

ORIGINAL ARTICLE

Knowledge, Attitude and Practice of Nursing Staff and Other Paramedical Staff regarding Sterilization of Instruments

Sunita R Bhandari¹, Rajesh Bande²

Professor ¹, Assistant Professor ², Dept of Microbiology, SMBT Institute of Medical Sciences & Research Centre, Dhamangaon Tal. Igatpuri, Dist. Nasik

Abstract

Background: Sterilization is very important part of any procedures including surgical procedures in the medical field. It is essential for the nursing as well as other paramedical staff to have basic knowledge of sterilization and disinfection of the instruments. The objective of the study was to assess the level of knowledge and awareness among different levels of healthcare workers about sterilization. **Materials & Methods:** Questionnaire was designed to obtain information about knowledge of sterilization among nursing and other paramedical staff of medical college and nearby hospitals. The questionnaires were filled in by the participants. The study was carried out over a period of 6 months. The questionnaire contained about knowledge about sterilization, sterilization protocol, etc. Data were analyzed by IBM SPSS statistical software version 20. **Results:** There were 20 questions in each questionnaire. Total 85 nursing staff and 125 paramedical staff had participated in the study. Comparison of the scores of nursing and paramedical staff had shown that nursing staff had more knowledge, attitude and practice regarding sterilization than that of the paramedical staff and the difference was statistically significant. Although the nursing staff had more knowledge than paramedical staff, they were still not having sufficient basic knowledge regarding sterilization of instruments like temperature, chemicals used, monitoring of the standardization of the sterilization, etc. **Conclusion:** There is need to improve the knowledge, attitude and practice of the healthcare staff regarding sterilization through seminars, symposiums or CDE programmes.

Keywords: Sterilization, Disinfection, Nursing staff, Cross-infection, Paramedical staff

Address for correspondence: Dr. Sunita R Bhandari. Professor, Dept of Microbiology, SMBT institute of Medical Sciences & Research Centre. Dhamangaon, Tal Igatpuri, Nasik.

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Introduction

Sterilization is a process by which complete destruction or killing of all microorganisms including bacterial spores is achieved. Disinfection is thermal or chemical destruction of pathogenic and other types of microorganisms. It is less lethal than sterilization because it destroys most recognized pathogenic microorganisms but not necessarily all microbial forms (e.g., bacterial spores). Asepsis refers to prevention of contact with microorganisms.¹ Prevention of infection and control is an important part of safe patient care. Concerns about the possible spread of blood-borne diseases, and the impact of emerging, highly contagious respiratory and other

illnesses, require practitioners to establish, evaluate, continually update, and monitor their infection prevention, control strategies, and protocols.² Health-care professionals are at an increased risk of cross infection and its transmission while treating the patients.² Surgical procedures frequently cause bleeding and exposure to infected blood, saliva, and aerosol are a known means of infectious disease transmission. Surgeons have to work in a pathogen-rich, contaminated environment, often dealing with blood. They are exposed to a variety of microorganisms present in blood and saliva, coupled with possible injury from the sharp instruments. While treating the patients, physicians become susceptible to various infectious diseases. Diseases such as hepatitis B

and Acquired Immuno Deficiency Syndrome (AIDS) can spread through unsterile instruments.²

Prevention of infection and control is an important part of safe patient care. Concerns about the possible spread of blood-borne diseases, and the impact of emerging, highly contagious respiratory and other illnesses, require practitioners to establish, evaluate, continually update and monitor their infection prevention and control strategies and protocols.³ Therefore the present study was done to evaluate the knowledge, attitude and practice of nursing staff and paramedical staff regarding sterilization.

Materials and Methods

The study was done including of nursing staff and paramedical staff of the medical college hospital and other hospitals, as these are the persons who most commonly carried out the sterilization of the instruments.

The study was carried out with the help of the questionnaires which were validated by doing pilot study. There were total 20 questionnaires related to knowledge, attitude and practice of sterilization of the instruments. Approval of the ethical committee was taken before start of the study and written informed consent also taken from each of the participants before start of the study. Statistical analysis was done with the help of IBM SPSS statistics version 20 using student's t test.

Results

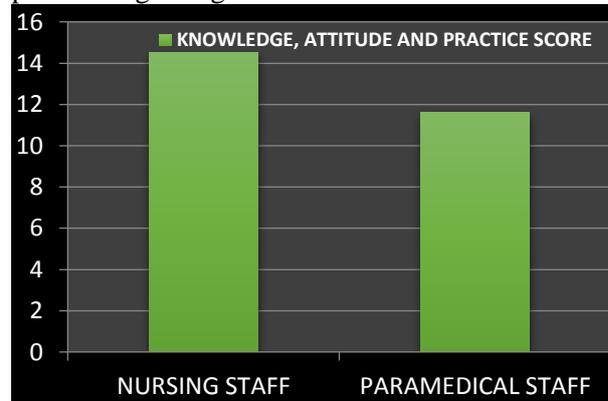
Total 85 nursing staff and 105 paramedical staff had participated in the study. Each of the correct response was given as score 1 and incorrect as score zero. Comparison of the scores of nursing and paramedical staff had shown that nursing staff had more knowledge, attitude and practice regarding sterilization than that of the paramedical staff and the difference was statistically significant. (Table 1, Graph 1).

Although the nursing staff had more knowledge than paramedical staff, they were still not having sufficient basic knowledge regarding sterilization of instruments like temperature, chemicals used, monitoring of the standardization of the sterilization, etc.

Table: Comparison of the scores of nursing and paramedical staff of knowledge, attitude and practice regarding sterilization.

Participants	Participants (n)	Score Mean SD	T value	P value
Nursing staff	85	14.50 1.96	3.22	0.005
Paramedical staff	105	11.60 2.07		

Graph: Comparison of the scores of nursing and paramedical staff of knowledge, attitude and practice regarding sterilization.



Discussion

The maintenance of the aseptic chain is a bio safety standard that must be followed to the letter in order to avoid the risk of cross-contamination, it being an ethical, moral and legal obligation of each and every health care worker. The surgeon comes into intimate contact with the patient and, accordingly, he must maintain strict standards of conduct with regard to infection control within his hospital, thereby preserving his own life, that of his patients, the auxiliary staff and their families.⁴ Physicians have been decontaminating instruments used in their office practices for over a century. It is remarkable that a procedure so historic, so universal and so basic to the practice of good medicine has generated literature that could be read in one sitting. Efforts to prevent cross infection by instruments have so far focused on hospital practice. There are many reasons why we should now turn our attention to the office: (a) although office medicine is less invasive than hospital medicine its extensiveness gives ample opportunity for cross infection, (b) office staff are often undertrained and unsupervised, (c) physicians

have little basic training in decontamination theory or practice, (d) office equipment for decontamination is crude and, most important, (e) office practitioners lack reference material that is concise, practical and relevant to their needs.⁵

There are effective infection control procedures and universal precautions for hospitals and surgical operatories to prevent cross contamination, which should be practiced by doctors and health-care staff including nurses, theater assistants, lab technicians, and sanitation staff of hospitals. To minimize the risk of cross infection in the hospitals, specific recommendations have been issued by professional health agencies. These recommendations include routine use of barrier techniques (gloves, masks, spectacles, etc.), heat sterilization of surgical instruments, and the universal precautions.⁶ The use of gloves, face mask, and spectacles has been reported to be important in preventing the three routes of transmission, namely doctor to patient, patient to doctor, and patient to patient in hospitals. Increased awareness about risks of transmission of infection through blood and saliva has led to increased use of protective barrier techniques and prevention of communicable diseases.²

Postoperative infections can be either of endogenous or exogenous origin. Factors associated with transmission of infective material exogenously in hospitals and clinics include presence of shedders of pathogenic microorganisms amongst the hospital personnel, use of inadequately sterilized equipment, contaminated environment and grossly contaminated surfaces.⁷

In the present study, comparison of the scores of nursing and paramedical staff had shown that nursing staff had more knowledge, attitude and practice regarding sterilization than that of the paramedical staff and the difference was statistically significant. Although the nursing staff had more knowledge than paramedical staff, they were still not having sufficient basic knowledge regarding sterilization of instruments like temperature, chemicals used, monitoring of the standardization of the sterilization, etc.⁷

It should be emphasized that general operation theater layouts, operating room etiquette, sterilization of instruments, sterile surgical protocol are all highly important and relevant

factors, which directly affect the incidence of postoperative infections in any setting. Proper protocols need to be put in place for proper adoption of these simple procedures by all theater staff.⁷

Aldehydes are the most commonly used agents for high level disinfection of the theater environment. Formaldehyde is the commonly used agent. Formaldehyde gas is generated from liquid formalin utilizing potassium permanganate crystals. 40% formalin liquid is added to potassium permanganate crystals to generate gas. Alternately, formalin liquid can be dispersed by a sprayer like device in the theater environment.⁷

Cleaning physically removes, rather than kills, microbes and is always the first step in decontamination. Since sterilization reduces microbial counts logarithmically in time an initial reduction of the instrument's bioburden is essential. Furthermore, organic matter such as mucus, blood and pus may shield organisms from the biocidal effects of heat or chemicals.

After cleaning, decontamination takes the form of either sterilization or disinfection. Sterilization is an absolute: it kills all forms of microbial life, including the most resistant - the bacterial endospore. Disinfection is a relative term. The proportion of microbial flora killed depends on the intrinsic power of the disinfectant and the innate resistance of the microorganism. Microbes can be ranked in terms of their resistance to destruction in descending order as follows: bacterial endospore, tubercle bacillus, fungal spore, hydrophilic virus, vegetative fungus, lipophilic virus and vegetative bacterium.⁸

Sterilization is most commonly accomplished by heat, either moist or dry. Boiling water takes about 12 hours to kill spores and so is impractical. Sterilization time can be reduced to 15 minutes if the boiling point of water is raised to 121°C by an increase of 1 atmosphere (103.4 kPa) of pressure in an autoclave chamber. The same conditions can be created in a domestic pressure cooker, which is sometimes used in medical practice.⁹ Moist heat delivers energy more efficiently than dry heat; consequently hot air ovens take much longer to achieve sterilization (60 minutes at 170°C or 120 minutes at 160°C). Their utility in practice is

further limited by the intolerance of most wrapping materials to this temperatures.⁵

Chemical disinfectants are ranked according to their biocidal capabilities as high, intermediate or low level.¹⁰ High-level disinfectants act against all microbial forms, including bacterial spores, and may even sterilize if the contact time is long enough.

(Boiling instruments for 5 minutes or more is a means of high-level disinfection.) Intermediate-level disinfectants can kill tubercle bacilli and everything else apart from bacterial spores and sometimes small, nonlipid viruses (e.g., enteroviruses). Low level disinfectants cannot be relied on to kill tubercle bacilli and often fail to kill many viruses and fungi.⁵

Ethylene trioxide (ETO) gas sterilization is a more complex and expensive process than steam sterilization. Hence, it is usually restricted to objects that might be damaged by heat or excessive moisture. Before gas sterilization, objects need to be cleaned thoroughly and wrapped in a material that allows the gas to penetrate. Chemical indicators need to be used with each package to show that it has been exposed to the gas sterilization process. Moreover, it is recommended that gas sterilizers be checked at least once a week with commercial preparations of spores, usually *Bacillus subtilis*. Because ETO gas is toxic, precautions (e.g. local exhaust ventilation) should be taken to protect personnel. All objects processed by gas sterilization also need special aeration according to manufacturer's recommendations before use to remove toxic residues of ETO. ETO sterilizers are widely used in hospitals for sterilizing heat sensitive equipments. Sterilized products also have a longer shelf-life when they are processed by ETO sterilizers. Small ETO sterilizers are also available which can be used in clinics.⁷

Surgeries conducted with adequate protocols and checklists have resulted in reduction of the postoperative events and complications as demonstrated in the "Safe Surgery Saves Lives" initiative of World Health Organization (WHO). The guidelines outlined here are framed to establish standard guidelines about infection control for practicing.^{7,11,12}

Thus the present study had highlighted the current knowledge, attitude and practice of the nursing and other paramedical staff about the

sterilization protocols. It should be emphasized that all the healthcare workers should have basic knowledge of the sterilization as it is important for the patient as well as health care workers point of view.

Conclusion

The present study concluded that the knowledge, attitude and practice of nursing staff and other paramedical staff was not sufficient. Regular seminars, symposiums or meetings should be taken to improve the situation.

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Ethical Permission: Obtained

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