

## Knowledge and Practice of Infection Control in Impression Making among the Dental Health Care Professionals

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### ABSTRACT

**Background:** Infection control is an imperative issue in the dental practice. Almost all of the dental procedures involve dealing with the saliva, blood and oral fluids which may have sufficient pathogens and cause cross infection through contaminated instruments, materials and surfaces. Therefore the dental health care workers must be aware of the possible contamination and should follow the measures to prevent it. The aim of the study is to assess the knowledge of dental health care professionals regarding infection control and modes of infection control employed by them during one of the dental procedure i.e. impression making.

**Methods:** A self-assessment questionnaire based survey was carried out among dental health care professionals to assess the knowledge and practice of infection control in dental clinics. Survey instruments containing 14 questions were randomly distributed to 113 dental health care professionals regarding knowledge of infection control methods and infection control practice during impression making in dental clinics and hospitals. Data was collected and analyzed. **Results:** Though most of the health care professionals (88.6 %) think an impression taken from patient mouth will have enough pathogens to cause cross infection, our study showed that only 52.3 % of them disinfect all the impression and washing impression under running water was the method used for disinfection by the majority (78.9 %). **Conclusions:** The knowledge about infection control during impression making is better among the dental health care professionals. But there is a need to improve the practice to minimize cross infection in dental set up and reduce the associated morbidity and mortality rates for both dental practitioners themselves and patients.

**Keywords:** dental impression; infection control; disinfection; knowledge; dental healthcare professional.

### INTRODUCTION

Infection is regarded as one of the most critical issues in health care services worldwide. Infection can be acquired by various means such as nosocomial infection, sub-clinical or cross infection. Cross infection, which is transmission of infectious agents between patients and staffs within a clinical environment, is of concern in dentistry. It is estimated that 1ml of saliva from average healthy person contains about 750 million microorganisms which indicates that dental health care professionals are at risk of cross infection through direct or indirect contact with the saliva, blood and other oral fluids.<sup>1</sup> AIDS, Hepatitis, Herpes and tuberculosis can affect many societies due to cross infection in health care services if we do not follow basic procedures in the norms of biosecurity.

In dentistry, this concern is well established, because during the clinical procedures, clinicians and their assistants are exposed to pathogens through materials and contaminated instruments. According to previous records it is found that dental professionals are at 3 times more risk of

contracting HBV infection than the general population. Therefore the use of mechanical barriers such as gloves, masks, safety glasses, aprons as well as disinfection of surfaces and instruments sterilization are basic procedures for universal precaution.<sup>2</sup>

In 2003, CDC (Centre for Disease Control and Prevention) updated their guidelines for infection control in dental setting and ADC also issued guidelines for disinfection. Although these have been followed to some extent in other dental procedures and surgical operatories, they are not often followed while taking dental impressions. Dental impressions can transmit serious diseases from patient to dental staff to lab technician or vice versa because they are in contact with saliva and blood from patient's mouth and can transfer microorganisms to stone casts. Some of these microorganisms survive by a very long time, even when they are outside the oral fluids, then this is a potential health risk.<sup>3</sup> So, all the impressions must be disinfected before being sent to the prosthetic

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laboratory or by the time they arrive there, avoiding the spread of cross infection. The disinfection of the dental impression must be done carefully. The selection of the disinfecting agent is very important, because it must have wide action spectrum without altering the physio chemical properties from the impression materials.<sup>4</sup> Other factors, such as concentration, compatibility and also time of disinfection to each impression materials are also very important.<sup>5</sup> Until 1991, rinsing the impression under running water was the recommended practice.<sup>6</sup> It has been shown to reduce the count of microorganisms present on the impression surface by approx. 90% but a measurable bacterial load still remained on the impression which could be transferred to the casts.<sup>7</sup>

Current recommendations advocate the use of disinfecting solutions like formaldehyde, chlorine compounds, glutaraldehyde, iodophors and phenolic compounds in adequate concentration.<sup>8,9</sup> Awareness about the disinfection is imperative in order to protect dental staffs and the patients. The aim of the study was to assess the knowledge of health care professionals regarding infection control and modes of control employed by them during impression making.

**METHODS**

This descriptive cross sectional survey was conducted in 6 randomly selected dental colleges and professionals running clinics in various parts of Nepal after obtaining ethical clearance from the Institutional Review Committee (IRC), Chitwan Medical College. A non-probability convenience sampling technique was used to select sample that included dental officer, consultant and academicians. In the dental colleges, those departments where impressions are routinely made were selected for the survey: Prosthodontics, Orthodontics, Conservative and Endodontics and Pedodontics. Only one participant from each department was selected to prevent repetition of the same data.

A pretested questionnaire from a published study was used for the study. A self administered questionnaire containing 14 questions was designed and distributed to the participants (Table 1). All the participants remained anonymous throughout the survey. Sample size was calculated by the formula  $n = \frac{Z^2pe}{d^2}$ , and was found to be 113. The participants in the study included the dental officer, consultant and academician.

Informed consent was obtained before the commencement of the survey. Data were collected by two methods. Questions were distributed and all of them were collected in written form for those who were easily accessible. Participants were given

no time limit to fill the questionnaire (in days) so as to reduce induced error. Those who were difficult to contact, an email with a questionnaire was sent to randomly selected participants. The response rate was 70% for those contacted by email. Data was entered in Statistical Package for Social Sciences (SPSS) Version 17 for descriptive analysis using frequency distribution. Data were collected between February 2019 to May 2019.

**RESULTS**

Out of 113 health care professional who responded 60% were female and 40% were male participant. Most of the participants were dental officer 65.9%, consultant 29.5 % and rest 4.6% were academician. The maximum participants were private practitioner 62.2%, fulltime academicians were 20% and academic as well as private practitioner were 17.8%. Majority of the participants had clinical experience of 3-5 years (37.8%), less than 1 year (26.7%), more than 10 years (24.4%) and 5-10 years (11.1%) (Table 1).

Questions	Percent
<b>Follow routine disinfection of impression in the clinic before dispatching to the lab</b>	
Yes	52.3
No	18.2
Sometime	29.5
<b>If yes, what are the methods</b>	
Washing impression under running water	78.9
Immersion/ spraying with glutaraldehyde	18.4
Immersion / spraying with sodium hypochlorite	2.7
Not disclosed	
<b>Disinfect the prosthesis after receiving from the laboratory</b>	
Yes	63.6
No	36.4
<b>Asking lab technician to disinfect the prosthesis before sending to the clinic</b>	
Yes	65.1
No	34.9
<b>Using protective wares while working in the clinic</b>	
Gloves	100
Mask	97.8
Apron	91.9
Eye shield	35.6

The response showed that most of the health care professionals received <20 (77.3%) or 20-30 (20.5%) impression in a week. 88.9% of the respondent said that they do not have their own laboratory and rest did have. Most of the laboratory attendants carry impression in plastic bags (85.4%) to the laboratory. Only 75% of the technicians told that they receive impression while wearing the gloves. Nearly 52.3% of the health care professionals said that they communicate with the

technician regarding the disinfection of the impression/prostheses received in the laboratory. Only 52.3% of the health care professionals responded that they disinfect all the impressions and washing impression under running water was the method used for disinfection of impression by the majority (78.9%). Among those using disinfecting solution, most of them (53.3%) responded that they immerse impressions for < 10 minutes for the disinfection. Regarding the protective wears, 100% said that they use gloves, 97.8% said that they use mouth mask, 35.6% told that they wear eye shields and 91.9% said that they wear aprons while working. Most of the health care professionals received vaccination against Hepatitis B virus (88.9%). About 66.3% of the health care professionals said that they disinfect the prostheses/denture after receiving from the laboratory. 81.8% of them that 0.5% sodium hypochlorite/2% gluteraldehyde is the concentration of the chemical disinfectant used for the impression disinfection. 88.6% of health care professionals think an impression taken from patient's mouth will have enough pathogen to cause cross infection.

## DISCUSSION

This study reports the result of a survey conducted in 115 dental health care professionals in Nepal about the infection control in dentistry. Though regulatory body of the dental profession in Nepal recommends strict disinfection procedures, studies demonstrating whether these norms are being routinely followed are still lacking. In dental practice, while working in the patient's mouth, plenty of pathogenic microorganisms may be transferred from patients to the health care professionals and from clinic to the laboratory or vice versa through contaminated objects and impressions if proper control measures are not adopted. Thus, the survey used in this study was designed to establish the actual methods used to treat impressions prior to the pouring of the casts. On literature review, the prevalence of occupational hazard in dental health care workers is found to be 15.4% and they are 3 times at more risk of acquiring Hepatitis B infection than the general population.<sup>10</sup> Occupational exposure to blood borne pathogens can be from HIV, HBV, HCV, Mycobacterium tuberculosis, Herpes Simplex virus Type I and Type II, Staphylococci and other potentially infectious agents.<sup>11</sup> So, it is necessary that all the dental auxiliaries also be made aware about the infection control practice. The concept in dental infection control were developed early in the 1960s (due to Hepatitis B virus infection), but this practice gained priority and was implemented only after HIV infections became epidemic and further it was prioritized in the USA after patients treated by a dentist infected by HIV were found positive for the same.<sup>2</sup> Evidence based studies have shown that

HBV and HIV viral particle have been isolated from saliva and the latter is one of the primary screening method for HIV infection. Prevalence of HIV in total % of population at ages 15-49 in Nepal was reported at 0.2% in 2015, according to the World Bank collection of development indicators, compiled from officially recognized sources. However, dental attribution to this is not documented till now in Nepal. Infectious disease and its spread through dental clinics and workers is a mammoth predicament where only the tip of the iceberg is visible to the naked eye. Impression materials have been shown to absorb and retain viruses and viable organisms even after 5 hours and the pathogens of tuberculosis remain dangerous for several weeks<sup>12</sup> with alginate impression transmitting more bacteria than silicone impression.<sup>13</sup> Other studies showed that HBV can survive on dry blood on surfaces for upto 1 week.<sup>14</sup> Viral Hepatitis, an acute inflammation of the liver, has emerged as a major public health problem occurring endemically throughout the world. Prevalence of HBV varies from country to country. It is lowest in countries with high standards of living (e.g. Australia, North America, North Europe) and highest in countries where socio-economic level is lower (China, South America, South East Asia). Globally, at least 257 million are affected with HBV out of which 30% are in China and 10% in India. The prevalence in Nepal is found to be relatively low which is 0.9%.<sup>15</sup> Therefore, it is imperative to use protective measures and other disinfection of all the impressions to prevent cross-infection. Various regulatory bodies in dental profession have provided guidelines regarding disinfection of impressions. The Centre for Disease Control and Prevention recommends that all patients be treated as potentially infectious.<sup>2,13</sup> and the British Dental Association stated that "infection control is a core element of dental practice."<sup>16</sup> The Federation of Dentaire Internationale (FDI) states that all patients' prosthesis should be cleaned and disinfected before delivery to the laboratory. Similarly, the American Dental Association (ADA) recommends chemical disinfection of all impression and prosthesis.<sup>17,18</sup> However, in our study regarding disinfection of prosthesis only 34.7% followed the routine while 65.3% did not disinfect them before using in patients. Regarding routine disinfection of impression before dispatching to lab, more than half i.e., 55.1% of the respondents followed routine disinfection of impression and 79.1% of them preferred washing under the running water. Only few 16.3% preferred immersion/ spraying with gluteraldehyde. Both immersion and spraying have been recommended for disinfection of impressions.<sup>19</sup> Spraying technique for disinfection showed less dimensional variability compared with immersion technique and has shown similar anti microbial activity compared

to immersion method.<sup>20</sup> There is a variation in dimensional stability between materials which showed possibility of ZOE disinfected by immersion for 10 or 60 minutes not affecting the stability while alginate, only 10 minutes immersion not affecting the dimensional stability.<sup>21</sup> Whereas, among the elastomers no significant variation was found on dimensional stability by immersion with gluteraldehyde but some expansion was seen with use of sodium hypochlorite.<sup>22</sup> Runnels in his study about infection control stated that all the impressions should be carefully rinsed under running water to clean debris and disinfect in an Environmental Protection Agency registered and ADA accepted disinfectant and only then it should be dispatched to the lab in a properly sealed and labeled plastic bags.<sup>23,24</sup> On enquiring on the methods of carrying an impression from clinics to the laboratory by the attendant, 86.7% told that the lab attendant carry them in plastic bags while 11.1% said that they receive in a container. The occupational safety and health administration (OSHA) has given specification for handling and transporting specimens and states that "potentially infectious materials shall be placed in a container which prevents leakage. Labelling or color coding is required when such specimens/ containers leave the facility." Regarding the communication between technician and doctor about disinfection of the impression/ prosthesis received in the laboratory, 51% of the doctors said they've explained about disinfection to the laboratory technician. Kohli and Puttaiah<sup>2</sup> mentioned that there should be adequate communication between dental lab and the dentist about decontamination of items that leave the clinic and must have a label stating whether it was disinfected and with which disinfectant. The ideal time duration for disinfection was 10 minutes and the ADA recommends the use of ADA accepted disinfectant that requires no more than 30 minutes for disinfection. But our study 54.4% said < 10 minutes. Regarding the use of personal protective equipments while working in the clinic 100% of dental health care professionals said that they wear gloves while 98% of them answered they wear a mouth mask. Furthermore, 92% of told that they

wear aprons and only 34% of them answered that they use eye shield while working in clinic. On enquiring about whether they've received vaccination against HBV, 90% of them said that they have received it. Almost all of the studies regarding infection control advocated the immunization of dentist as well as his team including technicians. In 1987, the Centre for Disease Control and Prevention developed Universal precautions to help protect Health Care Workers and patients from infection with blood-borne pathogens. Although awareness of cross infection was high in this study, it showed a lack of commitment in following essential procedures to prevent cross contamination. Even though literatures states that substantial loads of microorganisms still remain after washing under the running water, this was followed as a routine practice. Though disinfectants suitable for decontamination were mostly available in most of the clinics, not using it for routine disinfection of impression showed lack of positive attitude towards infection control. To eliminate possible contamination in the context of universal precaution, infection control programs must be recommended in the dental under graduate education and obligatory infection control courses and guidelines should be kept as a strategy to safe dental health care.

## CONCLUSIONS

Within the limitation based on followed methodology and fact analysis, the present study show that there was lack of commitment to the standard infection control practice during impression making. Through most of them used personal protective means and knew about cross infection from oral pathogens, disinfection of impression was not followed by most of them which showed negative or core attitude towards the practice of infection control during impression making. Therefore, it is mandatory not only to ensure impression disinfection protocol. Routinely in our work place but also teach dental students and other auxiliary personnel proper technique and importance of following them.

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