Original Article

Knowledge, attitude, and practices regarding sterilization protocol among dental students at Kanpur, Uttar Pradesh: A percentage-based study

ABSTRACT

Context: Infection control and prevention is an major part of 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.

Aims: The aim of this study was to assess the level of knowledge, attitude, and practice among dental students about sterilization protocol.

Settings and Design: A questionnaire-based survey was conducted.

Subjects and Methods: A total of 220 dental students comprising undergraduates and postgraduates participated in the survey where they were provided to fill a modified pretested, self-administered questionnaire consisting of 10 questions.

Statistical Analysis Used: The data were collected, compiled, arranged systematically, and analyzed in terms of percentage and frequencies. Participant's response was calculated and expressed as percentages and frequency.

Results: The clinical dental students showed a positive level of awareness, knowledge, and practice toward the sterilization protocols and infection control in their day-to-day practice.

Conclusions: Dental care professionals are at an increased risk of cross-infection as well as its transmission while treating the patients. This study is based on to assess the level of knowledge, attitude, and practice among dental students about sterilization protocol.

Keywords: Attitude, dental students, infection control, practice, sterilization

INTRODUCTION

Sterilization is the procedure that kills any living organism, pathogenic, and nonpathogenic; either it is in a vegetative form or spore, which is present on the surface of the material to be sterilized.[1] Proper sterilization and disinfection procedure benefit in preventing cross-infections and reduce the microbiological degree of contamination in the surrounding operative area.[2] While performing dental procedures, transmission pathways for infectious diseases are of the horizontal type, as the infections can be transmitted from dental surgeons to patients, patient to the dental surgeon, or from patient to patient.[3-5] Transmission of infection occurs when the pathogens come into direct contact with the exposed tissues either via a wound, blood, or any secretions. Infected instruments, when indirectly get in contact with the tissues and sometimes aerosol formation from air rotors, ultrasonic headpieces, or water contamination by the creation of biofilm in water pipes, also lead to the transmission of infection.[6,7] Dental

Vishal Mehrotra, Shazia Aslam, Kriti Garg, Rahul Srivastava, Pallavi Sinha, Jyoti Kiran

Department of Oral Medicine and Radiology, Rama Dental College, Kanpur, Uttar Pradesh, India

Address for correspondence: Dr. Vishal Mehrotra, 502 Twin Tower, Gurudev Palace, Kanpur - 208 024, Uttar Pradesh, India.
E-mail: vishal4march@rediffmail.com

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surgeons are at high risk of exposure to cross-infection with blood-borne pathogens, such as hepatitis B virus, human immunodeficiency virus (HIV), and other viruses. Some pathogenic bacteria present in the oral cavity and upper respiratory tract can also be easily transmitted while working.[8] Most of the instruments used in dentistry are in direct contact with the mucosa, infected sites, and oral tissues (in contact with blood during surgical procedures). Therefore, it is a must for a clinician to clean and sterilize contaminated reusable instruments and monitor them regularly. The instruments that are not reusable must be discarded and be assured not used again.[9] Awareness and knowledge regarding proper sterilization protocols among dental students are very less as they are in the learning period and are at high risk of exposure to infections with pathogens (blood-borne). As they are continually exposing themselves to blood and saliva, they are more prone to needle punctures.[9] Therefore, knowledge and awareness among dental students regarding sterilization and disinfection are utmost and must be added in the Dental Council of India syllabus. Time-to-time short courses and conferences must be organized by dental colleges and the local Indian Dental Association branch, for updating the proper way of sterilizing instruments after use. This will help the dental students to follow sterilization protocols when they will independently practice after the degree. This requires the involvement of dental students in playing an important role in recognizing the importance of maintaining proper sterilization protocols, which will yield the greatest public benefit in the future by them. Therefore, this study was conducted to assess the knowledge, awareness, and practice of dental students toward sterilization protocols. Education and training regarding proper sterilization must be provided to the dental students throughout the training in both theoretical and clinical context.

SUBJECTS AND METHODS

A questionnaire-based survey was conducted among 220 dental students comprising 70 3rd-year students, 70 final-year students, 40 interns, and 40 postgraduates. A modified pretested, self-administered questionnaire consisting of 10 questions each was included to evaluate the knowledge, awareness, and practice regarding sterilization protocols among dental students. Before conducting the survey, the ethical clearance was obtained from the Institutional Ethical Committee of the college. Informed consent was taken from the participating students.

Inclusion criteria

1. All the clinical dental students (3rd-year BDS, final-year BDS, interns, and postgraduate students) who were present on the day of the survey.

Exclusion criteria

1. Students not present on the day of survey
2. 1st-year and 2nd-year students as they are not exposed to clinical work.

Statistical analysis

The duration of the study spanned for a period of 1 month, i.e., March 2022. The data were collected, compiled, arranged systematically, and analyzed in terms of percentage and frequencies.

RESULTS

Awareness toward sterilization protocol and infection control among clinical dental students

All the participating dental students agreed that the sterilization of dental instruments is a must for starting any dental procedures. 97.14% of the total clinical dental students agreed that diseases such as AIDS and hepatitis can be transferred to a person from one another, i.e., dentist to the patient, patient to the dentist, or patient to patient. Only a few of them (22.25%) thought that patient coming for dental treatment is not aware of instrument sterilization. Only 20.57% of the clinical dental students thought that proper sterilization of instruments makes wound healing better. Only 48% of the clinical dental students were aware that dental surgeons might get an infection while performing dental procedures with unsterilized instruments. In contrast, the majority of them (52%) were unaware of this. 97.72% of the total dental students were aware of the myths that sterilization weakens the strength of the instruments.

Table 1: Awareness toward sterilization protocol and infection control among clinical dental students

Questions	Yes (%)	No (%)
Do you think sterilization is must for starting any dental treatment?	100	0
Do you think certain diseases such as AIDS and hepatitis can be transferred through unsterilized instruments?	97.14	2.8
Do you think patients are aware about sterilization of instruments?	77.14	22.8
Do you think surgery with proper sterilized instruments makes the wound healing better?	79.42	20.57
Do you think dental surgeons can get infected with the use of unsterilized instruments?	48.0	52.0
Do you think single-use syringes can be used again after sterilization with any means?	2.28	97.72
Do you think sterilization weakens the strength of instruments?	4.57	95.42
Do you think all surgical or dental instruments is must to be sterilized with autoclave?	73.71	26.29
Do you think courses and conferences are to be conducted for demonstrating proper methods of sterilization?	93.15	6.85
Do you think courses and conferences are to be conducted for demonstrating proper methods of sterilization?	90.28	9.79

73.71% of the students thought that all the surgical and dental instruments must be sterilized by an autoclave. Most of the patients (93.15%) thought that courses and demonstration (hands-on) in the conferences should be conducted for knowing proper methods of sterilization of the dental equipment. 90.28% of the total students are aware of using single-use instruments (disposable) for treating patients suspected with HIV and hepatitis [Table 1].

Knowledge toward sterilization protocol and infection control among clinical dental students

The response of the study subjects was based on knowledge toward sterilization protocol. The majority of the participating clinical dental students (91.42%) responded that they dispose of the used pair of gloves, whereas 5.14% of the students responded that gloves could be used after washing. 70.85% of the total dental students agreed that they cleaned their hands with soap/liquid hand wash after treatment. The majority of them (91.42%) responded that they use cheatle forceps to pick the sterilized instruments. 54.28% of the total study subjects agreed that tuberculosis has the highest rate of transmission via saliva followed by hepatitis (43.42%) and AIDS (2.28%), respectively. Regarding knowledge of clinical dental students about the rusted instrument, 58.85% of the total subjects agreed that the rusted instruments should be discarded. Majority of the total clinical dental students had knowledge about the autoclave that it is sterilization by moist heat, and 85.14% of them know that the ideal temperature of autoclave is 121°C for 15 min. Only 44.57% of them use the ultrasonic washer to wash their contaminated instruments. A substantial number of students (37.71%) only knew that ultrasonic scaler tips are sterilized using an autoclave. Surprisingly, only 3.42% of them were having knowledge that working room area should be sterilized by fumigation. 90.85% was having no idea of sterilization of the working area [Table 2].

Practice toward sterilization protocol and infection control among clinical dental students

Only 46.85% of the total clinical dental students responded that they sterilize the operative chair before starting a new patient. 72% of them wear a head cap while dealing with the patients. When we asked about whether they wear protective eyewear while performing oral prophylaxis, only 37.14% of the total study population opted for yes they wear. 88% of the total clinical dental students agreed that they do not touch a pen or any other objects once they were gloves. It was good to observe that the majority of the students (97.15%) wear a face mask while examining any of their patients. 71.43% of the total clinical dental students only sterilize patient's drapes for every new patient. It was good to see that the majority of the clinical dental students (91.43%) agreed that proper sterilization could not be achieved through the boiler. 98.28% of the total clinical dental students use sterilized sets of mouth mirror and probe while diagnosing each patient.

Table 2: Knowledge toward sterilization protocol and infection control among clinical dental students

Questions	Responses (%)
What do you do with used pair of gloves?	
Dispose them	91.42
Reuse after washing	5.14
Reuse after sterilization	3.42
With what do you clean your hands after treatment?	
Plain tap water	19.42
Soap/liquid hand wash	70.85
Disinfectant solution	9.71
What do you use to pick up sterilized instruments to keep them in your tray?	
Cheatle forceps	91.42
Hands	3.42
Tweezers	5.14
Which of the following has highest rate of transmission via saliva?	
Hepatitis B	43.2
AIDS	2.28
Tuberculosis	54.28
What should ideally be done with rusted instruments?	
Use them	9.71
Discard them	58.85
Clean with sand paper and reuse	31.42
Sterilization via autoclave is an example of?	
Dry heat sterilization	2.85
Moist heat sterilization	96.57
Chemical methods of sterilization	0.57
What is the ideal temperature/time of an autoclave?	
10°C for 15 min	1.14
121°C for 15 min	85.14
125°C for 15 min	13.71
How do you wash your instruments after use?	
Using hand and water	6.28
Using brush and water	49.14
Using ultrasonic washer	44.57
How did you sterilize your ultrasonic scaler tips?	
Washing with water	12.57
Dipping in ethyl alcohol	49.71
Autoclave	37.71
How did your working room area sterilized?	
Cleaning the floor with phenyl	5.71
Fumigation of room	3.42
No idea	90.85

However, 82.85% sterilized their air rotors, burs, and files before treatment. When they were asked about waste disposal, it was surprising to see the majority of the dental students (74.29%) do not follow color coding of the dustbins while disposing the waste [Table 3].

DISCUSSION

Proper sterilization and effective infection control is an essential step toward safe dental care practice. A variety of sterilization and infection control methods are practiced in

Table 3: Practice toward sterilization protocol and infection control among clinical dental students

Questions	Yes (%)	No (%)
Do you sterilize your operative chair before starting a new patient?	46.85	53.15
Do you always wear a head cap while dealing with your patient?	72.0	28.0
Do you wear protective eyewear while performing oral prophylaxis?	37.14	62.86
Do you touch a pen or any other object with gloved hands?	12.0	88.0
Do you wear a face mask while examining any patient?	97.15	2.85
Do you use sterilized patient drapes for every new patient?	71.43	28.57
Can proper sterilization be achieved through boilers?	91.43	8.57
Do you use sterilized sets of mouth mirror and probe while diagnosing each patient in the OPD?	98.28	1.72
Do you sterilize your air rotor, burs, and files?	82.85	17.15
Do you follow color coding of dustbins while disposing waste?	25.71	74.29

OPD: Outpatient department

dentistry for sterilizing the contaminated dental instruments. Dental professionals have to provide protection of the health and safety of patients. This survey yielded interesting findings regarding knowledge, awareness, and practice among clinical dental students. Primary sources of infection in dentistry are caused by hands. Wearing of gloves by dental surgeons had been essential for controlling cross-infection.[10] Two types of gloves are mainly used, i.e., single-use disposable nonsterile examination gloves or single-use disposable sterile surgical gloves. All the participating students, in our study, reported routine use of gloves and in examining and treating patients. Microorganisms under the gloves rapidly multiply due to the humid and warm environment.[11] Only 70.85% of the clinical dental respondents said that they wash their hands before and after treating a patient, which is lower than compared to (92.9%) a study conducted by Suresh *et al*.[12] In our study, majority of clinical dental students wear a face mask (97.15%), which was higher than the study reported from Davangere (85%) of wearing a face mask.[12] The use of a boiler as a method of sterilization is not acceptable in dentistry now. Boiling for 30 min or more only kills nearly all the vegetative cells but is not able to kill the spores. Therefore, the use of boilers is an insufficient method to achieve sterilization.[13] In our study, 91.43% of the total clinical students do not use the boiler to sterilize their instruments, which is a good sign for maintaining proper infection control. Sterilization of the instruments with autoclave was the method of choice for about 73.71% of the respondents in this study. Studies conducted by Al-Omari and Al-Dwairi (Jordan)[14] and Suresh *et al*.[12] reported that 63% and 78.4% of respondents were using an autoclave for sterilization. Transmission of the infections to the dental surgeons may occur through direct contact with blood of the infected patient, indirect contact with unsterilized instruments (prick of needles and sharp instruments), and contact with airborne contaminants present in aerosols of oral and respiratory fluid, specially while using air rotor or ultrasonic scalers. Learning clinical students are even more prone to these occupational hazards. Dental healthcare professionals are at high risk of getting infections by various microorganisms such as *Mycobacterium tuberculosis*, hepatitis B virus and hepatitis C virus, staphylococci, streptococci, herpes simplex virus, HIV, influenza, mumps, and rubella. In our study, only 54.38% of the total respondents had knowledge that tuberculosis has the highest rate of transmission via saliva. An educational program on infection control and proper sterilization methods for all dental health practitioners, especially clinical dental students, is a must to reduce infectious hazards among not only dental practitioners but also their patients.

CONCLUSION

In our study, clinical dental students showed a positive level of awareness, knowledge, and practice toward the sterilization protocols and infection control in their day-to-day practice. However, the knowledge acquired must be practically administered into daily practice. Compliance can be improved by upgrading students' knowledge through educational programs and making them aware of the various health hazards that can occur following malpractice of sterilization and infection control measures. The more updated and recent advances in sterilization protocols must be administered to the clinical students through educational programs. An additional subject for sterilization protocols must be incorporated in the curriculum so that upcoming dental surgeons must be aware about the various health hazards which can be occurred by avoiding proper infection control and sterilization protocols.

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Conflicts of interest

There are no conflicts of interest.

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