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Original Research Article

Assessment of infection control practice in private dental hospital

Bipin Kumar Yadav[1], Ambesh Kumar Rai[2], Savita Agarwal[3]*, Bindu Yadav[4]

[1]Department of Periodontology, [2]Department of Dentistry, [3]Department of Pathology, Uttar Pradesh University of Medical Sciences, Saifai, Etawah, Uttar Pradesh, India
[4]Osho Dental Clinic Etawah, Uttar Pradesh, India

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***Correspondence:**
Dr. Savita Agarwal,
E-mail: savvymedico@gmail.com

ABSTRACT

Background: The purpose of this study was to assess the awareness and practice of infection control procedures among dental surgeons in the private dental hospital.
Methods: This is an observational study conducted among thirty dental surgeons working in a private dental hospital in Gwalior, (M.P.) to evaluate the management policies and procedures associated with infection control and instrument decontamination. The doctors were indirectly interviewed by self-administered questionnaire consisted of twenty-one questions regarding the availability of infection control materials, use of personal protective devices, techniques of hand washing, sterilization methods, control of aerosols, status of immunization, asking about medical history, routine documentation of needle-prick injuries, methods of waste segregation etc. The study group was selected regardless of sex, age and field of expertise. This study was done in two weeks and in this time frame self-administered, pre-structured questionnaire was offered to professionals.
Results: In this study it was found that although 95% of doctor's wear gloves but only 6.6% doctors use protective eyewear and 3.3% use gowns for protection. The most of the doctor's use soap bars for hand washing which is also not a good infection control practice method. There are only 10% doctors who use high-volume-evacuator but most of the time available evacuator is not in working state. Not a single doctor used rubber dam. Out of thirty 74% use gluteraldehyde, 67% use sodium hypochlorite, 54% use phenolic compounds as a surface disinfectant. Most of the doctors use non-sterilized hand pieces, burs, impression trays etc.
Conclusions: The infection control actions implemented by dental surgeons were far from ideal. Efforts are needed to improve attitudes, encourage implementation, raise awareness, promote regular updating courses and motivate dental professionals in the correct and routine use of infection control measures. Apart from this, it is also important to improve the hospital management system.

Keywords: Cross-infection, Infection control, Practices

INTRODUCTION

Most of institution in the India faced a major problem such as poor infection control practice, poor management system, poor hospital engineering services, low staff satisfaction and long waiting line to get appointments for treatment. Because of this we had selected the most common problem i.e. poor infection control practice in our study. It must be the moral and ethical responsibility of a health care provider not to increase the patient problem by making him more ill or infecting him with some other disease rather than curing him because when patient visits a hospital, he is already ill and mentally disturbed and he come to get his disease cured. The dental clinic is an environment where disease transmission occurs easily.[1] Prevention of cross infection

in the dental clinic is therefore a crucial aspect of dental practice, and dental clinic workers must adopt certain basic routines while practicing. Dental Health Care Professionals (DHCPs) are at risk of infections caused by various microorganisms such as Mycobacterium tuberculosis, hepatitis B and C viruses, staphylococci, streptococci, herpes simplex virus types, human immunodeficiency virus (HIV), mumps, influenza and rubella. Infections may be transmitted in the dental operatory through several routes, including direct contact with blood, oral fluids, or other secretions; indirect contact with contaminated instruments, operatory equipment, or environmental surfaces; or contact with airborne contaminants present in either droplet splatter or aerosols of oral and respiratory fluids.[1-3]

The risks of disease transmission may vary depending upon host susceptibility, virulence and infectivity of the organism, the dose or number of organisms, period of exposure (time-span) and finally the mode of transmission. Controlling virulence of all pathogenic organisms or trying to reduce inherent patient susceptibility is next to impossible. A practical approach would be to understand the disease processes, routes of transmission, methods for controlling transmission, and implementing adequate infection control and safety measures during practice to break the chain of infection. Immunization against diseases, use of practical barrier techniques, use of personal protective equipment, engineering and work practice controls, disinfection of contaminated surfaces equipment, sterilization of critical and semi-critical instruments, and use of aseptic protocols during treatment, broadly encompass the realm of Dental Infection Control and safety.[4]

The most effective means of preventing the spread of infections, it is necessary to understand the basic modes of transmission. Transmission of infections requires three elements: (a) source of infecting microorganisms (b) susceptible host and (c) means of transmitting the microorganism. In the dental office, the main modes of transmission of microorganisms are:

- Direct transmission-direct physical contact with blood, oral fluids or other materials,
- Indirect transmission-contact with an intermediate contaminated object, such as a dental instrument, equipment or an environmental surface,
- Droplet - contact of oral, nasal or conjunctival mucosa with droplets, spatter or spray containing microorganisms generated from an infected person, such as by coughing, sneezing or talking,
- Aerosol-particles of respirable size (<10um) generated by both humans and environmental sources that can remain viable and airborne for extended periods in the indoor environment. In dentistry, aerosols are commonly generated by the use of hand pieces, ultrasonic scalars and air/water syringes.

Infection Prevention practice are important to

- Provide high quality, safe services to patients,
- Prevent post procedure infections in patients,
- Prevent infections in service providers and staff,
- Lower the cost of health care facilities,
- Protect the community from the infections which may occur from health care facilities.

Many diseases such as Hepatitis (A, B, C, D, and E), Tuberculosis, and HIV etc. are encountered in dental practice.[5] At times it is the patient who comes to seek care is infected, and other times it could be the clinician or clinical staff who is affected by the disease condition. In 1983, the Centers for Disease Control (CDC) made the first recommendations for the prevention of exposure to blood and body fluids through the use of universal precautions. In 1986, recommended Infection-Control Practices for Dentistry was published and later updated in 1993. The CDC published recommendation for prevention of HIV transmission in health-care settings in 1987, which recommended that blood and body fluid precautions be consistently used for all patients regardless of their blood borne infection status. Under universal precautions, blood and certain body fluids of all patients are considered to be potentially infectious for human immunodeficiency virus (HIV), hepatitis B virus (HBV), hepatitis C virus (HCV) and other blood borne pathogens. The rationale for treating all patients as potentially infectious is due to the fact that most patients are unaware of their infectious disease status. This concept was intended to use protective measures to prevent parenteral, mucous membrane and non-intact skin exposures of healthcare workers to blood borne pathogens based on the clinical procedure rather than the known infectious disease status of the patient or the appearance of the patient. In addition, the recommendation for health care workers to be immunized against hepatitis B was an additional measure.[6] Based on the evidence, information and rules, local to either the country or region, high standards of Dental Infection Control and Occupational Safety must be followed by the dental team for the safety of the patients and Dental Healthcare Workers. Disease transfer to the dentist and dental staff during dental care is considered an "occupational exposure" to a given pathogen, while disease transfer from one patient to another in the dental clinics is considered "cross-infection". Therefore, the dental health care provider must be knowledgeable about the diseases commonly encountered during dental care and must responsibly provide care to patients without getting infected, or without infecting patients

Thus, it is very important to understand the importance of infection control in hospitals or clinics. The concern for hospital infection control is gaining importance day by day because of:

- Increase medical awareness of public
- Stiff hospital competition in marketing health care

- Promulgation of Consumers Protection Act
- Rising cases of litigation in respect to Medical negligence
- Growing resistance to organisms to antibiotics
- These factors have led hospitals to become quality conscious, practicing high standard of care, adequate patient safety and reducing the hospital infection to minimum
- To prove their worth in quality standards, hospitals are going for accreditation by international/national bodies like JC/NABH.

A well-informed and alert professional is capable of performing his procedures without putting himself at risk or the health of his patients. Consequently, the goal of this study was to assess current infection control measures adopted by dental surgeons during their practice.

Aims and objectives of the study

- Protect the patient.
- Protect healthcare coworkers, visitors, and others in the healthcare environment.
- Accomplish the previous two goals in a cost-effective manner, whenever possible. The main objective of this study was to evaluate the infection control measures actually implemented by dental surgeons during dental practice, as patients and professionals are exposed to high biological risk in dental care environments.

METHODS

This was an observational/ questionnaire based study conducted among thirty dental surgeons working in a private dental hospital in Gwalior, Madhya Pradesh, India to evaluate the management policies and procedures associated with infection control and instrument decontamination. A pre-structured, self-administered questionnaire consisted of twenty-one questions was developed.

Keeping the study group in mind, questions were related to availability of equipments and materials of infection control in the dental hospital, how these equipment and materials are used in the departments, biomedical waste management system, documented infection control policies, standard precautions taken during treatment etc. The study group comprised of thirty dental surgeons working in the private dental hospital.

The study group was selected regardless of sex, age and field of expertise. Present study was done in two weeks-time and in this time frame self-administered, pre-structured questionnaire was offered to thirty dentists. Informed consent and university clearance were obtained for the study.

RESULTS

Present observational study was undertaken to evaluate the management policies and procedures associated with infection control and instrument decontamination. The doctors were indirectly interviewed by self-administered questionnaire consisting of twenty-one questions related to the availability of infection control materials, use of personal protective devices, techniques of hand washing, control of aerosols, sterilization methods, status of immunization, asking about medical history, routine documentation of needle-prick injuries etc.

In this study it was found that 95% of dental surgeons wear gloves, 80% use face mask but only 6.6% doctors use protective eyewear while 3.3% use gowns for protection during treating the patients (Table 1).

Table 1: Use of personal protective equipment's.

Personal protective equipments	Number of doctors using it	Percentage of doctors using it
Single use disposable exam gloves	28	95
Sterile single use disposable gloves for surgical procedures	06	20
Face mask	24	80
Protective eyewear	02	6.6
Protective gowns	01	3.3

The large variation was found by using the antimicrobial hand washing agents and measures taken to control of aerosols in his/her practice. Most of the dental surgeons 96.7% and 33% using soap bars and liquid soaps respectively and 50% use hand sanitizer, while only 10% doctors who use high volume-evacuator to control the aerosol and not a single doctor use rubber dam in our study (Table 2).

Table 2: Use of antimicrobial hand washing agents and measures to control of aerosols.

Hand washing agents	Number of doctors using it	Percentage of doctors using it
Antimicrobial soap bars	29	96.7
Antimicrobial liquid soaps	10	33
Hand sanitizer	15	50
Rubber dam	00	00
High-volume-evacuator	03	10

Out of thirty doctors 74% were using gluteraldehyde, 67% sodium hypochlorite and 54% phenolic compounds and 40% use quaternary ammonia compounds as a surface disinfectant while none of them use surface barriers like PVC film/coating wax (Table 3).

Table 3: Use of surface disinfectants and barriers.

Type of surface disinfectants and barriers	Number of doctors using it	Percentage of doctors using it
Surface barriers like PVC film/coating wax	00	00
Sodium hypochlorite	20	67
Phenolic disinfectant	16	54
Quaternary ammonia compounds	12	40
lodophor disinfectant	05	16
GIuteraldehyde	22	74

Various systems for routine sterilization of instruments used were boiling water, autoclave and glass bead sterilizer etc. Autoclave was the most common method for the sterilization of instruments. Our study reveals that 66.7% surgeon use boiler, 44% autoclave, 13.3% hot air oven and immersion sterilant whereas only 12% uses glass bead sterilizer. The most of doctors do not use heat sterilized hand pieces and burs. 80% doctors use heat sterilized hand instruments, 70% endodontic instruments, 53.3% orthodontic instruments and 13.3% impression trays after the heat sterilization (Table 4).

Table 4: Sterilization methods and use of heat sterilized instruments.

Type of sterilizer	Number of doctors using it	Percentage of doctors using it
Use of autoclave	13	44
Use of hot air oven	4	13.3
Use of boiler	20	66.7
Immersion sterilant	4	13.3
Use of glass bead sterilizer	3	12
High speed band-piece	00	00
Burs	00	00
Endodontic instruments	21	70
Orthodontic instruments	16	53.3
Impression trays and materials	4	13.3
Hand instruments	24	80

We also enquired about various risk factors associated with acquisition of infections and other important things to be considered for infection control by asking questionnaire in form of Yes/No to the dental surgeons and got surprising data like 98% had knowledge about airborne spread of diseases, 90% immunization against infectious diseases, 70% asking about medical history of patients, 40% proper biomedical waste management system, 16% use of Special container for disposal of sharp objects and 10% routine documentation of needle injuries while not a single doctors had a availability of infection control coordinator, use of sterilization indicators and prophylaxis facility of needle prick injuries (Figure 1).

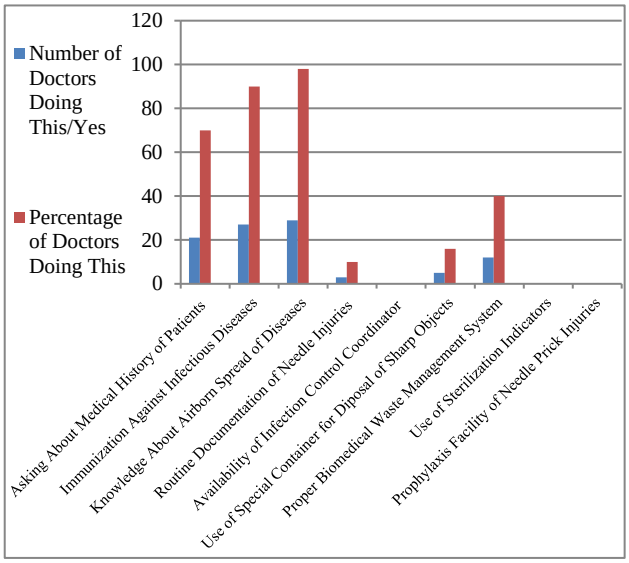

Figure 1: Other important things to be considered in infection control study yes/no.

DISCUSSION

Preliminary analysis of data from this convenience sample showed a good response rate in completion of questionnaire. Most respondents were general dentists while a significant number were specialists. Immunization of DHCPs before they are placed at risk for exposure remains the most efficient and effective use of vaccines in health care settings. Some educational institutions and infection control programs provide immunization schedules for students and DHCPs. Immunizations substantially reduce both the number of DHCPs susceptible to these diseases and the potential for disease transmission to other DHCPs and patients. Thus, immunizations are an essential part of prevention and infection control programs for DHCPs and a comprehensive immunization policy should be implemented for all dental health care facilities. Mandatory vaccination is recommended to all dental students before exposure to clinical practice. By doing so, they protect not only health care professionals, but also patients and their families.[7]

The most surprising result of the study was that although 90 percent of the employed dental surgeons had been vaccinated with hepatitis B vaccine but 71 percent of the students of this institute had not been vaccinated with hepatitis B vaccine. The Dental Council of India has made hepatitis B vaccination mandatory for dental students prior to admission, although the school has not listed it as a requirement. Even though the staffs know the importance and use of antiseptic solution, most of the doctors were not using it to wash their hands before and after patient examination. About 96.7 percent of the staff use antiseptic soap bars and 33 percent were using liquid

soaps. But this is because of non-availability of the liquid soap. Barrier technique with the exception of the use of eyewear and protective clothing was practiced by 90 percent of the staff. Use of eyewear, and protective clothing as standard infection control measures was practiced only by three staff. During graduation time dental students are stressed to wear mouth mask and gloves in the dental school, but it is a rarity to see dentists using eye shields and protective clothing. The level of knowledge about infection control measures was good among the staff but attributable reasons for non-compliance could be inadequate training for infection control measures, inadequate supply of personal protective equipment, and carelessness.

The utilization of protection barriers aims at minimizing the contamination of surfaces and equipment by microorganisms existing in the environment or on the hands of the professional. A study carried out by Bulgarelli et al emphasizes that the use of disposable barriers for each patient reduces bacterial contamination by 70%.[8] Either because of non-availability of this resource or carelessness, more than 90 percent of participants reported not to make use of it which may translate the indifference to preventive measures and cross contamination control. This finding underscores the need for adjustment and change in habits.[9]

Prior disinfection is characterized by soaking the instruments contaminated by organic material in chemical disinfectant solutions, before cleaning, in order to reduce risks of pathogen exposures to the professional. However, research shows that this practice is not based on scientific evidence, as the organic material can interfere in the antimicrobial activity of disinfectants. Most of the dental surgeons use gluteraldehyde and sodium hypochlorite as surface disinfectant. Ramesh and Anuradha in a study done with Bangalore and Chennai dentists found that although attitudes towards treating patients with infectious disease were positive, more knowledge about infection control was needed.[10]

Asymptomatic patients, whether carriers of infectious diseases or not, are assisted by dental surgeons every day, making sterilization processes and validation of paramount importance. In our study, autoclave (moist-heat by steam), oven (dry-heat sterilizer), chemical solutions and alcohol were analyzed as methods of "sterilization". Although, the respondents mentioned use of autoclaves, most were modified pressure cookers (locally manufactured) at the best. Autoclave is considered the preferred method due to its safety, quickness and its lethal effect of pressurized steam on all microorganisms. Nonetheless, recent studies have shown that 12% to 33% of these devices present defects easily detectable with periodical monitoring of the cycles and the simultaneous use of different sterilization indicators. Findings by Monarca et al and by Castitho et al show respectively, 68.60% and 72.55% of autoclave users with 27.40% and 26.95% referring no use of indicators.[11,12] The results obtained in this study is very surprising as in this hospital they do not use indicators. The free use of material and/or instruments with no certification of correct sterilization is a large concern in respect to biosafety.

The literature describes the oven as a secure method for sterilization, but it is less appropriate than the autoclave, mainly as it permits the interruption of process, by the heterogeneity of penetration and heat distribution inside the chamber, by the absence of a precision thermostat to effectively control temperature and because it requires prolonged exposure to high temperatures.[12] Due to these issues, sterilization in a dry-heat sterilizer which seemed to be the practice of approximately 13.3% of the participants in our project is currently recommended just for metal blades, points, cutting or drill instruments sensitive to oxidization by steam.

There is evidence that high-volume suction plays an important role in minimizing contamination of the treatment room by micro-particle aerosols that contain significant microbiological load.[13] Saliva alone has bacteria of about 150 million/ml. The present study revealed that only 10 percent of the studied dentists used the high-volume suction.

Many dentistry instruments are sharp and piercing and can easily cause lesions when handled. This type of accident, mainly with exposure to blood or bodily fluids should be treated as urgency, as the fastest the prophylaxis is initiated, the better the prognosis. In our data we identified that dental surgeons reported accidents had not got specialized medical assistance and effective prophylactic interventions in the hospital.

There is also lack of written infection control policies and routine documentation of needle prick injuries. There is poor segregation of biomedical waste in the departments. Personnel are more likely to comply with an infection control program and exposure control plan if they understand its rationale. Clearly written policies, procedures, and guidelines can help ensure consistency, efficiency, and effective coordination of activities.

CONCLUSION

Taking into account the initial proposal and the results obtained, we can conclude that infection control actions implemented by dental surgeons in this study in their dental practice are far from ideal. The critical points observed were: absence of protective barriers on surfaces, use of non-recommended methods of disinfection, use of ineffective methods of sterilization, lack of monitoring of autoclave sterilization cycles, failure to use indicators, negligent behavior in post occupational accidents, and use of irritant antiseptic solutions. It is necessary to educate, raise awareness of professionals, and promote constant updating courses on procedures aiming at improving safety in the dentistry practice.

Apart from this, it is also important to improve the hospital management system and educate the concern authority about the potentially lethal effects of poor infection control on the patients and health care professionals and most importantly on the reputation of hospital.

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