Deanship of Graduate Studies

Al Quds University

Effect of Infection Prevention and Control Training on Healthcare Professionals' Knowledge, Attitudes and Practices at the Governmental Hospitals

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Effect of Infection Prevention and Control Training on Healthcare Professionals' Knowledge, Attitudes and Practices at the Governmental Hospitals

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Thesis Approval

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Jerusalem-Palestine

1445/2023

Dedication

I dedicate this work to my dear parents. (Father Zouhair, Mother Samia)

To my beloved wife (Pauline Khalil)

To my beloved brothers (Ashraf + Waheep)

To my beloved children (Jad, Rayan, Aram)

Declaration

I certify that this thesis submitted for the degree of Master is the result of my own research, except where otherwise acknowledged and that this thesis (or any part of the same) has not been submitted for a higher degree to any other university or institution.

Signature :-

Name : Akram Zouhair Saleh Khalil

Date : 22/07/2023

Acknowledgment

الحمد الله رب العالمين الذي وفقني وأعانني على إتمام هذا العمل

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List of Abbreviation

HCAI -HAI Healthcare-Associated Infections or Hospital an Acquired Infection

KAP Knowledge, Attitudes, and Practices

IPC Infection Control and Prevention

CDC Central of Disease and Control

WHO World Health Organization

HCPs Health Care Professionals

MOH Ministry of Health

COVID Coronavirus Disease Of 2019

PPE Personal Protective Equipment

ER Emergency Room

ICU Intensive Care Unit

JCI Joint Commission International

SARS-COV Middle East Respiratory Syndrome Coronavirus

SPSS Statistical Package for the Social Sciences

HIV Human Immune-Deficiency Virus

SPH sub public health research

Chapter One: Introduction

1.1 Background

Infections are one of the most common serious problems in healthcare facilities around the world(**Yazie et al., 2019**). The World Health Organization (WHO) defines infection prevention and control (IPC) as an" evidence-based approach and practical solution developed to prevent harm to patients and health workers at every single healthcare encounter across the entire health system by preventing the spread of infection and antimicrobial resistance" **(Chi,2022).** The more serious infection in a health care facility are nosocomial infections, which are also called healthcare-associated infections (HCAIs), which can be defined as" infections acquired while receiving health care that was not present at the time of admission. The HCAIs appear within 48H or more after hospital admission, and may appear after discharge within 30 days. It can occur in different care units such as in primary and secondary health care, which can affect both patients and healthcare professionals" **(Szabó et al., 2022).** Acinetobacter baumannii, Escherichia coli, Klebsiella pneumoniae, Pseudomonas aeruginosa, Staphylococcus aureus, and Streptococcus pyogenes were the most common infections detected in the intensive care unit (ICU) .The urinary tract had the highest infection prevalence (44.4%), followed by wound infections (29.4%), pneumonia (10.7%), and bronchitis (7.4%). A Baumannii was resistant to more drugs than other nosocomial bacteria in the ICU. As a result, it is critical to tackle nosocomial infections **(Mythri et al., 2014)**. Regardless of diagnosis or perceived infection status, the majority of health care professionals correctly answered the knowledge questions about standard precautions for all patients (96.2%), isolation precautions (76.1%), and performing hand hygiene after contact with the patient's environment (95.8%), before and after providing patient care (96.2%), and before and after

handling potentially infectious materials (93.9%)(**Abalkhail et al ., 2021)**. According to reports from worldwide health organizations, approximately 100,000 of the two million people die each year as a result of hospital-acquired diseases IPC noncompliance, the workers who violated infection prevention measures were infected with Hepatitis B (HBV) and hepatitis C (HCV), and Human Immune-Deficiency Virus (HIV). As a result, healthcare professionals are on the front lines of infection prevention for both their customers and themselves **(CDC, 2013)**. Education and training institutions for health professionals should consider planning and executing faculty and teaching staff continuous development programs that are relevant to their communities' evolving health-care demands **(Alqahtani et al.,2020)**. Training, defined by the WHO, "is an activity for communicating information and guidance in order to improve trainees' performance". Poor knowledge of Health Care professionals may be caused by insufficient training, an inability to comprehend concepts of standard precaution, and lower educational status **(Uchendu et al., 2020)**. Training in infection prevention and control by healthcare professionals will enable health-care workers to better identify and mitigate hospital acquired infection (HAI) risks and occupational exposures **(CDC, 2022)**. Health care professionals like doctors and nurses play an important role in patient care and reducing the risk of various diseases, which necessitates the updating of knowledge, information, and skills in infection control and prevention **(Fashafsheh et al., 2015)**. Infection prevention and control training programs can help to reduce the occurrence and impact of hospital-acquired infections by educating and training healthcare professionals, patients, and visitors about the best practices for preventing and controlling hospital-acquired infections (**Alqahtani et al., 2020**). The meaning of infection prevention standards has tightened the guidelines regarding nosocomial infections all over the world **(Drägerwerk, 2016).**

1.2 Problem Statement:

No country in the world is free of diseases acquired in various health facilities, so they recommend improving infection prevention and control strategies and training, according to WHO **(WHO ,2019).**

There are few studies on the impact of training sessions on infection prevention and control in Palestine. This is an important area for researchers to investigate and monitor in order to avoid complications caused by insufficient infection control and prevention training.

Poor knowledge and lack of practice of Health Care professionals may be caused by insufficient training **(Uchendu et al., 2020)**.Unsafe injection practices place the patient and health care professionals (HCPs) at risk for infectious adverse health events like HBV, HCV **(CDC , 2019).** Health professionals training has been identified as an essential component for effective infection control and prevention guideline implementation, ultimately contributing to the prevention of hospital-acquired infections and the provision of high-quality health care delivery **(WHO, 2018) .**According to Palestinian Ministry of Health data, the number of Ministry of Health (MOH) physician was 4.4 per 10,000 population, while the number of MOH nurses per 10,000 population was only 8, furthermore the activities for health education in 2021, 20,345 health educational activities were carried out, with these activities focusing on childhood diseases, and communicable diseases, as well as education about COVID 19 using various educational methods **(Health Annual Report Palestine, 2021).**

In order to enhance the working environment, lower the incidence of hospital-acquired illnesses, and improve patient outcomes, health care staff must be trained in infection control and prevention. Education and training are recommended as a core component for effective infection prevention and control programs **(El Sebaey et al., 2022).**

Participating in a Joint Commission International Quality program has significant benefits for both the company and individual employees, which include creating a high-quality staff with experience in evidence-based techniques, processes for quality and patient safety should be standardized, improving staff quality, patient safety, and JCI accreditation, implementing methods to meet quality and safety objectives, improve operations for long-term success **(JCI, 2023).**

Many barriers exist in countries that restrict (HCPs) from participating in educational programs, including a lack of accessible qualified experts and budgetary restraints **(Shadi et al., 2022).**

1.3 Significant of the study

Ten years of experience as a nurse working in various departments which give the researcher a good background about the importance of infection control. Moreover, the lack of studies about the effect of training and conscious in-service education about this problem, it is important to identify our professional obligation to monitor infection control procedures and recommend developing a national training program to limit the effects of infection in diverse health institutions.

The Corona Virus appeared in Palestine in 2020, and it caused devastating human and economic losses . Due to the existing circumstances, the Palestinian ministry of health stepped up its efforts at that time and started holding classes, seminars, and other events in health institutions all around the nation. These online courses and seminars on infection prevention and control were delivered through both formal courses and electronic programs. The presentation was in English.

The first edition of the Palestinian guide for the prevention and control of infection in healthcare facilities was published in response to the ministry of health's development plans, which called for standardizing policies across all Ministry of Health facilities and improving the services offered to ensure patient health and safety through the caliber of services provided and their impact on maintaining the health for health care professionals. (**Health annual report , 2021**)

As a result of all of these factors and events, I was prompted and inspired to conduct a study and fact-finding about the importance of training sessions in government hospitals, and I focused on my area in order to work hard and persistently, as well as to be present among my fellow doctors and nurses in order to work together on this study and reap the benefits of this study and benefit all medical staff throughout the country.

1.4 Aim of the study

To assess the effect of infection prevention and control training on healthcare professionals' knowledge, attitudes and practices at the governmental hospitals.

1.5 Objectives of the study

- To evaluate the effect of training sessions of infection control and prevention on knowledge, attitude, and practice among nurses and doctors at North Palestine Governmental Hospitals.
- To find out the effect of training sessions of infection control and prevention on knowledge, attitude, and practice among nurses and doctors related to demographic data.
- To find out the differences in knowledge, attitude, and infection control practices between physicians and nurses related to training sessions in governmental hospitals.

1.6 Term Definition

Knowledge: Understanding for information about a subject obtained through experience or study, whether known by one person or by a group of people **(Knowledge, 2023).**

Attitude: It is a feeling or point of view about something or someone**. (Attitude, 2023)**

Practice: The act of doing something on a regular or repeated basis in order to improve your skill at it **(Practice, 2023).**

Kelman theory defines knowledge as a combination of experience, relevant knowledge, and competent insight that provides a framework for estimating, integrating new events and information as a necessary component of manufacturing. On the other hand, attitude and practice are viewed as strong agents of change for healthcare personnel coping with hospital-acquired infections **(Wu et al., 2021).**

1.7 Research Questions

- ✓ What is the effect of training sessions on nurses' knowledge, attitude, and practice about infection control and prevention at the selected governmental hospitals?
- ✓ What is the effect of training sessions on physicians' knowledge, attitude, and practice about infection control and prevention at the selected governmental hospitals?
- ✓ What is the effect of training sessions on nurses' knowledge, attitude, and practice of infection control and prevention at the selected governmental hospitals related to their demographic data (age, gender, education, experience, place of work, and training sessions' time)?
- ✓ What is the effect of training sessions on physicians' knowledge, attitude, and practice about infection control and prevention at the selected governmental hospitals related to their demographic data (age, gender, education, experience, place of work, and training sessions' time)?

- ✓ Are there differences in knowledge, attitude, and infection control practices between physicians and nurses related to training sessions in governmental hospitals?

1.8 Theatrical and conceptual Framework

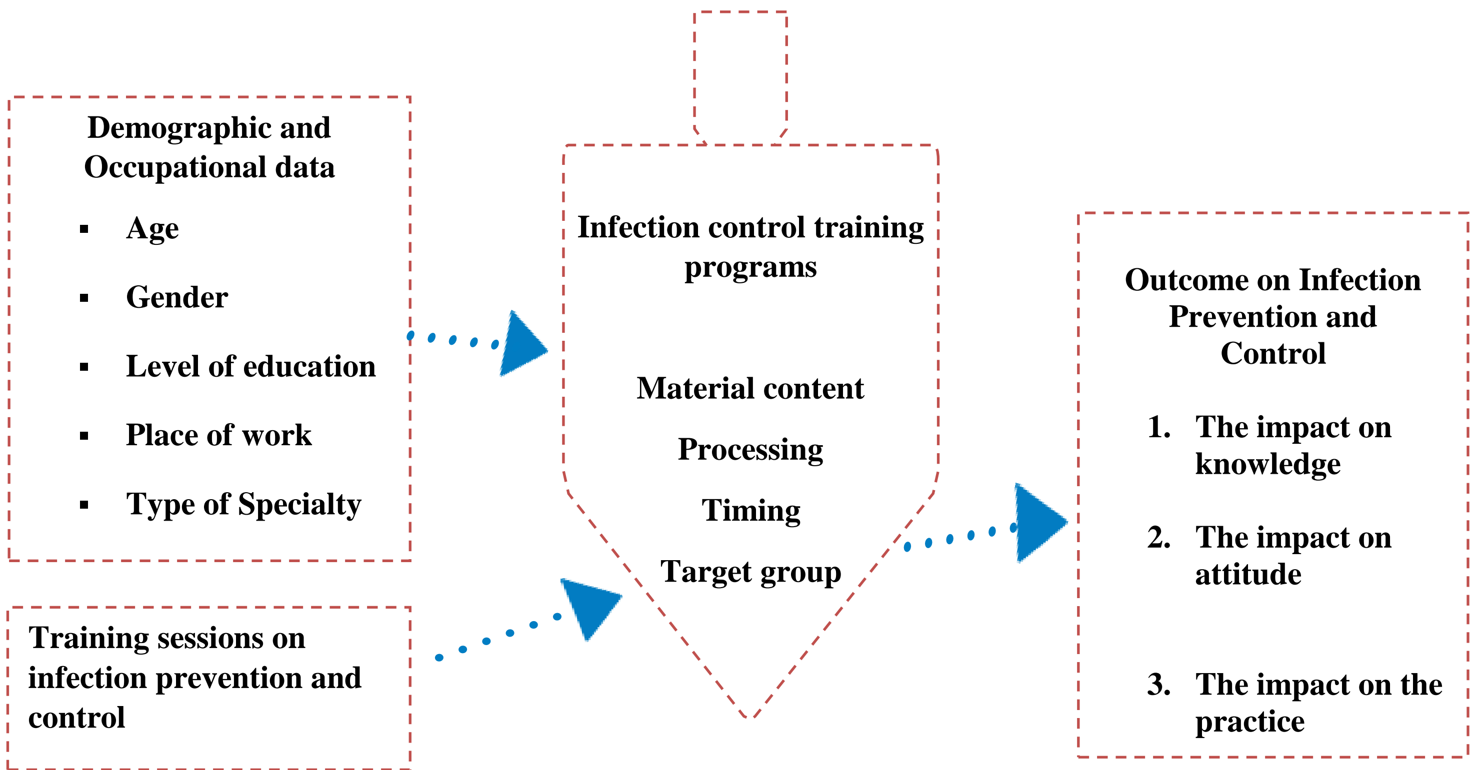


Figure 1: Socio –demographic data and training session's programmer impact on knowledge, attitude and practice about infection prevention and control

The materials used to train the HCP`s included clear and simple messages designed for all educational levels. This aspect of the training is thought to have helped participants increase their knowledge level **(Erdek et al., 2017).**

1.9 Operational Definition

Knowledge: understanding the concept and getting a new idea by training sessions which will be measured by the questioners, which consist of 19 questions using the scale of (true and false or I don't know) for answer.

Attitude: changing of feeling about infection control and prevention after training sessions which will be measured by the questioners, which consist of 9. Questions by using the scale of (strongly agree, agree, neutral, disagree, strongly disagree) for answer.

Practice: acting and acquiring a new skills through training sessions which will be measured by the questioners that consist of 19 Questions by using the scale of (always, often, sometimes, rarely, never) for answer.

Chapter Two

Literature of review

2.1 Introduction

According to the literature, numerous aspects are involved with infection control and practice training courses. These elements are classified as follows: Socio-demographic factors such as age and gender. Level of education and knowledge, stander precaution safety used, patient safety goals, hand hygiene practice, level of hospital acquired infection.

2.2 Nosocomial infection impact on health care facilities and people around the world

Lack of safe and clean healthcare facilities affects around 1.4 million individuals worldwide, with the figure being 2 to 20 times greater in low-resource nations due to a lack of healthcare hygiene. Infections acquired in hospitals occur in both low- and high-income nations. Every year, 1.7 million hospital-acquired infections caused 99,000 deaths in the United States, with annual costs ranging from $25.0 to $31.5 billion **(Jemal et al., 2020)**. in Germany, where statistics show that 400,000 to 600,000 people die each year as a result of HACI complications **(Drägerwerk, 2016)**. Increasing hospital stay duration, nosocomial infections are usually one of the primary health issues, and the expansion of hospitals has increased the occurrence and severity of these diseases. Nosocial infections alone kill 88,000 people in the United States each year and cost more than $6 billion in additional medical treatment **(Wanich et al., 2022).** Nosocomial infections have a significant impact on hospital stay duration and medical care expenditures **(JCI, 2023)**. The additional expenditures expenditure for nosocomial infections included not just the lengthening of hospital stays, but also extra medical expenses **(Sheng et al., 2005)** Each additional day spent in the ICU increased the cost per patient by $353**(Chen et al.,2005).**

2.3 Risk factor for nosocomial infection and health care professional responsibilities include training.

Healthcare professionals are responsible for preventing patients from becoming infected while they are in a health care facility. Infection prevention and control practices are being strengthened through regular in-service training/workshops **(Stellenbosch , 2017).** Level of education and work experience were independent risk factors for hospital-acquired infection , continuous on-the-job and off-the-job training, as well as strict adherence to updated standard operational procedures, may help to close the identified gap **(WHO,2021)** . Healthcare professionals should be provided with an effective education and training program to ensure appropriate infection prevention and control practices, such as the provision of up-to-date information, including infection prevention and control policy, infection control basic principles and related work practices, incident management, and staff role in preventing infection spread **(CDC,2019).** Participants agreed that infection prevention and control training sessions should be required for all healthcare professionals. However, it was also stated that, at the moment, only certain categories of staff members are required to attend training, with an emphasis on those who offer direct patient care (**Qureshi et al.,2022)**

2.4 The effect of stander precaution on infection control and prevention

Standard precautions are intended to safeguard both HCPs and patients by minimizing the risk of microorganism transmission from known and unknown sources. PPE should be worn by all healthcare personnel at all times and in all places to prevent the spread of pathogens between patients, health workers, and the environment (**WHO, 2022**). To increase infection prevention behaviors among healthcare professionals , hospitals should provide infection

prevention facilities , supplies and essential personal protective equipment **(Bayleyegn et al., 2022).**

2.5 Patient safety and hand hygiene effect on infection prevention and control

Patient safety is a means of preventing patient harm while receiving treatment in medical facilities. It is now one of the hospital administration's most critical problems and difficulties. It is regarded as one of the fundamental requirements that all medical personnel must meet **(Wake et al., 2021)** Patient safety is the goal of following the basic rules for infection control and prevention. Its primary goal is to ensure patient safety throughout the continuum of care and achieve the best possible outcomes (**APIC, 2022**). Hand hygiene, which is considered a cornerstone of infection prevention and control when performed optimally, is the most common technique used to reduce healthcare-associated infections and antimicrobial resistance **(Pittet, 2017).**Infectious diseases are the mainstay that leads to the emergence of diseases and their transmission from one person to another therefore it must training the health care professionals to enhance the practice in a health facility (**APIC, 2022).** Maintaining hygiene, safe and clean health care facilities, and reducing microbial contamination on objects, surfaces, and equipment are critical for lowering the risk of health-care-associated infections**(** Guideline Cleaning , Disinfection and Sterilization of Medical Device ,2021),

2.6 The importance of the training field in infection control and prevention

The importance of healthcare professionals (HCPs) regularly attending training programs has received significant attention in recent years, particularly during outbreaks of emerging and re-emerging infectious diseases such as SARS, Middle East respiratory syndrome coronavirus (MERS-CoV), Ebola, and COVID-19 **(Qureshi et al.,2022).** The infectious illnesses curriculum trains healthcare professionals to face the issues of health disparities,

high-impact infectious diseases, and antibiotic resistance **(Joint Royal, 2021).** Due to a lack of understanding of infectious diseases among health care providers, new cases are identified late, infection spread occurs, and infection control strategies are ineffective. As a result, healthcare professionals working in hospitals must be well-versed in pathogens and illnesses to combat the infection effectively. HCPs play a significant role in the spread of HAIs, and compliance with infection control measures appears to be required for preventing and controlling HAI. As a result, they should understand how to prevent transmission and be aware of the potential risk to patients, other staff, and visitors **(Yahaya, 2021).** After the emanation of severe infections like tuberculosis and severe acute respiratory syndrome (SARS), we realized the necessity for an effective infection control training course in all healthcare facilities. The first step in the success of an infection control in developing countries is to identify and implement current knowledge, attitudes and practices for infection control among health care providers **(Unkal et al., 2017).** The organized training program was successful in enhancing nurses' infection control knowledge and perception. The study's findings revealed that their risk reduction practice improved following the training program. The study also demonstrated that a training program is extremely beneficial and that all nurses should be subjected to infection control training to be prepared with the required knowledge and abilities to combat the spread of illness **(Farotimi et al., 2018).** Doctors have more knowledge than other staff, according to a study conducted by Najod Alshathri with a sample of 285 participants. Otherwise, nurses demonstrated a high level of positivity and safe practices. Superior knowledge, a good attitude, and safe actions were all associated with the availability of infection prevention recommendations among patients. The vast majority of healthcare personnel exercised hand hygiene. **(Alshathri, 2021).** The protection of the health of healthcare professionals (HCPs) is currently one of

the top priorities for all the coronavirus-affected nations. Knowledge and awareness, followed by appropriate conduct for illness prevention and transmission, are necessary to maintain the health of hospital employees, especially health care professionals (**Roupa et al., 2020)**. Health care professionals (HCPs) are more likely to catch infections due to working with infected body parts, blood, and fluids. If infection-control measures are not implemented, the infection will increase **(Alhmari et al., 2021)**. Standard precautionary training significantly enhanced the attitude toward normal precaution and assessment of its use in practice. Periodic training should be provided on a regular basis to personnel exposed to human and animal bodily fluids in order to improve and maintain a suitable attitude toward standard precautionary recommendations **(Uchendu et al., 2020)**. Simple practical procedures like hand hygiene have been found to be effective in reducing HCAIs. Using alcohol rubs in hand hygiene reduces the rate of nosocomial infection 40%. Teaching health care professionals about hand hygiene in an appropriate manner because of its importance on a professional and ethical level **(Iliyasu et al., 2016)**. Studies have shown that HCPs have widely applied for hand washing and using PPE in used health facilities **(Alhumaid et al., 2021).**

Chapter Three

Study Methodology

The research methodology is provided in this chapter. The study region, study population, study design, tools, sampling procedure, statistical analysis, ethical consideration, and operational definitions of variables are all discussed.

3.1 Study setting and population characteristics

We are focusing on a specific population group from the ministry of health (doctors and nurse) According to data released by the Palestinian Ministry of Health for the year 2021, the number of doctors in the West Bank is 802, accounting for 35% of the total number of general doctors in Palestine, while the number of nurses in the Palestinian Ministry of Health is 2652, accounting for 46% of the total number of nurses in Palestine **(Health Annual of Palestine , 2021)**.

- **Rafedia Governmental Hospital**, which`s also known as Rafdia Surgical Hospital, is a government hospital located in Nablus city, West Bank, Palestine. Forty years of work, health services for about half a million citizens, continuous development and higher quality services, provide medical services to about half a million citizens from various governorates of the country. The hospital is considered one of the largest health institutions in the country, containing 180 resident doctors, and 280 nurses (**Health Annual of Palestine, 2020).**
- **Al Watani Governmental Hospital** is one of the West Bank's Palestinian state hospitals. Located in Nablus city. The National Hospital is the oldest Palestinian government hospital and the principal internal hospital serving the West Bank's northern governorates.

For about 130 years, it has provided therapeutic services to residents (specialist 13, general practitioner 22, Nurse 92) **(wikiwand, 2023).**

- **Jenin Governmental Hospital**, which is also called Dr. Khalil Sleman governmental hospital .The hospital was established in 1961, as it provides health services to more than 350,000 citizens in Jenin Governorate, and the villages contain 35 specialist doctors, 46 general practitioners, and 200 nurses **(al wafa news, 2022).**
- **Tubas Governmental Hospital** This hospital is located in Tubas Governorate, provides health care to approximately (70) thousand citizens, the number of staff is (210), and includes 20 specialist doctors, 20 general practitioners, 74 nurses**, (Al wafa news, 2021).**

3.2 Study design

A cross-sectional descriptive evaluative methodology was used in this study to assess the effect of infection prevention and control training on healthcare professionals' knowledge, attitudes, and practices at governmental hospitals in Palestine.

3.3 Study sample

- A convenient sample of HCP focus on a specific group (Doctors and nurses) who work in the given hospital
- Have at least one years of experience
- Are willing to engage in the current study.

3.4 Sample size determination

According to calculation of G power program with effect size 0.25 , alpha error 0.05 power error 1-p =.8 maximum number of group 5 , the total sample size is 200 the researcher will add ten percent (20 participant) in case of a drop or attrition of questioner , this size of sample

will fulfill the aim of the study to evaluating the effect of training on infection control and prevention

3.5 The inclusion criteria

- Sample selection criteria are full-time employees of doctors and nurses working in Rafedia, Al-Wattani, Khalil Solaiman, and Tubas hospitals.

3.6 Exclusion criteria

- All Private Hospitals like
- Al Arabi Specialized Hospital, Nablus Specialized Hospital, and Arab Women's Union Hospital located in Nablus city
- Al Razi Specialized Hospital, Ibn Cinna Specialized Hospital located in Jenin city
- All educational hospital like al Najah Specialized Hospital located in Nablus city
- All other governmental hospital located in the north Palestine not mention above

3.7 Sample Frame

Data was gathered from

- Intensive Care Units
- Emergency Rooms
- Medical Wards, and Surgical Wards

Four hospitals linked with the Ministry of Health in the North West Bank region.

3.8 Study Tools

- After reviewing the related literature, the researchers designed a self-administrative questionnaire in English that would aid the participant's knowledge, practice, and attitude. The Questionnaire was created with the study's aim and objectives in mind and its conceptual framework. It was made up of the following components:

- **Part one:** demographic and occupational data. Questions Q1 to Q15. It includes gender, professions, age, educational level , place of work , years of experience , type , language , time , place , guideline , protocols of IPC training sessions .

- **Part two:** Knowledge about infection control and prevention among doctors and nursing in the North Governmental Hospital in Palestine. Questions Q1 to Q 19. We would like to clarify some of the contents related to the knowledge of each statement marked true and false or I don't know how to answer the statement. Some examples 1. Hand hygiene performance 2. Antiseptic solution 3. Use of stander precaution 4. Post-exposure prophylactic 5 Sterilization definition 6. Needle stick injury7. Mode of transmission of disease like hepatitis B, and C, HIV.

- **Part three**: Attitude regarding infection control and prevention among doctors and nursing in the North Governmental Hospital in Palestine. Questions Q1 to Q 9 We would like to clarify some of the contents related to the Attitude (for each statement mark the level of agreement (strongly agree, agree, neutral, disagree, strongly disagree) some statement examples (1.hand hygiene 2. Use of Stander precaution 3. Risk of occupational infection, hospital guideline).

- **Part four**: Practices regarding infection control and prevention among doctors and nursing in the North Governmental Hospital in Palestine. Questions Q1 to Q 19 We would like to clarify some of the contents related to the Practices (for each statement mark the level of agreement (always, often, sometimes, rarely, never) some statement (1.Hand hygiene 2. Use of Stander precaution 3.Needle stick injury 4. Infection control coordinator 5. Hospital guideline 6.overcrowding 7. Quality of infection control 8.Healthcare professional's obligation).

3.9 Questionnaire Validation

The study questionnaire was evaluated by the study supervisor before being distributed to three experts in this field for validation; one infectious disease specialist working at the MOH and three academic researchers to obtain opinions regarding transparency, ambiguity, the quality of the questions asked in the research and check statistically Cronbach's alpha (α) for Internal consistency. No major adjustments were made in response to the reviewers' suggestions, save for some wording tweaks to make it easier for the field researcher to grasp and explain to the participant. The questionnaire was later modified depending on the feedback.

3.10 Ethical Considerations: this study was submitted to Al Quds University-SPH (sub public health) research committee and graduate studies committee). Approval was obtained from the MOH to start the study at the hospital. A consent form was signed by participants who agreed to participate in the study**.**

3.11 Reliability of questionnaire and cut point

The knowledge scores were converted into percentage scores by dividing the respondents' results by the potential maximum scores and multiplying by 100. The total score of each result was calculated using Bloom's cutoff point **(Blooms, 1956).** The level of knowledge was categorized into three categories based on the aggregate scores: low level knowledge (less than 60%), moderate level knowledge (60-79%), and high level knowledge (80-100%).

The attitude scores were converted into percentage scores by dividing the respondents' results by the potential maximum scores and multiplying by 100. The total score of each result was calculated using Bloom's cutoff point (Blooms, 1956). The level of attitude was categorized into three categories based on the aggregate scores: Negative attitude (less than 60%), Neutral attitude (60-79%), and Positive attitude (80-100%).

The practice scores were converted into percentage scores by dividing the respondents' scores by the potential maximum scores and multiplying by 100. The total score of each result was calculated using Bloom's cutoff point **(Blooms, 1956)**. Based on the aggregate scores, the level of practice was classified as Poor Practice (less than 60%), Fair Practice (60-79%), and Good Practice (80-100%).

3.12 Pilot study

A pilot study was conducted to test the instrument. The primary purpose of a pilot is not to answer specific research questions but to prevent researchers from launching a large-scale study without adequate knowledge of the methods proposed **(Lowe, 2019).** The pilot study was conducted with 10% of participants from Tubas hospital's medical and surgical wards to determine the effectiveness of instructions, the clarity of questions, the completeness of response sets, the time required to complete the questionnaire, and the success of data collection techniques.

3.13 Reliability of questionnaire related to pilot study

The reliability of the questionnaire was tested by alpha Cronbach through the pilot study on 20 participants. Cronbach's alpha coefficient of knowledge, attitude, and practice scales were yielded 0.82, 0.84, and 0.93 respectively. Therefore, the scales were accepted to be applied in the study.

3.14 Data collection procedure

After taking the needed approvals from the university and Palestinian MOH, the questionnaire with the consent information was sent to the participants through Google form. The information includes the information needed for the participants for contact or any question, the questionnaire was collected in two weeks to give the participants enough time and to achieve the needed sample size (about 220 participant). Data entry and analysis by the SSPS

program after filtering the answered questionnaire will be done. Provide feedback on the questionnaire's applicability and appropriateness (validity).

3.15 Data analysis

Data was analyzed using statistical package for social science (SPSS) version 23. Management was done by coding and entering subject's responses into a computer. The researcher checked all data to avoid any discrepancies, expressed as means, standard deviations; p-value and T test, one-way Anova, and independent t test. The probability of an error (p-value) < 0.05 was considered significant.

Chapter Four

Results

4.1 Introduction

The statistical method enabled the investigator to derive, analyze, coordinate, measure, evaluate, and communicate numerical data. The goal of data analysis is to provide answers to study-related problems. The questions, the design and data gathering procedure, and the data measurement level all influence the data analysis strategy. The acquired data is edited, tabulated, analyzed, and interpreted in this chapter.

4-2 Response rate

The participants in the current study are composed of all nurses and physicians working in the governmental hospitals in the North West Bank/ Palestine. Two hundred and eleven out of 220 questionnaires (95.9% response rate) were completed and returned by the participants.

4.3 Reliability of the study scales

Cronbach's Alpha of the all scales were above 0.70, indicating acceptable internal consistency or homogeneity for the questionnaire, as seen in 4-1.

Table 4 -1. Cronbach's Alpha of the scales

Scale	Item	Cronbach's Alpha
Knowledge	19 questions	0.74
Attitude	9 questions	0.78
Practice	19 questions	0.90

4.4 Participants' characteristics

Two hundred and eleven participants participated in the study. The analysis revealed that the mean age of nurses was 32.1 (SD= 6.2) years.

The majority of the participants, 130(61.6%) were males and 198(93.8%) have a bachelor's degree. More than one fourth of them, 59(28.0%) are from Rafedia hospital and approximately one third of them, 72(34.1%) have 4-6 years' experience.

According to physicians, one hundred participated in the study. The analysis revealed that the majority of them, 68 (68.0%) were males and 94(94.0%) have a bachelor's degree. Twenty-nine of them (29.0%) from Rafedia hospital and 43(43.0%) have 4-6 years' experience.

One hundred and eleven nurses participated in the study. The analysis revealed that more than half of them, 62 (55.9%) were males and 104(93.7%) have a bachelor's degree. Thirty of them (27.0%) from Rafedia hospital and 48(43.2%) have 1-3 years' experience, as seen in Table 4-2.

Table 4-2. Demographic Characteristics of the Participants (N=211)

Variable		**Total** **M(SD)**	**Physician** **M(SD)**	**Nurse** **M(SD)**
Age		32.1 (6.2)	33.8(5.0)	30.6(6.7)
		N (%)		
Gender	Male	130(61.6)	68 68.0	62(55.9)
	Female	81(38.4)	32 32.0	49(44.1)
Educational level	Bachelor	198(93.8)	94 94.0	104 93.7
	Master	13(6.2)	6 6.0	7 6.3
59(28.0)	Jenin hospital	53(25.1)	27 27.0	26 23.4
	Rafedia hospital		29 29.0	30 27.0
	Al-Watani hospital	49(23.2)	21 21.0	28 25.2
	Tubas hospital	50(23.7)	23 23.0	27 24.3

Professional experience	1-3 years	64(30.3)	16	16.0	48	43.2
	4-6 years	72(34.1)	43	43.0	29	26.1
	7-9 years	44(20.9)	28	28.0	16	14.4
	10 years and above	31(14.7)	13	13.0	18	16.2

N= sample; %= percentage; M=Mean; SD= Standard deviation

Also, the analysis revealed that more than half of the participants 109(51.7%) have attended infection training sessions, as seen in figure 4-1.

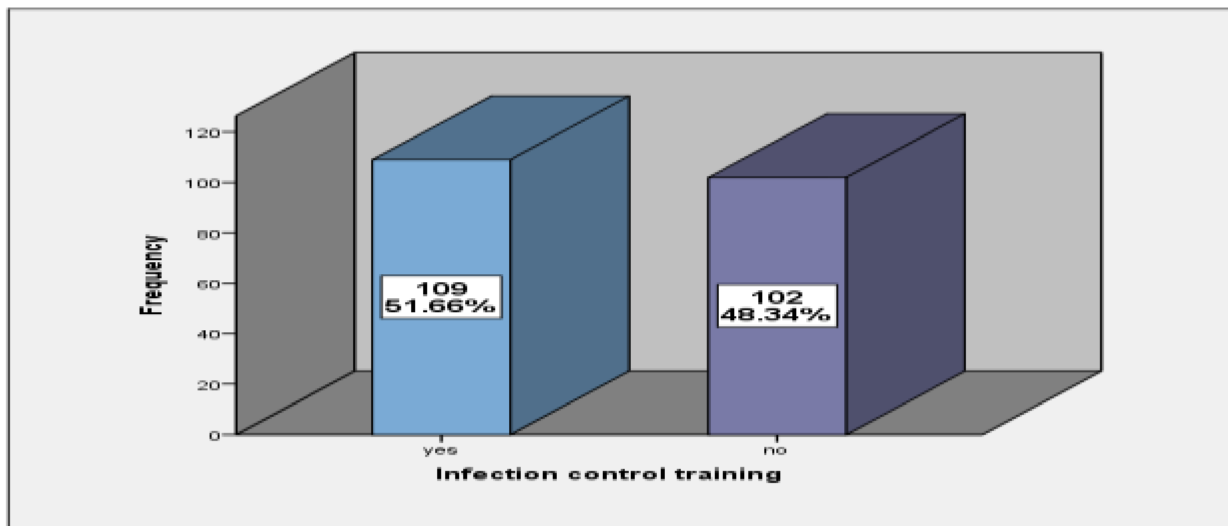


Figure 4-1. Distribution of the participants according to the infection control training (N=211)

Also, the analysis revealed that more than half of the professional 56(51.4%) were nurses who have attended infection training sessions, as seen in figure 4-2.

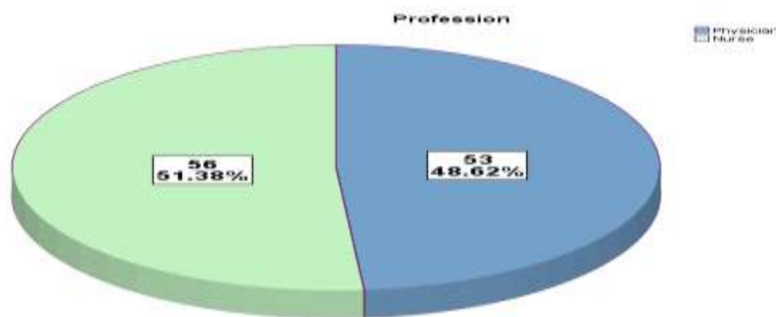


Figure 4-2. Distribution of the professionals according to the infection control training (N=109)

The analysis revealed that most of the participants, 77(70.6%) had attended COVID-19 management training sessions. Also, most of the participants, 81(74.3%) reported that mode of training was formal training and 101(92.7%) reported that the language of the training . The sessions were English. In addition, 62(56.9%) reported that training sessions time were 10 hours and above. Most of them, 79(72.5%) reported that last training sessions were 2 years or less.

According to the physicians, the analysis revealed that most of them 45(84.9%) had attended COVID-19 management training sessions and 43(81.1%) reported that mode of training was formal training. Also, 52(98.1%) reported that the language of the training sessions was English and 33(62.3%) reported that training sessions were fewer than 10 hours. Most of them 37(69.8%) reported that last training sessions were 2 years and less.

According to the nurses, the analysis revealed that more than half of them 32(57.1%) had attended COVID-19 management training sessions and 38(67.9%) reported that mode of training was formal training. Also, 49(87.5%) reported that the language of the training sessions were English and 42(75.0%) reported that training sessions were 10 hours and above. Most of them 42(75.0%) reported that last training sessions were 2 years or less, as seen in 4-3.

Table 4-3. Distribution of the Participants regarding infection control training sessions (N=109)

Variable		Total n (%)	Physician n (%)	Nurse n(%)
Type of training course	COVID-19 management	77(70.6)	45(84.9)	32(57.1)
	Standard precaution	12(11.0)	5(9.4)	7(12.5)
	Catheter association UTI	4(3.7)	0(0.0)	4(7.1)
	Blood borne disease	5(4.6)	0(0.0)	5(8.9)
	Injection safety practice	7(6.4)	1(1.9)	6(10.7)
	Other	4(3.7)	2(3.8)	2(3.6)
Mode of training course	Formal training	81(74.3)	43(81.1)	38(67.9)
	Seminars	16(14.7)	7(13.2)	9(16.1)
	Zoom	5(4.6)	0(0.0)	5(8.9)
	Seminars & zoom	2(1.8)	-	2(3.6)
	Other	5(4.6)	3(5.7)	2(3.6)
language of training course	Arabic	8(7.3)	1(1.9)	7(12.5)
	English	101(92.7)	52(98.1)	49(87.5)
Training time	Less than 10 hrs.	47(43.1)	33(62.3)	14(25.0)
	10 hrs. and above	62(56.9)	20(37.7)	42(75.0)
Last course time	2 years and less	79(72.5)	37(69.8)	42(75.0)
	More than 2 years	30(27.5)	16(30.2)	14(25.0)

N= sample; %= percentage

According to infection control protocols and resources, most of the participants 169 (80.1%) reported that they saw the national infection prevention and control guideline in their hospital and 170(80.6%) were aware of any other protocols concerning infection prevention and control. Also, 95 (45.0%) of the participants reported that sometimes their hospital provides all necessary resources for infection control and prevention, as seen in table 4-4.

Table 4-4. Distribution of the Participants regarding infection control protocols and resources (N=211)

Item		Total n(%)	Physician n (%)	Nurse n(%)
National infection prevention and control guideline in the hospital	Yes	169(80.1)	87(87.0)	82(73.9)
	No	42(19.9)	13(13.0)	29(26.1)
Other protocols concerning infection prevention and control	Yes	170(80.6)	89(89.0)	81(73.0)
	No	41(19.4)	11(11.0)	30(27.0)
Does your hospital provide all necessary resources for infection control and prevention?	Always	29(13.7)	14(14.0)	15(13.5)
	Most of the time	78(37.0)	40(40.0)	38(34.2)
	Sometimes	95(45.0)	43(43.0)	52(46.8)
	Never	9(4.3)	3(3.0)	6(5.4)

N= sample; %= percentage

According to the health professionals' knowledge, attitude, practice level of the infection control and prevention, the analysis revealed that more than half of them, 125 (59.2%) have a moderate knowledge level and 132(62.6%) have a positive attitude level. Also, the majority of them, 167(79.1%) have a good practice level.

According to the physicians, the analysis revealed that the majority of them 62(62.0%) have moderate knowledge level, 72(72.0%) a positive attitude level, and 86(86.0%) a good practice level. Also, 63(56.8%) of the nurses have a moderate knowledge level, 60(54.1%) positive attitude level, and 81(73.0%) good practice level, as seen in table 4-5.

Table 4-5: Description of the nurses' Knowledge, attitude, and practice level of infection control and prevention (N=211)

Variable		**Total**	**Physician**	**Nurses**
		N (%)	**N (%)**	**N (%)**
Knowledge	Low knowledge level	65(30.8)	27(27.0)	38(34.2)
	Moderate knowledge level	125 (59.2)	62(62.0)	63(56.8)
	High knowledge level	21 (10.0)	11(11.0)	10(9.0)
Attitude	Negative attitude	4 (1.9)	0(0.0)	4(3.6)
	Neutral attitude	75 (35.5)	28(28.0)	47(42.3)
	Positive attitude	132 (62.6)	72(72.0)	60(54.1)
Practice	Poor level	4 (1.9)	2(2.0)	2(1.8)
	Fair level	40 (19.0)	12(12.0)	28(25.2)
	Good level	167 (79.1)	86(86.0)	81(73.0)

N= sample; %= percentage

According to the professionals who have attended training sessions, the analysis of the knowledge, attitude, practice level of the infection control and prevention revealed that the majority of the participants, 66(60.6%) have moderate level, 74(67.9%) positive attitude level, and 86(78.9%) good practice level. Majority of the physician's 35(66.0%) have moderate knowledge level, 38(71.7%) a positive attitude level, and 44(83.0%) a good practice level. Also, 31(55.4%) of the nurses have a moderate knowledge level, 36(64.3%)

positive attitude level, and 42(75.0%) good practice level, as seen in table 4-6.

Table 4-6: Description of the professionals' Knowledge, attitude, and practice level of infection control and prevention who had training sessions (N=109)

Variable		Total	Physician	Nurses
		N (%)	N (%)	N (%)
Knowledge	Low knowledge level	33(30.3)	12(22.6)	21(37.5)
	Moderate knowledge level	66(60.6)	35(66.0)	31(55.4)
	High knowledge level	10(9.2)	6(11.3)	4(7.1)
	Negative attitude	0(0.0)	0(0.0)	0(0.0)
	Neutral attitude	35(32.1)	15(28.3)	20(35.7)
	Positive attitude	74(67.9)	38(71.7)	36(64.3)
Practice	Poor level	2(1.8)	2(3.8)	0(0.0)
	Fair level	21(19.3)	7(13.2)	14(25.0)
	Good level	86(78.9)	44(83.0	42(75.0)

N= sample; %= percentage

4.5. Testing the research questions

Research question one: What is the effect of training sessions on nurses' knowledge, attitude, and practice about infection control and prevention at the selected governmental hospitals?

An independent t test was used to assess differences between nurse's knowledge, attitude, and practice scores mean towards infection control and prevention and training sessions

Table 4-7. Differences between nurse's knowledge, attitude, and practice of infection control and prevention and training sessions (N=111)

Variable	Training session	N	M(SD)	Statistical test	
				t	P value
knowledge	Yes	56	64.7(13.1)	.46	.647
	No	55	65.8(13.8)		
Attitude	Yes	56	80.2(8.0)	2.3	.022*
	No	55	76.3(9.7)		
Practice	Yes	56	84.5(10.0)	.08	.939
	No	55	84.7(11.6)		

** Significant at the 0.05 level*

The difference was significantly with attitude ($p<0.05$), as shown in Table 4-7. The analysis revealed the attitude mean scores of the nurses who have training sessions(M= 80.2±8.0) was higher than those who haven't (M=76.3±9.7), as seen in Table 4-7.

Research question two: What is the effect of training sessions on physicians' knowledge, attitude, and practice about infection control and prevention at the selected governmental hospitals?

An independent test was used to assess differences between physicians' knowledge, attitude, and practice scores meant towards infection control and prevention and training sessions. The analysis revealed no significant differences between the variables ($p>0.05$), as shown in

Table 4-8. Table 4-8. Differences between physicians' knowledge, attitude, and practice of infection control and prevention and training sessions (N=100)

Variable	Training session	N	M(SD)	Statistical test	
				t	P value
knowledge	Yes	53	68.5(12.9)	.699	.486
	No	47	66.9(10.7)		
Attitude	Yes	53	81.4(7.3)	.279	.780
	No	47	81.0(6.4)		
Practice	Yes	53	85.9(9.8)	.754	.452
	No	47	87.3(7.6)		

** Significant at the 0.05 level.*

Research question three: What is the effect of training sessions on nurses' knowledge, attitude, and practice of infection control and prevention at the selected governmental hospitals related to demographic data (age, gender, education, experience, place of work, and training sessions' time)?

An independent test was used to assess differences between nurses' knowledge, attitude, and practice scores meant for infection control and prevention who had training sessions and gender. The analysis revealed no significant differences between the variables (p>0.05), as shown in Table 4-9.

Table 4-9. Differences between nurses' knowledge, attitude, practice of infection control and prevention who had training sessions and nurses' gender (N= 56)

Variable	Gender		Statistical test	
			t test	P value
	Male	Female		
	M(SD)	M(SD)		
Knowledge	63.2(14.1)	66.5(11.6	-.955	0.344
Attitude	81.4(8.1)	78.8(7.7)	1.178	0.244
Practice	82.4(11.2)	87.1(7.8)	-1.783	0.080

** Significant at the 0.05*

An independent test was used to assess differences between nurses' knowledge, attitude, and practice scores meant towards infection control and prevention for those who had training sessions and an educational level. The analysis revealed no significant differences between the variables ($p>0.05$), as shown in Table 4-10.

Table 4-10. Differences between nurses' knowledge, attitude, practice of infection control and prevention who had training sessions and nurses' education level (N=56)

Variable	education level		Statistical test	
			t test	P value
	Bachelor	Master		
	M(SD)	M(SD)		
Knowledge	64.5(13.4)	66.7(8.0)	-.270	0.788
Attitude	80.3(8.1)	80.0(8.0)	.053	0.962
Practice	84.3(10.2)	88.1(2.2)	-.630	0.532

** Significant at the 0.05 level.*

The ANOVA test was used to assess differences between nurses' knowledge, attitude, and practice scores meant for infection control and prevention who had training sessions and work place. The difference was significant with practice ($p<0.05$), as shown .

in Table 4-11. Scheffe post hoc test showed that there is statistical significance for nurses in Rafedia hospital group in practice more than the Tubas Hospital Group ($p = .042$).

Table 4-11. Differences between nurses' knowledge, attitude, practice of infection control and prevention who had training sessions and nurses' work place (N= 56)

Variable	work place				Statistical test	
					F test	P value
	Jenin hospital	Rafedia hospital	Al-Watani hospital	Tubas hospital		
	M(SD)	M(SD)	M(SD)	M(SD)		
Knowledge	62.7(13.6)	60.1(14.5)	66.8(13.0)	70.2(8.8)	1.688	.181
Attitude	83.0(11.6)	78.8(9.0)	80.4(6.2)	79.4(3.9)	.657	.582
Practice	84.4(8.9)	78.9(13.4)	86.8(6.7)	89.5(4.8)	3.401	.024*

** Significant at the 0.05 level.*

ANOVA test was used to assess differences between nurses' knowledge, attitude, and practice scores mean towards infection control and prevention who had training sessions and experience level. The analysis revealed no significant differences between the variables (p>0.05), as shown in Table 4-12.

Table 4-12. Differences between nurses' knowledge, attitude, practice of infection control and prevention who had training sessions and nurses' experience (N=56)

Variable	Experience				Statistical test	
					ANOVA test	P value
	1-3 years	4-6 years	7-9 years	10 years and above		
	M(SD)	M(SD)	M(SD)	M(SD)		
Knowledge	63.4(13.3)	67.4(13.3)	62.5(11.4)	66.2(14.4)	.340	.797
Attitude	77.7(8.8)	83.1(6.8)	84.7(3.5)	80.0(8.0)	2.238	.095
Practice	86.1(8.7)	83.5(9.9)	88.7(5.6)	80.1(13.0)	1.689	.181

** Significant at the 0.05*

An independent t test was used to assess differences between nurses' knowledge, attitude, and practice scores mean towards infection control and prevention who had training sessions and training sessions' time. The analysis revealed no significant differences between the variables (p>0.05), as shown in Table 4-13.

Table 4-13. Differences between nurses' knowledge, attitude, practice of infection control and prevention who had training sessions and training sessions' time (N= 56)

Variable	Training sessions' time		Statistical test	
			t test	P value
	Less than 10 hrs.	10 hrs. and above		
	M(SD)	M(SD)		
Knowledge	59.4(15.5)	66.4(11.9)	-1.767	0.083
Attitude	81.7(6.8)	79.7(8.3)	0.814	0.419
Practice	85.7(7.9)	84.1(10.7)	0.516	0.608

** Significant at the 0.05 level.*

Pearson correlation test was used to assess relationship between nurses' knowledge, attitude, and practice scores mean towards infection control and prevention who had training sessions and age. The analysis revealed no significant relationship between the variables (p>0.05), as shown in Table 4-14.

Table 4-14. Relationship between nurses' knowledge, attitude and practice of infection control and prevention who had training sessions and age of nurses (N= 56)

Variable	Age	
	r	P. value
Knowledge	.013	.923
Attitude	.178	.190
Practice	-.217	.108

** Significant at the 0.05*

Research question four: What is the effect of training sessions on physicians' knowledge, attitude, and practice about infection control and prevention at the selected governmental hospitals related to demographic data (age, gender, education, experience, place of work, and training sessions' time)?

An independent t test was used to assess differences between physicians' knowledge, attitude, and practice scores mean towards infection control and prevention who had training sessions and gender. The analysis revealed the practice mean scores of the female who have training sessions (M= 90.3±4.4) was higher than male (M=84.3±10.7), as shown in Table 4-15.

Table 4-15. Differences between physicians' knowledge, attitude, practice of infection control and prevention who had training sessions and physician' gender (N=53)

Variable	**Gender**		**Statistical test**	
			t test	**P value**
	Male	**Female**		
	M(SD)	**M(SD)**		
Knowledge	67.1(12.9)	72.6(12.2)	-1.416	.169
Attitude	81.3(7.0)	81.9(8.1)	-.266	.793
Practice	84.3(10.7)	90.3(4.4)	-2.856	0.006*

** Significant at the 0.05 level.*

An independent t test was used to assess differences between nurses' knowledge, attitude, and practice scores mean towards infection control and prevention who had training sessions and educational level. The analysis revealed no significant differences between the variables (p>0.05), as shown in Table 4-16.

Table 4-16. Differences between physicians' knowledge, attitude, practice of infection control and prevention who had training sessions and physician' education level (N=53)

Variable	Educational level		Statistical test	
			t test	P value
	Bachelor	Master		
	M(SD)	M(SD)		
Knowledge	68.4(13.3)	69.7(6.6)	-.195	0.846
Attitude	81.3(7.0)	83.3(11.5)	-.542	0.590
Practice	85.6(10.1)	89.5(2.3)	-.751	0.456

** Significant at the 0.05 level.*

ANOVA test was used to assess differences between physicians' knowledge, attitude, and practice scores mean towards infection control and prevention who had training sessions and work place. The analysis revealed no significant differences between the variables (p>0.05), as shown in Table 4-17.

Table 4-17. Differences between physicians' knowledge, attitude, practice of infection control and prevention who had training sessions and physician' work place (N=53)

Variable	work place				Statistical test	
					ANOVA test	P value
	Jenin hospital	Rafedia hospital	Al-Watani hospital	Tubas hospital		
	M(SD)	M(SD)	M(SD)	M(SD)		
Knowledge	68.4(10.5)	63.5(13.7)	70.8(5.9)	73.3(15.0)	1.801	.159
Attitude	82.4(10.0)	80.9(6.3)	82.7(6.0)	80.6(7.2)	.254	.858
Practice	85.8(12.8)	82.7(11.8)	88.1(3.4)	88.6(6.4)	1.170	.331

** Significant at the 0.05 level.*

ANOVA test was used to assess differences between physicians' knowledge, attitude, and practice scores mean towards infection control and prevention who had training sessions and experience level. The analysis revealed no significant differences between the variables (p>0.05), as shown in Table 4-18.

Table 4-18. Differences between physicians' knowledge, attitude, practice of infection control and prevention who had training sessions and physician' experience (N=53)

Variable	**Experience level**				**Statistical test**	
					ANOVA test	**P value**
	1-3 years	**4-6 years**	**7-9 years**	**10 years and above**		
	M(SD)	**M(SD)**	M(SD)	M(SD)		
Knowledge	69.3(11.7)	68.8(11.6)	68.8(13.3)	66.2(19.2)	.088	.966
Attitude	81.9(6.4)	82.2(7.8)	82.1(7.2)	76.8(5.3)	1.087	.363
Practice	82.3(5.4)	85.5(12.6)	89.9(4.0)	82.1(8.2)	1.511	.223

** Significant at the 0.05 level.*

An independent t test was used to assess differences between nurses' knowledge, attitude, and practice scores mean towards infection control and prevention who had training sessions and training sessions' time. The analysis revealed the knowledge mean scores of who have 10 hours and above of training sessions' time (M= 73.4±12.3) was higher than less than 10 hours (M=65.6±12.5), as shown in Table 4-19.

Table 4-19. Differences between physicians' knowledge, attitude, practice of infection control and prevention who had training sessions and training sessions' time (N= 53)

Variable	Training sessions' time		Statistical test	
			t test	P value
	Less than 10 hrs.	10 hrs. and above		
	M(SD)	M(SD)		
Knowledge	65.6(12.5)	73.4(12.3)	-2.240	.029*
Attitude	80.8(7.5)	82.4(7.0)	-.792	.432
Practice	86.4(9.9)	85.1(9.8)	.467	.643

Significant at the 0.05 level.

The Pearson correlation test was used to assess the relationship between physicians' knowledge, attitude, and practice scores meant towards infection control and prevention for those who had training sessions and age. The analysis revealed no significant relationship between the variables (p>0.05), as shown in Table 4-20.

Table 4-20. Relationship between physicians' knowledge, attitude and practice of infection control and prevention who had training sessions and age of physicians (N=53)

Variable	Age	
	r	P. value
Knowledge	.213	0.125
Attitude	-0.226	0.104
Practice	0.170	0.223

* *Significant at the 0.05 level.*

Research question five: Are there differences in knowledge, attitude, and infection control practices between physicians and nurses related to training sessions in governmental hospitals?

An independent t test was used to assess differences between nurses' knowledge, attitude, and practice scores mean towards infection control and prevention who had training sessions and profession. The analysis revealed no significant differences between the variables ($p>0.05$), as shown in Table 4-21.

Table 4-21. Differences between participants' knowledge, attitude, practice of infection control and prevention who had training sessions and profession of the participants (N= 109)

Variable	Profession		Statistical test	
			t test	P value
	Physician	Nurse		
	M(SD)	M(SD)		
Knowledge	68.5(12.9)	64.7(13.1)	1.549	.124
Attitude	81.4(7.3)	80.2(8.0)	.811	.419
Practice	85.9(9.8)	84.5(10.0)	.741	0.460

** Significant at the 0.05 level.*

Chapter Five

Discussion, Recommendations, And Conclusion

5.1. Introduction

In this chapter, discussion, conclusions, and recommendations will be explained. The conclusion will be formulated according to the purpose of the study. The purpose of this study was to assess the effect of infection prevention and control training on healthcare professionals' knowledge, attitudes, and practices at governmental hospitals.

5.2. Discussion

Infection prevention is widely regarded as the most difficult task for health-care institutions worldwide.

5.2.1 Knowledge, attitude, and practice of infection control and prevention

The current study indicated that health professionals' knowledge level is moderate. Basically, this could be due to the high level of academic education of health professionals. This result is similar to previous published literature, which acknowledges that healthcare professionals have average knowledge of infection control prevention (**Aniwada & Onwasigwe, 2016; Hasanah, Setiawati, & Apriani, 2016).** Similar studies in Nigeria and Egypt revealed fairly high levels of knowledge of infection control prevention amongst healthcare professionals (**Aniwada & Onwasigwe, 2016; Salam, El-Shazly, & Dewidar, 2014; Hassan et al., 2017; Iliyasu et al., 2016**). However, a study in Nigeria documented that healthcare professionals' knowledge of infection control was good (**Aniwada & Onwasigwe, 2016; Iliyasu et al., 2016**). This disparity may be explained in part by the fact that the current study dealt with general aspects of infection control and prevention, but the majority of study participants were educated in COVID-19 management, which is one of the infection control and prevention elements. Also,

The difference may be attributed to using a different classification system; for example, a score ≥60% was classified as a high knowledge level, while the cutoff point for a high knowledge level in the current study was 80%. With regard to attitude, the current study revealed that health care professionals have a positive attitude level. This result is similar to a previous published study in Saudi Arabia, which acknowledged that healthcare professionals have a positive attitude **(Abalkhail et al., 2021)**. However, this result is considerably higher compared with studies conducted in Jordan **(Darawad & Al-Hussami, 2013)** and Iran **(Sarani et al., 2016)**, but lower than the proportion reported in Ethiopia (64.2%) **(Yazie et al., 2019).**

The current study found that health professionals had a good practice level (≥80% score). This rate is higher compared with the findings from studies conducted in Vietnam (46.1%) (**Thu et al., 2012**), Northern Cyprus (30.9%) (**Abuduxike et al., 2021**), Ethiopia (60.2%) (**Asmr et al., 2019**), Iran (42%) (**Sarani et al., 2016**), and Singapore (66.3%) (**Nasirudeen et al., 2012**), but lower than the rate reported among nurses in India (91%) (**Kaushal et al., 2015**). These disparities in infection control and prevention practice in different nations may be related to variances in legislation, training, education, organizational culture, the presence of infection control guidelines, and the monitoring of their implementation.

5.2.2. Nurses' knowledge, attitude, and practice of infection control and prevention and training sessions.

The study indicated that there are no significant differences between training sessions and both nurses' knowledge and practice of infection control. This might be due to the fact that the majority of these training sessions have been conducted in the past two years. Therefore, updating training sessions is a priority for nurses. A previous study showed that attending formal training has a positive association with knowledge (**Asfaw, 2021**).

However, there is a significant difference between training sessions and attitudes toward infection control. This might be due to the fact that training sessions increase the trainees' chances of getting up-to-date information and improving their attitude.

In this study, there are no statistically significant differences between the nurses' demographic characteristics like age, gender, education, experience, place of work, and training sessions' time on infection control knowledge, attitude, and practices. This is in line with the study conducted by (**Sarani et al., 2016**).

However, only the workplace showed statistically significant differences in nurses' practices toward infection control. The possible explanation may be due to the fact that this hospital is a referral hospital through contact with more experienced nurses and their daily practices.

5.2.3 Physicians' knowledge, attitude, and practice of infection control and prevention and training sessions.

The current study indicated that there are no significant differences between training sessions and physicians' knowledge, attitude, and practice of infection control. These results are inconsistent with those of **Al-Ahmari et al. (2021**), who found that practices were significantly better among those who got a training program about infection control.

In this study, there are no statistically significant differences between the physicians' demographic characteristics like age, gender, education, experience, place of work, and training sessions' time on infection control knowledge, attitude, and practices. However, female physicians showed statistically significant differences in their practice toward infection control. Also, training sessions of 10 hours and above showed statistically significant differences in physicians' knowledge. These results were supported by Al-**Ahmari et al. (2021),** who found that there were no significant differences in participants'

Knowledge or attitudes according to their socio-demographic characteristics. However, a study conducted in Saudi Arabia by **Alshathri (2022)** indicated that there was a statistically significant correlation between age, occupation, education, and years of Experience with infection prevention practices among physicians. Also, a previous study conducted by **Mujtaba et al. (2021)** indicated that knowledge scores were significantly different among education levels.

5.2.4. Comparison between Nurses and Physicians' knowledge, attitude, and practice of infection control and prevention

The current study indicated that there are no significant differences between nurses and physicians in knowledge, attitude, or practice of infection control. The reason for this similarity in knowledge, attitude, and practice scores among professionals could be due to the strong undergraduate nursing education system and curriculum they have been through. The nurses undergo comprehensive learning and training. Further studies are required to identify possible reasons for this strength. These results are inconsistent **with Khan & Ishaq (2018)** finding that physicians have better knowledge and practices than nurses and paramedics. Similar results have been reported by the **Dhedhi et al. (2021)** study, where nurses had a lower mean knowledge score than doctors. Also, another study conducted in Egypt showed that physicians have a high practice score in comparison with nurses **(Salam et al., 2014).**

5.3. Strength and limitations of the study

This study was a facility-based cross-sectional study that used self-reported data collected from participants using a questionnaire. Efforts were made to minimize the weaknesses of the study; the knowledge part was assessed by correct or incorrect answers. This is one of the few studies conducted on physicians in Palestine to assess their knowledge, attitude,

and practice towards infection control. The current study's major limitation is that it was conducted in a small number of hospitals in the North West Bank. A study based on a large sample size and multiple centers should be conducted to get better results. A cross-sectional study design cannot be used to establish a link between the explanatory and Outcome variables. Self-reporting bias could be one of the study's shortcomings because participants self-reported their practices and were not cross-checked by watching the actual activities; hence, participants could possibly over-report or under-report their behaviors.

5.4 Recommendations

Policymakers and health-care professionals should consider the following recommendations:

- Giving more attention to infection control and prevention training sessions, especially for new employees who have not received any infection control and prevention training.
- Creating nationwide programs to support infection control and prevention training sessions.
- Introducing infection control and prevention training sessions for nurses and doctors through seminars and online courses
- Work to create an internal committee in each hospital department, with the duty of preparing, delivering, and following up on matters connected to the infection control program.
- Assesses the knowledge and practices of the health professions before and after the training sessions in the form of a pre- and posttest.
- The study recommends conducting further studies to evaluate the attitude and practices of infection control.

- Conducting more detailed researches with larger sample size and including more hospitals and health care professionals

5.5 Conclusion

- It is likely that there are no statistically significant differences in the statistics obtained from this study, for the following reasons: setting joint dates for workshops and scientific lectures, using educational and training methods in one language and methodology about infection control and prevention for the target groups of doctors and nurses workers in government hospitals.
- The study confirmed that the physicians and nurses have a moderate knowledge level, a positive attitude level, and a good practice level in infection control.
- The study indicated that there are no differences between training sessions and both
- nurses' knowledge and practice of infection control.
- There is a significant difference in attitude towards infection control.
- There are no statistically significant differences between the nurses' demographic characteristics like age, gender, education, experience, place of work, and training sessions' time on infection control knowledge, attitude, and practices.
- The current study indicated that there are no significant differences between training sessions and physicians' knowledge, attitude, and practice of infection control.
- There are no statistically significant differences between the physicians' demographic characteristics like age, gender, education, experience, place of work, and training sessions' time on infection control knowledge, attitude, and practices.
- Female physicians showed statistically significant differences in the practice of infection control.
- Training sessions' duration of 10 hours and above showed statistically significant differences with physicians' knowledge.

- The current study indicated that there are no significant differences between nurses and physicians in terms of knowledge, attitude, or practice of infection control.

List of References

- Abalkhail, A., Al Imam, M. H., Elmosaad, Y. M., Jaber, M. F., Hosis, K. A., Alhumaydhi, F. A., ... & Mahmud, I. (2021). Knowledge, attitude and practice of standard infection control precautions among health-care workers in a university hospital In Qassim, Saudi Arabia: a cross-sectional survey. International journal of environmental research and public health, 18(22), 11831.
- Abuduxike, G., Acar Vaizoglu, S., Asut, O., & Cali, S. (2021). An Assessment of the Knowledge, Attitude, and Practice Toward Standard Precautions Among Health Workers From a Hospital in Northern Cyprus. *Safety and health at work*, *12*(1), 66–73. https://doi.org/10.1016/j.shaw.2020.09.003
- Alhumaid, S., Al Mutair, A., Al Alawi, Z., Alsuliman, M., Ahmed, G. Y., Rabaan, A. A., Al-Tawfiq, J. A., & Al-Omari, A. (2021). Knowledge of infection prevention and control among healthcare workers and factors influencing compliance: a systematic review. Antimicrobial resistance and infection control, 10(1), 86. https://doi.org/10.1186/s13756-021-00957-0
- Aniwada, e., & onwasigwe, c. (2016). safety precaution; knowledge, attitude, practice and sociodemographic determinants among health care workers at primary health care level in enugu state, nigeria. Int j trop dis heal, 16(4), 1-13.
- Ahmad Alrashed,Alanoud Alfaris , Asem Shadid , Abdulelah Bin Shihah , Abdulrahman Alhomoud , Essam Osman, Muteb Alharbi, Mushref Alghamdi , Rajiv Khandekar &Waleed al Rashed , (2021). Knowledge, attitude, and practice toward glaucoma and its management among adult Saudi patients. Saudi journal of ophthalmology: official journal of the Saudi ophthalmological society, 34(4), 261–265. https://doi.org/10.4103/1319-4534.322596.

- Abuduxike, G., Acar Vaizoglu, S., Asut, O., & Cali, S. (2021). An Assessment of the Knowledge, Attitude, and Practice Toward Standard Precautions Among Health Workers From a Hospital in Northern Cyprus. *Safety and health at work*, *12*(1), 66–73. https://doi.org/10.1016/j.shaw.2020.09.003
- Alqahtani, A. N., Almaghrabi, R. H., Albaadani, M. M., & Almossa, K. (2020). Impact of Infection Control Training Program in Improving the Quality of Healthcare. *European Journal of Medical and Health Sciences*, *2*(5). https://doi.org/10.24018/ejmed.2020.2.5.498
- Al wafa News. (2021). General information about Tubas Governorate. Al - Wafa. Available at https://info.wafa.ps/ar_page.aspx?id=3276
- Al wafa News. (2022). General information about Jenin Governorate. Al - Wafa. Available at https://info.wafa.ps/ar_page.aspx?id=3289
- Al-Ahmari, A. M., AlKhaldi, Y. M., & Al-Asmari, B. A. (2021). Knowledge, attitude and practice about infection control among primary care professionals in Abha City, Kingdom of Saudi Arabia. *Journal of family medicine and primary care*, *10*(2), 662–668. https://doi.org/10.4103/jfmpc.jfmpc_1278_20
- Alshathri Najod (2022). Knowledge, Attitude and Practice Regarding Infection Control Measures Among Healthcare Workers at King Khaled Eye Specialist Hospital (KKESH) in Riyadh, KSA, *Science Journal of Public Health*. Volume 9, Issue 6, November 2022, pp. 180-189. doi: 10.11648/j.sjph.20210906.11
- Al Rashed, W. A., Bin Shihah, A. S., Alhomoud, A. S., Alharbi, M. M., Shadid, A. M., Alghamdi, M. A., Alfaris, A., Alrashed, A. W., Osman, E. A., & Khandekar, R. (2021). Knowledge, attitude, and practice toward glaucoma and its management among adult Saudi patients. Saudi journal of ophthalmology: official journal of the Saudi ophthalmological society, 34(4), 261–265. https://doi.org/10.4103/1319-4534.322596.

- Asmr, Y., Beza, L., Engida, H., Bekelcho, T., Tsegaye, N., & Aschale, Y. (2019). Assessment of Knowledge and Practices of Standard Precaution against Blood Borne Pathogens among Doctors and Nurses at Adult Emergency Room in Addis Ababa, Ethiopia. *Emergency medicine international*, *2019*, 2926415. https://doi.org/10.1155/2019/2926415
- Asfaw, N. (2021). Knowledge and practice of nurses towards prevention of hospital acquired infections and its associated factors. International journal of Africa nursing sciences, 15, 100333.
- Association for Professionals in Infection Control and Epidemiology (**APIC**)2022 *Infection preventions (IP) competency model*. https://apic.org/professional-practice/infection-preventionist-ip-competency-model/
- Attitude. (2023, July 26). Attitude in Arabic - Cambridge Dictionary. https://dictionary.cambridge.org/dictionary/english-arabic/attitude
- Bayleyegn, B., Mehari, A., Damtie, D., & Negash, M. (2021). Knowledge, attitude and practice on hospital-acquired infection prevention and associated factors among healthcare workers at university of gondar comprehensive specialized hospital, northwest ethiopia. Infection and drug resistance, 14, 259–266. https://doi.org/10.2147/idr.s290992.
- Bloom B. S. (1956) Taxonomy education. New York: David McKay.
- Centers for Disease Control and Prevention 2013. Healthcare Associated Infections, Atlanta, GA, USA, [Online] July 12, 2021. http://www.cdc.gov/ sttpublichealth/psr/hai/.
- Center of disease and control 2017 ''Your Guide to Infection Control and Prevention: A Webinar Series "The Importance of Collaboration Between Nurses and Environmental Services." . Available at

https://www.cdc.gov/infectioncontrol/webinars/videos/ana-empowering-nurses-pt2/accreditation-enduring-082117webcast.pdf

- Centers for Disease Control and Prevention 2019 Occupational Infection Prevention and Control: Education and Training. (2019. Retrieved March 29, 2022, from https://www.cdc.gov/infectioncontrol/guidelines/healthcare-personnel/training.html
- Centers for Disease Control and Prevention (2022) summary of infection prevention practice web sitehttps://www.cdc.gov/oralhealth/infectioncontrol/summary-infection-prevention-practices/standard-precautions.html.
- Chen, Y. W., Nagaraju, K., Bakay, M., McIntyre, O., Rawat, R., Shi, R., & Hoffman, E. P. (2005). Early onset of inflammation and later involvement of TGFbeta in Duchenne muscular dystrophy. *Neurology*, *65*(6), 826–834. https://doi.org/10.1212/01.wnl.0000173836.09176.c4
- Chi, V., & Llanes, E. (2022). Information and communication technologies for prevention and control. 2(4), 133–150. Available at https://apps.who.int/gb/mspi/pdf_files/2022/03/item1_07-03.pdf
- Drägerwerk Reprocessing and Preparation of Devices V 1.0. (2016). AG & Co. KGaA Moislinger Allee Lübeck, Germany. Retrieved January 1, 2023, from https://www.draeger.com/Content/Documents/Content/peprocessing-and-preparation-of-devices-GLOBAL-bk-a6-9103302-en-master-1612-1.pdf.
- Dhedhi, N. A., Ashraf, H., & Jiwani, A. (2021). Knowledge of standard precautions among healthcare professionals at a Teaching Hospital in Karachi, Pakistan. *Journal of family medicine and primary care*, *10*(1), 249–253. https://doi.org/10.4103/jfmpc.jfmpc_1622_20

- Darawad, M. W., & Al-Hussami, M. (2013). Jordanian nursing students' knowledge of, attitudes towards, and compliance with infection control precautions. *Nurse education today*, *33*(6), 580–583. https://doi.org/10.1016/j.nedt.2012.06.009
- El Sebaey, A. F., Atlam, S. A. E. M., El Kafas, E. S. A. E. R., & Zayed, H. A. (2022). Effect of infection control training course on knowledge and practices of medical interns in a large academic hospital in Egypt: an intervention study. *Environmental science and pollution research international*, *29*(10), 14371–14379. https://doi.org/10.1007/s11356-021-16755-5
- Erdek, F. O., Gozutok, C. K., Merih, Y. D., & Aliogulları, A. (2017). The effects of training in patients and their relatives about infection control measures and subsequent rate of infection. *Northern clinics of Istanbul*, *4*(1), 29–35. https://doi.org/10.14744/nci.2016.40316
- Farotimi, A. A., Ajao, E. O., Nwozichi, C. U., & Ademuyiwa, I. Y. (2018). Effect of Training on Knowledge, Perception and Risk Reduction Regarding Infection Control among Nurses in Selected Teaching Hospitals in Nigeria. *Iranian journal of nursing and midwifery research*, *23*(6), 471–477. https://doi.org/10.4103/ijnmr.IJNMR_208_17
- Fashafsheh, I., Ayed, A., Eqtait, F., & Harazneh, L. (2015). Knowledge and Practice of Nursing Staff towards Infection Control Measures in the Palestinian Hospitals. Journal of Education and Practice, 6(4), 79-90.
- *Guideline Cleaning , Disinfection and Sterilization of Medical Device*. (2021). The Ministry of Health Trinidad and Tobago. Retrieved August 2, 2023, from https://health.gov.tt/sites/default/files/2022-03/PAHO%20MoH%20Manual_Cleaning%2C%20Disinfection%20and%20Sterilization.pdf

- Hasanah, H., Setiawati, E. P., & Apriani, L. (2016). Knowledge and intention to use personal protective equipment among health care workers to prevent tuberculosis. Althea medical journal, 3(1), 120-125.
- Hassan, Zuwairai & Afolaranmi, Tolulope & Nathanel, Onimisi & Armiya'u, Aishatu & Tangkat, Tetsohot & Chomo, Danjuma & Chirdan, Oluwabunmi & Zuwaira, I & Ibrahim,. (2017). International Journal of Biomedical Research Knowledge of Transmission and Prevention of Nosocomial Infections: Primary Health Care workers' perspective in Plateau State North Central Nigeria QR Code *Correspondence Info. 8. 148-153.
- Health Annual Report Palestine (2020. Palestinian Health Information Center (PHIC) Health Policy & Planning Unit Ministry of Health, from https://site.moh.ps/Content/Books/mv2fIO4XVF1TbERz9cwytaKoWKAsRfslLobNuOmj7OPSAJOw2FvOCI_DQYaIXdf2i8gCmPHbCsav29dIHqW26gZu9qJDiW2QsifZt6FrdS4H2.pdf
- Health Annual Report Palestine (2021). Palestinian Health Information Center (PHIC) Health Policy & Planning Unit Ministry of Health, from https://site.moh.ps/Content/Books/Hqgu4D5vfT6bDhDUtl36GHhx9oYlCS9JplXYDfOMKrnDt6YoDPkPdl_I6mhnD3xb5MaPpX1mx6k6J4WowTnGUc1135KRHMmuMwEi1Zh1QUmFY.pdf
- Iliyasu, G., Dayyab, F. M., Habib, Z. G., Tiamiyu, A. B., Abubakar, S., Mijinyawa, M. S., & Habib, A. G. (2016). Knowledge and practices of infection control among healthcare workers in a Tertiary Referral Center in North-Western Nigeria. *Annals of African medicine*, *15*(1), 34–40. https://doi.org/10.4103/1596-3519.161724
- Jemal, K., Gashaw, K., Kinati, T., Bedada, W., & Getahun, B. (2020). Clean and Safe Healthcare Environment: Knowledge, Attitude, and Practice of Infection Prevention

and Control among Health Workforce at North Showa Zone Oromiya Region. *Journal of environmental and public health*, *2020*, 6021870. https://doi.org/10.1155/2020/6021870

- Jenin city (2023)Chamber of Commerce general information about Jenin Governorate Sponsored by World Vision available at https://www.jenincci.org/home/435.html page 1-4
- Joint Commission International . (2023). *Quality Management and Patient Safety.* Joint Commission International https://www.jointcommissioninternational.org/what-we-offer/advisory-services/quality-management-and-patient-safety
- Joint Royal Colleges of Physicians Training Board. (2021). Curriculum for Infectious DiseasesTraining.(August),page1–79. https://www.jrcptb.org.uk/sites/default/files/Infectious Diseases 2021curriculum final_0.pdf
- Kaushal, G., Doke, P., Shah, A., & Verma, V. (2015). An analysis of knowledge, attitude and practices regarding standard precautions of infection control and impact of knowledge and attitude of ICU nurses on self-reported practices of infection control. International journal of research foundation of hospital and healthcare administration, 3(2), 79-85 DOI: 10.5005/jp-journals-10035-1041
- Knowledge. (2023, July 26). Knowledge in Arabic - Cambridge Dictionary. https://dictionary.cambridge.org/dictionary/english-arabic/knowledge
- Khan, M., & Ishaq, M. (2018). Knowledge, attitude and practices regarding infection control among healthcare professional at Saidu Teaching Hospital (STH), swat, Khyber Pukhtoon Khwa, Pakistan, 2015. International journal of infectious diseases, 73, 263.

- Lowe, N.K. (2019) ‘what is a pilot study?’ JOGNN - journal of obstetric, gynecologic, and neonatal nursing, 48(2), pp. 117–118. doi:10.1016/j.jogn.2019.01.005.
- Mujtaba, H. U., Anwar, N., Fatima, N., Mukry, S., Jamal, A., Rizvi, Q. U. A., & Shamsi, T. S. (2021). Knowledge and attitude towards infection prevention at a newly established hospital. National journal of health sciences, 6(1), 11-16.
- Mythri, H., & Kashinath, K. (2014). Nosocomial infections in patients admitted in intensive care unit of a tertiary health center, India. *Annals of medical and health sciences research*, *4*(5), 738–741. https://doi.org/10.4103/2141-9248.141540
- Nasirudeen, A. M., Koh, J. W., Lau, A. L., Li, W., Lim, L. S., & Ow, C. Y. (2012). Hand hygiene knowledge and practices of nursing students in Singapore. *American journal of infection control*, *40*(8), e241–e243. https://doi.org/10.1016/j.ajic.2012.02.026
- Najod Alshathri. Knowledge, Attitude and Practice Regarding Infection Control Measures Among Healthcare Workers at King Khaled Eye Specialist Hospital (KKESH) in Riyadh, KSA, *Science Journal of Public Health*. Volume 9, Issue 6, November 2021 , pp. 180-189. Http doi: 10.11648/j.sjph.20210906.11
- Pittet D. (2017). Hand hygiene: From research to action. *Journal of infection prevention*, *18*(3), 100–102. https://doi.org/10.1177/1757177417705191
- Practice. (2023, July 26). Practice in Arabic - Cambridge Dictionary. https://dictionary.cambridge.org/dictionary/english-arabic/practice
- Qureshi, M., Chughtai, A., & Seale, H. (2022). Supporting the Delivery of Infection Prevention and Control Training to Healthcare Workers: Insights from the Sector. *Healthcare (Basel, Switzerland)*, *10*(5), 936. https://doi.org/10.3390/healthcare10050936

- Roupa, Z., Polychronis, G., Latzourakis, E., Nikitara, M., Ghobrial, S., Chrysafi, A., & Noula, M. (2021). Assessment of Knowledge and Perceptions of Health Workers Regarding COVID-19: A Cross-Sectional Study from Cyprus. *Journal of community health*, *46*(2), 251–258. https://doi.org/10.1007/s10900-020-00949-y
- Stellenbosch University, (2017). Knowledge, attitudes and practices of nurses in infection prevention and control within a tertiary hospital in Zambia. https://core.ac.uk/download/pdf/188224716.pdf .
- Salam, M. E. S. A., El-Shazly, H. M. A., & Dewidar, M. A. A. S. (2014). infection control awareness among healthcare providers in family health settings in Shebin El-Kom District, Menoufia Governorate, Egypt. Menoufia medical journal, 27(4), 840.
- Sarani, H., Balouchi, A., Masinaeinezhad, N., & Ebrahimitabs, E. (2016). knowledge, attitude and practice of nurses about standard precautions for hospital-acquired infection in teaching hospitals affiliated to Zabol university of medical sciences (2014). global journal of health science, 8(3), 193.
- Sheng, W. H., Chie, W. C., Chen, Y. C., Hung, C. C., Wang, J. T., & Chang, S. C. (2005). impact of nosocomial infections on medical costs, hospital stay, and outcome in hospitalized patients. journal of the Formosan medical association = taiwan yi zhi, 104(5), 318–326.
- Shadi, M. S., Geneid, A., Rubin, J. S., & Ibrahim, R. A. (2022). infection control, hand hygiene practice and PPE use among phoneticians and ENT specialists during the covid-19 pandemic. The Egyptian journal of otolaryngology, 38(1), 14. https://doi.org/10.1186/s43163-022-00205-1
- Szabó, S., Feier, B., Capatina, D., Tertis, M., Cristea, C., & Popa, A. (2022). An Overview of Healthcare Associated Infections and Their Detection Methods Caused by

Pathogen Bacteria in Romania and Europe. *Journal of clinical medicine*, *11*(11), 3204. https://doi.org/10.3390/jcm11113204

- Thu, T. A., Anh, N. Q., Chau, N. Q., & Hung, N. V. (2012). knowledge, attitude and practices regarding standard and isolation precautions among Vietnamese health care workers: a multicenter cross-sectional survey. intern med, 2(4), 115. Available at DOI: 10.4172/2165-8048.1000115
- Uchendu, o. c., desmenu, a. p., & owoaje, e. t. (2020). effect of training on knowledge and attitude to standard precaution among workers exposed to body fluids in a tertiary institution in south-west nigeria. *annals of ibadan postgraduate medicine*, *18*(2), 100–105.
- Unakal, C. G., Nathaniel, A., Keagan, B., Alexandria, B., Lauralee, B., Varun, C., Reneé, D., Sarah, D., Uniqué, T., & Akpaka, P. E. (2017). Assessment of knowledge, attitudes, and practices towards infection prevention among healthcare workers in Trinidad and Tobago. *International Journal Of Community Medicine And Public Health*, *4*(7), 2240–2247. https://doi.org/10.18203/2394-6040.ijcmph20172813
- Wanich Suksatan, Saade Abdalkareem Jasim, Gunawan Widjaja, Abduladheem Turki Jalil, Supat Chupradit, Mohammad Javed Ansari, Yasser Fakri Mustafa, Hayder A. Hammoodi, Mohammad Javad Mohammadi, assessment effects and risk of nosocomial infection and needle sticks injuries among patents and health care worker, toxicology reports, volume 9, 2022, pages 284-292, issn 2214-7500, https://doi.org/10.1016/j.toxrep.2022.02.013.
- Wake, A. D., Tuji, T. S., Gonfa, B. K., Waldekidan, E. T., Beshaw, E. D., Mohamed, M. A., & Geressu, S. T. (2021). Knowledge, attitude, practice and associated factors towards patient safety among nurses working at Asella Referral and Teaching Hospital,

Ethiopia: A cross-sectional study. *PloS one*, *16*(7), e0254122. https://doi.org/10.1371/journal.pone.0254122

- Wikiwand - المستشفى الوطني الحكومي. (2023.). page 1-5 https://wikiwand.com/ar/المستشفى_الوطني_الحكومي
- World Health Organization. (2018). World health statistics 2018: monitoring health for the sustainable development goals, sustainable development goals. https://apps.who.int/iris/handle/10665/272596.
- World Health Organization. (2019). Thirteenth general programmer of work, 2019–2023: promote health, keep the world safe, serve the vulnerable. World Health Organization. https://apps.who.int/iris/handle/10665/324775
- World Health Organization. Regional Office for Europe. (2021). Infection prevention and control: guidance to action tools. World Health Organization. Regional Office for Europe. https://apps.who.int/iris/handle/10665/341107.
- World Health Organization (2022) .Coronavirus Disease and Use of PPE .Retrieved July 29, 2023, from https://www.who.int/emergencies/diseases/novel-coronavirus-2019/question-and-answers-hub/q-a-detail/coronavirus-disease-covid-19-masks
- Wu, W., Wang, W., Yuan, Y., Lin, L., Tan, Y., Yang, J., Dai, L., & Wang, Y. (2021). Knowledge, attitude and practice concerning healthcare-associated infections among healthcare workers in Wuhan, China: cross-sectional study. *BMJ open*, *11*(1), e042333. https://doi.org/10.1136/bmjopen-2020-042333
- Yahaya, A.I. (2021) ‘nosocomial infection at the tamale teaching hospital from 2017 to 2020’, international journal of research studies in medical and health sciences, 6(5), pp. 1–7. doi: http 10.22259/ijrsmhs.0605001.
- Yazie, T. D., Sharew, G. B., & Abebe, W. (2019). Knowledge, attitude, and practice of healthcare professionals regarding infection prevention at Gondar University referral

hospital, northwest Ethiopia: a cross-sectional study. *BMC research notes*, *12*(1), 563.

https://doi.org/10.1186/s13104-019-4605-5

Appendix One: Approval Letter From The Palestinian MOH

State of Palestine Ministry of Health Education in Health and Scientific Research Unit		دولة فلسطين وزارة الصحة وحدة التعليم الصحي والبحث العلمي

Ref.: ....
Date:..................

الرقـــم: ٢٠٢١ ٥٤٧/١٦
التـاريخ: ٢٠٢١/٣/١٩

ق. أ. الوكيل المساعد لشؤون المستشفيات والطوارئ المحترم،،،

تحية واحترام...

الموضـــوع: تسهيل مهمة بحث

يرجى تسهيل مهمة الطالب: **أكرم زهير صالح خليل– تخصص ماجستير الوقاية وضبط العدوى/ جامعة القدس**، وباشراف د. عماد فشافشة، في عمل بحث بعنوان:

Effect of infection prevention and control training on healthcare professionals' knowledge, attitudes and practices at the governmental hospitals

من خلال السماح للطالب بالحصول على معلومات من خلال تعبئة استبانة من قبل الاطباء والممرضين (بعد أخذ موافقتهم)، وذلك في:

– مستشفيات: – جنين – طوباس – رفيديا – الوطني

على ان يتم الالتزام باساليب واخلاقيات البحث العلمي، وعدم التعرض للمعلومات الشخصية للمرضى.
على ان يتم الالتزام بجميع تعليمات واجراءات الوقاية والسلامة الصادرة عن وزارة الصحة بخصوص جائحة كورونا.
على ان يتم تزويد الوزارة بنسخة PDF من نتائج البحث.

مع الاحترام...

د. عبد الله القواسمي
رئيس وحدة التعليم الصحي والبحث العلمي

نسخة: عميد كلية الصحة العامة المحترم/ جامعة القدس

Telfax.:09-2333901 scientificresearch.dep@gmail.com لفاكس: 09-2333901

Appendix Tow: Ethical Commitments Approval from Al Quds University

Al-Quds University

Jerusalem

School of Public Health

جـامـعـة الـقـدس

القدس

كلية الصحة العامة

التاريخ: 31/1/2023

عزيزي الطالب اكرم خليل المحترم

برنامج ماجستير الوقاية وضبط الامراض المعدية

الموضوع: موافقة لجنة اخلاقيات البحث العلمي

قامت اللجنة الفرعية لأخلاقيات البحث التابعة لكلية الصحة العامة بمراجعة مشروع الرسالة بعنوان:

"Effect of infection prevention and control training on healthcare professionals' knowledge, attitudes and practices at the governmental hospitals."

المقدم من (مشرف البحث/د. عماد فشافشة).

يعتبر مشروعك مستوفيًا لمتطلبات أخلاقيات البحث في جامعة القدس.

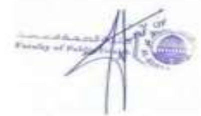
نتمنى لكم كل التوفيق في تسيير المشروع.

ملاحظة: في حالة الحاجة الى موافقة من اللجنة المركزية في الجامعة، تستطيع التقدم باستخدام هذه الموافقة على الرابط. https://research.alquds.edu/en/ethics/48-how-to-apply.html

رئيسة اللجنة الفرعية لاخلاقيات البحث

كلية الصحة العامة

د. نهى الشريف



نسخة/ أعضاء لجنة البحث

نسخة/ الملف

Jerusalem Branch/Telefax 02-2799234
Gaza Branch/Telefax 08-2644220 -2644210
P.O. box 51000 Jerusalem

فرع القدس / تلفاكس 02-2799234
فرع غزة / تلفاكس 08-264420-2644210
ص.ب. 51000 القدس

Appendix Three: Study Participants Consent Form

Al Quds University

Questionnaire

Effect of infection prevention and control training on healthcare professionals' knowledge, attitudes and practices at the governmental hospitals

Inform constant

Dear participant:

I am a master student at the faculty of high studies at al Quds University – Jerusalem city.

Kindly I invite you to participate in this research study. The study is carried out as part of fulfilling the requirement for master degree. The aim of this study is to assess effect of infection prevention and control training on healthcare professionals' knowledge, attitudes and practices at the governmental hospitals. Your participation is voluntary and your cooperation is highly appreciated. You have the right to withdraw at any time during data collection process without limitation. Filling the questionnaire will not take than 10 minutes from your time. I assure that your answers will be kept anonymous and confidential and will be used for the research purposes only.

Thanks

If you have any further inquiry about the questionnaire, please call or send massage on the following No: (0598552986).

Student: Akram khalil **Supervised By: Dr. Imad Fashafsheh**

Appendix Four: Demographic Data and Questioners

Part one:

Demographic and Occupational Data

1. Gender: Male__________Female ___________

2. Profession: Doctor_______Nurse _______

3. Age_______________?

4. Educational level: A. Bachelor degree B. Master degree

5. Place of work: 1. Jenin hospital 2. Rafedia Hospital 3. Alwatani Hospital 4. Tubas Hospital

6. Years of experience: 1-3 years______4-6 years______7-9 years______More than 10 years_______

7. Have you taken any infection control and prevention training courses? Yes_____No _______

If yes?

8. What type of training course you have taken ? **A. COVID management B. Stander precaution C Catheter association urinary tract infection. D. blood borne disease E. Injection safety practice Others specify ___________**

9. Through which mode were you trained? Formal training [ ] Seminars [ ] Zoom [ ] others specify……………

10. What language is used in training course: Arabic________English_________?

11. How long the training course last__________________?

12. When did you take the last course_________________?

13. Have you ever seen the national infection prevention and control guideline in your hospital? Yes [ ] No [ ]

14. Are you aware of any other protocols concerning infection prevention and control? Yes [ ] No [ ]

15. Does administration in your hospital provide all necessary resources for infection control and prevention ? Always [ ] Most of the time [ ] Sometimes [ ] Never [ ]

Part Two:

Knowledge about infection control and prevention among doctors and nursing in the north governmental hospital in Palestine.

For each of the statements below, please mark with a True (T) or False(F), if you don't an idea please mark I don't know.

NO.	Statement	T	F	I don't know
Q1	There is no need to wash my hands before contacting a patient (F).			
Q2	using an alcohol-based antiseptic for hand hygiene is just as effective as soap and water (F).			

Q3	There is no need to wash hands before doing procedure (F).			
Q4	Hand hygiene should be performed before and after direct patient contact only (F)			
Q5	Standard precautions should be practiced on all patients (T).			
Q6	The type of Personal Protective equipment (PPE) chosen depends on the type of exposure and procedures (T).			
Q7	There is post-exposure prophylaxis is used for managing injuries from an HIV-infected patient (T).			
Q8	Every equipment needs decontamination before sterilization (F).			
Q9	Disinfection means the removal of all pathogens and its spores (F).			
Q10	The appropriate immediate action after pricking finger by I.V. line needle is dressing wound and inform infection control supervisor (F).			
Q11	There is no need to change gloves between patients as long as there is no visible contamination (F).			
Q12	Dirty needles and sharp materials can transmit disease causing agents (T).			
Q13	Sharp needles should never be recapped (T).			
Q14	Needles should be bent or broken after use (F).			
Q15	Sharp containers are utilized for used injection needles (T).			
Q16	Hepatitis B causing agent can be transmitted with dirty needles and sharps (T).			
Q17	Hepatitis C causing agent can be transmitted with dirty needles and sharps (T).			
Q18	HIV/AIDS causing agent can be transmitted with dirty needles and sharps (T).			
Q19	Tuberculosis causing agent (*M. tuberculosis*) can be transmitted with dirty needles and sharps (F).			

Part Three:

Attitude regarding infection control and prevention among doctors and nursing in the north governmental hospital in Palestine. For each of the statement below, please mark (✔(your level of agreement.

NO.	Statement	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Q1	I do not have to wash hand if I used gloves.					
Q2	I am aware that patients expect me to wash hands before and after touching them.					
Q3	I believe that hand hygiene performance will reduce rate of hospital acquired infection.					
Q4	I feel that hand washing agents causing irritation & dryness.					
Q5	Standard precautions prevent infection at health care facility.					
Q6	Using gloves during patient care is a useful strategy for reducing risk of transmission of microbes.					

Q7	In absence of standard precautions, health care facilities can be the source of infection					
Q8	There is high risk of occupational infection among health workers in my work.					
Q9	I believe that following the prevention guidelines will reduce rates of hospital acquired infection.					

Part Four:

Practices regarding infection control and prevention among doctors and nursing in the north governmental hospital in Palestine. For each of the statement below, please mark (✔(your level of agreement.

NO.	Statement	Always	Often	Sometimes	Rarely	Never
Q1	I Follow hand hygiene guidelines in my hospital					
Q2	I wash my hands between each patient's contacts.					
Q3	I always wash hands before and after direct contact with the					
Q4	I wash my hands before examining patients.					
Q5	I use a towel or paper to turn off the water faucet after hand washing.					
Q6	I use personal protective equipment while examining all patients.					
Q7	I dispose of needles, blades, or any other single use sharp objects in a sharp disposal container after use.					
Q8	I inform the infection control coordinator as soon as possible to take measures following a needle stick.					
Q9	In my hospital, a lack of training on infection control guidelines resulted in patient harm.					
Q10	Inadequate antiseptics, such as alcohol solutions for hand disinfection, contribute to an increase in infection among HCP's					
Q11	A lack of personal protective equipment can heighten the risk in the workplace.					
Q12	Overcrowding in the workplace can reduce the quality of infection control practice.					
Q13	In my hospital, a lack of healthcare professionals has led to a decrease in the quality of infection control.					
Q14	Healthcare professionals' noncompliance with infection control hospital policies lead to harm the patients					
Q15	I perform hand hygiene after taking off gloves.					
Q16	I wash hands immediately after contacting any blood, body fluid, secretion, excretion, or dirty substances					

Q17	I wear gloves when dressing wounds.					
Q18	I wear a protective eye patch or goggle when performing operations/procedures that might induce spraying of blood, body fluid, secretions, or excretions.					
Q19	I wear gloves when performing parenteral injections of medications.					

Thank you