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Graduate School of Health
Sciences



Master of Science Thesis

**ASSESSMENT OF INFECTION CONTROL PRACTICE FOR
HEALTH CARE PROVIDERS WORKING IN EMERGENCY
UNITS IN AL HILLA CITY HOSPITALS**

BY

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Advisor
Asst. Prof. Dr. Songül ŞAHİN

Çankırı 2022

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**The Institute of Health Sciences
The Department of Nursing**

The Degree of Master of Science

**SUPERVISOR
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ETHICS STATEMENT

The thesis entitled “Assessment Of Infection Control Practice For Health Care Providers Working In Emergency Units In Al Hilla 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 my supervisor and 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.

October

Naji Yahya Naji AL SHUKUR

ABSTRACT

ASSESSMENT OF INFECTION CONTROL PRACTICE FOR HEALTH CARE PROVIDERS WORKING IN EMERGENCY UNITS IN AL HILLA CITY HOSPITALS

Naji Yahya Naji AL SHUKUR

Master of Science in Nursing

Advisor: Asst. Prof. Dr. Songül ŞAHİN

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In this study Infection acquired during the course of treatment and not apparent at the time of enrollment to a hospital or other health care institution. The risk of healthcare-associated illness is believed to from 2 to 20 times greater in poor nations than in developed ones, with 5 percent to 10 percent of patients hospitalized in developed countries contracting these diseases. the study aimed to assess healthcare providers' practices about infection control. The study used A cross-sectional descriptive design. There are 170 nurses working in emergency units in Al-Hilla city hospitals in Iraq. A convenience sample is a method of selecting a sample. The outcome demonstrates that nurses have made an effort to get high scores across all practice domains, (9.64%) for handwashing, (3.69%) for hand antisepsis, (16.02%) for isolation precaution, (5.84%) for masks, (12.88%) for medication, (12.78%) for intervention medication, (8.85%) for sharp disposal, (10.13%) for spillage, (34.55%) for indwelling urinary catheter, (9.04%) for transporting the patient to another department, (20.16%) for wound site care, (8.56%) for collection of specimen, (13.75%) for bed making, (29.70%) for suction, (7.76%) for maintenance of suction equipment, and finally (203.4%) for overall practice score for infection control. There is no statistically significant relationship between nurses' infection control practices and their demographics. The study finding concluded that most nurses have poor infection control practices. Also, they had poor handwashing and hand antisepsis management. Follow up on nurses' practice and identify the weak points in their practice regarding infection control and nosocomial infection. Nurses require additional training programs and educational institutions to concentrate more on standard precautions in order to increase their understanding and adherence to infection-control safe practices

2022, 85 pages

Keywords: Assessment, Infection control, Health care providers, Emergency units.

ÖZET

AL HİLLA ŞEHİR HASTANELERİNDE ACİL SERVİSLERDE GÖREV YAPAN SAĞLIK ÇALIŞANLARI İÇİN ENFEKSİYON KONTROL UYGULAMASININ DEĞERLENDİRİLMESİ

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Bu çalışmada, tedavi sırasında edinilen ve bir hastaneye veya başka bir sağlık kuruluşuna başvuru sırasında belirgin olmayan enfeksiyon. Sağlık hizmetiyle ilişkili hastalık riskinin, gelişmiş ülkelerde hastaneye yatırılan hastaların yüzde 5 ile yüzde 10'unun bu hastalıkları kapmasıyla, yoksul ülkelerde gelişmiş ülkelere göre 2 ila 20 kat daha fazla olduğuna inanılıyor. Çalışma, sağlık hizmeti sunucularının enfeksiyon kontrolü konusundaki uygulamalarını değerlendirmeyi amaçladı. Çalışmada kesitsel tanımlayıcı bir tasarım kullanılmıştır. Irak'ta Al-Hilla şehir hastanelerinde acil servislere 170 hemşire görev yapmaktadır. Kolayda örneklem, örnek seçme yöntemidir. Sonuç, hemşirelerin tüm uygulama alanlarında (%9,64) el yıkama, (%3,69) el antisepsisi, (%16,02) izolasyon önlemi, (%5,84) maske, (%5,84) ve maske (%12,88) olmak üzere tüm uygulama alanlarında yüksek puanlar almak için çaba sarf ettiğini göstermektedir. % ilaç tedavisi için, (%12,78) müdahale ilacı için, (%8,85) keskin imha için, (%10,13) dökülme için, (%34,55) kalıcı idrar sondası için, (%9,04) hastayı başka bir bölüme nakletmek için, (%20,16) yara yeri bakımı, (%8,56) numune toplama, (%13,75) yatak yapma, (%29,70) aspirasyon, (%7,76) aspirasyon ekipmanının bakımı ve son olarak (%203,4) genel olarak enfeksiyon kontrolü için uygulama puanı. Hemşirelerin enfeksiyon kontrol uygulamaları ile demografik özellikleri arasında istatistiksel olarak anlamlı bir ilişki yoktur. Çalışma bulgusu, çoğu hemşirenin zayıf enfeksiyon kontrol uygulamalarına sahip olduğu sonucuna varmıştır. Ayrıca el yıkama ve el antisepsisi yönetimi zayıftı. Hemşirelerin uygulamalarını takip edin ve enfeksiyon kontrolü ve hastane enfeksiyonu ile ilgili uygulamalarında zayıf noktaları belirleyin. Hemşireler, enfeksiyon kontrolü güvenli uygulamalarına yönelik anlayışlarını ve bağlılıklarını artırmak için standart önlemlere daha fazla odaklanmak için ek eğitim programlarına ve eğitim kurumlarına ihtiyaç duyarlar.

2022, 85 sayfa

Anahtar Kelimeler: Değerlendirme, Enfeksiyon kontrolü, Sağlık hizmeti sunucuları, Acil durum birimleri.

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INDEX OF ABBREVIATIONS AND SYMBOLS

T	Time factor
t	The time it takes for the drop to reach the base
v	Particle velocity
D	The distance between the spray gun and the base
P	Dry weight
W ₁	Hardness value
W ₂	Saturated weight
W ₃	Hanging weight
Hv	Vickers hardness
f	Shed pregnancy
d _{av}	Average impact diameter adhesion adhesive force
d _{hkl}	The distance between the crystal planes
θ	Diffraction angle
β	Curve width at mid-maximum intensity
C.S	Particle size rate
λ	The wavelength of the incident X-ray

LIST OF ABBREVIATIONS

XRD	X-ray diffractometry
SEM	Scanning electron microscopy
EDS	Energy dispersive spectroscopy
HAP	Hydroxyapatite
HVOF	High-velocity oxygen fuel
HV	Hardness value
ASTM	American standards for materials testing
TIG	Tungsten inert gas
XRD	Simulation body fluid
FWHM	Full width at half maximum

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1. INTRODUCTION

Hospitals are the primary collection points for garbage. Each department generates garbage, which is often divided into three categories: health care, domestic, and administrative waste. Infectious diseases, chemicals, outdated pharmaceuticals, radioactive materials, and needles are all found in health care wastes. Avoiding injury to patients, nurses, and other healthcare personnel is critical to ensuring patient safety and providing excellent treatment, as well as reducing healthcare-related infection risks like the pandemic influenza H1N1 virus. In circumstances when the Ebola virus is present, nurses play an important role in decreasing and avoiding the spread of infectious illness by providing safe care to patients and their families (Ghafoor *et al.* 2021).

The hospital atmosphere has been proven to have a role in the transmission of healthcare-associated illnesses and multidrug-resistant bacteria. Furthermore, viruses may live on unclean surfaces for days or months, creating a continuing danger of transmission. As a result, there is a greater fortuitous that a patient may get a disease from the prior room occupied. Improved cleaning may minimize the occurrence of healthcare-associated infections and is cost-effective, but it depends on healthcare professionals to perform cleaning techniques effectively and regularly (Mitchell *et al.*, 2021). Infection acquired during the course of treatment and not exhibited at the time of hospitalization or another healthcare institution is referred to as nosocomial illness (NI), healthcare-associated infection (HCAI), or hospital-acquired infection (HAI). The risk of healthcare-associated illness is believed to be 2 to 20 times greater in poor nations than in developed ones, with 5 to 10 % of patient admitted to hospital in developed countries contracting these diseases (Fawzi *et al.* 2019).

HAIs are still the major cause of morbidity and death among hospitalized patients and health personnel. HAIs often occur within 2 days of admission to the hospital or within one month of discharge. Healthcare workers (HCWs) are at an elevated risk of getting HAIs as a result of workers exposure to blood and body fluids, direct contact with patient, or infected environment surface in the patient's environment (Asfaw 2021).

Every year, millions of hospitalized patients throughout the globe get illnesses while on admission. Infections acquired in the hospital are a significant risk to patients' health. As a result, control and prevention of infections in the hospitals have become a major problem. In less than a decade, HAIs are estimated to have caused 1.7 million illnesses and approximately 99,000 deaths, making them the 6th greatest cause of mortality in the U.s and Europe alone (Appiah *et al.* 2021).

Postoperative wound infections are the 2nd most widely reported HAI, accounting for 19.6 percent of all HAIs and resulting in 16 million additional days in the hospital, 37,000 deaths, and a 7 billion EUR annual economic impact in Europe. It is also the most common type of HAI in low- and middle-income nations (LMICs). It is the most often reported disease in Africa, with a cumulative incidence ranging from 2.5 percent to 30.9 percent (Kebede *et al.* 2021).

Close contact with patients and the healthcare staff causes HAIs. Nurses spend a lot of time with patients in all of these occupations. As a result, the nurse is at the highest risk of contracting HAIs, and they may potentially spread illness to a patient. Student nurses aren't any different. While clinical practice training, they have contact with the patient and execute a variety of operations that may come into touch with the patient's body fluids. As a result, it is vital that nursing students are not subjected to HAIs (Kim and Park 2021).

Every year, around 4 million individuals in Europe contract an HCAI, with 37,000 of them dying. According to the European Center for Disease Prevention and Control, surveillance systems and prevention and hygiene control programs can protect approximately 30percent of HCAIs by 2020, making them an irrefutable preventative health content in health care institutions for their various professional, as well as learning resources required for all health care professional (Macho *et al.* 2021).

Due to the recap of a needles and sharps injuries, healthcare personnel were exposed to blood-borne infection like HIV, hepatitis B, and C. WHO resented statistics in 2002 showing that occupational exposure causes 2.5 percent of HIV infections and 40 percent

of Hepatitis B and C incidence among healthcare professionals globally (Salem 2019).

Surgical site infections (SSI) accounted for 20 percent of all HAIs in hospitalized patients, and each SSI is linked to an extra 7–11 days in the hospital after surgery. Furthermore, compared to operational patients without SSI, patients with SSI had a 2–11 times greater risk of mortality, and 77 percent of fatalities in patients with SSI are directly linked to the infection (Mengesha *et al.* 2020).

Infection control and prevention (ICP) is a scientific approach and a practical solution for decreasing infections-related harms to patient and health care workers. Because it is a major device for decreasing infection transmission in the hospital context, ICP is an essential component of any well-functioning health system. This requires a fundamental understanding of disease epidemiology, as well as predisposing or risk factors that increase susceptibility to infection (Olorunfemi *et al.*, 2020). In order to decrease patient mortality and morbidity, infection control practices are critical in the hospital context. One out of every twenty hospitalized patients is projected to get a healthcare-associated infection. HAI prevention has lately been a worldwide concern, resulting in the development of infections control and prevention practices (Das *et al.* 2020).

Infection prevention is a technique of putting a barrier between a vulnerable host and germs, and it's a big part of delivering safe and high-quality services at the facility level. As a result, HAI-related morbidity and death may be avoided by using infectious-prevention strategies such as adequate handwashing. The main stages in infections prevention included using appropriate procedures such as safety injections, isolation precautions (droplet, contact, and airborne precaution), patients bathing, immunizations, antibiotic stewardship, environmental cleanup, disinfection, and sterilization, as well as a holistic unit-based safety program and surveillance (Desta *et al.* 2018).

Nurses are the key to overcoming infection control difficulties, as they constitute a force of talents that may shape and enhance patient outcomes. Because they work on the front lines of health care, they may be subjected to a microorganism that can cause dangerous illnesses on a daily basis, and they may pass these microorganisms from one patient to

the next. Nurses can play a critical role in limiting HCAs by following standard practice guidelines, which include simple but cost-effective intervention strategies like maintaining handwashing, wearing personal protective equipment (PPE), taking aseptic precautionary measures, managing needles carefully, and proper disposal of wastes (Ara *et al.* 2019).

In the case of HCAs, education must follow the recommendations on key components of IPC, which are based on priority themes such as methods and instruments for assessment, among many others. Because this is a highly particular and broad scientific field in which theoretical knowledge is a tool for supporting clinical decision-making, learning techniques are critical in this educational setting, allowing students to gain and improve skills during their educational journey (WHO 2020).

A collection of procedures for infection control activities is known as standard precautions. This collection of procedures is used to prevent infections from being transmitted via non-intact skin and mucous membrane, as well as blood and bodily fluid. So, if the client or equipment does not seem to be contagious, infection control protocols must be followed while giving treatment to each person (Jael *et al.* 2019). Lazier, 80 percent of health professionals did not realize about PPE and appropriate use of PPE it's very essential to provide comprehensive information about utilization, health care workers satisfactions, time deficit, laziness, skin problem, allergies and some irritant antiseptic cause the spread of infection. The majority of nurses had inadequate handwashing procedures before and after attending to the patient as part of the infection control technique. Handwashing is the most cost-effective way to prevent illness from spreading from one patient to another. Gloves are also the easiest and most effective means of preventing the spread of infectious illnesses and other infections from the patient to the healthcare provider (Ghafoor *et al.* 2021).

For several year, hand hygiene was used in the medical field to avoid infections that are related to patient care, cross-infections, and the development of resistance to antibiotics. Nightingale (1860) advised nurses to wash their faces and hands frequently during the day, suggesting a long-standing appreciation of the need for handwashing. Compliance

with hand hygiene has increased in recent years, owing to positive role models and social pressure, as well as more research into the technique's usefulness (Hillier 2020)

1.1. Importance of the study

Infection control is an important aspect of healthcare. Although evidence-based recommendations have been produced to stop the spread of HCAs, certain behavior seen in daily infection prevention practice is still unknown. Investigating such behavior may provide useful information for future efforts targeted at improving practice and guaranteeing patient safety (Gould 2015).

For over 170 years, hospitals in developed countries had also studied and evaluated a variety of method for staff motivations, including “on-the-job training, distributed leaflets, seminars and lectures, provision of necessary equipment and personal protective equipment, as well as hospital epidemiological surveillance and control”. Nursing motivations is influenced by psychological factor like attitude, habit, stress, and tolerance (Plates and Miller 2018).

Major public health challenges include antibiotic resistance and healthcare-associated disorders. As resistance organisms emerge and antimicrobial medications become less effective, infections preventions and control are crucial parts of maintaining public health, particularly among susceptible patient groups like the elderly and young children. As healthcare treatment and intervention get more intricate, patients are becoming increasingly exposed to healthcare-associated disorders and resistant organisms (Burnett 2018).

Among other dangers at the hospitals, nurse are exposed to blood-borne diseases including Aids and hepatitis B and C virus (HBV and HCV) infections via sharp injuries and contact with contaminated fluid. Because nurses have the greatest interaction with patients, knowing their knowledge, attitudes, and practice patterns is a top responsibility of all nurses and healthcare workers (Ronak 2016).

Although the rate of nosocomial infection varies by nation, at any one moment, almost seven out of every hundred patients admitted to hospitals in industrialized countries and ten out of every hundred patients in poor countries get at least one kind of nosocomial infection. Despite the lack of information on NIs in Yemen, the prevalence rate of NIs, particularly surgical site infection, is significant on occasion, contributing to 8 percent in 2002 and 34 percent in 2013 (Alrubaiee *et al.* 2017).

HCWs who sustain needlestick injuries (NSI) run the risk of contracting 20 bloodborne infections, including HIV, HCV and HBV, via their profession. Any cutaneous damage caused by a needles or other sharpened device which has come into touch with blood, tissues, or even other biological fluid before the contact is referred to as a non-sterile injuries. In the United States, the CDC estimates that 600,000–1,000,000 NSIs happen each year (Joukar *et al.* 2018).

The annual sharp accident rate was 3.2/100 occupied beds, according to a survey done at 52 Saudi Arabian Ministry of Health Institutions in 2012. Nurses were the group most affected by NSIs, wards were the most common site of NSIs, disposal syringes have been the most frequent cause of harm, and the number of injuries happened while using devices (Alfulayw *et al.* 2021).

As per to the CDC, 600,000 to 800,000 instances of NSIs occur each year among HCWs in the United States. Nurses, specialties surgery and anesthesia, residents, midwives, operating room technicians, nursing aides, and employees have very high rates of NSIs, whereas physicians, radiology, and pediatrics have comparatively low rates. According to new research issued by the WHO, NSIs were to blame. 66,000 HBV, 16,000 hepatitis C, and 1000 HIV cases were reported (Effatpanah *et al.* 2020).

Every year, at least 190 million individuals are admitted to hospitals throughout the globe, with 9 million of them contracting HAIs. The prevalence of nosocomial infections is determined by the health system's degree of development. As a result, the prevalence of NI in France and the United States is believed to be between 6 and 7 percent and 3 and 5 percent, respectively. This frequency approaches 25 percent of

hospitalized patients in Africa. The prevalence rate in Cameroon is 20.74 percent (Nouetchognou *et al.* 2016).

Urinary tract infections were reported to have the largest proportion of nosocomial infection (N.I) types of descriptive research done in Iraq, with 21 (40 percent), surgical site infection 19 (35.8 percent), and respiratory tract infections 12 (12 percent) (Al-Kharkhi *et al.* 2016).

According to various research in Ethiopia, HAIs among patients rose by more than twofold from 5.7 percent in 2009 to 19.41 percent in 2018, potentially putting HCWs at risk. The research also found that HCWs had a high incidence of both lifelong (28.8 percent) and one-year (20.2 percent) HAI exposure, indicating that both patients and healthcare professionals should be concerned (Bayleyegn *et al.* 2021).

In hospitals and care facilities, nurses are largely responsible for conducting daily patient care tasks that need more interaction with patients than other health care staff (HCWs). As a result, the nurse is more likely to be exposed to diverse NIs and play an important role in NI transmission. As a result, infection control procedures must be followed by nursing personnel in order to prevent and control NIs. Nursing adherence to infection prevention, on the other hand, needs a sufficient degree of expertise in order for them to implement suitable prevention strategies in the clinical situation (Alrubaiee *et al.* 2021).

Nurses attempt to prevent and control illnesses despite a lack of information about infection control practices. This has resulted in the patient's long stay in the hospitals, functional handicap or lower life quality, high antibiotic resistance, mental stress, increased financial expenditures for both the patients and family members, and ultimately, avoidable deaths (Moses 2017).

“By properly sterilizing the skin, changing infusion sets, avoiding accidental needlestick, wearing protective clothing and masks, using prudential measures,

following standard precautions, isolating patients, maintaining hand hygiene, and avoiding infected respiratory disposal”, nurses can inhibit transmission of infection within and between patients in the hospital (Das *et al.* 2020).

1.2. Problem statement

Nosocomial infections have long been recognized as an issue that degrades health care quality and is a major cause of negative health care outcomes. These infections have been shown in the studies to have a major impact on patient safety. Longer hospital stays, increased health care costs, financial hardship for patients and family members, and even death are just a few of the many negative outcomes (Fashafsheh *et al.* 2015)

Nurses' appropriate knowledge and practice contribute significantly to a lower incidence of HAIs among hospitalized patients and HCWs. It's crucial to look at the influence of nurses' knowledge and behaviors on the level of infection control. In every healthcare environment, determining adherence to infection control procedures is critical. One of the most significant duties of any site where health care service is provided must be to update and enhance preventative measures on a regular basis.

1.3. Objectives of the study

1. Assessment of health care providers' practices regarding infection control.
2. To identify the demographic characteristics of the studied population.
3. To find out relationships between the practices of the health care providers and their demographic characteristics and employment characteristics

1.4. Research questions

1. What are the health care providers' practices regarding infection control?
2. What are the demographic characteristics of the studied population?
3. Are there relationships between the practices of the health care providers and their

demographic characteristics and employment characteristics?

1.5. Hypothesis

1.5.1. Null hypothesis

Health care providers have good practices regarding infection control at emergency units.

1.5.2. Researcher's hypothesis

Health care providers' poor level of practices regarding infection control at emergency units.

2. LITERATURE REVIEW

2.1. Overview of infection

Health professionals are part of communities, and therefore, they can play a major role in illness transmission between healthcare setting and the general public, as well as the beginning or magnifying epidemics in places like hospitals and lengthy care institutions (Abbas *et al.* 2021).

Protective measures are the most basic level of IPC measures that must be applied at all times in the treatment of all patients. They attempt to decrease the risk of spreading Bloodborne and other infections from identified and unrecognized sources. Hands and respiratory hygiene, the use of suitable PPE based on risk assessment, environment, cleanliness, proper waste disposal, injection safety, and disinfection of medical instruments are all examples of prevention strategies (WHO 2018).

CDC has issued standard precautions (SPs) that apply to all places and situations when healthcare staff comes into contact with patients. It's an important part of healthcare-associated infection management since it's the first line of defense against the transmission of Bloodborne and other diseases. Hand hygiene, adequate use of PPE, proper use and removal of injection sharps, environmental contamination and equipment, patient positioning, and textile and waste management are among the other components (Nhsn 2019).

People with infectious illnesses such as TB, MERS, hepatitis A, and COVID-19 are treated in an emergency room, which is a complicated and dynamic health care setting (Choi 2020).

Because 70 percent of nursing interventions increase the probability of exposure to blood or other body fluid, it has a higher rate of infection than patients' rooms or ICUs (Eileen *et al.*, 2018). This puts the safety of health care professionals and patients at

risk. As a result, EDs are the first line of defense against not just hospital-acquired infection but also community-acquired illnesses. As a result, infection prevention and control must be strong and methodical (Choi 2020).

2.2. Hospital acquired infection

Whenever a patient is hospitalised, HAIs, which are nosocomially acquired infections, are not yet manifest or incubating. Amongst ailments that might develop are catheter-associated urethritis, central line-associated bloodstream infections, hospital-acquired pneumonia, wound infection, ventilator-associated pneumonia, and *Clostridium difficile* infections. Infection symptoms include a persistent cough, wheezing, chest pain, nausea, rebound soreness, altered mental status, incontinence, urethral stricture pain, palpitation, polyuria, and costovertebral angle ache. This practice discusses the roles of the interprofessional team in enhancing patient care with hospital-acquired infections and describes the assessment and treatment of these infections (Monegro *et al.* 2021).

HAIs are nosocomially acquired infection that are frequently absent or in the early stages of development at the time of enrolment. These infection often start after a stay in the hospital and start showing up 2 days later. “The National Healthcare Safety Network (NHSN)” of the CDC is keeping a careful eye on the illnesses (Boev *et al.* 2017).

A hospital-acquired infection, often known as a nosocomial infection, is one that occurs in a healthcare setting. Sometimes it's referred to as HCAs. HCAs may occur in any healthcare setting. The major causes of HCAs include fungal, bacterial, and viral factors. Pathogen, dirty instruments, towels, and air droplets are all transmitted by HCWs. HCAs may be acquired via the outside polluted environment, another sick patient, or infected employees (CDC 2018).

Hospital-acquired illnesses had already caused hospital to feel uneasy for years. To lower the prevalence of hospital acquired infections, some hospital have implemented infection detection and surveillance systems as well as effective prevention techniques. (Habboush *et al.* 2021).

The criteria for Pneumonia were revised to better identify people at risk for multidrug-resistant (MDR) infections, according to the “Infectious Disease Society of America (IDSA) and the American Thoracic Society (ATS)” recommendations. This, in turn, is intended to prevent antibiotic misuse. The formerly frequently used HCAP test has been discontinued. HCAP has been superseded by HAP (Hospital-acquired Pneumonia). Hospital-acquired Pneumonia is described as pneumonia that arises two days or more following hospitalization, according to IDSA standards (Kalil *et al.* 2016).

Furthermore, healthcare facilities must follow key WHO-recommended IPC measures, such as respiratory etiquette and handwashing best practices, touch, droplet, and airborne safeguards, appropriate environmental disinfecting, proper ventilation, and patient isolation services; and, where feasible, preserving a physical range of at least 1 meter (raising it when feasible) between all people in healthcare facilities, particularly in urban areas (WHO 2021).

2.3. The burdens of infections

In terms of morbidity and mortality, and expenditures, healthcare-associated infection is a serious public health issue. The majority of the illnesses might have been avoided. To limit the effect of these preventable diseases, it's crucial to understand the relevant risk factors (Tolera *et al.* 2020).

In 2017, almost 2.5 million babies died during the first 28 days of their lives throughout the world, many of them from avoidable causes like bacterial infection (WHO 2019).

The great majority of newborn fatalities occur in low- and middle-income countries (LMICs), where the neonatal mortality rate is 10–15 times that of high-income nations ("Global Burden of Disease and 2015 Child Mortality Collaborators, 2016 Global Burden of Disease and 2015 Child Mortality Collaborators, 2016"). Infections, such as sepsis and pneumonia, account for around a third of the 2.5 million fatalities (WHO 2019).

In 2017, the CDC projected that over 1.70 million Americans are infected each year by hospital-associated infections caused by a variety of bacteria, some of which are difficult to cure with medicines (Alhassan 2021). One in every 31 patients who are admitted to a health institution had at least one healthcare-associated illness, according to the CDCP (CDCP 2018).

In poor nations, the incidence of nosocomial infections is 15.5 percent per 100 patients, and this continues to be a problem owing to a lack of efficient global infection - control programs, as well as a lack of compliance with hospital acquire infection recommendations (Labi *et al.* 2018).

Patients and healthcare staff are the most prevalent vulnerable hosts in healthcare settings.

1. The patient may be subjected to pathogenic bacteria from inside their bodies, such as germs found on the skin, in the respiratory or GIT system (endogenous infection), or from others, devices, and equipment, or the environmental (exogenous infection). The amount of risk is determined by the healthcare environment (particularly, the existence or lack of infectious pathogens), the kind of health care operations conducted, handwashing compliance, vaccination status, and the patient's vulnerability (Bischoff *et al.* 2000).
2. Infectious agents may be transmitted to healthcare personnel via infected patients, tools and equipment, or the environment. The kind of clinical interaction health care worker has with possibly infected or colonized patient groups, equipment, or settings, adherence to convention and transmission-based measures, and the healthcare workers' health state determines the amount of risk (e.g., immunized or immunocompromised) (Cruickshank *et al.* 2017).
3. The major mechanisms of transmission of infectious pathogens in hospital settings include contact (including droplet, blood bore, and airborne. The means of transmission differ depending on the organism. The same organisms can be spread by many pathways in certain situations (for example, influenza, norovirus, and respiratory syncytial virus) (Mitchel 2017).

2.4. Routes of transmission

The method of transmission is the method or mechanism by which the pathogen moves from the reservoir or habitat to the exposed person, and it differs according to the pathogenic factors, and one pathogen may have more than one method by which it is transferred. There are several classifications of modes of transportation, including:

1. Airborne transmissions
2. Vector-borne Transmissions
3. Droplets transmissions
4. Contact transmissions.
5. Vehicles-borne Transmission (Shiu *et al.* 2019).

2.5. Contact transmission

The most prevalent form of transmission is contact, which includes transmission by contact or via touch with blood or bodily fluids. Direct or indirect contact is possible:

Direct transmission: this happens when an infectious agent is conveyed greatly from one person to the other, such as when a patient's blood enters a health care worker's body via an open wound (AGPCI 2019). Infections' source Infection may come from two different places. It is an endogenous route, in which the microbes come from the patient's own microflora, such as from the gut due to a breach in intestinal mucosal barriers caused by chemotherapy in people with cancer; or (ii) an exogenous route, in which the microbes come from outside sources, such as contaminated healthcare workers' hand, item, tools, and/or the environments (Shiu *et al.* 2019).

Indirect transmission: It includes the transfer of a pathogen through an infected intermediate item or person, such as a health care worker's hand conveying an infectious agent after contacting an infected body site on one patient and not completing sufficient handwashing prior to contacting other patients, or a health care worker making contact

with germs (e.g., Bedding) or feces then with a patient.

Multi-resistant microorganisms (MROs), norovirus, *Clostridium difficile*, and pathogen that cause highly contagious skin infections are examples of pathogens transferred via touch (e.g., impetigo, scabies) (Kramer *et al.* 2018).

2.6. Droplet transmission

droplet transmission can happen when an infected person speaks, coughs or sneezes, breathes, or during certain operations. Droplets are infected particles with a diameter greater than 5 microns. Respiratory droplet carries disease when they travel straight from an infected person's respiratory system to that other person's mucosal surface (nose, conjunctiva, or mouth) over short distances. Droplet dispersal is normally restricted to 1 meter due to the force of ejection and gravity. Flu virus and *Neisseria meningitidis* are two infectious agents that are spread by droplets (Pannek *et al.* 2021).

A contagious agent that stays infectious over distance and time may be transmitted by airborne particles. Small-particle aerosols (typically less than 5 microns in diameter) are produced by breathing, talking, coughing, or sneezing, as well as by the evaporating of larger droplets under low-humidity circumstances. Aerosols harboring infectious agents may be transported over great distances by air current (e.g., ventilation or air conditioning system) and breathed by vulnerable people who have not come into touch with the sick person. These microscopic particles may spread the illness via the respiratory tract's narrow airways. *M. tuberculosis* and rubella virus are two examples of infectious organisms that are largely spread via the air (measles) (Gammon and Hunt 2018).

2.7. Asepsis and Infection Control

An infectious disease caused by bacteria invading bodily tissue and growing there. An

infectious agent is a microbe that may cause substantial illness in an unborn fetus. For example, cytomegalovirus (CMV) infections in a pregnant woman may cause major diseases in the unborn baby. Disease, on the other hand, is defined as a change in normal tissue function that may be detected. Infection is a disease that occurs when a pathogen (disease-causing germs) is present in and on the organism. Asepsis: Is the absence of disease-causing microorganisms in order to reduce the risk of microorganism transmission (Smeltzer *et al.* 2018). An infection is the consequence of a continuous cycle that has six elements. These elements are:

- Reservoir
- Infectious agents
- Portal of exit
- Portal of entry
- Susceptible host
- Means of transmission

2.8. Infectious agent

2.8.1. Bacterial

Bacterial infections have a substantial impact on the public's health. Illness can occur at any time and is caused by the organisms or the body's response to its presence. Bacteria can be transmitted by the air, water, food, and live vector. Contact, droplet, airborne, vectors, and vehicle transfer are the most common mechanisms of bacterial infection transfer. When preventative steps are followed, mortality and illness rate are drastically lowered. Examples of such efforts include water purification, animal and human immunization, basic hygiene measures, and safe sexual behaviors. Antibiotic resistance is an increasing problem, necessitating its careful usage (Engleberg *et al.* 2018).

2.8.2. Virus

The virus is an obligatory intracellular pathogen that cannot multiply without an apparatus and metabolism of a host cell, making them one of the most contagious agents. Whereas the viral replication cycle of life varies widely depending on the species and viral category, Viruses have a variety of hosts. Viruses, for example, infect particular cells or tissues of certain hosts, bacteria, or plants. - The precise types of cells that a virus may infect are referred to as viral specificity. It is governed by the virus's attachment, penetration, and reproduction characteristics. Viruses do not contain nuclei, mitochondria, ribosomes, or other biological components since they are not cells. Viruses reproduce or replicate. Viruses do not multiply. Viruses can only reproduce or proliferate in live cells. Viruses are intracellular parasites obligates. Pasteur invented the name virus, which comes from the Latin word meaning poison (Goulding 2020).

2.8.3. Fungus

Fungal, plural fungi, any of the 144,000 known fungi species, which include rust, yeast, smut, mold, mildew, and mushroom. Slime mold and oomycete (water mold) are examples of fungus-like creatures which do not belong to the kingdom. Despite this, fungi are frequently referred to as fungus. The Chromista kingdom is home to several of these fungus-like critters. Fungi are among the world's most widely distributed animals, with essential roles in both the environment and medicines. Many fungi survive in the water or soil on their own, while others have parasitic or symbiotic relationships with animals and plants (David 2020).

2.8.4. Parasite

Parasites are regarded as one of the leading causes of sickness in a number of nations. Intestinal parasites are the leading cause of illness in Pakistan, as well as India, Bangladesh, and other developing nations, and are also a leading cause of mortality in Western countries. Because parasites are generally endemic and common in particular

regions of the globe, illness patterns change depending on where you live. Helminth parasite infections are the most common NTDs, with 24 percent of the world's population known to be affected by helminths transmitted via the soil. In East Asia, China, Sub-Saharan Africa, and America, intestinal parasite infection is widespread (WHO 2018).

Not all organisms that a person comes into contact with cause illness. A lot of variables influence an organism's ability to cause illness in humans, including:

- The number of organisms.
- The ability of an organism to cause disease (virulence).
- The competence of a person's immune system.
- The length and intimacy of the person's contact with the micro-organisms (Taylor 2018).

2.9. Chain of infection

Understanding how an illness spreads is critical to preventing and controlling its transmission, particularly if there is no definite therapy. The "Chain of Infection" explains the infection process that starts when infectious agents leave its reservoir via a portal of exit and is transferred to a susceptible host by a transmission mode entering through a portal of entrance (Pan *et al.* 2019). Infectious Agent No.

1: Microorganisms that cause disease generation include the following: viruses, bacteria, fungi, protozoa and helminths, parasites, and prions are all examples of pathogens. Infectivity, pathogenicity, virulence, and invasiveness are all variables that impact disease transmission.

2. Infection Reservoirs An infectious agent's reservoir is where the agent lives and replicates in its natural state.

2.9.1. Types of reservoirs

- Human
- Animal
- Environment Reservoir
- Human Reservoir: A person infected with or without symptoms who may spread the disease to other (Molina *et al.* 2020)

2.9.2. Types of carriers

Asymptomatic and symptomatic carrier transmissions appear to be one of the most essential elements of infectious disease transmission, since persons without symptoms may spread the virus. However, quantifying their impact on outbreaks is difficult, therefore categorize carriers as asymptomatic and symptomatic.

1. Asymptomatic carrier: A person who is infected yet has no symptoms. They may spread sickness to others, even if they are unaffected.
2. Carrier with symptoms: A person with a clinically identifiable illness may be in the carrier state throughout the incubation phase, convalescence, and post-convalescence.

2.9.3. There are two kinds of human reservoirs

- Cases: people who are suffering from asymptomatic disease
 - Carriers: individuals who seem to be symptomatic or asymptomatic (Nogrady 2020).
1. There is a portal: There is a common portal: Respiratory system, Gastrointestinal system, Genitourinary system, Bleeds and Tears the skin (Tyshenko *et al.* 2018).
 2. Transmission: Once a microbe has left its reservoir, it must find a way to communicate with another individual. These mechanisms include:

- A) Direct transmission: Microorganism is transferred directly from one person to the other by touching, biting, kissing, sneezing, or coughing.
- B) Indirect transmission: Any material that acts as an intermediary route for transporting infectious agents, such as surgical instruments, cooking, water, milk, and animals or flying insects, is considered indirect transmission (Richard *et al.* 2017).

- 3. Microorganisms should enter the human body thru the same path as other organisms.
- 4. Susceptible host: someone who is susceptible to infections (Williams *et al.* 2020).

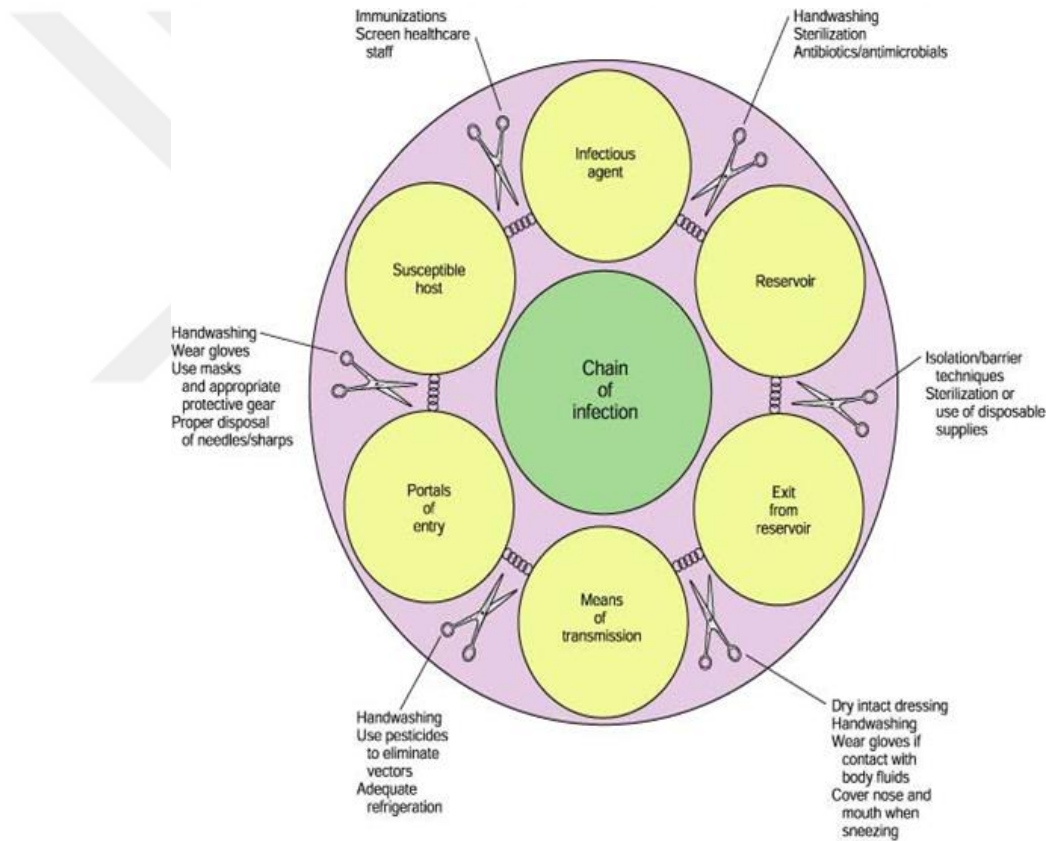


Figure 2.1. Breaking the Chain of Infection (Williams *et al.* 2020)

2.10. Stage of infections

During the incubation phase, the organism grows and multiplies. Prodromal stage: the individual is most infectious and signs and symptoms are non-specific. Full illness

stage: the existence of particular signs and symptoms. Recovery from infection during the convalescent phase (Kurtzman and Buerhaus 2018).

2.11. The Body's defense against infection

1. Normal flora; flora aids in the prevention of potentially dangerous microorganisms entering the body. In addition to the regular flora that lives in different parts of the body (Leung 2018).

2. Immune Response: The immune response is a set of sophisticated systems that the body uses to defend and protect itself. The foreign substance is referred to as an antigen, and the body often reacts by creating an antibody. One component of the entire immune response is the antigen-antibody reaction, commonly known as humoral immunity (Leung 2018).

3. Inflammatory Reaction: Inflammation is a tissue's localized and nonspecific defensive reaction to a harmful or infectious substance. It is an adaptive system that eliminates or dilutes the harmful substance, stops further injury spread, and promotes tissue recovery. If the damage is serious, it is characterized by five signs: (a) swelling, (b) pain, (c) redness, (d) heat, and (e) decreased function of the part. (Kurtzman and Buerhaus 2018).

2.12. Factors that Affect the Risk for Infections

The host's vulnerability is determined by numerous factors:

- Skin and mucous membrane integrity defends the body against invading microbes
- The GIT and genitourinary systems, and also the skin, have pH values that aid to prevent microbial invasions.
- The amount and integrity of WBCs in the body, which give resistance to infections.
- Susceptibility is influenced by age, sex, ethnicity, and inherited factors. Infants and

the elderly tend to be more susceptible to illness.

- Infection-prevention vaccines, either natural or acquired
- Fatigue, nutrition and general health state, prior diseases, past or present treatment, and particular drugs all have a role in a possible host's vulnerability.
- Stress level, however, if elevated, may have a negative impact on the body's natural defensive systems.
- The use of surgical or catheter medical devices, which expose patients to and allow additional possible sources of disease-producing organisms to enter, especially if their defenses are already compromised by sickness. (Trevisan *et al.* 2020)

2.13. Role of nurse in infection control

Infection control is the science of controlling infection transmission in hospitals and other health care. Infection prevention and control, like public health, is a critical function in every medical facility. It investigates the factors that influence the spread of infection among patients, workers, and staff patients. Hand washing, cleaning, disinfection, sterilization, and vaccination are examples of preventative practices. Monitoring and treating an infection outbreak, as well as identifying its causes, are further considerations (RN 2020).

A registered nurse (RN) who uses best practices to prevent the spread of bacteria or viruses while still providing great care to patients with infectious illnesses is known as infection control and prevention nurse. In this sector, exceptional concentration on detail, the capacity to work efficiently under pressure, and excellent communication skills are all required. Infection prevention and control nurses collaborate with patients, doctors, scientists, public health specialists, and government organizations to safeguard people's and the public's health. In the United States, about 2 million healthcare-associated infections occur every year, resulting in almost 100,000 fatalities. The most prevalent organisms causing hospital-acquired illnesses are *Clostridioides difficile* (C. diff), *Klebsiella*, *Staphylococcus aureus* (staph), and *Escherichia coli* (E. coli) (Monegro *et al.* 2020).

2.14. Some responsibilities of infection control nurses

- Collecting and evaluating infection data in order to make informed choices
- Infection prevention practices are being taught to medical and public health workers to help with disaster preparation.
- Containing the transmission of pathogens illnesses by isolating and treating affected persons.
- Assist with the development of strategic planning in the case of a community or hospital pandemic in order to mitigate the potentially disastrous repercussions.
- Collaborating with government organizations such as the CDC to guarantee that infection control and prevention procedures are adopted and implemented.
- Investigating diseases to figure out where they came from in order to avoid future outbreaks.
- Assisting researchers and professionals in the production of medications and vaccines to ensure the safety and health of patients and the general public (Monegro *et al.* 2020).
- Infection prevention Nurses work in a number of areas in the healthcare industry, including:
 - Residential care centers and nursing homes.
 - Community-based care facilities.
 - Settings such as home care or ambulatory care.
 - Hospice services.
 - Departments of public health.
 - Organizations dedicated to emergency preparation (RN 2020).

2.15. Infection prevention and control

Providing a safe hospital environment for both health care workers and patients throughout the continuum of care requires IPC. Patients and health care workers alike may suffer severe morbidity and death as a result of a lack of commitment to safe procedures or unintended contact with infections in the hospital setting. The availability of safe physical surroundings, the application of safe clinical procedures, the availability

of necessary resources, the supply of safety equipment and consumable goods, and a culture of safety for everyone are all part of a safe working environment. Health care safety also includes mechanisms for reporting incidents that arise as a result of a hazardous environment or practices (Bryant 2017).

2.16. Health-care-facility guidelines

These recommendations, according to the WHO, are general and should be applied in every healthcare institution in the area. The seven requirements listed below are vital for the Ministry of Health policy officials to help adapt the recommendations into practice since they must be altered to fit locally and national health care facilities.

1. It is necessary to have strong national participation in the development and implementation of IPC policy.
2. To help promote, develop, and sustain a culture of patient and the health care protections for workers and IPC, IPC guidelines and programming proposals are being developed at the institutional and national levels.
3. Infrastructure/system: guaranteeing that IPC person's funds are provided at the national and system ensured, that required equipment and supplies are accessible and that an environment is set up in preparation to allow the guideline suggestions to be implemented.
4. To raise accountability for IPC, integrate IPC indicators into the ministry of health's strategies and marketing plans.
5. Education and training: ALL IPC-related workers are required to participate in training sessions, education, and annual training.
6. Monitor, assessments, and reporting: In relation to the national guidelines, a strategy of frequent monitoring and evaluation, such as a surveillance system, is in place.
7. Executives and administrators at all levels of health care service delivery demonstrate adherence to and accountability for the execution of national IPC standards.
8. The WHO has proposed the following essential component of infections prevention and control strategies at the national and healthcare institution levels (WHO 2018).

2.17. Hand washing

Is a broad word that encompasses hand washing, antiseptic hand washing, antiseptic hand massage, and surgical hand antisepsis (CDCP 2020). These activities are defined by the (CDC) as follows:

- Hands washing - Using plain (non-antimicrobial) water and soap to wash hands.
- Hand Antisepsis - Either an antiseptic hand wash or an antiseptic hand massage (CDCP 2020).
- Surgical Hand Antisepsis - Before surgery, surgical staff utilizes antimicrobial handwashing or antiseptic hand rubbing to eliminate transitory germs and reduce resident bacteria. Washing hands is essential for preventing the spread of sickness to yourself and others. It is one of the most efficient methods for lowering the frequency of infections associated with hospitalization. Handwashing failure is a leading source of healthcare-associated infection and the spread of multi-resistant microorganisms like Methicillin Resistant Staphylococcus Aureus (MRSA), as well as a key contributor to outbreaks (Abad et al. 2010).

Based on the kind of process and the level of pollution, the best method for hand-cleaning. Hand washing is done with plain or anti-infective soaps and warm water for non-surgical procedures and routine examinations if the hand is visibly soiled with various pollutants like blood or other body fluids, but scraping the hands with gel or antiseptic alcohol is used when the hands are not visibly soiled (CHP 2018).

2.18. Five-Moment for Hand Hygiene

The WHO has identified 5 key points or moments related to hand hygiene that must be followed by all health care providers, which include:

1. Prior-handle the patients.
2. Prior to cleanliness/ sterilization procedures.

3. Post-exposure to blood or fluids.
4. Post-handle the patients.
5. Post handling with the patients' environment and equipment (WHO 2020).

2.19. Use of gloves

Gloves are often misused in disaster and war situations. Gloves are single-use items that must be disposed of carefully after patient contact and not reused, even if supplies are limited. Examination gloves should only be used in instances when there is a danger of direct contact with blood, bodily fluid, excretion, or filthy goods. Gloves are not necessary for normal patient interaction if there is no danger of contact with blood or bodily fluid, or if the environment is not polluted (Lathia *et al.* 2020).

2.20. Personal protective equipment (PPE)

“Safety helmets, gloves, eye protection, hazmat suits, high-visibility clothing, safety footwear, safety harnesses, ear plugs, ear defenders, and respiratory protective equipment are examples of personal protective equipment (RPE)”. In appropriate contexts, disposable PPE, like single-use trousers, may be provided. When it comes to supplying and wearing PPE at work, employers have duties. (NIHCE 2016).

- When directly touching potentially infected goods or contaminated surfaces, gloves may help protect you.
- Gowns protect you from possibly infectious particles contaminating your clothes.
- In a polluted area, shoes, and hair covers offer a barrier against potential exposure.
- Surgical masks and respirators shield your mouth and nose from body fluid splashes, while breathing masks filter the air before you inhale it.
- Additional Face and Eye Protections: Goggle only protect your eye against splodges. A face shield protects the skin of your face, your eyes, your nose, and your mouth from spattering (Pratt 2007).

2.21. Use of personal protective equipment

The use of suitable PPE in healthcare, such as gown, glove, and mask, is a common part of preventing infection, and it is handled for everyone's security (NHMRC 2019).

- Wearing PPE isn't enough; healthcare personnel should wash their hands before and after putting on and removing the protective gear.
- PPE is only worn in the patient care area, and healthcare professionals must remove it before leaving the area to avoid spreading illness.
- Gowns or aprons are worn by healthcare workers to protect their clothes and skin from contamination.
- If there is a danger of breathing an infectious agent, healthcare professionals should use an adequate mask.
- A health care practitioner must employ suitable masks, protective goggles, or face shields in situations where a patient's bodily fluids may spatter onto his or her face.
- Healthcare personnel should wear gloves if they will be in direct contact with blood or bodily fluids, mucous membrane, or wound, or if there is a risk of infection from touching the patients.
- Patient who is latex sensitive or allergic must inform their health care providers so that a different glove type may be used.
- It's worth noting that infection prevention and control techniques often alter over time as a result of risk assessment taken by local health care personnel.
- It's OK to ask a healthcare professional whether they should be wearing protective personal devices or if they're utilizing them correctly (Loibner *et al.* 2019).

2.22. Disposal of sharps

Incorrect removal of needles, dangerous knives, and shattered glass is the leading cause of injuries among HCWs and service workers, owing to failure to place sharp objects and needles in designated containers, a lack of attention to the fullness of sharp object disposal containers, or the forgetting of needles or sharp objects on patient linens and bedding, which also causes injury to those responsible for washing and cleaning (FDA

2018). Sharps injuries may be avoided by following these steps:

1. Using single-use needles.
2. Do not re-cap a used needle.
3. Needles and sharp items must be placed in the receptacles designated for them as soon as possible after use, ideally near the patient's bed.
4. Never put your hand in a garbage can or a sharps container.
5. Containers for sharp item disposal must be of high quality, puncture-resistant, and unbreakable.
6. Sharp waste containers must be changed when they reach three-quarters of their capacity or the prescribed limit.
7. All HCWs and service workers should be instructed on how to properly dispose of sharp instruments as well as the hazards that come with them. (Food and Drug Administration 2018).

Needle-stick injury (NSI) is described as the “introduction into the body of healthcare professionals during the routine implementation of tasks of blood or other body fluids or dangerous materials by hollow bore needles or sharp objects e.g., syringes, lancets, and contaminated shattered glass (Mengistu and Tolera 2020).

Occupational accidents to healthcare workers, like needle sticks and sharp tools, are still a major problem in the healthcare system, and they're linked to infections like hepatitis B, hepatitis C, and human immunodeficiency viruses⁵⁻⁸, as well as other blood-borne pathogens like cytomegalovirus, herpes virus, and parvovirus (Memish *et al.* 2019).

In health care settings, a needlestick injury is a major occupational health danger. Blood-borne infections and the psychological effects of these injuries are a concern for health care personnel. Needle stick injuries (NSIs) are one of the most prevalent occupational risks that need to be addressed among healthcare workers (HCWs) across the globe, and they are the most common cause of infection (Bouya *et al.* 2020). Around 40 percent of hepatitis C and B infections and 2.5 percent of HIV infections among healthcare personnel are caused by needle sticks and sharp injuries (Ahmed 2017).

Needle-Transmitted Diseases; Many additional viruses and bacteria may be spread by accidents or needle sharing, including:

- Hepatitis C
- Rocky Mountain spotted fever
- Syphilis
- Epstein-Barr virus, which is a form of herpes virus.
- Varicella zoster virus, which cause chickenpox and shingle

Infectious consequences from NSI exposure in the workplace might cause substantial health concerns ranging from moderate to severe anxiety (Yimechew *et al.* 2018).

2.23. Urinary tract infections

Urinary tract infections (UTIs) are one of the most prevalent causes of infection in hospitals. UTIs may manifest themselves in a number of ways. Some are minor UTIs that can be controlled with outpatient antibiotics and also have a favorable therapeutic course with nearly universally positive results, whereas florid urosepsis in a concurrent patient can be deadly. (Girgenti *et al.* 2019). Several risk factors can aggravate UTIs, leading to therapeutic failure, recurring infections, or significant mortality and morbidity with a poor prognosis. It's critical to figure out if these risk factors are to blame for the current episode and whether it'll go away with first-line antibiotics (Habak *et al.* 2021).

A simple UTI, also known as simple cystitis, is a UTI produced by sensitive bacteria in a hospital setting that is not associated with therapeutic failure or poor outcomes. In a non-pregnant, immune-competent female, this is frequently an infection. Pyuria and/or bacteriuria lacking symptoms are not UTIs and may not require treatment. Two instances are a patient with a Foley catheter and a positive urine culture in such an asymptomatic non-pregnant immunological competent female (Shi *et al.* 2019).

Because the urethra of the female urinary system is relatively short, it is predisposed to bacterial seeding at the proximal end. Infections are more likely as a result of this structure. Simple cystitis, a single episode of ascending pyelonephritis, and even recurring cystitis in the correct circumstances may all be classified as simple UTIs if they respond quickly to first-line antibiotics and have no long-term consequences (Gomila *et al.* 2018).

Any UTI which does not fit the above criteria or has a different clinical course is classified as a complex UTI. In these situations, protective variables that failed to stop infections or risk factors that lead to poor sepsis resolution, treatment failures, greater morbidity, and reinfection may always be found (Esposito *et al.* 2018).

3. MATERIALS AND METHOD

3.1. Study design

A descriptive cross-sectional study that carried out in the period of 1st February 2022 to 15th May 2022 in Al-Hilla city hospitals to assess nurses' practice toward Infection control at emergency units.

3.2. Sample and setting of the study

3.2.1. Place and sample

The study sample is (170) nurses collected chosen from the emergency units of three hospitals in AL-Hilla city (Al-Murjan Hospital, Imam Sadiq Training Hospital, and Babil Women's and Children's Training Hospital) in Iraq. The sample was chosen by using nonprobability sampling (convenience sample). "G power package program was used in power analysis. As a result of the power analysis, it was found that the power was 0.991 when the effect size, P, and sample size were 3.0, 0.05 and 170".

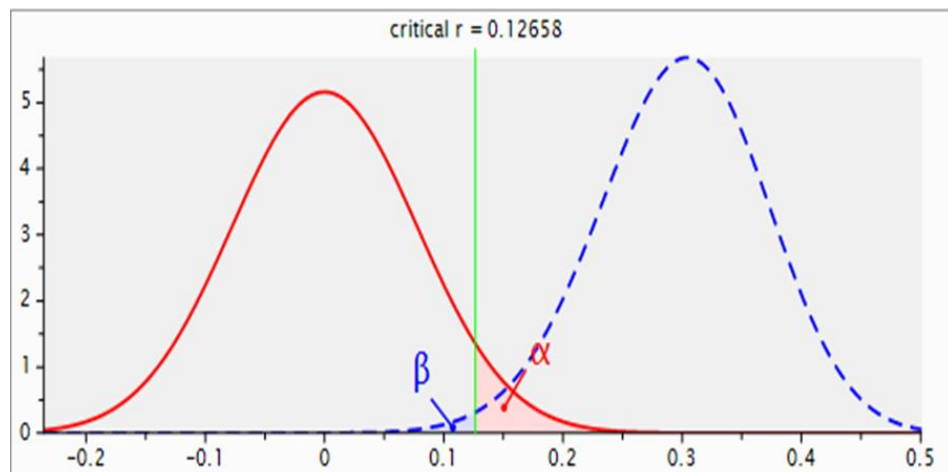


Figure 3.1. (A) G- power analysis.

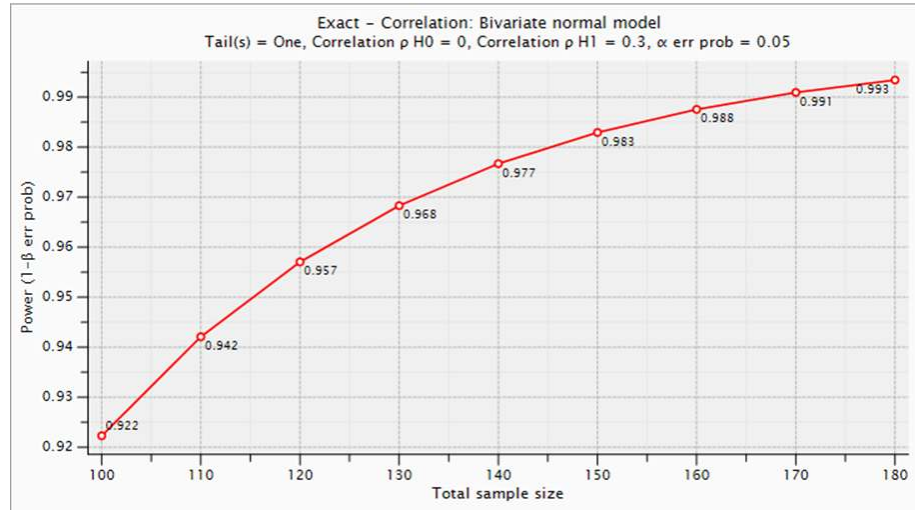


Figure 3.2. (B) G- power analysis.

3.2.2. Inclusion criteria of sample

Nurses who are working at the hospitals where the research will be conducted.
Volunteering to participate in the research. Being a native speaker of Arabic

3.2.3. Exclusion criteria of sample

Nurses who disagree to take part in the study

3.3. Study instrument

The study instrument is a questionnaire related to measuring the nurses' practice of infection control in the emergency units. This scale is taken from an Arabic study conducted in 2018. The questionnaire is composed of 3 parts:

Part one: Demographical data such as gender, age, education level, marital status, residence, and specialization.

Part two: General data, such as annual experience, emergency room experience, and infection control training courses, numbers.

Part three: Infection control scale: this scale is composed of 15 domains. 1st domain is related to handwashing and consists of 6 items. 2nd domain is related to hand antisepsis and consists of 2 items. 3rd domain is related to isolation precautions (Donning and Removing Personal Protective Equipment, Gloves) and consist of 10 items. 4th domain is related to mask and consists of 3 items. 5th domain is related to Medications (Administering an Injection) and consists of 7 items. 6th domain is related to intervention medication and consists of 8 items. 7th domain is related to sharp disposal and consists of 5 items. The 8th domain is related to spillage and consists of 6 items 9th domain is related to indwelling urinary catheters & consists of 20 items. 10th domain transporting the patient to another department and consists of 5 items. The 11th domain is related to wound site care and consists of 11 items. The 12th domain is related to the collection of specimens and consists of 5 items. 13th domain related to bed making and consists of 8 items. The 14th domain is related to suction and consists of 17 items. The 15th domain is related to the maintenance of suction equipment and consists of 5 items. The study instrument response, according to nurses' practice for infection control (never, sometimes, always) (Abdulhassan 2018).

3.4. Validity

According to past research, the study instrument is valid (Abdulhassan 2018). In trying to attain the study's objectives, the researcher employed content validity of the research instrument by a panel of experts with more than five years of experience in their area to investigate the clarity, relevance, and appropriateness of the questionnaire

3.5. Reliability

According to past research, the instrument used in this study is reliable (Abdulhassan 2018). The researcher enlists the help of two nursing college graduates to complete this phase; each participant in the pilot study is subjected to 3 distinct observations from 3 observers for each exercise; each participant receives three observations for each practice. The checklist's reliability was determined using a particular equation, and statistical findings were obtained ($r: 0.90$), which is statistically acceptable.

3.6. Ethics committee approval

Ethical approval of the ethical committee of a Çankırı University was obtained and directed to the Babilon health director to facilitate the data gathering in the hospitals.

The research was performed at the Alhilla Health Department /Training and Human Development. At the outset, written permission from the teaching hospital / Iraq, where the study was conducted.

The researcher informs the sample about the study and its goals, then obtains their verbal consent to take part in the study, and then begins collecting data

3.7. Collections of data

The data collection procedure lasted from December 27th, 2021, through February 26th, 2022. The investigator introduced the research and its aims to the study sample, the sample's verbal permission was obtained, and the questions were answered utilizing an interview to get the demographic characteristic of the sample. The investigator gathered the infection control practices of the sample who participated in the study by using the observation at three times. The process of data collection takes about 25-35 minutes for each participant

3.8. Analysis of data

Socio-demographic and descriptive data of the patients were reported as frequencies, percentages, and to test and Kruskal test in data analysis by using “Statistical Package for Social Science (SPSS) version (22.0)”.

4. RESULTS

This table shows that 75 (44.1%) of nurses at age (26-30) years, 98 (57.6%) of nurses are males, 118 (69.4%) of them reside in urban, 97 (57.1%) of them are married, 75 (44.1%) of nurses were college graduated, 99 (58.2%) of nurses have (1-5) years of service in nursing, 69 (40.6%) not received a training session.

Table 4.1. Distribution of the sociodemographic characteristics of the nurses.

Variables	Frequency	Percent
Age		
21-25	51	30.0
26-30	75	44.1
31-35	21	12.4
36-40	22	12.9
41-45	1	0.6
Total	170	100.0
Gender		
Male	98	57.6
Female	72	42.4
Total	170	100.0
Residence		
Urban	118	69.4
Rural	52	30.6
Total	170	100.0
Marital status		
Single	73	42.9
Married	97	57.1
Total	170	100.0
Educational level		
Nursing secondary school	28	16.5
Institution	67	39.4
College	75	44.1
Total	170	100.0
Years of service		
1-5	99	58.2
5-10	40	23.5
11-15	21	12.4
16-20	10	5.9
Total	170	100.0
Number of training courses		
0	69	40.6
1	37	21.8
2	25	14.7
3	23	13.5
4	9	5.3
5	4	2.4
6	3	1.8
Total	170	100.0

This table shows that (41.8%) of nurses sometimes clean their hands quickly in between each occurrence of direct contact with the patient during care. (37.6%) of them wash their hands sometimes after coming into touch with a microorganism source (body fluids substances, mucous membrane), (52.9%) of them never wash their hands after contact between different patients, (62.9%) of them never wash their hands after removing gloves, (63.5%) of them never use a hand towel, a sterile towel, or single-use towels to dry, (66.5%) of them never use clean, dry paper towels, shut off the water.

Table 4.2. Distribution of nurses' practice toward infection control (Handwashing).

Question	Always		Sometimes		Never	
	f	%	f	%	f	%
Handwashing						
In between each occurrence of direct contact with the patients during the care, the hands should be cleaned quickly.	40	23.5	71	41.8	59	34.7
After coming into touch with a microorganism source (body fluid substances, mucous membrane).	42	24.7	64	37.6	64	37.6
After contact between different patients.	15	8.8	65	38.2	90	52.9
After removing gloves	18	10.6	45	26.5	107	62.9
Use a hand towel, reusing sterile towel, or single-use towels to dry.	11	6.5	51	30.0	108	63.5
Using clean, dry paper towels, shut off the water.	14	8.2	43	25.3	113	66.5

This table shows that (41.2%) of nurses always use it before the performance of invasive procedure, (58.2%) of them never use hand antiseptic between care of a different patient.

Table 4.3. Distribution of nurses' practice toward control of infections (Hand antiseptics).

Question	Always		Sometimes		Never	
	n	%	n	%	N	%
Hand antiseptics						
Using before a performance of an invasive procedure	70	41.2	54	31.8	46	27.1
Hand antiseptic between care of a different patient	22	12.9	49	28.8	99	58.2

This table shows that (61.2%) of them never wash hands and dry thoroughly, (40%) of them choose the correct size gloves, (49.4%) of them wear gloves in proper way, (36.5%) of them remove gloves in proper way, (49.4%) of them drop gloves in appropriate waste receptacle, (56.5%) of them wash hands after removing gloves, (64.1%) of them all invasive surgeries need the use of gloves, (61.2%) of them in direct touch with bodily fluids, gloves should be used, (68.2%) of them gloves worn as single items remove when the activity is complete, (74.1%) of them change gloves between different activities.

Table 4.4. Distribution of nurses' practice toward infection control (Isolation precautions).

Question	Always		Sometimes		Never	
	f	%	f	%	F	%
<i>Isolation precautions</i>						
Wash hands and dry thoroughly	28	16.5	38	22.4	104	61.2
Choose the correct size of gloves	39	22.9	63	37.1	68	40.0
Wear gloves in a proper way	27	15.9	59	34.7	84	49.4
Remove gloves in a proper way	50	29.4	58	34.1	62	36.5
Drop gloves in an appropriate waste receptacle	30	17.6	56	32.9	84	49.4
Wash hands after removing gloves	32	18.8	42	24.7	96	56.5
Gloves must be worn for all invasive procedures	20	11.8	41	24.1	109	64.1
Gloves must be worn in direct contact with body fluid	32	18.8	34	20.0	104	61.2
Gloves worn as single items remove when the activity is complete	12	7.1	42	24.7	116	68.2
Change gloves between different activities	6	3.5	38	22.4	126	74.1

This table shows that (42.4%) of nurses sometimes wear face masks in a proper way, (37.6%) of them use masks in all procedures that need to provide a completely sterile field, and (50%) of them never discard them in a proper receptacle.

Table 4.5. Distribution of nurses' practice toward infection control (Mask).

Question	Always		Sometimes		Never	
	f	%	f	%	f	%
Mask						
Wear face masks in proper way	69	40.6	72	42.4	29	17.1
Use mask in all procedures that need to provide complete sterile field	45	26.5	64	37.6	61	35.9
Discard it in a proper receptacle	34	20.0	51	30.0	85	50.0

This table shows that (47.1%) of them always eliminate unnecessary injections, (61.8%) of them never wash their hands and observe other appropriate infection control procedures, (41.8%) of them sometimes prepare the medication and prevent contamination of medications, (51.2%) of them always use sterile needle and syringe, (49.4%) of them never put on clean gloves, (55.3%) of them never clean the site with an antiseptic swab, (45.9%) of them never remove the needle cover without contaminating the needle.

Table 4.6. Distribution of nurses' practice toward infection control (Medication).

Question	Always		Sometimes		Never	
	f	%	f	%	f	%
Medication						
Eliminate unnecessary injections	80	47.1	63	37.1	27	15.9
Wash hands and observe other appropriate infection control procedures.	14	8.2	51	30.0	105	61.8
Prepare the medication and prevent contamination of medications	40	23.5	71	41.8	59	34.7
Use a sterile needle and syringe	87	51.2	43	25.3	40	23.5
Put on clean gloves.	22	12.9	64	37.6	84	49.4
Clean the site with an antiseptic swab	16	9.4	60	35.3	94	55.3
Remove the needle cover without contaminating the needle.	38	22.4	54	31.8	78	45.9

This table shows that (54.1%) of them never wash their hands and use alcohol for hand antisepsis, (36.5%) of them sometimes replace tourniquet and palpate the vein, (61.8%) of them never wear gloves, (54.1%) of them never clean the site with an antiseptic solution, (55.9) of them never cleaning done by circular motion outward from the insertion site, (58.2%) of them never proper dressing by gauze or transparence used, (60.6%) of them remove gloves, (61.2%) of them never wash hands or alcohol antisepsis method used.

Table 4.7. Distribution of nurses' practice toward infection control (Intravenous medications).

Question	Always		Sometimes		Never	
	f	%	f	%	f	%
Intravenous medications						
Wash hands and use alcohol for hand antisepsis	25	14.7	53	31.2	92	54.1
Replace tourniquet and palpate the vein	53	31.2	62	36.5	55	32.4
Wear gloves	14	8.2	51	30.0	105	61.8
Clean the site with an antiseptic solution	23	13.5	55	32.4	92	54.1
Cleaning is done by circular motion outward from the insertion site	25	14.7	50	29.4	95	55.9
Proper dressing by gauze or transparence used	19	11.2	52	30.6	99	58.2
Remove gloves	17	10.0	50	29.4	103	60.6
Wash hands or alcohol antisepsis method used	22	12.9	44	25.9	104	61.2

This table shows that (64.7%) of nurses never sharp should be placed in a sharp's container immediately after use, (46%) of them always install sharps containers as close as an arms-length, (57.1%) of them always needle should not be bent back before being used or destroyed, (51.8%) of them never these containers should not be filled beyond the point where they are marked as full, (73.5%) of them never containers must not be left on the floor and must be stored in a secure location.

Table 4.8. Distribution of nurses' practice toward infection control (Sharp disposal).

Question	Always		Sometimes		Never	
	f	%	f	%	f	%
<i>Sharp disposal</i>						
Sharp should be placed in a sharp's container immediately after use	35	20.6	25	14.7	110	64.7
Install sharps containers as close as an arms-length	46	27.1	73	42.9	51	30.0
The needle should not be bent back before being used or destroyed.	97	57.1	36	21.2	37	21.8
These containers should not be filled beyond the point where they are marked as full.	27	15.9	55	32.4	88	51.8
Containers must not be left on the floor and must be stored in a secure location.	11	6.5	34	20.0	125	73.5

This table shows that (72.9%) of them always wear disposable gloves while cleaning up a spill, (38.8%) of them sometimes know that contaminated areas covered with chlorine releasing granules, powder, or proper disinfectant solution, and (47.1%) of them know that contaminated fluid is never totally absorbed by a disposable paper wipes, which is then discarded in the proper location, (61.2%) know that the surfaces must be cleaned and dried using a disposable paper wipe, (42.9%) of them wipe the area with disinfectant, (60.6%) of them know that all waste disposable gloves should be discarded as clinical waste.

Table 4.9. Distribution of nurses' practice toward infection control (Spillage).

Question	Always		Sometimes		Never	
	f	%	f	%	f	%
<i>Spillage</i>						
In cleaning up a spill, always wear a disposable glove.	23	13.5	23	13.5	124	72.9
Contaminated area covered with chlorine releasing granules, powder, or proper disinfectant solution	55	32.4	66	38.8	49	28.8
Contaminated fluid is totally absorbed by a disposable paper wipe, which is then discarded in the proper location.	24	14.1	66	38.8	80	47.1
The surfaces must be cleaned and dried using a disposable paper wipe.	25	14.7	41	24.1	104	61.2
The area wiped with disinfectant	43	25.3	73	42.9	54	31.8
All waste disposable gloves should be discarded as clinical waste	26	15.3	41	24.1	103	60.6

Table 4.10. Distribution of nurses' practice toward infection control (Indwelling urinary catheter).

Question	Always		Sometimes		Never	
	f	%	f	%	f	%
Indwelling urinary catheter						
Prepare the equipment needed	101	59.4	57	33.5	12	7.1
Wash hands	21	12.4	51	30.0	98	57.6
Wears clean gloves	26	15.3	35	20.6	109	64.1
Put the patient in suitable positions	60	35.3	65	38.2	45	26.5
Remove gloves	19	11.2	36	21.2	115	67.6
Hand antisepsis with alcohol used	20	11.8	42	24.7	108	63.5
Open equipment on the sterile field	39	22.9	26	15.3	105	61.8
Wear sterile gloves	32	18.8	56	32.9	82	48.2
Place a sterile drape under the patient's hip, then use fenestrated drapes to cover the lower abdominal area so that only the genital area remains exposed	36	21.2	42	24.7	92	54.1
Power povidone-iodine to sterile bowel or basin	18	10.6	64	37.6	88	51.8
Connect the drainage bag to a catheter's opposite end.	86	50.6	48	28.2	36	21.2
Using sterile forceps, clean the female urinary meatus on one side with an iodine-soaked cotton ball. For men, clean the penis with sterile cotton or applications held in forceps while using a circular motion beginning at the urinary meatus and moving outward. Clean the opposite side with a separated piece of cotton, then wipe directly over the meat with fresh application while using a downward motion.	37	21.8	36	21.2	97	57.1
Be sure that the clamp at the emptying part of the drainage bag is closed	73	42.9	61	35.9	36	21.2
Insert the urinary catheter with a suitable size and inflate the catheter balloon	62	36.5	61	35.9	47	27.6
Place the catheter with adhesive tape	30	17.6	41	24.1	99	58.2
The bag should be kept below the body level	28	16.5	62	36.5	80	47.1
The bag should be kept off the floor	17	10.0	62	36.5	91	53.5
Dispose of all used supplies properly	17	10.0	42	24.7	111	65.3
Remove gloves	15	8.8	44	25.9	111	65.3
Wash hands	12	7.1	45	26.5	113	66.5

In Table (4.10) shows that (59.4%) of them always prepare the equipment needed, (57.9%) of them never wash hands, (64.1%) of them never wears clean gloves, (38.2%) of them sometimes put the patient in suitable position, (67.6%) of them never remove gloves, (63.5%) of them never hand antisepsis with alcohol used, (61.8%) of them never open equipment on sterile field, (48.2%) of them never wear sterile gloves, (54.1%) of

them never place sterile drape under patient hip then use fenestrated drapes to cover lower abdominal area so that only the genital area remain exposed, (51.8%) of them never power povidone-iodine to sterile bowel or basin, (50.6%) of them always attach the drainage bag to the other end of the catheter, (57.1%) of them chosen never for female wipe one side of the urinary meatus with cotton ball soaked with iodine by using sterile forceps clean the other side by separated piece of cotton then wipe directly over the meatus by new application by using downward motion for male, clean the penis with sterile cotton or application held in forceps by using a circular motion stating at the urinary meatus and working outward, (42.9%) of them always be sure that the clamp at the emptying part of the drainage bag is closed, (36.5%) of them always insert urinary catheter with suitable size and inflate the catheter balloon, (58.2%) of them never place the catheter with adhesive tape, (47.1%) of them never the bags must be kept just below level of the body, (53.5%) of them never the bag should be kept off the floor, (65.3%) of them never dispose of all used supplies properly, (65.3%) of them never remove gloves, (66.5%) of them never wash hands.

This table (4.11) shows that (44.1%) of them never drape the stretcher with a clean sheet, (51.8%) of them never wrap the patient with clean material, (39.4%) of them always control and contain any of the patients' drainage, (37.6%) of them always clamp the urine bag tube during transportation, (69.4%) of them never disinfect the stretcher after use.

Table 4.11. Distribution of nurses' practice toward infection control (Transporting the patient to another department).

Question	Always		Sometimes		Never	
	f	%	f	%	f	%
Transporting the patient to another department						
Drape the stretcher with a clean sheet	30	17.6	65	38.2	75	44.1
Wrap the patient with clean material	36	21.2	46	27.1	88	51.8
Control and contain any patient's drainage	67	39.4	61	35.9	42	24.7
Clamp the urine bag tube during transportation	64	37.6	53	31.2	53	31.2
Disinfect the stretcher after use	15	8.8	37	21.8	118	69.4

In Table (4.12) shows that (42.9%) of them always prepare equipment which is needed, (42.4%) of them sometimes clean dressing trolley top by using a detergent solution and disposable the trolley top wipe with alcohol, (40.6%) of them never do cleaning activities (bed making should be avoided during dressing procedure, windows should be closed), (42.9%) of them always put the patient in the proper position, (58.2%) of them never wash hands, (54.7%) of them never pour the antiseptic solution into the sterile basin, (56.5%) of them never apply sterile gloves, (37.1%) of them always use sterile soaked gauze or swab wipe wound site directly with up-down motion separated for each side, (37.1%) of them always clean drain site with separated gauze, (50.6%) of them never dry sterile gauze placed, adhesive tapes applied directly on the skin, (62.9%) of them never dispose the used supplies in a proper place.

Table 4.12. Distribution of nurses' practice toward infection control (Wound site care)

Question	Always		Sometimes		Never	
	f	%	f	%	f	%
Wound site care						
Prepare equipment which needed	73	42.9	73	42.9	24	14.1
Clean dressing trolley top by using a detergent solution and disposable the trolley top wipe with alcohol	36	21.2	72	42.4	62	36.5
Cleaning activities (bed making should be avoided during dressing procedure, windows should be closed)	35	20.6	66	38.8	69	40.6
Put the patient in a proper position	73	42.9	58	34.1	39	22.9
Wash hands	32	18.8	39	22.9	99	58.2
Pour the antiseptic solution into a sterile basin	12	7.1	65	38.2	93	54.7
Apply sterile gloves	13	7.6	61	35.9	96	56.5
Using sterile soaked gauze or swab wipe wound site directly with up-down motion separated for each side	63	37.1	54	31.8	53	31.2
Clean drain site with separated gauze	63	37.1	58	34.1	49	28.8
Dry sterile gauze was placed, and adhesive tapes were applied directly to the skin	43	25.3	41	24.1	86	50.6
All used supplied disposed of in proper place	21	12.4	42	24.7	107	62.9

In Table (4.13) shows that (50%) of them always label the container, (48.2%) of them never wear gloves to collect specimens, (53.5%) of them never place all specimen containers on a clean paper towel, and (65.9%) of them know those specimen containers should be transported in trays, (57.6%) of them never remove gloves and wash hands.

Table 4.13. Distribution of nurses' practice toward infection control (bed making).

Question	Always		Sometimes		Never	
	f	%	f	%	f	%
Bed making						
Prepare sheets and blankets which needed	23	13.5	28	16.5	119	70.0
Wash hands	23	13.5	64	37.6	83	48.8
Wear gloves	43	25.3	33	19.4	94	55.3
Soiled, wrinkled, stained, or contaminated sheets should be changed	61	35.9	54	31.8	55	32.4
Sheets should change on discharge	27	15.9	56	32.9	87	51.2
All used sheets are kept in a laundry bag or plastic bag	32	18.8	47	27.6	91	53.5
Avoid shaking linen	61	35.9	58	34.1	51	30.0
Wash hands	22	12.9	54	31.8	94	55.3

This table (4.14) shows that (45.3%) of the nurses always prepare equipment, (39.4%) of them sometimes put the patient in the proper position, (65.3%) of them never wash hands or use hand sanitizer, (52.9%) of them always open suction device, (70%) of them never open sterile catheter, (70%) of them never pour sterile saline in sterile cap prepared for this purpose, (61.2%) of them never don sterile glove in the dominant hand, (65.3%) of them never use a clean disposable glove on other hand, (54.1%) never pick up the sterile catheter with sterile hand, (55.9%) of them never control on the suction device connection with a clean hand, (45.3%) of them sometimes insert the catheter into the trachea, rinse catheter with saline, (36.5%) of them never clean mouth cavity with the same catheter, (42.9%) of them rinse catheter and suction tube with saline, (52.4%) of them remove glove by pulling them off with their dominant hand to hold the catheter, (45.9%) of them always turn off the suction device, (55.3%) of them never dispose of all disposable supplies, (70%) of them never wash their hands.

Table 4.14. Distribution of nurses' practice toward infection control (suction).

Question	Always		Sometimes		Never	
	f	%	f	%	F	%
Suction						
Prepare equipment	77	45.3	69	40.6	24	14.1
Put the patient in the proper position	66	38.8	67	39.4	37	21.8
Wash hands or use hand sanitizer	15	8.8	44	25.9	111	65.3
Open suction device	90	52.9	48	28.2	32	18.8
Open sterile catheter	21	12.4	30	17.6	119	70.0
Pour sterile saline into a sterile cap prepared for this purpose	9	5.3	42	24.7	119	70.0
Don sterile glove in the dominant hand	16	9.4	50	29.4	104	61.2
Use clean disposable gloves on another hand	32	18.8	27	15.9	111	65.3
Pick up the sterile catheter with a sterile hand	21	12.4	57	33.5	92	54.1
Control the suction device connection with a clean hand	28	16.5	47	27.6	95	55.9
Insert the catheter into the trachea, rinse the catheter with saline	39	22.9	77	45.3	54	31.8
Clean mouth cavity with the same catheter	47	27.6	61	35.9	62	36.5
Rinse catheter and suction tube with saline	57	33.5	40	23.5	73	42.9
Remove gloves by pulling them off with your dominant hand to hold the catheter. The catheter will stay coiled within the glove.	32	18.8	49	28.8	89	52.4
Turn off the suction device	78	45.9	40	23.5	52	30.6
Dispose of all disposable supplies	18	10.6	58	34.1	94	55.3
Wash hands	10	5.9	41	24.1	119	70.0

In Table (4.15) shows that (55.9%) of the nurses know that separated machines should be used for each patient, (61.2%) of them know that all contents should be discarded after use, (47.1%) of them know that bottles washed and dried and fresh connecting tubes replaced, (52.4%) of them know that each time, a new catheter must be utilized, (60%) of them know that the bottle must be kept dry when the device is not in use, and the tubing and catheter must not be attached till the device is utilized.

Table 4.15. Distribution of nurses' practice toward infection control (Maintenance of suction equipment).

Question	Always		Sometimes		Never	
	f	%	f	%	f	%
Maintenance of suction equipment						
A separate machine should be used for each patient	13	7.6	62	36.5	95	55.9
All contents should be discarded after use	16	9.4	50	29.4	104	61.2
Bottles were washed and dried and fresh connecting tubes replaced	28	16.5	62	36.5	80	47.1
Each time, a new catheter must be utilized.	12	7.1	69	40.6	89	52.4
The bottle must be kept dry when the device is not in use, and the tubing and catheter must not be attached till the device is utilized.	20	11.8	48	28.2	102	60.0

This table (4.16) shows that the nurses have a mean for all domains of practice and an overall scores of (9.64) for handwashing, (3.69) for hand antisepsis, (16.02) for isolation precaution, (5.84) for the mask, (12.88) for medication, (12.78) for intervention medication, (8.85) for sharp disposal, (10.13) for spillage, (34.55) for indwelling urinary catheter, (9.04) for transporting the patient to another department, (20.16) for wound site care, (8.56) for collection of specimen, (13.75) for bed making, (29.70) for suction, (7.76) for maintenance of suction equipment, and finally (203.4) for overall practice score for infection control.

Table 4.16. Overall assessment of nurses' practice about infection control.

Scales	Mean	Standard dev.	Minimum	Maximum
Handwashing	9.64	2.125	6	15
Hand antisepsis	3.69	1.116	2	6
Isolation precautions	16.02	2.819	10	24
Mask	5.84	1.566	3	9
Medication	12.88	2.513	8	19
Intervention medication	12.78	2.23	9	21
Sharp disposal	8.85	1.729	5	13
Spillage	10.13	1.832	7	14
Indwelling urinary catheter	34.55	4.010	25	44
Transporting the patient to another department	9.04	1.565	6	13
Wound site care	20.16	2.533	15	26
Collection of specimens	8.56	1.613	5	12
Bed making	13.75	2.247	9	19
Suction	29.70	3.162	22	37
Maintenance of suction equipment	7.76	1.870	5	13
Overall practice	203.4	15.8	162	239

This table (4.17) shows that there is no statistically significant correlation between nurse practice and age, gender, residence, marital status, education & years of experience.

Table 4.17. Distribution of nurses score obtained from practice.

Scale	Gender	N	Average	SD	t	P
Practice	Male	98	203.5	15.6	0.16	0.87
	Female	72	203.1	16.1		
Scale	Age	N	Average	SD	X²	P
Practice	21-25	51	202.8	15.19	1.05	0.9
	26-30	75	204.9	15.92		
	31-35	21	202.14	17.58		
	36-40	22	200.5	15.61		
	41-45	1	201	0.00		
Scale	Residence	N	Average	SD	t	P
Practice	Urban	118	203.4	16.7	0.098	0.92
	Rural	52	203.1	13.6		
Scale	Marital status	N	Average	SD	t	P
Practice	Single	73	202.7	15.4	0.50	0.62
	Married	97	203.9	16.1		
Scale	Education	N	Average	SD	X²	P
Practice	Nursing secondary school	28	203	9.82	0.35	0.84
	Institute graduate	67	203.8	14.61		
	College graduate	75	203	18.5		
Scale	Years of service	N	Average	SD	X²	P
Practice	1-5	99	205.2	16.8	3.7	0.3
	6-10	40	200.7	13.7		
	11-15	21	200.9	14.9		
	16-20	10	200.7	13.3		

5. DISCUSSION OF THE RESULTS

Regarding to nurses practice about handwashing, the finding indicated that (41.8%) of nurses sometimes In between each occurrence of direct contact with the patient during care, the hands should be cleansed quickly, (37.6%) of them sometimes Handwashing after coming into contact with a microorganism source (body fluids substances, mucous membrane), (52.9%) never handwashing after contact between different patients, (62.9%) never handwashing after removing gloves, (63.5%) never Use a paper towel, reused sterile towel, or single-use towel to dry, (66.5%) never Using a clean, dry paper towels, shut off the water. Regarding to nurses practice about hand antisepsis, the finding indicated that (41.2%) of nurses always using before performance of invasive procedure, (58.2%) never hand antiseptic between care of different patient

In descriptive research, over 69 percent (167) of the respondents said they wash their hands often, and 69.1 percent (168) said they use alcohol-based hand massages. Hand washing was reported by 91.4 percent (222) of the participants following exposure to bodily fluids, 88.5 percent (215) when their hands seemed filthy, and 87.2 percent (212) after departing an isolation room. The lowest percentage of people washing their hands following physical contact with patients was 70.8 percent (172), followed by 72.4 percent (176) prior to any medical procedure and 73.3 percent (178) before reaching an isolation room (Al Mohaithef 2020).

According to Neme *et al.* (2020), 72.82 percent of research participants do not wash their hands before contacting a patient. Two-thirds of the respondents (66.59 percent) wipe their hands after being exposed to bodily fluids. According to the findings of descriptive research done by (Bimerew ve Muhawenimana 2022), the majority of people (178, or 91.3 percent) reported handwashing before non-invasive procedures; 156 (or 80%) reported hand washing before personal interaction, while 39 (20%) did not. Handwashing was reported by 161 (82.6%) people before contact with bodily fluids, 167 (85.6%) people before handling polluted various objects, and 136 (69.7%) people before having to handle waste materials, while hand washing was not revealed by 59 (30.3%) people before having to handle waste materials. This result contradicted the findings of the current research.

Regarding nurses' practice isolation precautions, the finding indicated that (61.2%) never wash their hands and dry them thoroughly, (40%) choose the correct size of gloves, (49.4%) wear gloves in a proper way, (36.5%) remove gloves in the proper way, (49.4%) drop gloves in an appropriate waste receptacle, (56.5%) wash hands after removing gloves, (64.1%) glove should be worn for all invasive procedure, (61.2%) gloves must be worn at direct contact with body fluid, (68.2%) gloves worn as single items remove when the activity is complete, (74.1%) change gloves between different activities.

Suliman *et al.* (2018) discovered that the mean score was 10.36 3.8 in descriptive research. Only 65 percent of nurses said they followed isolation protocols correctly, while 22 percent said they did so in an acceptable manner and 23 percent said they didn't. The lowest reported practices were wearing a mask every time a nurse has a respiratory disease (60.1 percent) and wearing personal protection equipment while caring for the airborne isolated patients (57.6 percent). When the isolation materials and instruments were examined, it was discovered that 46.4 percent of units and wards lacked isolation signs, 34.5 percent lacked isolation posters, and 33.3 percent lacked isolation rooms. In addition, there was a shortage of disinfection treatments and needle disposal bins. The researchers also discovered that just 20.2 percent of nurses followed conventional infection control procedures, and only a handful followed transmission-based isolation precautions (11.9 percent). This discovery was similar to ours.

According to the findings of descriptive research, the majority of respondents always followed transmission-based measures like hand cleanliness following all operations. PPE is always worn for COVID patients needing health care facility admission and with aerosol-generating procedures, according to 327 (89.1%) of the respondents, and 305 (83.1%) of the respondents agree. The respondents also specified the provision of a trash receptacle to dispose of tissues after usage 331 (90.2 percent), providing resources for conducting hand hygiene in or near the waiting area 325(88.6 percent), and control of the number of visitors surrounding a patient 305 (83.1 percent) (Afemikhe *et al.* 2020). Another research found that nurses adhered to isolation protocols for avoiding hospital infections to a high degree (Tanyeri and Işk 2021).

Regarding nurses' practice with masks, the finding indicated that (42.4%) of nurses sometimes Wear face masks in a proper way, (37.6%) Use masks in all procedures that need to provide a completely sterile field, and (50%) never Discard them in the proper receptacle.

According to the findings of the descriptive research, 318 (78.7 percent) of all nurses had inadequate practical face mask usage. In response to a specific question, 306 (76.5 percent) of participants do not eliminate their face masks at work; the remaining 23.5 percent remove their masks when they experience shortness of breath, and 123 (30.4) of respondents said they always store the used protective masks in a bag for later use during conversations with patients. Only 133 (32.9 percent) of them always wash, disinfect, and/or put on a clean pair of gloves before wearing a surgical face mask, while 99 (24.5 percent) did not use any kind of cleaning agent to keep their surgery facial mask clean (Leakem 2021). This result matched what we found in the current research.

Regarding nurses' practice of medication, the finding indicated that (47.1%) always eliminate unnecessary injections, (61.8%) never wash hands and observe other appropriate infection control procedures, (41.8%) sometimes prepare the medication and prevent contamination of medications, (51.2%) always use sterile needle and syringe, (49.4%) never put on clean gloves, (55.3%) never clean the site with an antiseptic swab, (45.9%) never remove the needle cover without contaminating the needle.

Alhashemi *et al.* (2019) supported our finding. They found that nurses have good adequate practice regarding solid dosage-form crushing, tube flushing and drugs dilution from, mixing crushed drugs through a feeding tube, and practice regarding verification of the feeding tube position.

Regarding nurses' practice regarding intervention medication, the finding indicated that (54.1%) never wash hands and use alcohol for hand antisepsis (36.5%) sometimes replace tourniquet and palpate the vein, (61.8%) never wear gloves, (54.1%) never clean

the site by antiseptic solution, (55.9) never cleaning done by circular motion outward from the insertion site, (58.2%) never proper dressing by gauze or transparence used, (60.6%) remove gloves, (61.2%) never wash hands or alcohol antiseptis method used.

According to Abd Elmageed *et al.* (2020), more than three-quarters of nurses (75.7 percent) have bad practice scores in medication preparation, and slightly more than three-fifths (60.7 percent) have poor practice scores in drug delivery. Furthermore, significantly less than half of the nurses (39.3%) had bad practice after providing medicine. Finally, over half of the nurses (46.4 percent) have a bad total practice score. Yusefzadeh *et al.* (2018) found that "reconstitution of a medicine using diluents from the same manufacturer" was performed 17 percent of the time, and hand hygiene was performed 19 percent of the time, with only injection providers having to wash their hands 19 percent of the time and using alcohol-based hand rub 15 percent of the time. Only half of the injections (44%) employed needle removers or needle destroyers. Thirteen percent of those polled had never mentioned NSIS or sharps injuries to a supervisor, while 17.1 percent had reported NSIS or sharps injuries on occasion.

According to the findings, 64.7 percent of nurses never place sharps in sharps containers immediately after use, (46 percent) always install sharps containers as close as an arms-length, (57.1 percent) always needles must not be broken prior to use or disposal, (51.8 percent) never these containers must be filled just above mark indicating that they are full, and (73.5 percent) never containers should be filled just above mark revealing that they are full.

In descriptive research, Samadder *et al.* (2020) discovered that 180 (90.0 percent) of respondents recognized the suitable color bin to classify sharp medical waste as red, whereas 20 (10.0 percent) didn't. 190 (95 percent) of the respondents said a color-coded container with a cover is used to collect sharp medical waste, whereas 10 (5.0 percent) said no. The majority of respondents, 103 (51.5%), believe that locking the color bin to dispose of sharp medical waste when it is 34 percent full is a good idea, while 97 (49%) do not. Out of 200 people polled, 165 (82.5%) said they carry sharp medical waste using a wheeled cart and a color-coded container, whereas 35 (17.5%) said they don't.

The majority of the 191 (95.5%) respondents said that while disposing of sharp medical waste, they should wear gloves, masks, gowns, goggles, and gumboots, while 9 (4.5%) said they should just wear gloves. Among the respondents, 180 (90.0 percent) use needle cutters for sharp medical waste segregation and 20 (10.0 percent) don't, whereas 155 (83.0 percent) use color bins for sharp medical waste segregation and 45 (17.0 percent) don't. When they are hurt by sharp objects, 170 (85.0 percent) of the 200 responders clean the affected area using hexitols/viodin. This conclusion is consistent with the findings of the current investigation.

According to Birhanu *et al.* (2019), the majority of respondents (181) said they never recapped needles after delivering injections, and 49 said they never recapped needles after giving injections (19.6 percent). Out of 247 respondents, 121 (49%) said they always disposed of produced garbage into appropriate color-coded containers, while 50 (20.2%) said they performed waste segregation at the moment of waste creation and 46 (18.6%) said they separated waste by kind.

Regarding nurses' practice about spillage, the finding indicated that (72.9%) never disposable gloves should be always be worn when cleaning spillage, (38.8%) sometimes contaminated areas covered with chlorine releasing granules powder or proper disinfectant solution, (47.1%) never contaminated fluid is completely absorbed with a disposable paper wipe, discard into the appropriate place, (61.2%) never the surface should be washed by using a disposable paper wipe and dried, (42.9%) sometimes the area wiped with disinfectant, (60.6%) never all waste disposable gloves should be discarded as clinical waste.

Wahba (2016) consisted with our findings, they found that half of them (52%) in terms of infection control, lacked experience. While, Boakyea and Mavhandu-Mudzusic, (2019) a majority of the participants scored high 128 (56%).

Regarding nurses' practice about indwelling urinary catheter, the finding indicated that (59.4%) always prepare the equipment needed, (57.9%) never wash hands, (64.1%) never wears clean gloves, (38.2%) sometimes put the patient in suitable position,

(67.6%) never remove gloves, (63.5%) never hand antisepsis with alcohol used, (61.8%) never open equipment on sterile field, (48.2%) never wear sterile gloves, (54.1%) never place sterile drape under patient hip then use fenestrated drapes to cover lower abdominal area so that only the genital area remain exposed, (51.8%) never power povidone-iodine to sterile bowel or basin, (50.6%) always attach the drainage bag to the other end of the catheter, (57.1%) never for female wipe one side of the urinary meatus with cotton ball soaked with iodine by using sterile forceps clean the other side by separated piece of cotton then wipe directly over the meatus by new application by using downward motion for male, clean the penis with sterile cotton or application held in forceps by using a circular motion stating at the urinary meatus and working outward, (42.9%) always be sure that the clamp at the emptying part of the drainage bag is closed, (36.5%) always insert urinary catheter with suitable size and inflate the catheter balloon, (58.2%) never place the catheter with adhesive tape, (47.1%) never the bag should be kept below the body level, (53.5%) never the bag should be kept off the floor, (65.3%) never dispose of all used supplies properly, (65.3%) never remove gloves, (66.5%) never wash hands.

According to Algarni *et al.* (2019), the majority of nurses (83.94 percent) had poor practices regarding indwelling urinary catheters. While 16.06 percent of nurses said that their practices were excellent. This conclusion is consistent with the current findings of our research.

Only 26.87 percent of nurses thorough handwashing in between catheter insertion, according to Rashmi and Dhaka (2021). Only 29.37 percent of nurses do catheter care on a daily basis. Throughout any catheter administration or while draining the collecting bag, at least 15.62 percent of the nurses use a gown and clean gloves. When an obstruction is expected, only 48.75 percent of nurses do close continuous irrigation.

Regarding nurses' practice of transporting the patient to other department, the finding indicated that (44.1%) never drape the stretcher with clean sheet, (51.8%) never wrap the patient with clean material, (39.4%) always control and contain any patient's drainage, (37.6%) always clamp the urine bag tube during transportation, (69.4%) never disinfect the stretcher after use.

Regarding nurses' practice about wound site care, the finding indicated that (42.9%) always prepare equipment which needed, (42.4%) sometimes clean the dressing trolley top by using a detergent solution and disposable the trolley top wipe with alcohol, (40.6%) never clean activities (bed making should be avoided during dressing procedure, windows should be closed), (42.9%) always put the patient in the proper position, (58.2%) never wash hands, (54.7%) never pour the antiseptic solution into the sterile basin, (56.5%) never apply sterile gloves, (37.1%) always using sterile soaked gauze or swab wipe wound site directly with up-down motion separated for each side, (37.1%) always clean drain site with separated gauze, (50.6%) never dry sterile gauze placed, adhesive tapes applied directly on the skin, (62.9%) never dispose all used supplies in a proper place.

According to Sürme *et al.* (2018), over 50% of the nurses did not follow wound healing practices on a regular basis, and more than 50% of the nurses did not follow wound care discharge education practices on a regular basis.

In descriptive research, Najm and Hussein (2018) discovered that the grand mean score of total wound dressing practice was on par with medium nursing practice ratings. Most of those elements are connected to infection control practice and have a low wound dressing practice. Discard wound dressing supplies 0.79 and preparation and evaluation items 0.99 had lower grand mean wound dressing practice scores. The grand mean score for wound irrigation and dressing items was greater than the grand mean score for total wound dressing practice. These results backed up the findings of our research.

Regarding nurses' practice regarding the collection of specimens, the finding indicated that (50%) always label the container, (48.2%) never wear gloves to collect specimens, (53.5%) never all specimen containers placed on a clean paper towel, (65.9%) never specimen containers should be transported in trays, (57.6%) never remove gloves and wash hands.

Regarding nurses' practice about bed making, the finding indicated that (70%) never prepare sheets and blankets which needed, (48.8%) never wash hands, (55.3%) never

wear gloves, (35.9%) always soiled, wrinkled, stained, or contaminated sheets should be changed, (51.2%) never sheets should change on discharge, (53.5%) never all used sheets kept in a laundry bag or plastic bag, (35.9%) always avoid shaking linen, (55.3%) never wash hand.

Regarding nurses' practice about suction, the finding indicated that (45.3%) always prepare equipment, (39.4%) sometimes put the patient in proper position, (65.3%) never wash hands or use hand sanitizer, (52.9%) always open suction device, (70%) never open sterile catheter, (70%) never pour sterile saline in sterile cap prepared for this purpose, (61.2%) never don sterile glove in the dominant hand, (65.3%) never use clean disposable glove on other hand, (54.1%) never pick up the sterile catheter with sterile hand, (55.9%) never control on the suction device connection with clean hand, (45.3%) sometimes insert catheter into trachea and rinse catheter with saline, (36.5%) never clean mouth cavity with the same catheter, (42.9%) rinse catheter and suction tube with saline, (52.4%) remove gloves by holding the catheter with the dominant hand and pull gloves off, the catheter remain coiled inside the gloves, (45.9%) always turn off suction device, (55.3%) never dispose of all disposable supplies, (70%) never wash hands.

In terms of nurses' suction equipment maintenance practices, the findings revealed that (55.9%) never separate machines should be used for each patient, (61.2%) never all content must be thrown after use, and (55.9%) never all content must be discarded after use, (47.1 percent) never wash and dry bottles and change connecting tubes, (52.4%) never use a new catheter each time, (60%) never keep the bottle dry while the machine is not in use, and the tube and catheter should not be linked until it is utilized.

According to the findings of descriptive research conducted in Iraq by Majeed (2017), 72 percent of nurses said that endotracheal tube suction (ETS) is performed only when necessary, and 72 percent of them believe that the closed approach is the best for endotracheal tube suctioning. 50 percent of nurses said a nasotracheal suctioning catheter could be inserted up to 16-20 cm, 48 percent only said endotracheal tube suctioning had to be done while withdrawing the catheter, 58 percent said the maximum suction time was 10-15 seconds, 70 percent said the semi fowler's position is

appropriate and comfortable for ETS, and 66 percent said the endotracheal tube had to be changed after each suction. The usage of personal protective equipment (PPE) was confirmed, with strong adherence to the use of gloves (92 percent) and frequent use of the mask and apron, comparable to what has been documented in the literature (72 percent and 60 percent). This result contradicted the findings of the current research.

The nurses have a mean for all domains of practice and overall scores, (9.64) for handwashing, (3.69) for hand antisepsis, (16.02) for isolation precaution, (5.84) for the mask, (12.88) for medication, (12.78) for intervention medication, (8.85) for sharp disposal, (10.13) for spillage, (34.55) for indwelling urinary catheter, (9.04) for transporting the patient to another department, (20.16) for wound site care, (8.56) for collection of specimen, (13.75) for bed making, (29.70) for suction, (7.76) for maintenance of suction equipment, and finally (203.4) for overall practice score for infection control.

According to Kalantarzadeh *et al.* (2014), (75.8%) had an intermediate degree of infection control performance. According to Fashafsheh *et al.* (2015), 91.14 percent of nurses had effective infection control practices.

Age, gender, location, marital status, education, and years of experience have no statistically significant link with nurses' practice.

According to Kalantarzadeh *et al.* (2014), there was a strong link between sex and participant performance ($p = 0.014$). According to Fashafsheh *et al.* (2015), there is no statistically significant association between nurse practice and age or years of experience.

6. CONCLUSION AND RECOMMENDATION

6.1. Conclusion

The study finding concluded that the majority of nurses have poor infection control practices. They had poor handwashing & hand antisepsis management. Nurses have poor isolation precautions (donning and removing personal protective equipment gloves). Nurses have moderate practice in dealing with masks, medication administration, and injection, also with intervention medication. Nurses have a poor level of practice regarding sharps disposal and spillage. Nurses have poor preparation for the equipment of urinary catheters and catheter-associated UTIs. Nurses have unsatisfactory performance with transporting the patient in a safe way to another ward inside the hospital. Nurses have inadequate skills in wound care. Nurses have poor practice in the collection of specimens and bed-making of the patient. Finally, nurses have poor practice in suction management and maintaining suction equipment. There is no statistically significant correlation between nurses' infection control practices and their demographic factors.

6.2. Recommendation

The study recommended that: Follow up on nurses' practice and identify the weak points in their practice regarding infection control and nosocomial infection. Nurses require additional training programs and educational institutions to concentrate more on prevention strategies in order to increase their understanding and adherence to infection-control prevention strategies. Educate nurses about techniques of handwashing and hand antisepsis methods. Encourage nurses to use personal protective equipment and teach them about the correct way to use the ppe. Educate nurses about dealing with medical and sharp waste. Educate nurses about how to prepare a bed for patients. Encourage nurses to make training sessions about the essential of nurses' practice regarding medication use and administration. Educate nurses about catheter-associated urinary tract infections and how to control infection of the urinary tract. Educate nurses about

wound dressing and management. Educate nurses about lung and endotracheal tube suction with the size of the suction tube according to the age.



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APPENDICES

APPENDIX A: Questionnaire

Hospital name:

Part One:

Demographical Data:

1- Gender: Male ☐ Female ☐

2- Age: years old

3- Educational level: Secondary school ☐ Institution ☐

College ☐

4- Marital status: Single ☐ Married ☐

5-Residency: Urban ☐ Rural ☐

5- Specialty:

Part Two:

General information:

Years of experience: years

Years of experience in Emergency Room: years

Training courses related to Infection Control: Numbers Duration

Part 3

Hand washing

Items		1st Observation		2nd observation		3rd observation		Final		
		Yes	No	Yes	No	Yes	No	never	sometimes	always
1	Hand must be immediately washed before and after each episode of direct contact with patient during care.									
2	After contact with a source of microorganisms (body fluid substance, mucous membranes).									
3	After contact between different patients.									
4	After removing gloves									
5	Dry with paper towel, reusable sterile or single use towels									
6	Turn off the water using clean, dry paper towel		☐							

Hand antisepsis

Items		1st observation		2nd observation		3rd observation		Final		
		Yes	No	Yes	No	Yes	No	never	sometimes	always
1	Using before performance of invasive procedure									
2	Hand antiseptic between care of different patient									

ISOLATION PRECAUTIONS

Donning and Removing Personal Protective Equipment

Gloves

Items		1st observation		2nd observation		3rd observation		Final		
		Yes	No	Yes	No	Yes	No	never	sometimes	always
1	Wash hands and dry thoroughly									
2	Choose the correct size gloves									
3	Wear gloves in proper way									
4	Remove gloves in proper way									
5	Drop gloves in appropriate waste receptacle									
6	Wash hands after removing gloves									
7	Gloves must be worn for all invasive procedures									
8	Gloves must be worn at direct contact with body fluid									
9	Gloves worn as single items remove when the activity is complete									
10	Change gloves between different activities									

Mask

Items		1st observation		2nd observation		3rd observation		Final		
		Yes	No	Yes	No	Yes	No	never	sometimes	always
1	Wear face mask in proper way									
2	Use mask in all procedures that need to provide complete sterile field									
3	Discard it in proper receptacle									

Medications

Administering an Injection

Items		1st observation		2nd observation		3rd observation		Final		
		Yes	No	Yes	No	Yes	No	never	Sometimes	always
1	Eliminate unnecessary injections									
2	Wash hands and observe other appropriate infection control procedures.									
3	Prepare the medication and prevent contamination of medications									
4	Use sterile needle and syringe									
5	Put on clean gloves.									
6	Clean the site with an antiseptic swab									
7	Remove the needle cover without contaminating the needle.									

INTRAVENOUS MEDICATION

Items		1st observation		2nd observation		3rd observation		Final		
		Yes	No	Yes	No	Yes	No	never	sometimes	always
1	Wash hands and use alcohol for hand antisepsis									
2	Replace tourniquet and palpate the vein									
3	Wear gloves									
4	Clean the site by antiseptic solution									
5	Cleaning done by circular motion outward from the insertion site									
6	Proper dressing by gauze or transparence used									
7	Remove gloves									
8	Wash hands or alcohol antisepsis method used									

Sharp disposal

Items		1st observation		2nd observation		3rd observation		Final		
		Yes	No	Yes	No	Yes	No	never	sometimes	always
1	Sharp should be placed in sharps container immediately after use									
2	Install sharps containers as close as an arms length									
3	Needles must not bent or broken prior to use or disposal									
4	These containers must not be filled above the mark indicating that they are full									
5	Containers should not be placed on the floor located in a safe position									

spillage

Items		1st observation		2nd observation		3rd observation		Final		
		Yes	No	Yes	No	Yes	No	never	sometimes	always
1	Disposable gloves should be always be worn when cleaning spillage									
2	Contaminated area covered with chlorine releasing granules powder or proper disinfectant solution									
3	Contaminated fluid is completely absorbed with a disposable paper wipe, discard into appropriate place									
4	The surface should be washed by using a disposable paper wipe and dried									
5	The area wiped with disinfectant									
6	All waste disposable gloves should be discarded as clinical waste									

Indwelling urinary catheter

Items		1st observation		2nd observation		3rd observation		Final		
		Yes	No	Yes	No	Yes	No	never	sometimes	always
1	Prepare the equipment needed									
2	Wash hands									
3	Wears clean gloves									
4	Put the patient in suitable position									
5	Remove gloves									
6	Hand antisepsis with alcohol used									
7	Open equipment on sterile field									
8	Wear sterile gloves									
9	Place sterile drape under patient hip then use fenestrated drapes to cover lower abdominal area so that only the genital area remain exposed									
10	Power povidone-iodine to sterile bowel or basin									
11	Attach the drainage bag to the other end of the catheter									
12	For female wipe one side of the urinary meatus with cotton ball soaked with iodine by using sterile forceps clean the other side by separated piece of cotton then wipe directly over the meatus by new application by using downward motion for male, clean the penis with sterile cotton or application held in forceps by using a circular motion stating at the urinary meatus and working outward									
13	Be sure that the clamp at the emptying part of the drainage bag is closed									
14	Insert urinary catheter with suitable size and inflate the catheter balloon									

15	Place the catheter with adhesive tape									
16	The bag should be kept below the body level									
17	The bag should be kept off the floor									
18	Dispose of all used supplies properly									
19	Remove gloves									
20	Wash hands									

Transporting the patient to other department

Items		1st observation		2nd observation		3rd observation		Final		
		Yes	No	Yes	No	Yes	No	never	sometimes	always
1	Drape the stretcher with clean sheet									
2	Wrap the patient with clean material									
3	Control and contain any of patients drainage									
4	Clamp the urine bag tube during transportation									
5	Disinfect the stretcher after use									

Wound site care (dressing)

Items		1st observation		2nd observation		3rd observation		Final		
		Yes	No	Yes	No	Yes	No	never	sometimes	always
1	Prepare equipment which needed									
2	Clean dressing trolley top by using detergent solution and disposable the trolley top wipe with alcohol									
3	Cleaning activities (bed making should be avoided during dressing procedure, windows should be closed)									
4	Put the patient in proper position									
5	Wash hands									
6	Pour antiseptic solution in to sterile basin									
7	Apply sterile gloves									

8	Using sterile soaked gauze or swab wipe wound site directly with up-down motion separated for each side								
9	Clean drain site with separated gauze								
10	Dry sterile gauze placed, adhesive tapes applied directly on skin								
11	All used supplied disposed in proper place								

Collection of specimen

Items		1st observation		2nd observation		3rd observation		Final		
		Yes	No	Yes	No	Yes	No	never	sometimes	always
1	Label the container									
2	Wear gloves to collect specimen									
3	All specimen containers placed on a clean paper towel									
4	Specimen containers should be transported in trays									
5	Remove gloves and wash hands									

Bed making

Items		1st observation		2nd observation		3rd observation		Final		
		Yes	No	Yes	No	Yes	No	never	sometimes	always
1	Prepare sheets and blankets which needed									
2	Wash hands									
3	Wear gloves									
4	Soiled, wrinkled, stained or contaminated sheets should be changed									
5	Sheets should change on discharge									
6	All used sheets kept in laundry bag or plastic bag									
7	Avoid shaking linen									
8	Wash hand									

Suction (lung hygiene)

Items	1st observation		2nd observation		3rd observation		Final		
	Yes	No	Yes	No	Yes	No	never	sometimes	always
1 Prepare equipment									
2 Put the patient in proper position									
3 Wash hands or use hand sanitizer									
4 Open suction device									
5 Open sterile catheter									
6 Pour sterile saline in sterile cap prepared for this purpose									
7 Don sterile glove in the dominant hand									
8 Use clean disposable glove on other hand									
9 Pick up the sterile catheter with sterile hand									
10 Control on the suction device connection with clean hand									
11 Insert catheter into trachea, rinse catheter with saline									
12 Clean mouth cavity with the same catheter									
13 Rinse catheter and suction tube with saline									
14 Remove gloves by holding the catheter with the dominant hand and pull gloves off, the catheter remain coiled inside the gloves									
15 Turn off suction device									
16 Dispose of all disposable supplies									
17 Wash hands									

Maintenance of suction equipment

Items		1st observation		2nd observation		3rd observation		Final		
		Yes	No	Yes	No	Yes	No	Never	sometimes	always
1	Separated machine should be used to each patient									
2	All contents should be discarded after use									
3	Bottles washed and dried and fresh connecting tubes replaced									
4	Fresh catheter should be used at each time									
5	When the machine is not use bottle should be kept dry, the tube and catheter should not connected until it is used									

APPENDIX B . Ethical apporval from Iraq







APPENDIX D: Editing Certificate



CURRICULUM VITAE

Personal Information

Name and Surname : Naji Yahya Naji AL SHUKUR

Education

MSc	Çankırı Karatekin University Graduate School of Health Sciences Department of Nursing	2020-Present
Undergraduate	University of Babylon College of Nursing Department of Nursing	2015-2018