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Effectiveness of sterilization technique used in wasit hospitals at emergency care unity

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( يَرْفَعِ اللَّهُ الَّذِينَ آمَنُوا مِنْكُمْ وَالَّذِينَ أُوتُوا الْعِلْمَ دَرَجَاتٍ )

(المجادلة: 11)

## الاهداء

إلى صاحب السيرة العطرة، والفكر المُستنير؛

فلقد كان له الفضل الأَوَّل في بلوغي التعليم العالي

(والدي الحبيب).

إلى من وضعتني على طريق الحياة، وجعلتني رابط الجأش،

وراعتني حتى صرت كبيراً

(أمي الغالية).

إلى إخوتي ؛ من كان لهم بالغ الأثر في كثير من العقبات والصعاب.

إلى جميع أساتذتي الكرام ؛

ممن لم يتوانوا في مد يد العون لي وبالخصوص الاستاذ ( هاني البدري )

أهدي إليكم بحثي .....

## **Terminology**

EPA.....Environmental Protection Agency

CDC.....centers for disease control and prevention

HIV.....human immunodeficiency virus

HBV .....hepatitis B virus

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# Chapter one

## 1.1. Introduction

Medical devices that enter sterile tissue during a surgical procedure should be sterile when used. Sterilization is a legalized process for version a new, previously used, or contaminated reusable medical device ready for use on a patient. This process includes the following steps: initial cleaning at the point of use to prevent drying of soil and contaminants in or on the device,

- thorough cleaning of the item,
- inspection for correct function and cleanliness,
- correct packaging for sterilization, and
- sterilization of the item to destroy any microbial contamination (Link, 2019)

With increasing use of complex medical equipment in the healthcare setting, the challenge of ensuring adequate cleaning and disinfection of instruments is increasing. Outbreaks or incidents related to inadequate reprocessing of endoscopes have recently highlighted the urgency of ensuring excellence in practices at the sterilization or reprocessing department . The intent of this document is to highlight practical recommendations in a concise format designed to assist healthcare facilities



at Asia Pacific region in achieving high standards in sterilization and disinfection. This document is a summary of the revised APSIC Guidelines for Disinfection and Sterilization of Instruments in Health Care Facilities developed by the Asia Pacific Society of Infection Control (Ling, Patricia, Ammar, Aliso, & Nanthipha, 2020)

All invasive procedures involve contact by a medical device or surgical instrument with a patient's sterile tissue or mucous membranes. The level of disinfection or sterilization is dependent on the intended use of the object: critical (items that contact sterile tissue such as surgical instruments), semicritical (items that contact mucous membrane such as endoscopes), and noncritical (devices that contact only intact skin such as stethoscopes) items require sterilization, high-level disinfection, and low-level disinfection, respectively. Cleaning must always precede high-level disinfection and sterilization (Rutala, 2013)

## **1.2. Importance of study**

the effective use of antiseptics, disinfectants, and sterilization procedures in health care settings is important in the prevention of hospital-acquired infections. Sterilization can be accomplished by the steam autoclave, ethylene oxide gas sterilizers, and with EPA-ap-proved chemical sterilants. Devices or items that come into contact with mucous membranes should be sterilized or, at a minimum, receive high-level disinfection. Chemical germicides that are registered with the EPA as sterilants may be used either for sterilization or for high-level disinfection depending on contact time.

Devices that are subjected to disinfection or sterilization procedures should be cleaned before being exposed to a chemical germicide, and the manufacturer's instructions for use of the germicide should be closely followed. Further, it is important that the manufacturer's specifications for compatibility of the medical device with chemical germicides be closely followed. In the specific instance of medical devices used in the field of anesthesiology, current recommendations by the American Society for Anesthesiologists, as well as other professional organizations and the CDC, are sufficient to prevent the transmission of infection from patient to patient and from patient to staff members. None of these classical protocols needs to be changed when these instruments are used on individuals infected with HIV or HBV (Martin,1989)

### **1.3. Statement of the Problem**

Effectiveness of sterilization technique used in wasit hospitals at emergency care unity

### **1.4. Objective of study**

The study aims to:

- 1) Effectiveness of sterilization technique used at emergency care unity
- 2) Find out the relationship between nurse's knowledge about the sterilization technique and their level of education, year of experiences, and training course

## **Chapter two ( Review of literature )**

### **2.1. Strilization ,disinfection and chemical sterilant definition**

Sterilization: Sterilization is defined as a process of complete elimination or destruction of all forms of microbial life (i.e., both vegetative and spore forms), which is carried out by various physical and chemical methods.

Chemical sterilant: These are chemicals used for a longer duration (3–12 h) to destroy all forms of microbes, e.g., peracetic acid (PAA) (0.2%), glutaraldehyde ( $\geq 2.4\%$ ), and hydrogen peroxide (7.5%).

Disinfection: Disinfection is defined as a process of complete elimination of vegetative forms of microorganisms except the bacterial spores from inanimate objects. (Mohapatra, 2017)

### **2.2. Classification of the instrument used in health care facility**

To determine the amount of chemical agent and the type of disinfection method required for surgical and other medical instruments that are reusable, the instruments are classified in three types: critical, semi-critical, and noncritical.

**Critical instruments** are those that are used on sterile tissue, including blood vessels, implants, endoscopic biopsy forceps, laparoscopes, and arthroscopes.

**Semi-critical instruments** are in contact with mucous membranes or nonhealthy skin, but are not used on sterile tissues. Cystoscopes, gastrointestinal endoscopes, bronchoscopes, anesthesia, vaginal probes, and respiratory therapy equipment are examples of this type of instruments. Noncritical tools are those in contact only with intact skin, such as blood pressure cuffs, tourniquets, linens, general use equipment, and environmental surfaces . The efficacy of any sterilization and disinfection method depends on the following three basic aspects. First, to achieve an effective destruction of living organisms. Second, the sterilizing processes and tools must be validated and suitable in design and procedure to accomplish a good combination of temperature and sterilant agent to be effective on microorganisms. Devices undergoing a disinfection process must be cleaned to reduce bio load to further confirm the effectiveness of the disinfection process. Third, there must be enough contact between the sterilant and all surfaces and fissures of the device to be sterilized . There are many methods used to sterilize and disinfect instruments such as steam, heat, chemicals, and others chemical methods using compounds with antiseptic or antimicrobial properties.( Thu-Alfeqar,2019)

### **2.3. Emergency department**

The Emergency Department (ED) is the place where patients are first exposed to the hospital's special infectious environment, and this is because of being primary entrance for patients admitted to the hospital. As the ED has specific obstacles to patient safety, involving, the urgency of treatment, staff shortages, and prolonged delays in moving patients to the ICU and other facilities, the introduction of infection control measures in the ED is likely to face particular challenges. In addition, improving hand hygiene and obeying with proper requirements for the application of a urinary catheter may not be initiated in a excited situation relative to the essential health care needs of the patient requiring emergency care. However, in western European EDs no published studies on infection prevention are available to date . The emergency department nurses are working to limit the transmission of infection and prevent harmful risks by supplying patients with health and curative care. In addition to research undertaken to improve the practical procedures of nurses, adopting protective strategies and prevention steps such as hand washing and other precautionary steps properly contribute to infection management( Kareem.ahmed,2021)

### **2.4. Types of sterilant material**

**Chlorhexidine gluconate (CHG)** Chlorhexidine gluconate is active against gram-negative and gram-positive bacteria including aerobes and anaerobes, yeasts, and fungi. CHG is a synthetic antimicrobial drug widely used as a broad-spectrum antiseptic in clinical and veterinary medicine. The

mechanism of action is through the interaction of the positive charge on the CHG molecule with negatively charged phosphate groups on the microbial cell wall resulting in a change in the osmotic equilibrium of the cell. The increase in the cell wall permeability allows the CHG molecule to penetrate the microbe and facilitate the release of cytoplasmic material

. Sterilization and disinfection are necessary to prevent the dissemination of infectious pathogens to patients and staff. The current study is an attempt to obtain a better sterilizing method.

**Povidone-iodine** iodine is toxic to microbes because it irreversibly associates with residues of tyrosine in the protein structure, interacts through the formation of hydrogen bonds with several amino acids and nucleic acids, oxidizes sulfhydryl groups, and reacts with lipid unsaturation . Povidone-iodine is a broad-spectrum antimicrobial solution effective against a variety of pathogens including *Staphylococcus aureus* . In addition to its antibacterial activity, it is also effective against fungi, viruses, protozoa, and some bacterial spores PVP-iodine has rapid in vitro activity (it is bactericidal within 15–20 s) and the duration of the effect on the skin has been reported to be 12–14 h due to a phenomenon called back-diffusion. Compared with antibiotics, there is little chance for bacteria to develop resistance to PVP-iodine because of the multiple cellular targets

Alcohols Alcohols are colorless solutions having one or more of functionally active hydroxyl groups<sup>14</sup>. Alcohols are classified as bacteriostatics or bactericidals against vegetative bacteria; they also act as a

fungicidal, , and virucidal but they do not destroy bacterial spores .( Thu-Alfeqar,2019)

## **Methodology**

This chapter presents the research design that has been used in this study. It included the sample selection, instrument construction, pilot study, methods of data collection and data analysis.

### **3.1. Design of the Study.**

Quantitative design (a descriptive study) has been carried out as a choice to specific phenomena of interest related to evaluate nurses' practices regarding sterilization techniques at Emergency Department in Wasit Alkut Teaching Hospital.

### **3.2. Setting of the Study.**

The present study is carried out in emergency department of the B Al Karrama Teaching Hospital in Wasit

### **3.3. Sample of the Study.**

A purposive (Non probability) sample of (50) nurses

### **3.4. Criteria of the Sample Selection**

The criteria for selecting the study samples are: Those who works at morning shift ,Male and female nurses. ,All the educational level of nurses, And Nurses who have agreed to participate in the study.

### **3.5. Instrument Construction**

The instrument was constructed through the review of the literature which is consists of three parts:

Part I: The demographic data includes nurses' characteristic (4 Items) which as age, gender, level of education, and marital status

Part II: consist of (4 Items) which as years of experience, years of experience in emergency, training course. emergency and the training course in or out of iraq

Part III this part consists from 8 domains which include: hand washing, gloves, gown, mask, instruments and equipment, peripheral venous catheter (PVC), intravenous IV fluids and medication, and medical waste management.



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