

Postoperative wound infections in the surgical clinic of University Hospital Centre “Mother Theresa” in Tirana- a microbiologic study _____

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Abstract

Introduction: Every year hundreds of thousands of surgical and invasive medical procedures such as endoscopic and others are performed in Albania. In each of these procedures, a surgical instrument or medical device comes into contact with the sterile tissue or mucous membranes of the patient. In case of failing during disinfecting and sterilizing procedures there is a risk of transmission of environmental pathogenic microbes.

Methodology: This is a comparative study carried out in March 2014 and September 2021 in the surgical clinic of ward III of the University Hospital Centre “Mother Theresa”. The samples were taken from the postoperative wounds of patients with surgical intervention, in which were isolated and identified the pathogenic microbes. The samples in the operative wounds were taken with sterile tampons inserted in simple broth, then they were placed in a thermostat for 24 hours at a temperature of 37°C. The tubes are left on the table, the transition is made to nutrient

media such as Agar-blood, Machonkay, Deoxycholate-citrate, they are put back into the thermostat at a temperature of 37°C for 24 hours and the next day the plates are analyzed to isolate and identify the pathogenic microbes.

Results: Surgical wound infections are considered surgical infections, which are directly related to the type of surgical intervention. Out of 49 samples of postoperative wounds taken in 2014, 48.8% (24) of them were isolated and identified microbial stains. Regarding the pathogen type: 12.5% *E. Coli*, 16.7% *Staphylococci aureus*, 50% *Staphylococci epidermis*, 12.5% *Pseudomonas* and 8.3% *Klebsiella*. Out of the 7 samples in 2021, no pathogenic microbes were isolated.

Conclusions: Comparing the microbial charge in the wounds of postoperative patients in 2014 and 2021, we found a considerable improvement. We relate this finding with the considerable improvement of hygienic-sanitary conditions in 2021, in accordance with infection prevention protocols.

Key words: surgical wound, interventions, hospital infections, pathogen, microbial stain

Introduction

Every year hundreds of thousands of surgical and invasive medical procedures such as endoscopic and others are performed in Albania. In each of these procedures, a surgical instrument or medical device comes into contact with the sterile tissue or mucous membranes of the patient. The biggest risk of all such procedures is the introduction of pathogenic microbes that can cause infections.

If we fail to properly disinfect or sterilize these medical instruments and equipment, we risk breaching host defense barriers, as well as person-to-person transmission (eg. hepatitis B virus) or transmission of environmental pathogens, such as *Pseudomonas aeruginosa* (1). Disinfection and sterilization are essential processes that ensure that medical and surgical instruments or equipment will not transmit infectious pathogens to patients. Through the health care policies, we identify according to certain items the cleaning, disinfection and sterilization that must be carried out and strictly followed.

Lack of compliance with established guidelines for disinfection and sterilization and failure to follow science-based guidelines can lead to epidemic outbreaks or cases of nosocomial infections.

However, sterilization and disinfection are only one of the basic horizontal hospital infection control procedures.

During the year 2021, fewer infections of operative wounds were observed where there were no isolations for different pathogens compared to previous years. Likewise, during 2021, no epidemic outbreaks have been observed in the

country's hospitals from hospital infections, which indicates an improvement in the hospital environment, sterilization and disinfection and other measures. (3)

FIG. A. A post-surgical wound swab sample



FIG. B. Surgical set in sterile cystine



Also, a decrease in days-stay in the hospital for 3-7 days, as well as over 3 weeks is observed, which indirectly indicates the absence of serious hospital infections as observed in previous years. We also have a decrease in the use of antibiotics in

more than 1 day, which indirectly indicates that we have a decrease in hospital infections. (4-5)

Surgical wound infections, which are directly related to the type of surgical intervention, are considered surgical infections and are divided into two types:

1. Superficial wound infection which is characterized by the development of infection within 30 days, and where the infection affects only the superficial part of the wound. This infection presents with pain, edema, erythema, and purulent secretions from which pathogenic microbes are isolated.
2. Deep wound infection where the infection appears within 30 days, affects the soft tissues, and presents purulent secretions from the depth of the incision, temperature above 38o C, abscess and must definitely have wound drainage. (6)

Every year in the world, on average, 15-28% of the patients operating in surgery clinics get a hospital infection.

In a monitoring study carried out in Albania during the years 2012 - 2015, 234 samples of post-operative wounds were taken from the ward number 1 and ward number 3 of the “Mother Teresa” University Hospital Center. The age of the patients was 22 - 70 years, and 213 were male and 21 were female. Samples were taken and a microbiological examination was carried out for each patient’s postoperative wound. Out of 234 samples, 44.4% microbial strains (n=104) were isolated and identified, of which E. Coli strains (30.7%, n=32), Staphylococcus aureus strains (43.2%, n=45), Staphylococcus epidermis strains (4%, n=14), Pseudomonas aeruginosa strains (5.7%, n=6), Proteus strains (3.8%, n=4) and 3 strains of Klebsiella pneumoniae (2.8%). An assessment of hospital environments, disinfection and sterilization was also carried out. (7)

The contamination of the wounds was thought to be a consequence of the hygienic-sanitary conditions not according to the standards, the surgical sets were very old and were sterilized in the autoclaves found in the surgical wards. Wound treatment was carried out in patient rooms where there were more than 3-4 patients in the room together with visitors, and the infrastructure of the halls and wards was not in modern conditions.

However, the data of the PPS study in 2019 show a general prevalence of 16.8%, similar to the countries of the European Union (EU), but it is still necessary to conduct a similar study to summarize all the data. Also, since the prevalence of hospital infections is complex, and the use of antibiotics must be justified and specified. There is an urgent need to strengthen other measures to limit nosocomial infections and follow relevant protocols and guidelines by having efficient infection control units in every hospital. (8)

Methodology

The study was carried out during March 2014 and September 2021 in the surgical clinic of ward III of the University Hospital Centre “Mother Theresa”. The samples were taken from the postoperative wounds of patients with surgical intervention and was carried out the identification and isolation of pathogenic microbes.

The samples in the operative wounds were taken with sterile tampons inserted in simple broth, then they were placed in a thermostat for 24 hours at a temperature of 37°C. The tubes are left on the table, the transition is made to nutrient media such as Agar-blood, Machonkay, Deoxycholate-citrate, they are put back into the thermostat at a temperature of 37°C for 24 hours and the next day the plates are analyzed to isolate and identify the pathogenic microbes. (9).

Results

56 samples were analyzed in total. Out of 49 samples of postoperative wounds taken in 2014 in the III-rd clinic of the “Mother Teresa” University Hospital Center in Tirana, 48.8% (24) of them were isolated and identified microbial stains. Regarding the pathogen type: 12.5% E. Coli, 16.7% Staphylococci aureus, 50% Staphylococci epidermis, 12.5% Pseudomonas and 8.3% Klebsiella.

The age of the patients was 20 – 65 years, out of them 32 were male and 24 were female. Samples were taken from each patient’s postoperative wound to carry out a microbiological examination.

In 2014, the samples of the operative wounds were taken at the time when there were more than 4 patients in the patient’s room, and there were many visitors.

While in 2021, the samples of the operative wounds in the intervened patients were taken in the room where there are only two patients and no visitors, since after the period of covid-19, visitors were not allowed to enter the patients’ rooms outside of the specified schedule, something which makes there is less flow of people and less contamination.

According to the results, it can be seen with a higher percentage of the identification of the pathogenic microbe Staphylococci aureus, since the wounds were smelly and contaminated, which comes as a result of the carelessness of hygiene in the environments where the patient stays in a room with four other people, supported by the identification of gram-negative bacteria, which find suitable ground in the environments of intervened wounds.

Staphylococci are gram-positive, facultative anaerobic cocci that appear in the form of grape villi. They are catalase positive, constituting the main component of the normal flora of the skin and nose.

- Staphylococcus aureus is one of the most frequent causes of hospital and community opportunistic infections, especially operative wounds.

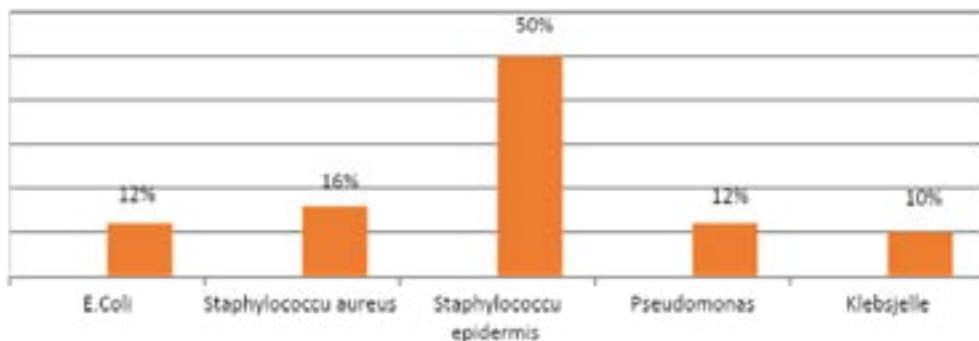
Identification

1. Beta - hemolysis in blood agar
 2. It ferments mannitol
 3. Golden pigment (aureus) is present
 4. Coagulase positive
- Staphylococcus epidermidis. Staphylococcus epidermidis is a rarer cause of opportunistic infections than S.aureus, but still significant. It is a mediator of nosocomial infections (eg catheters, surgery (heart valves).

Identification

1. There is no hemolysis on blood agar
2. It does not ferment mannitol
3. No pigment
4. Coagulase-negative.

GRAPH. 1 Identification of pathogenic microbes



While in the monitoring carried out in 2021, out of the 7 samples of postoperative wounds, no pathogenic microbes were isolated.

It was also noticed that surgical interventions were performed in operating rooms with modern infrastructure, where at the entrance to the room the patient passes through the passage to the filter room and then to the operating room (10).

The hygienic-sanitary conditions were quite good and infection prevention protocols are implemented, as well as the operating theaters are cleaned, disinfected

by health personnel according to the regulations and at the end of the operations, the theaters are disinfected by the sterilization center with the relevant equipment.

The surgical sets were packed, put in cystine with the indicator paper on top, which shows that the surgical sets have been sterilized and have the date of sterilization. (11)

We also emphasize that during the monitoring in these operating rooms there are not only two or three cystines with surgical packages, but there are many and the operations are performed in the most comfortable way possible.

Conclusions and Recommendations

This study compared the microbial charge in the wounds of postoperative patients in two different years 2014 and 2021.

In the monitoring carried out in 2014, based on the results of the study, it was found that the contamination of the wounds was the result of:

Lack of hygienic-sanitary conditions according to the standards, low level of infrastructure of the operating theaters and pavilions, use at a depreciated level of the sets surgical, Inadequate sterilization carried out in autoclaves located inside the operating block, use of practices for treating wounds in patient rooms where there could be more than 2-3 operated on, accompanied by family members.

The impact of post-operative wound infections on patients' lives plays an important role in: Lengthening the length of stay, Increasing the cost of treatment, increasing diagnostic procedures.

In the monitoring carried out in 2021, 7 samples of postoperative wounds of clinic No. 3 were taken. Of the total of 7 samples taken for microbiological examination, none of the operative wounds came out contaminated.

This indicates a good continuation of the chain of infection in surgical wounds. (12) Interventions were performed in operating rooms with modern infrastructure, where the patient enters the room through the passage to the filter room and then to the operating room.

Hygienic-sanitary conditions are in accordance with infection prevention protocols, as well as operating rooms are cleaned, disinfected by health personnel according to regulations and at the end of operations, the rooms are disinfected by the sterilization center with the relevant equipment.

The surgical sets are packed, inserted into the cystine with the indicator paper placed on top, which shows that the surgical sets have been sterilized and have the date of sterilization (9,11)

We also emphasize that during monitoring in these operating rooms there are not only two or three cystines with surgical packages, but they are endless, thus helping the doctor to have unlimited access to sets.

One of the most effective methods to prevent post-surgical infection is prophylaxis, which can be achieved only with a single dose of an antimicrobial agent which is defined in detailed instructions for antimicrobial prophylaxis before surgery that is part of the National Infection Prevention Project surgical. (11,12). We recommend the implementation of the National Program for the Prevention and Control of Hospital Infections supported by the World Health Organization.

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