcomes: sepsis, urinary tract infection (UTI), and pneumonia. The results of this review suggest that in hospitals with registered nurse staffing levels above the 75th percentile, rates of hospital-acquired pneumonia and UTI in medical patients were reduced by 6.4% and 3.6% respectively compared with

patients in hospitals with low numbers of registered nurses (25th percentile). In surgical patients, higher staffing was associated with a reduction of 4.9% in UTI rates.

A prospective study carried out by Hugonett et al, (2004) assessed data over a four-year period (January 1999 – December 2002) in a medical intensive care (ICU) unit in Switzerland. This study found that, on average, an increase of the nurse-patient ratio by one unit was associated with a 30% reduction of risk of infection in univariate analysis. This remained unchanged in a multivariate model (controlling for risk factors). The authors concluded that a nurse to patient ratio of 2.2 could have prevented 26.7% of infections acquired during the study period. A major strength of this study is that it assessed the temporal link between staffing levels and infection outcome, showing that staffing levels were consistently lower 2–4 days before infection. However, such ratios are not applicable to other clinical settings (Griffiths et al, 2008).

2.9.3 Physical Environmental Factors

A clean environment plays an important role in the prevention of (HAIs). Many factors, including the design of patient care areas, ORs, air quality, water supply and the laundry, can significantly influence the transmission of HAI (WHO, 2004).
Routine cleaning is important to ensure a clean and dust-free hospital environment. There are usually many micro-organisms present in “visible dirt”, and routine cleaning helps to eliminate this dirt. Administrative and office areas with no patient contact require normal domestic cleaning. Most patient care areas should be cleaned by wet mopping. Dry sweeping is not recommended. The use of a neutral detergent solution improves the quality of cleaning (WHO, 2005).

2.9.3.1 Operating room design

The OR design must be undergoing the principles of sterilization and safety of the clients, it must be away from the traffic and entry and exit from the hospital, it should have two areas clean and unclean, restricted and unrestricted areas and the personal flow must be in a suitable way to keep the sterilization of the ORs. In addition to other design requirement as ventilation, air conditions and High Efficiency Particulate Air (HEPA) filters. The physical design of hospitals is an essential component of a

hospital's infection control strategy, incorporating infection control issues to minimize the risk of infection transmission. Hospital design or renovation therefore needs to consider the separation of operating and cleaning areas, adequate ventilation, lighting and storage facilities and the design of patient accommodation areas, including adequate numbers of hand basins and single bed facilities (National Health and Medical Research Council (NHMRC), 1996).

In general, the structural surfaces of the hospital environment are a low infection risk compared with instruments and equipment which come into intimate contact with the patient. The number of organisms present on any surface does not continually increase, and cleaning of the hospital environment only temporarily changes the number present (Collins, 1988).

The literature search identified very few studies that provided any quantifiable evidence in relation to operating theatre design and the pre-specified outcomes. In particular, of the five pre-specified outcomes, the studies included in this review only reported infection rates. The types and designs of operating theatres reported in the included literature varied quite significantly, with studies often reporting on the effects of a new operating theatre being built as opposed to an old operating theatre. In some cases, a change in operating theatre ventilation occurred as part of the design change, which raises the issue of what proportion of the reported effects can be attributed to the operating theatre design itself.

A further study to analyze the move from an old to a new operating theatre found a reduction in infection rates after the move (whitehead et al, 2008).

Operating theatres may be located in either purpose-built units or in converted hospital accommodation. They are busy units and therefore they require considerable planning and discussion before they are built in order to prevent expensive mistakes. They should be:

• Separated from the main flow of hospital traffic and from the main corridors; however, it should be easily accessible from surgical wards and emergency rooms.

• Ideally, the floor should be covered with antistatic material, and the walls should be painted with impervious, antistatic paint. This reduces the dust levels and allows for frequent cleaning. The surfaces must withstand frequent cleaning and decontamination with disinfectant (Operating Theatre, 2011).

2.9.3.2 Flow

It's very important to regulate the flow of staff, patients and visitors at the ORs to prevent the infection transmission in health care facilities. Because the increasing in the number of persons who enter the OR lead to increase possibility of microbial contamination especially in the mixed areas as waiting room. Microbial contamination is minimized by reducing the number of people permitted into an area and by defining the activities that take place there (Rebmann, et al, 2009).

It is important to direct activity patterns and traffic flow in these areas to keep contaminated areas separate from areas where procedures take place. Activities such as waste disposal, instrument processing and cleaning procedure areas should be carefully planned and organized to minimize the risk of infection to patients and healthcare workers. Equally important are designing and implementing traffic flow patterns that prevent soiled instruments and other items from crossing paths with cleaned, high-level disinfected or sterilized items (Tietjen et al, 2003).

SSI cause significant morbidity and mortality in the postoperative period. Opening of the OR door disrupts its filtered atmosphere, increasing contamination above the wound. A study of traffic in the OR as a risk for infections, found that a total of 3071 door openings were recorded in 28 cases. Traffic varied from 19 to 50 events per hour across specialties. The pre incision period represented 30% to 50% of all events. Information requests accounted for the majority of events. Door openings increase in direct proportion to case length, but have an exponential relationship with the number of persons in the OR. There is a high rate of traffic across all specialties, compromising the sterile environment of the OR (Lynch et al, 2009).

A report indicated that mortality rate secondary to burns infection was lowest in wards that were situated on the top floor probably due to minimal movements and good ventilation. This report emphasized the importance of regulating traffic flow and activity patterns a component of infection prevention. Controlling of traffic and activity patterns in a ward helps in minimizing the number of microorganisms present in the environment, as the number of microorganisms in a designated area tends to be related to the number of people present and their activity (katowa, 2007).

2.9.3.3 Air Quality

Heating, ventilation, and air conditioning systems in health-care facilities are designed to maintain the indoor air temperature and humidity at comfortable levels for staff, patients, and visitors; control odors; remove contaminated air; facilitate air-handling requirements to protect susceptible staff and patients from airborne health-care–associated pathogens; and minimize the risk for transmission of airborne pathogens from infected patients. Decreased performance of healthcare facility systems, filter inefficiencies, improper installation, and poor maintenance can contribute to the spread of health-care–associated airborne infections (CDC, 2003).

ORs air may contain microorganisms, dust, aerosol, lint, skin squamous epithelial cells, and respiratory droplets. The microbial level in OR air is directly proportional to the number of people moving in the room. One study documented lower infection rates with coagulase-negative staphylococci among patients when OR traffic during the surgical procedure was limited (CDC, 2003).

Therefore, efforts should be made to minimize personnel traffic during operations. Outbreaks of SSIs caused by group beta-hemolytic streptococci have been traced to airborne transmission from colonized OR personnel to patients. Several potential health-care–associated pathogens (e.g., *Staphylococcus aureus* and *Staphylococcus epidermidis*) and drug-resistant organisms have also been recovered from areas adjacent to the surgical field, but the extent to which the presence of bacteria near the surgical field influences the development of postoperative SSIs is not clear (WHO,2004).

2.10 Summary of literature review

The researcher build up the conceptual frame work to clarify the main domains of the study, it includes three aspects which affect the IPC practices at the ORs, the domain are individual factors, organizational factors and physical environmental factors. IPC refers to measures, practices, protocols and procedures aimed at preventing and controlling infections and transmission of infections in health care settings. Such infections may be pre-existing on admission or may be acquired in a health care facility (nosocomial). HAIs need to be properly managed in order to prevent transmission of organisms amongst patients, HCWs and visitors. HCWs and visitors may be sources of infections that may result in facility-based outbreaks.

Many studies conducted on this issue in many different region of the world, all of them agreed about the seriousness and importance of the proper IPC practices to maintain the health and safety of the people.

The literature clarify the factors that affect the compliance to IPC protocols through different studies in the world, lack of knowledge, training and education are one of the main causes of weak implementation of the IPC measures and directions.

In spite most HCWs have good attitudes towards the IPC practices according to literature but there are weakness in knowledge and practice of IPC and the lack of supervision and monitoring regarding this issue lead to ignorance and carelessness of adherence to these guidelines.

The studies of infection control also revealed that, high compliance was associated with inclusion of Guidelines in the Curricular. Training interventions improve the performance of the HCWs and lead to good practices of IPC activities.

Many researchers focused on the factors that contribute to non-compliance with SPs. Reported factors were lack of knowledge, lack of time, forgetfulness, lack of means, negative influence of the equipment on nursing skills.

Availability of infection prevention materials has been cited as important determinants of compliance. Many previous studies revealed that the lack of IPC materials and equipment lead to bad practices and increase the rate of nosocomial infection.

Many factors affect HCWs compliance to IPC including, personal variables, knowledge and training about the importance of infection prevention, administrative support and punishment used for non- compliant persons, and the accessibility of

materials used in disinfection. Most of studies emphasized on the need of every health facility to have infection control team as a supervision body; the infection control team is responsible for the day-to-day activities of the infection control program. Health care establishments must have access to specialists in infection control, including physicians and infection control practitioners

About the importance of physical environment of the health care facilities many studies revealed that routine cleaning is important to ensure a clean and dust-free hospital environment. There are usually many micro-organisms present in “visible dirt”, and routine cleaning helps to eliminate this dirt. Administrative and office areas with no patient contact require normal domestic cleaning. Most patient care areas should be cleaned by wet mopping. Dry sweeping is not recommended. The use of a neutral detergent solution improves the quality of cleaning.

The physical design of hospitals is an essential component of a hospital's infection control strategy, incorporating infection control issues to minimize the risk of infection transmission. Hospital design or renovation therefore needs to consider the separation of operating and cleaning areas, adequate ventilation, lighting and storage facilities and the design of patient accommodation areas, including adequate numbers of hand basins and single bed facilities. Several studies clarified the relationship between the knowledge, attitude, training, materials and equipment, availability of the guidelines, flow system and educational courses interventions and good practices of infection prevention and control. The training efforts towards IPC can change the behavior of the HCWs and lead to proper practices.

Also the studies agreed on the necessity of increasing the efforts of compliance to IPC standards and guidelines to protect the patients and HCWs from getting more infection.

Finally, it clear that infection control is a worldwide problem and a lot of efforts and studies made by governments and health organizations to tackle this problem to reach to the high quality of health services throughout the world.

At the Palestinian level more efforts are needed to be given to this issue by developing the work in our hospitals to match the IPC instructions and guidelines.

Chapter 3: Methodology

This chapter presents study methodology which include the study design, study population, the study instruments which used in the study ,ethical and administrative consideration ,piloting ,data collection process, selection criteria, data analysis and limitation of the study.

3.1 Study design

The study design is descriptive analytical cross sectional with mainly quantitative approach and supported with in-depth interviews. The cross sectional design is appropriate for description of the practice and its relation to other variables. The quantitative part will describe and measure the health care practices at the ORs according to the Palestinian IPC protocol. The in-depth interviews help in understanding and interpreting the real causes of the problem through the understanding of key person's perceptions and feelings to strength and enrich the study outcomes.

3.2 Study population

The population of this research consisted of all HCWs working at the ORs in the selected NGOs hospitals (surgeons, anesthesiologists, OR nurses and anesthesia technicians). The total number of the HCWs at the ORs was 184 persons, 15 of them were drawn to the pilot study and the rest (169) participated in the study for both questionnaires and checklists

The in-depth interviews were conducted with 6 selected persons from the different hospitals under investigation.

According to eligibility criteria the study was conducted in 6 NGOs hospitals in Gaza governorates. The hospitals are Al-Awda hospital, Patient's Friends hospital, Public aid hospital, Yafa hospital, Dar Essalam hospital and Al-Kuwait hospital. It is important to mention that Al-Ahli hospital refused to be included in the study sample.

3.3 Study Settings

The study was conducted at the ORs in the 6 selected NGOs hospitals- in all Gaza governorates (Al-Awda Hospital in Northern Gaza, Patient's Friends Hospital, and Public Aid Hospital in Gaza city, Yafa Hospital in Der Al-Balah, Dar Essalam Hospital in Khanyounis, And Al-Kuwait Hospital in Rafah) to reflect representative results.

3.4 Period of the study

The study was conducted from February to November 2011, it was started by preparing research proposal and designing the data collection instruments, and then get the approval from the University to complete the study, pilot study and data collection was done in august and September and then data analysis and completing the research in October and November.

3.5 Selection criteria:

3.5.1 Inclusion criteria

To select the 6 NGOs hospitals from the 13 hospitals, the researcher used the MOH directory of health services (MOH, 2011).

According to the MOH there are 13 Non-Governmental Organizations hospitals in Gaza governorates, the hospitals (sample) were chosen according to the following criteria:

- The hospital which carries out general surgery
- The hospital that has two ORs and more.
- The hospital which does more than 100 surgeries per month.

All the surgical team members (surgeons who frequently do operation, anesthesia team either physicians or technicians, and nurses) irrespective of the type of hiring, (full time, part time, hour method, and the case method) are included in the study to fill the questionnaire and checklist.

3.5.2 Exclusion Criteria

- Workers of the ORs, because they haven't the IPC knowledge to answer the questions of this research.
- The hospitals that have less than two ORs, because they don’t do general surgery.
- The two hospitals (Al-Quds &Al-Amal) which are affiliated to the Palestinian red crescent society because they are considered national hospitals.
- Jordanian hospital in Gaza because it is a relief and temporary hospital.

3.6 Ethical and administrative considerations

The researcher was committed to all ethical and administrative consideration required to conduct a research.

- Ethical approval was obtained from the school of public health Al-Quds University, and Helsinki committee in Gaza.
- Also an official approval was obtained from hospitals directors.
- Every participant in the study received a complete explanation about the research purposes and confidentiality.
- Every person in the study population informed about the optional participation in the study.
- All the ethical consideration observed, respect for people and human rights and respect for truth.
- Confidentiality was given and maintained.

3.7 Study instruments

In this research, self-administered questionnaire, check list for the HCWs practices, and checklist for the OR setting are used for the quantitative part of the research and supported by the in-depth interviews.

Self-administered questionnaire

Self-administered questionnaire was constructed and used for the entire study sample (184). The questionnaire was clear with no complex terms, no jargons, and no leading questions. The researcher's own opinions did not influence the respondent to answer questions in a certain manner; there are no verbal or visual clues to influence the respondent. The questionnaire was designed in Arabic language to be easily understood by the respondents. In each questionnaire, an explanatory letter was attached to facilitate questionnaire filling.

The questionnaire consisted of five sections and took approximately 15 minutes to be completed. The first part covered the profile of the respondents, the second part contained questions to assess the individual factors that influence the HCWs practices and compliance to the standards. The third part included questions that assess the HCWs practices and performance. The fourth part examined the influence of organizational factors on the adherence to IPC protocols. The fifth part assessed the physical environmental factors that hindering the adherence to protocols.

The observation checklist for the physical environment

The researcher constructed ORs observation checklist to assess the physical environment fitness for the implementation of IPC protocols. The observation checklist consisted of different items aimed to assess availability of protocols, general cleanliness, OR design, materials and equipment, flow system and sharp disposals. The observation was done for every health setting 3 times (6x 3 = 18) in different times and in different working shifts.

The observation checklist for the health care workers

It was constructed and observed by the researcher in order to assess all aspects of health care worker's practices regarding IPC protocols. The researcher developed it to assess the main practices at the ORs included the compliance to hand washing, wearing gown and gloves, skin preparation for surgery, antiseptic and disinfectants, and sharp disposal.

The in-depth interviews

The researcher conducted these interviews to probe further findings to get high quality data and to answer questions that cannot be answered by the questionnaire. It was carried out with 6 selected persons in managerial positions such as: hospital director general, hospital medical director, nursing director, and head nurse from different selected hospitals.

3.8 Reliability

Reliability ensured by using three instruments to measure the same factors through a questionnaire and two checklists, and by used the same measurement tools with all participants.

In order to test the internal consistency of the questionnaire Cronbach's Coefficient Alpha was used, the normal range of Cronbach's coefficient alpha value between 0.0 and + 1.0, and the higher values reflects a higher degree of internal consistency. The Cronbach's coefficient alpha was calculated for each field of the questionnaire.

Table (3.1) shows the values of Cronbach's Alpha for each filed of the questionnaire and the entire questionnaire.

Table 3.1: Reliability of the questionnaire

No.	Domains	Cronbach's Alpha
1.	**Individual factors**	**0.522**
2.	**Organizational factors**	**0.788**
3.	**Physical environmental factors**	**0.667**
4.	**Practices**	**0.629**
	All statements of the questionnaire	**0.847**

3.9 Validity

Face validity

It is achieved by organizing the questionnaire in categories with logical sequence to encourage the respondent to fill it.

Content validity

The questionnaire sent to different experts including (annex, 10) researchers, managers, and statistician to assess the clarity and relevance to the objectives of the study. All comments on the questionnaire were taken in consideration, and as a result some modification for some items was done.

3.10 Pilot Study

A pilot study was conducted before starting the data collection as a pretest to point out weaknesses in wording, predict response rate, determine the real time needed to fill the questionnaire and identify areas of ambiguity and to test the validity and suitability of the questionnaire. 15 participants were chosen from the study target population to conduct the pilot study. All of them received clear explanation about the study purpose. Some modifications were introduced to the questionnaire but did not affect its important content. Participants who participated in the pilot study were not included in the study sample.

3.11 Response rate

Of the 169 HCWs who constitute the study population 154 responded with a response rate of 91%.

3.12 Data collection

In the quantitative part, the researcher used three instruments: self-administered questionnaire, observation checklist for ORs, and observation check list for HCWs. All the three data collection instruments were developed by the researcher in the light of Palestinian IPC protocols, and were reviewed by experts. The questionnaire was filled by the 154 HCWs themselves under the researcher supervision. Both of the

checklists were observed by the researcher himself during the operation three times in different times and in different working shifts with total of 159x 3= 477 checklist for HCWs and 6x3= 18 checklist for physical environment. In the qualitative part the researcher used in depth interviews including 6 HCWs, whom were purposively chosen. Those were in managerial positions such as: hospital medical director, nursing director, and head nurse from different NGOs hospitals. The main factors that influence the practices of the IPC will be discussed.

3.13 Data management and statistical analysis

Data analysis was conducted using (SPSS 19), The data was gathered and then the instruments reviewed , coding the data, appropriate entry method, coding variables, data cleaning then doing cross tabulation, An independent t-test and one way ANOVA statistical test were used to investigate the relationship between the independent and dependent variables. The personal characteristics (gender, age, level of experience and education) and other variables as knowledge ,attitude, practice, availability of protocols, availability of materials, supportive policies, workload ,workforce, OR design, traffic flow and air quality will be compared as independent variables to IPC protocol and practice as dependent variable. The analysis of data after the interviews was analyzed using Open Coding thematic analysis (OCTA), all the interviews were recorded and then wrote on papers and every question answers analyzed through making points of agreement.

3.14 Limitation of the study

- Limited educational resources, particularly updated books and journals.
- Hawthorne effect.
- Unstable schedule of surgeries.
- Cut of electricity.
- Lack of cooperation specially surgeons.
- Unstable numbers of employees.

Chapter 4: Results and Discussion

4.1 Profile of the respondents

Table 4.1a: Socio-demographic characteristics of the respondents

Hospital name	**Frequency**	**Percentage %**
Al-awda	30	19.5
Public aid	33	21.4
Patient's friends	36	23.4
Yafa	19	12.3
Dar Essalam	18	11.7
Al-Kuwait	18	11.7
Gender		
Male	136	88.3
Female	18	11.7
Age group		
20-29 years	48	37.2
30-39 years	32	24.8
40-49 years	35	27.1
50 and over	14	10.9
Marital status		
Married	122	79.2
Single	32	20.8

Table 4.1a shows that 19.5% of the respondents were from Al-Awda hospital, 21.4 % from Public aid hospital, 23.4% from Patient's Friends hospital, 12.3% from Yafa hospital, 11.7% from Dar Essalam hospital and 11.7% from Al-Kuwait hospital. The variation in the percentage of the human resource within these facilities is due to variation in the hospitals size and place. Also in the same table (4.1a) 88.3% of the respondents were males and 11.7 %were females. This low female participation percentage is a reflection of the low female employees in the labor force at NGOs hospitals and indicates the undesire of the females to work at the operating rooms because it is considered to be a hard job. In addition, the majority of the surgeons and anesthesiologist are males. Also the table shows the age distribution of the participants, as follows; 37.2% were from 20-29 years, 24.8% from 30-39 years, 27.1% from 40-49 years and 10.9% were above 50 years old. It's obvious that the percentage of the participants younger than 30 years constitutes the majority which indicates the large number of ORs and anesthesia technicians. This indicates a real

chance to develop the work at the ORs in these hospitals by using intense training courses. This result is consistent with a study results regarding infection control which was conducted in Assiut Egypt. The study indicated that nearly half (48.6%) of the sample were in the age group 20-30 years, and 45.8% were over 30 years (Hassan et al, 2004). Regarding the marital status of the respondents the table shows that married respondents constituted 79.2% of the study population and the single respondents represented 20.8% of the study population.

Table 4.1b: Socio-demographic characteristics of the respondents

Profession	**Frequency**	**Percentage %**
Surgeon	76	49.4
Anesthesiologist	14	9.1
OR Nurse	52	33.8
Anesthesia technician	7	4.5
Other	5	3.2
Education		
Diploma	48	31.2
Bachelor	28	18.2
Master	45	29.2
PhD	31	20.1
Other	2	1.3
Current position		
Director	7	4.5
Head of department	35	22.7
Practitioner	112	72.7
Years of experience		
Less than 10 years	78	51.0
10-20 years	52	34.0
More than 20 years	23	15.0

Table 4.1b shows that the majority of the respondents were surgeons who constitute 49.4%, 9.1% anesthesiologist, 33.8% nurses, 4.5 % anesthesia technician and 3.2% for other occupations. The high percentage of surgeons is due to the fact that there are different specialties in surgery and a large number of surgeons come to NGOs hospitals to do private cases.

Also in the same table, 31.2% of the respondents hold a two- year diploma, 18.2% hold bachelor degree, 29.2% hold a master degree, 20.1% hold a PhD degree, and

1.3% of the respondents have other degrees (physician with board qualification). About 72.7% of the respondents were practitioners, 22.7% head of department and 4.5% directors. Regarding the experience, 51% of the participants have less than 10 years of experience, 34% have experience from 10 -20 years and 15% have more than 20 years of experience. This shows that these hospitals hire the less experienced practitioners who usually accept low salaries. In a previous study conducted in Iran, 40.6% of the respondents have 0–5 years' experience, 10.3% have 6–10 years, 15.1% have 11–15 years and 34.0% have more than 15 years of experience (Motamed et al, 2006). This agrees with the study of Hassan et al, (2004) where 65% of the respondents has less than 15 years' of experience.

Table 4.2: Distribution of participants by having HB vaccine and exposed to needles or sharp instruments injury.

HB Vaccination	**Frequency**	**Percentage %**
Yes	138	90.8
No	14	9.2
No. of doses		
One dose	12	8.9
Two doses	16	11.9
Three doses	107	79.3
Exposure to injury		
Yes	124	81.6
No	28	18.4

When the participants were asked if they had been vaccinated for hepatitis B 90.8% answered yes and 9.2% answered no. And this result is consistent with the general coverage of immunization in Palestine. About 79.3% of the respondents have three doses and the rest have not completed the vaccination and this required more awareness to infection protection among the HCWs. These results are consistent with previous studies in Gaza, the first was the study of Awad, (2009) which revealed that 85.6% of respondents have received hepatitis B vaccination and the second was the study of El-Dalow, (2011) which reported that 84.7% of the participants have received hepatitis B vaccination and 63.2% of them received three doses. The research results is better than the results of a research conducted in Jordan which revealed that only 36% of HCWs were vaccinated (Al-Omari, Al-Dwairi, 2005),

while 11.3% of the respondents had received three doses in Egypt (Ismail et al, 2007). Another study conducted in Iran revealed that 61.5% had received complete vaccination against HBV (Askarian, 2002). Another study conducted in India revealed that 61.2 percent of the dental students had not been vaccinated with hepatitis B (Singh et al, 2011).

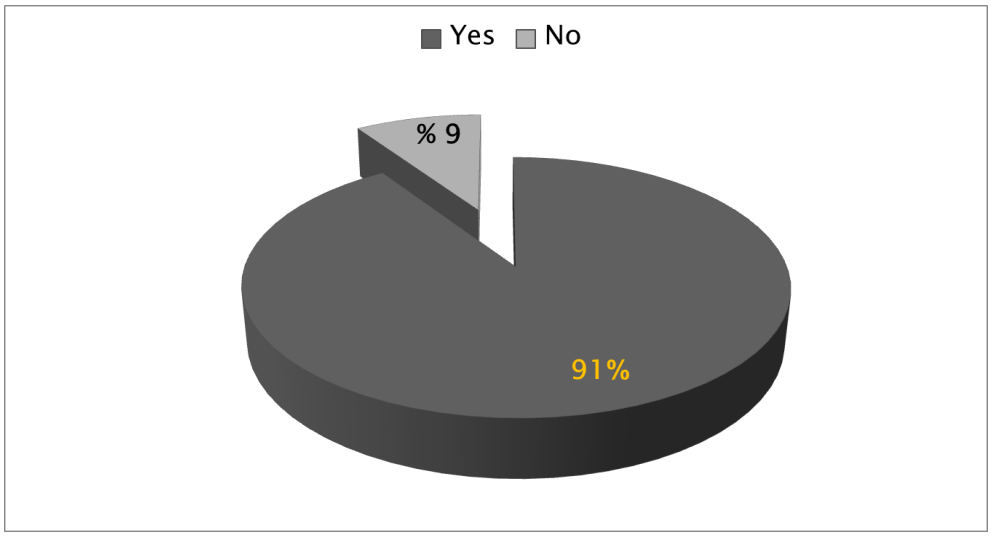

Figure 4.1: Distribution of study population by having HB vaccine

As far as the sharp needles or instrument sticks are concerned, 81.6% of the respondents were injured due to needles or sharp instruments. This result indicates the importance of Hepatitis B vaccination and using PPE during contact with patients to achieve the safety of both providers and patients. This result is better than that of a study which was conducted by Hassan et al, (2004) at Assiut University and recorded that 97.2% of participants were exposed to needle sticks.

Another study conducted at a German university hospital by Wicker et al, (2007) which reported better results as 31.4% of the participants were injured by needle stick. Another study conducted at Gharbiya Governorate, Egypt by Ismail et al, (2007) and showed that females HCWs were more likely to experience needle-stick injuries than males. HCWs who graduated from nursing school or who had lower levels of education were more likely to experience needle-stick injuries than those who had graduated from medical or nursing institutes or higher levels of education. HCWs who give injections were more likely to experience needle-stick injuries than those

who do not give injections. These differences were statistically significant. However, HCWs who had received training are less likely to have a needle stick injury than those who had not. Two-hand recapping of needles was the commonest cause of such injuries.

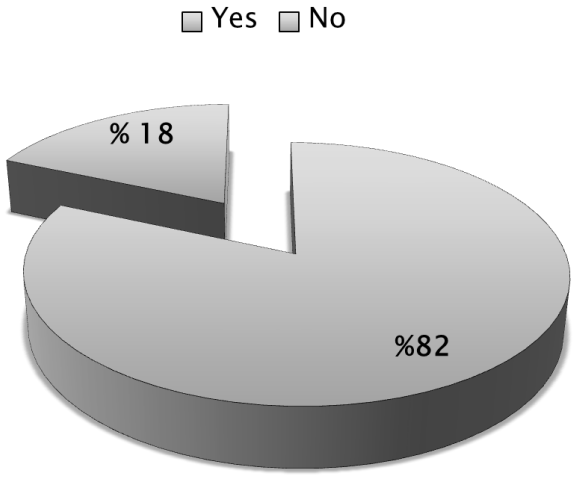

Figure 4.2: Distribution of participants by exposing to needles or sharp instruments injury

According to the current study, all the interviewed persons in the in-depth interview stated that the high percent of needle stick between HCWs is due to negligence and poor compliance with SPs. One respondent said that the "lack of professionalism is the cause" while another one said that the "lack of HCWs concentration during procedures is the cause". Three of the respondents said that the "lack of compliance to the directions and instruction is the main cause of needle stick between the HCWs". The last one stated that the "lack of knowledge regarding infection transmission leads to negligence of HCWs". This result is consistent with a study conducted in Gaza by El-Dalow, (2011) who reported that the poor compliance, negligence, workload and lack of experience are the main causes of sharp needles injuries. Regarding HB vaccination they stated that the responsibility in this issue is mainly individual with sort of organizational carelessness where they did not follow up the employee's vaccination.

4.2 Individual factors

4.2.1 Knowledge

Table 4.3: Distribution of participants by knowledge about SPs

Initial test for hepatitis and HIV should be done for	**Frequency**	**Percentage %**
All patients admitted for surgery	113	73.9
Major cases only	27	17.6
Not necessary to be done.	13	8.5
knowledge about the international SPs		
Yes	98	66.7
No	49	33.3
Standard precautions are designed for	**Responses No.**	**Percent of cases**
The care of all patients	120	80.5
Blood and all other body fluids, secretions and excretions	63	42.3
Reduction of the risk of transmitting microorganisms	109	73.2

Respondents were asked about their knowledge of IPC concepts. Table 4.3 shows that 73.9% of the respondents believe that Initial test for hepatitis and HIV should be done to all patients admitted for surgery, 17.6% stated that this test should be done for major cases; and only 8.5% stated that it is not necessary for the test to be done. This result reflects the risk perception of the participants to infection. About 66.7% know about the SP term and the rest (33.3%) didn't know. This result is consistent with three studies conducted in Gaza; Abuzaid study showed that 56% of the respondents were familiar with the concept of SP (Abuzaid, 2010), Awad, (2009) revealed that 73% of HCWs have knowledge about SP and the study of El-Dalow, (2011) showed that 59.3% know about SPs. Also it is consistent with a study conducted in Iran by Motamed, (2002) which showed that 65.8% of the total population was familiar with SPs. Another study reported a high knowledge of SPs where 92% of the respondents claimed knowledge about universal precautions (Hesse et al, 2006).

A recent study conducted in Tehran showed that the percentages of participants with good and acceptable knowledge regarding infections control in hospitals 1, 2 and 3

were 64.91, 60 and 66.7 respectively. Distribution of respondents with good knowledge by gender shows 54.5% in men and 25.8% in women. By marital status, 62.5% in singles and 64.2% in married (Amerion et al, 2010).

Also the results in the table 4.3 reflect the low knowledge of HCWs about the SPs, which require more education and on-the job training to improve and update the HCWs knowledge. Regarding the use of SPs 80.5% stated that they are used for the care of all patients regardless of whether or not they are infected, 73.2% stated that they are applied to blood and all other body fluids, secretions and excretions and 42.3% stated that they are used to reduce the risk of transmitting microorganisms from known or unknown sources of infection.

Table 4.4: Distribution of respondents by knowledge about IPC

	Knowledge about infection prevention and control	**N**	**Mean**	**%**
1	Keeping the door closed during operation minimize microbial Contamination.	154	4.31	86.10
2	PPE are not used in emergency situation	153	2.54	50.85
3	Glove use for all patients is a useful strategy for reducing risk of SSI.	152	4.42	88.42
4	Performing hand hygiene in the recommended situations can reduce patients' mortality.	153	3.80	75.95
5	IPC can reduce medical costs associated with HAIs.	154	4.47	89.35
	Total mean	**154**	**3.91**	**78.12**

Table 4.4 shows the participants knowledge about IPC practices. The overall mean of Knowledge equals 3.91 (78.12%). This means that the majority of HCWs know about IPC practices and its role in reducing nosocomial infections. About 89.35% of the respondents agreed on the statement that Infection prevention and control can reduce medical costs associated with HAIs; this indicates a good awareness of the consequences of nosocomial infections. Also 88.42% of the respondents stated that glove use for all patients is a useful strategy for reducing risk of SSI. About 86.10% of the respondents agreed and strongly agreed that keeping the door closed during surgical procedure minimizes microbial contamination and 75.95% of the respondents believed that performing hand hygiene in the recommended situations can reduce

patient mortality. And 50.85% of the respondents stated that PPE are not used in emergency situation.

These results are consistent with a study in Iran by Efstathiou et al, (2011) which revealed that there was a low understanding of SPs, except disposal of sharps, contact with vaginal fluid, use of mask and gown or cleaning spilled blood. Health workers had difficulty distinguishing between deep body fluids and body secretions that are not considered infectious. Good practices were reported regarding hand-washing, disposal of needles, and glove, mask and gown usage.

4.2.2 Attitudes

Table 4.5: Distribution of respondents by their attitudes towards IPC

	Attitude towards IPC	**N**	**Mean**	**%**
1.	Complying with IPC protocol is very essential for infection control.	154	4.45	88.96
2.	Recurrent hand washing is essential to prevent HAIs	154	4.47	89.48
3.	The PPE decreases the infection.	154	4.45	89.09
4.	The influence of IPC protocol on your practice is positive.	145	3.88	77.52
5.	Insuring the client's safety and preventing them of getting HAIs is HCWs responsibility.	152	4.18	83.55
6.	Proper waste disposal decreases infection	144	4.48	89.58
	Total mean	**154**	**4.32**	**86.34**

Table 4.5 shows the respondents attitudes towards IPC, The mean of all statement is 4.32 (86.59%), test value = 38.9 and p-value = 0000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this field is significantly greater than the hypothesized value 3. This indicates that the attitudes of the respondents are positive towards IPC. In a study conducted in the Department of Surgery, College of Health Sciences, and University of Ghana on Knowledge, Attitude and Practice Universal Basic Precautions by Medical Personnel in a Teaching Hospital, results showed that all respondents except one person said that

SPs reduce the risk of HIV transmission. About 96% of the respondents agreed that SPs should be practiced for all patients (Hesse et al, 2006).

4.2.3 Training and Education

Table 4.6: Distribution of respondents by training and education variables

On the job training	**Frequency**	**Percentage %**
Never	59	38.8
Yes sometimes	84	55.3
Yes regularly	9	5.9
Participation in education session		
Never	45	30.0
Yes, last year	49	32.7
Yes in the past 2 years	22	14.7
Yes, more than 2 years	34	22.7
Improvement in performance due to training		
Yes	95	87.2
No	14	12.8
Need for more training & education		
Yes	134	88.7
No	17	11.3
Basic education curriculum incorporate training about IPC		
Yes	119	78.8
No	32	21.2
Orientation of new personnel on IPC		
Yes	68	44.4
No	85	55.6

When the participants were asked if their hospital provides on job or in service training and education about IPC, 55.3% answered yes sometimes, 38.8% never and 5.9% yes, regularly. Regarding the participants' attendance to any workshop or education session on IPC, 32.7% of the respondents answered yes, last year, 22.7% answered yes, more than two years, 14.7 % answered yes in the past two years, and 30% answered never. It is clear that there are a large number of HCWs at the OR who didn't have any training on IPC. These results are consistent with that of a study conducted in Gaza at UNRWA health centers which revealed that 50% of the

participants have had training about IPC, the results of this study are better than those of a study conducted in governmental pediatric hospitals by El-Dalow, (2011) which showed that 21.5% of the study population share an education or training session of IPC. Najeeb, (2007) conducted a research in Maldives found that 44.9% of doctors and nurses did not attend any form of training program on infection control practices. Amerion et al, (2010) in his study about Knowledge of Hospital Infection Control by Supervisors in Three Selected Military Hospitals in Islamic Republic of Iran found that 46.9% did not receive any specific education with regard to hospital infectious. 54.7%, however, participated in hospital infection seminars.

About 87.2% of the participants said that the provided training improves their performance and this denotes the efficacy of training and education process in this field. Also 88.7% of the participants answered that they need to learn more about IPC. In a study conducted by Yassi,et al, (2007) only 5% of the respondents rated their training in infection control as excellent, and 30% felt they were not offered the necessary training. Training and education are very important to improve the HCWs practices and adherence to infection control measures and protocols. In a study conducted in Nepal, the researcher designed infection control program and assessed their effectiveness to improve infection control at peripheral health care facilities in Nepal. It was found that after training, infection control practice increased significantly (Gurung, 2009).

About 55.6% of the respondents said that their basic education curriculum incorporates training about the IPC protocols and guidelines and 44.4% stated that it does not. This percentage is less than that of the study of Abu-Zaid, (2010) which revealed that 71.2% of the respondents reported that their basic education curriculum incorporates IPC training. Katowa et al, (2007) in their study about compliance with infection prevention guidelines revealed that, high compliance was associated with inclusion of guidelines in the curricula, high knowledge of infection prevention/ HAIs, positive attitude towards infection prevention and availability of materials for infection prevention.

Concerning the results of in-depth interview about the lack of training and education amongst the HCWs, one respondent attributed the cause to the "weakness in the

managerial performance especially the role of MOH, lack of effective coordination and cooperation with the MOH", another respondent said that the "workload and time factor is the main obstacle of training". Another respondent stated that "because most of the employee works by the part time method, so the management of these hospitals is not obligated to hold training courses" according to their point of view. Another respondent said that "they did the training for special employees who didn't do their role in teaching other staff"

4.3 Organizational factors

4.3.1 Availability of protocols and guidelines

Table 4.7: Participants' responses to the protocol's variables

Knowledge about IPC protocol.	**Frequency**	**Percentage %**
Yes	57	37.0
No	97	63.0
Existence of the copy in the ward.		
Yes	7	4.5
No	96	73.4
Don't know	34	22.1
Access to the copy		
Yes	33	24.8
No	100	75.2
Applying IPC protocols		
Always	28	32.9
Sometimes	40	47.1
Never	17	20.0
Where it is located?		
Present in the drawer	2	2.0
Present on the shelf	11	11.0
Present in the cupboard	7	7.0
Present in other places	2	2.0
DK	78	78.0
Source of protocols		
WHO	34	25.2
MOH	66	60
Others	20	14.8

Table 4.7 shows that 63.0% of the respondents do not know if there are Palestinian IPC protocols and 37% said they do. This result is consistent with the study of El-Dalow, (2011) which showed that 34.2% of the participants know about the IPC protocol. This result is inconsistent with a study conducted in Zambia by Katowa et al, (2007) which revealed that 86% of the respondents had heard about IPC guidelines. Several other studies have indicated that the majority of HCWs in Zambia have heard about IPC. Almost all participants 95% indicated that they had heard about HAI. Despite such a response, when asked to give examples of HAIs, most mentioned conditions such as malaria, scabies and mumps with only 9.8% had mentioned postoperative wound infections even though they were common at the institution averaging 15.5% per year. This implied that, a very small percentage of HCWs at the institution knew that postoperative wound infections are nosocomial (Katowa et al, 2007).

Hsia, et al, (2006) conducted a study in most of the hospitals in Sub-Saharan Africa they reported that they have written protocols for infection control procedures concerning: (a) basic infection control (70%); (b) room cleaning (71%); (c) screening for multi resistant organisms (53%); and (d) isolation of patients with alert organisms (63%).

In the current study all the interviewed persons of the in-depth interviews agreed about the necessity of availability of IPC protocols in their hospitals and attributed the lack of the knowledge about the protocols to many causes. Such causes include lack of workshops and educations regarding IPC best practices, the protocols are not disseminated either in MOH or in NGOs hospitals. Two third of the respondents said that "they don’t know about the IPC protocols before the interviews ". One respondent blame the role of MOH in dissemination of protocols and guidelines and said that "I work in the health field for a long time and I hadn’t any copy of the protocols" and another one considered it a "managerial responsibility of the hospital". Another respondent said that "the lack of dissemination and training is the responsibility of the team who did the protocols". These results are consistent with a study conducted in Gaza which revealed that 40% of the interviewed persons gave different interpretations like the absence of training and education of IPC practices and 20%

blame the MOH and ask to integrate the protocols items in the hospital policy (El-Dalow, 2011).

Regarding the availability of protocols in their wards 73.4% stated that they are not available, 22.1% don't know and just 4.5% reported that these protocols are available. About 75.2% of the participant said that they hadn't any possibility to access to protocols while 24.8% answered they can access them. This result is consistent with a similar study conducted in Nigeria revealed that 75% of the respondents do not have specific regulatory guidelines for infection control in their ultrasound laboratories while only 25% of them have it (Eze et al, 2009). And contradicts with another study was conducted in Zambia where the respondents were asked about access to IPC guidelines within the work-place, 84.4% of the respondents stated that it is displayed in the work place. (Katowa et al, 2007).

About the question if they apply the protocols, 47.1% reported they apply it sometimes, 32.9% answered always and 20% answered never. These results are partially consistent with that of a study conducted in Gaza which revealed that 50% of the study population uses the protocols always, 11.35% said that they used it sometimes and 38.7% never used it (Abu Zaid, 2010). The result of this research is better than those of a study conducted in 13 Dutch hospitals to study the adherence to local hospital guidelines. The study revealed that overall adherence to all aspects of the guideline was achieved in only 28% (Kasteran, et al, 2003).

Also the results revealed that 78% of the respondents don't know where the protocols located. This result agrees with the answers of the respondents about their knowledge and access to protocols where 11% stated that it is on the shelf, 7% stated that it is in the cupboard, 2% stated that the protocols are present in the drawer and 2%stated that the protocols are present in other places. According to the table (4.7), the sources of the protocols are the Ministry of health MOH 60%, WHO 25.2% and other sources 14.8%.

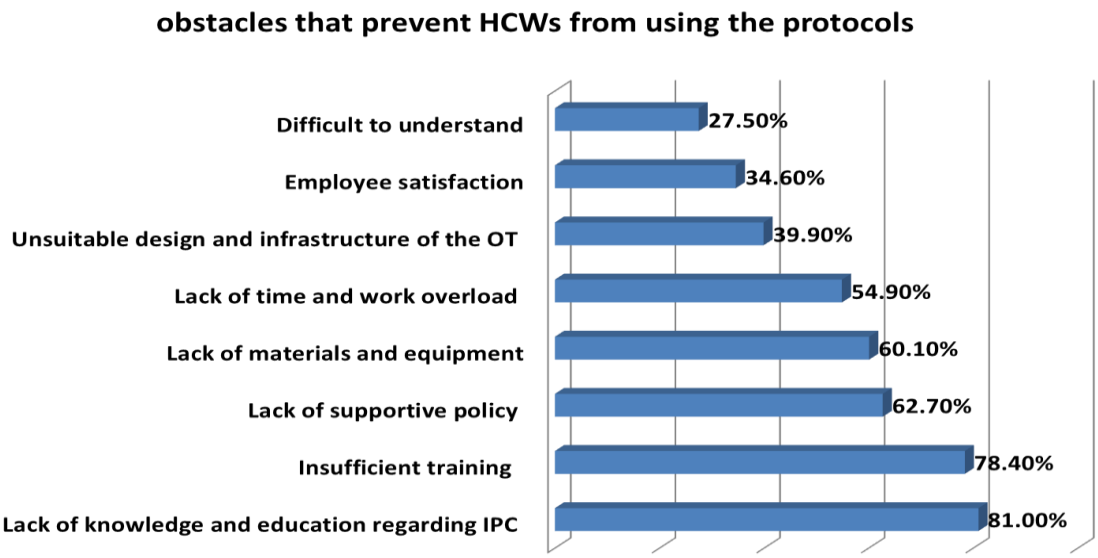

Figure (4.3) Obstacles that prevent healthcare workers from using protocols

There are many obstacles that prevent or reduce the compliance to IPC protocols. Many barriers have been mentioned in the literature and the researcher chooses the most common of them and examined which of the items are considered barriers to implementing the protocols. Figure (4.1) illustrate these obstacles. Two studies conducted in Gaza regarding the compliance of IPC protocols, agreed with this study with different ranking of the barriers, Awad, (2009) reported that the main cause was absence of training programs, followed by the lack of knowledge and education, lack of time and work overload , insufficient supplies and finally no accountability and feedback of performance. El-Dalow, (2011) ranked the causes was the absence of education, lack of knowledge, lack of required supplies and workload and insufficient time followed by no feedback of performance were the main barriers. Pittet, (2001) addressed many barriers such as the lack of adherence with recommendations inaccessible supplies, interference with worker-patient relation, forgetfulness, ignorance of guidelines, insufficient time, high workload and understaffing, and lack of scientific information.

These results are consistent with the results of the in-depth interviews which revealed that two third of the interviewees stated many obstacles that prevent the adherence to protocols such as: "lack of training and education, lack of knowledge, workload,

negligence and carelessness". Third of them said that the "absence of supervision and follow up of HCWs practices are the main obstacles".

4.3.2 Availability of Materials and Equipment

Table 4.8: Respondents answers about the availability of materials

Availability of materials & equipment.	**Frequency**	**Percentage %**
Yes	145	94.8
No	4	2.6
Don't know	4	2.6
Sharp boxes are available in each room		
Yes	142	94.7
No	5	3.3
Don't know	3	2.0
Suitable number of sterilization sinks and dispensers are available		
Yes	118	78.1
No	27	17.9
Don't know	6	4.0
The sterilization equipment which are available and functioning in the OR		
Autoclave	119	79.3
Ultraviolet	91	60.7
Boilers	44	29.3
Ultrasonic washing machine	32	21.3
Gas sterilizer	30	20.0
PPE which are available in the OR.		
Gowns	144	94.7
Head cap	144	94.7
Gloves	144	94.7
Shoe cover	139	91.4
Masks	138	90.8
Plastic apron	112	73.7
Eye glasses	32	21.1

The availability of materials and equipment are very important to apply the IPC protocols and guidelines. The participants were asked for their opinion about the availability of materials and equipment. Table (4.8) shows that 94.8% of the respondents stated that they are available, 94.7% said that sharp boxes are available in each room, 78.1% stated that there are suitable number of sterilization sinks and dispensers. This result is inconsistent with a result of research conducted in Zambia by Katowa, et al, (2007) where only 11.7% of the participants indicated that materials

for infection prevention were always available. Almost half 47% stated that, the materials were not easily accessible from stores, 45.5% indicated that materials were not easily accessible at ward or departmental level. Regarding the sterilization equipment and machines which are available and functioning in the OR 79.3% of the respondents said yes for autoclave, 60.7% said yes for ultraviolet, 29.3% for boilers, , 21.3% for ultrasonic washing machine and 20.0% for gas sterilizer. Regarding PPE which are available in the ORs, 94.7% stated that the gowns, gloves and head cap are available, 91.4% stated that shoe cover are available , 90.8% answered masks, 73.7% for plastic apron and 21.1% for eye glasses.

The participants of the in-depth interviews were asked how to overcome the scarcity of materials and equipment needed to proper practices of IPC. All of them confirmed the shortage but they gave different solutions to overcome this problem. One third of the interviewees put the responsibility on the management of the hospitals and asked them to increase their efforts and cooperation either with the MOH or donors to get these materials and equipment. Other participants stated that "the cause of the shortage of the materials is the unavailability in the pharmaceutical companies", another respondent stated "the financial factor and the low income is the cause of scarcity of the materials".

4.3.3 Supportive policy

Table 4.9 shows that 39.6% of the respondents stated that hospital management adopts policies and regulations to support the compliance to IPC protocols, 32.5% stated that hospital management does not adopt such policies and regulations. Also 39.9% stated that hospital management does not encourage the practice of the IPC protocols while 35.9% believed that hospital management encourages this practice. Fifty percent of the participants believe that there is no auditing program to ensure that policies have been implemented while 16.3% believe that this program does exist. About 32% of the respondents stated that the IPC is not enrolled in the hospital quality assurance program while 28% stated that the IPC is enrolled in such a program. The interviewed persons were asked about the role of the management in supporting the monitoring of the practices of IPC. Half of them claimed that they practice their role in this field by encouraging the managers of units to follow up the

practice of the HCWs and enhance their compliance to standards. Other participants suggested to do on-the-job training to overcome this problem, another one stated that they have not any policy in this field and said that the interview increases their awareness regarding this issue.

Table 4.9: Distribution of respondents answers toward supportive policies.

Management support compliance to the IPC	**Frequency**	**Percentage**
Yes	61	39.6
No	50	32.5
Don't know	43	27.9
Management encourages the practice of IPC		
Yes	55	35.9
No	61	39.9
Don't know	37	24.2
Existence of auditing program to IPC		
Yes	25	16.3
No	77	50.3
Don't know	51	33.3
IPC enrolled in the quality assurance program		
Yes	43	28.1
No	49	32.0
Don't know	61	39.9

4.3.4 Supervision, Monitoring and Evaluation

Table 4.10 shows that 46.1% of the respondents stated that there is no infection prevention and control committee (IPCC) in their hospitals, 28.6% answered yes and 25.3% answered don't know. About 58.4% stated that there are no IPC practitioners in their hospital, 22.7% answered don't know and 18.8% answered yes. Almost 51.6% believe that there is occasional existence of monitoring system about infection rate in the facility and 29.4% believe that such a system does not exist.

About 72.1% of the respondents believe that their hospitals do not carry out supervision or follow up, 19% answered don't know and 8.8% believe that their hospitals do carry out supervision and follow up. Also 63.6% stated that they never receive any feedback after supervisor's visit regarding IPC practices, 33.3% stated that they do receive written feedback, and 3% received verbal feedback. About 56.4% said

they use the feedback in developing improvement strategies while 36.4% said that they discuss it with concerned people and 5.5% said they keep it in the files without discussion.

During the in-depth interview the participants were asked about the existence of IPCC in their hospitals. One respondent of them said "there is no IPCC in their hospital and stated that they depend on the MOH IPCC and its role in monitoring and supervision". Other participants stated that "the financial situation of their hospitals prevent them of hiring more personnel to do this job". Two directors of these hospital stated that IPCC exist, but not active and promise to activate its role. Another interviewee attributed the absence of IPCC to the "defect in the management thinking and lack of awareness regarding IPC".

Table 4.10: Respondents answers towards supervision, monitoring & evaluation

Existence of IPCC as a supervisory body.	**Frequency**	**Percentage %**
Yes	44	28.6
No	71	46.1
Don’t know	39	25.3
Designated IPC practitioners are available.		
Yes	29	18.8
No	90	58.4
Don’t know	35	22.7
Monitoring system about infection rate.		
Yes	2	1.3
Occasionally	79	51.6
No	45	29.4
Don’t know	27	17.6
Supervision regarding the IPC		
Yes every ------ month	13	8.8
No	106	72.1
DK	28	19.0
Receiving feedback after supervisor visit		
Not at all	84	63.6
Yes written feedback	44	33.3
Yes verbal feedback	4	3.0
If yes, what you do with the feedback?		
Keep it in the files without discussion	3	5.5
Discuss it with concerned people	20	36.4
Use it in developing improvement strategies	31	56.4
Other specify -	1	1.8

4.3.5 Workload and workforce

Table 4.11: Distribution of respondents answers by workload and workforce.

The shortage of human resource increases the HAI.	**Frequency**	**Percentage**
Strongly disagree	5	3.3
Disagree	21	13.8
Neutral	28	18.4
Agree	59	38.8
Strongly agree	39	25.7
Work overload affect practices and increase HAI.		
Strongly disagree	2	1.3
Disagree	5	3.3
Neutral	9	5.9
Agree	79	52.0
Strongly agree	57	37.5

Table 4.11 shows the answers about the workforce and workload impact on the adherence to protocols where 64.5% of the participants think that the shortage of human resource at the OR increases the nosocomial infection while 17.4% disagree with that. This result is consistent with the study conducted by Hugonnet et al, (2007) who did a narrative review of seven multi-center studies to assess the association between understaffing and HAIs. The authors concluded that there is sufficient evidence for a relationship between staff downsizing and an increase in nosocomial infections.

About 89.5% of the respondents believe that work overload affect the IPC practices and increase HAI while 4.6% disagree with that and 5.9% were neutral. This result is consistent with the opinion of key persons who were interviewed by the researcher. They considered the workload as one of the main causes of un-compliance to the IPC protocols. Also the results are consistent with the study of El-Dalow, (2011) which revealed that 39.7% refer the un-compliance to protocols to work overload and insufficient time. This result agrees with that of a study of Collins, (2008) who concluded that hospitals with low nurse staffing levels and patient overcrowding leading to poor adherence to hand hygiene have been associated with higher adverse outcome rates and hospital outbreak investigations.

4.4 Physical Environmental Factors

4.4.1 Results from the questionnaire

Table 4.12: Distribution of participants answers towards physical environment.

The OR design comply with standards.	**Frequency**	**Percentage**
Yes	107	69.9
No	34	22.2
Don't know	12	7.8
The place of theatre is away from the flow and easy to reach from emergency and surgical wards.		
Yes	116	76.3
No	33	21.7
Don't know	3	2.0
The flow system at the OR is appropriate to IPC.		
Yes	93	60.1
No	52	34.0
Don't know	9	5.9
Traffic in and out of the OR has no influence on the infection.		
Yes	33	21.7
No	111	73.0
Don't know	8	5.3
There is a system for controlling the environmental temperature and humidity.		
Yes	86	56.6
No	52	34.2
Don't know	14	9.2
The air ventilation system of the OR is complying with infection control standards.		
Yes	86	57.0
No	39	25.8
Don't know	26	17.2

Table 4.12 shows that 69.9% of the respondents stated that OR design and infrastructure comply with standards, 22.2% answered no and 7.8% answered don't know. When asked about the location of the OR if away from the traffic flow, 76.3% reported yes, 21.7% reported no and 2% answered don't know. When asked if the

traffic flow system at the OR is appropriate to infection control measures. About 60.1% said yes and 34% said no and 5.9% said don't know. Seventy three percent of the participants negatively answered the statement "Traffic in and out of the OR has no influence on the infection", 21.7% answered yes and 5.3% answered don't know. Also 56.6% of the respondents believe that there is a system for controlling the environmental temperature and humidity that ensures safe limits for anaesthetized patients, 34.2% answered no and 9.2 answered don't know, and 57.0% of the respondents stated that the air ventilation system of the OR comply with infection control standards, 25.8% answered no and 17.2% answered don't know.

These results contradict the observation checklist which revealed that the OR design and infrastructure does not adhere to standards, because most hospitals were not established as hospital designs. These respondents' answers may be return to lack of knowledge of IPC measures and standards.

In the interviews, the participants were asked about their suggestion to solve the problem of unsuitable OR design with the IPC standards. Two third of them "blame the role of MOH and its standardization committee as a supervisory body regarding this issue and asked for more follow up to these hospitals from the beginning by preventing the unstandardized design". Another respondent stated that "there is no chance to modify the situation because it is too difficult to correct it; especially the hospitals were not designed to be hospital from the beginning'. And another respondent said that the "building reform is the proper and logic solution for this problem.

4.4.2 Results from operating theatre observation checklist

To get more accurate and actual information, the researcher chose to do observation checklist to assess the physical environment of the ORs and the HCWs practices and performance regarding IPC during the work hours to stand on real situation and to compare their actual practices with what they answered on the questionnaire. The study was conducted at six NGOs hospitals in Gaza governorates. ORs at the selected hospitals were assessed by the researcher three times for each hospital at different times. The observation checklist for the operating theatre was designed to assess the

OR from many aspects, the first was general cleanliness of the OR , the second part assessed some critical issues in practices, the third part handled the availability of materials and equipment of IPC, the fourth part assessed the HCWs behavior and flow system, the fifth part was about the sharp and waste disposal, the sixth part assessed the ORs design and infrastructure and the last part handled the sterilization techniques. (annex12)

Table 4.13: Results from operating theatre observation checklist.

No		Met		Partially		Unmet	
		N	%	N	%	N	%
1.	There is a copy of IPC protocol in the OR.	-	-	-	-	18	100
	General cleanliness of the OR.						
2.	Daily scrubbing of ORs.	7	38.9	3	16.7	8	44.4
3.	Between patients operating table and any equipment in direct contact with the patient should be cleaned with detergent.	2	11.1	3	16.7	13	72.2
5.	Mops should be color coded: each theatre area should have a separate color code, with mops kept for one theatre.	-	-	-	-	18	100
6.	After use mops should be decontaminated by hot wash.	-	-	-	-	18	100
7.	Vents are clean with no visible dust.	-	-	-	-	18	100
	All	**9**	**10.0**	**6**	**6.7**	**75**	**83.3**

Table 4.13 shows that according to the observation checklist the availability of the protocols at the OR in the six hospitals are unmet with a percent of 100% and this result contradict with the respondents answers and this contradiction may be due to false answers. This calls for the need to explore the causes of this absence of the protocols and raise a question about the role of management of these hospitals. This result is consistent with a study conducted by El –Dalow, (2011) showed that there

were no any copy of the IPC protocol in any department in the pediatric hospitals in Gaza.

Regarding the general cleanliness of the OR, table (4.13) shows that 10% of the items were met, 16.7% were partially met and 83.3% were unmet. Daily scrubbing and cleaning of the OR were met by 38.9%, the second item which related to cleaning of OR between patients with detergents met by 11.1% and the other three items were unmet and the total percent for unmet was 83.3% .The OR daily cleaning is considered a basic principle in any hospital, so the OR management must put the roles and directions to identify the role and responsibility of each provider.

In these hospitals the workers clean the OR by the same mops for the entire suite, and they didn't clean it by hot water and 5% chlorine, which are considered a serious threat of HAIs. Also there is a big problem regarding air quality and ventilation; there are no vents in these hospitals which affect the air circulation and exchange.

Table 4.14: Results from operating theatre observation checklist regarding practices.

No		Met		Partially met		Unmet	
	Practices	**N**	**%**	**N**	**%**	**N**	**%**
8.	The clean operation is done before the unclean.	11	61.1	4	22.2	3	16.7
9.	Single patient use items are only used for one patient.	18	100.0	-	-	-	-
10	Suction tubes and suction bottles are cleaned after use.	9	50.0	-	-	9	50.0
	All	**38**	**70.4%**	**4**	**7.4**	**12**	**22.2%**

Regarding the practices of the participants, Table (4.14) shows that the overall compliance was 70.4% divided as follows 61.1% for the item "The clean operation is done before the unclean", 100% for the item "single patient use items are only used for one patient" and 50% for the item "suction tubes and suction bottles are cleaned after use".

It is obvious that the practice of the HCWs differs from one procedure to another. There is an excellent result for single patient use items, while regarding suction cleaning facing certain shortage which leads to increase in the possibility of infection. The answer regarding the question number 8 is complied with a 61.1% of all cases which considered relatively good, but need more compliance to achieve the goal of infection control among operations.

Table 4.15: Results from operating theatre observation checklist regarding materials and equipment.

No		Met		Partially		Unmet	
	Materials and equipment	**N**	**%**	**N**	**%**	**N**	**%**
11.	There is sufficient number of scrub dispensers	9	50.0	-	-	9	50.0
12.	Antiseptic and disinfectant solutions are available in the OR.	15	83.3	3	16.7	-	-
13.	Alcohol swabs are available.	18	100	-	-	-	-
14.	Supplies for hand washing are available.	13	72.2	5	27.8	-	-
15.	All three types of gloves are available in OR.	-	-	18	100	-	-
16.	Plastic basins for decontamination are available.	18	100	-	-	-	-
17.	Pillows are enclosed in a washable and impervious cover.	3	16.7	-	-	15	83.3
18.	Elbow operated taps are available at all hand wash basins in clinical areas	12	66.7	-	-	6	33.3
	All	**78**	**61.1**	**26**	**18.06**	**30**	**23.45**

Table 4.15 shows the availability of materials in the ORs according to the observation checklist, 61.1% of the items was met, 18.06 % partially met and 23.45% were unmet. The higher percentage was for the availability of alcohol swab and plastic basins, and the lower percent were for the availability of pillows with impervious cover 16.7% and 50% for existence of sufficient number of scrub dispensers. The results above show that there is an absence of pillows which are enclosed in a washable and impervious cover, which considered easier in cleaning and then removal of microorganisms. There also insufficient number of scrub dispensers at operating

theatre which impact the proper practice of surgical scrubbing. Furthermore there is absence of utility gloves at any hospital, which are used in cleaning and dealing with medical waste and decontamination of instruments, leading to an increase in the possibility of injury and then infection.

Table 4.16: Results from OR observation checklist regarding flow system.

No		Met		Partially		Unmet	
	Behavior Movement and flow	**N**	**%**	**N**	**%**	**N**	**%**
19.	The surgical department trolleys doesn't enter the ORs and vice versa	2	11.1	-	-	16	88.9
20.	Minimum number of surgical team enters OR.	17	94.4	-	-	1	5.6
21.	Maintain the minimum movement in the OR.	16	88.9	1	5.6	1	5.6
22.	No entry to OR for who is not wearing uniform	2	11.1	11	61.1	5	27.8
23.	The application of one-way movement in the completion of activities within OR.	6	33.3	-	-	12	66.7
24.	Talks should be minimal.	15	83.3	-	-	3	16.7
25.	Keep OR doors closed in order to optimize the efficiency of the ventilating system.	14	77.8	3	16.7	1	5.6
26.	Theatre staff should wear a clean white coat over theatre suit, if leaving the department and especially in public areas.	7	38.9	2	11.1	9	50.0
	All	**79**	**54.9**	**17**	**11.8**	**48**	**33.3**

Table 4.16 shows the compliance of the participants to the proper movement and flow at the OR. About 54.9% of items were met, 11.8% was partially met and 33.3% was unmet. The higher percent of the unmet was 88.9% for the item" The surgical department trolleys doesn't enter the operating rooms and vice versa" and this may increase the probability of infection among the hospitals' wards.

The higher percentage that met the standards was 94.4% which was for the item "Minimum number of surgical team enters OR" which is considered a good compliance to protocols and help in infection control. About 61.1% of the

observations indicate that there wasn't complete compliance regarding the entry of persons who are not wearing the theatre suit, which increase the risk of nosocomial infection. The application of one-way movement in the completion of activities within OR, only achieved in 33.3% of the observations. Regarding the wear of clean white coat over theatre suit, if leaving the department and especially in public areas, did not adhere by the HCWs in 50.0% of the observations, which considered another risk of infection.

Table 4.17: Results from OR checklist regarding sharp and waste disposal

No		Met		Partiall		Unmet	
	Sharp and waste disposal	**N**	**%**	**N**	**%**	**N**	**%**
27.	Disposables and suction catheters discarded after single use.	18	100	-	-	-	-
28.	There is sharp disposal container in each room.	18	100	-	-	-	-
29.	Needles, scalpel blades and other sharp objects are disposed of in a sharp box.	8	44.4	5	27.8	5	27.8
30.	Dispose sharp disposable container when 3/4 full.	6	33.3	3	16.7	9	50.
31.	Clean all waste containers periodically with disinfectant solution.05% chlorine solution	-	-	-	-	18	100.
32.	Use covered waste containers for contaminated wastes.	-	-	-	-	18	100.
	All	**50**	**46.2**	**8**	**7.41**	**50**	**46.3**

Table 4.17 shows the results regarding sharp and waste disposal, which considered an essential source of infection among cases. The table shows that 46.28% of the items comply with protocols, 7.41% partially comply and 46.3% do not comply with the protocols. The higher percentage was100% met for the items "Disposables and suction catheters discarded after single use" and: "There is sharp disposal container in each room". This considered a good sign of compliance to IPC protocols.

The higher percentage which was unmet "Clean all waste containers periodically with disinfectant solution. 05% chlorine solution" and" Use covered waste containers for contaminated wastes". These two items do not met in any hospital according to the

researcher observations, the 05% chlorine solution is not available most of the time and so the covered waste containers, which considered an actual threat of HAIs, where the possibility of cross infection is high especially between the operations that may be dirty or infected one.

Table 4.18: Results from OR observation checklist regarding OR design

No		Met		Partially		Unmet	
	OR design and infrastructure	**N**	**%**	**N**	**%**	**N**	**%**
33.	The location of OR is away from the traffic flow and accessible from surgical wards and emergency rooms.	3	16.7	12	66.7	3	16.7
34.	There is a central air conditioner and a HEPA filter at the OR.	9	50.0	3	16.7	6	33.3
35.	The floor is covered with antistatic material, and the walls are painted with impervious, antistatic paint washable and impervious to moisture.	3	16.7	9	50.0	6	33.3
36.	The OR design is divided into three areas	9	50.0	3	16.7	6	33.3
37.	Storage room for the surgical supplies and instruments.	15	83.3	-	-	3	16.7
	All	**39**	**43.34**	**27**	**30.02**	**18**	**26.66**

Regarding the OR design and infrastructure, most of the hospitals were not established as hospitals design from the beginning, so their design especially the ORs are not adhere to standards.

About 43.34% was the total mean for the met items, 30.02% partially met and 26.66% were unmet. 66.7% of the OR location was partially met the standards, 50% of the OR design met the standard regarding the division of the OR design into three areas.

OR design in any hospital must be away from the traffic flow system and build according to standards to meet the IPC protocols. The floor should be covered with antistatic material, and the walls should be painted with impervious, antistatic paint washable and impervious to moisture.

During the in-depth interview most of interviewees considered that the design of the ORs is not appropriate to the IPC standards and stated that the rebuilding of these hospitals is the solution to this problem.

Table 4.19: Results from OR observation checklist regarding sterilization.

No		Met		Partially		Unmet	
	Sterilization	**N**	**%**	**N**	**%**	**N**	**%**
38.	Instruments are always decontaminated immediately after use	18	100.	-	-	-	-
39.	Gloves are always worn by all steps processing instruments.	18	100.	-	-	-	-
40.	Instruments are dried before sterilization	11	61.1	2	11.1	5	27.8
41.	Cleaning brushes are available	15	83.3	1	5.6	2	11.1
42.	Wraps clean instruments in double thickness of muslin or autoclave paper.	4	22.2	11	61.1	3	16.7
43.	The laryngoscope and anesthesia instrument are cleaned after each operation.	4	22.2	9	50.0	5	27.8
44.	Sterile equipment is stored in a clean dry area, free from dust and off the floor to protect the integrity of the packages.	6	33.3	9	50.0	3	16.7
45.	Ultrasonic cleaning machine is located in designated washroom/dirty room	3	16.7	-	-	15	83.3
46.	A validated steam sterilizer available and functioning	15	83.3	-	-	3	16.7
47.	High disinfectant materials are available	15	83.3	3	16.7	-	-
	All	**10**	**60.5**	**36**	**19.4**	**36**	**20.1**

The above table 4.19 shows the result regarding the sterilization at the OR, where 60.5% of the items were met by the six hospitals, and 19.45% were partially met and 20.1% unmet.

It is obvious that there is a problem in sterilization techniques which considered the first need to do any operation. The higher percentages were for both items" Instruments are always decontaminated immediately after use" and" Gloves are always worn by all steps processing instruments". These two items were met by 100%. But the problem here was in unavailability of utility gloves which designed especially for cleaning the instruments.

There is a shortage in double thickness towels or autoclave paper which is used for wrapping the instruments packages to keep their sterilization. About 33.3% of the hospitals met the item "sterile equipment is stored in a clean dry area, free from dust and off the floor to protect the integrity of the packaging and equipment", and this item met partially by 50% of observations.

One hospital has ultrasonic cleaning machine and located in designated washroom/dirty room. The laryngoscope and anesthesia instruments are cleaned after each operation just partially met in 50% of the observations.

83.3% of ORs have a validated steam sterilizer available and functioning and 83.3% have high disinfectant materials with some shortage in some types especially the chlorine 5%.

4.5 Practices

4.5.1 Results from the questionnaire

This part of the questionnaire was directed to ask the respondents about their practices and the scale was

No	**Rarely**	**Sometimes**	**Often**	**Always**

Table 4.20: Distribution of respondents by their practices

No	Practices	mean	%	T	p-value	Ran
1.	Do you use PPE in ORs?	4.42	88.42	22.81	0.000	5
2.	Do you properly handle contaminated equipment to prevent cross infection?	4.32	86.49	18.93	0.000	7
3.	Keep sterilization during the surgery.	4.80	96.05	53.48	0.000	3
4.	You scrub your hands for 3-5 minutes when conducting an operation.	4.06	81.17	12.75	0.000	8
5.	You don't wash your hands when arriving at work.	2.61	52.24	-4.29	0.000	10
6.	When washing hands, you remove jewelry, watch and rings.	4.40	87.97	16.33	0.000	6
7.	You wash your hands after any contact with blood &body fluids.	4.86	97.12	56.80	0.000	2
8.	You don't wash hands before leaving OR	1.92	38.41	-11.88	0.000	14
9.	Wearing gloves when you come in contact with blood & body fluids.	4.71	94.12	31.60	0.000	4
10.	When you touch unsterile objects, you don't change your gloves?	1.83	36.67	-11.10	0.000	15
11.	Used needles, syringes and knifes are discarded into safety box.	4.88	97.66	64.80	0.000	1
12.	You don't cap the used needles before disposal	2.47	49.40	-4.79	0.000	12
13.	You break or bend the used needle before disposal.	2.11	42.25	-8.46	0.000	13
14.	You don't remove used needles from syringes before disposal.	2.55	50.93	-4.09	0.000	11
15.	HCP with symptoms of influenza is prevented from entering OR	3.74	74.77	7.43	0.000	9
	All statements of the filed	**3.59**	**71.75**	**20.13**	**0.000**	

The t test in this table is one sample t test; it was done to assess the significance level of the respondent's answers for each item.

Table 4.20 shows the overall mean of the practices items is 3.59 (71.75) which indicates that the respondents agree with the items of this field. This is not satisfactory percent in such field like IPC which must have more compliance especially if we are dealing with client's safety.

Also the same table shows the respondents' answers regarding their practices of infection prevention and control measures. The first question was about the adherence of HCWs to PPE during operation, the mean of answers is 4.42 (88.42%), test value equals 22.81and p-value = 0.000 which is less than the level of significance at $\alpha = 0.05$. The sign of the test is positive, so the mean of this statement is significantly greater than the hypothesized value 3. We conclude that the respondents agreed to this statement and their answers are located between often and always.

At the same table the answers of the question "Do you properly handle contaminated equipment to prevent cross infection?" the mean of answers is 4.32(86.49%), test value equals 18.93and p-value = 0.000 which is less than the level of significance at $\alpha = 0.05$.The sign of the test is positive, so the mean of this statement is significantly greater than the hypothesized value 3. We conclude that the respondents agreed to this statement and their answers are located between often and always.

The mean of statement “You keep sterilization during the surgery” equals 4.80 (96.05%), Test-value = 53.5, and P-value = 0.000 which is less than the level of significance at $\alpha = 0.05$. The sign of the test is positive, so the mean of this statement is significantly greater than the hypothesized value 3. We conclude that the respondents agreed to this statement and their answers located between often and always.

Hand washing

Table 4.20 shows that the respondents answers regarding their hand scrub, where the mean for compliance with this practice is 4.06(81.17%) with test value 12.75 and p-value 0.000 which is less than the level of significance at $\alpha = 0.05$. The sign of test is positive which means that the respondents answered often and always for this question. Also the same table shows the disagreement of the respondents regarding

the statement "You don’t wash your hands when arriving at work." The mean is 2.61(52.24%) with test value -4.29 and p-value 0.000 which is less than the level of significance at $\alpha = 0.05$, so the mean of this statement is significantly smaller than the hypothesized value 3. It is concluded that the respondents disagree to this statement.

About 87.97% of the participants reported that they remove jewelry, watch and rings when washing hands. Also 97.12% of the participants wash their hands after any contact with blood, body fluids, secretions, and excretions and 38.41% of the participants reported that they disagree with the statement "You don’t wash hands before leaving the operating theatre" with a mean of 1.92.

Wearing gloves

About 94.12% said that they wear gloves when they come in contact with blood, body fluids, secretions, mucous membranes and excretions, the mean is 4.71,t test 31.60 and the p-value is 0.000* which is smaller than the level of significance $\alpha = 0.05$. So the mean of this statement is significantly less than the hypothesized value 3. We conclude that the respondents agree with this statement. The mean of statement when you touch unsterile objects, you don’t change your gloves equals1.83 (36.67%), Test-value = -11.10, and P-value = 0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is negative, so the mean of this statement is significantly less than the hypothesized value 3. We conclude that the respondents disagree with this statement.

Sharp disposal

Table 4.20: shows that 97.66% of the participants said that "used needles, syringes and knifes are discarded into safety box". The mean of statement “You don't cap the used needles before disposal” equals 2.47 (49.40%), which indicate that the respondents disagree and strongly disagree about this statement which means that they recap the needles before disposal which is contradicts with the protocols. About 42.25% of the respondents stated that they break or bend the used needle before disposal and 50.93% of them stated that they remove used needles from syringes before disposal, and 4.77% said that HCWs with symptoms of influenza, fever, or any other infectious disease is prevented from entering OR.

4.5.2 Results from HCWs Observation checklist

Like the observation checklist for operating theatre, the researcher builds the provider's observation checklist according to the Palestinian IPC protocols beside his experience in this field. The observation checklist consists of 44 items and is divided into seven parts (wearing uniform, hand washing, surgical scrub, wearing gown and gloves, aseptic technique, skin preparation for surgery and sharp disposal (annex13).

Table 4.21: Summary of the results of observation checklist for HCWs practices

		Yes		No		NA	
	Practice	**N**	**%**	**N**	**%**	**N**	**%**
Part 1	Wearing uniform	1,683	88.2	225	11.8	-	-
Part 2	Hand washing	1,162	48.7%	1,205	39.9	18	0.74
Part 3	Surgical scrub	2,278	43.5	1,731	33.0	1,231	23.5
Part 4	Wearing gloves	2,969	56.4	953	18.0	1,33	25.4
Part 5	Aseptic technique	1,202	63.0%	240	12.6	466	24.4
Part 6	Skin preparation for surgery	1,000	41.9	438	18.4	947	39.7
Part 7	Sharp disposal	972	51.0%	366	19.2	569	29.8
Total	**All practices**		**56.1%**				

For more details see annexes

Wearing uniform

The first part was about the provider's behavior regarding wearing uniform, 88.2% of the respondents comply with uniform, 90.1% wear scrub suit during duty, 94.3% wear shoe covers when entering OR, 92% keep quit and minimum movements and 76.3% of them wear mask and head cap when entering the ORs.

Hand washing

Regarding the hand washing 48.7% comply with protocols, 39.9% do not comply. The higher percentage in the group was 86.8 for hand washing after touching blood or body fluids while the lower percent 20.8 was for hand washing when arriving at work. In spite of the importance of hand washing as primary protection and basic principle of IPC, the compliance among the HCWs is weak. In a study conducted in Nigeria revealed that only 1 (2.5%) of the respondents wash his hands before examinations

and 35 (87.5%) after examinations and 4 (10%) before and after each examination (Eze et al, 2009).

About 31.9% of the respondents wash their hands before touching the patient, more compliance with hand washing observed (63.9%, 86.8%) when the respondents work with patients and after touching blood and body fluids respectively. Less than half of the study population (40.3%) washes their hands for 15-30 seconds with soap and running water.

Surgical scrub

Regarding the surgical scrub which is considered very important before the operation to minimize the possibility of infection, table (4.21) shows that 43.5% of the HCWs comply with the protocols while 33% do not comply; this is considered a real danger for the client's health and safety. The 23.5% was not applicable for group of HCWs such as anesthesiologist, anesthesia technician and circulate nurse. The higher percentage of compliance 64.4 was for not touching anything before putting on gloves while the lower percent was 2.5% for hand rub with alcohol 5ml pre operation. About 55.9% of the respondents do not clean under each fingernail and 45.0% of the respondents do not lathers and scrubs one hand for 1 minute and wrist for one minute.

Wearing gown and gloves

Table 4.23 shows the HCWs compliance to wearing gown and gloves, which is considered an essential part of PPE and maintains the safety for both providers and patients. About 56.7% comply with protocols, while 18.0% do not, 89.9% of the participants comply with wearing gloves when they come in contact with blood or other body fluids. Also the majority of the participants do not comply with using utility gloves when handling or cleaning contaminated instrument and for waste disposal. It's essential to say that utility gloves are not available in these hospitals, and this percentage constitutes the group who are supposed to use it (mostly nurses).

Aseptic techniques

Table 4.21 shows the participants adherence to antiseptic and disinfectant measures which is considered an important element of infection prevention and control

practices. The overall mean for this field is 63.0% for the adherence to standards, 12.6% didn't adhere to antiseptic and disinfectant measures and 24.4% of items did not apply to participants. It's clear that there is some sort of negligence regarding this critical issue and it is worth to mention that the HCWs do not pay enough attention to infection control measures. 79.5% of the respondents maintain the sterile field during operations, 38.7% open the sterile packages correctly and 68.1% pour the solution in proper way.

Skin preparation for surgery

Regarding the Skin preparation for surgery 41.9% of the study respondents comply with protocols. This low percentage is due to wrong application of the protocols. For example antiseptic was applied to scrub the patient's skin, but circular motion moving from center to outward was not applied.

Sharp disposal

Table 4.21 shows the sharp disposal observations at the observed hospitals. Sharp disposal is a method of infection control in the hospital and outside, proper sharp disposal protects us from getting infection. The overall mean for compliance with protocols was 51.0%, 19.2% do not comply and 29.8% not applicable. Those are the providers who didn't use sharp needles during operations. Despite the availability of sharp boxes in each room, the HCWs do not adhere to sharp disposal guidelines. Only 42.6% of the respondents do not remove used needles from syringes before disposal, only 41.7% do not recap used needles and 54.5% of the respondents dispose all sharps in safety box.

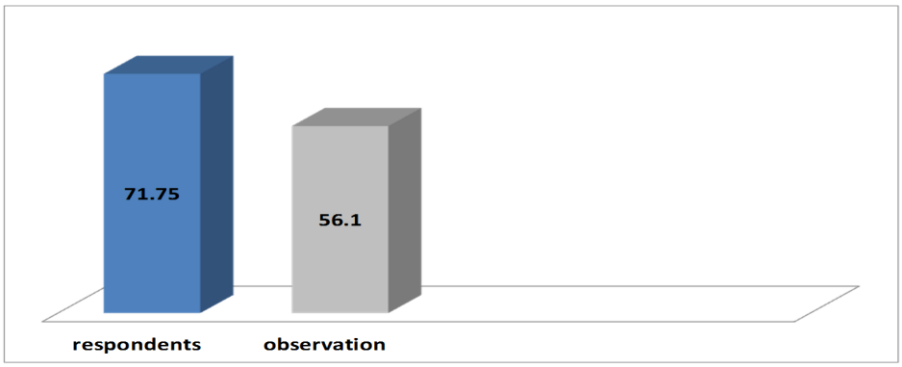

Figure (4.4): Percentage of perceived and observed IPC practices

4.6 Relationships between variables

4.6.1 Relationship between individual factors and practices

Table 4.22: Relationship between individual factors and practice

Field	Pearson Correlation Coefficient	P-Value (Sig.)
Knowledge	.170	0.018*
Attitudes	.237	0.002*
Training & education	.208	0.005*

Table 4.22 shows a significant relationship between practices and knowledge about IPC measures with p-value (Sig.) equals 0.018. This result is consistent with a previous study which revealed a significant relationship between the respondents' knowledge and practices toward universal precautions (Motamed, et al 2006).

Another study conducted at the endoscopy units in El-Kasr El-Ani Hospital, to assess the knowledge of health team in relation to infection control measures as well as their level of practice in the application of infection control measures. The study results revealed that 5% of physicians and 10% of nurses had satisfactory knowledge, and 30% of physicians and just 4% of nurses had adequate level of performance, while none of the workers had satisfactory level of knowledge or practice. The researcher found that the factor affecting infection control measures in endoscopy department regarding endoscopy health team level of knowledge and practice is the lack of knowledge in addition to insufficient level of performance during and post procedure as disinfection of endoscope, hand washing, and cleaning of environment post procedure, and few written Arabic protocols for universal precautions (El-Shamma, 2010).

Also table 4.22 shows that the correlation coefficient between practices and attitudes equals .237 and the p-value (Sig.) equals 0.002. The p-value (Sig.) is less than 0.05, so the correlation coefficient is statistically significant at $\alpha = 0.05$. We conclude that there is a significant relationship between practices and attitudes. This result is

consistent with a study conducted in India which revealed that significant linear correlation was seen between attitude and practice scores. The level of knowledge and practice of infection control measures was poor among dental students. The attitude towards infection control measures was positive, but a greater compliance was needed. They recommended rigorous training on infection control measures prior to graduation and mandatory hepatitis B immunization of students before exposure to clinical practice (Singh et al, 2011).

Table 4.22 shows that the correlation coefficient between practices and training and education equals .208 and the p-value (Sig.) equals 0.005. The p-value (Sig.) is less than 0.05, so the correlation coefficient is statistically significant at $\alpha = 0.05$. We conclude that there is a significant relationship between practices and training & education**.** This result consistent with the IPC guidelines of WHO, which clarifies that staff working in the sterilizing service department and are responsible for the reprocessing of instruments and equipment must have undergone formal training in how to clean, disinfect and sterilize instruments and equipment. The level of training must be appropriate for the level of responsibility that the staff member is expected to undertake (WHO, 2004).

Another study conducted in India revealed that education has positive impact on retention of knowledge, attitudes and practices (Suchitra, 2007).

A study conducted at Barnes-Jewish Hospital in Washington an observation of surgical personnel in four specialties (Cardiothoracic, General, Gynecologic, and Orthopedic) in the ORs was performed prior to implementation of an educational intervention designed to improve compliance with Universal Precautions and at 1- and 2-years post-intervention. Use of protective eyewear and double gloving increased following the intervention, whereas the incidence of documented blood and body fluid exposures decreased (Kim et al, 2001).

Also the result is consistent with a study conducted in Nepal where the researcher designed infection control programs and assessed their effectiveness to improve infection control at peripheral health care facilities. It was found that after training, infection control practice increased significantly (Gurung, 2009).

4.6.2 Relationship between organizational factors and practices

Table 4.23: Relationship between organizational factors and practice

Field	Pearson Correlation Coefficient	P-Value (Sig.)
Availability of the protocols.	0.047	0.283
Materials and equipment	5.183	0.007
Supportive policies	0.023	0.388
Supervision, Monitoring and Evaluation	-0.124	0.062
Workload and workforce	0.039	0.318

The researcher used Pearson Correlation Coefficient to test the relationships between the dependent and independent variables, Table 4.23 shows that all the p-value (Sig.) for the availability of the protocols is greater than the level of significance $\alpha = 0.05$. We conclude that the availability of the protocols have no effect on participants practices. This result contradicts with the study of Pittet, (2002) which revealed that the organizational factors that affect adherence to hand hygiene are lack of written guidelines. Another study conducted in 13 Dutch hospitals on the adherence to local hospital guidelines revealed that overall adherence to all aspects of the guideline, however, was achieved in only 28% (Kasteran et al, 2003).

In our case the absence of relationship between availability of the protocols and practice may be due to weakness of the role of the management in direction and supervision of the employee, which let everyone to do practices according to his education and experience without paying attention to protocols and guidelines.

Table 4.23 shows that the p-value (Sig.) is lesser than the level of significance $\alpha = 0.05$. We conclude that there is a relationship between the availability of materials and equipment and participants practices. This result is consistent with a study conducted in Zambia revealed a significant association between availability of infection prevention materials and compliance. Another study reported that inadequate supply

of gloves in southern province based health facilities lead to incorrect routines (Katowa et al, 2007).

Table 4.23 shows that the correlation coefficient between practices and supportive policies equals 0.023 and the p-value (Sig.) equals 0.388. The p-value (Sig.) is more than 0.05, so the correlation coefficient is statistically significant at $\alpha = 0.05$. We conclude that there is no significant relationship between practices and supportive policies. This result contradicts with the results of the study that was conducted by Pittet, (2002) who stated that amongst the factors that affect the health care providers compliance to IPC is the existence of administrative support and punishment. This contradiction between the two results is due to the weak management role in our healthcare system, they do not support the implementation of policies and regulation, so the HCWs behave according to their knowledge and education.

Table 4.23 shows that the correlation coefficient between practices and supervision, monitoring and evaluation equals -0.124 and the p-value (Sig.) equals 0.062. The p-value (Sig.) is more than 0.05, so the correlation coefficient is statistically significant at $\alpha = 0.05$. We conclude that there is no significant relationship between practices and supervision, monitoring and evaluation. This result contradicts with the world health organization guidelines which says that the health care facility must have a supervision monitoring, and evaluation activities to direct the employee to do the things right. Continuous monitoring and evaluation will encourage the best practice and service (WHO, 2004).

This result is interpreted because the IPC practices in our hospitals mostly do not comply with the protocols, so it is normal that absence of supervision, monitoring and practices do not affect the practice.

Table 4.23 shows that the correlation coefficient between practices and workload and workforce equals 0.039 and the p-value (Sig.) equals 0.318. The p-value (Sig.) is more than 0.05, so the correlation coefficient is statistically significant at $\alpha = 0.05$. We conclude that there is no significant relationship between practices and workload and workforce.

This result is contradicts with Hugonnet et al, (2007) who conducted a narrative review of seven multi-center studies to assess the association between understaffing

and HAIs. The authors concluded that there is sufficient evidence for a relationship between staff downsizing and an increase in nosocomial infections. The results also contradicts with a study conducted by Collins, (2008) which illustrate an association between staffing workload, infections, and microbial transmission from poor adherence to hand hygiene policies.

McCutcheon et al, (2005) also conducted a systematic review on the evidence relating nurse staffing to three infection outcomes: sepsis, UTI and pneumonia. The results of this review suggest that in hospitals with registered nurse staffing levels above the 75th percentile, rates of hospital-acquired pneumonia and UTI in medical patients were reduced by 6.4% and 3.6% respectively compared with patients in hospitals with low numbers of registered nurses (25th percentile). In surgical patients, higher staffing was associated with a reduction of 4.9% in UTI rates (McCutcheon et al, 2005).

The contradiction in this issue is due to unrealistic answers of the respondents or misunderstanding of the question because there is confusion about the staff numbers at the ORs. The low numbers of staff is recommended to prevent the crowding of OR and then minimize the possibility of infection.

4.6.3 Relationship between Physical environmental factors and practices

Table 4.24: Relationship between physical environmental factors and practice

Physical environmental factors	Pearson Correlation Coefficient	P-Value (Sig.)
OR design	.191	0.009
Traffic flow	.223	0.025
Air quality	.202	0.006

Table 4.24 shows that the correlation coefficient between practices and OR design equals .191 and the p-value (Sig.) equals 0.009*. The p-value (Sig.) is less than 0.05, so the correlation coefficient is statistically significant at $\alpha = 0.05$. We conclude that there is significant relationship between practices and OR design factors.

Also there is significant relationship between traffic flow system and practices (p-value (Sig) is less than 0.05. A significant relationship also showed between air quality and practices.

These results are consistent with a study conducted to analyze the move from an old to a new operating theatre found a reduction in infection rates after the move (Whitehead et al, 2008).

This result is consistent with a report indicate that mortality rate secondary to burns infection was lowest in wards that were situated on the top floor probably due to minimal movements and good ventilation. This report emphasized the importance of regulating traffic flow and activity patterns a component of infection prevention. Controlling of traffic and activity patterns in a ward helps in minimizing the number of microorganisms present in the environment, as the number of microorganisms in a designated area tends to be related to the number of people present and their activity (katowa, 2007).

A clean environment plays an important role in the prevention of HAIs. Many factors, including the design of patient care areas, ORs, air quality, water supply and the laundry, can significantly influence the transmission of HAI (WHO, 2004).

In a study conducted by Bryce, E. (2005) revealed that, Compliance with IPC procedures significantly affected by organization and environment they work in but not by their personal beliefs or attitudes.

A strong correlation was found between both environmental and organizational factors and self-reported compliance. No relationship was found with individual factors (yassi et al, 2007).

4.7 Differences in IPC practices and socio-demographic factors

4.7.1 Results from questionnaire

Table 4.25 Differences in IPC practices and socio demographic factors

Dependent variable	Independent variable	Test value	P-value(Sig.)
Practices	Hospital	0.814	0.541
	Gender	1.213	0.227
	Age	0.243	0.866
	Marital status	1.339	0.249
	Profession	2.153	0.077
	Education	1.521	0.199
	Experience	2.747	0.067
	Current position	1.451	0.230

The researcher used t-test and one way ANOVA to compare means and to examine the differences in the respondents' answers due to their socio demographic characteristics. Such as place of work (hospital), gender, age, marital status, profession, education, experience and current job position. Table 4.25 shows the differences in IPC practices and socio demographic factors of the study population, the p-value (Sig.) is greater than the level of significance at $\alpha = 0.05$ for the all variables and then there is no significant differences in respondents' answers due to socio demographic factors. The current finding of this study is consistent with a study conducted at Gaza by Abu Zaid, (2010) revealed that there is no statistical significant differences due to socio demographic factors.

Another Study conducted by El-Dalow, (2011) revealed that there are differences between gender and wearing uniform practices where females are complying to wearing uniform more than males which is consistent with another study conducted by Creedon et al, (2008) revealed that male HCWs were less likely to comply with hand hygiene than women. Another study also found that males across all occupations were less likely to comply with IPC practices than females (Yassi et al, 2007). In the study of Askarian et al, (2006) reported that there are varieties in compliance with

personal hygiene among health care workers, where physician and nurses were less compliant than cleaners

In the current study there is no difference among the respondents practices may be due to the small number of females in the study population who constitutes just 11.7%. And the dominant culture of IPC practices which is similar among all HCWs into different hospitals.

4.7.2 Results from Observation Checklist regarding differences

In the observation checklist for HCWs, there are no significant differences due to hospital name (place of work), but there are significant differences due to respondents profession, table 4.26 shows that the means of nurses (1.56) is higher than other profession which means that nurses are more adherence to IPC protocols than others, because nurses are responsible about the sterilization and disinfection of the ORs and they feel that the safety of the patients is their responsibility. Anesthesia technician has the lowest mean which reflect the bad compliance to IPC protocols, as it clear in our hospitals the culture of incompliance to wearing head cover or mask especially amog the anesthesia team. This result agreed with the study conducted in Iran by (Motamed, et al.2006) about Knowledge and practices of HCWs and medical students towards universal precautions in hospitals, significant relationship was shown between knowledge and practice and occupation, as nurses obtained the highest score.

Table 4.26 Mean differences between HCWs practices related to their hospital and profession.

No	Field		Test value	P-value(Sig.)
1.	**Hospital name**		2.185	0.059
2.	**Profession**	**Mean**	86.642	0.000*
	Surgeon	1.40		
	Nurse	1.56		
	Anesthesiologist	0.72		
	Anesthesia technician	0.65		

Chapter 5: Conclusion and Recommendations

5.1 Conclusion

One of the causes for conducting this research is the importance and sensitivity of the IPC for all people, no one can deny the bad consequences of HAIs on the health of people, the SSI is a serious problem that cannot be alleviated without the complete compliance to IPC guidelines. This requires good IPC Strategy to guide staff, patients and public towards excellence in managing and reducing HAIs.

The aim of this study is to assess the infection control practices at ORs in NGOs hospitals in order to stand on the real situation and actual practices to recognize the points of strengths and weaknesses in this field. The researcher used four instruments to assess the compliance to protocols, self-administered questionnaire, two checklists for HCWs and physical environment and in-depth interviews, all these instruments were developed by the researcher himself according to IPC protocols. The use of these instruments enable the researcher to draw the main causes of incompliance to standards and to know the difference between what the providers answered in the questionnaire and the researcher observations.

The study revealed that there is a relationship between both individual and physical environmental factors and practices at the ORs, and relationship between the availability of materials and equipment and the practices of IPC, which is in consistent with reviewed literature

The study results show that the majority of HCWs know about IPC practices and its role in reducing nosocomial infections. Also the majority of HCWs have good attitudes towards IPC practices. These results considered a good chance for improvement and development in this context. About 88.7% of the respondents stated that they need more training about IPC. Regarding the organizational factors, 63% 0f the respondents do not know if there are Palestinian IPC protocols and 75.2% had not any possibility to access the protocols.

Several factors affect the compliance to IPC protocols, mainly knowledge, attitudes, training and education, availability of materials and equipment and the factors of

physical environment. Weaknesses in many different points of managerial and technical issues, lack of knowledge about the protocols, unavailability of protocols in all hospitals, lack of supportive policies, supervision monitoring , follow up of employees practices and lack of training about IPC protocols, have led to malpractice of all technical procedures of infection control.

Many factors were determined by the participants as a obstacles in the way of IPC implementation, 81% of the respondents considered the lack of knowledge and education regarding IPC is an obstacle, 78.4% of the respondents stated that Insufficient training is an obstacle while 62.7% of the them considered the lack of supportive policy is an obstacle and 60.1% considered the Lack of materials and equipment is an obstacle.

HCWs in the ORs must have high degree of awareness toward IPC. The ORs is one of the most hazardous places in the hospitals and the possibility of getting infection is high because of the invasive procedures and operation.

The operating theatre observation checklist revealed that all operating theaters at the investigated hospitals do not have copies of IPC protocols, about 83.3% of the general cleanliness items were not met, and 61.1% of the materials and equipment were available. There are a problem in the traffic flow system at the ORs, also the OR design do not comply with the standards. Poor compliance with the protocols was determined during the observation of the HCWs practices (hand washing, surgical scrub, sharp disposal and the rest of practices).

All mentioned points clarify the magnitude of the problem in Gaza governorates NGOs hospitals and the research has developed comprehensive view about the real situation and practices regarding IPC protocols.

There is a significant relationship between knowledge, attitudes, training and education, and practices of the respondents. Also a significant relationship between the availability of materials and practices, and a significant relationship between physical environment and practices of the HCWs are proven.

Finally, the researcher emphasizes on the necessity of taking the research results in consideration. It's very important to these hospitals management to find solutions to the problem of unavailability of protocols and other mentioned points.

5.2 Recommendation

Based on the results of the study, the researcher would emphasize many useful recommendations that may help in promoting the compliance to IPC protocols.

1- Training courses and education sessions regarding IPC should be implemented for all HCWs to increase their awareness towards this issue.
2- More attention must be given to hepatitis B vaccination to cover all HCWs and to get the complete doses to maintain their safety.
3- The HCWs have to comply with SPs to protect themselves and others; they must end the culture of ignoring infection control guidelines.
4- Upon the results of the interviews with the key person of the selected NGOs hospitals, they must increase the coordination and mutual cooperation with the MOH to get its role as a supervisory body.
5- Every hospital should have an IPCC to be responsible for all activities of infection prevention such as, organizing regular training programs for the staff on essential infection control practices, supervising and monitoring the HCWs practices and to provide all materials and equipment of infection control.
6- The MOH should activate its role as it is considered the main HCP in Palestine. Also it must activate the IPCC, to do its task in disseminating the protocols.
7- The IPC protocols must be developed and updated to meet all aspects of health care especially the procedures at the ORs.
8- The role of management in supervising, monitoring and evaluation the practices of IPC, must be strengthened.
9- At the ORs level a high quality practitioner have to be designated to practice the role of in-service training and education.
10- As much as possible hospitals have to modify the physical environment of ORs to be suitable for IPC standards, the OR design must include three areas

(unrestricted, semi restricted and restricted area), proper flow system and high air quality system.

5.2.1 Recommendations for further research

- Conducting similar research at the ORs of the governmental hospitals as it is considered the main HCP.
- Conducting research concerning specific kinds of infections especially the SSI (post operation infection).
- Further research regarding HAIs.
- Further researches to assess the compliance of IPC protocols: pre and post an intervention.
- Further research to assess the role of managerial factors in adherence to IPC protocols.
- Further research to assess the consequences of needle stick injuries on the health of the exposed persons.
- Conducting research to study the workers of the ORs and their role in IPC practices.

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Annex (1) Map of Palestine

Source: Palestine Royal Commission Report (Peel) July 1937, London: HMSO

Palestinian Academic Society for the Study of International Affairs (PASSIA)

Annex (2) Map of Gaza

Annex (3) Helsiniki Committee Approval

Palestinian National Authority
Ministry of Health
Helsinki Committee

السلطة الوطنية الفلسطينية
وزارة الصحة
لجنة هلسنكي

التاريخ : 07/03/2011

Name: **Jehad El Madhoon**

الاسم: جهاد المدهون

I would like to inform you that the committee has discussed your application about:

" Assessment of infection prevention and control practices at operating rooms in NGOS Hospitals – Gaza Governorates. "

نفيدكم علماً بأن اللجنة قد ناقشت مقترح دراستكم حول:-

In its meeting on March 2011

and decided the Following:-

To approve the above mention research study.

و ذلك في جلستها المنعقدة لشهر 3 2011

و قد قررت ما يلي:-

الموافقة على البحث المذكور عاليه.

Signature
توقيع

Member
عضو

Member
عضو

Chairperson

Conditions:-

- Valid for 2 years from the date of approval to start.
- It is necessary to notify the committee in any change in the admitted study protocol.
- The committee appreciate receiving one copy of your final research when it is completed.

Annex (4) Approval of Al-Awda Hospital

Al-Quds University
Jerusalem
School of Public Health

جـامـعـة الـقـدس
القدس
كلية الصحة العامة

التاريخ: 2011/6/26

حضرة الدكتور يوسف عوض الله المحترم
رئيس مجلس الأدارة لإتحاد لجان العمل الصحي
تحية طيبة وبعد،،،

الموضوع: مساعدة الطالب جهاد المدهون

يقوم الطالب المذكور أعلاه بإجراء بحث بعنوان:

"Assessment of Infection Prevention and Control Practices at Operating Rooms in Ngos Hospitals- Gaza Governorates"

كمتطلب للحصول على درجة الماجستير في الصحة العامة–مسار الإدارة الصحية. و عليه نرجو التكرم للإيعاز لمن ترونه مناسب لتسهيل مهمة الطالب في جمع البيانات و الأحصاءات اللازمة للبحث من قسم العمليات في مستشفى العودة التابع لإدارتكم الموقرة.

علماً بأن المعلومات ستكون متوفرة لدى الباحث و الجامعة فقط.

و اقبلوا فائق التحية و الاحترام،،،

د. بسام أبو حمد
منسق عام برامج الصحة العامة

نسخة:
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Annex (5) Approval of Public Aid Hospital

Al-Quds University
Jerusalem
School of Public Health

جامعة القدس
القدس
كلية الصحة العامة

التاريخ: 2011/6/26

حضرة الاستاذ عوني العكلوك المحترم
مدير مستشفى الخدمة العامة
تحية طيبة وبعد،،،

الموضوع: مساعدة الطالب جهاد المدهون

يقوم الطالب المذكور أعلاه بإجراء بحث بعنوان:

"Assessment of Infection Prevention and Control Practices at Operating Rooms in Ngos Hospitals- Gaza Governorates"

كمتطلب للحصول على درجة الماجستير في الصحة العامة–مسار الإدارة الصحية. و عليه نرجو التكرم للإيعاز لمن ترونه مناسب لتسهيل مهمة الطالب في جمع البيانات و الأحصاءات اللازمة للبحث من قسم العمليات في مستشفى الخدمة العامة التابع لإدارتكم الموقرة.
علماً بأن المعلومات ستكون متوفرة لدى الباحث و الجامعة فقط.

و اقبلوا فائق التحية و الاحترام،،،

د. بسام أبو حمد
منسق عام برامج الصحة العامة

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Annex (6) Approval of Patients Friends Hospital

Al-Quds University
Jerusalem
School of Public Health

جامعة القدس
القدس
كلية الصحة العامة

التاريخ: 2011/6/26

2.7.2011

حضرة الدكتور علي الجيش المحترم
مدير مستشفى أصدقاء المريض
تحية طيبة وبعد،،،

الموضوع: مساعدة الطالب جهاد المدهون

يقوم الطالب المذكور أعلاه بإجراء بحث بعنوان:

"Assessment of Infection Prevention and Control Practices at Operating Rooms in Ngos Hospitals- Gaza Governorates"

NGOs

كمتطلب للحصول على درجة الماجستير في الصحة العامة-مسار الإدارة الصحية. و عليه نرجو التكرم للإيعاز لمن ترونه مناسب لتسهيل مهمة الطالب في جمع البيانات و الأحصاءات اللازمة للبحث من قسم العمليات في مستشفى أصدقاء المريض التابع لإدارتكم الموقرة.

علماً بأن المعلومات ستكون متوفرة لدى الباحث و الجامعة فقط.

و اقبلوا فائق التحية و الاحترام،،،

د. بسام أبو حماد
منسق عام برامج الصحة العامة

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Annex (7) Approval of Yafa Hospital

Al-Quds University
Jerusalem
School of Public Health

جامعة القدس
القدس
كلية الصحة العامة

التاريخ: 2011/6/26

المحترم
حضرة الدكتور أكرم أبو زعيتر
مدير مستشفى يافا
تحية طيبة وبعد،،،

الموضوع: مساعدة الطالب جهاد المدهون

يقوم الطالب المذكور أعلاه بإجراء بحث بعنوان:

"Assessment of Infection Prevention and Control Practices at Operating Rooms in Ngos Hospitals- Gaza Governorates"

كمتطلب للحصول على درجة الماجستير في الصحة العامة-مسار الإدارة الصحية. و عليه نرجو التكرم للإيعاز لمن ترونه مناسب لتسهيل مهمة الطالب في جمع البيانات و الأحصاءات اللازمة للبحث من قسم العمليات في مستشفى يافا التابع لإدارتكم الموقرة.

علماً بأن المعلومات ستكون متوفرة لدى الباحث و الجامعة فقط.

و اقبلوا فائق التحية و الاحترام،،،

د. بسام أبو حمد
منسق عام برامج الصحة العامة

نسخة:
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Annex (8) Approval of DarEsslam Hospital

Al-Quds University
Jerusalem
School of Public Health

جامعة القدس
القدس
كلية الصحة العامة

التاريخ: 2011/6/26

حضرة الدكتور محمد المصري المحترم
مدير مستشفى دار السلام
تحية طيبة وبعد،،،

الموضوع: مساعدة الطالب جهاد المدهون

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منسق عام برامج الصحة العامة

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Annex (9) Approval of Al-Kuwait Hospital

Al-Quds University
Jerusalem
School of Public Health

جامعة القدس
القدس
كلية الصحة العامة

التاريخ: 2011/6/26

حضرة الدكتور عبد العاطي المزين المحترم
مدير المستشفى الكويتي
تحية طيبة وبعد،،،

الموضوع: مساعدة الطالب جهاد المدهون

يقوم الطالب المذكور أعلاه بإجراء بحث بعنوان:

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و اقبلوا فائق التحية و الاحترام،،،

د. بسام أبو حمد
منسق عام برامج الصحة العامة

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Annex (10)

Al Quds University

School of public health

Informed consent

Research title: Assessment of Infection Prevention and Control Practices at Operating Rooms in the Non-Governmental Organizations Hospitals- Gaza Governorates.

Dear Participant

Hello, my name is **Jehad Nasri Elmadhoun**; I am a master degree student of public health at Al Quds University-Palestine.

I am conducting my research as a part of my study requirement at the university.

The overall aim of this study is to assess the adherence of healthcare providers' practices at the operating rooms in NGOs hospitals in Gaza governorates to the infection prevention and control protocols and guidelines.

I highly appreciate your participation in this study. The questionnaire takes about15 minutes to be completed. Participation in this study is voluntary and you have the right to withdraw at any time. Confidentiality will be provided, writing your name is optionally. Please answer the questions as you feel and practice in reality.

Thank you very much for your co-operation.

Researcher: Jehad Nasri Elmadhoun

Mobile: 0599608386

Email: madhoun2020@hotmail.com

madhoun.abuwaseem@gmail.com

Questionnaire **Serial No. ----**

Hospital name ---------- Name (optional) ---------

Section 1: profile of the respondents

1.	**Gender**	☐1. Male	☐2. Female
2.	**Age in years** ---------- years		
3.	**Marital status**	☐ 1. Married ☐ 2. Single ☐3. Divorced ☐ 4. Widow/er	
4.	**Profession**	☐ 1. Surgeon ☐2. Anesthesiologist ☐ 3.OR Nurse	☐4. Anesthesia technician ☐ 5. Other specify ----------
5.	**Education**	☐ 1. Diploma ☐ 2. Bachelor ☐3. Master ☐4. PhD ☐5.Other (specify) ---------	
6.	**Current job position**	☐1. Director ☐2. Head of department ☐3. Practitioner ☐4. Others specify_____	
7.	**Total years of experience** ----------		
8.	Have you ever been vaccinated for hepatitis B? if no, skip to Qs 12		☐ yes ☐ no
9.	If yes, how many doses you have had? ☐1. One ☐2. Two ☐3.		
10.	Have you been exposed to any injury from used needle or sharp surgical instrument?		☐ yes ☐ no

Section 2: individual factors

A.	***Knowledge***					
11.	**Initial test for hepatitis and HIV should be done for:** ☐ 1. All patients who admitted for surgery.☐ 2. For major cases only.☐ 3. Not necessary to be done.					
12.	Do you know about the international standard precaution for IPC**?**	☐ yes ☐ no				
13.	**standard precautions are designed for : (you can choose more than one choice)** ☐ 1. The care of all patients regardless of whether or not they are infected. ☐ 2. Standard Precautions apply to blood and all other body fluids, secretions and excretions ☐ 3. Their implementation is mean to reduce the risk of transmitting microorganisms from known or unknown sources of infection					
	Give your opinion	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
14.	Keeping the door closed during surgical procedure minimize microbial contamination.					
15.	PPE are not used in emergency situation.					
16.	Glove use for all patients is a useful strategy for reducing risk of surgical site infection.					
17.	Performing hand hygiene in the recommended situations can reduce patient mortality.					
18.	Infection prevention and control can reduce medical costs associated with HAIs.					

B.	***Attitudes***	Strongly disagree	Disagree	neutral	agree	Strongly agree
19.	Complying with IPC protocol is very essential for infection prevention.					
20.	Recurrent hand washing is essential to prevent hospital acquired infection.					
21.	The personal protective equipment (gloves, gown, apron and eye glasses) decrease the infection.					
22.	The influence of IPC protocol on your practice is positive.					
23.	Insuring the client's safety and preventing them of getting nosocomial infection is the healthcare provider's responsibility.					
24.	Safe and proper waste disposal decreases or prevent infection.					

C.	***Training and Education***	
25.	Does your hospital provide on job or in service training and education about IPC? ☐1. Never ☐2. Yes sometimes ☐3. yes regularly	
26.	Have you ever attended an education session or workshop on IPC? ☐ 1. Never ☐2 .yes, last year ☐ 3.yes in the past 2 years ☐4. yes, more than 2 years	
27.	If yes, does the provided training improve your performance?	☐ yes ☐ no
28.	Do you feel that you need to learn more about infection prevention and control?	☐ yes ☐ no
29.	Does your basic education curriculum incorporate training about the IPC protocols and guidelines?	☐ yes ☐ no
30.	Is program of orientation of new personnel on IPC implemented in your facility?	☐ yes ☐ no

Section 3: practices

No.	*Practices*	*no*	*rarely*	*Sometimes*	*often*	*always*
31.	Do you use protective barriers (gloves, mask, cap, eye protection, gown and over shoes) when conducting an operation?					
32.	Do you properly handle contaminated equipment to prevent cross infection?					
33.	You scrub your hands for 3-5 minutes when conducting an operation.					
34.	You don't wash your hands when arriving at work.					
35.	When washing hands, You remove jewelry, watch and rings.					
36.	You wash your hands after any contact with blood, body fluids, secretions, and excretions.					
37.	You keep your sterilization during surgery.					
38.	When you touch unsterile objects, you don't change your gloves.					
39.	You don't wash hands before leaving OR.					
40.	Used needles, syringes and knifes are discarded into safety box.					

No	***Practices***	***no***	***rarely***	***Sometimes***	***often***	***always***
41.	Wearing gloves when you come in contact with blood, body fluids, secretions, mucous membranes and excretions.					
42.	You don't cap the used needles before disposal.					
43.	You break or bend the used needle before disposal.					
44.	You don't remove used needles from syringes before disposal.					
45.	HCP with symptoms of influenza, fever, or any other infectious disease is prevented from entering the OR.					

Section 4: Organizational Factors

A.	***Availability of protocols and guidelines***	
46.	Do you know if there is a Palestinian infection prevention and control protocol?	☐ yes ☐ no
47.	Do you have a copy of the Palestinian IPC protocol in your ward? ☐ Yes ☐ No ☐ DK	
48.	If no, have you access to the copy?	☐ yes ☐ no
49.	If Yes, are you currently applying the IPC protocols within your OR? ☐ always ☐ sometimes ☐ never	

50.	**Where it is located?** ☐ present in the drawer ☐ present on the shelf of the room where services are provided ☐ present in the cupboard ☐ present in other places (specify)---------- ☐ DK
51.	**If no, what are the barriers that prevent you from using the protocol? Tick all that apply** ☐ 1- Lack of knowledge and education regarding IPC ☐ 2- Lack of materials and equipment ☐ 3- Difficult to understand ☐ 4- Employee satisfaction ☐ 5- Unsuitable design and infrastructure of the operating theatre ☐ 6- Lack of time and work overload ☐7- Insufficient training ☐ 8- Lack of supportive policy
52.	**What is the source of the protocols you have?** ☐ WHO ☐ MOH ☐ Others
B.	***Availability of Materials and Equipment***
53.	The antiseptic and disinfectant materials and equipment are available in OR. ☐ a. yes ☐ b. no ☐ c. dk
54.	Which of the sterilization equipment and machines are available and functioning in the operating theatre? ☐ a. autoclave ☐ b. boilers ☐ c. ultraviolet ☐ d. ultrasonic washing machine ☐ e. gas sterilizer
55.	Which of the Personal Protective equipment are available in the OR? ☐ a. gowns ☐ b. eye glasses ☐ c. masks ☐ d. shoe cover ☐ e. head cap ☐ f. plastic apron ☐ g. gloves
56.	Sharp boxes are available in each room. ☐ a. yes ☐ b. no ☐ c. dk
57.	There are suitable number of sterilization sinks and dispensers ☐ a. yes ☐ b. no ☐ c. dk

C.	***Supportive policies***					
58.	Does hospital management adopt policies and regulations to support the compliance to the IPC protocols? ☐ a. yes ☐ b. no ☐ c. dk					
59.	Does hospital management encourage the practices of the IPC protocols? ☐ a. yes ☐ b. no ☐ c. dk					
60.	Is there an auditing program to ensure that policies have been implemented? ☐ a. yes ☐ b. no ☐ c. dk					
61.	Is infection prevention and control program included in the hospital quality assurance program? ☐ a. yes ☐ b. no ☐ c. dk					
D.	***Supervision, Monitoring and Evaluation***					
62.	Is there an infection control committee in your hospital as a supervisory body? ☐ a. yes ☐ b. no ☐ c. dk					
63.	Are designated IC practitioners/nurses available? ☐ a. yes ☐ b. no ☐ c. dk					
64.	Do have in use monitoring system about infection rate in your facility? ☐ yes ☐ occasionally ☐ no ☐ dk					
65.	Has you facility ever carried out a follow up / supervision of your practice regarding the infection prevention implementation? ☐ yes every ------ month ☐ no ☐ dk					
66.	Did you receive any feedback after your supervisor's visit regarding your IPC practices? ☐ Yes written feedback ☐ Yes verbal feedback ☐ Not at all					
67.	If yes, what you do with the feedback? ☐ keep it in the files without discussion ☐ Discuss it with concerned people ☐ Use it in developing improvement strategies ☐ Other specify ----------					
E.	***Workload and workforce***	**strongly disagree**	**disagree**	**neutral**	**agree**	**strongly agree**
68.	The shortage of human resource at the OR increases the nosocomial infection.					
69.	The large number of surgeries (work overload) affects the IPC practices and increase HAI.					

Section 5: Physical environmental factors

A.	***OR Design***
70.	The operating room infrastructure and design (water supply and the laundry, adequate ventilation, lighting and storage facilities) is complying with infection control strategies. ☐ a. yes ☐ b. no ☐ c. dk
71.	The place of theatre is a way from the traffic flow and easy to reach from emergency and surgical wards. ☐ a. yes ☐ b. no ☐ c. dk
B.	***Flow***
72.	The traffic flow system at the operating rooms is appropriate to infection control measures. ☐ a. yes ☐ b. no ☐ c. dk
73.	Traffic in and out of the operating room has no influence on the infection. ☐ a. yes ☐ b. no ☐ c. dk
C.	***Air quality***
74.	There is a system for controlling the environmental temperature and humidity that ensures safe limits for anaesthetized patients. ☐ a. yes ☐ b. no ☐ c. dk
75.	The air ventilation system of the operating rooms is complying to infection control standards. ☐ a. yes ☐ b. no ☐ c. dk

Annex (11)

جامعة القدس

كلية الصحة العامة

استبانة

Research title: Assessment of Infection Prevention and Control Practices at Operating Rooms in the Non-Governmental Organizations Hospitals- Gaza Governorates.

عزيزي المشارك/ة

أنا الباحث/ جهاد نصري المدهون ، طالب ماجستير بجامعة القدس كلية الدراسات العليا برنامج الصحة العامة تخصص الإدارة الصحية، أقوم بإجراء هذا البحث كمتطلب رئيس من متطلبات الحصول على شهادة الماجستير.

الهدف الرئيس لهذه الدراسة هو تقييم ممارسات منع ومكافحة العدوى في غرف العمليات في المستشفيات التابعة للمنظمات الأهلية في محافظات غزة حسب البروتوكولات والتوجيهات الفلسطينية.

أثمن عاليا مشاركتكم في هذه الدراسة . تستغرق تعبئة هذه الاستبانة حوالي15 دقيقة . مع العلم أن المشاركة في هذه الاستبانة اختيارية ولك الحق في الانسحاب متى تشاء، مع ضمان سرية المعلومات المقدمة وكتابة الاسم اختيارية وان هذا البحث لن يستخدم إلا لأغراض البحث العلمي فقط.

يرجى إجابة جميع الأسئلة الواردة في الاستبانة وفق ما تراه مناسبا في الممارسة والواقع حيث لا يوجد آراء صحيحة وأخرى خاطئة.

ولكم جزيل الشكر والتقدير

الباحث/ جهاد المدهون

الرقم السري :-------

اسم المستشفى :----- **الاسم (اختياري) :-----**

القسم الأول: معلومات عن المشاركين

.1	**الجنس**	☐ 1- ذكر	☐ 2- أنثى
.2	**العمر:** _____ سنة		
.3	**الحالة الاجتماعية**	☐ 1- متزوج/ة ☐ 3- مطلق/ة	☐ 2- أعزب ☐ 4- أرمل/ة
.4	**المهنة**	☐ 1- طبيب جراح ☐ 3- ممرض عمليات أو حكيم	☐ 2- طبيب تخدير ☐ 4- فني تخدير ☐ 5- غير ذلك حدد ----
.5	**التعليم**	☐ 1- دبلوم ☐ 2- بكالوريوس	☐ 3- ماجستير ☐ 4- دكتوراه ☐ 5- غير ذلك حدد ----
.6	**الوظيفة الحالية**	☐ 1- مدير ☐ 2- رئيس قسم	☐ 3- موظف (بدون صفة ادارية) ☐ 4- غير ذلك حدد ----
.7	**عدد سنوات الخبرة** _____ سنة		
.8	**هل سبق وأن تطعمت لالتهاب الكبد الوبائي B ؟** ☐ 1- نعم ☐ 2- لا إذا لا انتقل لسؤال 12		
.9	**إذا كانت الإجابة نعم، فكم جرعة تلقيت؟** ☐1- واحدة ☐ 2- اثنتان ☐ 3- ثلاثة		
.10	**هل سبق لك أن تعرضت لوخز ابر أو أدوات جراحية حادة مستخدمة ؟** ☐1- نعم ☐ 2- لا		

القسم الثاني : العوامل الفردية

أ	**المعرفة**
.11	الاختبار المبدئي لالتهاب الكبد الوبائي وفيروس نقص المناعة المكتسبة يجب أن يعمل : ☐1. لكل من يجرى له عملية جراحية ☐ 2. للعمليات الكبرى فقط ☐ 3. ليس من الضروري القيام به
.12	هل تعرف عن وجود الاحتياطات المعيارية العالمية لمكافحة العدوى؟ ☐ 1- نعم ☐ 2- لا
.13	الاحتياطات المعيارية العالمية صممت من اجل : (بإمكانك اختيار أكثر من إجابة) ☐ 1. رعاية جميع المرضى سواء كانوا مصابين بالعدوى أم لا ☐ 2. تستخدم للتعامل مع كل سوائل الجسم سواء دم أو أي إفرازات أخرى ☐ 3.تطبيقها وسيلة لتقليل خطر انتقال الميكروبات من مصادر معروفة أو غير معروفة

	الرجاء إعطاء رأيك فيما يلي	**لا أوافق بشدة**	**لا أوافق**	**محايد**	**أوافق**	**أوافق بشدة**
.14	إغلاق الأبواب خلال إجراء العمليات يقلل التلوث الميكروبي					
.15	لا تستخدم معدات الوقاية الشخصية في حالة الطوارئ.					
.16	استخدام القفازات مع كل المرضى يعتبر إستراتيجية مفيدة					

	لتقليل التهابات مواضع الجراحة.					
17.	غسل اليدين في الأوضاع الموصى بها يقلل الوفيات.					
18.	منع ومكافحة العدوى يقلل التكاليف الطبية الناتجة عن عدوى المستشفيات.					
ب	**المواقف والتوجهات**	**لا أوافق بشدة**	**لا أوافق**	**محايد**	**أوافق**	**أوافق بشدة**
19.	الامتثال لبروتوكولات منع ومكافحة العدوى مهم جدا لمنع حدوث العدوى.					
20.	غسل اليدين المتكرر ضروري لمنع العدوى المكتسبة من المستشفيات.					
21.	استخدام معدات الوقاية الشخصية (مثل القفازات والنظارات والكمامة والملابس الواقية) يقلل نقل العدوى.					
22.	تؤثر برتوكولات مكافحة العدوى ايجابيا على أدائك.					
23.	حفظ سلامة المرضى ومنعهم من الحصول على عدوى المستشفيات هي مسؤولية مقدمي الخدمات الصحية.					
24.	التخلص الصحيح والآمن من المخلفات الطبية يقلل أو يمنع العدوى					
ج	**التدريب والتعليم**					
25.	هل يقدم المستشفى الذي تعمل به تدريبا وتعليما في مكان العمل عن منع ومكافحة العدوى؟ ☐1- أبدا ☐2- نعم أحيانا ☐ 3- نعم بانتظام					
26.	هل سبق وان شاركت بحضور جلسة تعليمة أو ورشة عمل عن منع ومكافحة العدوى؟ ☐1- أبدا ☐2- نعم، السنة الماضية ☐ 3- نعم، في السنتين الماضيتين ☐4- نعم، منذ أكثر من عامين					
27.	إذا كانت الإجابة نعم، هل ساعد التدريب المقدم في تحسين أدائك؟ ☐ 1- نعم ☐ 2- لا					
28.	هل تعتقد انك بحاجة لمزيد من التدريب والتعليم عن طرق منع ومكافحة العدوى؟ ☐ 1- نعم ☐ 2- لا					
29.	هل منهاجك الدراسي الأساسي اشتمل على تدريبات حول بروتوكولات مكافحة العدوى؟ ☐ 1- نعم ☐ 2- لا					
30.	هل يطبق مستشفاكم برامج لتعريف الموظفين الجدد على منع ومكافحة العدوى؟ ☐ 1- نعم ☐ 2- لا					

القسم الثالث: الممارسات

	الممارسات	لا التزم	نادرا	أحيانا	غالبا	دائما
.31	هل تستخدم معدات الوقاية الشخصية (القفازات، الكمامة، غطاء الرأس، النظارات، المريول، وغطاء الحذاء) عندما تقوم بعمل أو المساعدة في العمليات الجراحية.					
.32	هل تتناول الآلات الملوثة بطريقة صحيحة لمنع انتقال العدوى					
.33	تقوم بتعقيم يديك من 3-5 دقائق قبل إجراء العمليات.					
.34	لا تغسل يديك فور وصولك إلى العمل.					
.35	التزم بخلع الساعة والمجوهرات والخاتم عند غسل الأيدي.					
.36	تغسل يديك إذا لمست دم ، أو أي من سوائل أو إفرازات جسم المريض بالماء والصابون.					
.37	تلتزم بالحفاظ على التعقيم خلال إجراء العمليات.					
.38	عند ملامستك شيء غير معقم ، لا تقوم بتغيير القفازات.					
.39	لا تقوم بغسل يديك قبل مغادرتك قسم العمليات.					
.40	يتم التخلص من الإبر والمشارط والسرنجات المستخدمة في الصندوق الآمن.					
.41	ترتدي القفازات عندما تتناول الأدوات الملوثة أو إفرازات الجسم.					
.42	لا تقوم بغطاء الإبر قبل التخلص منها.					
.43	تقوم بثني أو كسر الإبر قبل التخلص منها.					
.44	لا تقوم بفصل الإبر عن السرنجات قبل التخلص منها.					
.45	تمنع العاملين الذين تظهر عليهم أعراض العدوى من دخول العمليات.					

القسم الرابع: العوامل التنظيمية

أ.	توافر البروتوكولات والمبادئ التوجيهية
.46	هل تعرف بوجود بروتوكول فلسطيني لمنع ومكافحة العدوى؟ ☐1- نعم ☐ 2- لا
.47	هل يوجد نسخة من بروتوكول منع ومكافحة العدوى الفلسطيني في قسمك؟ ☐ 1- نعم، رايتها ☐ 2- نعم، لم أرها ☐ 3- لا ☐ 4- لا أعرف
.48	إذا لا ، هل يسهل عليك الحصول على هذه النسخة؟ ☐1- نعم ☐ 2- لا
.49	إذا نعم ، هل تقوم حاليا بتطبيق البروتوكولات في قسمك ؟ ☐1- نعم دائما ☐2-نعم أحيانا ☐ 3-لا أبدا
.50	إذا كانت هناك نسخة من البرتوكولات في قسمك فأين توجد؟ ☐ 1- في الدرج ☐ 2- على الرف في غرفة تقديم الخدمة ☐ 3- في الخزانة ☐ 4- في أماكن أخرى حددها _____ ☐ 5- لا اعرف

.51	حسب رأيك ما الذي يعيق الالتزام ببرتوكولات منع ومكافحة العدوى ؟ اشر على كل من ينطبق عليه ☐ 1- قلة المعرفة والتعليم حول منع و مكافحة العدوى. ☐ 2- نقص المواد والمعدات اللازمة لتطبيق ممارسات منع العدوى. ☐ 3- صعوبة فهم البروتوكولات والتوجيهات. ☐ 4- الرضا الوظيفي لدى العاملين. ☐ 5- تصميم غرف العمليات غير مناسب لتطبيق منع ومكافحة العدوى. ☐ 6- قلة الوقت و زيادة عبء العمل. ☐ 7- قلة البرامج التدريبية حول مكافحة العدوى. ☐ 8- ضعف السياسات الداعمة.
.52	ما هو مصدر البروتوكولات لديك؟ ☐ 1- وطني ☐ 2- منظمة الصحة العالمية ☐ 3- وزارة الصحة ☐4- من تطوير المستشفى ☐ 5- أخرى
ب.	**توافر المواد والمعدات**
.53	المواد المطهرة والمعقمة متوفرة في العمليات ☐ 1- نعم ☐2- لا ☐ 3- لا أعرف
.54	أي من الآلات وأجهزة التعقيم التالية متوفرة وتعمل في قسم العمليات؟ ☐ المبخرة ☐ الغلايات ☐ الأشعة فوق البنفسجية ☐ غسالة تنظيف الأدوات بالموجات فوق صوتية ☐ التعقيم بالغاز
.55	أي من المعدات الواقية الشخصية متوفرة ؟ ☐ المريول ☐ واقي العينين ☐ الكمامة ☐ غطاء الأحذية ☐ غطاء الرأس ☐ والمريول البلاستيك ☐ القفازات
.56	صندوق المواد الحادة متوفر في كل غرفة. ☐ 1- نعم ☐ 2- لا ☐3- لا أعرف
.57	يوجد عدد كافي من أحواض التعقيم يتناسب مع عدد الغرف☐ 1- نعم ☐ 2- لا ☐3- لا أعرف
ج.	**السياسات الداعمة**
.58	هل تتبنى إدارة المستشفى سياسات وتعليمات تدعم الامتثال لبروتوكولات منع ومكافحة العدوى؟ ☐ 1- نعم ☐ 2- لا ☐ 3- لا أعرف
.59	هل تشجع إدارة المستشفى من يلتزم ببروتوكولات منع ومكافحة العدوى؟ ☐1- نعم ☐ 2- لا ☐ 3- لا أعرف
.60	هل يوجد برامج تدقيق للتأكد من تطبيق البروتوكولات؟ ☐ 1- نعم ☐ 2- لا ☐ 3- لا أعرف
.61	هل يشتمل برنامج ضمان الجودة في المستشفى على برامج لمكافحة العدوى؟ ☐ 1- نعم ☐ 2- لا ☐ 3- لا أعرف
د.	**الإشراف والمراقبة والتقييم**
.62	هل يوجد لجنة مكافحة العدوى في مستشفاكم كجسم إشرافي؟ ☐ 1- نعم ☐ 2- لا ☐ 3- لا أعرف
.63	هل يوجد مهنيين مخصصون / ممرضون لمكافحة العدوى؟ ☐ 1- نعم ☐ 2- لا ☐ 3- لا أعرف

.64	هل يوجد نظام مستخدم لمراقبة معدلات العدوى في مستشفاكم؟ □1- نعم □2- أحيانا □3- لا □4- لا أعرف
.65	هل حصل وأن توبعت وقيمت تطبيقاتك وممارساتك بما يخص بروتوكولات منع ومكافحة العدوى؟ □1- نعم كل _____ شهر □ 2- لا □3- لا أعرف
.66	هل تسلمت أي تغذية راجعة(ملاحظات) بعد زيارة مسئولك لك بخصوص تطبيق منع ومكافحة العدوى؟ □1 - نعم، ملاحظات مكتوبة □ 2- نعم، ملاحظات شفهية □ 3- لا على الإطلاق
.67	إذا نعم، ماذا تفعل بهذه الملاحظات ؟ □ 1- تحتفظ بها في ملفك دون مناقشتها □ 2- تناقشها مع المعنيين □ 3- تستخدمها في إطار استراتيجيات تحسين العمل □ 4- أخرى حدد_____

ه	القوى العاملة وعبء العمل	لا أوافق بشدة	لا أوافق	محايد	أوافق	أوافق بشدة
.68	نقص القوى البشرية في قسم العمليات يزيد عدوى المستشفيات.					
.69	زيادة عبء العمل وعدد العمليات يؤثر على ممارسات مكافحة العدوى ويزيد عدوى المستشفيات.					

القسم الخامس: العوامل البيئية الطبيعية

أ.	تصميم غرف العمليات
.70	البنية التحتية وتصميم غرف العمليات (الماء، الغسيل، التهوية ،الإضاءة وأماكن التخزين) مناسب لاستراتيجيات مكافحة العدوى. □1- نعم □2- لا □3- لا أعرف
.71	مكان قسم العمليات مناسب وبعيد عن حركة المارة وسهل الوصول من قسم الطوارئ وأقسام الجراحة. 1- نعم □2- لا □3- لا أعرف
ب.	**نظام الحركة**
.72	الحركة داخل العمليات تتماشى ومبادئ مكافحة العدوى ، الحركة في اتجاه واحد وفصل الأماكن المعقمة عن المنطقة الغير معقمة. □ 1- نعم □ 2- لا □ 3- لا أعرف
.73	التحرك داخل وخارج العمليات ليس له تأثير على عدوى المستشفيات. □ 1- نعم □2- لا □3- لا أعرف
ج.	**التهوية**
.74	هناك نظام للتحكم في درجة الرطوبة والحرارة التي تضمن حدودا آمنة للمرضى المخدرين. □1- نعم □2- لا □3- لا أعرف
.75	نظام التهوية داخل العمليات يلبي معايير منع ومكافحة العدوى. □ 1- نعم □2- لا □ 3- لا أعرف

Annex (12) Assessment checklist of operating theatre

Serial number ---------- **Hospital name----------**

No.	Item	1ST observation Date -------- Time ---------			2nd observation Date ------- Time ------			3rd observation Date ------- Time -------		
		Met	PM	Unmet	Met	PM	Unmet	M	PM	Unmet
1.	There is a copy of IPC protocol in the theatre									
	General cleanliness of the OR.									
2.	Daily scrubbing of ORs (Operating theatre floors, surfaces and trolleys should be cleaned using an approved detergent, no blood, dust, or other dirty).									
3.	After the patient has left and before the next patient, surfaces such as the operating table and any equipment in direct contact with the patient should be cleaned with detergent.									
4.	After cleaning, the surface should be dry before the next patient									
5.	Mops should be color coded: each theatre area should have a separate color code, with mops kept for one theatre.									
6.	After use mops should be decontaminated by hot wash.									
7.	Vents are clean with no visible dust									
	Practices									
8.	The clean operation is done before the unclean.									
9.	Single patient use items are only used for one patient.									
10.	Suction tubes and suction bottles are cleaned after use.									
	Materials									
11.	There is sufficient number of scrub dispensers in the department.									
12.	Antiseptic and disinfectant solutions are available in the OR.									
13.	Alcohol swabs are available in the OR.									

14.	All supplies for hand washing are available (water source, a sink, soap bar, or liquid soap, and tissue paper).									
15.	All three types of gloves are available in the OR.									
16.	Plastic basins for decontamination are available.									
17.	Pillows are enclosed in a washable and impervious cover.									
18.	Elbow operated taps are available at all hand wash basins in clinical areas									
	Behavior Movement and flow									
19.	The surgical department trolley doesn't enter the operating rooms.									
20.	Minimum number of surgical team enters the operating room									
21.	Maintain the minimum movement in the OR									
22.	No entry to OR for who is not wearing uniform.									
23.	The application of one-way movement in the completion of activities within the OR.									
24.	Talks should be minimal.									
25.	Keep OR doors closed in order to optimize the efficiency of the ventilating system.									
26.	Theatre staff should wear a clean white coat over theatre suit, if leaving the department and especially in public areas.									
	Sharp and waste disposal									
27.	Disposables and suction catheters discarded after single use.									
28.	There is sharp disposal container in each room.									
29.	Needles, scalpel blades and other sharp objects are disposed of in a puncture resistant Container.									
30.	Dispose sharp disposable container when 3/4 full.									
31.	Clean all waste containers periodically with disinfectant solution.05% chlorine solution									

32.	Use covered waste containers for contaminated wastes.									
	OR design and infrastructure									
33.	The location of OR is suitable and away from the traffic flow and easily accessible from surgical wards and emergency rooms.									
34.	There is a central air conditioner and a HEPA filter at the operating rooms.									
35.	The floor should be covered with antistatic material, and the walls should be painted with impervious, antistatic paint washable and impervious to moisture.									
36.	The operating rooms design is divided into three areas (unrestricted, semi restricted and restricted).									
37.	There is a storage room for the surgical supplies and instruments.									
	Sterilization									
38.	Instruments are always decontaminated immediately after use.									
39.	Gloves are always worn by all steps processing instruments									
40.	Instruments are allowed to dry before sterilization.									
41.	Cleaning brushes are available for proper instruments cleaning.									
42.	Wraps clean instruments in double thickness of muslin or autoclave paper.									
43.	The laryngoscope and anesthesia instrument are cleaned after each operation.									
44.	Sterile equipment is stored in a clean dry area, free from dust and other particulate matter and off the floor to protect the integrity of the packaging and equipment.									
45.	Ultrasonic cleaning machine is located in designated washroom/dirty room									
46.	A validated steam sterilizer is used ,available and functioning									
47.	High disinfectant materials are available (Cidex, Formalin).									

Annex (13) Observation check list for healthcare providers

Serial number ---------- **Hospital ----------**

☐ **Surgeon** ☐ **Nurse** ☐ **Anesthesiologist** ☐ **Anesthesia technician**

No.	*Item*	**First observation** **Date ---------- Time ---------**			**Second observation** **Date ---------- Time ---------**			**Third observation** **Date ---------- ---Time ---------**		
		Yes	**No**	**NA**	**Yes**	**No**	**NA**	**Yes**	**No**	**NA**
1	HCP wear scrub suit during duty.									
2	Wearing shoe covers when entering OR									
3	Wearing mask and head cap when entering the OR.									
4	Keeping quiet and minimum movements.									
	Hand Washing	**Yes**	**No**	**NA**	**Yes**	**No**	**NA**	**Yes**	**No**	**NA**
5	Hand washing when arriving at work.									
6	Hand washing before touching the patient.									
7	Hand washing after working with patients.									
8	Hand washing after touching blood or body fluids.									
9	Washing hands for 15-30 seconds with soap and running water.									
	Surgical Scrub	**Yes**	**No**	**Na**	**Yes**	**No**	**Na**	**Yes**	**No**	**Na**
10	Removing jewelry, hand watch, and ring when washing hands.									
11	Cleans under each fingernail.									
12	Applies antiseptic solution or antibacterial soap									

13	Lathers and scrubs one hand (1 minute) and wrist (1 minute).									
14	Lathers and scrubs to elbows (1 minute)									
15	Scrubs hands again.									
16	Rinses each hand and arm separately under running water, keeping hands pointing up and working from fingertips down to wrist and arm.									
17	Dry from fingertips to elbow with a sterile paper towel, using a separate towel for each arm.									
18	Turn of water after surgical scrub without touch.									
19	Do not touch anything before putting on gloves.									
20	Hand rub with alcohol 5ml pre op.									
	Wearing Gowns and Gloves									
21	Prepares a large clean dry area for opening the package of gown or gloves.									
22	Opens the inner glove wrapper, exposing the gloves with the palms up.									
23	Picks up the first glove by the cuff, touching only the inside portion of the cuff									
24	Holds the cuff with fingers pointing down. Slips the other hand in the glove.									
25	Picks up the second glove by sliding the fingers of the gloved hand under the cuff.									
26	Puts the second glove on the ungloved hand.									
27	Wear gown and sterile gloves before surgical procedure.									
28	Wear gloves when contact with blood or other body fluids.									
29	Disposable plastic aprons are worn when there is a risk that clothing or uniform may become exposed									

	to body fluids or become wet.									
30	Use utility gloves when handling or cleaning contaminated instrument and for waste disposal.									
31	Wearing sterile gloves when doing invasive procedure.									
	Antiseptic and Disinfectant	**Yes**	**No**	**NA**	**Yes**	**No**	**NA**	**Yes**	**No**	**NA**
32	Sterile field is established and maintained during procedures.									
33	When touching unsterile object change his/her gloves.									
34	When opening the sterile package only the corners of the towel are used.									
35	Pour out of containers, do not dip into containers.									
	Skin preparation for surgery									
36	Clean skin with soap and water if soiled.									
37	Selects appropriate antiseptic									
38	Applies antiseptic with dry sterile or HLD forceps and cotton soaked in antiseptic using a circular motion moving from the center outward.									
39	Allows antiseptic to dry before beginning procedure									
40	Sterile drapes are used to create a barrier between the surgical field and the potential sources of bacteria.									
	Sharp disposal									
41	Do not remove used needles from syringes before disposal.									
42	Do not bend or break used needles prior disposal.									
43	Do not recap used needles.									
44	Dispose all sharps in safety box.									

Annex (14) The in-depth interviews questions

١- بماذا تفسر عدم معرفة غالبية مقدمي الخدمات الصحية بوجود بروتوكول فلسطيني لمكافحة العدوى؟

٢- هل توجد لجنة منع ومكافحة العدوى في مشفاكم، اذا لا ما هي الموانع ؟

٣- لماذا لا يتم استقصاء العدوى المنقولة داخل المستشفيات في مشفاكم؟

٤- كيف تفسر قلة التزام مقدمي الخدمات الصحية بكافة اجراءات مكافحة العدوى خاصة غسل الأيدي كلما وجب ذلك؟

٥- ماهى اقتراحاتك لحل مشكلة عدم تواءم تصميم غرف العمليات مع مقاييس منع ومكافحة العدوى؟

٦- كيف يمكن تجاوز مشكلة عدم كفاية بعض الأدوات واجهزة التعقيم الخاصة بمنع ومكافحة العدوى؟

٧- ما هو تفسير الاختلاف بين اجابات المشاركين في الدراسة وبين ملاحظات الباحث؟

٨- بماذا تفسر اصابة معظم الاطباء والتمريض بوخز الابر ٨١.٦% وعدم اكمالهم لجرعا ت تطعيم الكبد الوبائي؟

٩- ما هو تفسيرك لاجابات العاملين بعدم تلقيهم أي جلسة تعليمية أو تدريب حول مكافحة العدوى؟

١٠- وضح دور الادارة في دعم سياسات منع العدوى وتقييم ومراقبة اداء العاملين؟

Annex (15) Names of expert

1.	Dr. Bassam Abu hamad	Al-Quds University
2.	Dr. Yehia Abed	Al-Quds University
3.	Dr. Yosef Abu Safieh	Al-Quds University
4.	Dr. Mofeed Al-Mokhalalati	Islamic University
5.	Dr. Sobhi Skaik	Al-Shifa Hospital
6.	Dr. Hamza Abed Aljawwad	Palestine Nursing College
7.	Mr.Sadi Abu Awad	Palestine Nursing College
8.	Mr. Ramadan Younis	Islamic University

Annex (16) Name of the interviewed persons

1.	Mr. Rami Abu Jaser	Al-Awda hospital
2.	Dr. Nafez Naeem	Public aid hospital
3.	Dr. Ali Al-Jesh	Patient's freids hospital
4.	Dr. Akram Abu Zaiter	Yafa hospital
5.	Mr. Bassam Mosalm	Dar Essalam hospital
6.	Mr. Abed Alateef Elmajdi	Al-Kuwait hospital

Annex (17) results regarding wearing uniform and hand washing

		Yes		No		NA	
No.	**Wearing uniform**	**N**	**%**	**N**	**%**	**N**	**%**
1	HCP wear scrub suit during duty.	430	90.1%	47	9.9%	-	-
2	Wearing shoe covers when enter OR	450	94.3%	27	5.7%	-	-
3	Wearing mask and head cap when entering the OR.	364	76.3%	113	23.7%	-	-
4	Keeping quiet and minimum movements.	439	92.0%	38	8.0%	-	-
	All	**1,683**	**88.2%**	**225**	**11.8%**	**-**	**-**
	Hand washing						
5	Hand washing when arriving at work.	99	20.8%	378	79.2%	-	-
6	Hand washing before touching the patient.	152	31.9%	325	68.1%	-	-
7	Hand washing after working with patients.	305	63.9%	170	35.6%	2	0.4%
8	Hand washing after touching blood or body fluids.	414	86.8%	51	10.7%	12	2.5%
9	Washing hands for 15-30 seconds with soap and running water.	192	40.3%	281	58.9%	4	0.8%
	All	**1,162**	**48.7%**	**1,205**	**39.9%**	**18**	**0.74%**

Annex (18) Results related to compliance to surgical scrub

		Yes		No		NA	
	Surgical Scrub	**N**	**%**	**N**	**%**	**N**	**%**
10	Removing jewelry, hand watch, and ring when washing hands.	297	62.3%	66	13.8%	114	23.9%
11	Cleans under each fingernail.	96	20.2%	266	55.9%	114	23.9%
12	Applies antiseptic solution or antibacterial soap	295	62.0%	64	13.4%	117	24.6%
13	Lathers and scrubs one hand 1 minute and wrist 1 minute.	147	30.9%	214	45.0%	115	24.2%
14	Lathers and scrubs to elbows (1 minute)	38	33.3%	34	29.8%	42	36.8%
15	Scrubs hands again.	265	55.6%	98	20.5%	114	23.9%
16	Rinses each hand and arm separately under running water, keeping hands pointing up and working from fingertips down to wrist and arm.	177	37.1%	187	39.2%	113	23.7%
17	Dry from fingertips to elbow with a sterile paper towel, using a separate towel for	244	51.3%	114	23.9%	118	24.8%
18	Turn of water after surgical scrub without touch.	301	63.4%	60	12.6%	114	24.0%
19	Do not touch anything before putting on gloves.	307	64.4%	57	11.9%	113	23.7%
20	Hand rubs with alcohol 5ml pre operation.	12	2.5%	380	79.7%	85	17.8%
	All	**2,278**	**43.5%**	**1,731**	**33.0%**	**1,231**	**23.5%**

Annex (19) Results of observation checklist about wearing gowns and gloves

		Yes		No		NA	
	Wearing gown and gloves	**N**	**%**	**N**	**%**	**N**	**%**
21	Prepares a large clean dry area for opening the package of gown or gloves.	324	67.9%	47	9.9%	106	22.2%
22	Opens the inner glove wrapper, exposing the gloves with the palms up.	329	69.0%	43	9.0%	105	22.0%
23	Picks up the first glove by the cuff, touching only the inside portion of the cuff	290	60.9%	82	17.2%	104	21.8%
24	Holds the cuff with fingers pointing down. Slips the other hand in the glove.	275	57.8%	95	20.0%	106	22.3%
25	Picks up the second glove by sliding the fingers of the gloved hand under the cuff.	278	58.4%	94	19.7%	104	21.8%
26	Puts the second glove on the ungloved hand.	326	68.5%	46	9.7%	104	21.8%
27	Wear gown and sterile gloves before surgical procedure.	340	71.3%	46	9.6%	91	19.1%
28	Wear gloves when contact with blood or other body fluids.	429	89.9%	29	6.1%	19	4.0%
29	Disposable plastic aprons are worn when there is a risk that clothing or uniform may become exposed to body fluids	73	15.3%	151	31.7%	252	52.9%
30	Use utility gloves when handling or cleaning contaminated instrument and for waste disposal.	0	0.00%	164	36.9%	301	63.1%
31	Wearing sterile gloves when doing invasive procedure.	295	61.8%	144	30.2%	38	8.0%
	All	**2,969**	**56.4%**	**953**	**18.0%**	**1,330**	**25.4%**

Annex (20) Results of skin preparation, Aseptic technique and Sharp disposal

		Yes		No		NA	
	Skin preparation for surgery	**N**	**%**	**N**	**%**	**N**	**%**
36	Clean skin with soap and water if soiled.	79	16.6%	100	21.0%	298	62.5%
37	Selects appropriate antiseptic	300	62.9%	18	3.8%	159	33.3%
38	Applies antiseptic with dry sterile or high level disinfectant forceps and cotton soaked in antiseptic using a circular motion moving from the center outward.	166	34.8%	145	30.4%	166	34.8%
39	Allows antiseptic to dry before beginning procedure	176	36.9%	134	28.1%	167	35.0%
40	Sterile drapes are used to create a barrier between the surgical field and the potential sources of bacteria.	279	58.5%	41	8.6%	157	32.9%
	All	**1,000**	**41.9%**	**438**	**18.4%**	**947**	**39.7%**
	Aseptic technique						
32	Sterile field is established and maintained during procedures.	379	79.5%	71	14.9%	27	5.7%
33	When touching unsterile object change his/her gloves.	245	51.4%	65	13.6%	167	35.0%
34	When opening the sterile package only the corners of the towel are used.	63	38.7%	54	33.1%	46	28.2%
35	Pour out of containers, do not dip into containers.	325	68.1%	43	9.0%	109	22.9%
	All	**1,202**	**63.0%**	**240**	**12.6%**	**466**	**24.4%**
	Sharp disposal	**N**	**%**	**N**	**%**	**N**	**%**
41	Do not remove used needles from syringes before disposal.	203	42.6%	131	27.5%	143	30.0%
42	Do not bend or break used needles prior disposal.	310	65.1%	22	4.6%	144	30.3%
43	Do not recap used needles.	199	41.7%	135	28.3%	143	30.0%
44	Dispose all sharps in safety box.	260	54.5%	78	16.4%	139	29.1%
	All	**972**	**51.0%**	**366**	**19.2%**	**569**	**29.8%**

تقييم ممارسات منع ومكافحة العدوى في غرف العمليات في المستشفيات التابعة للمنظمات الاهلية في محافظات غزة

تعتبر العدوى المكتسبة من المستشفيات واحدة من اخطر المشاكل التى تواجه عالمنا، وتزداد خطورة هذه المشكلة مع قلة الموارد المتاحة لمكافحتها و ضعف السياسات والجهود المبذولة في هذا المجال. ولقد أوصت المراكز التي تعنى بمكافحة العدوى بأن تعليم مقدمي الخدمات الصحية فيما يتعلق بتدابير مكافحة العدوى يعتبر الأولوية القصوى لمنع ومكافحة عدوى المستشفيات.

وتهدف هذه الدراسة لتقييم مدى التزام مقدمي الخدمات الصحية في غرف العمليات في المستشفيات التابعة للمنظمات الأهلية بتوجيهات وتدابير منع ومكافحة العدوى حسب البروتوكولات الفلسطينية الخاصة بمكافحة العدوى. وتعتبر الدراسة متعددة ووصفية تحليلية صممت لتكون كمية ونوعية أجريت في العام 2011م.

ولقد استخدم الباحث أدوات متعددة للحصول على المعلومات في هذا المجال فكان استخدام الاستبانة وقوائم الملاحظات لكل من مقدمي الخدمات الصحية وبيئة العمل في الجزء الكمي واستخدمت الطريقة النوعية عبر إجراء مقابلات معمقة مع ستة أفراد من اصحاب النفوذ والتأثير في المستشفيات المذكورة. وضمت الدراسة جميع العاملين في أقسام العمليات المذكورة والبالغ عددهم 169 موظفا من كافة الفئات واستجاب منهم 154 بنسبة 91%.

وقد أظهرت الدراسة أن88.3% من المستطلعة آراءهم كانوا ذكورا، 79.2% كانوا متزوجين و 81.6% تعرضوا لوخز الابروالأدوات الحادة 88.7% ذكروا انهم بحاجة لمزيد من التدريب و63 % من المشاركين في الدراسة لا يعرفون عن وجود بروتوكول فلسطيني لمنع ومكافحة العدوى ولقد ذكر 84.4% بعدم توافر نسخ من البرتوكولات في أقسامهم. ولقد أعتبر 81% من المشاركين في الدراسة أن نقص المعرفة والتعليم عن مكافحة العدوى هو العائق الأول باتجاه تطبيق بروتوكولات مكافحة العدوى، كما أشار(78.4% و 62.7%) إلى عدم كفاية التدريب والسياسات الداعمة كعائق في اتجاه تطبيق البروتوكولات. واظهرت الدراسة أن 61.1% من المواد والمعدات اللازمة متوفرة . وذكر 39.6% منهم بوجود سياسة تدعم الامتثال للمعاييروالتوجيهات كما ذكر 46.1% بعدم وجود لجنة مكافحة العدوى في مستشفياتهم ولقد ذكر 72.1% من المشاركين بعدم تقييمهم من قبل إداراتهم بما يتعلق بمكافحة العدوى.

وعلى الرغم من فهم أغلب المشاركين في الدراسة لأهمية اتباع تعليمات مكافحة العدوى إلا أن التزامهم العملي كان ضعيفا فلقد تبين أن 48.7% فقط يلتزمون بمعايير غسل الأيدي و 43.5% يلتزمون بمعايير تعقيم الأيدي قبل إجراء العمليات و 56.4% يلتزمون بلبس القفازات و 41.9% لتعقيم مواضع الجراحة و 51.0% يلتزمون بمعايير التخلص من الأدوات الحادة.

ولقد أظهرت قوائم تقييم بيئة العمل بعدم وجود البرتوكولات في أي من غرف العمليات المذكورة . كما تبين عدم ملائمة غرف العمليات في أغلب المستشفيات لمقاييس منع ومكافحة العدوى و وجود بعض النقص في المواد

والأجهزة الخاصة بمنع ومكافحة العدوى مثل القفازات وغطاء العين والأجهزة الخاصة بتنظيف الآلات الجراحية وعدم وجود حاويات مغطاة وعدم وجود أنظمة تهوية وتكييف تتناسب مع معايير منع ومكافحة العدوى.

وأظهرت الدراسة وجود علاقات ذات دلالة إحصائية بين كل من العوامل الفردية والبيئية من جهة وممارسات منع ومكافحة العدوى من جهة أخرى. مع وجود فروقات بين ممارسات العاملين نتيجة المهنة فتبين أن الممرضين يتبعهم الجراحين هم أكثر التزاما بتوصيات منع ومكافحة العدوى.

وأوصت الدراسة بضرورة زيادة التعاون والتنسيق بين المستشفيات الأهلية ووزارة الصحة من أجل تقوية المعرفة والتعليم والتدريب في هذا المجال ونشر البرتوكولات لتكون متاحة لجميع العاملين في الحقل الصحي أو على الأقل في كل مكان لتقديم الخدمة الصحية. كما أوصت الدراسة بتطوير البرتوكولات الخاصة بمكافحة العدوى لتشمل جميع الممارسات الصحية خاصة غرف العمليات.