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Fundamentals of the Intensive Care Unit "ICU"

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ABSTRACT

The main idea of the research is to fully identify the most important intensive care units, their parts and the most important devices used in them, with an explanation of how to install the intravenous catheter. We will study the method of measuring the patient's temperature and the method of measuring the patient's pulse as well. We will explain what are the reasons or indications that require the patient to be fully anesthetized during his stay in intensive care. We will explain some of the medications and analgesics used. We will also explain delirium and its causes, knowing, evaluating and identifying them.

Keywords: patient, intensive care unit, temperature, measurement, tools, devices

INTRODUCTION

The intensive care unit is the appropriate place for treating critical cases that need special care and has a special medical staff in addition to a special nursing staff. The unit operates for 24 hours. The intensive care unit was established because there are severe and serious injuries that may lead to death, and also to care for patients after major surgeries. The first special 3-bed neurological intensive care unit was established at Johns Hopkins Hospital. The first special neonatal intensive care unit was established at Sarah Morcy Hospital in Chicago. During the years 1946-1948, when the polio epidemic swept the country of America and caused many deaths due to breathing problems, so the idea of manual ventilation was created in Denmark, by placing a tube in the trachea of infected patients, then this technique developed during the fifties of the last century into what is called the intensive care unit (Nates et al., 2016). There are two types of patients in intensive care:

1) Patients who require continuous monitoring due to the deterioration of one or more vital functions;
2) Patients who suffer from failure of the circulatory system, respiration, kidneys, or central nervous system.

In general, patients with very critical conditions or who suffer from irreversible or treatable diseases are not admitted to the intensive care unit.

ICU PARTS

The ICU parts are as follows:

1) The patient's room.
2) The central station (in the intensive care unit).
3) The laboratory that is used to perform analyzes such as blood gas analysis, blood enzyme analysis, blood sugar analysis, blood cholesterol analysis and liver function analysis.
4) The warehouse that is used to store medicines and medical supplies.
5) Medical equipment, including medical devices (11 devices), tools (7 tools), medical supplies (23 types), medicines (23 types), antibiotics (5 types), anesthetic drugs (2 types), solutions (9 types) 6-refrigerator to save Medicines that need very low temperature 7-mobile phones and records to record patient information (Figure 1) (Marshall et al.,

2017).

Figure 1: Intensive care unit

PATIENT TEMPERATURE MEASURING

Temperature is a number that indicates the state of the body in terms of cold and hot. Measuring tools that must be available (mercury thermometer, alcohol, gauze, timer) (Figure 2).

Figure 2: Temperature measurement tools

Oral measurement

The measurement method placing the silver part under the tongue for 3 minutes...then we work on cleaning the thermometer from the second part to the silver....we work on holding the thermometer vertically to see the level of mercury and the temperature corresponding to it.....we work on it recording the degree in the patient's records.

Underarm

Same as previous steps except. We put the silver part under the armpit for 5 minutes. When recording the temperature in the records, we work to increase the degree by 0.5 (Figure 3).

Figure 3: Temperature measurement by underarm

Measurement through the anus

The patient should sleep on one side and the leg he sleeps on should be flat and the other leg should be bent to ensure that the anus is open.

The duration of the measurement is one minute.

The thermometer must be inserted 2 cm into the anus for measurement.

When reading the temperature, half of the reading should be reduced by 0.5 degrees from writing it in the required records.

It is preferable to measure the temperature of children through the anus or armpit to avoid breaking the thermometer inside the child's mouth, because swallowing mercury leads to death.

In cases of burns, it is preferable to measure from the anus and the armpit as well.

PATIENT PULSE MEASURING

The pulse is a wave that occurs in the arteries as a result of the contraction of the heart.

Pulse places used to measure patient pulse are the side of the eyebrows, the side of the neck, above the elbow, the side of the genitals, the area under the thumb, the artery behind the knee, the artery of the forefoot and the artery behind the hock.

The tools used to measure the patient's pulse are a timer, gloves.

The normal pulse rate for an adult is 70-100 beats per minute.

The normal pulse rate for children is 80-130 beats per minute.

The method of measurement is to wear gloves, then choose a specific artery for the patient...the index and middle fingers are placed on the artery to feel the pulses during the minute by means of the timer and then record them in the patient's private records.

The thumb cannot be used when measuring (Figure 4).

Figure 4: Measure the patient pulse from the side of neck

Figure 5: Pulse measure in the wrist

Figure 6: Pulse measure in the wrist

ICU DEVICES

1) Monitor
2) Mechanical ventilator
3) CVC
4) Infusion pump
5) Syringe pump
6) Air way
7) Crash cart
8) Extra corporeal membrane oxygenation (EcMo)

Central Venous Catheter (CVC)

It is a cardiac catheterization that is mostly made of silicone rubber that enters the body through large veins such as subclavian vein, femoral vein and jugular vein (Figure 5) (Funaki, 2002).

CVC uses

1) Monitor the central venous pressure (CVP)
2) Volumes of fluid, blood or some medications as kcl
3) Long term lv therapy
4) Dialysis
5) To assess cardiac function in shock cases to asses fluids and blood loss
6) To take blood sample to lap

Tools used in CVC installation

1) Sterile gloves
2) Sterile gauze and dressing
3) Antiseptic solution
4) Syringe
5) Heparin ampoule
6) Normal saline
7) Sterile towel
8) Adhesive tap
9) Needle holder
10) Scissor
11) Suture
12) Xylocain for anesthesia
13) Three way
14) CVC fixed
15) Normal saline 0.9%
16) CVP
17) Gwen

CVC installation

First should be hand wash before and after procedure, prepare equipment needed, explain procedure to the patient, keep patient privacy, place the patient in Trendelenburg position to dilate the vein and reduced the risk of air embolism, turn the patient head away from the site to easy of insection and prevent of infection, prepare the insertion site by betadine, make sure the skin is free of hair because hair can harbor micro organisms,wip the top of the lidocaine vial with an alcohol pad and invent it, the physician then fills the 3- mL syringe and injects the anesthetic in to the site of insertion, open the catheter package and give the catheter to the physician using sterile technique the physician then insert the catheter, during this time preparete the l.v. administration set for immediate attachment to the catheter hub, flushed with heparin to prevent blood clot inside the catheter, x-ray to confirm correct catheter placement, finally place the patient in comfortable position (Saugel, Scheeren, & Teboul, 2017).

SEDATION, AGITATION AND DELIRIUM

There is a very strong relationship with the death rate in intensive care with the level of pain treatment and anesthesia for patients. When there is not enough treatment, the death rate increases, so there is great importance to this matter. In addition, sedative drugs bring fear and delirium to the patient and lead to death. There are 60-70% of patients in intensive care who suffer from delirium, and these vary in their levels, as they lead to artificial respiration. Recent studies indicated that the length of time patients stay in intensive care for a long time and subject them to artificial respiration increases with the increase in delirium, and thus the death rate increases (Jacobi et al., 2002; Kollef et al., 1998). There are special cases that require full anesthesia in order to benefit the patient in such cases:

a) Acute infections such as sepsis, ARDs
b) A case of acute cerebral hemorrhage, which leads to high blood pressure, where the patient is given complete anesthesia to prevent high blood pressure.

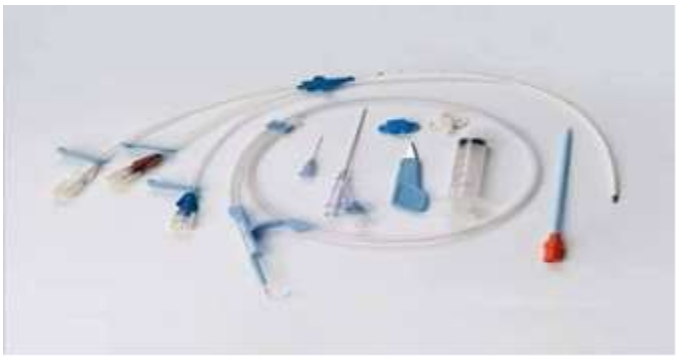

Figure 7: Central venous catheter (CVC) tools

c) When surgical interventions such as endoscopes and others where the patient needs a sufficient amount of anesthesia.
d) In the case of Covid-19 disease or patients with pulmonary failure, where the patient needs to lie on the abdomen for a long period of more than 16 hours, this position is painful for the patient, and therefore he needs adequate anesthesia.
e) After pulmonary resuscitation to lower the patient's temperature.

Delirium

It poses a danger to the patient and requires great care due to its causes, Alzheimer’s and lack of oxygen in the case of Covid-19 and accidents. Delirium is more prevalent in intensive care and reaches 15-50% for patients without artificial respiration and 80% for patients with

artificial respiration. This percentage is very frightening and should be she is given attention in intensive care. Delirium is of two types, the first is quiet and accompanied by hallucinations, and the second is highly active and emotional, accompanied by high blood pressure, sweating and aggressiveness.

ENGINEERING DESIGN OF THE INTENSIVE CARE ROOM

There are certain foundations and criteria for designing an intensive care room. The first step in designing the room should be wide to allow the movement completely freely for the medical staff, technicians and nursing staff, all its walls and even the ceiling should be made of ceramic with a soft texture to facilitate the cleaning and washing process, the corners of the walls should be arched to avoid the accumulation of dirt and dust, electrical connections It should be very good, thick and insulated with rubber material. The lighting of the intensive care room should be artificial only and of a rounded shape and should not allow the formation of a shadow to avoid vision problems that occur to the doctor when performing the surgery. The intensive care room must be equipped with fresh air conditioners to avoid transferring bacteria to the operating room, and it must be equipped with a backup generator to avoid power outages. The doors of the intensive care room must be completely flexible and smooth, whether they are made of plastic or stainless steel. The doors must be lightweight and at the same time strong, water resistant, non-twisting, and fire resistant for a period of up to 4 hours. All contents of the room must be made of stainless steel and glass for easy cleaning and dust removal. The design of windows in the intensive care room is almost non-existent, there must be mobile lamps that contain batteries that are easy to use and operate. The intensive care room has a certain temperature and humidity that is controlled by air conditioning. One of the most important accessories of the intensive care room is a gas detector to detect any gas leakage (Thompson et al., 2012; Guidelines, 2018).

DISINFECTION AND STERILIZATION

There is a difference between disinfection and sterilization. The disinfection process is to kill most of the microorganisms, not all of them, or to prevent the spread of most of the microbes on the surface to be disinfected. Therefore, the disinfection process inhibits, prevents, or kills part of the microbes. Disinfection works to weaken the vital processes of these germs. Disinfection is done using killer or antimicrobial materials. Among the types of disinfectants are chlorine, alcohol, iodine, and some types of halogens. Examples of disinfection include disinfection of human skin when suffering injuries, laboratory tests, or before surgeries, and disinfection of surfaces such as surgical aprons. Disinfection is also done with ultraviolet rays. The sterilization process kills all microorganisms and all microbes. The sterilization process includes exposing the material to be sterilized to harsh and very strong conditions, such as the use of high heat, such as burning medical waste with high-temperature furnaces. Also, sterilization is done by exposing the material to steam under pressure, such as the autoclave device for sterilizing tools and equipment for surgical operations. When entering the patient's room, the medical staff must wear masks. After identifying the patient and his condition, and during the process of drawing blood, gloves must be worn. After that, when heading to the patient’s room, the color of the waste bag must be red. The medical staff must remove the gloves from the right hand to the left hand and pull the muzzle from the inside to the outside, as well as the outer shoes. Wash hands with water and soap up to the elbow, then wash the right hand, then the left hand, without touching, to prevent the transmission of germs (Rutala & Weber, 2001; Rutala & Weber, 2010).

CONCLUSION

The intensive care unit works to receive critical cases of traffic accidents, internal cases,

and cases that need special care after major surgeries, such as open heart operations. The intensive care room is equipped with a number of beds for the patient. The bed is equipped with a respirator that contains all the settings and receives all cases Focused on the screen, which will show blood pressure, oxygen and carbon dioxide levels.

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