

Cross infection control of impressions: a questionnaire survey of practice among private dentists in Hong Kong

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ABSTRACT Objective. To assess, by means of a postal questionnaire, the details of impression disinfection in private dental practices in Hong Kong. **Methods.** The questionnaire was distributed to all 98 private general dental practices functioning in the north-western district of Hong Kong. **Results.** A response rate of 54% was achieved. Of the respondents, 48% carried out procedures to disinfect impressions; immersion in disinfectants being the most common method employed. Seventy-two percent of respondents were not sure whether or not their laboratory would disinfect their impressions; the majority did not inform their laboratory about the disinfection status of the impressions. **Conclusion.** Response to this survey indicates the need for additional education and awareness in specific infection control practices, and greater communication between dental clinics and laboratories.

Introduction

Dental impressions which have been in contact with the patient's oral cavity pose a potential hazard to the dental team as well as being a cross infection hazard. Disinfection of impressions has been advocated by dental organizations worldwide for many years, yet compliance with guidelines has been poor. A survey ¹ of the methods used to disinfect impressions in UK dental hospitals concluded that "there is no universally recognized impression disinfection protocol and this is reflected in the diverse decontamination procedures currently carried out". A more recent epidemiologic survey ² of dental schools in Europe came to similar conclusions.

Studies ^{3,4} generally show that the practice of impression cross infection control in the general dental practice environment is a cause of concern. Many impressions

were sent to dental laboratories without proper disinfection, some of which were clearly contaminated with blood and food debris ⁴.

Concerns about the disinfection of dental impressions have increased in recent years due to the growing awareness of viral diseases including Severe Acute Respiratory Syndrome (SARS). Furthermore, the need to take impressions of patients during surgical procedures prompted the search for impression materials that are supplied in sterile format. Thus, they have to be sterilizable (or able to withstand disinfection at least) in order to minimize surgical infection ⁵ and such materials are now available.

In Hong Kong, relatively little is known about current general dental practice regarding this topic. A study ⁶ of patients' attitudes to cross infection measures has clearly shown that UK and Hong Kong Cantonese patients had broadly similar attitudes to cross infection protection. Proper guidelines from a local authority may be conflicting, unclear or not followed as there is no single recommended disinfection technique in use.

This study used a questionnaire-based survey to assess the practice of impression disinfection by private dentists in Hong Kong. Hong Kong was selected in view of the increased concern about cross infection in general, following the SARS outbreak. The objective of this study

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was to survey current practice, so that such information could be used to encourage the development and application of appropriate local guidelines.

Materials and methods

A confidential questionnaire (Appendix 1) that consisted of 19 questions was designed to assess the details of impression disinfection, including how impressions were disinfected and what materials were used. The questionnaire was piloted initially, to check content and administrative aspects, by sending it to a group of five dentists.

The questionnaire was then mailed to all 98 dentists in private dental practice in the north-western district of Hong Kong (Tuen Mun, Yuen Long, and Tin Shui Wai). Information about the study population was retrieved from the 2003 list of registered dentists published by the Dental Council of Hong Kong. All dentists were contacted regardless of age. An accompanying letter (Appendix 2) described the aims of the study and how the data would be used. Dentists were reminded by telephone 1 month after the initial mailing. Identification of individual respondents was not required to assure confidentiality.

Results

Replies were received from 53 dentists representing a response rate of 54% with 46% responding after the initial mailing, and a further 8% after the telephone reminder. Not all respondents answered every question. The data were collected anonymously and so the results from the study could not be analyzed with regard to the year or place of graduation for individual dentists.

The majority (77.3%) of the responses were from local (The University of Hong Kong) dental graduates, and the remainder were from dentists who had graduated in the Philippines (7.5%), UK (5.7%), Australia (1.9%), the United States (3.8%), and Taiwan (3.8%). Regarding the number of years since graduation, 35% were between 0 and 5 years, 8% between 6 and 10 years, 40% between 11 and 20 years, and 17% had graduated 21 or more years earlier.

Alginate was a popular material for impressions for study casts (100%); only 5.5% indicated that other impression materials were also used occasionally. About 4% used silicone and another 4% used polyether in addition to alginate. Prior to pouring, alginate impressions were routinely rinsed under running tap water by 93%

of respondents and almost half of them (48%) indicated that they also carried out some form of prior disinfection procedure.

Of those who disinfected impressions for study casts, 77% used immersion in disinfectant, 19% used a spray, and 4% used a dipping method. Sodium hypochlorite of varying concentrations was the most commonly used disinfectant (77%), followed by glutaraldehyde (8%), alcohol (8%), hydrogen peroxide (4%), and 3.8% used brand-named products.

With regard to working impressions for crown and bridgework, 17% of respondents used more than one type of impression material; silicone was the most popular (72%), followed by polyether (35%), polysulphide (9%), and alginate (4%).

When treating known high-risk patients, only 4% changed to an alternative material for study impressions and none for working impressions.

In these cases 93% would rinse their study impression under running water whereas only 74% would rinse their working impression after removal from the mouth. Some of the respondents (48%) indicated that they carried out some form of disinfection procedure on their working impressions before sending them to the laboratory.

Among those who would disinfect their working impressions, the methods entailed immersion in disinfectants (69%), spraying (23%), and dipping (7%). Sodium hypochlorite of varying concentrations was again the most common disinfectant employed (73%); also used were glutaraldehyde (15%), alcohol (8%), and hydrogen peroxide (4%), whilst 8% used brand-named products. The majority (96%) of those who disinfected their study impressions would also disinfect their working impressions.

Many dentists (85%) used the same disinfection regimen for both study and working impressions despite the materials being different. All of the dentists poured their study impressions in their office, whereas 72% relied on their laboratory technicians for pouring working impressions. Only 37% informed their laboratory technicians whether or not their working impressions were disinfected.

When asked, "Does your laboratory technician disinfect your working impression before pouring?" most (72%) were "Not sure", none responded "No", and only 26% answered "Yes".

Finally 50% of the respondents indicated that an autoclavable impression material would be desirable in their practice.

Discussion

This study has achieved a reasonable response rate when compared with response rates to other questionnaires mailed to dentists⁷. However it must be acknowledged that a 54% response rate may limit the applicability of any conclusions drawn.

As expected, all respondents used alginate as an impression material for study casts, as it is easy to use, has a low cost, and is accurate enough for the purpose of study impressions. Immediate pouring is preferred and all the dentists poured their study impressions in the dental clinic.

Not surprisingly elastomeric impression materials are used by all the dentists for working impressions for crown and bridgework, although 4% sometimes also used alginate.

Alternative impression materials that are more resistant to disinfection have been suggested for use with known high-risk patients (e.g. HIV +ve or viral hepatitis carriers, etc). However, because there is no means of verifying the disease status of every patient, universal precautions for infection control are more appropriate. This survey indicates that only 4% of respondents would use alternative impression materials for taking study impressions in high-risk patients.

Rather than attempt to identify those at high risk, it is recommended that all impressions are treated as having a high risk. Moreover, identifying a case submitted to the laboratory as "high-risk" can be considered a breach of confidentiality, as patients are often identified by name on laboratory instructions.

Rinsing an impression under running water to remove grossly visible contaminants should be a routine procedure to remove saliva, blood and food debris. It also removes up to 90% of microorganisms⁸. Surprisingly, only 93% and 74% would rinse their study and working impressions respectively. However, microorganisms may be absorbed into the body of the impression material,⁹ for which reason the available Hong Kong SAR Government guidelines for impression disinfection¹⁰ should be followed.

During the SARS outbreak, the Department of Health recommended that dentists in Hong Kong should disinfect their clinics with diluted NaOCl, which was believed to deactivate the SARS coronavirus¹¹. This may explain the use of NaOCl to disinfect impressions by the dentists in this survey.

Dentists have a responsibility to decontaminate impressions before sending them to a laboratory. Some impression materials should not be disinfected in the laboratory if they have already been disinfected in the dental clinic, so as to avoid unnecessary duplication and adverse effects on the prosthetic results¹². Thus, it is essential to notify the dental laboratory whether or not impressions have been disinfected.

The implications of this survey are that a variety of disinfection procedures in use, some of which may not be based on current best-practice guidelines. The Dental Authorities in Hong Kong should issue advice on the necessary procedures, perhaps using current Department of Health guidelines as a framework¹⁰.

Notably, silicone impressions can be autoclaved in a conventional steam autoclave¹³ although there is a loss of accuracy which may preclude their use for cast prostheses^{14,15}. However, the technique would be suitable for study casts and possibly acrylic dentures. The present study revealed that 50% of the surveyed dentists would favor this method. Further work is needed to evaluate the use of the autoclave to sterilize impressions as an effective yet simple procedure. Manufacturers of dental impression materials should consider promoting color-changing, addition of silicone material to encourage sterilization in the dental autoclave. The present survey suggests that some dentists would prefer this technique and research seems to support its use for certain clinical situations¹³⁻¹⁵.

Conclusions

A total of 48% of dentists who responded carried out disinfection procedures on their impressions. While this survey was not designed to explore the reasons why dentists do not disinfect the impression, the responses indicate the need for additional education in specific infection control practices, as well as greater communication between dental clinics and laboratories. The lack of compliance to infection control procedures was surprising for a highly aware community. The use of an autoclave to sterilize silicone impressions should be pursued. The conclusions from this small-scale survey may be applicable

to other regions, however as to whether they can be confidently generalized to other parts of Hong Kong must await further study.

References

1. Blair FM, Wassell RW. A survey of the methods of disinfection of dental impressions used in dental hospitals in the United Kingdom. *Br Dent J* 1996;180:369-75.
2. Muller-Bolla M, Lupi-Pegurier L, Velly AM, Bolla M. A survey of disinfection of irreversible hydrocolloid and silicone impressions in European Union dental schools: epidemiologic study. *Int J Prosthodont* 2004;17:165-71.
3. Sofou A, Larsen T, Fiehn NE, Owall B. Contamination level of alginate impressions arriving at a dental laboratory. *Clin Oral Investig* 2002;6:161-5.
4. Randall RC, Wilson MA, Setcos JC, Wilson NH. Impression materials and techniques for crown and bridgework: a survey of undergraduate teaching in the UK. *Eur J Prosthodont Restor Dent* 1998;6:75-8.
5. Firtell DN, Moore DJ, Pelleu GB. Sterilization of impression materials for use in the surgical operating room. *J Prosthet Dent* 1972;27:419-22.
6. Porter SR, Peake G, Scully C, Samaranayake LP. Attitudes to cross-infection measures of UK and Hong Kong patients. *Br Dent J* 1993;175:254-7.
7. Tan R, Burke FJ. Response rates to questionnaires mailed to dentists. A review of 77 publications. *Int Dent J* 1997;47:349-54.
8. Jennings KJ, Samaranayake LP. The persistence of microorganisms on impression materials following disinfection. *Int J Prosthodont* 1991;4:382-7.
9. Gerhardt DE, Sydiskis RJ. Impression materials and virus. *J Am Dent Assoc* 1991;122:51-4.
10. The Basic Protocol—Infection Control Guidelines for the Dental Service, Department of Health (October 2004). Centre for Health Protection website: [http://www.chp.gov.hk/files/pdf/grp_the_basic_protocol-infection_control_guidelines_for_the_dental_service_department_of_health_\(october_2004\).pdf](http://www.chp.gov.hk/files/pdf/grp_the_basic_protocol-infection_control_guidelines_for_the_dental_service_department_of_health_(october_2004).pdf). Accessed Sep 2006.
11. Samaranayake LP. Severe Acute Respiratory Syndrome (SARS) and dentistry: lessons for the future. *Dental Asia* 2004;January:10-8.
12. Kugel G, Perry RD, Ferrari M, Lalicata P. Disinfection and communication practices: a survey of U.S. dental laboratories. *J Am Dent Assoc* 2000;131:786-92.
13. Millar BJ. Dimension stability of additional cured silicone impressions following autoclave sterilization. *J Dent Res* 1999;78 (abstract 297):1072.
14. Olin PS, Holtan JR, Breitbart RS, Rudney JD. The effects of sterilization on addition silicone impressions in custom and stock metal trays. *J Prosthet Dent* 1994;71:625-30.
15. Holtan JR, Olin PS, Rudney JD. Dimensional stability of a polyvinylsiloxane impression material following ethylene oxide and steam autoclave sterilization. *J Prosthet Dent* 1991;65:519-25.

Appendix 1 Questionnaire

Part A Preliminary/study impression

1. Which of the following impression materials would you routinely use for a preliminary impression?
 Alginate
 Silicone Condensation or Addition
 Polyether
 Polysulphide
 Others, please specify
2. Do you use a different impression material for known high-risk patients (e.g. HIV +ve or viral hepatitis carrier)?
 Yes, which one _____
 No
3. Do you routinely pour the preliminary impression in your clinic?
 Yes
 No
4. Do you routinely rinse your preliminary impression with tap water prior to pouring or before sent to laboratory?
 Yes
 No
5. Do you routinely disinfect your preliminary impression prior to pouring or before sent to laboratory?
 Yes, go to question 6
 No, go to question 7
6. If yes, how would you disinfect your preliminary impression? (You could choose more than one)
 Rinse with tap water
 Spray with disinfectant, name if known _____
 Immerse in disinfectant, name if known _____ how long _____
 Others, please specify
7. Does your laboratory technician disinfect your preliminary impression before pouring?
 Yes
 No
 Not sure

Part B Working/final impression

8. Which of the following impression materials would you routinely use for working impression of crown and bridgework?
 Alginate
 Silicone Condensation or Addition
 Polyether
 Polysulphide
 Others, please specify
9. Do you use a different impression material for known high-risk patients (e.g. HIV +ve or viral hepatitis carrier)?
 Yes, which one _____
 No
10. Do you routinely pour the working impression in your clinic?
 Yes
 No
11. Do you routinely rinse your working impression with tap water prior to pouring or before sent to laboratory?
 Yes
 No
12. Do you routinely disinfect your working impression prior to pouring or before sent to laboratory?
 Yes, go to question 13
 No, go to question 15
13. If yes, how would you disinfect your working impression? (You may choose more than one)
 Rinse with tap water
 Spray with disinfectant, name if known _____
 Immerse in disinfectant, name if known _____ how long _____
 Other, please specify
14. Do you notify your laboratory technician that your working impression has already been disinfected?
 Yes
 No
15. Does your laboratory technician disinfect your working impression before pouring?
 Yes
 No
 Not sure
16. Would an autoclavable impression material be desirable in your practice?
 Yes
 No

Part C Dentist information (optional)

17. Year of graduation:
 18. Private practice since:
 19. Place of graduation:

Thank you.

Appendix 2 Accompanying letter

Dear colleague,

Re: Invitation to participate in an academic research

I am a final year student studying for the Master of Clinical Dentistry in Prosthodontics (University of London) by distance learning and I am currently conducting a research concerning on the subject of disinfection of impression materials. This project would include a literature review of articles in this topic and a survey by questionnaire of the current practice of disinfection of impression materials among private practicing dentists in Hong Kong. I am therefore asking for the opinions and contributions of professional community members, like you, to provide some input into this academic research. The general findings that emerged from this study will be recommended to the Dental Council of Hong Kong in order to provide some insight for the formulation of practical protocol of infection control in Hong Kong.

It is estimated that the questionnaire can be completed in approximately ten minutes. Confidentiality of answers is assured as identification of individual respondent is not required, so please answer all questions in accordance with the instructions as accurately as possible. Completed questionnaire could be returned by post in the pre-paid return envelope.