

Knowledge, attitude, and practice regarding sterilization among health-care staff in a tertiary hospital of western India

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Abstract

Background: Sterilization and disinfection in hospitals is a significant concern for both the medical and the general community. There has been an increase in many infectious diseases such as acquired immunodeficiency syndrome (AIDS) and hepatitis B because of inadequate sterilization.

Objective: To know the knowledge, attitude, and practice regarding sterilization among health-care staff working in a tertiary hospital.

Materials and Methods: This descriptive, observational hospital-based cross-sectional study was conducted from October 2013 to December 2013. The study participants included final-year medical students, interns, nursing staff, laboratory technicians, ward boys, and sanitation staff working in the institute who deal with patients, blood, etc. The study was conducted using pretested, semi-structured pro forma. The data were tabulated and interpretation was done using percentages through EpiInfo software, version 3.5.1.

Result: The study included 280 participants. Of them, 254 participants returned completed questionnaires. The respondents included 111 final-year students and interns, 83 nurses, 11 laboratory technicians, and 49 sanitary staff. Majority (61%) of the respondents belonged to the age group of 21-30 years. More than two-third of study participants had been working in the hospital since the last 1-5 years. Only 44% respondents received training for sterilization and its management. As per the respondents, AIDS (74.4%) and hepatitis B (55.9%) were the main infectious diseases transmitted due to inadequate sterilization.

Conclusion: There was inadequate knowledge among health-care staff regarding sterilization. They need to be trained on a regular basis to improve not just their knowledge but also attitude and practice.

KEY WORDS: Sterilization, disinfection, asepsis, health-care staff, knowledge

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.

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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 immunodeficiency syndrome (AIDS) can spread through unsterile instruments.

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.^[3] 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.

Surgeon's compliance with these recommendations and infection control programs has been recently studied in different parts of the world. These studies indicate that there are gaps in the knowledge of some health-care staff regarding modes of transmission of infectious diseases. The awareness about the importance of sterilization in reducing the communicable diseases needs to be increased among medical faculty. There is also a pressing need to identify the areas where improvements can be made in hospital setup toward disinfection and sterilization practices.

This study was conducted with objective to know the knowledge, attitude, and practice regarding sterilization among health-care staff working in our hospital.

Materials and Methods

This descriptive observational hospital-based cross-sectional study was conducted at Gujarat Adani Institute of Medical Sciences and GK General Hospital, Bhuj, Gujarat, India, from October 2013 to December 2013. The institute is a tertiary-care center serving not only the Bhuj city but also the other parts of Kutch district. Patients visit this institute from different surrounding districts such as Anjar, Bhachau, and Naliya for treatment. The study was approved by the ethics committee of the institute. The study participants included the final-year medical students, intern doctors, nursing staff, laboratory technicians, ward boys, and sanitation staff working in the institute who deal with patients. The study was conducted using pretested, semi-structured pro forma.

Table 1: Basic profile of health-care study population (*n* = 254)

Characteristic	Frequency (%)
Age (years)	
21–25	60 (23.6)
26–30	95 (37.4)
31–35	32 (12.6)
36–40	29 (11.4)
>40	38 (15.0)
Sex	
Male	107 (42.1)
Female	147 (57.9)
Working status	
Final-year medical students, interns	111 (43.7)
Lab technicians	11 (4.3)
Nurses	83 (32.7)
Sanitary staff	49 (19.3)
Working in hospital since (years)	
<1	1 (0.4)
1–5	172 (67.7)
6–10	47 (18.5)
>10	34 (13.4)
Received any training for sterilization	
Yes	112 (44.0)
No	142 (55.9)

A self-administered questionnaire with closed-ended and a few open-ended questions was given to the voluntary participants. The information about their knowledge, practices, and attitude was evaluated. Questionnaires were both in English and vernacular languages.

Questionnaire elicited information on various sociodemographic variables, such as age, sex, educational status, working experience, type of work, and perception on the use of gloves, facemasks, spectacles, and disinfectants in the regular medical practice. The study also included other details regarding knowledge, attitude, and practice of sterilization and its management, methods of sterilization, and knowledge about the biomedical waste management. All the final-year medical students, intern doctors, nurses, and other health-care staff were invited individually to participate in the study and were assured about their confidentiality and anonymity. The data collected from respondents were tabulated and interpretation was done using percentages through EpiInfo software, version 3.5.1.

Result

In this study, 280 health-care personnel participated; of which, 254 returned completed forms constituting a 91% response rate. The study participants were in the age range of 21–44 years. Of 254 respondents, 111 were final-year medical students and intern doctors, 83 nursing personnel, 11 laboratory technicians, and 49 sanitary staff. The demographic details are presented in Table 1. A majority (61%)

Table 2: Awareness about sterilization among health-care personnel (*n* = 254)

Awareness	Yes (%)	No (%)
Are you aware of sterilization, disinfection, and asepsis?	209 (82.3)	45 (17.7)
Are you aware of different sterilization methods?	174 (68.5)	80 (31.5)
Are you aware of the most common method of sterilization?	132 (51.9)	122 (48.0)
Are you aware of the temperature for sterilization in autoclave?	93 (36.6)	161 (63.4)
Are you aware that infectious diseases can be transmitted when aseptic precautions are not taken? If yes, name those infectious diseases.		
HIV	189 (74.4)	65 (25.6)
Hepatitis B	142 (55.9)	112 (44.0)
Tuberculosis	22 (8.7)	232 (91.3)
Others	135 (53.2)	119 (46.9)
Are you aware of methods of disinfection and biomedical waste management?	197 (77.6)	57 (22.4)
Is there any sterilization protocol/policy in this hospital?	74 (29.1)	180 (70.9)
Is there a CSSD (Central Sterilization and Supply department) in this hospital?	137 (53.9)	117 (46.1)
Is there an Infection Control Committee in this hospital?	86 (33.9)	168 (66.1)

Table 3: Practice of health-care personnel regarding sterilization and its management (*n* = 254)

Practice	Yes (%)	No (%)
Do you wash hands with antiseptic before and after handling patients?	195 (76.8)	59 (23.2)
Do you use personal protective measures while handling patients/blood/tissues etc., for example, gloves, masks, glasses, caps, and apron?	162 (63.8)	92 (36.2)
Do you use disposable needles, intravenous sets, etc.?	251 (98.8)	3 (1.2)
Did you ever get needle injury?	47 (18.5)	207 (81.5)
Did you report and take treatment for needle injury? (<i>n</i> = 47)	39 (83.0)	8 (17.0)
Have you observed or assisted sterilization process in hospital?	135 (53.2)	119 (46.9)
Have you been trained to use autoclaved linen and instruments as per protocol?	103 (40.6)	151 (59.5)
Have you been vaccinated against hepatitis B	172 (67.7)	82 (32.3)

of the study respondents belonged to the age group of 21–30 years. The respondent group consisted of 107 (42.1%) men and 147 (57.9%) women. More than two-third of the study respondents had been working in the hospital since the last 1–5 years. Only 44.2% study respondents received training for sterilization.

Knowledge about sterilization and sterilization techniques is presented in Table 2. It also includes other particulars related to sterilization policy, awareness of health hazards owing to inadequate sterilization, and whether they received any training for sterilization.

Of 254 respondents in the study, 209 (82.3%) were aware of sterilization, disinfection, and asepsis; and 174 (68.5%) were aware of sterilization techniques. More than half of the respondents (132, 51.9%) were aware of the most common methods of sterilization and 93 (36.6%) were aware of the temperature for sterilization in autoclave. AIDS and hepatitis B were the main infectious diseases transmitted by not using sterile techniques as per 189 (74.4%) and 142 (55.9%) health-care staff, respectively. Of all the health-care staff who returned completed forms, 197 (77.6%) were aware of methods of disinfection and biomedical waste management and 74 (29.13%) were aware of the sterilization protocol/policy

of this hospital. Existence of Central Sterilization and Supply department in this hospital was known by 137 (53.9%) health-care staff and 86 (33.9%) knew of the existence of an Infection Control Committee in this hospital.

Detailed information on practice of health-care staff is presented in Table 3. Of all the health-care staff who returned completed forms, 195 (76.8%) washed their hands with antiseptic before and after handling patients and 162 (63.8%) used personal protective measures such as gloves, masks, glasses, caps, and apron while handling patients/blood/tissues, etc. Of all the respondents, 251 (98.8%) used disposable needles, intravenous sets, etc., and 172 (67.7%) had been vaccinated against hepatitis B. A few of the health-care personnel (47, 18.5%) accidentally got needlestick injury. Of these 47 health-care staff, 39 (83.0%) reported about their needlestick injury and underwent treatment. Of all the respondents, 135 (53.2%) observed or assisted sterilization process in hospital and 103 (40.6%) had received training to use autoclaved linen and instruments as per protocol.

Detailed information on attitudes of health staff is presented in Table 4. A 5-point Likert scale was used to record the attitudes of health-care staff. The score ranged from 1 to 5 for responses of strongly disagree, disagree, neither agree nor

Table 4: Attitudes of health-care personnel regarding sterilization (*n* = 254)

Item	Yes* (%)	Not always/not sure** (%)	No*** (%)
Health staff should always put on gloves while handling blood/saliva/tissues etc. of patients	154 (60.6)	82 (32.3)	18 (7.1)
Health staff should always put on glasses while handling blood or surgical cases	61 (24.0)	107 (42.1)	86 (33.9)
Health staff should always put on a mask while handling oral or nasal cavity of patients	92 (36.2)	75 (29.5)	87 (34.3)
Health staff should always wash hands with antiseptic before and after handling patients	197 (77.6)	21 (8.3)	36 (14.2)
I am willing to treat HIV patients after using protective gear and taking universal precautions	211 (83.0)	18 (7.1)	25 (9.8)
There is a utility of sterilization guidelines/policy in this hospital?	214 (84.3)	33 (13.0)	7 (2.8)
There is a need to regularly train health staff on sterilization and disinfection procedures	199 (78.4)	41 (16.1)	16 (6.3)

*Strongly agree and agree; **neither agree nor disagree; ***strongly disagree and disagree.

disagree, and agree to strongly agree. For analysis, we took strongly agree and agree in “yes” category whereas strongly disagree and disagree were in “no” category. Of all the health-care staff who returned completed forms, 154 (60.6%) would always put on gloves while handling blood/saliva/tissues, etc., of patients; 61 (24.0%) would always put on glasses while handling blood or surgical cases; and 92 (36.2%) would always put on a mask while handling oral or nasal cavity of patients. Of all the health-care staff, 197 (77.6%) would always wash their hands with antiseptic before and after handling patients and 211 (83.0%) were willing to treat patients with human immunodeficiency virus (HIV) after using protective gear and taking universal precautions. Of all the respondents, 214 (84.3%) felt that there is a utility of sterilization guidelines/policy in this hospital and 199 (78.4%) said that there is a need for a regular educational training on sterilization and disinfection to health-care staff.

Discussion

In our study, the majority of respondents (60%) were in the age group of 21–30 years. In a study conducted in Nigeria, the majority of respondents (89%) were in the age bracket of 21–40 years.^[4]

In our study, respondents mentioned that HIV (74.4%) and hepatitis B (55.9%) were the main infectious diseases transmitted by not using sterile techniques. In another study carried out in Italy, nurses, with frequencies ranging from 77.6% to 96.4%, correctly agreed that the inappropriate application of disinfection procedures increase the risk for a health-care worker of acquiring/transmitting from/to a patient a hospital-acquired infection.^[5]

Our study reported that 82.3% health-care staff were aware of sterilization, 68.5% knew techniques of sterilization, 51.9% knew common sterilization methods such as autoclaving, and 36.6% knew temperature for autoclaving. In a study conducted in Pakistan, 97.4% believed that sterilization is a very important part of the daily routine.^[6] Studies carried out in Nigeria reported that autoclaving was the most common method of sterilization by 84.1%,^[7] 92%,^[8] and 79.2%^[9] respondents, respectively. In a study conducted in Pakistan, the most common method of sterilization reported by the

respondents was autoclaving (93.2%), which is higher than that reported in previous studies.^[6] In a recent study conducted in Nigeria, autoclaving was the most widely used sterilization method (73.2%), but only less than half of the respondents knew how to ascertain whether sterilization was effective.^[4] Dry heat method was used by 3.8% and boiling method by 1.8%^[6] compared to 43.7% and 31.9%, respectively, in yet another study.^[10] In a study carried out in Iran, 81% dental students selected sodium hypochlorite as a suitable material for sterilization whereas 78% students believed that oven sterilization is a good method.^[11]

Our study shows 77.6% respondents were aware of disinfection and biomedical waste management. In a study conducted in Pakistan, the use of disinfectants was reported by 89.4% respondents.^[6] In a study conducted in Malaysia, knowledge on methods of decontamination, disinfection, and sterilization of equipment varied widely from 28.8% to 90.1% whereas 23.1% were unaware of the temperature used for sterilization.^[12] In another study, 1.2% respondents were unaware of the proper sterilization techniques.^[9] The overall knowledge regarding sterilization was inadequate in all the studies.

Another observation was the frequency of washing hands. In our study, 77.6% participants washed their hands with antiseptic before and after handling patients. In a study conducted in Pakistan, 41.2% washed their hands once only whereas 42.6% respondents washed their hands twice, 14.8% washed their hand more than four times, and 1.4% did not feel the need of washing their hands.^[6] In a study carried out in Italy, 86.5% maintained hand hygiene with antiseptic-containing soap and water or alcohol-based products before invasive procedures such as urinary catheter or peripheral venous line insertion.^[5,13]

The use of proper protective devices plays major part in preventing oneself from getting contaminated during a surgical procedure. In our study, 63.8% participants used protective devices while handling patients. Of them, the attitude was 60.6% to wear gloves, 24% to protective glass, and 36.2% to wear mask while dealing with patients. In another study, good infection barrier practices were adopted by 89.9% health-care staff.^[4]

In another study, 78.6% respondents wore gloves. A total of 86.5% patients believed that the orthodontist

should change gloves between patients; 96.8% respondents changed their gloves after examining a patient, which was higher than other studies. While handling instruments, 83% always preferred to use gloves, followed by 15.2% who used the gloves sometimes and 6% who did not use gloves.^[14]

Eye wear should be used in clinical practice as blood or foreign particles can get into eyes accidentally. In a study conducted in Pakistan, 1.2% believed that eye wear protects eyes and the proportion of dentists using eye wear in the study^[6] was lower than that reported in previous studies in Nigeria. 3.6% believe in wearing only face mask during practice.^[7-9]

In a study carried out in the UK and Hong Kong, respondents thought that head cap helps to cover and protect their hairs from getting dirty or falling into patients mouth accidentally. Of all the respondents, 78.6% used all these protective devices and did not perform any kind of dental procedure if any of the attire was missing.^[6,15]

In our study, 98.8% respondents used disposable needles and intravenous infusion sets. In another study conducted in Nigeria, disposable cartridges for local anesthetic agents and needles were used by 93.4% respondents.^[4]

In our study, needlestick injury reporting rate was 83% of the 47 (18.5%) health-care staff injured through needles. In another study conducted in Birmingham, UK, there were 37% respondents who reported that they had had a needlestick injury with a used needle. Of them, 28% doctors and 2% nurses did not report their needlestick injuries.^[16] In other studies, low reporting of injuries may be attributed to the fact that most of the doctors and other technical and non-technical staff were unaware about a formal system of injury reporting that should be established within all the health facilities. The concept about the maintenance of records related to injuries due to surgical procedures is not prevailing in most of the studies.

In our study, only 67.7% health-care staff was vaccinated against hepatitis B. A study carried out in Brazil on pedicure and manicure facilities mentions of no importance given to hepatitis B vaccination.^[17] Attempts should be made to vaccinate the entire staff.

In our study, majority (83%) were willing to treat HIV-infected patients while observing universal precautions where the percentage of such respondents was high (93%) in a study conducted in Nigeria.^[4]

In our study, 44.2% received training for sterilization and disinfection procedures. Majority of the participants heard about the sterilization but less than half of the respondents had actually received a formal training for sterilization and disinfection in our hospital. Emphasis should be given to good-quality training of health-care personnel working in the hospitals at regular time interval.

To improve overall knowledge and practice related to sterilization and its handling following steps can be taken: strict implementation of sterilization policy; it should be made compulsory for health-care facilities to get their health-care personnel trained from accredited training centers; these training centers should not become merely a one-time activity

but should be a continuous process depending on the patient input in different health-care facilities; training of sanitary staff should be specially emphasized; it should be ensured that the injuries happening to the health-care personnel are reported to the person in charge of Infection Control Committee of the hospital, and they report it in the prescribed format to the authorities.

Conclusion

The results of this study indicated that knowledge, performance, and attitude of health-care staff in relation to sterilization and disinfection methods was inadequate. Training imparted to health-care staff was inadequate. Continuous in-service training is needed to improve, supplement, and update knowledge about sterilization and disinfection. There is a need to sensitize and motivate new health-care staff through lectures and hands-on training can be imparted in workshops. In addition, orientation programs for new staff should also be aimed at creating awareness and providing information on guidelines and policies related to their duties.

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