Çankırı Karatekin University
Graduate School of Health Sciences

*Master of Science Thesis*

# NURSES PERFORMANCE ABOUT COMPLIANCE WITH INFECTION CONTROL PRECAUTIONS IN ALHILLA CITY HOSPITALS

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**ÇANKIRI 2022**

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Master of Science Thesis
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**BY**

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**The Degree of Master of Science**

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**2022**

## ACCEPTANCE AND APPROVAL

Mohammed Amer Mousa, the graduate student of The Institute of Health Sciences with the student number of 208205250 , has successfully presented her thesis entitled "nurses performance about compliance with infection control precautions in alhilla city hospitals" before the jury whose signatures are below, after fulfilling all of the requirements determined by the relevant regulations for the degree of Master of Science

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## ETHICS STATEMENT

The thesis entitled “nurses performance about compliance with infection control precautions in alhilla city hospitals” which was prepared and presented as a thesis, was written by myself and in accordance with the scientific, academic rules and ethical conduct. The idea/hypothesis of my thesis solely belongs to me. The research pertaining to the thesis was conducted by myself and therefore, all of the used sentences and interpretations within the work belongs to me.

I declare the aforementioned issues to be correct.

**Signature**

**September, 2022**

**Mohammed Amer Mousa Mousa**

## ABSTRACT

# NURSES PERFORMANCE ABOUT COMPLIANCE WITH INFECTION CONTROL PRECAUTIONS IN ALHILLA CITY HOSPITALS

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Master of Nursing Science Health Science Institute

Advisor: Assoc.Prof. Özge Çınar Medeni

September 2022

**Background**: Hospital surfaces that have been contaminated play an essential role in the propagation of harmful diseases .Because of the possible threats to the environment and public health that medical waste poses, it is a huge global concern.

**Aim:** To assess nurses' compliance with standard precautions and determine the relationship between nurses' compliance with the standard preventive measure and their demographic characteristics in Al Hail city.

**Method:** A suitable sample consisting of (270) nurses was selected using the appropriate sampling method with G.Power program, and these samples were collected from (3) hospitals. Scale, the Cronbach alpha scale was 0.89. The interview lasted (15-25) minutes. Data collected between 1st February 2022 – 1st May 2022.

**Results:** The study showed that most nurses performed well. Half of the 135 nurses responded by always removing PPE in a designated area, 132–48.9% always disinfecting surfaces and equipment after use, 215 nurses (79.6%) always disposing of used needles after injection. Significantly different between age groups $X^2 = 9.94$, $P < 0.05$. Nurses' compliance with respect to standard precautions did not differ significantly when disaggregating cases by sex, education level, marital status, total hours of clinical exposure and years of service $p > 0.05$.

**Conclusion:** The results of the study concluded that most of the nurses have good precautionary standards. The nurses have good practices regarding infection control (person to person) by washing hands before and after patient care and wearing protective gloves. There are significant differences between nurses' compliance with regard to standard precautions and age nurses.



**2022, 70 pages**

**Key Words:** Compliance , Nurses, Nurses performance, infection control Precautions.

# ÖZET

## ALHILLA ŞEHİR HASTANELERİNDE ENFEKSİYONU KONTROL TEDBİRLERİNE UYUM SAĞLAMAK KONUSUNDA HEMŞİRELERİN PERFORMANSI

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**Arka plan**: Kirlenmiş hastane yüzeyleri, zararlı hastalıkların yayılmasında önemli bir rol oynamaktadır. Tıbbi atıkların oluşturduğu çevre ve halk sağlığına yönelik potansiyel tehditler nedeniyle, büyük bir küresel endişe kaynağıdır. hastane kaynaklı enfeksiyonlar (HAI'ler) önlenebilir. HAI'leri önlemek için standart önlemler (el hijyeni, eldiven kullanımı, önlük, göz koruması ve kesici aletlerin doğru şekilde atılması dahil) ve izolasyon önlemleri önerilmiş ve yaygın olarak kullanılmaktadır. Hasta ve sağlık çalışanı güvenliği, sağlıkla ilişkili enfeksiyonlar için ciddi bir tehdit HAI'ler, sağlık sistemleri ve organizasyonları için yüksek bir öncelik olarak ele alınmalıdır. Hepatit B virüsü ve hepatit C virüsü, kan yoluyla bulaşan en yaygın virüslerden ikisidir. HIV aynı zamanda en yaygın virüslerden biridir. Bir sağlık tesisinde COVID-19 ile enfekte olmuş hastalarla uğraşırken, sağlık hizmeti sağlayıcıları her zaman virüse maruz kalma riski altındadır. Hastalık Kontrol Merkezi 'ye göre, sağlık bakım ortamlarında kişisel koruyucu ekipman KKD'nin doğru kullanımını sürdürmek, bu ortamlarda COVID-19'un yayılmasını azaltmak için çok önemlidir. Kişisel koruyucu ekipman, İşyeri Güvenliği ve Sağlık İdaresi tarafından "ciddi mesleki yaralanmalara ve hastalıklara neden olabilecek tehlikelere maruz kalmayı en aza indirmek için giyilen ekipman" olarak tanımlanmaktadır. Maske ve solunum cihazı, gözlük ve yüz siperi, cildi ve giysileri bulaşıcı ajanlardan korumak için sağlık bakım ortamlarında sıklıkla kullanılan KKD'lerine örnektir.

**Amaç**: Al Hilla şehrinde hemşirelerin standart önlemlere uyumunu değerlendirmek ve hemşirelerin standart koruyucu önlemlere uyumu ile demografik özellikleri arasındaki ilişkiyi belirlemektir.

**Yöntem**: Bu çalışmada tanımlayıcı kesitsel bir çalışma kullanılmıştır.Veri toplama sürecinde çalışmanın amacı araştırmacı tarafından araştırma örneklemine açıklanmış,

örneklemin sözlü onamları alınmış ve soru görüşme yöntemiyle cevaplanmıştır. Araştırmacı, çalışmaya katkıda bulunan örneklem hakkında genel bilgiler toplamış ve daha sonra uygunluk standardı ölçümleri hakkında veri toplamıştır. Veri toplama süreci her katılımcı için yaklaşık 15-25 dakika sürmektedir.G.Power programı ile uygun örnekleme yöntemi kullanılarak 270 hemşireden oluşan uygun bir örneklem seçilmiş ve bu örnekler 3 hastaneden toplanmıştır. Ölçeğin, Cronbach's alpha skalasında 0.89 olarak bulundu. Veriler 1 Şubat 2022' ile 1 Mayıs 2022' arasında toplandı.

**Bulgular**: Çalışma, çoğu hemşirenin performansının iyi olduğunu gösterdi. 135 hemşirenin yarısı her zaman KKD'yi çıkarar dığını söyledi 132'si (%48,9) kullanımdan sonra yüzeyleri ve ekipmanı her zaman dezenfekte ettiğini bildirdi Hemşirelerin 215'i (%79,6) kullanılmış iğneleri enjeksiyondan sonra her zaman çöpe attığını 89'u (%33) maske veya tek kullanımlık kişisel koruyucu ekipmanı çıkardıktan sonra tekrar kullanmadığını bildiridi. 134 (%49,6) hemşire herhangi bir hastanın kanına, vücut sıvılarına veya salgılarına maruz kaldığında daima önlük veya koruyucu giysi giydiğini belirtti. 213 (%78,9) hemşire hastayla temas halindeyken ellerini her zaman yıkadığını. Belirtti. Hemşirelerin standart önlemlere uyumunun yaş grupları arasında anlamlı farklılık gösterdiği $X^2$=9,94, p<0,05 bulundu. Hemşirelerin standart önlemlere uyumu vakalar cinsiyet, eğitim düzeyi, medeni durum, hizmet yılı toplam klinik maruziyet saatlerine göre gruplandırıldığında anlamlı farklılık göstermemektedir (p>0.05).

**Sonuç**: Çoğu hemşirenin standart önlemlere iyi uyum göster mektedir. Hemşirelerin çoğu kişisel koruyucu ekipman (eldiven, gözlük, maske, önlük…) kullanımı konusunda yeterli pratiğe sahiptir. Ayrıca biyomedikal atıkların ve keskin kokulu atıkların bertarafı konusunda da iyi uygulamalara sahiptir. Hemşireler, hastalara bakmadan önce ve sonra elleri yıkayarak enfeksiyon kontrolünde (kişiden kişiye) iyi uygulamalar sergilemektedirler. Hemşirelerin dökülen ve kullanılmış eşyaları belgeleme konusunda iyi uygulamaları vardır. Hemşirelerin standart ölçütlere uyumu ile hemşirelerin yaşı arasında istatistiksel olarak anlamlı fark vardır. Bu çalışma Alhilla şehir hastanelerinde hemşirelerin enfeksiyon kontrol önlemlerine uyum performansnın iyi olduğunu göstermiştir.

**2022, 70 sayfa**

**Anahtar Kelimeler:** Uyum , Hemşireler, Hemşirelerin performansı,enfeksiyon kontrol Önlemleri

## PREFACE AND ACKNOWLEDGEMENTS

I offer my first and greatest appreciation to my first supervisor, Dr. Özge Çınar Medeni, for her wonderful supervision, guidance and encouragement. We express our sincere gratitude for his generous participation of guidance, constructive feedback, kind support and advice during the Master's degree.

A big thank you to all the faculty at the Institute of Health Sciences for their kind support while studying my masters degree in dictation. I also thank all my colleagues at Çankiri Karatekin University for their continued encouragement and support

Last but not least, my heartfelt and heartfelt thanks go to my family, my father, my mother, my wife, my brothers and (my children Ali and Rital for enduring my absence while studying) for the tremendous support and hope they have given me. Without this hope, this thesis would not have been possible. Thank you all for the strength you

**Mohammed Amer Mousa Mousa**

**Çankırı_2022**

**CONTENTS**

**INDEX OF ABBREVIATIONS AND SYMBOLS**

| | |
|---|---|
| HAIs | :Hospital-acquired infections |
| WHO | :World Health Organization |
| ICUs | : Intensive care units |
| CDC | : Center for Disease Control |
| PPE | :Personal protective equipment |
| NSI | : Needle prick injuries |
| N95 | : N95 respirator mask |
| HCWs | :Health care workers |
| BBPs | :Bloodborne pathogens |
| HCW | :Healthcare waste |
| MW | :Medical waste |
| MWM | : Medical waste management |
| HH | :Hand hygiene |
| ARI | :Acute respiratory infection |
| FDA | :Food and Drug Administration |
| FFP | : Filtering face piece |
| NI | :Needlestick injury |
| NSSIs | : Needles stick and sharp injuries |
| HCW | :Human-caused waste |

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# 1. INTRODUCTION

The hospital environment has the potential to be a source of hospital-acquired infections HAIs. The amount of cleanliness required to prevent organisms from entering the body from the environment is not known, which contributes to the spread of infection (Pyrek 2018).

Hospital surfaces that have been contaminated play an essential role in the propagation of harmful diseases. As a result, adequate disinfection of surfaces and equipment that clients and health care staffs come into contact with is essential to decrease exposure to infection (Song 2019).

Bio-medical wastes are defined as any sort of waste that contains infectious material. The phrase "biomedical waste" refers to any waste created during the diagnosis, management, and immunization of humans or animals, as well as during study activities pertinent to, as well as during the manufacture or testing of Biologicals. Everything used in delivering treatment to patients, as well as everything that has been contaminated by hazardous fluids, is included in this category (blood, urine, feces, and other body fluid). Because of the possible threats to the environment and public health that medical waste poses, it is a huge global concern (Oyefabi and Yahuza 2016).

A grave threat to patient and healthcare worker safety, healthcare-associated infections HAIs must be tackled as a high priority for healthcare systems and organizations, according to the WHO. Hospital acquired infections HAIs impact between 5 and 15 percent of hospitalized clients, and they can influence 9–37 percent of those confined to ICUs. Every 25 hospitalized patients in the United States US are infected with a hospital acquired infection HAI at any one moment (Al-Omari *et al*. 2020, Alhumaid 2021)

It is possible that 55–70 percent of HAIs are avoidable. Standard measures (comprising hand cleanliness, use of glove, gown, eye protection, use of cough etiquette, and correct disposal of sharp instrument) and isolation precaution (including contact, droplet, and airborne precaution) are proposed and extensively utilized to prevent HAIs (Alhumaid 2021).

It was determined that the standard protections are a collection of measures aimed to avoid the transmission of blood-borne diseases when providing health-care services to members of the general population (Ronak 2016).

A standard precaution is "the bare minimum infection preventing measure that should be applied to all patient care" regardless of whether or not they have a suspicion of or confirmation of the patient's infection status, and they are used in any situation where healthcare is provided, as defined by the CDC. These defenses would be observed in every circumstance where health-care service is offered, with the understanding that clients' blood, bodily fluid, secretion, and feces may include germs that can be transmitted to other persons (Al-Faouri and colleagues 2021).

Precautions include the use of protective barriers and practice to protect clients and healthcare providers from exposure to blood and body substances through parenteral, mucosal, and non-intact skin routes, as well as the use of antimicrobial agents to reduce the transmission of blood-borne pathogens between individuals. Healthcare workers, particularly hospital cleaners, should be encouraged them to use personal protective equipment, which will decrease their exposure to infection, which is something that is sometimes overlooked. It is inherent in the nature of their employment that they are always at risk of infection, which can occur from a range of sources, including hazardous chemicals and blood-borne pathogens, as well as other contaminated bodily secretions (Mothiba and Maputle 2015).

A around 380,000 percutaneous-related damages occur each year in the US among hospital employees, with roughly half of all such exposures going unreported, according to the "Center for Disease Control and Prevention". Hepatitis virus (B ,C) are the most well-known blood-borne viruses, but the human immunodeficiency virus is also among the most well-known (Chilaka 2020).

Narrow needle stick injuries (NSIs), which can occur in both educational and medical contexts, are one of the most common forms of injuries that occur. NSIs are common when performing needle recapping, drawing blood, transiting a sharps container with a disposable needle in the middle of the road, passing a disposable needle between personnel, placing needles in a poorly located sharps container, or failing to use

appropriate personal protective equipment (PPE). A major source of worry is the transmission of nosocomial infections amongst health-care workers HCWs, which can result in the transmissions of a number of diseases such as the hepatitis (B,C) virus, and the human immunodeficiency virus. As a result, the diagnosis, removal, and protective activity of cases can all be highly beneficial in the prevention of nosocomial infection and nosocomial septicemia in healthcare facilities (Effatpanah 2020).

Chemical agents such as cleaning and antiseptic material, anesthetic and cytotoxic drug, and biological agent such as blood pathogen as hepatitis B and C viruses, human immunodeficiency viruses, and respiratory pathogens such as influenza, T.B diphtheria, and chicken pox) also, health care workers are high risk of exposure to a variety of respiratory hazards. The effective use of respiratory defense equipment in healthcare facilities is one means of safeguarding healthcare workers from respiratory risks in healthcare facilities, as previously stated respiratory protective equipment (RPE). Surgical masks and (N95) respirators are the two types of respiratory protection equipment RPE that are most regularly used in hospitals. As a result of the use of surgical masks, health-care personnel are protected from inhaling infectious fluids and bacteria that are transmitted through the mouth and nose while on the job (Honarbakhsh 2018).

It is estimated that general and non-hazardous rubbish accounts for around 85% of the waste generated by healthcare operations. Only 15% of the remaining population is considered to be possibly harmful. According to the World Helath Organization (WHO), an estimated 16 billions injections are given every year around the world, yet not all needles and syringes are correctly disposed of after use (Paniyadi 2019).

The majority of incidents of healthcare-associated illnesses are caused by the spread of microorganisms from one individual to another. Because of this, healthcare workers face a significant danger of becoming infected by pathogens in the hospital environment, as well as a significant risk of transferring infections to patients and colleagues. The fact that health-care professionals come into frequent direct contact with carriers or clients of infectious diseases, as well as the fact that they come into frequent contact with contaminated patient samples and medical equipment, as well as their exposure to contaminated environments and air, puts them at significant risk of infection (Yeon and Shin 2020).

When dealing with COVID-19-infected patients at a health-care facility, healthcare providers are always at risk of being exposed to the virus. Maintaining the correct use of PPE in healthcare settings is crucial in reducing the spread of COVID-19 in these settings, according to the Centers for Disease Control and Prevention (CDC). Personal protective equipment is defined by the Workplace Safety and Health Administration as "equipment worn to minimize exposure to dangers that might cause serious occupational injuries and illnesses." Mask and respirator, goggle, and face shield are example of personal protective equipment PPE that is frequently used in healthcare settings to protect the skin and clothing from infectious agents. Masks and respirator, goggle, and face shield are also example of PPE that protects the respiratory tract and mucous membranes from infectious agents (Pandey 2021).

The proper and adequate management of medical waste are, as a result, critical throughout the process of providing healthcare services to patients. Medical waste will unavoidably be generated during the course of providing health care services, and this cannot be avoided (whether preventative, promotional, or curative). If waste is not properly disposed of, it has the potential to have serious health consequences for both humans and animals, as well as to have a significant detrimental impact on the ecosystem if it is not managed properly (Benfer and Gold 2017).

## 1.1 The Importance of the Study

"Hospital-acquired infections (HAIs) are  remain the major cause of illness and mortality among hospitalized patients and those who work in the healthcare system, despite improvements in recent years. Health-care-associated infections HAIs are illnesses that arise within 48 hours or more after hospitalization or within 30 days of being discharged. Despite developments in the healthcare system, the threat of HAIs continues to exist since it goes beyond elevating healthcare expenses to cause the death of healthcare personnel and hospitalized patients, among other things. A growing number of healthcare workers are at risk of contracting healthcare-associated infections HAIs, which can occur as a result of occupational exposures to blood and bodily fluid, direct contact with a patient, or contaminated environmental surface in the patient's immediate vicinity, among other factors (Asfaw 2021).

In the United States, the CDC approximations that over 100,000 patients die each year as a outcome of hospital-acquired infections HAIs, which impact roughly 2 million individuals each year. According to the CDC, HAIs result in an increase in health care costs of up to US$4.5 billion each year. Hospital-acquired infection in surgical wards ranged from 5.7 percent in Ethiopia to 45.8 percent in other nations, including "Algeria, Burkina Faso, Senegal, and the United Republic of Tanzania", to name a few. According to a study on HAIs published by Ghana's Volta Regional Hospital, the incidence rate of HAIs in the country is roughly 152,000 per 100,000 people, which is a high rate for a developing country (out of a total population of 20.7 million) (Appiah and colleagues 2021).

According to the data, the risk of "HAIs" following a needle-stick injury used needles from an infected sources patients was 0.3 percent for HIV, 3 percent for hepatitis C, and 6–30 percent for hepatitis B following a needle-stick injury. According to the "World WHO approximately 3 million health care workers HCWs international are exposed to bloodborne pathogens (BBPs) on a yearly basis; 2 million of these are exposed to HBV, 0.9 millions to HCV, and 0.17 million for HIV. Every year, hospital-acquired infections HAIs have an estimated economic impact of approximately US$ 6.5 billions in the United States alone (Alhumaid 2021).

In Saudi Arabia, the cities of Riyadh and Abha have reported that the prevalence of HAI is between 8% and 8.5 percent, according to the WHO (Paul 2020).

Only a few prior studies in Iraq have shown the compliance by Iraqi medical staff in general, and those in the Nineveh governorate in particular, with Information and privacy committee (IPC) measures in the context of any of the infectious diseases that have been documented in the country. According to the results of a study conducted in Nineveh, the overall sample size was 412 people, with 316 77 percent of the participants being male and 142 35 percent of the participants being physicians. Overall, the percentage of employees who adhered to different IPC measures ranged from 31 percent who wore a head cover to 97 percent who kept their hands clean all of the time, according to the results. The most commonly overlooked areas were respiratory hygiene, physical distancing, and self-isolation, Females were found to be more likely than males to apply bandages to wounds and to put on gloves before inspecting patients. Physicians were found to be less compliant with hand washing, disposing of waste in

specified areas, and wearing protective clothing when compared to other medical staff. Workers in hospitals were more conscientious about sanitizing their hands before entering their homes than the general population (Kassim 2020).

It is essential to pay close attention to the collection, storage, and disposal of healthcare waste HCW because of the hazardous nature of the material and its composition. This is due to the fact that HCWs have a high risk of transferring infectious diseases to others, such as HIV/AIDS and hepatitis B and C, as well as contaminating the surrounding environment. For the purpose of facilitating the proper and cost-effective disposal of hospital garbage, the hospital waste management plan classifies hospital waste into two major categories: regular hospital waste and hazardous hospital waste (also known as medical waste) (Olaifa *at el*. 2018).

Healthcare workers HCWs can be protected from blood-borne infections through the use of PPE like disinfected surgical gloves and gowns, as well as hygiene performs like antiseptic hand wash and safe instruments and waste disposal techniques as outlined in the SP guideline. However, implementing SP has been established to be an important problem for HCWs, particularly those working in underdeveloped countries, putting their safety at risk and elevating their exposures to blood-borne viruses as a result. There are several reasons for this, including a lack of resources, substandard safety measures, inadequate training, a lack of understanding of the risks associated with hazardous infection control practice, and a lack of organizational support for safe practices (Akagbo and colleagues 2017).

It is becoming increasingly dangerous to handle and dispose of medical waste MW because of its contagious nature and terrible stench, which endangers both human health and the environment when done improperly. Poor conduct, as well as unsuitable management and disposal methods, are becoming more common, causing major health concerns as well as environmental contamination and hazard to the ecosystem. (Awodele 2016).

discovered that existing medical waste management MWM procedures differed from hospital to hospital despite the fact that (Awodele 2016) discovered that existing medical waste management MWM practices differed from hospital to hospital Maseko

2014 identified a number of challenges, including non-enforcement of policies, poor sufficient funding for policy application, insufficient knowledge of health care providers, non-quantification of wastes at health care services, poor segregation, improper method of management and disposal, a poor of sufficient and regular training of health care providers, and a lack of attention to the issue of medical wastes managing by the head of health care facilities, medical wastes generator, and handwashing facilities (Olaniyi 2021).

According to guidelines from the United Kingdom and the United States, healthcare providers who care for people who have COVID-19 should wear a mask when providing care for them. There have been global shortages of personal protective equipment PPE as an outcome of increased demand and supply chain disruptions. This has resulted in an effort to conserve PPE through extended using or reusing, and disinfection protocol has been established, despite the fact that there is currently a little scientific consensus on the best practice in this area.

Additionally, health workers must be educated about and adhere to the right use of personal protection equipment PPE when doing their tasks, in addition to having adequate equipment and clear guidance. It is therefore vital to protect the safety of health professionals working on the front lines with adequate personal protective equipment PPE, particularly those who are involved in aerosol-generating activities (Bhamra 2021).

## 1.2 The Problem Statement

It is possible that nurses will come into touch with a patient's bodily fluids and blood when providing nursing care. They may also use needles that have been infected with a range of infectious microorganisms. It is possible that this will increase the likelihood of developing an infection. As a result, knowledge, and adherence to fundamental precautions among nurses is crucial in order to reduce the frequency of those secondary illnesses that are preventable in their practice.

Despite the fact that nursing plays a crucial role in the prevention of HAIs, it is not often recognized as a core component of nursing practice. Inadequate awareness of infection

control measures among health care workers, it is claimed, leads to lower compliance with infection control policies and an elevated risk of nosocomial infection among both HCWs and patients. Specifically, the goal of this research was to assess nurses' knowledge of and practices in the area of regular precaution.

## 1.3 Objectives of the Study

- To assess the nurses' compliance of standard precautions
- To identify the relationship between nurses' compliance of standard precaution and their demographic characteristic

## 1.4 Research questions

- What is the nurses' compliance of standard infection control precautions?
- Is there relationship between nurses' compliance of standard infection control precautions and their demographic characteristics?

## 1.5 Hypothesis

- H0: There is not any relationship between compliance of standard infection control precautions and their demographic characteristics
- H1: There is relationship between compliance of standard infection control precautions and their demographic characteristics.

# 2. GENERAL INFORMATION

## 2.1 Nosocomial Infection

Known also as healthcare-associated infection HAI, nosocomial infections are illnesses that develop during the course of receiving health care services and were not current at the period of admission. They can manifest themselves in a variety of situations, including hospitals, long-term care facilities, and ambulatory settings, and they can also manifest themselves after a patient has been discharged. Occupational infections, which may have an impact on personnel, are also included in HAIs (Sikora and Zahra 2021).

One of the common serious risks to health care systems in the developed world is a nosocomial infection, which can occur in any hospital setting. Diseases that develop after admission to a healthcare facility, but were not current or incubating at the time of admissions are referred to as post-admission diseases. Infections and deaths caused by them may account for up to 10% of all hospitalized patients and may account for up to 1% of all deaths among all patients admitted. When expressed in absolute numbers, this is an unacceptable level of data, especially when considering that a significant proportion of such infections and deaths may be prevented by simple routine measures (Bouza 2019).

Hospital acquired infections HAIs are considered a public health issues since they increase mortality and morbidity while also increasing the length of time spent in the hospital and resulting in extremely high health care costs. Every year in Europe, HAI results in an additional 16 million inpatient days, resulting in costs of over 7 billion euros per year in Europe. The early identification and diagnosis of HAI on the basis of specific definitions is a critical first step in ensuring that patients are properly managed. They should always be recorded in order to gain a better accepting of the magnitude of the events and to ensure that appropriate measures are implemented with consistency (Voidazan 2020).

According to a survey done in 2015, the frequency of HAI among hospitalized patients in the United States was 3.2%, which was significantly lower than the 4 % reported in a study conducted in 2011. According to the same study, 36.4% of HAI in US health

institutions were associated with critical care sites, 57.5% with the ward or nursery locations, 6.1% with step-down or specialty care units, and 6.1% with mixed acuity locations (which included multiple levels of acute care) (Magill 2018).

As a result of the exposure, the agent and the host engage in a series of interactions that may result in infection, sickness, recovery, or death, depending on the circumstances. Both the infectivity, pathogenicity, and virulence of the agent, as well as the host's vulnerability to infection and disease, which is largely related to both the protective and detrimental effects of the host immune response, are important factors in determining the outcome of an infection or disease (Van Seventer and Hochberg 2017).

## 2.2 Chain of Infection

A communicable disease can be defined as an ailment caused by pathogens or its toxic product that spread from a susceptible host to an infected person, an infected animal, or a contaminated inanimate item through the transfer of a pathogen or toxic product. Infectious illnesses are responsible for an enormous global burden of disease that has a negative impact on public health systems and economies all over the world, with vulnerable groups bearing the brunt of the burden (Van Seventer and Hochberg 2017).

A. It is believed by some that infectious diseases develop as a result of the interaction between an infectious agent and a host, as well as the surrounding environment. According to this definition, transmission happens when an agent exits its reservoir or host through a portal of exit, transfers to a susceptible host by some mechanism of transmission, and enters the susceptible host through an appropriate portal of entrance. In certain circles, this sequence of events is referred to as the infection chain (Tyshenko 2015).

B. Infectious agents (pathogens) comprise a variety of organisms such as bacteria, parasites, viruses, and fungi among others. Pathogens' virulence is defined by the number of pathogens present, their potency, their capacity to enter and live in the body, and the host's susceptibility to infection with these pathogens (Seladi-Schulman 2019).

C. The reservoir is any individual, animal, arthropod, plant, soil, or material (or a combination of these) in which an communicable agent usually lives and multiply, as well as any place from which an infectious agent can be spread. To be able to reproduce

itself in such a way that it may be transmitted to an unprotected host, the infection agent must be able to live. The reservoir acts as a means of preserving the infectious agent's survival. An example of an animate reservoir is a person or an insect. Other examples include birds and other animals. Soil, groundwater, food, feces, intravenous fluid, and specialist equipment are all examples of inanimate reservoirs, as is specialized equipment (Calisher 2021).

D. The migration or transfer of infections from a reservoir to a vulnerable host is referred to as a mechanism of transmission in this context. Once a pathogen has escaped from the reservoir, it must find a way to communicate itself to the host, which is accomplished by a portal of entry. Direct or indirect contact, as well as airborne transmissions, are all likely modes of transmission. Direct contact involves the transmission of diseases from one person to another through physical contact such as touching, biting, kissing, or sexual intercourse. Coughing, sneezing, and talking are all ways in which microorganisms can be evacuated from the body. It is believed that the organisms travel through the air as droplets that travel less than a meter in distance and are inhaled by a vulnerable host. Indirect contact can occur through both vehicle-borne and vector-borne transmissions. Unanimated go-between, an intermediary between the portal of escape from the reservoir and the portal of admission into the host, a vehicle serves as a go-between. A typical vector for infection transmission includes inanimate object such as handkerchief and tissues, dirty laundry, surgical instruments and dressings, among other things (MacNeill and Terezhalmy 2021).

E. In the case of pathogens exiting a reservoir through portals of entry, the term "portals of exit" is used to refer to the entry points of the pathogens (D). Blood, respiratory secretions, and anything else that is discharged through the gastrointestinal or urinary systems, among other things, can serve as the portal of exit for a human reservoir. As soon as a pathogen has been released from its reservoir, it requires a method of transmission in order to be transferred into an infected individual. This is accomplished by the virus infiltrating the host through an entry point that is favorable to the virus replication. Indirect touch, as well as direct and indirect contact with an object, as well as transmission through the air (Antonovics 2017).

F. The infective agents must first penetrate the mucous membrane and non-intact skin and then travel through the respiratory, gastrointestinal, and genitourinary tracts, among other pathways, to reach the body's tissues. For example, airborne viruses from one

individual's sneeze can enter the body of another individual through their own nose, if the host is exposed to the same environment as the pathogens did when they left the reservoir (Eion 2017).

G. Sufficient hosts are individuals who are susceptible to infection and who serve as the final link in the chain of transmission of infection. When a pathogen is introduced into the body of an individual whose immune system is functioning properly, the infection does not occur as a result of the introduction of the pathogen. The majority of the time, when a virulent pathogen is introduced into the body of an immunocompromised individual, infection results. It is dependent on a variety of circumstances, including the person who was exposed (the host), the disease (the agent), and the surrounding environment, whether or not a person will get infected after being exposed to a pathogen. Examples of host characteristics that may impact the results of an exposure comprise the occurrence or nonappearance of natural barriers, the functioning status of the immune system, and the occurrence or absence of an invasive device, among others (Casadevall and Pirofski 2018).

## 2.3 Infection Control

Patient and healthcare worker infection deterrence and control are a scientific technique and practical solution aimed to limit the harm caused by infection to both patients and healthcare providers. Its basis is in infectious illnesses, epidemiology, social sciences, and the design of healthcare systems. IPC occupies a unique position in the disciplines of patient safety and high-quality, worldwide health coverage because it is related to both healthcare practitioners and patients at every point in the patient's journey through the healthcare system. A lack of appropriate water, sanitation, and personal hygiene (WASH) result in health-acquired infections, the transmission of disease from health facilities to communities, and the increased use of antibiotics, all of which exacerbate outbreaks and the spread of infections (United Nations Children's Fund 2020).

"Standard infection control precautions" are infection control methods that are intended to avoid the transmission of infection that can be developed through contact with blood, bodily fluid, non-intact skin (including rashes), and mucous membranes. Infections can be developed through contact with blood, bodily fluid, non-intact skin (including

rashes), and mucous membrane. This list of precautions should be taken while providing care to anyone, regardless of whether or not they appear to be infectious or to be experiencing symptoms (Murray 2018).

"Standard infection control precautions" are the bare minimum infection control techniques that would be performed to give all patients care in any setting where healthcare is offered, irrespective of whether patients has a suspected or confirmed illness status, according to the American Academy of Pediatrics. These evidence-based interventions are meant to both protect patients and healthcare workers from disease as well as to prevent the spread of infection among those who are exposed to it (Esmail 2019).

A collection of behaviors that are equally applicable to all patients regardless of their diagnosis in all settings where healthcare is offered can be defined as standard precautions when it comes to infection prevention procedures in the healthcare setting. Hand hygiene, the use of appropriate personal protective equipment PPE, respiratory hygiene and cough etiquette, safe injection techniques, and the handling of potentially contaminated tools or surfaces are all examples of best practices. Contact with infected patients, visitors, and healthcare personnel is the most common way that nosocomial diseases spread (Arinze-Onyia 2018).

Whenever it comes to patient interactions, precautions should always be the first line of defense because they lay the groundwork for safe care that protects both patients and healthcare professionals by operating under the assumption that every encounter between the patient and a healthcare professional may result in an infection transmission opportunity. The use of transmission-based methods is recommended when an organism has been discovered or suspected, and there is a reasonable understanding of how the organisms may be distributed during the course of therapy. In addition to the selection, use, and disposal of PPE , transmission-based precautions include the adoption of segregation measures, such as patient placement and isolation, and the implementation of appropriate and realistic policies and techniques, among other things (Carrico 2018).

### 2.3.1 Hand Hygien

Hand hygiene is the act of washing the hand with or without the use of water, other liquids, or soap, with the goal of removing soil, filth, and microorganisms from the hands. In the prevention of the transmission of various nosocomial infections amongst staff nurses, it is an essential component of the overall strategy (Deol 2016).

Hand hygiene, as mentioned by both the WHO and the CDC, is the most important and easiest strategy for avoiding and controlling hospital infections, and it is also the most cost-effective. Due to the fact that nurses play such a vital role in patient care, an increased emphasis is being made on their role in the prevention and control of HAIs. The crucial role that nurses play in the prevention of nosocomial infection has earned them the status as important members of the infection control team in healthcare facilities (Asadollahi 2015).

Transmission of germs and the subsequent transmission of illnesses most commonly occur through contact with the hands . In accordance with normal IC precautions, hand hygiene (HH) is a critical component. It is the most crucial, the easiest, and the most cost-effective practice in the management of healthcare-associated infections. Routine, aseptic, and surgical HH techniques are the three types of HH techniques available. Hand hygiene is mostly comprised of hand wash and hand rubbing. While it is necessary to hand washing with soap and water if they are obviously filthy, an alcohol-based hand rub is more effective against most bacteria and viruses than either simple liquid soap or antimicrobial soap (Salama 2017).

Infection prevention begins with nurses' individual factors, such as their knowledge of the five instants of hand hygiene, their behaviors, such as not wearing hand and arm jewelry while nursing, and their application of their learning from the most recent hygiene training to enhance compliance with hand hygiene measure (Hammerschmidt and Manser 2019).

### 2.3.2 Personal Protective Equipment (PPE)

Health-care providers, particularly nurses, are protected from becoming contaminated by blood and other bodily fluid through the use of personal protective equipment, which acts as a physical barrier. -Body secretions and excretions- refers to any bodily secretion or excretion that may be communicated through direct interaction with a patient or the patient environment, as well as infectious airborne particles that may be inhaled by the patient. Patients are also protected from the potential transmission of diseases from the hand or clothing of healthcare workers when they are wearing PPE . "Personal protective equipment" has evolved as a means of protecting those who work in healthcare environments from blood and bodily fluid sprays and splashes, as well as other potentially harmful substances (Brown 2019).

Personal protective equipment PPE is available in the following forms: gloves, protective eye wear goggles, masks, apron, gown, boots/shoe cover, and a hair net. Use of PPE in the proper manner is the most effective method of prevention contact with secretions and the "transmission of infectious diseases". The risk of infection for nurses working in surgical wards is greater than the risk for other nurses working in the same setting (Ugochukwu and Onyejinaka 2019).

Nurses, in particular, are exposed to a wide range of pathogens on a regular basis as they carry out their nursing responsibilities. Standard precautions such as hands hygiene, the use of PPE (such as gloves, gowns, and masks), safe injection practice, the safe handling of potentially contaminated tools or surfaces in patients' environment, and respiratory hygiene/coughing should be followed by all healthcare workers in order to decrease the risk of contracting a work-related infection from both known and unexpected sources in the health care settings (Abukhelaif 2019)

PPE, such as a mask, eye protection, gowns, and gloves, is recommended in addition to standard and transmission-based precautions (droplet/contact/airborne). Despite the fact that PPE is the most visible control used to avoid the spread of acute respiratory infections, it is only one of several infection prevention and control IPC measures and should not be relied on as a primary preventions strategy for acute respiratory infection (World Health Organization 2021).

### 2.3.3 Gloves

One of the primary functions of medical gloves is to keep the hands from becoming contaminated, as well as to prevent contamination of a surface or a patient. A risk assessment of the total task is used to determine whether or not gloves should be worn in a clinical environment. This risk evaluation takes into account the possibility of coming into contact with bodily fluids such as blood, broken skin, excretions, secretions, and potentially harmful chemicals or medicines, among other factors (Preece 2021).

While the use of "personal protective equipment", such as non-sterile gloves, during any clinical activity is in unity with standard hygiene procedures, it should be avoided if at all possible harms. Using gloves properly and in conjunction with hand disinfection can help to decrease the risk of hand contaminations and the transmission of bacteria from one person to another (Lindberg 2019).

Consequently, gloves should be worn during any patient-care duties that may expose the caregiver to blood and other bodily fluids (including mucous membranes and non-intact skin), and when implementing contact precautions in outbreak situations (Alberta Health Services 2020).

### 2.3.4 Aprons/Gowns

Isolation gowns and surgical gowns are both types of medical garments. A medical gown has been identified as the second most widely utilized personal protective equipment item in health care settings, after gloves. "An isolation gown is a piece of protective clothing intended to protect health-care staff and patients from the transmission of microbes and bodily fluids in the patient isolation settings," according to the Association for the Advancement of Instrumentation. Surgical gowns are defined by the Food and Drug Administration of the United States as devices that are envisioned to be worn by operating room personnel during surgical techniques in order to protect both the surgical patient and the operating room personnel from the transfer of germs, body fluid, and other potentially infectious materials" (McQuerry 2021).

### 2.3.5 Eye protection, visors, or full face protection

Goggles and safety glasses, among other forms of eye protection, can help to prevent eyes injuries. Protecting one's noses, and mouth from a number of hazards such as dust, flying particles, chemicals, radiation (both visible and invisible), and potentially infectious blood or bodily fluids are some of the reasons why one might wear a face shield or visor. In this case, normal prescription glasses will not provide adequate eye protection because of their shape. Working with supplementary eye protection that does not interfere with their vision while still providing a suitable barrier against potential workplace hazards is recommended for workers who require reading glasses or another vision correction. Whether single-use or reusable, face shields/visors are useful in conjunction with single-use face masks and can be used as an alternative to protective eyewear in some scenarios. When wearing a face shield, you are protecting not just your eyes, but also your entire face from being wounded or damaged. A face shield that extends from the chin to the crown provide the best protection for the face and eyes against splashes and sprays, according to the manufacturer (Government of South Australia 2020).

protection of the mouth and nose space are also necessary, protective eye/facial equipment would: cover the entire face region (for example, a face shield); be pleasant to wear (for example, goggles); and be simple to put on and take off (for example, goggles). In order to avoid contact with potentially contaminated surfaces, single-use eyewear should be changed as soon as visible contamination is detected. Eyewear that is designed to fit over personal glasses and has anti-fog properties should also be taken into consideration (e.g., anti-fog lenses, anti-fog lenses, anti-fog lenses, and anti-fog lenses) (Wigglesworth 2019).

### 2.3.6 Masks

Using masks and respirators in health care settings are common practice in order to protect hospital healthcare providers HCPs from respiratory infections such as pneumonia. Protective masks are used to prevent health care workers from catching an infection from splashes of blood and bodily fluid, as well as to reduce the transmission of potentially contagious bodily fluids in a sterile environment (Chughtai 2015).

Fabric masks are masks, bandanas, or scarves that are made at home and worn to cover the nose and mouth when a person is exposed to a hazardous substance. There is no way to predict how much protection they will provide, as it is dependent on the type of fabric used and how well the garment is fitted. In order to prevent the spread of viruses, fabric masks are worn while coughing, sneezing, conversing, or exhaling. This is especially necessary when traveling by public transit. In order to be effective, surgical masks must be fluid-resistant, which means they should not leak when bodily fluids are splashed or sprayed on them. Although this type of mask provides some protection against droplet transmission, it does not provide complete protection. It is possible to breathe the unfiltered air around the edge of the mask while wearing it. Combined with fabric masks, their principal role is to prevent the transfer of infectious droplets from the wearer to other persons in the surrounding environment. Using a filtering face piece on your respirators is a good idea FFP. These aid in the creation of a tight seal around the edge of the mask, allowing all air to travel through the filter without restriction or obstruction. Using this type of mask, the wearer and anybody else with whom they come into touch will be protected against potentially contagious droplets that may fall from the sky. N95 masks (referred to as FFP2 in European and American terminology, respectively) are capable of filtering at least 94–95 percent of particles with sizes bigger than 0.3 microns in size. FFP3 or N99 masks are effective in filtering at least 99 percent of particles with a size greater than 0.3 microns (Watts 2020).

### 2.3.7 Caps and boots/shoe covers

The using  of a head cover protects against potential exposure to contaminants in a contaminated area. When there is a possibility of exposure to airborne contaminants, it protects the hair and scalp from existing contaminants. The head cap is made of high-

quality non-woven fabric. It includes an elastic cuff that provides for a secure fit. Its purpose is to keep the infection from spreading among those who work in the health care industry. As a result, it makes it easier and more comfortable to provide patients with the best possible care. It is mostly employed in hospitals, doctor's offices, clinical laboratories, pathology, and other similar settings (Juergensmeyer 2021).

The shoe cover is made of non-woven material and has a high ankle type of component. It contributes to keeping the sensitive environment free of dirt, bacteria, twigs, and lint, among other things. It aids in the preservation of cleanliness and the prevention of footwear from becoming stained by chemicals and paints. Among its principal functions is the protection of the user's feet from numerous threats such as crushing, sliding, piercing, high temperatures, and electrical currents as well as cutting and chemical agents (Ali and colleagues 2014).

### 2.3.8 Needle stick and Sharps Injury Prevention

Needle sticks and sharp hurts are important work-related dangers for health care providers, and they occur when sharp tools such as needles or other sharp tools pierce the skin and cause tissue damage or death. Injury caused by things such as hypodermic needles, blood gathering needles, canals, and needles used to connect sections of the intravenous delivery system is referred to as needlestick injury . It can also be defined as a piercing body suffering caused by sharp medical equipment that has been exposed to body fluids from another person and has been contaminated. Typically, needlestick and sharp injuries occur during drug delivery, surgical procedure, blood sample gathering, needle recapitulating, and improper handling and disposal of sharp items, among other activities (Abadiga et al., 2020). For health care professionals, the most common occupational danger for blood-borne pathogen infections is exposure to blood and body fluids from infected needle sticks and sharps incidents (Assen 2020).

In order to prevent the transmission of blood-borne pathogens among or to healthcare providers, national public health policies call for the use of devices with safety features, the promotion of health education, the implementation of safety protocols, and training programs for individuals at risk of needles stick and sharp injuries (NSSIs), and the promotion of health education (Saadeh 2020).

Employees in the health care field should get training on how to prevent accidents and other occupational risks associated with cutting and puncturing instruments, as well as instruction on how to use protective equipment, which must be provided by the employer. For hypodermic injections, it is recommended that safety-engineered devices be utilized. In the event of an injury or occupational sickness, a team of occupational physicians should be assigned to monitor the situation. Nurses, as well as all other allied health employees, should be provided with hepatitis B vaccinations and antibody follow-ups, as well as screening, diagnosis, and treatment assistance for other occupational infectious illnesses, as recommended by the World Health Organization (Calikoglu 2019).

According to the Canton City Public Health Nursing (2019), the following comments were made about how to prevent NSSIs:

1.The red/yellow sharps container should be used to dispose of any and all sharps materials.
2.It is never acceptable to dispose of sharps materials in ordinary trash.
3.It is important to activate the safety devices on all needles and other sharps as soon as possible after use.
4.Never put an uncapped needle in your pocket or bring it about with you at all.
5.Recapped needles (unless they have a safety cap) should not be bent or cut, nor should they be removed from the syringe or tube holder, nor should they be otherwise manipulated.
6.Picking up broken glass or other sharp things with your hands is not recommended. Neither is using mechanical mean, as a brush and dustpans, tongs, or other similar implements, nor attempting to recap a needle that is not yours.
7.Do not recycle or reuse needles or syringes in any manner.
8.Do not flush needles or syringes that have been used down the toilet.
9.No glass containers should be used to dispose of used needles or syringes.

## 2.4 Risk assessment

To date, there is no widely applicable evidence-based approach for doing a risk analysis that is widely applicable. Although the theoretical model and grading systems are available, they are often difficult to put into practice. As a result, the expert panel has reached the unanimous conclusion that the foundation of any risk analysis should be an general assessment consisting of three fundamental factors:

1. Patients risk profiles (susceptibility of the patient to infections or colonization);
2. Surfaces risk profile (likelihood of contamination with pathogen and potential for exposing and/or indirect transmission, as well as the frequency of hand contact); and 3. Pathogen risk profile (vulnerability of pathogens to infections or colonization) (persistence, antibiotic resistance, and primary modes of transmission)
3. These three cornerstones are interdependent and must not be understood separately from each other in practice (Assadian 2021).

## 2.5 Disinfection and sterilization

Cleaning and disinfection are critical components of an infection prevention approach that is comprehensive in scope. However, while there is an increasing desire for more effective cleaning and disinfection, there is also emerging evidence that exposure to cleaning and disinfection can result in acute and chronic health impacts, notably respiratory sickness. As a result, several hospitals are looking for cleaners and disinfectants that are less hazardous (commonly referred to as "green") (Quinn 2015).

**Table2.1** Definition of terms in sterilization (Mohapatra 2017).

| **Terms** | **Definition** |
|---|---|
| Sterilization | As defined by the American Society for Microbiology, sterilization is the comprehensive elimination or obliteration of all forms of microbial life (counting both vegetative and spore forms), which can be accomplished in a variety of physical and chemical techniques. When it comes to technical details, at the halfway point of an average cycle, the most resistant spores had their colony forming units reduced by 106 logs, which is a significant reduction |
| Chemical sterilant | The use of long-lasting chemicals 3–12 h to eradicate all sorts of germs, such as peracetic acid (PAA) 0.2 percent, glutaraldehyde 2.4 percent, ortho- |

| | |
|---|---|
| | phthalaldehyde 0.55 percent, and hydrogen peroxide (0.55 percent), has been shown to be effective 7.5 percent). |
| Disinfections | Disinfection is described as the procedure of completely removing vegetative forms of microorganisms from inanimate items, with the exception of bacterial spores, from the environment. This procedure, which does not use spores, results in a reduction of 103 log CFU of germs, according to the science. |
| High-level disinfectant (HLD) | For a shorter period of time, glutaraldehyde 2.0 percent, oPA 0.55 percent, hydrogen peroxide 7.5 percent, hypochlorite 650–675 parts per million, and hypochlorous acid 400–450 parts per million can be used to kill 106 log microorganism except for spores, for example |
| Intermediate level disinfectant (ILD) | Because these disinfectants are effective against Mycobacterium TB, they are typically reserved for noncritical goods that have been contaminated with blood or bodily fluids. |
| Low-level disinfectant (LLD) | Liquid detergents LLDs are used to remove bacteria, fungi, and some enveloped viruses from noncritical items such as 3 percent hydrogen peroxide, quaternary ammonium compound, diluted glutaraldehyde, phenolics, and other noncritical products. |
| Decontamination and cleaning | Decontamination is the process of eliminating potentially harmful microorganisms from objects in order for them to be handled properly in other situations. Cleaning can be defined as the removal of visible soil (including organic and inorganic materials) from a variety of surfaces and items in general. A minimum reduction in microorganisms of 1 log CFU per liter of water is achieved, according to the technology's specifications. |
| Antisepsis | Antisepsis is the process of eliminating germs from the skin through the application of antiseptic treatments. The term "dermatological disinfection" refers to the process of disinfecting living tissue or skin in a patient. When it comes to the health-care professional, hand washing refers to the decrease or eradication of transitory bacteria from the skin by the use of soap and water. |
| Germicide | Specifically, it is the agent that is responsible for destroying germs. This area also includes antiseptics and disinfectants, among other things. The prefix identifies the type of microorganism that is under consideration (e.g., tuberculocide, virucide, bactericide, sporicide, and fungicide,) |

Prior to being used to avoid the spread of nosocomial infections, all medical and surgical tools must be completely cleaned and sterilized before they may be used. As defined by the International Standard Organization, "sterilization" is defined as a procedure that destroys or eliminate all form of microbial life and is carried out using a physical or chemical method, while "disinfection" is defined as a process that eliminates many or all pathogenic germ from inanimate objects with the exception of bacteria spores and is carried out using physical or chemical methods. As a result, antiseptics

and disinfectants are chemical agents that either suppress or eliminate germs on living tissues (antiseptics) or on inanimate surfaces and objects (disinfectant) in order to prevent infection (disinfectants). They are a critical component of infection control protocols in hospitals (Dabhade 2017).

## 2.6 Respiratory Hygiene (Cough Etiquette)

Transmission of respiratory diseases through droplet or airborne transmission channels are addressed by these infection prevention measures, which are meant to minimize the spread of respiratory illnesses. Specifically, the strategies are intended for use by the patient and individual accompanying patients to the dental office who may be suffering from undiagnosed respiratory infections; however, they are also applicable to anyone (including dental healthcare professionals DHCP) who is experiencing signs and signs of illness. Standard Precautions were revised in 2007 to emphasize two important aspects (Centers for Disease Control and Prevention 2021).

1. First, make sure you have a strong grasp of the scenario; and second, make sure you have a good grasp of the circumstance.

A device measuring to avoid the spread of respiratory infection from anybody in a health care setting with symptoms

- Postmarks at entrances asking a patient with the symptom of respiration infection to (mouth, nose) when coughing or sneezing

- Use tissue and throw them away.

- Wash hands or use a hand sanitizer every time you touch the mouth or nose.

- Prepare tissue and no-touch receptacle for the disposal of tissues and other waste.
- Providing resources for completing hand hygiene in or near waiting areas, such as soap and paper towels.
- Symptomatic patients should be provided with masks when they attend the dental office.

- Make sure there is enough space and advise symptomatic patients to sit as far away from other people as they can. If a separate waiting space is provided, facilities may wish to accommodate these patients while they await treatment.

2. Teach DHCP about the importance of the prevention measure when investigative and caring for patient with symptom of a respiratory infection.

## 2.7 Waste Disposal

Medical waste generated by healthcare and health-research facilities, as well as it are accompanying laboratories, are referred to collectively as healthcare waste. Human-caused waste is defined as any solid or liquid waste that poses a risk of infection to humans. Hospitals (during the diagnosis, treatment, or immunization of human beings), blood banks, clinics, dental practices, labs, as well as medical research institutions, and other forms of health care services, among other places, generate this waste product. Because of its contagious and/or poisonous characteristics, it poses a significant threat (Sobh 2018).

**Table 2.2** category of hospital waste (WHO 2018).

| **Types of waste** | **Description** |
|---|---|
| Infectious waste | Biohazardous waste includes contaminating waste with blood and other body fluid (for example, from a discarded diagnostic sample), culture and stocks of infective agents from laboratory work (for example, wastes from autopsies and infected animals from laboratories), and waste from a patient suffering from an infection (e.g. swab, bandage and disposable medical device) |
| Pathological waste | human tissue, organs or fluid, body portions and contaminating animal corpses |
| Sharps waste | syringe, needle, disposable scalpel and blade, etc. |
| Chemical waste | for example solvents and reagents used for laboratory preparation, disinfectant, sterilant, and heavy metal included in medical devices (e.g. mercury in broken thermometers) and batteries |
| Pharmaceutical wastes | expired, unused and contaminated drug and vaccine |
| Cytotoxic wastes | waste covering compounds with genotoxic qualities (i.e. very dangerous substances that are, mutagenic, teratogenic, or carcinogenic), such as cytotoxic medications used in cancer treatment and their metabolites |
| Radioactive wastes | such as products polluted by radionuclides comprising radioactive diagnostic material or radiotherapeutic resources |

| | |
|---|---|
| Non-hazardous or general wastes | wastes that do not pose any special biological, chemical, radioactive or physical danger |

The proper management of biomedical waste management begins with the generation of waste and continues through the stages of segregation at the sources, storage at the site, disinfection, and transfer to the final disposal site. Each stage is critical in the proper management of biomedical waste management. Doctors, nurses, lab technicians, and other members of the medical staff are among those who are involved in the handling of biomedical waste at various points in the hospital's life cycle. As a result, increased understanding of biomedical waste management among healthcare professionals has a bigger impact on both health and the environment (Dash 2021).

Phases in the management of hospitals wastes include (Nagpal 2019).

1. Creating a wastes management plan that is based on an assessment of the present condition and that is designed to reduce the amount of waste produced.

2. Separate clinical (infectious) trash from non-clinical wastes and store them in separate containers.

3. Wastes should be conveyed in a special trolley.

4. Wastes should be kept in designated areas with a controlled access.

5. Collect and store sharps in sharps containers to avoid contamination. It is preferable if the sharps containers are constructed of plastic or metal and have a lid that can be closed. They should be labelled with the appropriate emblem, for example, a Biohazard symbol for clinical (infectious) waste should be displayed.

6. Denote the hazardous storage places with a Biohazard icon.

7. Make sure that the carts or trolleys utilized for the transportation of the segregated trash collection are not being used for any other purpose and that they are cleaned on a regular basis.

8. Designate a temporary storage facility for garbage before it is treated or transported to a final disposal site.

## 2.8 Blood Spill Management

The following are the fundamental principles of blood and body fluid/substance spill management: - Standard precaution should be taken, including the use of -PPE- when necessary; spills would be cleaned up before the area is cleaned, and the generation of aerosol from spilled material should be avoided. For major or minor spills with splash potential, as well as for dried body fluids or modest spills with minimal splash potential, suitable cleanup procedures must be followed. Spills of any magnitude, large or little, with the potential to splash: In the first case, use absorbent material to soak up and cover the spill with absorbent powder or paper towel. Disinfectant should be administered directly to the material to be disinfected. The use of a broad-spectrum disinfectant such as 10 percent bleach solution powder and keeping it on the material for 10-30 minutes before cleaning is usually adequate to disinfect the material (Deepika 2020).

Alternatively, an alternative disinfectant may be used as long as the label says that it is effective against a broad spectrum of human pathogenic diseases. After the body fluid waste has been gathered and dumped in a rubbish bag, apply disinfectant to the area of the spill to guarantee comprehensive disinfections and wipe up with paper towels to remove any lingering contamination (Sunil 2021).

# 3. MATERIAL METHODS

## 3.1 Study design:

A descriptive cross-sectional study has been carried out to “nurses performance about compliance with infection control precautions in alhilla city hospitals” 1st February 2022 to 1st May 2022.

## 3.2 Setting and sample of the study

### 3.2.1 Setting and Sample

The research data were collected from Alhilla City Hospitals Imam Al-Sadiq Teaching Hospital, Al-Hilla Teaching Hospital, and Marjan Medical City between 1st February 2022 to 1st May 2022, Iraq. The study sample is 270 nurses. The sample was chosen by using a purposive sample. "The G power package program was used in power analysis". As a result of the power analysis, it was initiated that the power was 0.999 when the effect p (3.0) and (0.05) , the sample size was 120.

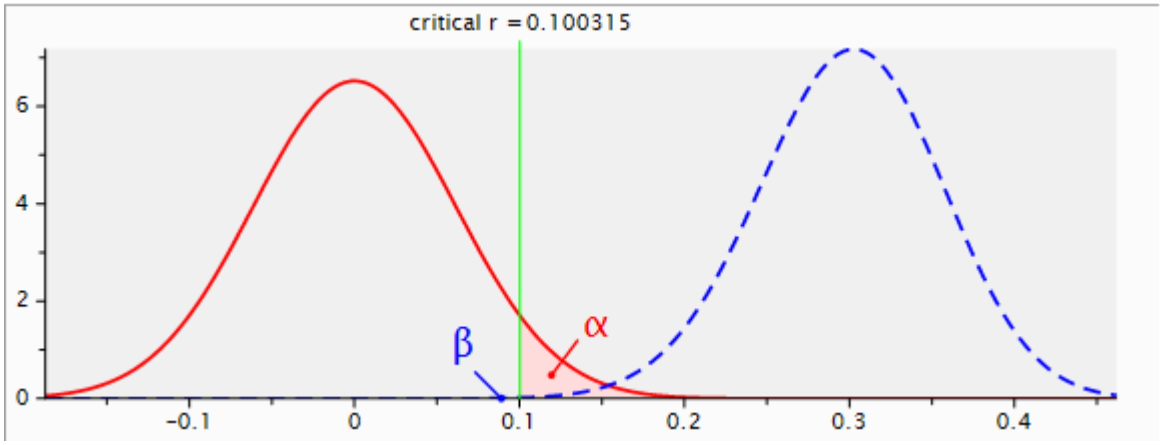


**Figure3.1** (A) G- power analysis

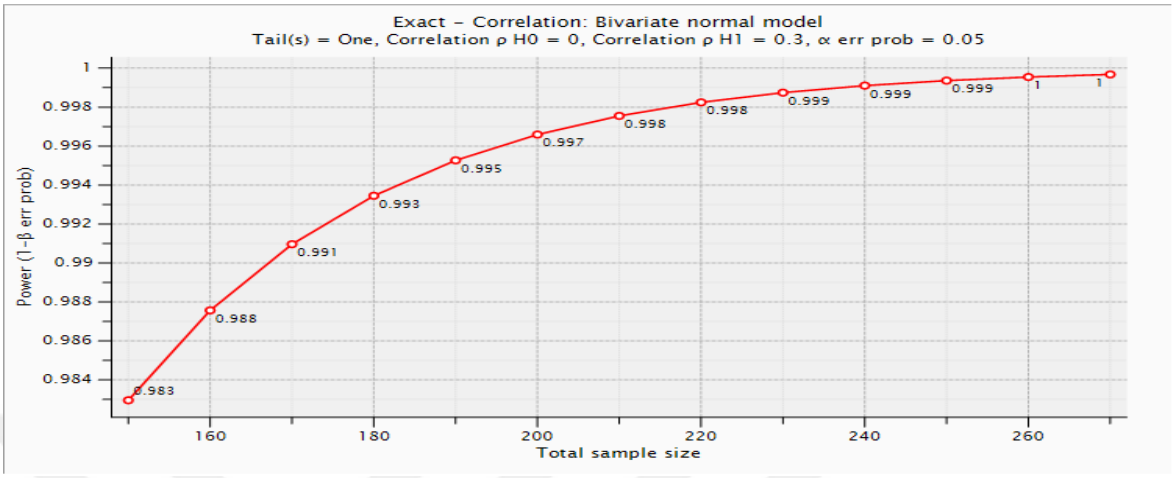


**Figure3.2** (B) G- power analysis

### 3.2.2 Inclusion criteria of sample

Both gender of nurses , at any age and level of education and whom agree to share in the study

### 3.2.3 Exclusion Criteria of sample

Nurses whom disagree to participate in the study

## 3.3 Study instrument

Research data were collected by using of questionnaire composed of 2 parts (Appendix 1) including the following:

- **Part one**: Demographics data; including age, gender, educational level, marital status, years of service.
- **Part two:** "Compliance with Standard Infection Control Precautions"; The study instrument is composed of 5 domains and these domains include the first domain use of the protective device which consist of 6 items, the second domain

disposal of sharps and consist of 3 items, third domain disposal of waste consisting of 1 item, forth domain documentation of spills and used articles consist of 3 items, and fifth domain prevention of cross infections from individual to individual consist of 7 items. This scale consists of 20 questions, and these questions are described as compliance with standard precautions. The scale rating by four points Likert scale zero for Never, 1 point for Seldom, 2 points for Sometimes, and 3 points for Always) The CSPS English versions were turned into the Arabic version subsequent to a recommended guideline from the cross-cultural adaptation and translation tool (Al-otaibi 2016).

### 3.4 Reliability & Validity

Content validity was recognized by calculating the item levelS content validity index (I-CVI) and scale-levels content validity index (S-CVI/Ave). An I-CVI = 1 for a panel with ≤5 members and an S CVI/Ave ≥0.90 was acceptable. The calculated "Cronbach's alpha of the scale" was 0.89. (Al-otaibi 2016).

### 3.5 Ethics Committee approval

"Ethical approval was obtained from Çankırı Karatekin University" and directed to the Babylon Health Director to facilitate the data gathering in the hospitals(Appendix 2).

The research was conducted in the Babylon Health Department / Training and Human Development (No.: 1286, Date: 12.22.2021) at the beginning with written permission from teaching hospitals, including (Imam Al-Sadiq Teaching Hospital, Al-Hilla Teaching Hospital, and Marjan Medical City) Hospital) (Appendix 3).

The researcher explains the study and the objectives to the samples then ask them to take their oral agreement to share in the research and then began to collect the data.

### 3.6 Data collection

The process of collecting data was conducted from 1st February 2022 to 1st May 2022. The nurses and the objective were clarified to the study sample by the researcher,

the sample´s verbal consent has been taken and the answering of the question has been done by using the interview. The investigator collected the general information about the sample contributed to the study, and then collected the data related to compliance standard precautions. The process of data collection takes about 15-25 minutes for each participant. Then the data was collected through using the self-reported questionnaire.

### 3.7 Data analysis

Data analysis by using the "Statistical Package for Social Science" SPSS version 22.0, Socio-demographic and descriptive features of the nurses were given as a number, percentage, mean & standard deviation, t test and Kruskal-Wallis tests were implemented to analyse the data. . The significant level of p-value equal to and less than 0.05.

# 4. RESULTS

**Table 4.1** distribution of the nurses' sociodemographic characteristics

| Variables | Frequency | Percent |
|---|---|---|
| **Gender** | | |
| Female | 89 | 33.0 |
| Male | 181 | 67.0 |
| Total | 270 | 100.0 |
| **Age** | | |
| 20-29 years | 193 | 71.5 |
| 30-39 years | 58 | 21.5 |
| 40-49 years | 19 | 7.0 |
| Total | 270 | 100.0 |
| **Education** | | |
| Nursing school graduated | 14 | 5.2 |
| Nursing diploma | 77 | 28.5 |
| Nursing bachelor | 171 | 63.3 |
| Higher education | 8 | 3.0 |
| Total | 270 | 100 |
| **Marital status** | | |
| Single | 101 | 37.4 |
| Married | 169 | 62.6 |
| Total | 270 | 100.0 |
| **Total hours of clinical exposure** | | |
| 1-8 hours | 198 | 73.3 |
| 9-16 hours | 26 | 9.6 |
| 17-24 hours | 46 | 17.0 |
| Total | 270 | 100.0 |
| **Years of service** | | |
| 1-10 years | 230 | 85.2 |
| 11-20 years | 28 | 10.4 |
| 21-30 years | 12 | 4.4 |
| Total | 270 | 100.0 |

This table shows that 181 (67%) of nurses are males, 193 (71.5%) of nurses aged 20-29 years, 171 (63.3%) had a bachelor's degree in nursing, 169 62.4% were married, 198 (73.3%) of nurses had (1-8) hours clinical exposure, 230 85.2% of nurses had 1-10 years of service.

**Table 4.2** Distribution of nurses' compliance standard precaution

| Domains | Response | Frequency | Percent |
|---|---|---|---|
| **Use of protective device** | | | |
| I remove PPE in a chosen area | Never | 8 | 3.0 |
| | Seldom | 16 | 5.9 |
| | Sometimes | 111 | 41.1 |
| | Always | 135 | 50.0 |
| | Total | 270 | 100 |
| I wear glove when I am unprotected to body fluid, blood product, and any excretions of clients | Never | 2 | .7 |
| | Seldom | 14 | 5.2 |
| | Sometimes | 39 | 14.4 |
| | Always | 215 | 79.6 |
| | Total | 270 | 100 |
| I wear a face mask alone or in combination with goggles, face shields, and a bib whenever there is a likelihood of a splash or splatter | Never | 35 | 13.0 |
| | Seldom | 65 | 24.1 |
| | Sometimes | 89 | 33.0 |
| | Always | 81 | 30.0 |
| | Total | 270 | 100 |
| My (mouth, nose) is protected when I wear a face mask | Never | 14 | 5.2 |
| | Seldom | 37 | 13.7 |
| | Sometimes | 57 | 21.1 |
| | Always | 162 | 60.0 |
| | Total | 270 | 100 |
| I re-wear mask or one-use PPE | Never | 89 | 33.0 |
| | Seldom | 55 | 20.4 |
| | Sometimes | 75 | 27.8 |
| | Always | 51 | 18.9 |
| | Total | 270 | 100 |
| I am wearing a dress or apron when exposed to blood, body fluid, or any patient excretion | Never | 23 | 8.5 |
| | Seldom | 32 | 11.9 |
| | Sometimes | 81 | 30.0 |
| | Always | 134 | 49.6 |
| | Total | 270 | 100 |
| **Disposal of sharps** | | | |
| I recap used needles after giving an injections | Never | 15 | 5.6 |
| | Seldom | 12 | 4.4 |
| | Sometimes | 28 | 10.4 |
| | Always | 215 | 79.6 |
| | Total | 270 | 100 |

Continuous table

| Domains | Response | Frequency | Percent |
|---|---|---|---|
| I place used sharp articles in sharps boxes | Never | 8 | 3.0 |
| | Seldom | 19 | 7.0 |
| | Sometimes | 50 | 18.5 |
| | Always | 193 | 71.5 |
| | Total | 270 | 100 |
| The sharps boxes are only disposed when it is filled | Never | 10 | 3.7 |
| | Seldom | 20 | 7.4 |
| | Sometimes | 58 | 21.5 |
| | Always | 182 | 67.4 |
| | Total | 270 | 100 |
| **Disposal of waste** | | | |
| contaminated wastes with blood, body fluid, secretions, and excretions are put in a red plastic bag irrespective of the client's infectious status | Never | 50 | 18.5 |
| | Seldom | 54 | 20.0 |
| | Sometimes | 75 | 27.8 |
| | Always | 91 | 33.7 |
| | Total | 270 | 100 |
| **Documentation of spills and used articles** | | | |
| I decontaminated surface and tools after using | Never | 10 | 3.7 |
| | Seldom | 41 | 15.2 |
| | Sometimes | 87 | 32.2 |
| | Always | 132 | 48.9 |
| | Total | 270 | 100 |
| I am wearing gloves to decontaminate used equipment with visible soils | Never | 7 | 2.6 |
| | Seldom | 42 | 15.6 |
| | Sometimes | 71 | 26.3 |
| | Always | 150 | 55.6 |
| | Total | 270 | 100 |
| I am cleaning up spillage of blood or other body fluids directly with disinfectant | Never | 5 | 1.9 |
| | Seldom | 28 | 10.4 |
| | Sometimes | 56 | 20.7 |
| | Always | 181 | 67.0 |
| | Total | 270 | 100 |
| **Prevention of cross infection from person to person** | | | |
| I am washing my hand between patient contact | Never | 3 | 1.1 |
| | Seldom | 8 | 3.0 |
| | Sometimes | 46 | 17.0 |
| | Always | 213 | 78.9 |
| | Total | 270 | 100 |

Continuous table

| Domains | Response | Frequency | Percent |
|---|---|---|---|
| I am only using water for hand washing | Never | 73 | 27.0 |
| | Seldom | 51 | 18.9 |
| | Sometimes | 106 | 39.3 |
| | Always | 40 | 14.8 |
| | Total | 270 | 100 |
| I use alcohol hand rubs as an another if my hand is not visibly soiled | Never | 15 | 5.6 |
| | Seldom | 30 | 11.1 |
| | Sometimes | 111 | 41.1 |
| | Always | 114 | 42.2 |
| | Total | 270 | 100 |
| I take a bath in case of wide, splashing even after I have placed on PPE | Never | 10 | 3.7 |
| | Seldom | 37 | 13.7 |
| | Sometimes | 73 | 27.0 |
| | Always | 150 | 55.6 |
| | Total | 270 | 100 |
| I am covering my wounds or lesions with waterproof covering before patients contact | Never | 16 | 5.9 |
| | Seldom | 44 | 16.3 |
| | Sometimes | 69 | 25.6 |
| | Always | 141 | 52.2 |
| | Total | 270 | 100 |
| I am changing gloves between each patient contact | Never | 5 | 1.9 |
| | Seldom | 27 | 10.0 |
| | Sometimes | 92 | 34.1 |
| | Always | 146 | 54.1 |
| | Total | 270 | 100 |
| I am decontaminating my hands directly after the removal of gloves | Never | 4 | 1.5 |
| | Seldom | 37 | 13.7 |
| | Sometimes | 79 | 29.3 |
| | Always | 150 | 55.6 |
| | Total | 270 | 100 |

This table shows that in the first domain (Use of protective device) half of nurses 135 (50%) responded always to removing PPE in a designated area. 215 (79.6%) of nurses responded always to wear gloves when I am showing body fluid, blood product, and any excretions of the patient. 89 (33%) of nurses responded sometimes wear a surgical mask alone or in combination with goggles, face shields, and an apron whenever there is a likelihood of a splash or splatter. 162 (60%) responded always for covered their

mouth and nose when they wear a mask. 89 (33%) of nurses never reuse masks or disposable PPE. 134 (49.6%) of nurses always wear a gown or apron when exposed to blood, body fluids, or any patient's excretion.

Regarding the second domain (Disposal of sharps) 215 (79.6%) of nurses always recap used needles after giving an injection. 193 (71.5%) of nurses always put used sharp articles into the sharp box. 182 (67.4%) of nurses responded always in the sharp box is only disposed of when it is full

Regarding the third domain (Disposal of waste), 91 (33.7%) of nurses responded always for contaminating wastes with blood, body fluid, secretion, and excretions are placed in a red plastic bag irrespective of the client's infective status

Regarding the fourth domain (Documentation of spills and used articles) 132 (48.9%) of nurses always decontaminated surfaces and equipment after use. 150 (55.6%) of nurses always wear gloves to decontaminate used equipment with visible soils. 181 (67%) of nurses always clean up spillage of blood or other body fluid directly with disinfectant

Regarding the fifth domain (Prevention of cross infection from person to person) 213 (78.9%) of nurses always wash their hands between patient contacts. 106 (39.3%) of nurses sometimes use water for hand washing. 114 (42.2%) of nurses always use alcohol hand rub as the other if my hands are not visibly soiled. 150 (55.6%) of nurses responded always for I take a shower in cases of wide wallowing even after I have put on PPE. 141 (52.2%) of nurses responded always since I cover my wounds or lesions with a waterproof dressing before patients contact. 146 (54.1%) responded always for changing glove between each client contact. 150 (55.6%) responded always for me decontaminated my hand immediately after removal of gloves.

**Table 4.3** Overall nurses' compliance standard precaution

| Variable | Mean | Median | SD | Minimum | Maximum |
|---|---|---|---|---|---|
| Overall | 45.2 | 46 | 7.78 | 11 | 60 |

This table shows that the mean and standard deviation of nurses' compliance about standard precaution are 45.2±7.78

**Table 4.4** Difference between nurses' compliance of standard precaution and socio-demographic characteristics

| Variables | No. | Mean | Standard deviation | Kruskal-Wallis test |
|---|---|---|---|---|
| **Gender** | | | | |
| Female | 89 | 45.83 | 6.982 | t=0.94 |
| Male | 181 | 44.88 | 8.150 | p=0.348 |
| Age | | | | |
| 20-29 years | 193 | 44.68 | 6.891 | $X^2$=9.94 |
| 30-39 years | 58 | 45.36 | 9.924 | p=0.007 |
| 40-49 years | 19 | 49.95 | 7.771 | |
| **Education** | | | | |
| Nursing school graduated | 14 | 46.29 | 9.707 | |
| Nursing diploma | 77 | 44.94 | 9.350 | $X^2$=4.11 |
| Nursing bachelor | 171 | 45.02 | 6.875 | p=0.25 |
| Higher education | 8 | 49.5 | 5.606 | |
| **Marital status** | | | | |
| Single | 101 | 44.62 | 8.397 | t=0.934 |
| Married | 169 | 45.54 | 7.399 | p=0.351 |
| **Total hours of clinical exposure** | | | | |
| 1-8 hours | 198 | 45.30 | 8.268 | $X^2$=0.87 |
| 9-16 hours | 26 | 44.35 | 5.899 | p=0.645 |
| 17-24 hours | 46 | 45.22 | 6.572 | |
| **Years of service** | | | | |
| 1-10 years | *230 | 44.82 | 7.582 | $X^2$=4.08 |
| 11-20 years | 28 | 47.93 | 7.013 | p=0.13 |
| 21-30 years | 12 | 46.08 | 11.897 | |

This table displays that nurses' compliance regarding standard precautions is significantly different between age groups $X^2$=9.94, $p<0.05$.

Nurses' compliance regarding standard precaution is not significantly different when cases are grouped by gender, level of education, marital status, total hours of clinical exposure, and years of service $p>0.05$.

## 5. DISCUSSION

According to the nurses` compliance with standard precautions the findings indicated that in the first domain (Use of protective device) most of nurses have good performance.

In a descriptive study conducted by Almoghrabi 2018 in KSA, the finding revealed that 73.8% of nurses always wearing a face mask to defend the (mouth, nose) mucosa during the operation might induce the spraying of blood, body fluid, secretions or excretions. 51.6% of nurses always wearing a protective eye patch and goggle to protect the eyes during the operation might induce the spraying of blood, body fluid, secretions, or excretions. 59.1% of nurses always wearing a defensive suit in the process might induce the spraying of blood, body fluids, secretions, or excretions. 50.4% of nurses always wearing a protective cap or shoe shad to protect hair or shoes during the operation might induce the spraying, flowing, or leaking of blood, body fluids, secretions, or excretions. This result is consistent with the present study's finding.

In a descriptive study conducted in Ethiopia, the study findings indicated that 50.65% of nurses have poor standard precaution practice regarding the use of personal protective equipment Angaw 2019. In another study conducted in Ethiopia by Beyamo 2019, they found that 87.2% of nurses have good practice regarding personal protective equipment. This finding agrees with our study.

In a descriptive study conducted by Mohd-Nor and Bit-Lian 2019 the result indicated that 24 (36.8%) of participants often wear gloves when drawing blood samples. 25 (37.6%) of participants very often wear gloves when disposing of stool and urine. 29 of participants (45.1%) very often wearing gloves when handling impaired the patient's skin. 23 (35.4%) of participants very often wear gloves when handling clients' mucosa. 34 (51.4%) of participants often wear gloves when handling saliva or sputum culture. 47 (71.5%) of participants very often wearing gloves when dressing wounds. 44 (67.4%) very often wear gloves when comes in contact with blood. 27 (40.7%) of participants very often wear masks when accomplishment operation/ techniques that might induce spraying of blood, body fluid, secretions, and excretions. 31 (47.2%) of participants often wears protective suits or gown when performing operation/procedure that might

induce spraying of blood, body fluids, secretion, and excretion. This results are in the same line of our study's findings.

In a descriptive study conducted by Maristela 2019 the finding revealed that the sample had excellent hand washing practice. In another study conducted by Wong 2021 in China, the result indicated that 562 (73.4%) of health care workers always use PPE to protect from exposure to infectious materials. This finding supported our study

Regarding the second domain (Disposal of sharps) 215 (79.6%) of nurses always recap used needles after giving an injection. 193 (71.5%) of nurses always put used sharp articles into sharp boxes. 182 (67.4%) of nurse's responses always in the sharp box is only disposed of when it is full.

Almoghrabi (2018) found that 68.7% of nurses do not re-use syringes. (59.7%) no returns application of second-hand syringes or applying the return application with a single hand. 80.9% response always to the second-hand sharp such as pinhead and blade are gathering in the special sharp disposal box. In a descriptive study carried out in Nigeria by Arinze-Onyia (2018) they found that over 50% of needles are disposed of after proper use. This finding supported our study.

Angaw (2019) found that 52.98% of nurses had good standard precaution practice regarding safe injection management. Mohd-Nor Bit-Lian (2019) found that 41 (62.5%) did not recap the syringe after use. 50 (75.8%) very often dispose of the needles and blades in a sharps disposal box or container after use. Maristela (2019) found that the study sample had very good, safe handling of needles and other sharp devices of the respondents. Beyamo (2019) found that (67.6%) of nurses had good handling sharp practice.

Dash (2021) found that 72 (72%) nurses had good practice for disposal of sharps in a puncture-proof container. Wong et al., (2021) found that 565 (74.2%) of nurses always Handling of needles and other sharp objects, and 377 (54.4%) always performed invasive procedures (e.g. injection, lumber puncture). This finding hasn't supported our study.

Regarding the third domain (Disposal of waste), 91 (33.7%) of nurses responded always for wastes contaminated with blood, body fluid, secretions, and excretion are located in a red plastic bag irrespective of the client's infectious status.

Shamnani (2018) found that 52 (81.25) nurses have good medical waste management. Beyamo (2019) found that (80.8%) of nurses had a good instrument processing and waste management.

Angaw (2019) found that 50.52% of nurses have poor standard precaution practice regarding health care waste management. Also, Maristela (2019) found that the study sample had excellent proper handling and disposal of contaminated materials by the respondents.

In a descriptive study carried out in Qatar by Musa (2020) they found that the majority of nursing (92.8%) were practicing incorrect color-coding for the different waste categories. This finding is consistent with our study.

Regarding the fourth domain (Documentation of spills and used articles) 132 (48.9%) of nurses always decontaminate surfaces and equipment after use. 150 (55.6%) of nurses always wear gloves to decontaminate used tools with visible soils. 181 (67%) of nurses always clean up spillage of blood or other body fluid directly with disinfectant.

Wong (2021) found that 680 (86.2%) always environmental cleaning and disinfection, 357 (45.9%) had proper patient handling, and 619 (79.7%) proper handling of textiles and laundry. This finding supported our study.

Regarding the fifth domain (Prevention of cross infection from person to person) 213 (78.9%) of nurses always wash their hands between patient contacts. 106 (39.3%) of nurses sometimes use water for hand washing. 114 (42.2%) of nurses always use alcohol hand rubs as an alternative if their hands are not visibly soiled. 150 (55.6%) of nurses responded always for them to take a bath in case of wide wallowing even after I have put on PPE. 141 (52.2%) of nurses responded always for I cover my wounds or lesions with a waterproof dressing before patient contact. 146 (54.1%) responded

always for me is changing gloves between each patient contact. 150 (55.6%) responded always for me decontaminated my hands directly after removal of gloves.

Almoghrabi (2018) found that (77.2%) of nurses wash their hands if contact with different patients. (78.8%) washing hands if taking off the glove. (95.7%) washing or disinfecting hands directly if contacting any blood, body fluid, secretion, excretions, or dirty substance. Arinze-Onyia (2018) found that (73.6%) wash or decontaminate hands after removal of gloves.

In another descriptive study conducted by Lawal (2018) they found that 68.8% wash hands before touching patients, 99% wash hands after touching patients and wash hands after handling secretions, 97.9% wash hands after removing gloves.

Angaw (2019) found that 50.65% of nurses have poor standard precaution practice regarding hand hygiene. Also, Beyamo (2019) found that (58%) of nurses had good hand hygiene practices. Mohd-Nor and Bit-Lian (2019) found that 33 (50%) often wash their hands when coming in contact with different patients. 35 (52.8%) often wash their hands after taking off their gloves. 34 (51.4%) often washed hands directly after contacting any blood, body fluids, secretion, excretions, and dirty substance.

In a descriptive study conducted in KSA by Mohaithef (2020) the finding indicated that nearly 69% (167) of the samples claimed to routinely wash their hand and 69.1% (168) demanded to use alcohol-based hand rub. The highest percentage of hand washing practices described by the samples was 91.4% (222) after exposure to body fluid, followed by 88.5% (215) when their hand looks dirty and 87.2% (212) after exiting an isolation room. The lowest percentage of hand washing practices described by the samples was 70.8% (172) after physical contact with a patient, followed by 72.4% (176) before any medical techniques and 73.3% (178) before entering an isolation room.

Wong (2021) found that 793 (98.8%) of nurses always hand washing, and 624 (80.2%) adopt respiratory hygiene/cough etiquette principles.

In Table (4.4) the findings revealed that the mean and standard deviation of nurses' compliance with standard precautions are (45.2±7.78). This finding hasn't supported our study.

As regards the difference between nurses` compliance and standard precaution in the Table (4.5), the result shows that there is a significant statistical Difference between nurses' compliance regarding standard precaution and nurses' age.

Angaw (2019) found that there is a significant different between standard precaution practice and age at a p-value (0.05). Also, Wong (2021) found that there is a significant different between standard precaution practice and age at a p-value (0.019). Beyamo (2019) found that there is a significant different between standard precaution practice and age at a p-value (0.003)

There is no significant statistical Difference between nurses' compliance regarding standard precaution and gender, level of education, marital status, total hours of clinical exposure, and years of service.

Beyamo (2019) found that there is a significant different between standard precaution practice and gender at a p-value (0.001). While, there is no significant statistical different between nurses' compliance regarding standard precaution and level of education, and years of service.

Wong (2021) found that there is no significant statistical different between nurses' compliance regarding standard precaution and gender, marital status, total hours of clinical exposure.

- **Limitations of the study**

Results of this study were limited to nurses in Alhilla city hospitals and could not be generalized to all nurses in Iraq.

## 6. CONCLUSION AND RECOMMENDATIONS

### ❖ Conclusions

The study findings concluded that most of nurses have good standard precaution compliance. Most of nurses have adequate practice toward using of personal protective equipment (Gloves, glass, mask, gown…). Also, they have good practice for disposal of biomedical waste and sharp waste. Nurses have good practice regarding infection control (from person to person) by hand washing before and after care of patients and wear protective gloves. Nurses have good practice regarding documentation of spills and used articles. There is significant statistical Difference between nurses' compliance regarding standard precaution and nurses' age.

### ❖ Recommendations

The study recommended that:

"Standard infection control precautions" are elementary levels of infections control procedure. The contributors may have satisfactory compliances level, but additional training program and additional concentrating on the standard precautions by instructive institutions are required for nursing to enhance their knowledge and "compliance with infection-control standard precautions" which including chain of infection, use of PPE, hand washing, management of medical and sharps waste, hospital environment cleaning and disinfectant, and safe injection procedure and management.

**REFERENCES**


Abadiga., M, Mosisa, G., Abate, Y. 2020. Magnitude of Needlestick and Sharp Injury and Its Associated Factors Among Nurses Working at Health Institutions in Western Ethiopia, 2020. Journals Risk Management and Healthcare Policy. 13, 1589-1602

Abukhelaif, A.E.E. 2019. Personal Protective Equipment Knowledge and Practices among Nurses Working at Al-Baha King Fahad Hospital, Saudi Arabia. J Healthc Commun. 4(1), 1-6

Akagbo, S.E., Nortey, P. & Ackumey, M.M. 2017. Knowledge of standard precautions and barriers to compliance among healthcare workers in the Lower Manya Krobo District, Ghana. BMC Res Notes 10, 432. https://doi.org/10.1186/s13104-017-2748-9

Alberta Health Services. 2020. Glove Use and Selection. 1-8. https://www.albertahealthservices.ca/assets/healthinfo/ipc/if-hp-ipc-glove-use-selection.pdf

Al-Faouri, I., Okoura, S. H., Alakour, N. A., & et al. 2021. Knowledge and compliance with standard precautions among registered nurses: A cross-sectional study. Annals of Medicine and Surgery, 62, 419-424

Alhumaid, S., Al Mutair, A., Al Alawi, Z. et al. 2021. Knowledge of infection prevention and control among healthcare workers and factors influencing compliance: a systematic review. Antimicrob Resist Infect Control 10, 86. https://doi.org/10.1186/s13756-021-00957-0

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

Ali, Z., Qadeer, A., & Akhtar, A. 2014. To determine the effect of wearing shoe covers by medical staff and visitors on infection rates, mortality and length of stay in Intensive Care Unit. Pakistan journal of medical sciences, 30(2), 272–275.

Almoghrabi, R., Aldosari, N., Areej Bakhsh, A. , & et al. 2018. Standard Precaution Among Nurses In Primary Health Care Centers: Knowledge And Compliance. Journal of Nursing and Health Science, 7(4), 57-63

Al-Omari, A., Al Mutair, A., Alhumaid, S., & et al. 2020. The impact of antimicrobial stewardship program implementation at four tertiary private hospitals: results of a five-years pre-post analysis. Antimicrob Resist Infect Control. 9(1),1–9.

Al-otaibi, J. H., Jonas P.Cruz, J. P., Colet, P. C., and et al. 2016. Validity and reliability assessment of the Compliance with Standard Precautions Scale Arabic version in Saudi nursing students. Journal of Infection and Public Health, 9(5), 645-653

Angaw, D. A., Gezie, L. D., Dachew, B. A. 2019. Standard precaution practice and associated factors among health professionals working in Addis Ababa government hospitals, Ethiopia: a cross-sectional study using multilevel analysis. BMJ Open, 9, e030784. doi:10.1136/ bmjopen-2019-030784

Antonovics, J., Wilson, A. J., Forbes, M. R., Forbes, M. R., Hauffe, H. C., & Kallio, E. R. 2017. The evolution of transmission mode. Philos Trans R Soc Lond B Biol Sci.372(1719):20160083

Appiah, E. O., & Appiah, S., & et al. 2021. Experiences of infection prevention and control in clinical practice of nursing students in the Greater Accra Region, Ghana: An exploratory qualitative study. SAGE Open Medicine. 9, 1–9

Arinze-Onyia S. U., Ndu, A. C., Aguwa, E. N., Modebe, I., Nwamoh, U. N. 2018. Knowledge and Practice of Standard Precautions by Health-Care Workers in a Tertiary Health Institution in Enugu, Nigeria. Niger JClin Pract, 21, 149-55

Arinze-Onyia, S. U., Ndibuagu, E. O.1 & Ozor, I. I. 2018. Standard precautions: Nurses' knowledge and use in a tertiary health institution in Southeast Nigeria. International Research Journal of Medicine and Medical Sciences. 6(2), 35-40.

Asadollahi, M., Bostanabad, M. A., & et al. 2015. Nurses' Knowledge Regarding Hand Hygiene and Its Individual and Organizational Predictors. Journal of Caring Sciences, 4(1), 45-53

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, https://doi.org/10.1016/j.ijans.2021.100333

Assadian, Q., Harbarth, S., & et al. 2021. Practical recommendations for routine cleaning and disinfection procedures in healthcare institutions: a narrative review. Journal of Hospital Infection. 113, 104-114

Assen, S., Wubshet, M., Kifle, M. et al. 2020. Magnitude and associated factors of needle stick and sharps injuries among health care workers in Dessie City Hospitals, north east Ethiopia. BMC Nurs 19, 31. https://doi.org/10.1186/s12912-020-00422-0

Awodele, O., Adewoye, A.A. & Oparah, A.C. 2016. Assessment of medical waste management in seven hospitals in Lagos, Nigeria. BMC Public Health 16, 269. https://doi.org/10.1186/s12889-016-2916-1

Benfer, E. A., & Gold, A. E. 2017. There's no place like home: Reshaping community interventions and policies to eliminate environmental hazards and improve population health for low‐income and minority communities. Harvard Law Policy Rev, 11, S1‐52

Beyamo, A., Dodicho, T., and Facha, W. 2019. Compliance with standard precautionpractices and associated factors among health care workers in Dawuro Zone, South West Ethiopia, cross sectional study. BMC Health Services Research, 19, 381

Bhamra, N., Gupta, K., Lee, J., Al-Hity, S., Jolly, K., & Darr, A. 2021. Personal protective equipment: knowledge of the guidance. British Journal of Nursing, 30(1), 16–22.

Bouza, E., Alonso, S., & et al. 2019. Information on nosocomial infections in the mainstream media: an opinion document. Rev Esp Quimioter, 32(2), 165-177

Brown, L., Munro, J., Rogers, S. 2019. Use of personal protective equipment in nursing practice. Nursing Standard. doi: 10.7748/ns.2019.e11260

Calikoglu, E. O., Bedir, B., Akcay, H. B., & Gumus, A. 2019. Needlestick and sharps injuries among the nurse at Ataturk university research hospital and their Practices after injury. The European Research Journal, 5(1):128-133

Calisher, C.H. 2021. Pathogen-Reservoir Interactions: What We Do Not Know Likely Will Hurt Us. Viruses, 13, 195. https://doi.org/10.3390/v13020195Charles H. Calisher

Canton City Public Health Nursing. 2019. Use of Needleshark NS-950. 1-15. http://www.cantonhealth.org/pdf/200-019-P%20Needleshark%20NS-950%20Use.pdf

Carrico, R. M., Garrett, H., Balcom, D., & Glowicz, J. B. 2018. Infection Prevention and Control Core Practices: A Roadmap for Nursing Practice. Nursing, 48(8), 28–29. https://doi.org/10.1097/01.NURSE.0000544318.36012.b2

Casadevall, A., & Pirofski, L. A. 2018. What Is a Host? Attributes of Individual Susceptibility. Infection and immunity, 86(2), e00636-17. https://doi.org/10.1128/IAI.00636-17

Center of diseases control and prevention. 2021. Respiratory Hygiene/Cough Etiquette. https://www.cdc.gov/oralhealth/infectioncontrol/faqs/respiratory-hygiene.html

Chilaka, V. N., Hassan, R., Konje, J. C. 2020. Post-exposure prophylaxis for Blood-Borne Viral (BBV) Infections. European Journal of Obstetrics & Gynecology and Reproductive Biology, 255, 83-91

Chughtai, A. A., MacIntyre, R., Zheng, Y., & et al. 2015. Examining the policies and guidelines around the use of masks and respirators by healthcare workers in China, Pakistan and Vietnam. J Infect Prev. 16(2), 68–74

Dabhade, S.A., Tiwari, S., Chattar, K. B, Dabhade, S.S. 2017. A Survey of Knowledge of Antiseptic and Disinfectant Use in Staff Nurses in A Tertiary Care Hospital. JMSCR. 05(03), 19267-19273

Dash, K., Das, M., &Satapath, N. K. 2021. Assessment of Knowledge, Attitude, and Practices about Biomedical Waste Management among Nursing Professionals in a Tertiary Care Hospital, Bhubaneswar, Odisha. European Journal of Molecular & Clinical Medicine, 8(3), 1-16.

Dash, K., Das, M., Satapathy, N. K. 2021. Assessment of Knowledge, Attitude, andPractices about Biomedical Waste Management among Nursing Professionals in a Tertiary Care Hospital, Bhubaneswar, Odisha. European Journal of Molecular & Clinical Medicine, 8(3), 1127-1142

Deepika, R., Preejitha, V. B. and Brundha, M. P. 2020. Knowledge and awareness of blood/body fluid spill management among the third year dental students", Drug Invention Today, 14(2). Available at: http://search.ebscohost.com/login.aspx?direct=true&profile=ehost&scope=site&authtype=crawler&jrnl=09757619&AN=142963146&h=AKh9Ipvsv%2B0XvtxodC2meJYzZ2hNAeTrwREsSKLRfXoY9r4JxqN%2Fw%2BB1bW8JtKVnJRNNOXrLceV2vPmGpV49pw%3D%3D&c

Deol, R., Kaur, S., & Singh, D. 2016. Effect of Knowledge on The Attitude and Practice of Hand Washing Techniques Among Staff Nurses Working In Pediatric Units of Selected Tertiary Hospital, Punjab. Int. J. Adv. Res. 4(11), 2032-2036

Effatpanah, M., Effatpanah, H., & et al. 2020. The prevalence of nosocomial infection rates and needle sticks injuries at a teaching hospital, during 2013–2014. Clinical Epidemiology and Global Health, 8(3), 785-790

Eion, O. 2017. Breaking the Chain of Infection in the Laboratory. Canadian Journal of Medical Laboratory Science, 79(3):14-15.

Esmail, R. E., Taha, N. M., & Hafez, G. E. 2019. Factors Influencing Nurses ' Compliance with Standard Precautions Regarding Occupational Exposures to Blood and Body Fluids. Zagazig Nursing Journal. 15(2), 118-136

Government of South Australia. 2020. Personal Protective Equipment (PPE) Selection Policy Guideline. Ver. 3. https://www.sahealth.sa.gov.au/wps/wcm/connect/8776f5804a4632a38e90cfb0cfc4074a/PPE+Selection+Policy+Guideline_final.pdf?MOD=AJPERES&CACHEID=ROOTWORKSPACE-8776f5804a4632a38e90cfb0cfc4074a-nKPt6mW

Hammerschmidt, J., Manser, T. 2019. Nurses' knowledge, behaviour and compliance concerning hand hygiene in nursing homes: a cross-sectional mixed-methods study. BMC Health Serv Res 19, 547 2019. https://doi.org/10.1186/s12913-019-4347-z

Honarbakhsh, M., Jahangiri, M., & Ghaem, H. 2018. Knowledge, perceptions and practices of healthcare workers regarding the use of respiratory protection equipment at Iran hospitals. Journal of infection prevention, 19(1), 29–36. https://doi.org/10.1177/1757177417724880

Juergensmeyer, M., and Adetunji, S. A. 2021. Safety in Chemical and Biomedical Laboratories: Guidelines for the Use of Head Covers by Female Muslim Scientists. Applied Biosafety.ahead of print. http://doi.org/10.1089/apb.2021.0015

Kassim, Z. A., Al-Mulaabed, S. W., Younis, S. W., & Abutiheen, A. A. 2020. Infection prevention and control measures for COVID-19 among medical staff in Nineveh Governorate, Iraq. J Contemp Med Sci. 6(4), 150-155

Lawal, T.O., Monsudi, K. F., Zubayr, B. M., & et al. 2018. Hand hygiene practices among nurses in health facility in a semi-urban setting. Int J Health Allied Sci,7, 191-5

Lindberg, M., Skytt, B., & Lindberg, M. 2019. Continued wearing of gloves: a risk behaviour in patient care. Infection Prevention in Practice, 2(4), https://doi.org/10.1016/j.infpip.2020.100091

MacNeill, B. A., & Terezhalmy, G. T. 2021. Introduction to Infection Prevention Modes of Transmission. Dental care. https://www.dentalcare.com/en-us/professional-education/ce-courses/ce582/modes-of-transmission

Magill, S. S., O'Leary, E., Janelle, S. J., Thompson, D. L., Dumyati, G., Nadle, J., Wilson, L. E., Kainer, M. A., Lynfield, R., Greissman, S., Ray, S. M., Beldavs, Z., Gross, C., Bamberg, W., Sievers, M., Concannon, C., Buhr, N., Warnke, L., Maloney, M., Ocampo, V., … Emerging Infections Program Hospital Prevalence Survey Team (2018). Changes in Prevalence of Health Care-Associated Infections in U.S. Hospitals. The New England journal of medicine, 379(18), 1732–1744. https://doi.org/10.1056/NEJMoa1801550

Maristela, T. A., Jemarjo Coleen R. Alano, J. C. R., & et al. 2019. Awareness and Practice of Standard Precaution for Infection Control among Student Nurses. Abstract Proceedings International Scholars Conference, 7(1), 417-133

McQuerry, M., Easter, E., Cao, A. 2021. Disposable versus reusable medical gowns: A performance comparison. American Journal of Infection Control 49(2021), 563−570

Mohaithef, M. 2020. Assessing Hand Hygiene Practices Among Nurses in the Kingdom of Saudi Arabia. The Open Public Health Journal, 13, 220-226

Mohapatra, S. 2017. Sterilization and Disinfection. Essentials of Neuroanesthesia. 2017, 929–944.

Mohd-Nor, N., & Bit-Lian, Y. 2019. Knowledge, Attitude and Practices of Standard Precaution among Nurses in Middle-East Hospital. SciMedicine Journal,1(4), 189-198.

Mothiba, T., & Maputle, S. 2015. Knowledge and Practices of Infection Control Interventions amongst Hospital Cleaners at Health Care Units of Capricorn District, Limpopo Province. J Hum Ecol, 51(1), 25-32

Murray J, Agreiter I, Orlando L, et al. 2018. The European Blood and Marrow Transplantation Textbook for Nurses: Under the Auspices of EBMT [Internet]. Cham (CH): Springer; 2018., https://www.ncbi.nlm.nih.gov/books/NBK543675/table/ch7.Tab2/ doi: 10.1007/978-3-319-50026-3_7

Musa, F., Mohamed, A., & Selim, N. 2020. Assessment of Nurses' Practice and Potential Barriers Regarding the Medical Waste Management at Hamad Medical Corporation in Qatar: A Cross Sectional Study. Cureus, 12(5), e8281. https://doi.org/10.7759/cureus.8281

Nagpal, B., Nagpal, J., Nagpal, J., Garg, A., Garg, A., & Nagpal, A. 2019. Biomedical Waste Management : A Review. 1-4. https://www.researchgate.net/publication/332859914_Biomedical_Waste_Management_A_Review

Nguyen, L. H., Drew, D. A., & et al. 2020. Risk of COVID-19 among front-line health-care workers and the general community: a prospective cohort study. The Lancet, 5(9), 475-483

Olaifa, A., Govender, R. D., & Ross, A. J. 2018. Knowledge, attitudes and practices of healthcare workers about health care waste management at a district hospital in KwaZulu-Natal. South African Family Practice, 60(5),137-145.

Olaniyi, F. C., Ogola, J. S., & Tshitangano, T. G. 2021 Challenges of effective management of medical waste in low-resource settings: perception of healthcare workers in Vhembe district healthcare facilities, South Africa, Transactions of the Royal Society of South Africa, 7(1), 81-88, DOI: 10.1080/0035919X.2021.1900949

Oyefabi, A, & Yahuza, B. S. 2016. Ethical issues in knowledge, perceptions, and exposure to hospital hazards by patient relatives in a tertiary institution in North Western Nigeria. Niger J Clin Pract, 19, 622‑31

Pandey, S., Poudel, S., Gaire, A., Poudel, R., Subedi, P., Gurung, J., & et al. 2021 Knowledge, attitude and reported practice regarding donning and doffing of personal protective equipment among frontline healthcare workers against COVID-19 in Nepal: A cross-sectional study. PLOS Glob Public Health 1(11), e0000066. https://doi.org/10.1371/journal.pgph.0000066

Paniyadi, N. K., Shetty, A. P., Minj, A., Varghese, E. J., & Laxmi, K. R. 2019. Knowledge and practice among housekeeping staff on methods of bio-medical waste (BMW) management. Manipal Journal of Nursing and Health Sciences, 5(1), 16-20.

Paul, E., Alzaydani Asiri, I.A., Al-Hakami, A. et al. 2020. Healthcare workers' perspectives on healthcare-associated infections and infection control practices: a video-reflexive ethnography study in the Asir region of Saudi Arabia. Antimicrob Resist Infect Control 9, 110. https://doi.org/10.1186/s13756-020-00756-z

Preece, D. 2021. The Assessment of Medical Gloves for In-Situ Applications. The University of Sheffield. Doctorate dissertation. 1-344. https://etheses.whiterose.ac.uk/29023/1/Daniel%20Preece%20Thesis%20-160260708%20-%20Corrected%20MS%20070621.pdf

Pyrek, K. M. 2018. Environmental Cleaning: A Round-Up of Reports from the Medical Literature. Infection Control Today. https://www.infectioncontroltoday.com/environmental-hygiene/environmental-cleaning-round-reports-medical-literature

Quinn, M. M., Henneberger, P. K., & et al. 2015. Cleaning and disinfecting environmental surfaces in health care: Toward an integrated framework for infection and occupational illness prevention. American Journal of Infection Control 43, 424-34

Ronak, N.H. 2016. Knowledge about infection control measures among nurses at Hawler Teaching Hospital in Erbil city. Zanco J. Med. Sci. 20(2), 1-8

Saadeh, R., Khairallah, K., Abozeid, H., Al Rashdan, L., Alfaqih, M., & Alkhatatbeh, O. 2020. Needle Stick and Sharp Injuries Among Healthcare Workers: A retrospective six-year study. Sultan Qaboos University medical journal, 20(1), e54–e62. https://doi.org/10.18295/squmj.2020.20.01.008

Salama OE, Elweshahi HMT, Abd EL Raheem AMG. 2017. Knowledge, attitudes and compliance with hand hygiene practices among health care workers in Alexandria main university hospital. JHIPH.47(2),39-47.

Seladi-Schulman, J. 2019. What You Need to Know About Pathogens and the Spread of Disease. Health line. https://www.healthline.com/health/what-is-a-pathogen

Shamnani, G., Verma, D. K., Bhartiy, S. S. 2018. Knowledge, awareness, attitude, and practice regarding biomedical waste management among health care workers in tertiary care setting. International Journal of Medical Science and Public Health, 7(8), 611-615

Sikora, A, Zahra, F. 2021. Nosocomial Infections. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK559312/

Sobh, D. R., Fakhry, S. F., & Mohamed, H. A. 2018. Knowledge And Practice Of Staff Nurses Related To Health Care Waste Management. Port Said Scientific Journal of Nursing. 5(2), 1-4

Song, X., Vossebein, L., & Zillecorresponding, A. 2019. Efficacy of disinfectant-impregnated wipes used for surface disinfection in hospitals: a review. Antimicrob Resist Infect Control. 8, 139

Sunil, M. P., Kavitha, S., Preetha, S., Vishnupriya, V., Gayath, R. 2021. Awareness And Knowledge On Blood/Body Fluid Spill Management Among Medical Students - A Survey. Turkish Journal of Physiotherapy and Rehabilitation, 32(3), 7742-7752

Tyshenko, M. g. 2015. Chain of Infection. University of Ottawa. https://www.researchgate.net/publication/310510509_Chain_of_Infection

Ugochukwu, C. G., & Onyejinaka, N. P. 2019. Knowledge and use of Personal Protective Equipment Among Nurses in Teaching Hospital Wards, Enugu, Nigeria. 1-19. https://sigma.nursingrepository.org/bitstream/handle/10755/18122/Ugochukwu_97977_PST444.pdf?sequence=1

UNICEF. 2020. COVID-19 Emergency Response WASH and Infection Prevention and Control (IPC) in Health care facilities (HCF) Guidance Note.

https://www.humanitarianresponse.info/sites/www.humanitarianresponse.info/files/documents/files/unicef-covid-19_and_wash_in_health.pdf

van Seventer, J. M., & Hochberg, N. S. 2017. Principles of Infectious Diseases: Transmission, Diagnosis, Prevention, and Control. International Encyclopedia of Public Health. 2017, 22–39.

Voidazan, S., Albu, S., & et al. 2020. Healthcare Associated Infections—A New Pathology in Medical Practice? Int. J. Environ. Res. Public Health, 17, 760

Watts, E., Leck, A., & Hu, V. 2020. Personal protective equipment for COVID-19 in eye care. Comm Eye Health. 33(109), 28-33.

Wigglesworth, N. 2019. Infection control 5: equipment for facial and respiratory protection. Nursing Times; 10, 30-32

Wong, E. L., Ho, K. F., Dong, D., & et al. 2021. Compliance with Standard Precautions and Its Relationship with Views on Infection Control and Prevention Policy among Healthcare Workers during COVID-19 Pandemic. Int. J. Environ. Res. Public Health, 18, 3420. https://doi.org/10.3390/ijerph18073420

World Health Organization. 2018. Health-care waste. https://www.who.int/news-room/fact-sheets/detail/health-care-waste

World Health Organization. Regional Office for Europe. 2021. Aide-memoire: personal protective equipment. In: Infection prevention and control: guidance to action tools. World Health Organization. Regional Office for Europe. https://apps.who.int/iris/handle/10665/341417. License: CC BY-NC-SA 3.0 IGO

Yeon, J. H., & Shin, Y. S. 2020. Effects of Education on the Use of Personal Protective Equipment for Reduction of Contamination: A Randomized Trial. SAGE Open Nursing 6, 1–10

**APPENDICES**

**APPENDIX 1. Questionnaire**

**Appendix 2. Ethical approval from Çankırı karatekin Üniversitesisi**

**APPENDIX 3. Ethical approval from Iraq**

**APPENDIX 4. English proofreading**

**Appendix 1. Questionnaire**

**EK1**
**Part one: demographic data**

1. Gender :
- Male
- Female
2. Age (year)
- 20-29 years
- 30-39 years
- 40-49 years
3. Level of education:
- Secondary school graduate
- Nursing diploma
- Nursing bachelor
- Higher education
4. Marital status:
- Single
- Married
5. Total hours of clinical exposure……..
6. Years of service:…….

**Part two: Compliance with Standard Precautions**

| Items | Never | Seldom | Sometimes | Always |
|---|---|---|---|---|
| 1. I wash my hands between patient contacts | | | | |
| 2. I only use water for hand washing | | | | |
| 3. I use alcohol hand rubs as an alternative if my hands are not visibly soiled | | | | |
| 4. I recap used needles after giving an injection | | | | |
| 5. I put used sharp articles into sharps boxes | | | | |
| 6. The sharps box is only disposed when it is full | | | | |
| 7. I remove PPE in a designated area | | | | |
| 8. I take a shower in case of extensive splashing even after I have put on PPE | | | | |
| 9. I cover my wound(s) or lesion(s) with waterproof dressing before patient contacts | | | | |

| | | | | |
|---|---|---|---|---|
| 10. I wear gloves when I am exposed to body fluids, blood products, and any excretion of patients | | | | |
| 11. I change gloves between each patient contact | | | | |
| 12. I decontaminate my hands immediately after removal of gloves | | | | |
| 13. I wear a surgical mask alone or in combination with goggles, face shield, and apron whenever there is a possibility of a splash or splatter | | | | |
| 14. My mouth and nose are covered when I wear a mask | | | | |
| 15. I reuse mask or disposable PPE | | | | |
| 16. I wear a gown or apron when exposed to blood, body fluids, or any patient excretions | | | | |
| 17. Waste contaminated with blood, body fluids, secretion, and excretion are placed in red plastic bags irrespective of patient's infective status | | | | |
| 18. I decontaminate surfaces and equipment after use | | | | |
| 19. I wear gloves to decontaminate used equipment with visible soils | | | | |
| 20. I clean up spillage of blood or other body fluid immediately with disinfectants | | | | |

**Appendix 2. Ethical approval from Çankırı karatekin Üniversitesisi**

**Appendix 3. Ethical approval from Iraq**

## Appendix 4. English proofreading

**CURRICULUM VITAE**

**Personal Information**

Name and Surname : MOHAMMED AMER MOUSA MOUSA

**Education**

| | |
|---|---|
| MSc | Çankırı Karatekin University<br>Graduate School of Health Sciences 2020-Present<br>Department of Nursing |
| Undergraduate | University of Babylon,<br>College Of Nursing<br>2011-2016 |

**Work Experience**

| **Year** | **Institution** |
|---|---|
| 2017-2018 | Cardiac care unit |
| 2018-2020 | Continuing Education |

**Academic Activities**

1. Participation with the Red Crescent in Iraq
2. Participate and give a medical waste isolation course