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Awareness of Newer Challenges in Cross Infection Control and Their Management Protocol among Endodontists: A Questionnaire Based Survey

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Abstract

Background: Cross- infection is considered to be one of the most important causes of morbidity and mortality associated with clinical, diagnostic and therapeutic procedures. The risk of exposure to cross-infection in endodontists, with blood-borne pathogens as well as with other viruses and bacteria that colonize the oral cavity and the upper respiratory tract, is enhanced by the constant contact with patients and the accidental injuries caused by sharp instruments such as needles and files during patient treatment. Despite the availability of prevention guidelines and recommendations on infection control, many dental practices lack the minimum requirements due to the lack of adequate knowledge. The purpose of this study was to evaluate the awareness of newer challenges in cross infection control and their management protocol among endodontists.

Materials and Methods: A standardized web-based questionnaire survey was conducted in a group of 400 endodontists including post graduate students, consisting of 20 multiple choice questions in English. The recorded data was statistically analyzed in the form of frequencies and percentages.

Results: According to the survey, only 19% of the participants exhibited good awareness (>80% correct answers), 41% of the participants exhibited moderate awareness (50-80% correct answers) and 40% of the participants exhibited poor awareness (<50% correct answers).

Conclusions: The findings of this survey indicate a moderate level of awareness about the newer challenges

in cross infection control and their management protocol among endodontists. There is a statistically significant increase in awareness, with increase in the years of clinical experience.

Keywords: Cross-Infection Control, Endodontists, Questionnaire.

Introduction

The diverse microbial flora in the oral cavity, direct contact with blood or saliva, indirect contact with contaminated equipment and contact with airborne contaminants such as aerosols, contribute to the hazardous nature of the dental workplace.[1]

The practice of endodontics presents additional problems to infection control due to the constant contact with patients as well as the increased potential of accidental percutaneous exposure to body fluids via contaminated files, spreaders etc. In addition to awareness about the basic principles of asepsis, endodontists are expected to be aware about specific challenges such as biofilms in dental unit waterlines, to adopt higher levels of infection control.

Materials and Methods

The ethical clearance for the survey was obtained from the Institutional Ethics Committee of A B Shetty Memorial Institute of Dental Sciences, Mangalore. A pilot study was conducted before the start of the survey. Based on the results of this pilot study, a final sample size of 400 was calculated.

A standardized cross- sectional web-based questionnaire survey was then conducted amongst a group of 400 endodontists, including post graduate students, in various parts of the country. Informed consent was obtained from the respondents at the beginning of the web- based survey.

Details of the participants such as their age and the number of years of clinical experience were recorded. The close-ended questionnaire was designed so as to include 20 multiple choice questions in English. Face validity and content validity was done to ensure the standardization of the questionnaire.

The questions included were regarding the awareness of the participating endodontists about the use of personal protective equipment, the ideal methods of instrument sterilization, the management and disposal of sharps, the recommended vaccinations in an endodontic practice and most importantly the biofilms found in dental unit waterlines and their disinfection protocol.

Statistical Analysis

The collected data was then entered in a Microsoft excel worksheet and further analyzed using the software IBM SPSS Statistics, Version 22 (Armonk, NY: IBM Corp). The frequencies and percentages of the correct and the incorrect responses were assessed. Graphical representation was done using bar and pie diagrams. A comparison of the categorical values was done using ANOVA with tukey post hoc test and Chi square test.

Results

- **According to Table 1 which shows the frequency of correct and wrong answers**:

Majority of the participants were not satisfactorily aware of the CDC accepted microbial level in dental unit waterlines as well as their disinfection protocol.

Table 1: Frequency of correct and wrong answers

Questions	Wrong		Right	
	Frequency	Percent	Frequency	Percent
The recommended method of "Hand Drying" is using	221	55.3	179	44.8
The specific time period within which the instruments should be sterilized is	305	76.3	95	23.8
At what level is segregation of health care wastes recommended before their disposal?	167	41.8	233	58.3
How are waste sharps disposed?	60	15.0	340	85.0
The vaccinations necessary for health professionals is/ are	136	34.0	264	66.0
Which of the following has the highest rate of transmission via saliva?	192	48.0	208	52.0
In case of a single contaminated needle stick injury, what do you think are the chances of HIV transmission?	204	51.0	196	49.0
On an average, endodontic files can be used on how many patients before sterilization?	65	16.3	335	83.8
Who carries out disinfection and sterilization of endodontic files?	179	44.8	221	55.3
The most ideal method of sterilizing endodontic files is/ are	235	58.8	165	41.3
Should silicon stoppers be removed before sterilization?	176	44.0	224	56.0
Contamination through usage of gutta percha cones is reduced by	150	37.5	250	62.5
The source of water in the dental unit water lines in your hospital/ dental clinic should ideally be from	177	44.3	223	55.8
Biofilms can be formed in dental unit water lines.	51	12.8	349	87.3
The microorganisms most commonly found in the biofilm formed in dental unit water lines are:	134	33.5	266	66.5
What is the level of microbial colony forming units that is accepted by the Centers for Disease Control and Prevention (CDC)?	284	71.0	116	29.0
How often should you flush out the dental unit water lines and devices ?	232	58.0	168	42.0
The minimum required time for which the dental unit water lines should be flushed is	220	55.0	180	45.0
Dental unit waterlines in your hospital/ dental clinic can be disinfected with	160	40.0	240	60.0

- **According to Graph 1, which shows the relationship between the number of years of clinical experience of the participants and their awareness**:

A statistically significant increase in the awareness of the participants with an increase in the number of years of clinical experience was observed.

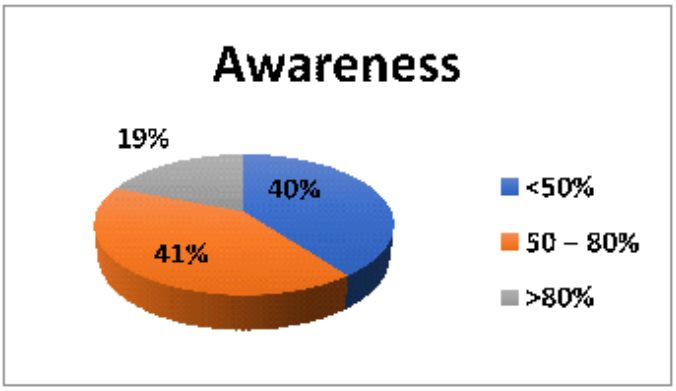
Graph 1- Relationship between the years of clinical experience and awareness

- **According to Graph 2, which shows the percentage awareness of the participants:**

o 19 percentage of the participants showed good awareness (scoring >80% correct answers)

o 41 percentage of the participants showed moderate awareness (scoring 50-80% correct answers)

o 40 percentage of the participants showed poor awareness (scoring <50% correct answers)



Graph 2: Percentage awareness of the participants

Discussion

Following the recommended infection control guidelines can prevent most of the unintentional exposure in endodontic practice. The results of this survey reveal a moderate awareness of the challenges in cross infection control and their management protocol among endodontists.

Hand hygiene (handwashing, hand antisepsis, or surgical hand antisepsis) in dental practice is the single most critical measure to prevent the spread of infections among patients and dental health care personnel. Education and training programs should thoroughly address the techniques and the indications for hand hygiene practices. Hand washing before as well as after gloving is an extremely important measure as the skin harbors resident and transient microbes. [1] Resident microflora is adherent to the deeper layers of the skin and is less likely to be associated with healthcare associated infections. On the other hand, transient microflora colonizes the superficial layers of the skin and can be easily removed during routine hand washing procedures.[2] Hand hygiene is performed when hands are visibly soiled, after the barehanded touching of contaminated instruments and equipment as well as before and after each patient. The preferred method for hand hygiene depends on the degree of contamination, the type of treatment procedure, and the desired persistence of antimicrobial action on the skin. When the hands are visibly soiled with blood and other body fluids, an antimicrobial soap and water is used; otherwise an alcohol-based hand rub may be used. [3] The antimicrobials used during hand washing tend to have a residual effect and accumulate in the epithelial tissues. Disposable paper tissues should be used to dry the hands as well as to turn the handles of contaminated faucets. Foot operated regulators and sensor activators are now available to facilitate the switching on and off of taps

without having to touch the handles. [1] In the present survey, 55.3% of the participants were unaware of the recommended method of hand drying.

A needle stick injury is an accidental skin penetrating wound from a needle containing another person's blood or body fluid. Endodontists are at an increased occupational risk of exposure to blood-borne pathogens via needle stick and sharp injuries.[4] Hence, they should be made aware of the hierarchy of controls that categorizes and prioritizes prevention strategies. Whenever possible, engineering controls that eliminate or isolate the hazard, should be used as the primary method to reduce exposures to bloodborne pathogens via sharps. This includes the use of puncture- resistant sharps containers or needle retraction devices. In the situations where engineering controls are unavailable or not appropriate, work practice controls that result in safer behaviors are incorporated. These include one handed needle recapping and not using fingers for cheek retraction while using sharp instruments. [3]In accordance with OSHA's requirement to eliminate two handed needle recapping, the passing of contaminated files, spreaders etc. from the dentist to the assistant and vice versa must also be avoided. An assortment of devices such as sponges, and file organizers are available to tackle this issue. [1] The disposal of waste sharps is ideally done by segregating them in to an empty puncture proof container and then handing them over to the local waste management agency. According to the current survey, although majority of the participants were aware of the recommended method of waste sharps disposal, 49% were unaware of the chances of HIV transmission through a single contaminated needle stick injury.

Sterilization refers to any process that eliminates, removes, kills or deactivates all forms of life including spores. Patient care items (instruments, devices and equipment) are categorized into critical, semi- critical and non-critical based on the potential risk of infection associated with their intended usage. Critical items are those used to penetrate soft tissue or bone and that enter into or contact the blood stream or other normally sterile tissue. These include burs, endodontic files, surgical blades etc. and have the highest risk of transmitting infection. They should be sterilized by heat. Semi critical items are those that contact the mucous membranes or non- intact skin without penetrating soft tissue, bone or entering or contacting the blood stream. These have a lower risk of transmission of infections and include mouth mirrors, dental handpieces, reusable impression trays etc. Since the majority of the semi critical items used in dentistry are heat tolerant, they are also sterilized using heat. If a semi critical instrument is heat sensitive, it should be processed with high level disinfection. Non-critical patient care items such as radiographs pose the least risk to infection transmission, as they contact only intact skin. In most of these cases cleaning or if visibly soiled, cleaning followed by disinfection with an EPA registered hospital disinfectant is adequate. [3]

According to the study conducted by Craig et al, steam autoclaving produced completely sterilized endodontic files in comparison with salt sterilizer and glutaraldehyde solution.[5] Only 41.3% of the participants in the current survey were aware of the ideal method of file sterilization.

For an instrument to be cleaned adequately and to be made accessible for subsequent sterilization, a complete exposure of its surface is necessary.[6] In the current survey, 56% of the participants were aware that silicon stoppers are to be removed before endodontic files are sterilized. This is in contrast to the study by Sonntag et al where only 43.3% of the participants reported the removal of the silicon stoppers prior to sterilization.[6]

Dental handpieces, air/water syringes etc. are connected to the dental units by a network of thin, plastic tubings known as dental unit waterlines (DUWL).[7] This system is used to irrigate the oral cavity as well as to cool certain equipment such as airotors and mechanical scalers. Recurrent long-term water stagnation (over nights, weekends and holidays) at warm temperatures within the tubings, may create conditions for microflora to establish tenacious adherent communities known as biofilms. [8] Biofilms protect organisms from the effect of heat and chemicals thereby reducing their susceptibility to disinfection processes and creating conditions conducive to the multiplication and transmission of microorganisms. Waterborne microorganisms may lead to infections in a patient undergoing dental treatment in one of the following ways- hematogenous spread during surgical procedures, mucosal (oral/conjunctival) contact, inhalation or ingestion. Evidences suggest that dental personnel are continuously exposed to waterborne pathogens. The prevalence of antibodies to L pneumophilia was seen to be significantly higher among dental professionals than in a control population (34% and 4% respectively. Also, the nasal flora of dental professionals was seen to have a higher proportion of Pseudomonas spp. [7] In 1993, CDC recommended that dental waterlines be flushed at the beginning of the clinic day as well as in between patients to reduce the microbial load. Dental devices that enter the patient's mouth and are connected to the dental water system, such as handpieces and air water syringes, should be operated to discharge air and water for a minimum of 20-30 seconds after every patient. The intention of this procedure is to physically flush out patient material such as oral microorganisms, blood and saliva, that may have entered the turbine, air or waterlines. However, studies have demonstrated that the recommended value of <500 CFU/ mL cannot be achieved by this practice alone. [3] The potential solution to this problem includes installing filters near handpieces that provide a physical barrier to the passage of microorganisms as well as using chemical disinfectants that reduce the bacterial counts to an acceptable level.[7] In this survey, 55% of the participants were unaware of the recommended protocol for dental unit waterline flushing and a mere 29% of the participants were aware of the fact that the CDC accepted level of microbial colony forming units in dental unit waterlines is <500 CFU/mL.

It is observed in this survey that there is a moderate level of knowledge about cross infection control among the participants. It is also observed that the knowledge of participating endodontists significantly increases with an increase in the years of clinical experience. This can be attributed to the greater exposure to patients and the consequent understanding that cross infection control does in fact contribute to the success of any treatment provided.

The deficiency in the knowledge and awareness of the challenges in cross infection control and their management protocol among endodontists is of utmost concern. To increase awareness, various steps should be undertaken such as every clinical set up should have its own infection control advisory where the dental health professionals are educated about the newer methods of cross infection control, and where strategies for the prevention of health care associated infections are discussed. Also, a written infection control program should be developed to prevent or reduce the risk of disease transmission. This program should be designed to include the establishment and implementation of policies, procedures and practices to prevent work related illnesses and injuries among dental health care personnel as well as health care associated infections among patients. The program should embody the principles of occupational

health and infection control, reflect current science and also adhere to the relevant federal, state and local regulations. A knowledgeable or willing to be trained DHCP should be employed as the infection control coordinator with the responsibility of coordinating the program and creating and maintaining a safe work environment. Moreover, the effectiveness of such an infection control program should be evaluated on a day to day basis as well as over time to ensure that the policies, practices and procedures are relevant, efficient and successful. [3]

Conclusion

The transmission of infections in endodontic practice is of significant concern for both patients and the endodontist. Cross infection prevention must be made a priority in endodontic as well as any dental health care setting. At least one individual with adequate training and knowledge in infection prevention, should be appointed the infection prevention coordinator who will be responsible for developing written infection prevention policies and procedures based on evidence-based guidelines, regulations, and standards. The findings of this survey indicate a moderate level of awareness about newer challenges in infection control and their management protocol among endodontists. It is also observed that there is a statistically significant increase in awareness with increase in the years of clinical experience.

References

1. Reams GJ, Baumgartner JC, Kulid JC. Practical application of infection control in endodontics. Journal of endodontics. 1995 May 1;21(5):281-4.
2. Naik S, Khanagar S, Kumar A, Vadavadagi S, Neelakantappa HM, Ramachandra S. Knowledge, attitude, and practice of hand hygiene among dentists practicing in Bangalore city–A cross-sectional survey. Journal of International Society of Preventive & Community Dentistry. 2014 Sep;4(3):159.
3. Kohn WG, Collins AS, Cleveland JL, Harte JA, Eklund KJ, Malvitz DM. Guidelines for infection control in dental health-care settings-2003.
4. Pavithran VK, Murali R, Krishna M, Shamala A, Yalamalli M, Kumar AV. Knowledge, attitude, and practice of needle stick and sharps injuries among dental professionals of Bangalore, India. Journal of International Society of Preventive & Community Dentistry. 2015 Sep;5(5):406
5. Craig A, Hurtt, Rossman LE. The sterilization of endodontic hand files. Journal of endodontics. 1996 Jun 1;22(6):321-2.
6. Sonntag D, Martin E, Raab WH. Representative survey on the reprocessing of endodontic instruments in Germany. British dental journal. 2016 May;220(9):465.
7. Jean Barbeau. Waterborne biofilms and dentistry: the changing face of infection control. J Can Dent Assoc. 2000;66:539-41.
8. Kengadaran S, Srisakthi D, Arumugham IM, Pradeepkumar R. Knowledge, attitude, and practice regarding dental unit waterline disinfection among dental practitioners of India. Journal of Advanced Pharmacy Education & Research| Jul-Sep. 2017;7(3).
9. Wirthlin MR, Marshall GW, Rowland RW. Formation and decontamination of biofilms in dental unit waterlines. Journal of periodontology. 2003 Nov 1;74(11):1595-609.
10. Smith AJ, Bagg J, Hurrell D, McHugh S. Sterilisation of re-usable instruments in general dental practice. British dental journal. 2007 Oct;203(8):E16
11. Petti S, Messano GA, Polimeni A. Dentists' awareness toward vaccine preventable diseases. Vaccine. 2011 Oct 19;29(45):8108-12.

12. Askarian M, Mirraei K, Etminan M, Araujo MW. Knowledge, attitude and practice towards droplet and airborne isolation precautions among dental health care professionals in Shiraz, Iran. Journal of public health dentistry. 2005 Mar;65(1):43-7.
13. Sudhakar V, Chandrashekar J. Dental health care waste disposal among private dental practices in Bangalore City, India. International dental journal. 2008 Feb;58(1):51-4.
14. Singh A, Purohit BM, Bhambal A, Saxena S, Singh A, Gupta A. Knowledge, attitudes, and practice regarding infection control measures among dental students in Central India. Journal of dental education. 2011 Mar 1;75(3):421-7.
15. Mathur V, Dwivedi S, Hassan MA, Misra RP. Knowledge, attitude, and practices about biomedical waste management among healthcare personnel: A cross-sectional study. Indian journal of community medicine: official publication of Indian Association of Preventive & Social Medicine. 2011 Apr;36(2):143.
16. Guruprasad Y, Chauhan DS. Knowledge, attitude and practice regarding risk of HIV infection through accidental needlestick injuries among dental students of Raichur, India. National journal of maxillofacial surgery. 2011 Jul;2(2):152.
17. Khanghahi BM, Jamali Z, Azar FP, Behzad MN, Azami-Aghdash S. Knowledge, attitude, practice, and status of infection control among Iranian dentists and dental students: a systematic review. Journal of dental research, dental clinics, dental prospects. 2013;7(2):55.
18. Alharbi G, Shono N, Alballaa L, Aloufi A. Knowledge, attitude and compliance of infection control guidelines among dental faculty members and students in KSU. BMC oral health. 2019 Dec 1;19(1):7.