# Dental Assistants` Knowledge, Attitude and Practices of Infection Prevention and Control Measures in South-African Oral Health Care Facilities

by

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**CENTRAL UNIVERSITY OF TECHNOLOGY, FREE STATE**

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# Declaration

I, Philida Martina Schoonwyk (Neè Smith), identity number _____ and student number _____, do declare that:

1. This research project is submitted to the Central University of Technology Free State for the Degree of Masters in Health Sciences in Environmental Health (M_HSEN).
2. It is my independent work; and complies with the Code of Academic Integrity and other relevant policies, procedures, rules and regulations of the Central University of Technology Free State.
3. This thesis has not been submitted to any institution by me or any other person to attain a qualification.



Philida Martina Schoonwyk

2022
DATE

I certify that the above statement is correct.



Dr HCL Gleimius: Study supervisor

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# Dedication

- In memory of my late parents, Fillis Alfred Smith and Roseline Isobel Smith – Jordaan
- In memory of my late sibling, Charlotte Rose-Mary Kisten and Theodore Christopher Smith
- In celebration of my living siblings, Benjamin Vincent Smith and Marie-Francis Lambatjeen

I cannot reward you for all your sacrifices for me. Your support, encouragement, and constant love have sustained me throughout my life. Thank you for always believing in me!

*" Not to us, Lord, not to us, but to Your Name be the Glory, because of Your Love and Faithfulness."*

*Psalm 115:1*

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# Abstract

**Introduction:** Due to the invasive nature of many dental procedures, the presence of blood, saliva, and intact mucous membranes and tissues are inevitable. Exposure to these substances that potentially contain pathogens puts oral health care workers (OHCWs), patients and significant others at risk of contracting infectious diseases. This lurking danger puts the obligation on each oral health care team (OHCT) member to ensure the utmost safety when providing oral health care (OHC) service to patients. The principal approach to attain safety within oral health care facilities (OHCFs) is to apply effective infection prevention and control (IPC) measures. Therefore, this study aimed to determine dental assistants' knowledge, attitude, and practices (KAP) of IPC measures within OHCFs.

**Methods:** A quantitative descriptive study was conducted at public OHCFs and within OHCFs under the management of a specific private health care service group, further referred to as private OHCFs. A validated questionnaire was used to collect data. A total of n = 197 dental assistants, of whom n = 76 were employed in the public sector, and n = 121 employed in the private sector, participated in the study. Of the total respondents, n = 84 were formally trained (FT), and n = 113 were in-service (IST) dental assistants.

**Results and discussion: *IPC duties*:** Out of the fifteen (15) IPC tasks surveyed, more than 80% of the dental assistants were always responsible for performing twelve (12) of the IPC tasks. However, tasks such as preparing the clinical area, flushing the waterlines between patients, and changing the 3-in-1 tips after every patient were performed by less than 70% of the dental assistants. Significantly more dental assistants employed in the private sector were always responsible for the disinfection of working surfaces $(p < 0.01)$, removing the local anaesthetic needles and ampules from the syringe and maintaining the clinical area $(p=0.02)$. In contrast, significantly more IST dental assistants always flushed waterlines between patients $(p < 0.01)$.

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***Knowledge about IPC measures*:** A high percentage (81%) of dental assistants perceived their level of IPC knowledge as average and above. More than 80% were knowledgeable about aspects of infectious diseases and risks, sterilisation and disinfection, hand hygiene, personal protective equipment (PPE) and health care related waste. However, 77% of dental assistants were knowledgeable about aspects related to vaccination, and 62% of dental assistants were knowledgeable about aspects related to IPC training and continuous professional development.

Dental assistants' preferences for resources to obtain IPC information differed. In terms of IPC guidelines, less than 65% were aware of IPC guidelines, if it is available in their OHCFs, and were familiar with the content thereof. Significantly more private sector $(p=0.001)$, and IST dental assistants $(p=0.02)$, knew that IPC guidelines existed and were available within their OHCFs. Even though 89% of dental assistants were aware of transmitting Hepatitis B, HIV and TB within OHCFs, only 42% were knowledgeable about the possibility of transmitting prions within OHCFs. Furthermore, only 44% of dental assistants confirmed indirect contact as a disease transmission mode within OHCFs. Although dental assistants were aware of the risk of occupational exposure incidents (OEI), they were not knowledgeable about the correct management thereof. Furthermore, dental assistants lacked knowledge about the classification of endodontic instruments, mouth mirrors and dental handpieces; awareness about the vaccination against Hepatitis B was higher than that of Hepatitis A and Influenza. However, a misconception about the availability of a Hepatitis C vaccine exists among 74% of the dental assistants.

***Attitude towards IPC measures:*** More than 80% of dental assistants portrayed a positive attitude toward IPC training and continuous professional development, disinfection and sterilisation, infectious diseases and risks, vaccination, hand hygiene, personal protective equipment (PPE) and health care related (HCRW) management.

Even though 90% agreed with the application of standard precautions to all patients, 43% of dental assistants indicated that they would consider changing their standard IPC routine when working on a patient

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with a known infectious disease, with significantly more respondents in the public sector who hold that stance *(p=0.01)*. Furthermore, significantly more FT dental assistants portrayed a positive attitude towards the correct method to process orthodontic instruments. Significantly more FT dental assistants who portrayed a positive attitude towards Hepatitis B vaccination *(p=< 0.01)*, vaccination against Influenza *(p=0.01)* and vaccination against Hepatitis C *(p=0.01)*. Only 50% believed that protective clothing should always be used. However, less than 25% considered limited availability of PPE, comfortability of PPE, the time it takes to put on and remove PPE, the costs of PPE, patients fearing PPE and OHCWs being used to work without PPE as reasons that prevented them from wearing PPE.

**Practices of IPC measures:** Overall, more than 70% of dental assistants reported acceptable practices in IPC training and continuous professional development, disinfection and sterilisation, infectious diseases and risks, vaccination, hand hygiene, personal protective equipment (PPE) and health care related waste (HCRW) management. However, the overall tendency was that significantly more dental assistants employed in the private sector confirmed performing the respective IPC practices.

Dental assistants reported inadequate attendance of IPC training and ongoing professional development events, with only 40% receiving yearly IPC training within their respective OHCFs. Significantly more dental assistants in the private sector received IPC training when new IPC products and equipment arrived *(p=0.01)*. On the other hand, more dental assistants in the public sector did not receive IPC training when new IPC equipment arrived *(p=0.02)*. Factors that prevented dental assistants from attending CPD events were the cost of CPD events, unawareness of upcoming CPD events, and the date and time of the CPD event that clashed with their schedules. Significantly more FT dental assistants indicated that the costs of CPD events deterred them from attending the CPD events. Significantly dental assistants in the public sector were unaware of CPD events.

Among the total dental assistants, 74% previously worked on a patient with a known infectious disease. A total of 48% once experienced an occupational exposure injury (OEI). The most common OEIs occurred

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during the instrument cleaning process (27%), as manual cleaning of instruments before sterilisation was done by 91% of the dental assistants. Splash into the eyes and face, and needle stick injuries were among the top OEI experienced. A further concern was that 37% of dental assistants who used cold/chemical sterilisation methods did not use a high-level disinfectant. Dental assistants' routine practices to clean dental handpieces require attention. Less than 40% run the dental handpiece for 20-30 seconds before removing it from the hose and disassembling it to reach the inner parts. Even though 88% confirmed being vaccinated against Hepatitis B, only 45% of the total respondents received all three Hepatitis B vaccination doses. Although visible hand hygiene instructions are available in 86% of OHCFs, only 67% of the dental assistants washed their hands before putting on gloves, and 77% always washed their hands after taking off their gloves and before leaving the clinical area. Furthermore, 60% did not use an alcohol-based hand sanitiser (ABHS) to supplement their hand hygiene practices. The average use of the individual PPE items across the listed procedures was 66% for gloves, 80% for masks, 5% for protective eyewear, and 50% for protective clothing. Regarding the use of PPE during different procedures, the tendency was that higher percentages of dental assistants used all the PPE items when assisting during surgical procedures, helping a patient with known infectious disease, and anticipating blood and splatter during procedures.

**Barriers to IPC:** Less than 40% of dental assistants indicated that limited time, the number of patients seen, the number of practitioners they assist, limited PPE supply and lack of guidance about IPC measures influenced their IPC practices. In the current study, significantly more dental assistants in the public sector agreed that limited PPE supplies *($p=0.008$)* and the lack of guidance about IPC measures *($p=0.005$)* made it challenging to execute IPC effectively. However, significantly more dental assistants in the public sector disagreed that limited time and the number of patients seen were barriers to applying effective IPC practices *($p=0.02$)*. Significantly more dental assistants in the private sector were neutral about limited time *($p=0.01$)*. In addition, the number of practitioners the dental assistant needs to assist made it challenging to practice IPC measures effectively *($p=0.005$)*.

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**Conclusions:** Overall, a relatively high percentage of dental assistants were knowledgeable about IPC measures and portrayed a positive attitude. The majority reported compliance with IPC practices. However, certain aspects across the KAP domains show deficiency and should be addressed to improve the overall IPC measures to keep patients and staff safe within OHCFs.

**KEYWORDS:** Dental assistant; Infection prevention and control; Knowledge; Attitude; Practices

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# Abbreviations

| | |
|---|---|
| AA | Attitude aspect |
| CDC | Centres for Disease Control and Prevention |
| CPD | Continuous professional development |
| DoH | Department of Health |
| FT | Formally trained |
| HCW | Health care worker |
| HPCSA | Health Professions Council of South-Africa |
| IPC | Infection prevention and control |
| IST | In-service trained |
| KA | Knowledge aspect |
| KAP | Knowledge, attitude, and practices |
| OEI | Occupational exposure injury |
| OH | Oral health |
| OHC | Oral health care |
| OHCF | Oral health care facility |
| OHCT | Oral health care team |
| OHCWs | Oral health care workers |
| PA | Practice aspect |
| UoT | University of Technology |
| WHO | World Health Organisation |

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# Chapter 1

## 1.1. Introduction

Oral health care (OHC) treatments are often invasive, resulting in exposure to injured tissues and bodily fluids. Tissues and bodily fluids have the potential to contain micro-organisms. Disease-causing micro-organisms are also known as pathogens (Casadevall, Liise and Pirofski, 2009; Casadevall and Pirofski, 2014). Han *et al*. (2021) confirmed through a visualisation experiment that typical dental instrumentation such as ultrasonic scaling, air-water spray, and high-speed and low-speed dental handpieces created splatter and aerosol contamination. The splatter and sprays created during dental treatment contain blood and saliva that contains pathogens (Aguilar-Duran *et al.*, 2020; Allison *et al.*, 2021).

The annual statistical reports on the prevalence of infectious diseases globally indicated that the disease burden is still above 30% (Roser and Ritchie, 2016). Furthermore, Gerber S. (2021) stated that currently, there are about 233 infectious diseases that are endemic or potentially endemic to South-Africa. Again, several researchers documented the occurrence of the spread of diseases from patient-to-patient, patient-to-practitioner or practitioner-to-patient (Redd *et al.*, 2007; Radcliffe *et al.*, 2013; Ramich, Eickholz and Wicker, 2017; Volgenant and De Soet, 2018). Hence, effective infection prevention and control (IPC) measures must be in place when rendering health care services.

Infection prevention is defined as the "measures, practices, protocols and procedures geared towards preventing the transmission of infection within health care settings" (CDC, 2003b, 2017; Matsoso, 2018). Previously, the term "universal precautions" applied to IPC measures to prevent the transmission of bloodborne diseases (Gershon, Karkashian and Felknor, 1994). However, after 1996, the concept of universal precautions about other aspects of disease transmission became prevalent.

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The idea of universal precautions then expanded into a standard of care designed to protect health care professionals and patients against disease-causing micro-organisms (Molinari, 2003). Currently, "standard precautions" is the acceptable term for IPC measures (CDC, 2003a; Cleveland *et al.*, 2012; Cleveland, *et al.*, 2017).

Standard precautions refer to the primary protective measures that need to be adhered to whilst rendering patient treatment irrespective of the patient's health status (CDC, 2003a). Standard precautions include several IPC measures to prevent the spread of diseases when rendering health care services. These IPC measures refer to disinfection of surfaces and equipment, sterilisation of instruments, hand hygiene, vaccinations against infectious diseases, wearing personal protective equipment (PPE) and effective management of health care related waste (HCRW) management (CDC 2003). When standard precautions are adhered to before, during and after dental treatment, both patient and OHCWs receive protection against exposure to potential pathogens. However, previous studies in South-Africa indicated that compliance with standard precautions in OHCFs varies and is often low (Nemutandani, 2007; Mehtar, 2007; Oosthuysen *et al*., 2012).

Every member of the OHCT are responsible to ensures effective and efficient IPC processes (HPCSA, 2016a). The OHCT consist of dentists, dental assistants, oral hygienists, dental therapist, and other members, such as cleaners and waste removers. Therefore, all OHCT members are responsible for applying effective IPC measures when rendering OHC services. Furthermore, the execution of daily IPC measures within OHCFs is part of the duties of dental assistants (HPCSA, 2012). However, in many IPC-KAP studies done within OHCFs, minimal attention was explicitly directed at the IPC- KAP of dental assistants

In a literature review about infection prevention and control measures within South-African OHCFs, (Oosthuysen, J. *et al*. 2010) concluded that a considerable gap exists between what is expected and

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the actual performance of IPC measures. Furthermore, the elements of previous IPC research conducted within South-African OHCFs varied in terms of the IPC themes, the KAP domains and aspects addressed, the group of OHCWs, the respondents' employment sector, and the area where the study was conducted (Table 1-1).

**Table 1-1 IPC studies conducted within South-African oral health care facilities**

| Author and year | Domain(s) / aspect addressed | Group of HCWs | Sector | SA province / region |
|---|---|---|---|---|
| 1) Moola *et al*. (1992) | Infectious disease: Seroprevalence of HBV surface antibody | Preclinical dentistry and OH students | Dental school | Western Cape |
| 2) Naidoo S. (1994) | Cross-infection | Dentists | Dental school | Western Cape |
| 3) Rudolf *et al.* (1999) | Infectious disease: HIV infection Impact on OHC | Dentists, DT; OH; DA | Public dental clinics | South-Africa |
| 4) Webber L.M. (2000) | Bloodborne viruses and occupational exposure | OHCW | Dental setting | South-Africa |
| 5) Yengopal, *et al. (2001)* | Infection control | Dentists | Private | Durban, KZN |
| 6) De Kock and Van Wyk (2001) | Infection control practices | Oral hygienists | Dental setting | South-Africa |
| 7) Naidoo and Mahommed, (2002) | Infectious disease: TB infection knowledge, attitudes, behaviour, and prevalence | Dentists | Dental setting | Western Cape |
| 8) Oosthuysen J. (2003) | Infection control techniques | Dentists | Private and Public | South-Africa |
| 9) Mathabathe (2006) | Infectious disease: HIV/AIDS Knowledge, Attitude and Practices | Oral Health Practitioners | Private and Public | South-African |
| 10) Nemutandani *et al*. (2007) | Occupational exposures KAP | Dental assistants | Public | Limpopo |

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| Author and year | Domain(s) / aspect addressed | Group of HCWs | Sector | SA province / region |
|---|---|---|---|---|
| 11) Mehtar *et al.* (2007) | Infection control practices | OHCT | Public | Free State |
| 12) Singh *et al.* (2010) | Dental unit waterlines Occupational exposure to endotoxins | OHCT | OHCFs | South-Africa |
| 13) Hartshorne J. (2010) | Contaminated dentistry and infection control standards of care | Dentistry | General | South-Africa |
| 14) Oosthuysen *et al.*, (2014) | IPC Knowledge and Practices | OHCT | Private and Public | South-African |
| 15) Oosthuysen J. (2015) | IPC audit feedback | OHCT | Private and Public | South-African |
| 16) Moodley and Naidoo (2015). | Percutaneous exposure incidents | Dental personnel and students | Dental training site | KwaZulu-Natal |
| 17) Sammy and Benjamin (2016) | Infection control mechanisms | Dental Technicians / Technologists | Dental Laboratories | Durban (KZN) |

Dental assistants are significant role players in IPC measures applied within OHCFs. Hence, dental assistants should demonstrate relevant knowledge and background information on IPC measures, exhibit a positive attitude towards recommended IPC measures, and use responsible practices when performing IPC tasks. Research geared toward surveying dental assistants' knowledge, attitude and practice of the different aspects within various IPC themes will provide a holistic overview identifying gaps in the IPC KAP of dental assistants in South-Africa. Results of this study could serve to guide the planning, implementation, monitoring and evaluation of programmes aimed to address IPC measures within OHCFs.

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## 1.2. Aim of this study

This study aims to determine dental assistants' IPC knowledge, attitudes, and practices in public and private OHCFs within South-Africa.

## 1.3. Objectives:

To achieve the aim of this study, the following objectives pertain.

- Construct a questionnaire that will probe the following:
    - IPC duties that dental assistants are currently responsible for.
    - Dental assistants' knowledge, attitudes and practices of different aspects within specific IPC themes,
    - Possible barriers to apply effective IPC measures which dental assistants experience.
- Validate and assess the reliability of the questionnaire by using the pilot study data.
- Administer the questionnaire to the main study population.
- Analyse and interpret data

## 1.4. Study research questions

1. What IPC duties are dental assistants in South-African OHCFs currently performing?
2. What percentage of dental assistants are knowledgeable about aspects within the respective IPC themes?
3. What are the prevailing attitudes of dental assistants toward the respective IPC themes?
4. What are the current practices of dental assistants within the respective IPC themes?
5. Are there any differences in the IPC-KAP of dental assistants employed in the different sectors?
6. Are there any differences in the IPC-KAP of dental assistants with different training types?

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## 1.5. Ethical clearance

The process to obtain ethical clearance started before the onset of the study. Due to the extensive nature of the research project, an application for ethical approval was obtained from more than one ethical committee, namely:

i) The University of the Free State, Health Sciences Research Ethics Committee (HSREC): An academic entity to provide approval because the study required that individuals complete a questionnaire (Appendix A).

ii) Department of Health Provincial Ethical committee, via the National Health Research Database (NHRD). The Department of Health (DoH) is a public OHC service provider employing dental assistants (Appendix B).

iii) Netcare Research Ethics committee is a private group OHC service provider employing dental assistants (Appendix C).

## 1.6. Layout of dissertation

This thesis is arranged into nine chapters.

**Chapter 1: Introduction**

The field of the study is introduced, and the research problem is identified. It further outlines the aims and objectives, the research questions and address aspects about the ethical clearance of the study.

**Chapter 2: Literature review**

This chapter reviews the existing literature about infection prevention and control within OHCFs.

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**Chapter 3: Methodology**

This chapter describes the study design, sample, setting, and analysis plan used in this research project.

**Chapter 4: Questionnaire construction and validation**

This chapter describes the development of the questionnaire. It further discusses the findings of the reliability and validity of the measurement tool.

**Chapter 5: Participant Demographics and IPC duties**

This chapter outlines the demographic information of the study population. In addition, it displays the results of the IPC duties performed by dental assistants, followed by a discussion.

**Chapter 6: IPC Knowledge**

This chapter presents the results of dental assistants' perceived knowledge of the identified Knowledge aspects (KAs) within the seven IPC themes. In addition, the critical findings of dental assistants' perceived IPC-Knowledge are discussed, and the significant differences in the perceived IPC knowledge between the respondent categories are highlighted.

**Chapter 7: Attitude towards IPC**

This chapter presents the results of dental assistants' attitudes towards the identified Attitude aspects (AAs) within the seven IPC themes specific IPC themes. In addition, the critical findings of dental assistants' attitudes towards IPC are discussed, highlighting the significant differences in the attitude towards IPC measures between the respondent categories.

**Chapter 8 IPC Practices**

This chapter presents the results of dental assistants' IPC practices relating to the identified Practice aspects (PAs) within the seven IPC themes. In addition, the critical findings of dental assistants'

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perceived IPC Practices are discussed and highlight the significant differences in the IPC practices between the respondent categories.

**Chapter 9 Conclusions and Recommendations**

This chapter presents the conclusions and recommendations for potential future research and outlines the study's limitations.

**References**

The references in this document have been prepared using the reference manager Mendeley.

**Appendices**

Appendix A Ethical approval HSREC

Appendix B Ethical Approval DoH

Appendix C Ethical Approval Medicross

Appendix D Consent letter

Appendix E Final Questionnaire

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# Chapter 2

# Literature Review

## 2.1. Introduction

The importance of infection prevention and control is recognised in health sectors globally. When rendering care to patients, OHCWs have the ethical duty to "do no harm", which obligates OHCWs to take appropriate care when delivering treatment. However, due to the invasive nature of dental treatments, there is a possibility of transmitting pathogens within OHCFs. The possible risk of transmission of pathogens poses a risk to both patients and OHCWs. Therefore, effective infection prevention and control (IPC) procedures, which aim to limit the transmission of pathogens in OHCFs, are an integral part of this obligation to provide due care (McCarthy and McDonald, 1998).

## 2.2. Infection prevention and control

Infection prevention and control (IPC) is defined by the Centres for Disease Control and Prevention (CDC) as the processes involved in limiting the spread of infectious diseases from patient to patient, patient to health care worker (HCW) or from HCW worker to patient (Bednarsh *et al*., 2015). OHCWs and patients can be protected against contracting a potentially infectious disease if standard precautions are always used (Bebermeyer *et al*., 2005). A basic infection-control principle is to know the chain of infection and identify the most effective points to prevent potential disease transmission. By applying IPC practices, the spread of infection can be stopped at all the points within the chain of infection (Figure 2-1).

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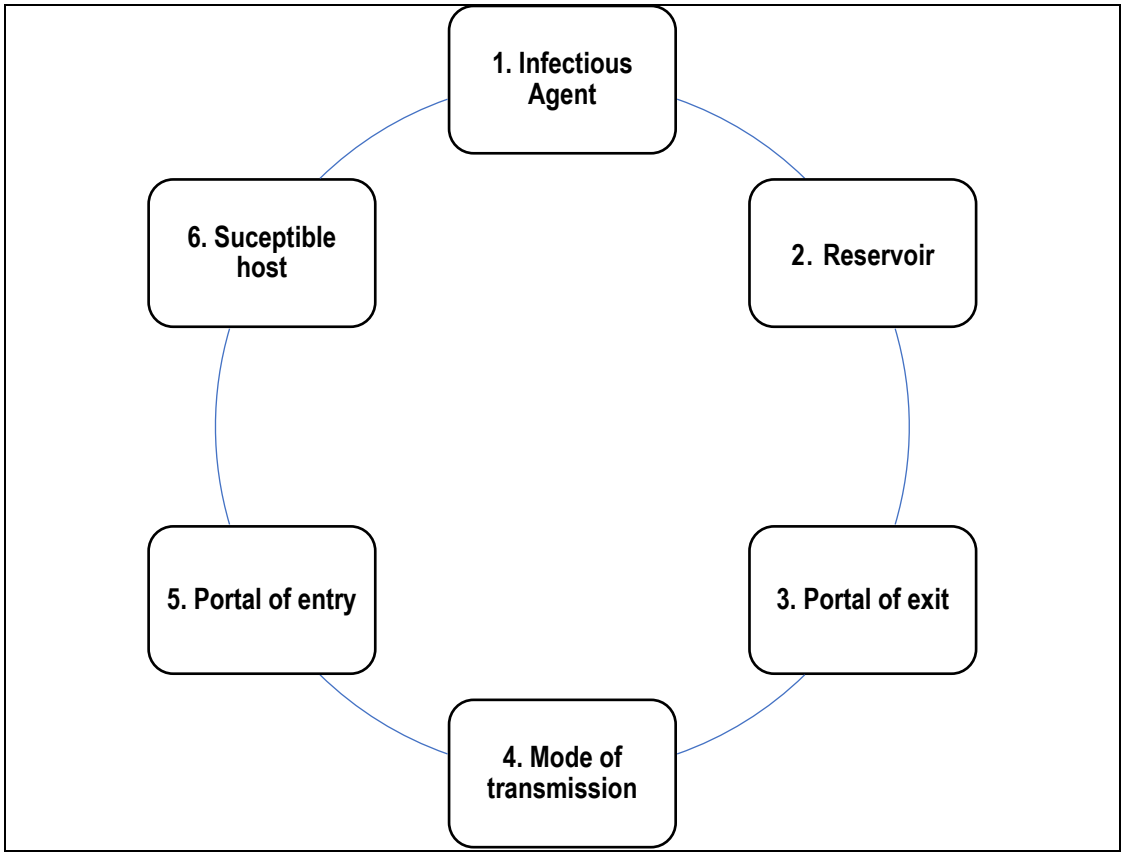



**Figure 2-1 Chain of infection: Adapted from (Oosthuysen, J. *et al.* 2020)**

All patients should be treated as if they are potentially infectious. All bodily fluids, secretions, excretions (except sweat), and non-intact skin and mucous membranes can harbour pathogens that can cause an infection (CDC, 2003b). The CDC guidelines and recommendations form the basis of various countries' IPC policies and regulations. When IPC guidelines are understood, OHCWs have a more positive attitude towards the content, and the application of the guidelines is more readily complied with. When IPC guidelines are meticulously applied, it will ensure that OHC services are delivered in a safe manner for patients and staff (CDC, 2003b).

When HCWs do not break the chain of infection, this breach of IPC holds the risk of exposing patients, others and themselves to pathogens that could lead to an infection (Dramowski *et al.,* 2017). Furthermore, breaches in IPC could cause an infection that harms or damages the patient, resulting

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in investigations and litigation (Hughes, 1993; Republic of South-Africa, 2009; HPCSA, 2016a). The incidents of a breach in IPC measures have far-reaching effects. Besides litigation, when an incident of an alleged breach of IPC occurs within an OHCF, a lengthy process of reporting, investigation, and patient follow up takes place (Cheng *et al.* 2013).

Patients trust the health profession to do the right thing regarding IPC processes. Smith (2014.) indicated that patients had not avoided or delayed a visit to the dentist because of concerns over risks of cross-infection, which is consistent with the findings of (Perz *et al.,* 2010), were less than 5% of patients avoided or delayed visits due to the risk of cross-infection. Furthermore, patients who believed that instruments had been sterilised were less concerned about IPC procedures (Barghout *et al.,* 2012). In contrast, within the South-African context, 20% of patients were unsure of the instrument sterilisation methods used in dentistry (Smith *et al.* 2014). Furthermore, patients' knowledge regarding autoclaves was poor (Deogade *et al.* 2016).

However, irrespective of patients' perception of IPC within OHCFs, the OHCT must still warrant the trust that patients place in them (Welie, 2012). The dental assistant is an integral part of the OHCT. They should retain the trust that patients show by attaining sufficient IPC knowledge, demonstrating a positive attitude towards IPC, and applying effective IPC practices before, during, and after delivering OHC services.

## 2.3. Duties of dental assistants

As far back as the 1950s, Waterman (1951) pondered the idea that the medical profession increased its professional services through the effective use of auxiliary personnel. He found it sensible that the appointment and effective utilisation of trained assistants will also help the dentist meet the increasing

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demand for dental care services. At that time, the estimated number of full-time dental assistants exceeded 50 000, but a small number of dentists utilised dental assistants to their full potential effectiveness.

The Indiana State Board of Health and the city of Richmond, with the cooperation of the Public Health Service, conducted a five year (December 1946 to December 1951) clinical study about the effective utilisation of dental assistants. The results thereof highlighted several advantages to dentists who work with dental assistants:

- The dentist can provide more dental-care services,
- Quality of services is improved.
- Better control of the patient is possible through the influence of an assistant.
- Less mental and physical strain on the dentist, as the necessary armamentarium has been placed at hand by the dental assistant.
- Through the entire treatment procedure, the dentist can work from a seated position.
- A higher income for the dental practices due to supplying more services to more patients.
- A decrease in the tooth mortality rate per patient through early detection and treatment, and there is time to provide preventive treatment.
- Shorter appointment periods with less pain and discomfort to the patient.

These advantages that a dental assistant's services afford the dentist are still applicable today in the South-African dental fraternity as it was then. As an integral part of the OHCT, the dental assistant has a unique role. The regulations defining the scope of practice of dental assistants in South-Africa were made in terms of the Health Professions Act, 1974 (Act No. 56 of 1974). Dental assistant duties include:

✓ Preparation and management of the dental clinical environment before, during and after patient care.

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- ✓ Sterilisation of instruments and disinfection of surfaces and equipment in the dental environment.
- ✓ Monitor infection control, sterilisation processes, and HCRW management within the dental environment.
- ✓ Prepare dental materials and instruments (including dental handpieces) for use in clinical procedures performed by the oral health practitioner.
- ✓ Aid with the patient's needs and comfort during dental treatment.
- ✓ Provide clinical assistance using four-handed dentistry, including instrument transfer, high speed suctioning, and debridement techniques in procedures that an oral health practitioner performs.
- ✓ Record patient data gathered during the patient interview, when the dentists assessed the hard and soft tissues and extra-oral structures during the patient's treatment.
- ✓ Process dental radiographs.
- ✓ Care and maintenance of equipment used in the dental clinical environment; and
- ✓ Help the oral health practitioner in case of a medical emergency in the dental environment and apply the necessary measures during clinical emergencies.

The duties that South-African dental assistants are allowed to perform confirm that the completion of infection prevention and control tasks depends on the dental assistant (Banks *et al.*, 1994; Sarll *et al.,* 1996). In other countries, dental assistants are responsible for performing similar elementary duties, with the responsibility for infection prevention and control as one of the everyday tasks of dental assistants globally. Except for radiography, the tasks performed by dental assistants in Iran were similar to South-African dental assistants (Baghban *et al.*, 2022). However, in countries where the scope of dental assistants has been widened, the duties of dental assistants vary according to the state's dental practice act (Kracher and Steinhaus, 1999; Kracher *et al.*, 2017). The widened scope in these countries allows for the expanded function of dental assistants to perform advanced patient

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treatment, which places an even higher responsibility on the dental assistant to ensure effective IPC measures when performing these procedures on patients.

If a dental assistant applies standard precautions before, during and after every dental procedure, effective IPC can be achieved within an OHCF. However, dental assistants are aware that they fail to implement the IPC guidelines and recommendations (Ashton *et al.,* 1994). Furthermore, in the UEA, almost half of the dental assistants believed that they were not carrying out cross-infection control procedures as well as they should (Mustafa *et al.,* 2015). In conclusion, IPC is a critical task that dental assistants perform daily. Therefore, dental assistants should have the appropriate knowledge and understanding of IPC, a favourable attitude towards IPC, and apply sound IPC practices.

## 2.4. Dental assistant training and continuous professional development CPD

Various training programs prepare dental assistants for clinical practices in different regions worldwide. Some programs include a bachelor's degree in dental assisting, while others terminate with a registered diploma and certificate. (Al Jazairy *et al*., 2014). Previously in South-Africa, dentists were customary to give in-service training to their dental assistants. However, a standardised in-service training guideline that dental practitioners could follow during the in-service training of their dental assistants does not exist.

In November 2015, the Supreme Court of Appeal of South-Africa confirmed the decision of the North Gauteng High Court that professional status is conveyed to dental assistants and that the profession is regulated to protect the public and themselves. Protection of the public is an embedded principle in the Constitution of South-Africa which is reinforced by the Health Professions Act, Act 56 of 1974. (Republic of South-Africa, 2009). Currently, dental assistants in South-Africa are regulated by the

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Health Professions Council of South-Africa (HPCSA) and fall under the Professional Board for Dental Therapy and Oral hygiene auspices.

Professional status requires a standardised educational program at a recognised training facility (Welie, 2012). When the DAs received professional status by the HPCSA, the regulation was instated that an accredited University formally train all DAs. However, the HPCSA made provision for unqualified but experienced dental assistants that were IST to register with the board on the condition that IST dental assistants must complete the board examination within two years from the date of registration. In contrast to the regulation of dental assistants in South-Africa, mandatory qualifications for dental assistants in other countries such as Australia (Holden *et al.*, 2018), India, and Iran (Baghban *et al.*, 2022), and China are not yet implemented. However, 91% of the participants in an online voting poll in Australia indicated that they believe that formal training of dental assistants should be made mandatory in Australia (Australian DAPA website in July 2017). However, in other countries, such as the USA and Canada, measures to ensure the overall quality of dental assistants have been in place, and the activities of dental assistants are regulated and required that dental assistants be registered or issued a license to be able to practice as a dental assistant (Kracher *et al.*, 2017). A study among dental assistants in North West Region of England further supports the belief that "all dental surgery assistants should be educated to the level of certification, and that this improved education and training would improve cross-infection control in general dental practice" (Banks, Jones and Sarll, 1994).

Researchers recommend that Infection prevention training should be emphasised at all levels of professional dental training (Hedayati *et al.*, 2014; Kulkarni *et al.,* 2019). In 2003, only 34.4% of FT and 35.1% of IST dental assistants in South-Africa confirmed formal training in cross-infection control (Oosthuysen, 2003). In previous studies, OHCWs agreed that their overall IPC knowledge is not on par. Dental assistants acknowledged that regular IPC training would, at best, increase the effectiveness of the IPC measures they apply (Ashton, *et al.*, 1994; Mustafa *et al.*, 2015; Bandugh *et*

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*al.*, 2018).In a study conducted among dental health care personnel at a German university dental clinic, the authors concluded that a targeted education and training strategy should be embarked upon to enhance dental assistants' IPC compliance, especially (Mutters *et al.*, 2014). Furthermore, evidence exists that the introduction of mandatory continuing education increased the yearly IPC training received by dentists, which led to a rise in their IPC knowledge and practices (Mccarthy *et al.*, 1999; Su *et al.*, 2012; Saquib *et al.* 2019).

IPC training and ongoing continuing education (CE) are essential and should constantly be reviewed to address the lack of IPC compliance identified in South-Africa and elsewhere in the world (McCarthy and Koval, 1996; Cleveland *et al.,* 2012; Darawad and Al-hussami, 2013; Hedayati *et al*., 2014). Furthermore, the expressed need for IPC training among OHCWs within the different categories varied. A lower percentage of dental assistants expressed the need to receive further education on IPC measures (Ebrahimi et al., 2013). However, when OHCWs understand the rationale and are consulted when IPC guidelines and policies are drafted, they are more likely to comply with infection prevention and control protocols (Royal College of Dental Surgeons of Ontario, 2010b; Surgeons, 2012; Royal College of Dental Surgeons of Ontario, 2018).

In addition to formal training done to receive the qualification, all OHCWs must receive office-specific training in infection prevention and control (Ziady, 2010). Furthermore, South-African dental assistants must attend continuous professional development sessions to earn continuous educational units (CEUs)/ CPD points to maintain their registration with the professional board for Dental Therapy, Oral hygiene and Dental Assisting (HPCSA, 2017b). Another recommendation is that IPC training for OHCWs be offered at specific occurrences, such as upon appointment when new IPC products and equipment arrive and at least annual IPC training (Royal College of Dental Surgeons of Ontario, 2010).

However, besides IPC training offered to dental assistants, dental assistants are responsible for keeping up to date through engagement with different IPC information sources. Several IPC

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information sources are available to HCWs in general. These IPC information sources ranged from public media in terms of websites, memos, posters, newspapers, and helplines to peer-reviewed published articles in professional journals (Alhumaid *et al.,* 2021)

In previous studies, OHCWs confirmed their need to receive additional education in IPC elements, such as hand hygiene, vaccination, and HCRW management (Askarian, Mirzaei and McLaws, 2006; Askarian, McLaws and Meylan, 2007; Askarian and Assadian, 2009). One of the weaknesses highlighted by Kracher *et al.* (2017) is that no empirical studies that compare the performance of formally and informally educated dental assistants have been published. Therefore, the current study could aid in providing insights on whether any differences exist in the IPC-KAP of South-African dental assistants who have diverse types of dental assistant training.

## 2.5. Infectious diseases and risks

Oral health care workers (OHCWs) within dental practices are exposed to various hazards, including physical, chemical, biological, or psychosocial hazards (Health and Safety Authority, 2016). Given biological hazards, dental assistants' knowledge of the basic principles of the spread of disease is essential for implementing effective IPC measures (Dicker, R. 2006). In sub-Saharan Africa, the prevalence of pathogens causing infectious diseases, such as HIV /AIDS (Coovadia and Tollman, 2015), Hepatitis (Vardas *et al.*, 2002) and Tuberculosis (TB) is high (McCarthy *et al.*, 2015). In addition, other pathogens such as Herpes simplex, Influenza and Creutzfeldt-Jacob Disease (CJD) have also brought about heightened awareness over the risk of cross-infection in OHCFs (Smith 2014).

Within the South-African context, the increased demand for dental treatment, combined with the increase in the number of patients with confirmed infectious diseases, could increase the spread of

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infections within OHCFs (Methar, 2007; Rothe *et al.,* 2013). Furthermore, previous studies showed that OHCWs lacked knowledge regarding bloodborne diseases (Galane, 2012; ul Haq *et al.*, 2012; Gopal *et al.*, 2014; Abou El Fadl *et al.*, 2019; Saquib *et al.*, 2019). In addition, cases where HIV has allegedly been transmitted in the OHCFs, have been reported in other countries with a lower HIV infection rate. In England, a dentist allegedly transmitted HIV to a cluster of patients (Goodman, Carpenter and Cox, 1994).

There have been reported cases of hepatitis A, B and C infection of HWCs (Ashkenazi *et al.,* 2001; Carlson and Perl, 2010). Furthermore, dental visits were the most significant risk factor for acquiring HBV (Nazzal and Sobuh, 2014). The transmission of Hepatitis within OHCFs has been investigated, and confirmation was that acute hepatitis B were diagnosed among patients and volunteers (Scully and Greenspan, 2006; Radcliffe *et al.,* 2013; Cleveland *et al.,* 2016). An urgent call to apply standard precautions was made since most of the hepatitis B transmitters do not have any clinical illness manifestations, and the newest infections of hepatitis C are subclinical and do not have clinical manifestations (Ebrahimi, 2013.) Once again, the Tulsa incident focused on HCV transmission within dental practices (Weaver, 2014). Considering the medical and occupational consequences of HCV infection, OHCWs are strongly advised to continue to be vigilant and maintain the highest standards of infection control procedures to minimise the possible spread of HCV during OHC delivery (Coppola *et al.,* 2016; Mangkara *et al.,* 2021).

Furthermore, in countries with a lower TB infection rate, incidences and allegations of TB transmission within the OHCF have been investigated (Merte *et al.,* 2014; Smith *et al.,* 2014; Cleveland *et al.*, 2016). In addition, health care workers in South-Africa are more likely to develop TB than ordinary citizens (Porteous and Brown, 1999; Araujo and Andreana, 2002; Claassens *et al.,* 2013; Mustafa *et al.*, 2015). An even darker picture unveils when considering the rise in the incidence of known infectious diseases and the appearance of new infections such as SARS (Respiratory syndrome) and $\mathbf{H_1N_1}$ and the recent

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global outbreak of the Coronavirus COVID_19 infections. Hence, the high burden of disease within South-Africa poses a threat to OHCWs and patients if practical and efficient IPC procedures are not meticulously followed.

Knowledge of the basic principles of disease occurrence and spread in a population is essential for implementing effective control and prevention measures (Oosthuysen *et al.,* 2010; Oosthuysen, *et al.,* 2020). Infection prevention and control measures in OHCFs are far from ideal (Matsuda *et al.,* 2011). Glitches in IPC measures previously led to the transmission of bloodborne pathogens in health care settings (Cleveland *et al.*, 2016)

An occupational exposure incident (OEI) can be any occurrence in the workplace that puts the worker at risk (Bednarsh *et al*., 2015; Viragi *et al*., 2013). The routine use of sharp instruments, blood and saliva, diverse bacterial flora in the oral cavity, and equipment that creates sprays and splatters containing blood and saliva all contribute to the hazardous nature of the dental workplace. All these factors pose a risk to dental assistants becoming exposed to micro-organisms that can transmit diseases (Sawhney *et al.,* 2015). Turkish dentists expressed concern about the risk of cross-infection from patients to themselves and their dental assistants (Yüzbasioglu *et al*., 2009). When an OHCW is exposed to pathogens because of the treatment in an OHCF, which leads to infection, these conditions are referred to as health care associated infections (HCAI) (Cleveland *et al.,* 2012). Furthermore, occupational risk increases as the number of working years in a dental environment increases (Mungure *et al.,* 2010; Kommogldomo, 2016).

In fulfilling their duties, dental assistants are at risk of exposure through percutaneous injuries, contact with the mucous membranes of the eyes, nose, and mouth, or contact with non-intact skin (Ontario 2010). Furthermore, bloodborne pathogens through occupational hazards such as needle stick injury (NSI) are a reality for OHCWs (Ebrahimi *et al.*, 2013; Rahman *et al.,* 2013; Virag *et al.*, 2013; Lee *et*

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*al.,* 2014). Furthermore, the resulting HBV infections after an NSI were higher among dental assistants than among dentists (Ebrahimi *et al.*, 2013; Lee *et al.,* 2014; Pervaiz *et al.*, 2018).

Needlestick injuries (NSI) are at the top of the list of occupational injuries in the OHCF. This is mainly because a disposable dental needle is attached to a reusable injection syringe, but percutaneous injuries also occurred as a result of scalpels or needles that were not immediately discarded and during manually prewashing of sharp instruments (Kuru *et al.*, 2014; Halboub, *et al.*, 2015; Moodley and Naidoo, 2015; Wu *et al.*, 2016; AL-Essa and AlMutairi, 2017). Furthermore, NSI can be attributed to the rush to finish the task at hand, as researchers found that NSI increased among OHCWs that are behind schedule and see many patients and during procedures close to the lunch break and off-duty hours (Lee *et al*., 2014). Therefore, when dental assistants are careful, thoughtful, and vigilant whilst executing duties, the risks of occupational injuries are reduced.

Percutaneous injuries are more likely to occur within OHCFs, as many OHCWs previously experienced percutaneous injuries. Several practical steps can prevent percutaneous injuries in the OHCFs and prevent the spread of diseases within OHCFs. However, OHCWs' knowledge of managing these injuries is lacking (Panagakos and Silverstein, 1997; McNamara and Bagramian, 1999; Reda *et al.,* 2010; Myers *et al.,* 2012). Furthermore, researchers believe that the most effective means of preventing the transmission of bloodborne pathogens is to avoid exposure to needle stick injuries (Zaidy, L 2010; Viragi, 2013).

## 2.6. Sterilisation and disinfection

Reports on inconsistencies in instrument decontamination have heightened concerns over the risks of transmission of infectious agents (Smith, 2014). Documented evidence exists where a breach in the instrument sterilisation process led to the transmission of infectious diseases (Perz *et al*., 2010;

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Cleveland *et al*., 2016; Volgenant and De Soet, 2018). Recommendations for the cleaning and disinfection of dental instruments have been published (CDC, 2003a, 2008, 2016b; Ling *et al*., 2018; Laneve *et al*., 2019; Rutala *et al*., 2019).

Within the OHC environment, both air and surfaces within the OHCF are contaminated by blood particulates (Cristina *et al.,* 2008; Salvia *et al.,* 2013). Considering that any item contaminated with blood and saliva is deemed potentially infected, sterilisation and disinfection are two of the major processes used in the OHCF to decrease the spread of pathogens (Rutala and Weber, 2016). However, there is a distinct difference between disinfection and sterilisation.

Disinfection aims to reduce the concentration of micro-organisms to a level that is no longer a risk. Disinfection only reduces the count of micro-organisms but does not kill all types of micro-organisms and is therefore not acceptable to only disinfect items that were in contact with bodily fluids (Puttaiah *et al.,* 2003; CDC, 2008, 2016b; Oosthuysen *et al.,* 2020). Bacterial spores and prions are resistant forms of micro-organisms that can survive unfavourable environments outside the body (Walker *et al.*, 2008). Disinfection should only be used for items that are not suitable to be sterilised by using an appropriate level of disinfectant (Exner *et al.*, 2020)

Sterilisation destroys micro-organisms such as bacteria, viruses, and spores through a properly functional autoclave. When improperly sterilised instruments are used in an OHCF, this may lead to infection if the epithelium and mucous membranes of the patient are penetrated. Sterilisation errors have often been linked to operator errors (Goodman *et al.*,1994). As incidences of the failure of sterilisation equipment have been reported previously (Cheng *et al.* 2013), it is essential to use biological monitoring to ensure that the sterilisation process is effective.

Furthermore, the category of type of instrument or equipment used will determine how it must be processed to eliminate micro-organisms (Classification, 2014). In general, instruments are classified

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into critical, semi-critical, and non-critical items (Oosthuysen *et al.,* 2020). Critical instruments are those items that penetrate soft tissue or contact bone, e.g., extraction forceps, surgical instruments and scalers, and must be sterilised, preferably in an autoclave. Semi-critical instruments are those items that only come in with mucous membranes, e.g., mouth mirrors, amalgam condensers, reusable impression trays and handpieces. Non-critical items touch intact skin but not mucous membranes, e.g., radiograph head/cone, blood pressure cuff, stethoscope and face bows that should be cleaned with a low-level disinfection solution (Royal College of Dental Surgeons of Ontario, 2010). If items are heat-sensitive, they should be processed using a high-level disinfectant for the recommended time. Hence, a call went out to improve the handling of disinfectant solutions and sterilisation methods of handpieces (Gopal *et al.,* 2014).

The recommendations for sterilisation and disinfection of patient care devices (CDC, 2003) outline the following:

- Reusable dental equipment should always be disinfected and sterilised according to the manufacturers` instructions before use on another patient. If the manufacturer does not supply such instructions, the device may not suit multi-patient use.
- Display the instructions for reprocessing reusable instruments/equipment in or near the sterilisation area.
- OHCWs should be trained to reprocess dental equipment effectively to assign the responsibility of reprocessing dental equipment to OHCWs who have appropriate training.
- Wear the right PPE when handling and reprocessing contaminated patient equipment.
- Keep a record of sterilisation processes, label sterilised items with the number of the steriliser used (if more than one is available) and the date and cycle or load number.
- Ensure that sterilisation equipment is regularly maintained and ensure that the maintenance records are available.

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Moist heat is the most preferred and commonly used sterilisation method within OHCFs, as many OHCWs know how to operate these sterilisation devices (Christian and Kikwilu, 2014; Arif *et al.,* 2019). Other sterilisation methods were also used to a lesser degree (Otieno *et al.,* 2020). Failure in the functioning of these devices is possible, yet OHWs practices in monitoring the machines seem to be lacking (Coulter *et al.,* 2001).

Regarding surfaces within the operatory area, surface barriers should be used to protect clinical contact areas, particularly those areas that are difficult to clean, e.g., switches on dental chairs and keyboards. Surface barriers should be changed between patients. Contact surfaces that are not barrier protected must be cleaned with an appropriate disinfectant, namely an intermediate-level disinfectant, when it becomes visibly contaminated with blood and after each patient. (Arif *et al.,* 2019)

## 2.7. Vaccination

Another way of controlling the spread of diseases is to increase a host's defence mechanism, which is the immune system. For this purpose, vaccines are administered to promote the development of specific antibodies that protect against infection (CDC Epi course). The two most critical vaccine-preventable diseases likely to be transmitted in the dental office are Hepatitis B and Influenza. An adequate vaccination program for OHCWs is required to ensure effective IPC in dentistry (Petti *et al.,* 2011). A comprehensive vaccination programme in any OHCF is a critical element of effective IPC measures. There is low awareness and consequent low vaccination rates because vaccination programs for OHCWs are few and often unclear about which vaccinations are recommended (Petti *et al*., 2013).

Vaccines are available to prevent infectious diseases such as Hepatitis B, Influenza, Varicella, Measles, Mumps, Rubella, and Tetanus. Yet, in South-Africa, the vaccination rates against vaccine-

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preventable infectious diseases are low (Rothe *et al.,* 2013)., The Hepatitis B vaccination is vital for all the members of the OHCT (Schillie *et al.*, 2013). Yet, in the Limpopo province in South-Africa, 62.7% of the dental assistants in the public sector were not vaccinated against HBV (Nemutandani *et al.,* 2007). Furthermore, research shows that the vaccine rates of dental assistants are lower than those of dentists. Daou *et al.* (2015) reported that only 34% of the dental staff received HBV vaccination compared to the 90,6% of dentists who participated in the study.

However, high HBV vaccination rates have been reported in recent years in other countries: Pakistan, 96.7% (Mohiuddin and Dawani, 2015); Belgaum city, 89% (Viragi *et al*., 2013) and 90.6% in Lebanon (Daou *et al.* 2015). Furthermore, as reported, the Hep B vaccination rate in China has increased from 32,66% in 2000 to 68,14% in 2010 Sun (2013). In 2015, a Hep B vaccine rate of 60% was reported amongst dental faculty in Egypt. (El-Adawi *et al.*). a higher percentage (66.7%) of dentists in Karachi were vaccinated against primary infectious diseases (Arif *et al.,* 2019). However, checking for seroconversion after administering the Hepatitis B vaccine was low (Al-Maweri *et al*., 2015). The decline in the HBV infection rates after 1990 proves the success of the vaccine program. In contrast, the compliance rates with the influenza vaccination among OHCWs were only 31.6% (Wicker *et al.* 2012).

There is a need for a specific vaccination plan which focuses on the vaccine-preventable diseases that pose a genuine risk for infection in the dental health care setting. The recommendation is that all health care workers be vaccinated against Hep B, Varicella, MMR (Mumps, Measles, Rubella) and Influenza (Kim *et al.,* 2015; IAC, 2017; Kim *et al.,* 2018). The Australian vaccination requirements are similar, but they also add Diphtheria and Tetanus vaccines to the mentioned list (Australian Dental Association, 2012).

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## 2.8. Hand hygiene

There is universal agreement that handwashing is one of the single most effective measures to reduce the risk of transmission of pathogens (Pittet, 2002; Pessoa-Silva *et al.,* 2005; Bednarsh *et al.,* 2015; CDC, 2016b; WHO, 2017). Hand hygiene is a simple act conducted within a complex IPC system. Therefore, even one poor handwashing technique would cancel the effectiveness of the rest of the IPC endeavours (Cole, 2006). Over the years, the WHO launched global safety challenge campaigns to improve HCWs hand hygiene knowledge and practices. All OHCWs should exhibit knowledge of the different hand hygiene techniques, the purpose thereof and the agents required to perform the specific methods, as outlined in (Table 2-1).

**Table 2-1 Techniques, purposes, and agents for hand hygiene measures**

| Technique | Purpose | Agents |
|---|---|---|
| Social handwashing / Routine handwashing | Cleansing to remove soil and reduce transient micro-organisms/ flora | Water and non-antimicrobial / non-medicated soap (e.g., plain soap) soap |
| Careful handwashing / Antiseptic handwash | Cleansing after patient contact | Water and antimicrobial soap (e.g., chlorhexidine, iodine and iodophors, chloroxylenol [PCMX], |
| Hygienic hand disinfection / Antiseptic hand rub | Disinfection after contamination to kill transient flora | Alcohol-based hand rubs that contain 60%-95% ethanol or isopropanol |
| Surgical hand disinfection / Surgical antisepsis | Preoperative disinfection kills transient flora and inhibits resident flora. | Use a combination of antiseptic hand wash and antiseptic hand rub. |

**(Adapted from WHO, 2009b; Cleveland *et al.* 2012; Bednarsh** *et al.*, **2015)**

OHCWs lack knowledge of hand hygiene and indicated that they need to receive more information on hand hygiene (Nair *et al.,* 2014*;* Bakarman *et al.*, 2019). The CDC recommendations for hand hygiene indicate that handwashing must be performed when hands are visibly soiled, after barehanded touching of instruments, equipment, materials, and other objects likely to be contaminated by blood,

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saliva, or respiratory secretions, before and after treating each patient, before putting on gloves and again immediately after removing gloves (CDC, 2017). However, previous studies showed that the hand hygiene practices of HCWs varied in several ways:

HCWs practices of hand hygiene at the specified events varied. On the one hand, only 27% of OHCWs at a dental faculty in Egypt washed their hands before putting on gloves, whereas 73.9% of the same respondents washed their hands after removing their gloves (El_Adawi *et al*., 2015). On the other hand, 98.96% of HCWs washed their hands before treatment, and 97.14% washed again after gloves were removed (Su J, Deng X-H, 2013). Furthermore, 38.5% of dentists in private practices in Nairobi washed hands after removing gloves, 43,7% washed hands before and after wearing gloves, and 2.8% washed hands only before wearing gloves (Otieno *et al*., 2020).

The hand hygiene practices of OHCWs working in different sectors varied. For example, among OHCWs in Karachi, Pakistan, 93.3% of dentists in a public setup performed handwashing before and after the dental procedures (Mohiuddin and Dawani, 2015). On the other hand, 65% of dentists in private dental clinics washed their hands before examining patients, but 92% washed their hands after examining patients (Arif *et al.*, 2019). The overall or average hand hygiene compliance rate of OHCWs varied, as a high compliance rate (Dagher *et al.*, 2017) and a low compliance rate (McCarthy and McDonald, 1998) with hand hygiene practices were reported. Effective handwashing was highly variable within the sub-Saharan Africa region (Rothe *et al.*, 2013).

Furthermore, the method and product used for handwashing varied. For example, among dentists in Karachi, 47% used antiseptic solutions, 46.2% used liquid soap, 1.7% used soap bars, and 5.1% washed with water only (Arif *et al.*, 2019).On the other hand, 53.2% washed their hands with soap, but the type of soap has not been specified in the report (Christian and Kikwilu, 2014).

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## 2.9. Personal protective equipment (PPE)

During the delivery of oral health care, equipment such as the handpiece, 3-in ejector, and scalers often produce sprays and splatters of blood, saliva, and other bodily fluids. Therefore, PPE is worn to shield the exposed tissues of OHCWs from exposure to potentially infectious material. PPE protects the conjunctival mucosa of the eyes and the lining mucosa of the respiratory tract and prevents micro-organisms from being introduced into deeper tissues by traumatic injuries (Bednarsh, *et al*., 2015). For this purpose, the CDC recommends wearing gloves, masks, protective eyewear, overcoats, and surface barriers (CDC, 2003).

Gloves must be worn to protect the OHCWs hands when in contact with blood, body fluids, mucous membranes, non-intact skin, or contaminated equipment. However, prolonged use of gloves for contact precautions without considering the need to perform hand hygiene can result in the transmission of germs (WHO, 2017). Therefore, gloves must be changed for each patient, and as mentioned earlier, proper hand hygiene should be done before putting on gloves and after donning gloves.

Another important aspect is to use the correct type of glove for the appropriate task – e.g., use heavy-duty gloves when washing instruments and use sterile gloves when performing invasive procedures. The reuse of single-use gloves is strongly discouraged, mainly because gloves deteriorate during use, and there is not a standardised, validated and affordable method for safe glove reprocessing (WHO, 2017).

Even though the use of gloves has increased, this is not true for the use of masks and eyewear (Halboub *et al.,* 2015). It is essential to wear masks to protect the respiratory mucosa of the OHCW against potentially contaminated droplet material. Some pathogens are incorporated in the sprays and splashes, which are evident during dental procedures and become airborne. Therefore, appropriate masks covering the nose and mouth should be worn during dental procedures. Masks lose efficiency

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over time as they become moist from breathing. Accordingly, masks should be changed when they become contaminated and wet and therefore be changed more often during longer appointments (Ontario 2010).

Eyewear is intended to protect the conjunctival mucosa of OHCWs from spatter and debris created during dental procedures (Jones *et al.*, 2020). The dentist and the dental assistant should be wearing protective eyewear throughout the dental procedure. In addition, dental assistants should also put on eyewear when processing the contaminated instruments to prevent splatter from getting into the eyes whilst cleaning the instruments (Oosthuysen *et al.*, 2020). There is, however, a general tendency amongst OHCWs not to wear eyewear. Rahman *et al.* (2013) reported that a mere 27% of students regularly use eyewear. This tendency is also confirmed by other studies (Viragi *et al.*, 2013), with an even lower percentage of less than 10% of dental assistants working at Tertiary Care Hospitals of Multan, Pakistan. They reported wearing eyewear every time while assisting the patient (Javaid *et al.*, 2019). Furthermore, in the instances where eyewear is worn but not properly disinfected between patients, there is a potential that the dental eyewear could harbour pathogens (Woo *et al.* 1992; Yang *et al.* 2015). Hence, part of IPC measures is to clean and disinfect protective eyewear between patients.

Dental equipment such as dental handpieces, ultrasonic instruments and air/water syringes creates large particle droplets of water, saliva, blood, micro-organisms, and other debris. (Gopal *et al.*, 2014). This visible spray typically travels only a short distance. It settles out quickly, landing on nearby surfaces, including the countertops and equipment, and the OHCW and patient (Darawad and Al-hussami, 2013). It is strongly recommended that barriers should be used to cover surfaces and equipment within the clinical area (Oosthuysen, Potgieter and Fossey, 2020b). These barriers should also be changed between patient treatments. It is further advised that single-use bibs or drapes should be used to protect patients' clothing and reduce their exposure to spatter and debris created during

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dental procedures. Single-use strips may be used to secure bibs and drapes in place of clumsy reusable chains. OHCWs should remove all PPE before leaving the work area and not enter non-clinical areas with masks or gloves.

## 2.10. Health care related waste management

Waste generated in health care facilities, including OHCFs, has been identified as a global problem and can negatively impact human health and the environment (Sambo *et al*., 2017). Correct HCRW management is crucial for an effective IPC process (HPCSA, 2016b). When proper HCRW management is not practised in an OHCF, it pose a risk of cross-infection of waste handlers and staff beyond the direct OHCT, such as cleaners, porters and waste transporters (Bansal *et al.,* 2013). During the general day-to-day activities in any OHCF, household and medical waste are generated. Of particular concern is how the harmful, potentially infectious medical waste is managed. This biohazardous waste, also known by other names such as "medical waste" or "infectious waste", holds a potential danger to humans, animals, and plants as well as the environment (WHO, 2014b). It is, therefore, important that the OHCT has the appropriate knowledge of waste composition, correct segregation of waste and the proper management of waste (Ozbek and Sanin, 2004).

Various authorities bodies such as OSHA, CDC, and HPCSA have similar guidelines concerning waste generated in health care facilities (CDC, 2003a; HPCSA, 2016b; Collins and Kelsch, 2021). The dental fraternity uses specialised single-use waste containers for sharps, red refuge bags within a sturdy cardboard box for waste that holds human parts such as extracted teeth and items such as gloves and cotton-wool rolls contaminated with blood and saliva. Practices are encouraged to refrain from using black bags and are recommended to use transparent bags for general waste. General waste should be discarded separately from biohazardous waste. Once biohazardous waste containers are

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filled up to the indicated line, they should be sealed and given over to a registered HCRW management agency, which must be incinerated. In contrast, general waste is discarded through the local municipality's waste removal services.

The key to effective management of health care waste is to apply good segregation when the waste is generated. This separation of hazardous from non-hazardous waste components ensures that appropriate containers are used in the first place and that the waste is handled correctly throughout the cradle-to-grave process. Furthermore, segregation will also minimise the amount of waste that will require expensive treatment processes, thus reducing costs (WHO, 2014b).

To correctly manage waste, it is crucial that the OHCW can differentiate between the types of waste categories. In Table 2-2, the only waste category regarded as regular trash is waste category 5. If the waste has a "sharps" hazard, referring to needles, ampules and blades (category 4), if it is contaminated with material that is potentially infectious to humans, animals or plants, for example, toxic or chemical substances (categories 3 and 2) and if blood or other regulated body fluids can be released from the waste (category 1), then it is regarded as biohazardous waste (Storr *et al.*, 2017)

**Table 2-2 Components of the different waste categories**

| Waste Category | | Components |
|---|---|---|
| 1 | Potentially infectious waste | Items contaminated with blood or saliva, including paper towels, gauze, cotton, dental rolls, gloves, masks, saliva ejectors, tongue depressors, extracted teeth, |
| 2 | Chemical and pharmaceutical waste | Dental materials such as calcium hydroxide, dental impression materials, wax, and medicine ampoules. |
| 3 | Toxic waste | Amalgam particles and contaminated items such as paper towels, gauze, cotton, and dental rolls. Lead foil in film packets, radiographic film and radiograph developer and fixing solutions. |
| 4 | Sharp waste | Syringe and local anaesthetic needles, surgical blades, the needle with sutures, |
| 5 | Domestic / General waste | Dental products containers and covering such as paper and plastic; food waste |

***South-African SANS regulation 10248:2004 (Adopted)***

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## 2.11. Conclusion

All health care workers should be equipped with adequate knowledge and skills and positive attitudes to apply effective infection prevention and control measures (Gopal, Jesija and Vardhan, 2014). However, findings were that compliance of dental support staff with IPC guidelines was lower than that of dentists (Alakhras *et al.*, 2020)

Since there was no equal training foundation for the dental assistants in South-Africa, there can be no speculation regarding dental assistants' IPC Knowledge, Attitude and Practices (IPC KAP). Furthermore, empirical evidence of South-African dental assistants' IPC KAP across different IPC themes that include infectious diseases and risks, sterilisation and disinfection, vaccination, hand hygiene, PPE and HCRW management are few and far apart.

In general, previous research on aspects of IPC within the South-African oral health facilities was primarily conducted among dentists, with a few exceptions that included dental assistants (Moola, *et al.*, 1992; Naidoo, 1997; Yengopal *et al.*, 2001; Mehtar *et al.*, 2007; Nemutandani *et al.*, 2007; Hartshorne, 2010; Ziady, 2010; Jarand *et al.*, 2010; Oosthuysen *et al.*, 2010; Naidoo *et al.*, 2012; Oosthuysen *et al.*, 2014; Oosthuysen, 2015; Duse, 2017). The gaps identified in the IPC KAP of other OHCWs, across several of the IPC themes beg the question about the IPC KAP of dental assistants working in South-African OHCFs.

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# Chapter 3

# Methodology

## 3.1. Introduction

Within dentistry, a team of OHC professionals, including dental assistants, is responsible for ensuring optimal care when services are rendered to patients. The safety of patients and OHCWs could be compromised if a member of the team does not adhere to the recommended infection prevention and control (IPC) measures (CDC, 2016b). In a comparative study of dentist IPC knowledge, attitude and practices, Puttaiah *et al.* (2011) concluded that the dental infection control knowledge and practices varied widely across the eight countries. Also, multiple studies investigated aspects of IPC among other health care professionals such as nurses, doctors, and medical students (Singh *et al.*, 2011; W. Gichuhi *et al.*, 2015; Ibrahim and Elshafie, 2016; Chisanga, 2017; Biniyam *et al.*, 2018; Yazie, Sharew and Abebe, 2019). However, publications about dental assistants' knowledge, attitude and practices of infection prevention and control (IPC) measures within OHCFs are limited.

This research study consisted of three main phases. Phase 1 entailed the construction of an IPC questionnaire. Phase 2 entailed validating the newly constructed IPC questionnaire by evaluating data obtained in the pilot study. Finally, phase 3 entailed administering the questionnaire to the main study population.

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## 3.2. Ethical considerations

Before distributing any questionnaire to respondents, consent and approval were obtained on different levels. An application for ethical clearance was submitted to two research ethics committees. Furthermore, permission was sought from the Health Department to include dental assistants employed in the OHCFs within the public sector. In addition, consent was sought to have dental assistants employed within the selected group of private OHC service providers.

### 3.2.1. Ethical clearance from research ethics committees

Ethical clearance was sought from the ethical committee of the Faculty of Health Sciences at the University of the Free State (UFS, FHS) (Appendix D). Then, after their approval, ethical clearance was sought from the Ethical committee of the Netcare private group, under which the Medicross dental practices resort (Appendix C).

### 3.2.2. Consent from the employers of dental assistants (Gatekeepers)

Dental assistants from both the public and the private sectors were included in this study. Therefore, consent from the gatekeepers of both the private and public sectors was sought. Permission to include dental assistants employed in the public sector was sought from the Department of Health in the Free State Province (FS DoH) through submission of the required documentation on the National Department of Health research internet site. Furthermore, consent to include dental assistants from the private sector were sought from Dr Smith, the Director of Oral Health Services at the Netcare group, via electronic communication (Appendix C: the consent letters).

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### 3.2.3. Informed consent of participants

Care was taken to ensure that participants were well informed and fully understood the nature of the study. Therefore, an information leaflet accompanied each questionnaire. This information letter outlined the following (Appendix A):

- The purpose of the research and what is required of the participants.
- It also made it clear that participation was voluntary.
- It reassured the participants that their anonymity would be maintained. No participant could be identified during or after the study.
- The information letter also indicated to the participants that the researcher would maintain the confidentiality of the information provided.
- Indicated the approximate time it would take to complete the questionnaire.

Furthermore, a statement on the questionnaire made it clear to participants that completing the questionnaire implied that they consent to partake in the study. Therefore, individual consent forms from the respondents were not collected to protect the anonymity of the participants.

## 3.3. Phase 1: Questionnaire construction

Several steps form part of constructing questionnaires used for data collection (Singh, 2017). The construction of a questionnaire required reflection on and consideration of various elements (Bennett *et al.*, 1998; Murray, 1999; Rattray and Jones, 2007; Sansoni, 2011; José Nicolás *et al.*, 2016). An in-depth review and evaluation of existing questionnaires were done to identify trending aspects of infection prevention and control (IPC) within OHCFs (Ramphoma *et al.*, 2014; Ogoina *et al.*, 2015;

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Ibrahim and Elshafie, 2016; Da Costa *et al.*, 2017; Mandoh *et al.*, 2017; Alhumaid *et al.*, 2021). Furthermore, questionnaires that surveyed the knowledge, attitude, and practices in fields other than health care were also reviewed. The review process guided the elements included in the questionnaire, such as IPC themes, selection of existing items and formulation of new items, and identification of existing and construction of new response options.

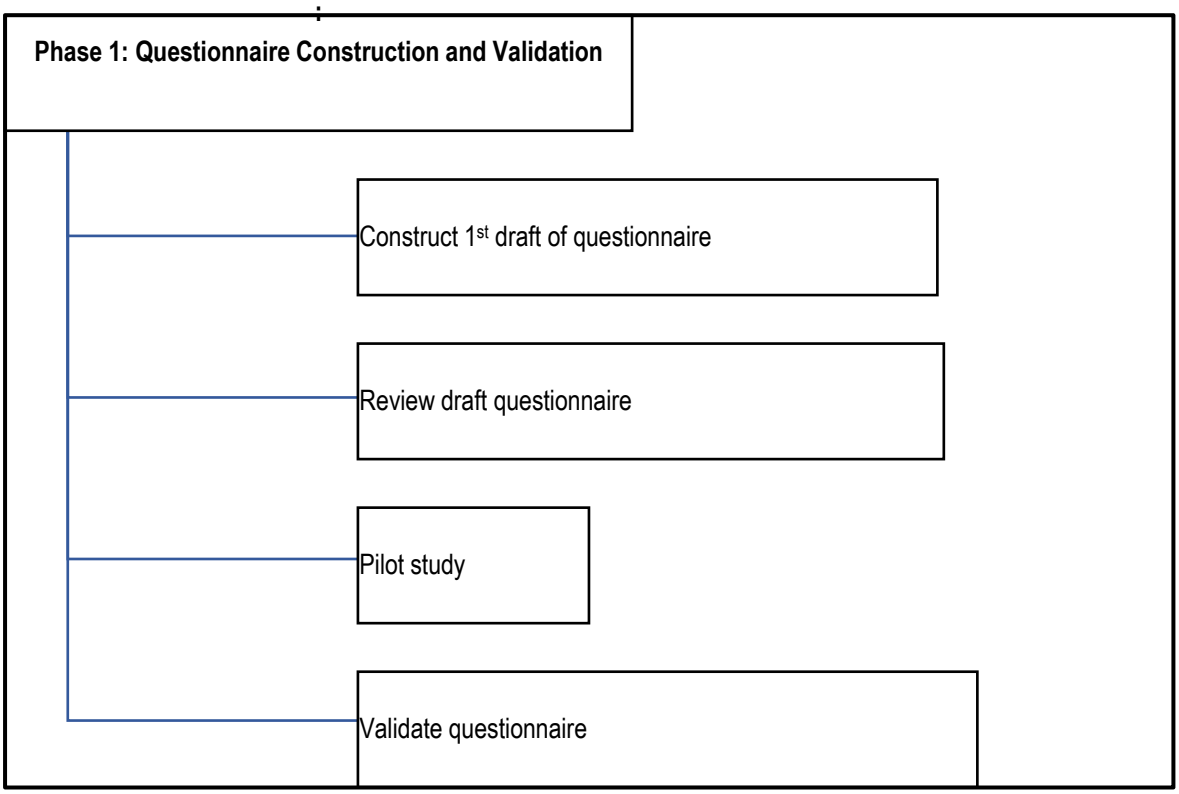
Identifying the specific IPC themes was further guided through a review of IPC guidelines from National and International role players to delineate the scope of this study. (Puttaiah and Kohli, 2003; Department of Health_RSA, 2007, 2020; Puttaiah, Bedi and Shetty, 2010; Royal College of Dental Surgeons of Ontario, 2010; Budnyak *et al.,* 2012; CDC, 2016, 2017; WHO, 2016a). As a result of these reviews, the seven IPC themes identified for the study were:

- IPC theme 1: IPC training and continuous professional development
- IPC theme 2: Infectious diseases and risks
- IPC theme 3: Disinfection and sterilisation
- IPC theme 4: Vaccination
- IPC theme 5: Hand hygiene
- IPC theme 6: Personal protective equipment (PPE)
- IPC theme 7: Health care related waste management

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## 3.4. Study design

A descriptive approach was followed in this study. A newly constructed and validated questionnaire was used to survey dental assistants' infection prevention and control knowledge, attitudes, and practices within OHCFs. The data collected using a standardised self-administered questionnaire was interpreted as percentages. Therefore, a quantitative method was applied to this study (Figure 3-1).




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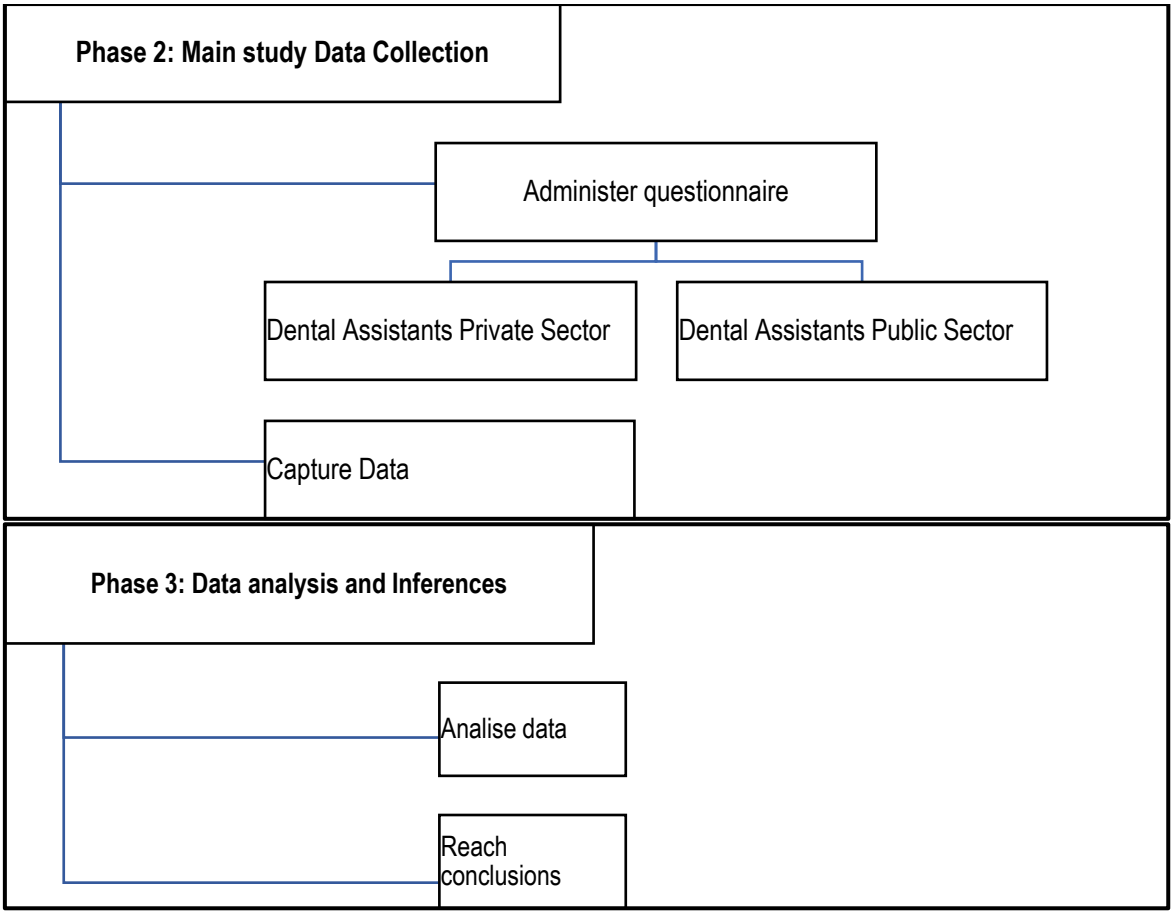



**Figure 3-1 Study design**

### 3.4.1. Structure of sections in the questionnaire

The questionnaire consisted of 10 sections. A separate section in the questionnaire addressed the KAP of each of the seven identified IPC themes. The outline of the section in the questionnaire was as follows:

Section 1: Demographic details

Section 2: IPC duties of dental assistants

Sections 3 – 9 Covered the seven identified IPC themes

Section 10: Barriers to efficient IPC measures that a dental assistant experienced.

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### 3.4.2. Items used in the questionnaire

To meet the requirements for comparability with other studies, care was taken that the items decided upon were in line with national and international IPC-guiding documents (Brancato *et al.*, 2004). National advisory papers on IPC within Health practices, the scope of practice for dental assistants as issued by the Health Profession Council of South-Africa (HPCSA) and the IPC framework and strategy of the Department of Health were reviewed. Other international IPC-guiding documents from leading organisations such as the Centres for Disease Control and Prevention (CDC) and the World Health Organisation (WHO) were also reviewed. Furthermore, instruments that were previously used in surveying IPC related fields and questionnaires that assessed Knowledge, Attitude, and Practices within the OHC field were also reviewed. An initial list of items extracted from existing questionnaires, and new items that were constructed to fit into and address the issues of interest of the study, formed the first draft of the questionnaire.

During the construction of the draft questionnaire, a review of the draft questionnaire was performed. Review panel members were representative of the OHC field, infection prevention and control field and academic field. The items in the draft questionnaire were evaluated in terms of the following:

- ✓ The use of simple language,
- ✓ The length of the questions,
- ✓ Questions addressed only one concept at a time,
- ✓ Questions do not lead respondents towards a specific response,
- ✓ Questions are unambiguously stated, and
- ✓ The questions follow a logical order.

There was no specific pattern to arrange the items according to the KAP domain within the sections addressing the IPC themes. Thus, the researcher randomly placed the items measuring knowledge,

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attitude, and practices of specific IPC themes, within the respective sections of the questionnaire. The data grouping that addressed the KAP domains occurred in the analysis stage.

### 3.4.3. Response options to items

Different responses were created dependent on the type of question asked. In this study, specific response options for the different KAP domains varied. Most items surveying knowledge and practices were matched with Yes, No or Not sure response options. All items measuring attitude were checked with a 5-point Likert-type response option, namely: Strongly disagree, Disagree, Neutral, Agree and Strongly Agree. A four-point Likert-type response option was applied to items that probed the frequency of practices: Never, Seldom, Often and Always. In a few other items, ranking the listed details or correctly ordering the listed actions was required.

## *3.5.* Phase 2: Questionnaire validation

Several studies documented the importance of measuring the accuracy and consistency, also known as the validity and reliability of questionnaires (Bolarinwa, 2015; Singh, 2017). In general, each measurement tool has the potential to contain some errors. Singh (2017) referred to errors as the portion of the score on the test that is not relevant to the construct being measured. He further mentioned that mistakes in a measuring tool cause the study results to lose integrity. Therefore, evaluating the validity and reliability of a newly developed questionnaire is a must to reduce measurement error and ensure that data quality and utilisation are not undermined (Esposito, 2002; Taherdoost *et al.*, 2016). Moreover, when a new measuring tool is developed or modifications are made to an existing tool, it is required that the tool be validated (Rattray and Jones, 2007).

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### 3.5.1. Pilot study

A pilot study aims to identify shortfalls in proposed research by applying the intended measurement tool to a small group like the envisaged study population. These shortfalls could be in the practicability of using the tool, the respondents' understanding of the measurement tool, the analyses of the information, and if the information would be applicable to address the identified research problem.

The pilot study population were analogous to the main study population. The dental assistants' class of 2017 at the Central University of Technology, FS (CUT) were requested to participate in the pilot study. Only students who completed more than 50% of their Work Integrated Learning hours at dental practices participated in the pilot study. A total of 60 dental assisting students participated in the pilot study voluntarily. The pilot study population completed the draft questionnaire following a group administrative approach. The draft questionnaire was distributed to the students in a classroom setting at the CUT. The researcher was present to explain any unclear questions and was thus familiar with the conditions under which the participants completed the draft questionnaires. On average, respondents took less than 45 minutes to complete the questionnaire. The researcher collected all questionnaires at the end of the session. A focus group discussion was also done with participants from the pilot study group to discuss proposed changes to the questionnaire.

#### 3.5.1.1 Data preparation

Data preparation aimed to get the data organised and ready for analysis. Several steps were followed to prepare the raw data (Leahy, 2004). The researcher used the Micro Soft Excel program to create a database for the responses. A unique number was allocated to the 60 fully completed questionnaires. Coding of the data occurred through assigning numbers to the different response options of the items in the questionnaire.

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#### 3.5.1.2 Statistical analysis of pilot-study data

The statistical analysis of the pilot study data was used to assess the validity and reliability of the newly developed questionnaire. Distinct types of validation methods are applied to diverse kinds of research. The questionnaire validation process involved two parts; one part considered aspects of validity, and the other part considered aspects of reliability (Figure 3-2). Two aspects of validity were measured, namely face validity and content validity. Reliability was assessed by applying the Kuder Richardson 20 formula (KR_20), the Cronbach's alpha as well as evaluating the Inter-Rater Agreement (IRA)

Review panels consisted of OHC professionals, including dental assistants, oral hygienists and dentists, IPC experts from a private hospital, and individuals with previous research backgrounds. In addition, academics with experience in research and colleagues with a background in dental assisting were well represented within the panels. The reviewers' results were used to determine the face validity of the instruments. Furthermore, the content validity was assessed by calculating the Average congruency percentage (ACP) and Scale-content validity (S-CVI) based on the responses from the reviewers. In respect of the reliability of the instrument, reviewers' evaluation results were also used to calculate the inter-rater agreement (IRA) score. Furthermore, other aspects related to the reliability of the draft questionnaire, namely the Kuder_Richardson formula and the Cronbach's alpha, were assessed through statistical calculations.

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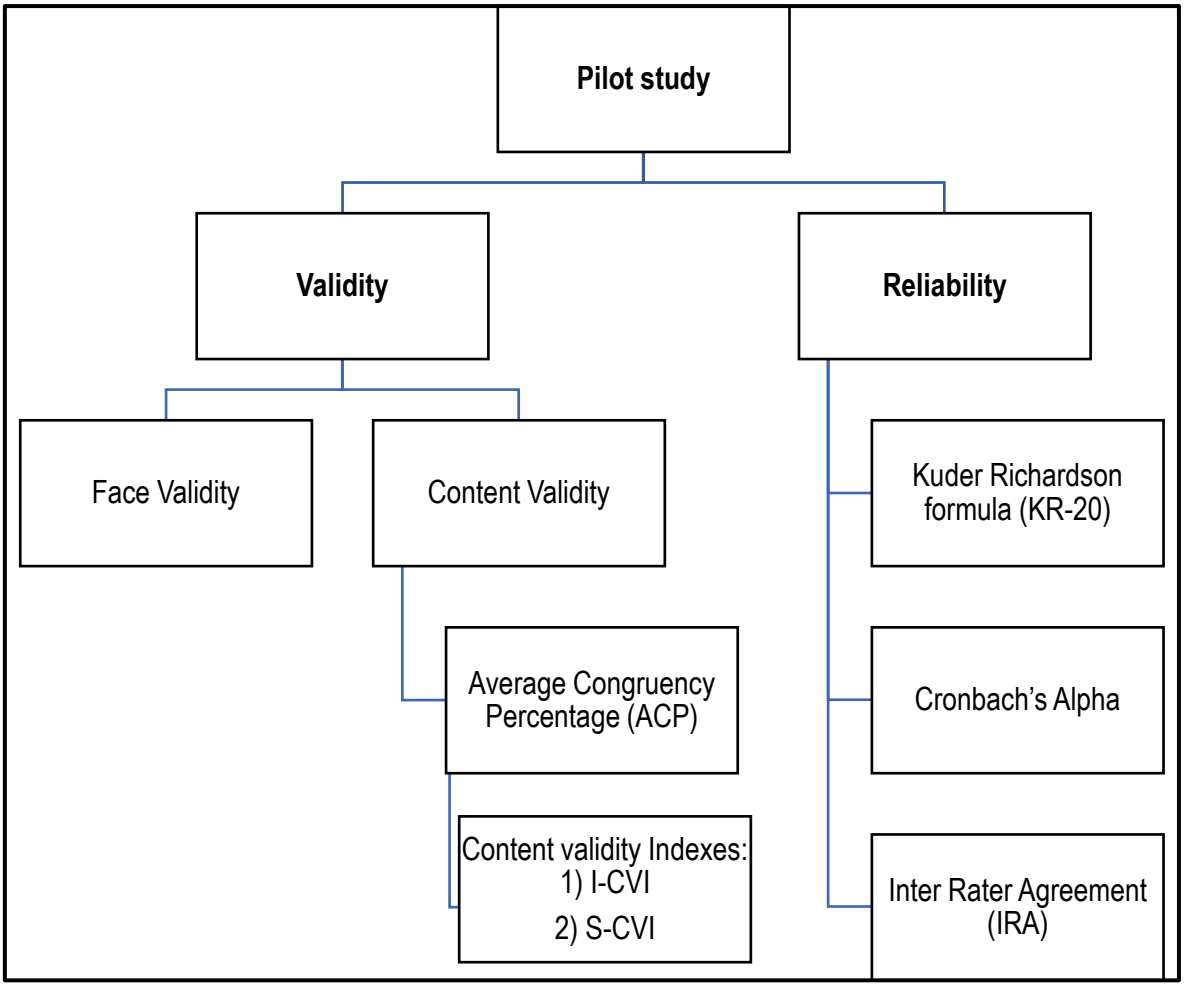



**Figure 3-2 Validty and reliability of the questionaire**

### 3.5.2. Validity

Validity refers to the ability of an instrument to measure what it is intended to measure (Del Greco *et al*., 1987; Jain, *et al*., 2016). Researchers used several measures to determine the internal consistency validity of an instrument (Del Greco *et al*., 1987; Bennett *et al*., 1998; Zamanzadeh *et al*., 2015; Taherdoost and Lumpur, 2016; Jain *et al*., 2016; Sebastian *et al*., 2017). In this study, the questionnaire was intended to determine dental assistants' IPC knowledge, attitude, and practice at a specific time. Face validity and different measures of content validity were applied to determine if the instrument measured what it was intended to measure.

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#### 3.5.2.1 Face validity

Face validity is the *measurement to determine the* extent to which a questionnaire appears to be valid on the surface (Ghahroudi *et al.*, 2013; Taherdoost, 2016). Face validity is a subjective form of evaluation, as reviewers determine if the questionnaire's content looks relevant to what the researcher intended to survey. A panel of experts evaluated the feasibility, readability, consistency of style and formatting, and the clarity of the language used (Taherdoost, 2016). Their suggestions for improvements were incorporated into the final draft of the questionnaire.

#### 3.5.2.2 Content validity

The content validity test ensures that the questionnaire survey only the content related to the field of study and that the items represent the research objectives (Zamanzadeh *et al.*, 2015; Sebastian *et al.*, 2017). Various methods exist to measure the content validity of a tool. Different groups of experts used other measures to evaluate the questionnaire for this research. Criteria to be used to determine the content validity of the tool included the Average congruency percentage (ACP), Item-content validity index (I-CVI) and the Scale content validity index (S-CVI) (Sebastian *et al.*, 2017).

3.5.2.2.1 Average congruency percentage (ACP)

A panel of experts were asked to assess the questionnaire using the average congruency percentage (ACP) method. If the ACP is more than 90%, the questionnaire items could be valid (Taherdoost *et al.*, 2016). The ACP method required the following:

1) Select experts in the field to evaluate each question in the questionnaire.
2) Request experts to indicate the questions deemed to be relevant.
3) Researcher to calculate the *% of relevant questions* for each expert.
4) Researcher to calculate the average % of all experts.

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3.5.2.2.2 Item-content validity index (I-CVI)

The other experts used a validation method known as the **content validity index (CVI).** The ***I-CVI*** assess the importance of the individual items. The **I-CVI** procedure requires that the relevance of each question be measured on a four-point Likert scale, namely: 1 = Not relevant; 2 = Somewhat relevant; 3 = Relevant; 4 = Very relevant. Three external reviewers evaluated three characteristics or elements of the items and response ratings: readability, clarity of wording, and feasibility.

The questions scoring a 1 and 2 were regarded as not relevant. In contrast, questions scoring 3 and 4 were considered relevant. Then for each question, the number of experts who gave a 3 or 4 was counted. The proportion calculation was done as follows: The total number of experts who considered any given question as relevant or completely relevant was calculated. This number was then divided by the total number of experts participating in the study, multiplied by 100. E.g., If 4 out of 5 experts gave 3 or 4 for a specific question, then the I-CVI = 0.80 or 80% (Sebastian *et al.*, 2017)

When five (5) or fewer experts are consulted, all must agree that the question is relevant. In that case, the I-CVI should be 1.0 (100%). If more than five (5) experts are involved, then the I-CVI score should be more than 0.78 (78%) to declare that the questionnaire is valid (Sebastian *et al.*, 2017). Suggestions received by reviewers to improve readability, clarity of wording and the feasibility of the items and response options were incorporated into the final draft of the questionnaire.

3.5.2.2.3 Scale-content validity index (S- CVI)

Scale content validity Index (S- CVI) indicates the level of relevance to the overall importance of the instrument (Khami, Razeghi and Mirmohammadi, 2016). A panel of external reviewers evaluated the items in each section of the draft as relevant or not relevant to questions. The researcher then analysed the results indicated by the external reviewers. The S-CVI for each section of the draft questionnaire was calculated: Totalling the number of questions considered completely relevant by

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all experts. This total was divided by the number of questions in the section and expressed as a percentage. Finally, the average ratios of all the sections were calculated to determine the final S-CVI of the actual instrument. The final S-CVI indicated the validity of the instruments as a scale to measure the IPC-KAP of dental assistants (Sebastian *et al.*, 2017).

### 3.5.3. Reliability

#### 3.5.3.1 Subjective assessment of reliability

Reliability is the degree of consistency with which the instrument measures an attribute (Hiew *et al.*, 2015). The reviews of panel members provided a subjective evaluation of the draft questionnaire. The reviewers evaluated different elements of the questions and response options in the draft questionnaire:

- Assess if the questions suit the aim of the study.
- Determine if any questions are missing or questions that should be left out or changed.
- Evaluate if the questions are set, unambiguous, and straightforward.
- Evaluate if the response items and the scaling thereof are appropriate.
- Evaluate if the questions are structured so that respondents are not given a particular answer.
- Evaluate if the questions would not alienate the respondents.
- Evaluate if the question suits the professional nature of the respondent.

The panel members also checked to minimise potential errors from coders and see if an efficient and meaningful analysis of the required data would be possible. Numerous suggestions to improve the questionnaire were received. In Chapter 4, a table reflects the panel's recommendations and the adjustments made in response to the proposals.

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#### 3.5.3.2 Objective assessment of reliability

The objective statistical measures used to measure the reliability of the items within the different KAP domains varied. Based on the various response options to the items in the questionnaire, various statistical measures were utilised for the items in the different KAP domains (Rubio *et al*., 2003; Sinkovics *et al*., 2008; Jain *et al*., 2016; Singh, 2017; Tsang *et al*., 2017; Taherdoost, 2018*).* The Kuder and Richardson Formula 20 (KR_20) was used to determine the internal consistency of the items within the Knowledge-domain, whereas the Cronbach's alpha reliability coefficient was used to determine the internal consistency reliability of the items in the Attitude- and Practice-domains (Al-lela *et al.*, 2011; Naghavi *et al.*, 2012; Rasouli Ghahroudi *et al.*, 2013; Jain, Dubey and Jain, 2016). The Excel Data analysis tool pack calculated the KR_20 and the Cronbach's alpha test statistics.

##### 3.5.3.2.1 Kuder and Richardson Formula 20 (KR-20)

The items under the Knowledge domain are measurements with dichotomous choices. As each question was either right or wrong, the KR-20 test was used to determine the internal consistency reliability. The guide towards an appropriate coefficient for the reliability of items in the knowledge domain was 0.6 (Hiew *et al.*, 2015; Singh, 2017).

##### 3.5.3.2.2 Cronbach's alpha

The results of the Cronbach's alpha tests verified the internal consistency reliability of the items within the Attitude and Practice domains. The Cronbach's alpha of the different groups of items within the various IPC themes was calculated using the Excel Data analysis tool pack. A Cronbach's alpha value of 0.7 or more was deemed an appropriate indication of the reliability of the items in the instrument (Cronbach, 1951; Al-lela *et al.*, 2011; James T Croasmun *et al.*, 2011; Gadermann, Guhn and Zumbo, 2012; Rasouli Ghahroudi *et al.*, 2013; Ali Jadoo *et al.*, 2014; Lohit, Vidya and Manjunath, 2016).

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3.5.3.2.3 Inter-rater agreement (IRA)

Inter-rater agreement, also called inter-observer reliability, is a measure of consistency between two or more independent raters of the same construct (Safi *et al.*, 2015; Khami *et al.*, 2016). The IRA is determined by calculating the proportion of items to which reviewers agreed. Two approaches towards IRA exist. The conservative approach considers only the items rated 100% by all reviewers. In contrast, the alternative approach considers the items that 80% of the reviewers agreed on (Khami *et al.*, 2016). For this study, a conservative approach regarding the IRA was followed.

## 3.6. Phase 3: Main study

### 3.6.1. Study population

The study was conducted among dental assistants who worked in the clinical areas of dental practices. The study included only dental assistants working in public OHCFs in the Free State and dental assistants employed by a specific group of private OHC service providers across South-Africa. The group of dental assistants employed by the network of private health care providers are hereafter referred to as the Private sector. On the other hand, the group of dental assistants employed by the Free State Department of Health is referred to as the public sector. At the time of the study, approximately 250 dental assistants were employed in the sectors of interest. These numbers were confirmed by the Assistant Director: Oral health care services of the Department of Health, Free State, and the Dental Director of the private group of health care providers.

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### 3.6.2. Response rate

The questionnaire was sent to all possible participants working within the Free State Department of Health and the private OHCFs under the auspices of Net care across South-Africa. Of the total of 250 possible participants, 197 completed the questionnaire.

Overall, a response rate of 79% was achieved. The researcher also calculated the response rate for the respective respondent categories. This proportion was calculated by counting the total of completed questionnaires received from the specific respondent category, divided by the total number of questionnaires received from all the respondents. A roughly equal proportion of responses was obtained from respondents in the respective working sectors. The response rate of dental assistants working within the private sector was 81% (n= 121). The response rate of dental assistants working within the public sector was 80% (n= 76). In the respondent categories based on the type of training, 43% (n=84) of the respondents were FT, whereas 57% (n=113) of the respondents were IST (Figure 3-3).

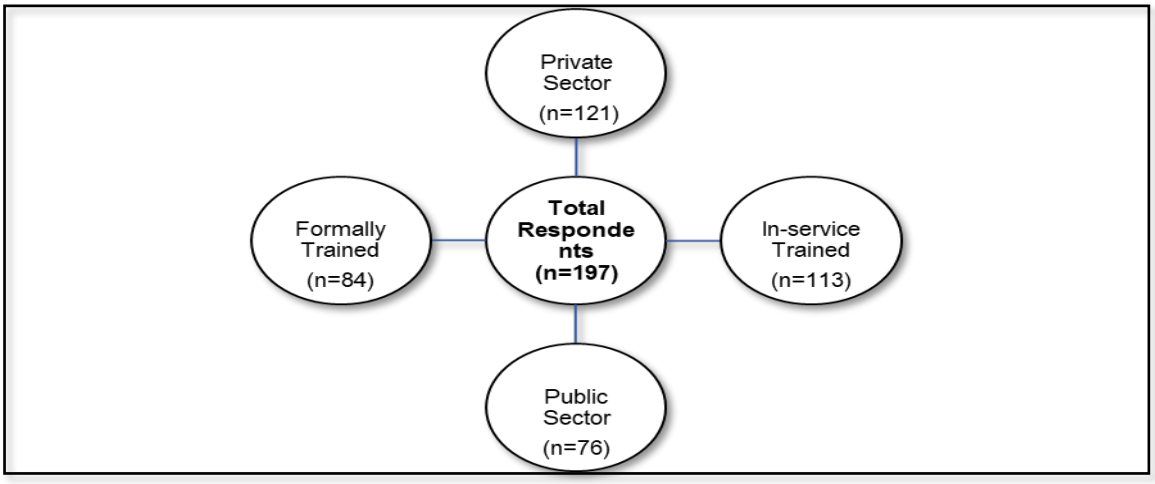



**Figure 3-3 Number of respondents coording to working sector and type of training**

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### 3.6.3. Data collection

A combination of two questionnaire administration methods was used: self-administered and group-administered (Marshall, 2005; Richardson, 2005; Rattray and Jones, 2007; Dicker, 2009; Zohrabi, 2013; Mora *et al.,* 2016; Singh, 2017; Taherdoost, 2018). Continuous written and telephonic communication was maintained with the practice managers of the private OHC sector *d*uring the data collection process. Participants were ensured that participation in the study was voluntary. Furthermore, the information provided would remain anonymous, and the data received would be handled with utmost care to protect confidentiality.

#### 3.6.3.1 Self-administered questionnaire

For respondents from the private sector that were not within the researcher's reach, self-administered questionnaires were applied. After consultation with the practice managers of the OHCFs within the private health care group, a research package was sent via courier to the respective practices. The research-packages packages consisted of various documents related to the research. A copy of the ethical approval from the research committee of the private health care network and a copy of the letter received from the Dental director indicating his awareness and support of the proposed research to be undertaken were included. In addition, the research information leaflet explained the rationale of the study, aspects of confidentiality, informed consent, and voluntary participation of the participants and was attached to each questionnaire. Furthermore, the practice managers of the private OHC service providers were requested to indicate on the provided template the number of dental assistants employed at the specific OHCFs at the time of the study.

A return waybill and courier packaging were included to ease the return of the completed questionnaire and information document. Dental assistants were granted seven to ten working days to complete the questionnaire voluntarily and confidentially. After that, the researcher contacted the

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practice managers to confirm if the dental assistants within their OHCF completed the questionnaire. The researcher then arranged to collect the completed questionnaires from the respective practices with the courier company.

#### 3.6.3.2 Group administered questionnaire

By offering a free, accredited CPD seminar on infection prevention and control, a group of dental assistants were gathered at one venue on the same day. The seminar was arranged in collaboration with colleagues at the Dental program of the Central University of Technology, Free State (CUT). As a result, the event was well attended by OHCWs, of which 93 were dental assistants. Furthermore, the greater number of dental assistants who participated in the event were from the Free State Department of Health.

Setting completion of the questionnaire as the day's first activity ensured that the day's presentations did not influence attendants' responses. All attendants received the questionnaire together with a research information leaflet. The research information leaflet explained the rationale of the research, aspects of confidentiality, informed consent, and voluntary participation of the participants. Furthermore, the researcher informed the attendants that the respective ethics committees approved continuing with the proposed study. The researcher was present to explain any unclear questions and was thus familiar with the conditions under which the questionnaires were filled out. Respondents completed the questionnaire in less than an hour. The researcher gathered all questionnaires before the commencement of the lectures scheduled for the remainder of the seminar.

#### 3.6.3.3 Preparation of data

Raw data were obtained from the questionnaires completed in the main study. Preparation of data involved coding, capturing and cleaning before statistical analysis could commence. The methods used to prepare the data of the main study population were the same as the pilot study data.

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### 3.6.4. Data analysis

Several statistical analyses were performed on the data gathered in this study. Various functions in the data-analysis tool pack of the Excel program were used for this purpose. Descriptive statistics, as well as inferential statistics, were computed.

Descriptive statistics summarise data and identify critical findings (Dicker, 2009). The descriptive statistics described the frequency distribution, central tendency and variability. Pivot tables were created to determine frequencies from which the percentages were calculated. The descriptive function of the Excel data analysis tool was used to calculate the central tendency that reflected the mean, and the variability was calculated to indicate the standard deviation. The descriptive statistics for each item in the questionnaire were presented in a table format. The tables reflected the results of the total respondent group and the four respondent categories.

The interpretation of the results of items in the knowledge and practice domain was similar, but the interpretation of the results of items in the attitude domain differed. Knowledge and practices items with the correct response received one point, and zero points were allocated to an incorrect answer. Knowledge and practice scores were considered excellent (>75%,) good (74%-51%), moderate (50% - 26%) and weak (<25%) (Kumar and Rahman, 2017). The respondents' attitudes were interpreted as either positive or negative, depending on the level of agreement with the statements. Higher scores of agreement with positively stated items and higher scores of disagreement with negatively worded items denoted a positive attitude, and the opposite was indicative of a negative attitude (Bonetti *et al.*, 2009).

Inferential analyses were used to determine if there was a significant difference between the respective respondent categories, namely respondents employed in the Private sector versus respondents employed in the public sector and FT respondents versus IST respondents. Using the probability theory, Dicker (2009) stated that "a statistical significance indicates whether a result is

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more robust than what might have occurred due to chance or random error". A high probability was indicative that the results were not due to chance or random variation. A $p\text{-}value < 0.05$ indicated a statistically significant difference, and p < 0.01 was considered highly significant. Inferential analysis was made by applying the Chi-square test to determine the *p-value*, the *degree of freedom (df)* and the corresponding alpha value ($x^2$)

The Excel data analysis tool-pack was used to calculate *the p-value* using the built-in formula of **CHISQ.TEST (*Actual Range, expected range*).**

- The *actual range*, also referred to as observed values, was obtained from the pivot tables.
- The *expected range* was calculated as follows: Sum of the row totals (Rt) * Sum of the column total (Ct) / Sum of the row and column (RC) ***[(∑Rt*∑Ct) / (∑RC)].***
- The *degrees of freedom (df)* were determined by calculating the number of rows (R) minus 1, multiplied by the number of columns (C) minus 1 ***[(R-1) *(C-1)].***

To determine the corresponding alpha value ($x^2$), the formula ***CHISQ.INV.RT (p-value * df)*** were used. With the confidence level set at 95%, with $alpha = 0.05$, a $p\text{-}value\ of < 0.05$ indicated a significant difference, whereas a $p\text{-}value\ of < 0.01$ was indicative of a highly significant difference between the respective respondent categories. Figure 3-4 is an excerpt from the Excel spreadsheet used to calculate the *p-value* using the Chi-square test method.

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| Correct method to discard packaging material | | | |
|---|---|---|---|
| | | | |
| **Observed value** | | | |
| Waste disposal methods | Private Sector | Public sector | Grand Total |
| Other | 3 | 7 | 10 |
| Red bag | | 3 | 3 |
| Sharps container | 25 | 18 | 43 |
| Municipality | 93 | 48 | 141 |
| Grand Total | 121 | 76 | 197 |
| **Expected value** | | | |
| Waste disposal methods | Private Sector | Public sector | Grand Total |
| Other | 6.14213198 | 3.85786802 | 10 |
| Red bag | 1.842639594 | 1.157360406 | 3 |
| Sharps container | 26.41116751 | 16.58883249 | 43 |
| Municipality | 86.60406091 | 54.39593909 | 141 |
| Grand Total | 121 | 121 | 242 |
| $x^2$ (Corresponding α value) | 8.520124303 | | |
| df = (Nr of coulmns -1) * (Number of rows -1) | 3 | | |
| p = | 0.04 | | |
| α | 0.05 | | |
| Private sector | 77% | Public sector | 63% |
| **Conclusion** | p < α ; Results is statistically significant. Reject the H0 . Conclude that significantly more dental assistants in the private sector (77%) is familiar with the correct methods to discard packaging material than dental assistants in the public sector (63%) | | |

**Figure 3-4 Excerpt from the Excel spreadsheet used to calculate the *p-value*, using the Chi-square test method.**

### 3.6.5. Presentation of results

The results of the statistical analysis of each item were presented in a table format. Each table reflected the results for the total study population and the respective subgroups to convey a clear picture of the findings (Wilson and Stern, 2001). When approximate equal proportions of responses are obtained, roughly accurately comparisons between the respective respondent categories can be made (Wilson and Stern, 2001). Furthermore, graphs were used to summarise the overall results of the aspects surveyed within the respective IPC themes.

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# Chapter 4

# Questionnaire construction and validation

## 4.1. Introduction

In research, questionnaires prove to be a popular measuring tool. (Comín Bertrán, 1990). Several studies about infection prevention and control (IPC) within the oral health environment were published (Dagher *et al.*, 2017). These studies included knowledge, attitude and practices (KAP) related to infection prevention and control within the OHCFs and other health care fields (Halboub, *et al.*, 2015; Mohiuddin and Dawani, 2015; Ibrahim and Elshafie, 2016; Alharbi *et al.*, 2019). Furthermore, some studies focused only on a single KAP domain within a particular aspect of infection prevention and control, such as instrument sterilisation (Laneve *et al.*, 2019); knowledge and use of autoclaves (Banks *et al.*, 1994); knowledge of hand hygiene (Gore and Saxena, 2018), and challenges of HCRW management (Kumar *et al.*, 2015); use of personal protective equipment (Mew, 2015; Javaid *et al.*, 2019); and attitudes towards the influenza vaccination (Wicker *et al.*, 2012); needlestick injuries (Pavithran *et al.*, 2015)

However, for this study, a standardised, validated questionnaire that included all the IPC themes and addressed all the aims and objectives of this research could not be identified. Therefore, a modified research tool was constructed to measure the IPC-KAP of dental assistants working within South-African oral health care facilities (Appendix E).

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## 4.2. Questionnaire construction

The construction of the questionnaire requires that an array of aspects be considered (Murray, 1999; Frary, 2002; Brancato *et al.*, 2004; Rattray and Jones, 2007; Al-lela *et al.*, 2011; Hiew *et al.*, 2015; Singh, 2017; Tsang *et al.*, 2017)The initial framework for the questionnaire was constructed by identifying IPC themes. For each selected IPC theme, specific aspects of the Knowledge-, Attitude- and Practice- domains were selected. Items and response options to items aligned with the respective IPC themes and KAP domains were added. Some items from previously published questionnaires were used as-is. In addition, modifications were made to existing items, and new items were constructed to address the aims and objectives of this research project. Several draft questionnaires were built and later refined to form the final questionnaire.

### 4.2.1. IPC themes in the questionnaire

The fundamental elements of infection prevention and control were referred to as IPC themes. In total, seven IPC themes emerged from the literature (Kohli *et al*., 2003; Department of Health_RSA, 2007; WHO, 2008; Oosthuysen, *et al*., 2010; Oosthuysen, 2015; Pandit *et al*., 2015; Pavithran *et al.*, 2015; Thakker and Jadhav, 2015; CDC, 2016b; Ranjan *et al.*, 2016), formed the basis of the questionnaire (Table 4-1).

**Table 4-1 IPC themes selected for the study**

| IPC themes | Description |
|---|---|
| 1. IPC training and continuous professional development (CPD) | IPC training and ongoing professional development events enhance IPC KAP, such as seminars or workshops, both formally and informally. |
| 2. Infectious diseases and risks | Infectious diseases threaten the public and risk transmission when oral health treatment is rendered. |

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| IPC themes | Description |
|---|---|
| 3. Disinfection and sterilisation | The care of instruments and equipment used during the rendering of OHC treatment and surfaces in the OHCFs. |
| 4. Vaccination | The vaccinations are necessary for OHC workers to have immunity against contagious diseases. |
| 5. Hand hygiene | The reduction of the bacterial count on hands, looking at the frequency and methods of handwashing and additional forms of hand sanitation. |
| 6. Personal protective equipment (PPE) | The use of gloves, masks, eyewear and protective clothing during patient treatment. |
| 7. Health care related waste (HCRW) management | The types of waste generated in the OHCFs, and the correct disposal method thereof. |

### 4.2.2. Sections in the questionnaire

Different sections within the draft questionnaire were allocated to elicit specific information. The draft questionnaire consisted of ten sections. Separate sections were assigned to encompass each of the seven IPC themes in the draft questionnaire. In addition to these, three other sections were incorporated into the questionnaire. These sections addressed aspects concerning the demographic details of respondents, the IPC duties that dental assistants are expected to perform and possible barriers to efficient IPC measures. (Table 4-2).

**Table 4-2 Sections in the draft questionnaire**

| Section number | Section names |
|---|---|
| 1. | Demographics |
| 2. | IPC training and continuous professional development (CPD) |
| 3. | Infectious diseases and risks |
| 4. | Disinfection and sterilisation |
| 5. | IPC duties |
| 6. | Vaccination |
| 7. | Handwashing |

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| Section number | Section names |
|---|---|
| 8. | Personal protective equipment (PPE) |
| 9. | Health care related waste (HCRW) management |
| 10. | Barriers to effective IPC practices |

### 4.2.3. KAP-aspects within IPC themes

The objective of this study was to probe dental assistants' knowledge about IPC, their attitude towards IPC and their IPC practices. Even though seven specific IPC themes were identified, each IPC Theme covers multiple aspects. Therefore, aspects represented the knowledge, attitude, and practice (KAP) domains within the respective IPC themes.4.2.3.1 Knowledge aspects across IPC themes

Specific knowledge aspects (KAs) are addressed in the different IPC themes. Across the respective IPC themes, 14 knowledge aspects were addressed. Table 4-3 outlines the KAs within the respective IPC themes.

**Table 4-3 Knowledge aspects across IPC themes**

| IPC theme | Knowledge aspects |
|---|---|
| 1. IPC training and continuous professional development (CPD) | 1. Perceived IPC knowledge level<br>2. IPC information sources<br>3. IPC guidelines |
| 2. Infectious diseases and risks | 4. Risk for diseases to be transmitted within OHCFs<br>5. Types of micro-organisms that can be transmitted within OHCFs<br>6. Modes of disease transmission<br>7. Occupational exposure injuries |
| 3. Disinfection and sterilisation | 8. Difference between disinfection and sterilisation<br>9. Differentiation between critical and non-critical instruments |
| 4. Vaccination | 10. Vaccination needed by OHCW |
| 5. Hand hygiene | 11. The prevention of transmission of diseases to others through hand hygiene |
| 6. Personal protective equipment (PPE) | 12. Appropriate use of PPE |

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| IPC theme | Knowledge aspects |
|---|---|
| 7. Health care related waste (HCRW) management | 13. Difference between domestic (household) waste and health care related waste (HCRW)<br>14. Correct waste disposal methods. |

#### 4.2.3.2 Attitude aspects across IPC themes

Specific aspects of dental assistants' attitudes towards IPC measures were included in the different IPC themes. Across the respective IPC themes, 19 attitude aspects (AAs) were addressed. Table 4-4 outlines the different AAs within the respective IPC themes.

**Table 4-4 Attitude aspects across IPC themes**

| IPC theme | Attitude aspects |
|---|---|
| 1. IPC training and continuous professional development (CPD) | 1. IPC training opportunities within OHCFs<br>2. IPC training opportunities outside OHCFs |
| 2. Infectious diseases and risks | 3. IPC routine when working on a patient with a known infectious disease<br>4. Possibility for diseases transmission within OHCF<br>5. Comfortability with IPC practices when assisting a patient with a known infectious disease<br>6. Standard IPC precautions<br>7. A team effort with IPC activities within OHCF<br>8. Priority of IPC activities in the OHCF<br>9. Confidence in the IPC measures applied to prevent the transmission of diseases within the OHCF |
| 3. Disinfection and sterilisation | 10. Disinfection of items<br>11. Actions required as part of instrument sterilisation routine |
| 4. Vaccination | 12. Vaccination needed by OHCW |
| 5. Hand hygiene | 13. Importance of hand-hygiene<br>14. Factors that influence effective hand hygiene |
| 6. Personal protective equipment (PPE) | 15. Use of PPE in general<br>16. Reasons that kept you from wearing full PPE |
| 7. Health care related waste (HCRW) management | 17. HCRW separation<br>18. Potential of HCRW to spread disease |

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| IPC theme | Attitude aspects |
|---|---|
| | 19. Risk of inadequate HCRW management<br>20. HCRW training needs |

#### 4.2.3.3 Practice aspects across IPC themes

Specific aspects of dental assistants' IPC practices across the different IPC themes were surveyed. Across the respective IPC themes, 19 practice aspects (PAs) were addressed. Table 4-5 outlines the different PAs within the respective IPC themes.

**Table 4-5 Practice aspects across IPC themes**

| IPC theme | Practice aspects |
|---|---|
| 1. IPC training and continuous professional development (CPD) | 1. IPC training received<br>2. Last attendance of a CPD event<br>3. Factors that influence the attendance of CPD events |
| 2. Infectious diseases and risks | 4. Worked on a patient with a known infectious disease<br>5. Occupational exposure incident (OEI) experienced |
| 3. Disinfection and sterilisation | 6. Actions performed as part of instrument sterilisation routine<br>7. Type of sterilisation device used<br>8. Use of cold or chemical sterilisation<br>9. Dental handpiece sterilisation routine |
| 4. Vaccination | 10. Hepatitis B vaccination |
| 5. Hand hygiene | 11. Handwashing practices<br>12. Type of soap used for handwashing<br>13. Supplementation of hand hygiene routine with an alcohol-based gel or sanitiser spray<br>14. Hand drying methods<br>15. Availability of a handwashing poster that shows how to wash hands correctly |
| 6. Personal protective equipment (PPE) | 16. The use of gloves<br>17. The use of masks<br>18. The use of protective eyewear |

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| IPC theme | Practice aspects |
|---|---|
| | 19. The use of protective clothing<br>20. Glove replacement practices |
| 7. Health care related waste (HCRW) management | 21. Health care related waste (HCRW) management |
| 8. Barriers to effective IPC practices | 22. Barriers to effective IPC |

### 4.2.4. Draft questionnaire

#### 4.2.4.1 Types of questions used in the questionnaire

The types of questions depended on the standardisation of the items and the simplicity of performing statistical analysis on the information obtained from the questionnaire (Singh, 2017). The use of open-ended items to which there is no pre-defined answer was minimised. Mostly close-ended items with pre-determined answers from which the respondent chose were used. Based on the response format of the questions, the types of closed-ended questions used in the questionnaire included categorical, numerical, ordinal ranking and Likert-type items (Who, 2008). Different types of questions, further referred to as items, were used in the draft questionnaire.

#### 4.2.4.2 Response options to items

The response options to the items probing the knowledge, attitude and practice domains varied. Response options to items within the knowledge domain were: Yes, No or Not sure. For the items within the attitude domain, a 5-point Likert-type response rating of Strongly disagree, Disagree, Neutral, Agree and Strongly agree was applied. The response options to items in the Practice domain were either in a Yes, No, Not sure option or a four-point Likert type scale of Always, Often, Seldom or Never. In some items, respondents chose from a list of options provided. In contrast, other items

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required respondents to rank the options provided or arrange the listed options in the correct order. Respondents were also requested to complete information in the open-ended items.

#### 4.2.4.3 Number of items per KAP-domains within IPC themes

The first draft of the questionnaire consisted of 253 items. Of the total items, ten items surveyed the respondents' demographics, 39 items surveyed IPC duties, and ten items investigated barriers to IPC measures. Furthermore, 194 items resorted under the knowledge, attitude and practice domains (KAP-domains). Of these items, 52 items surveyed the Knowledge domain, 56 items surveyed the Attitude domain, and 86 items surveyed the Practice domain (Table 4-6).

**Table 4-6 Summary of the number of items in the draft - questionnaire**

| Sections of the Draft questionnaire | Nr of items per KAP domain | | | Grand Total |
|---|---|---|---|---|
| | K | A | P | |
| 1. Demographics | *N/A* | *N/A* | *N/A* | *10* |
| 2. IPC training and continuous professional development (CPD) | 9 | 4 | 10 | *23* |
| 3. Infectious diseases and risks | 15 | 7 | 19 | *41* |
| 4. Disinfection and sterilisation | 7 | 8 | 22 | *37* |
| 5. IPC duties | *N/A* | *N/A* | *NA* | *39* |
| 6. Vaccination | 4 | 4 | 10 | *18* |
| 7. Handwashing | 3 | 11 | 10 | *24* |
| 8. Personal protective equipment (PPE) | 4 | 15 | 12 | *31* |
| 9. Health care related waste (HCRW) management | 10 | 7 | 3 | *20* |
| 10. Barriers to effective IPC practices | *N/A* | *NA* | *N/A* | *10* |
| **Total items per KAP domain** | 52 | 56 | 86 | *253* |

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## 4.3. Questionnaire validation

The newly constructed draft IPC questionnaire was subjected to a validation process before being used in the main study. The draft questionnaire was administered to a pilot study population of 60 dental assisting students., Following the pilot study, the data obtained from the pilot study was subjected to meticulous statistical testing to assess the questionnaire's validity and reliability. Figure 4-1 illustrates the processes followed to validate the questionnaire.

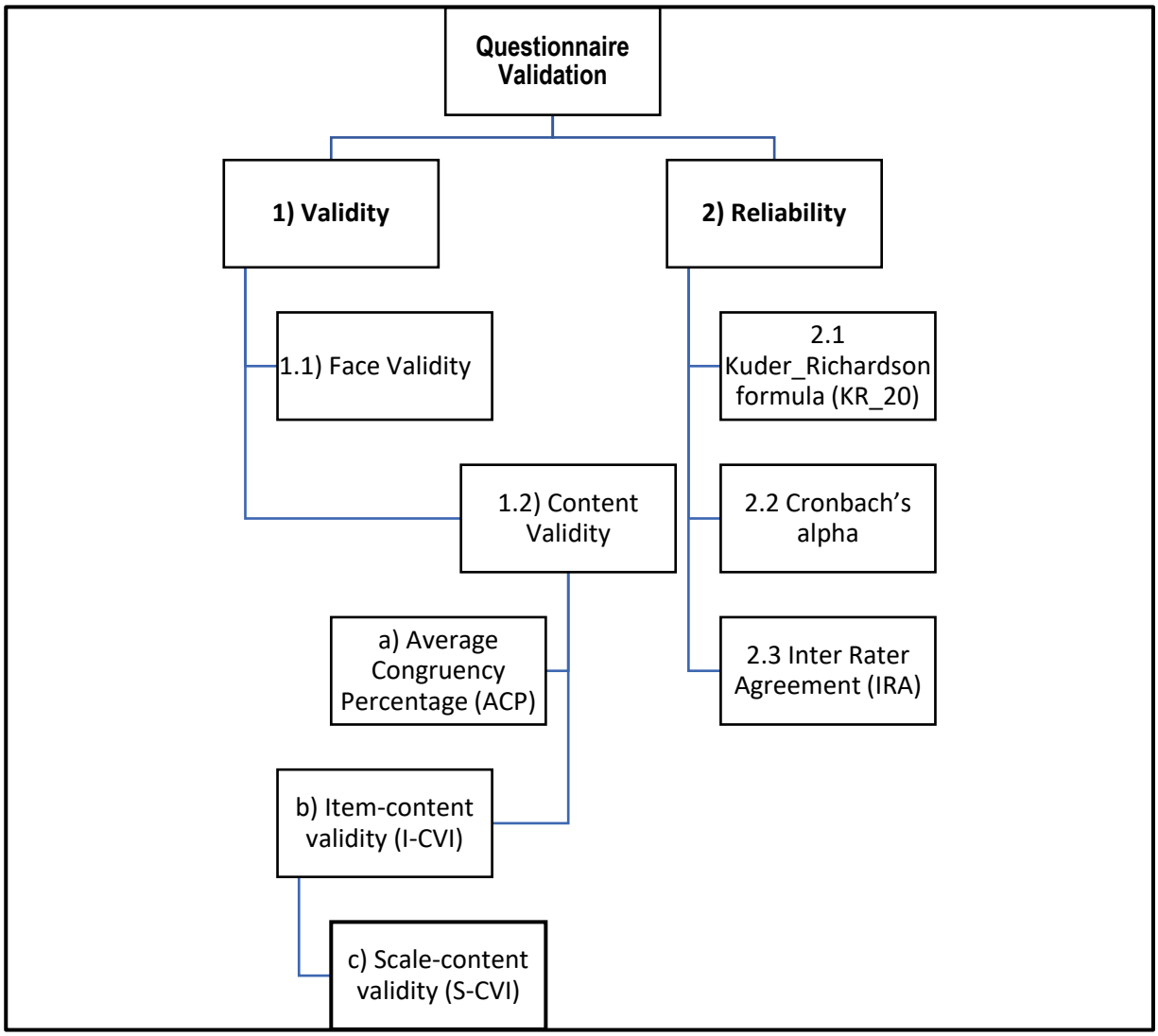



**Figure 4-1 Flowchart of the questionnaire validation process**

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### 4.3.1. Validity

Both subjective and statistical measures were used to determine the validity of this draft questionnaire. First, face validity measured the draft questionnaire on a subjective level. After that, statistical calculations to determine the validity of the draft questionnaire on an objective level were applied (Taherdoost, 2016). These statistical measures included the application of validity indexes such as the Average congruency percentage (ACP), Item content validity index (I-CVI) and Scale-content validity index (S-CVI).

#### 4.3.1.1 Face validity

Face validity is an essential consideration as it considers whether the questionnaire looks professional enough to elicit a serious response (Del Greco, Walop and Mccarthy, 1987). For this purpose, an external panel of OHCWs from the public and private OHC sectors subjectively looks at the draft questionnaire's items. They judged the applicability of the items and the user-friendly layout of the draft questionnaire. They furthermore looked if the items were feasible, readable, consistent in style and format and if clear language was used (Taherdoost, 2016) and indicated the corrections on the questionnaire. Suggestions for improvements (Table 4-14) were incorporated into the final draft of the questionnaire

#### 4.3.1.2 Content validity

Several methods were utilised to measure the content validity of this research instrument. In this research, the methods used to measure the content validity included the Average congruency percentage (ACP)., Item-content validity index (I-CVI) and the Scale content validity index (S-CVI).

The results of the Average congruency percentage (ACP) indicated the relevance of the items in the draft questionnaire. An overall ACP score of 94% was attained (Table 4-7). If the ACP is more than 90%, the questionnaire items could be considered valid (Taherdoost *et al.*, 2016). Based on the ACP

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score, < 10% of the items in the draft questionnaire were indicated as not relevant to the aims and objectives of the research and were deleted from the questionnaire.

**Table 4-7 Average congruency percentage (ACP)**

| Reviewers | Relevance of Items | |
|---|---|---|
| | Relevant (%) | Not relevant (%) |
| 1 | 91 | 9 |
| 2 | 93 | 7 |
| 3 | 97 | 3 |
| 4 | 98 | 2 |
| 5 | 93 | 7 |
| | ***ACP =94%*** | |

4.3.1.2.1 Item-content validity index (I-CVI)

The results of the Item content validity index (I-CVI) indicated the item validity of the draft questionnaire. The average score for the three reviewed elements was above 98% (Table 4-8).

**Table 4-8 Item-content validity (I-CVI)**

| Reviewers | Elements reviewed | | | |
|---|---|---|---|---|
| | Readability | Clarity of wording | Feasibility | |
| | | | Items | Response options |
| 1 | 100 | 100 | 100 | 100 |
| 2 | 94 | 99 | 99 | 99 |
| 3 | 100 | 100 | 100 | 99 |
| *Average* | *98.3* | *99.9* | *99.9* | *99.4* |

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4.3.1.2.2 Scale-content validity index (S-CVI)

Across the ten sections within the draft questionnaire, the percentage ranged between 100% and 51%. As a result, the final S-CVI for the total items in the draft questionnaire was 74%. Overall, across six of the sections in the draft questionnaire, the score was above 74%. Across two sections, the score ranged between 68% and 71%. Furthermore, two of these sections obtained a score below 55% (Table 4-9).

**Table 4-9 Scale-content validity results per section of the draft questionnaire**

| Sections | | Number of Items per section | Number of items shown as relevant | S-CVI (%) |
|---|---|---|---|---|
| 1. | Demographics | 10 | 7 | *70* |
| 2. | IPC duties of dental assistants | 23 | 22 | *95* |
| 3. | IPC training and continuous professional development | 41 | 28 | *68* |
| 4. | Infectious diseases and risks | 37 | 20 | *54* |
| 5. | Disinfection and sterilisation | 39 | 20 | *51* |
| 6. | Vaccination | 18 | 14 | *77* |
| 7. | Hand hygiene | 24 | 20 | *83* |
| 8. | Personal protective equipment (PPE) | 31 | 28 | *90* |
| 9. | Health care related waste (HCRW) management | 20 | 19 | *95* |
| 10. | Barriers to effective IPC | 10 | 10 | *100* |
| | Total | 253 | 188 | *74%* |

## 4.3.2. Reliability

Three different methods were used to evaluate the internal consistency reliability of the instrument. Items within the knowledge domain had only one correct answer. Therefore, the Kuder-Richardson formula 20 (KR-20) was used to test the reliability of those items. The suggested coefficient of 0.6

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was used to guide appropriate reliability for items in the knowledge domain (Hiew *et al.*, 2015; Singh, 2017). Furthermore, a scale-type response rating was applied to items probing attitude and practices. Hence, Cronbach's alpha was used to measure the reliability of items within the Attitude and Practice domains. Cronbach's Alpha values above 0.7 reflect reliable measurements (Duerink *et al.*, 2013). Lastly, the Inter-Rater Reliability (IRA) method was used to determine the overall consistency of the questionnaire.

#### 4.3.2.1 Kuder-Richardson formula 20 (KR-20)

The results of the Kuder-Richardson formula 20 (KR-20) verified the internal consistency reliability of the items within the Knowledge domain. Overall, the KR_20 scores for the knowledge items varied between 0.94 and 0.65 across the different IPC themes. Two IPC themes ranged within 0.9; two IPC themes ranged within 0.8, and another two IPC themes ranged within 0.7. Only one IPC theme scored below 0.7, with 0.65 recorded for the knowledge items in IPC theme 6: Personal protective equipment. (Table 4-10).

**Table 4-10 Internal consistency reliability (KR_20) results of items within the knowledge-domain**

| IPC theme | | K_R 20 score |
|---|---|---|
| 1. | IPC training and CPD | 0.76 |
| 2. | Infectious diseases and risks | 0.9 |
| 3. | Disinfection and sterilisation | 0.78 |
| 4. | Vaccination | 0.94 |
| 5. | Hand hygiene | 0.86 |
| 6. | Personal protective equipment (PPE) | 0.65 |
| 7. | HCRW management | 0.87 |

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#### 4.3.2.2 Cronbach's alpha _ Attitude domain

Overall, the Cronbach's alpha of the items within the attitude domain ranged between 0.99 and 0.86. Cronbach's alpha values of 0.7 or more were considered a significant indication of the internal reliability of the instrument (Cronbach, 1951; Al-lela *et al.*, 2011; James T Croasmun *et al.*, 2011; Gadermann *et al.*,, 2012; Rasouli *et al.*, 2013; Ali Jadoo *et al.*, 2014; Lohit *et al.*, 2016). Across four of the IPC themes, the score was above 0.9. A score of 0.8 was achieved in the remaining three IPC themes (Table 4-11).

**Table 4-11 Results of the Cronbach's alpha for the Attitude items per IPC themes**

| IPC themes | | Cronbach's alpha |
|---|---|---|
| 1. | IPC Training and CPD | 096 |
| 2. | Infectious diseases and risks | 0.86 |
| 3. | Disinfection and sterilisation | 0.88 |
| 4. | IPC duties | 0.88 |
| 5. | Vaccination | 0.94 |
| 6. | Hand hygiene | 0.86 |
| 7. | Personal protective equipment (PPE) | 0.98 |
| 8. | HCRW management | 0.99 |

#### 4.3.2.3 Cronbach's alpha items in the Practice domain

Overall, the Cronbach's alpha of practice items in the respective IPC themes ranged between 0.97 and 0.69 (Table 4-12). Furthermore, the outcome of the tests of Cronbach's alpha with missing items did not indicate any extreme deviations from the overall Cronbach's alpha score. Like the items in the attitude domain, an appropriate Cronbach's alpha value for the internal reliability of the practice items was 0.7. Items below this score was reviewed and adjusted or removed from the draft questionnaire.

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**Table 4-12 Results of the Cronbach's alpha for the Practice items per IPC themes**

| IPC themes | | Cronbach's alpha |
|---|---|---|
| 1. | IPC Training and CPD | 0.84 |
| 2. | Infectious diseases and risks | 0.85 |
| 3. | Disinfection and sterilisation | 0.94 |
| 4. | IPC duties | 0.87 |
| 5. | Vaccination | 0.69 |
| 6. | Hand hygiene | 0.93 |
| 7. | Personal protective equipment (PPE) | 0.97 |
| 8. | HCRW management | 0.83 |

#### 4.3.2.4 Inter-rater agreement (IRA)

The results of the IRA verified the consistency and reliability of the relevance of the items in the questionnaire (Khami, Razeghi and Mirmohammadi, 2016). The conservative approach resulted in an IRA score of 74%, whereas the alternative approach resulted in an IRA score of 91% (Table 4-13). A conservative approach was utilised in this study, and 65 items that the reviewers disagreed with were removed from the draft questionnaire.

**Table 4-13 Inter-rater agreement (IRA) of items at 80% and 100% agreement level**

| **Criteria to evaluate items** [Total items = 253] | **Alternative IRA approach (80% agreement)** | **Conservative approach (100% agreement)** |
|---|---|---|
| Number of items shown as relevant | 230 | 188 |
| Number of items shown as not relevant | 23 | 65 |
| **Inter-rater agreement %** | **91%** | **74%** |

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## 4.4. Changes to the draft of the questionnaire

As a result of testing validity and reliability, changes to the draft questionnaire were inevitable. However, care was taken not to jeopardise the content validity by performing several reviews and using different panels to review the draft at different stages of the construction. The process was repeated until the expected standards for a questionnaire that respondents would readily complete were met (Del Greco, Walop and Mccarthy, 1987). Several suggestions for changes to items and response options were received from these reviews. The changes made to the draft questionnaire included adding new items, modifying items and response options, and deleting items (**Error! R eference source not found.**).

**Table 4-14 Summary of changes made to the draft questionnaire**

| **Suggestions from reviewers**<br>**Addition of:** | **Accommodation of suggestions** |
|---|---|
| ➢ An item to identify if the OHCF is in a rural or urban area | ✓ An item to identify the site where the OHCF is located was added. In addition, two response options were provided, namely: Rural and Urban. |
| ➢ Items regarding chemical/liquid sterilisation | ✓ Three items were added about chemical/liquid sterilisation |
| ➢ Add items about the care of dental handpieces | ✓ Six items relating to dental handpiece care were added. |
| ➢ Add new response options to certain items | ✓ New response options were added to specific items |
| **Modifications** | **Action to accommodate suggestions** |
| ➢ Spit questions to address only one factor | ✓ Separate the question about the type of OHCF and sector working. Two separate questions were created in which one probed the type of working sector namely: Private or Public sector, .and the other that probed the type of practice that respondents were employed at, namely: General or specialist practices. |
| ➢ Rephrase questions to fit in with the specific KAP domain intended to be measured. | ✓ Items rephrased to fit in with specific KAP domain measured. |

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| **Suggestions from reviewers** | |
|---|---|
| ➢ Modify response options to fit in with the KAP domain. | ✓ Response options were modified to fit in with the KAP domain measured. |
| ➢ Modify response options to fit in with the KAP domain. | ✓ Typical response option for knowledge items were Yes, No or Not sure; a 5-point Likert type scale to indicate level of agreement for attitude items, and for practice items the typical response option was also a 5point Likert scale from Never to Always |
| | ✓ Items combined as indicated by reviewers. |
| ➢ Combine questions about occupational injury experienced. | ✓ Deleted the option to specify "other" and provided a comprehensive list to respond to. |
| ➢ Modify options to write in "other" and instead provide a complete list of options from which respondents can choose | ✓ Unfamiliar words in items were changed to terms that are more familiar among the study population |
| ➢ Modify the wording of certain items by using words that are familiar to the respondent | |
| **Deletions** | **Action to accommodate suggestions** |
| ➢ Remove items that are not aligned with the research's aims and objective.<br>➢ Remove jargon and slang used in items and response options.<br>➢ Remove the question about language.<br>➢ Remove items that might introduce biases.<br>➢ Remove items about concepts that may be strange to respondents.<br>➢ Remove questions that could alienate the respondents.<br>➢ Unless necessary, remove options to indicate "other" in response options<br>. | The following were deleted:<br>✓ Items that were not in alignment with the research aims and objective were deleted.<br>✓ Jargon and slang used in items were deleted.<br>✓ Item to indicate language proficiency was deleted.<br>✓ items that might introduce bias were deleted.<br>✓ Items about concepts that might be strange to the respondents were deleted.<br>✓ Items that might alienate respondents were deleted<br>✓ Options to indicate "other" was deleted in several items and were only retained in items where necessary<br>. |

The final questionnaire still consisted of seven IPC themes. However, modifications resulting from the validity and reliability processes led to changes in the number of aspects and items within the respective KAP domains. The number of aspects has decreased in the Knowledge domain. In contrast, the number of aspects in the Attitude and Practice domains increased, increasing from 56

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to 64 KAP aspects in the final questionnaire. However, apart from items in the Attitude domain, where the numbers have increased, the total number of items in the final questionnaire has decreased from 194 to 169 items (Table 4-15).

**Table 4-15 Comparison between the draft and final questionnaire in terms of the total KAP aspects and items**

| ***Number of Aspects per KAP domain*** | **Draft Questionnaire** | **Final Questionnaire** |
|---|---|---|
| Knowledge | 14 | 11 |
| Attitude | 20 | 28 |
| Practices | 22 | 25 |
| Total | 56 | 64 |
| ***Number of Items per KAP domain*** | **Draft Questionnaire** | **Final Questionnaire** |
| Knowledge | 52 | 50 |
| Attitude | 56 | 59 |
| Practices | 86 | 60 |
| Total | 194 | 169 |

## 4.5. Conclusion

The literature review about dental assistants' knowledge, attitude, and practices of IPC in OHCFs did not yield a standardised tool that comprehensively addresses the aims and objectives of this research. Therefore, it was necessary to further consult with study leaders and experts in the OHC and IPC arenas to discuss the need to construct and validate a distinct instrument. In this case, a questionnaire was constructed to survey dental assistants' KAP across a group of IPC themes.

The construction of the IPC-KAP questionnaire required the researcher to stand on the shoulders of giants. The researcher relied on the experience and expertise of other researchers who previously used questionnaires and were involved in the construction thereof. Furthermore, the panel reviewers' reports were also incorporated to form the final questionnaire. Statistical analysis was performed on the data obtained from the participants in the pilot study. These processes aided in confirming the validity and reliability of the newly constructed IPC questionnaire

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# Chapter 5

# Participant Demographics and IPC-Duties

## 5.1. Introduction

The demographic information reflects the characteristics of this study population. Graphs were used to illustrate the respondents' data about the working sector, training type, gender, age, type of OHCF, the location of the OHCF and the number of years working as a dental assistant. The prominent independent variables used for comparison purposes related to the working sectors and the training types of the respondents.

During a typical day in an OHCF, dental assistants are often responsible for performing infection prevention and control duties. Hence, this chapter also reports how often dental assistants are responsible for performing the 15 identified IPC related tasks. In addition, comparisons were made between dental assistants employed within the different working sectors and with varying types of training. Results are expressed in percentages and presented in table format.

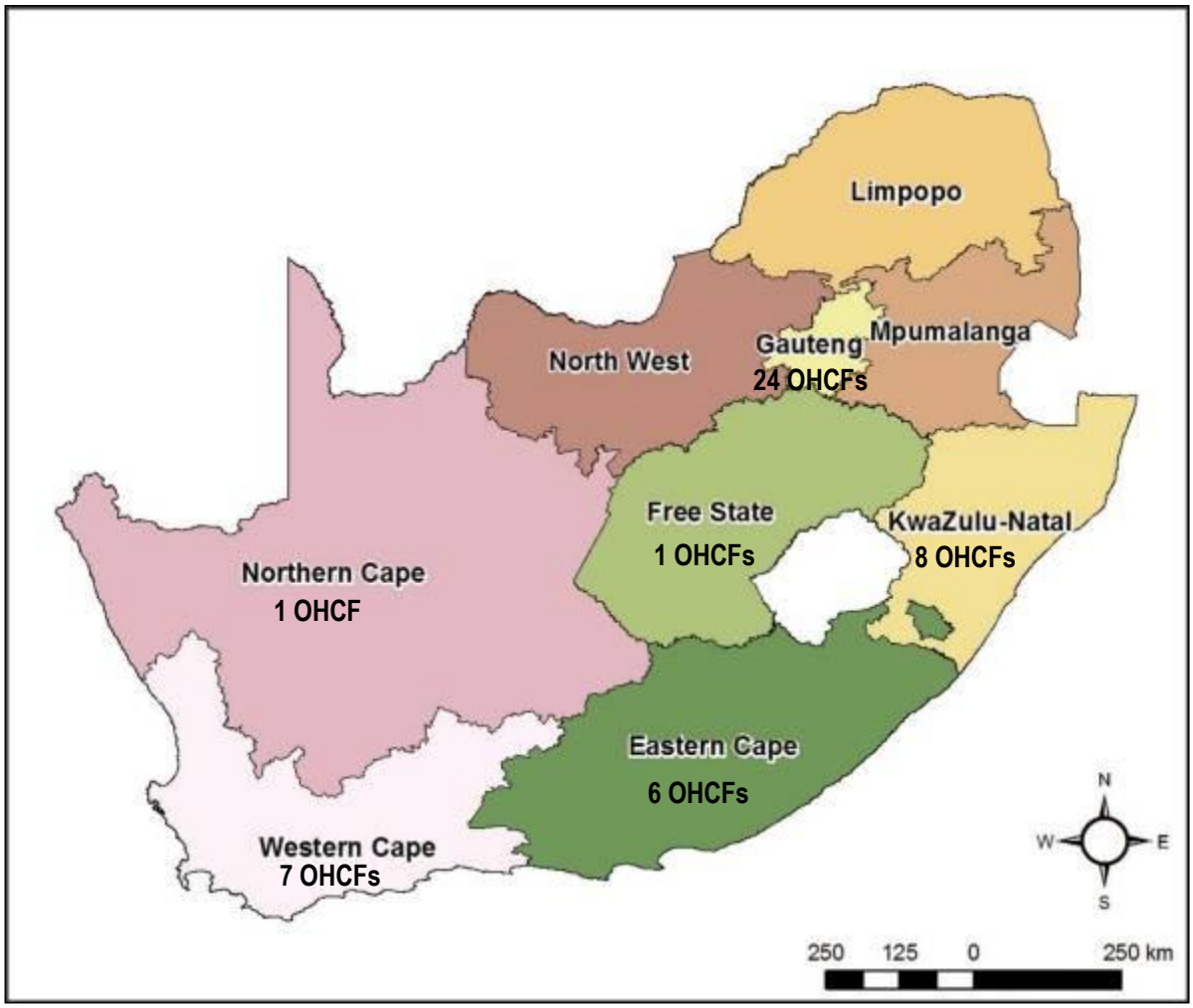
## 5.2. Working sectors

The total respondents (n=197) were categorised according to the sector where participants were employed when the study was conducted. Dental assistants from both the Public and the Private sectors participated in the study. Of the total participants, 61% (n=121) were employed in the private sector, whereas 39% (n=76) were employed in the public sector.

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### 5.2.1. Private Sector

The private sector refers to dental assistants employed by private OHC service providers who resort under Netcare / Medicross. The 52 OHCFs within this group were spread across six out of the nine provinces within South-Africa. A total of 121 dental assistants from 47 out of the 52 (90%) OHCFs completed and returned the questionnaires. Figure 5-1 provide an overview of where the private OHCFs were situated across the provinces in South-Africa: Western Cape = 7; Eastern Cape = 6; Free State = 1; Northern Cape = 1; Gauteng =24 and Kwa Zulu Natal (KZN) = 8.




*OHCFs = Oral health care facilities*

**Figure 5-1 Distribution of the private group of OHCFs across provinces within South-Africa**

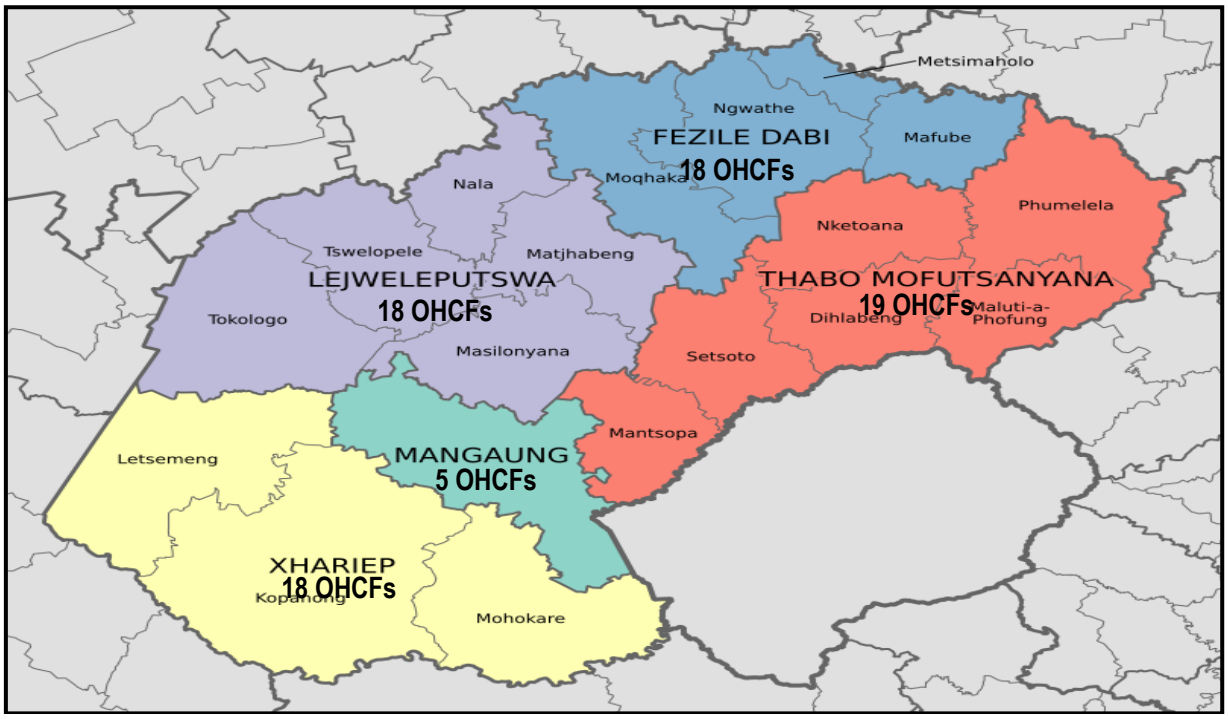
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### 5.2.2. Public Sector

The public sector referred to dental assistants employed by the Free State Department of Health (FSDoH). A total of 76 questionnaires were received from participants who were employed in the public sector at the time of the study. Respondents from the public sector formed 39% of the total participants.

The Free State is divided into one metropolitan municipality (Mangaung Metropolitan Municipality) and four district municipalities (The Free State | Free State Online, website). The four districts are further subdivided into 18 local municipalities. Overall, 85 dental clinics resort under the local municipalities within the different districts of the Free State Province (Figure 5-2)

However, many clinics in the rural areas are not operational daily because the clinics do not have permanently based OHWs. In these cases, OHCWs from dental clinics in the urban areas service the rural dental clinics on a rotational basis.



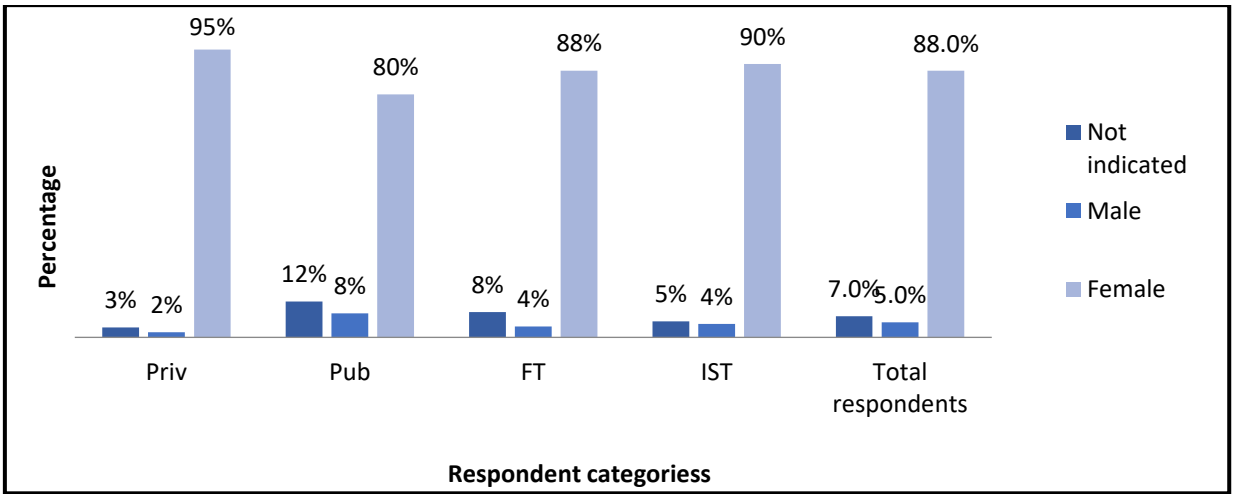

*OHCFs = Oral health care facilities*

**Figure 5-2 Distribution of public oral health care facilities across the five districts within the Free State province**

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## 5.3. Gender

It is generally found that more female dental assistants are employed in OHCFs. This research confirmed that notion, as 88% of respondents who participated in this study were female. Only 5% indicated their gender as male. However, 7% of the total respondents did not reveal their gender. In the respective working sectors, 2% of respondents in the private sector were males versus 8% of male respondents in the public sector. Of the male respondents, 4% were IST and 4% were FT dental assistants (Figure 5-3).




*Priv = Private sector; Pub = Public sector; FT = Formally trained; IST = In-service trained*

**Figure 5-3 Gender of responddents within different employment sectors and with different training types.**

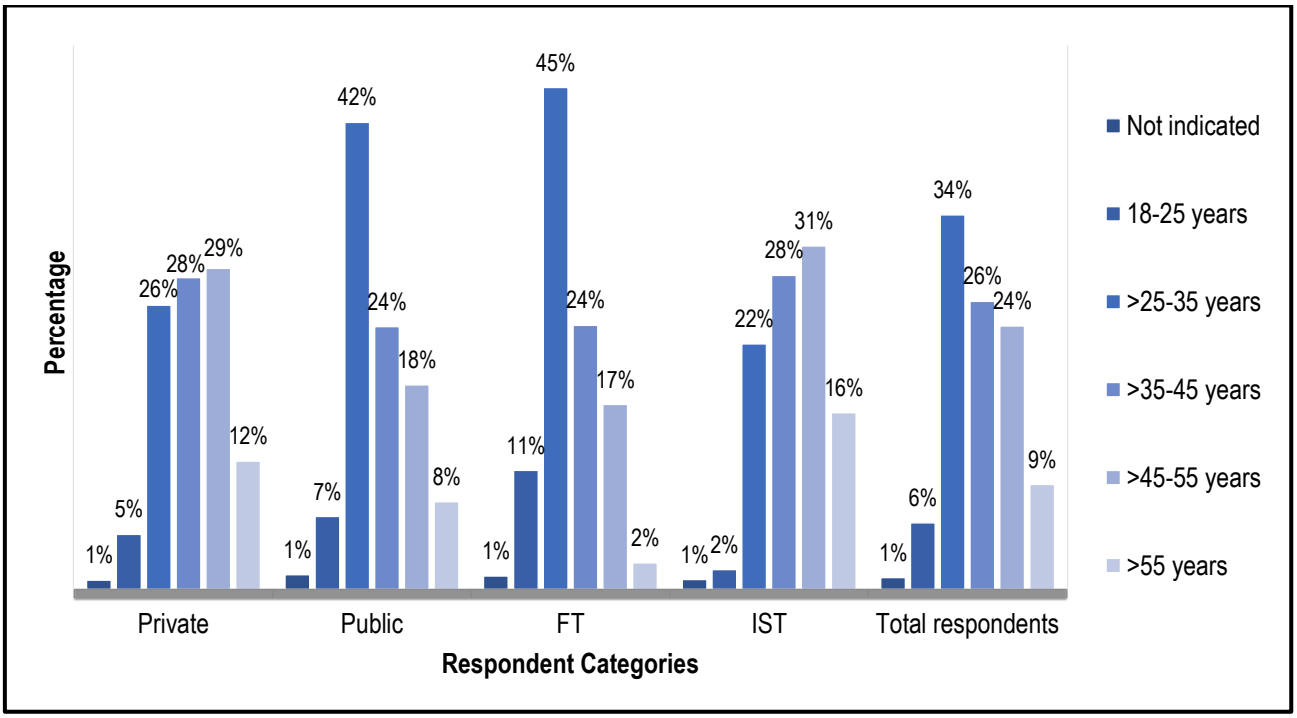
## 5.4. Training types

The total respondents (n=197) were also categorised according to the type of dental assistant training received. IST dental assistants referred to dental assistants trained by the dentists in their private capacity within their OHCFs. FT dental assistants referred to dental assistants who were formally trained and in possession of a dental assisting qualification from one of the accredited dental assistant training providers. Of the total respondents 73% (n= 113) were IST, whereas 27% (n= 83) were FT. Within the Private sector, 62% (n=75) IST and 38% (n=46) FT dental assistants participated in the study. An equal number (n=38) of FT and IST dental assistants within the public sector participated in the study

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## 5.5. Age

The age of the respondents was grouped into five categories. Of the total respondents, 34% were between 25 and 35 years old. Furthermore, an almost similar percentage of the total respondents were between 35 and 45 years and between 45 and 55 years, with 26 % and 24% in the respective age groups. However, this pattern differed across the separate respondent categories. Within the private sector, an almost equal percentage of respondents were between 25 to 35 years (26%), 35 to 45 years (28%), and 45 to 55yrs (29%). Within the public sector, most respondents (42%) were between 25 and 35 years, and 8 % were older than 55years. Similarly, within the FT respondent category, 45% of respondents were between 25 and 35 years old. Only 2% were older than 55years. In contrast, only 22% of IST respondents were 35 years old. Furthermore, 31% of IST respondents were between 45 and 55 years, and 17% were older than 55 years (Figure 5-4).



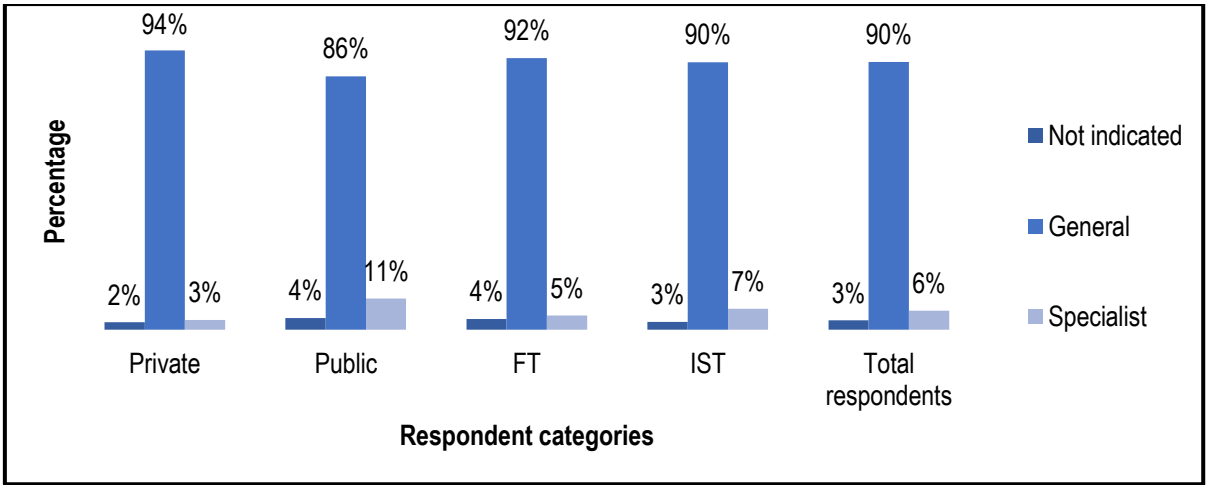

*FT = Formally trained; IST = In-service trained*

**Figure 5-4 Age group of respondents within the different employment sectors and training types**

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## 5.6. Type of oral health care services rendered at the facilities

Differentiation was made between the type of oral health services provided at the OHCFs where the participants were employed, namely general oral health services and specialist services. The specialist practices specialise in specific services, such as orthodontics, maxillo-facial, prosthodontics and endodontics. Of the respondents who participated in this study, 90% were employed at OHCFs, where general oral health services were offered. On the other hand, only 6% of the total respondents worked at specialist practices. However, 11% of public sector participants and 7% of IST participants worked in specialist practices (Figure 5-5).




*FT = Formally trained; IST = In-service trained*

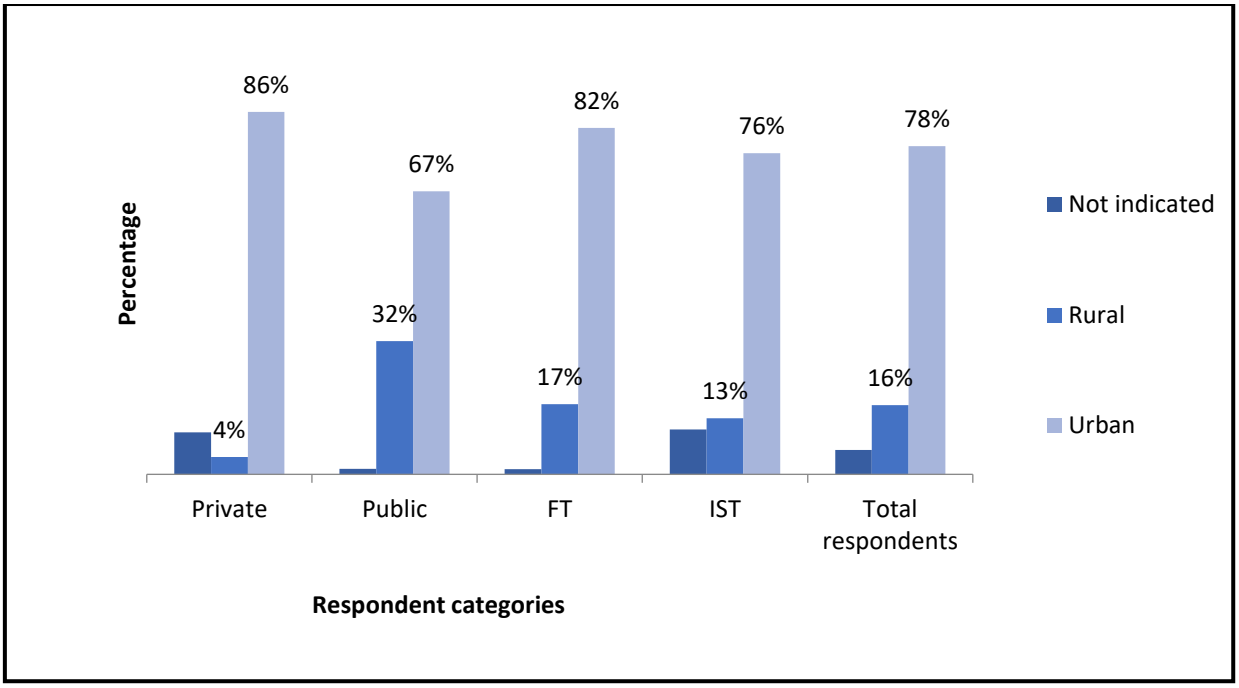
**Figure 5-5 The type of oral health care facility that respondents are employed at**

## 5.7. Location of oral health care facility

The location of the OHCFs was grouped as rural or urban areas. Across all the respondent categories, 78% of the OHCFs were situated in urban areas. However, 86% of the private OHCFs, versus 67% of the public OHCFs, were in urban areas. Furthermore, 32% of respondents in the public sector versus 4% of

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respondents in the private sector worked in OHCFs in rural areas. Additionally, 17% of FT respondents and 13% of IST respondents worked in rural areas (Figure 5-6).



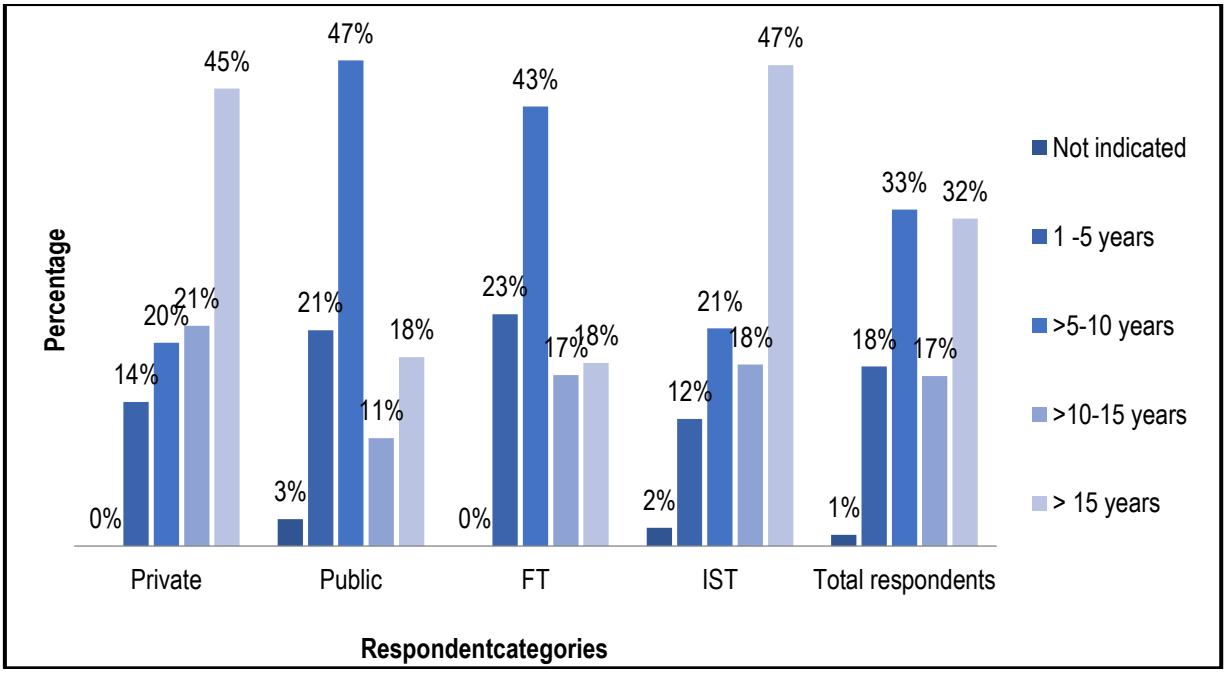

*FT = Formally trained respondents; IST = In-service trained respondents*

**Figure 5-6 Distribution of respondents according to the location of the OHCF`**

## 5.8. Years working

Overall, four categories of working years were created. A relatively high percentage of the total population was representative of two distinct classes of work experience. Of the total population, 32% had more than 15 years of working experience, and 33% had five to ten years of work experience. However, this pattern differed within the respective respondent categories. A total of 45% of respondents employed in the Private sector worked more than 15 years, whereas 47% of participants from the public sector worked between five to 10 years. Furthermore, 47% of IST respondents worked for more than 15 years, whereas 43% of the FT respondents had 5 - 10 years of work experience (Figure 5-7).

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*FT = Formally trained respondents; IST = In-service trained respondents*

**Figure 5-7 Distribution of respondents according to number of years working in an OHCF**

## 5.9. IPC duties of dental assistants

Dental assistants often perform a vast range of duties within OHCFs. These duties range from clinical services to practice management functions. For this study, the focus was on clinical responsibilities related to infection prevention and control aspects. Since the possible IPC tasks can be extensive, a list of 15 IPC duties was selected. Using a four-point Likert-type scale of Neve, Seldom, Often and Always, respondents indicated how frequently they were responsible for performing these duties. Furthermore, at $alpha = 0.05$, the Chi-square tests results determined if statistically significant differences existed between respondents employed in the private sector versus respondents employed in the public sector and between FT respondents versus IST respondents. The results of the total respondent group and the individual respondent categories are expressed in percentages within the tables.

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### 5.9.1. Preparation of clinical area

A high percentage of the respondents indicated that they are responsible for preparing the clinical area before any dental procedure. Across the total population, 94% (n=186 /197) of the respondents indicated that they are always responsible for performing this duty. A similar pattern occurred across the respective respondent categories. The Chi-square test results did not show statistically significant differences between respondent categories concerning their responsibility to prepare the clinical area before the dental procedure (Table 5-1).

**Table 5-1: Prepare the clinical area**

| Respondent categories | Percentage per response option | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|
| | Never | Seldom | Often | Always | Not indicated | | | |
| Private sector (n=121) | 2 | 1 | 2 | 95 | 1 | 3.91 | 0.53 | *0.72* |
| Public sector (n=76) | 0 | 4 | 12 | 83 | 1 | 3.86 | 0.85 | |
| Formally trained (n=84) | 1 | 2 | 7 | 89 | 0 | 3.87 | 0.64 | *0.69* |
| In-service trained (n= 113) | 1 | 2 | 4 | 91 | 2 | 3.9 | 0.48 | |
| ***Total population (n=197)*** | *1* | *2* | *6* | *90* | *1* | *3.89* | *0.55* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

### 5.9.2. Disinfection of surfaces within the clinical area

Across the total population, 90% indicated that they are always responsible for disinfecting the working surfaces in the clinical area. A similar pattern was observed between respondents with different training types. However, differences occurred between respondents employed in the respective sectors. At $p<0.01$, the Chi-square test results confirmed that significantly more respondents in the private sector are always responsible for disinfecting the working surfaces between patients (Table 5-2).

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**Table 5-2 Disinfect working surfaces between patients**

| Respondent categories | Percentage per response option | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|
| | Never | Seldom | Often | Always | Not indicated | | | |
| Private sector (n=121) | 0 | 0 | 1 | 99 | 0 | 3.99 | 0.09 | **<0.01 |
| Public sector (n=76) | 0 | 5 | 8 | 87 | 0 | 3.82 | 0.51 | |
| Formally trained (n=84) | 0 | 5 | 5 | 90 | 0 | 3.86 | 0.47 | *0.14* |
| In-service trained (n= 113) | 0 | 5 | 8 | 87 | 0 | 3.97 | 0.16 | |
| ***Total population (n=197)*** | *0* | *4* | *6* | *90* | *0* | *3.92* | *0.33* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

### 5.9.3. Flush the waterlines between patients

An average of 66% of the total respondents indicated that they are responsible for flushing the waterlines between patients. Less than 5% of the total respondents indicated that they seldom or never are responsible for flushing the waterlines (Table 5-3). However, the Chi-square test results confirmed that significantly more FT respondents indicated that they are always responsible for flushing waterlines between patients (p<0.01).

**Table 5-3 Flush the waterlines between patients**

| Respondent categories | Percentage per response option | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|
| | Never | Seldom | Often | Always | Not indicated | | | |
| Private sector (n=121) | 0 | 2 | 22 | 69 | 6 | 3.49 | 1.0 | *0.27* |
| Public sector (n=76) | 3 | 7 | 20 | 62 | 9 | 3.22 | 1.26 | |
| Formally trained (n=84) | 0 | 7 | 30 | 61 | 2 | 3.64 | 0.83 | **<0.01 |
| In-service trained (n= 113) | 2 | 2 | 15 | 71 | 11 | 3.34 | 1.29 | |
| ***Total population (n=197)*** | *2* | *4* | *22* | *66* | *6* | *3.39* | *1.1* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

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### 5.9.4. Change 3-in-1 tips after every patient

Across the total population, 70% indicated that they are always responsible for changing the 3-in-1-tips after every patient. A similar percentage occurred across the respective respondent categories. The Chi-square test results did not indicate statistically significant differences between the respondent categories concerning their responsibility for changing the 3-in-1 tips after patients (Table 5-4).

**Table 5-4 Change the 3-in-1 tips after every patient**

| Respondent categories | Percentage per response option | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|
| | Never | Seldom | Often | Always | Not indicated | | | |
| Private sector (n=121) | 11 | 3 | 12 | 69 | 4 | 3.32 | 1.2 | *0.28* |
| Public sector (n=76) | 7 | 9 | 13 | 70 | 1 | 3.43 | 1 | |
| Formally trained (n=84) | 14 | 6 | 13 | 67 | 0 | 3.32 | 1.1 | *0.17* |
| In-service trained (n= 113) | 5 | 5 | 12 | 72 | 5 | 3.4 | 1.15 | |
| ***Total population (n=197)*** | *9* | *6* | *12* | *70* | *3* | *3.37* | *1.12* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

### 5.9.5. Suction tips

Of the total respondents, 99% (n=195) reported consistently being responsible for replacing the suction tips after every patient. Respondents indicated a similar percentage across the respective categories. The Chi-square test results did not show statistically significant differences between the respondent categories regarding their responsibility to replace suction tips after every patient. (Table 5-5).

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**Table 5-5 Change suction tips after each patient**

| Respondent categories | Percentage per response option | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|
| | Never | Seldom | Often | Always | Not indicated | | | |
| Private sector (n=121) | 1 | 0 | 1 | 98 | 0 | 3.97 | 0.29 | *0.78* |
| Public sector (n=76) | 0 | 0 | 0 | 100 | 0 | 4 | 0 | |
| Formally trained (n=84) | 1 | 0 | 1 | 98 | 0 | 3.95 | 0.34 | *0.57* |
| In-service trained (n= 113) | 0 | 0 | 0 | 100 | 0 | 4 | 0 | |
| ***Total population (n=197)*** | *1* | *0* | *1* | *98* | *0* | *3.98* | *0.22* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

### 5.9.6. Set out the appropriate instruments for dental procedure

Of the total respondents, 95% indicated that they are responsible for setting out the appropriate instruments for the dental procedure. Respondents across all categories reported a similar percentage. At $alpha=0.5$, the Chi-square test results did not indicate any statistically significant differences between respondent categories concerning their responsibility to set out the appropriate instruments for the dental procedure (Table 5-6).

**Table 5-6 Set out the appropriate instruments for dental procedure**

| Respondent categories | Percentage per response option | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|
| | Never | Seldom | Often | Always | Not indicated | | | |
| Private sector (n=121) | 0 | 0 | 2 | 98 | 0 | 3.98 | 0.16 | *0.26* |
| Public sector (n=76) | 0 | 3 | 5 | 92 | 0 | 3.89 | 0.39 | |
| Formally trained (n=84) | 0 | 1 | 6 | 93 | 0 | 3.92 | 0.32 | *0.21* |
| In-service trained (n= 113) | 0 | 1 | 2 | 97 | 0 | 3.96 | 0.23 | |
| ***Total population (n=197)*** | *0* | *1* | *4* | *95* | *0* | *3.94* | *0.27* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

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### 5.9.7. Maintain clinical area during patient treatment

Of the total respondents, 90% indicated that they are always responsible for maintaining the clinical area during patient treatment. However, the Chi-square test results confirmed a significant difference between respondents employed in the respective sectors. At $p=0.02$, significantly more respondents within the private sector indicated that they are always responsible for maintaining the clinical area during patient treatment (Table 5-7).

**Table 5-7 Maintain clinical area during patient treatment**

| Respondent categories | Percentage per response option | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|
| | Never | Seldom | Often | Always | Not indicated | | | |
| Private sector (n=121) | 2 | 1 | 2 | 95 | 1 | 3.88 | 0.57 | ***0.02** |
| Public sector (n=76) | 0 | 4 | 12 | 83 | 1 | 3.75 | 0.66 | |
| Formally trained (n=84) | 1 | 2 | 7 | 89 | 0 | 3.85 | 0.5 | *0.84* |
| In-service trained (n= 113) | 1 | 2 | 4 | 91 | 2 | 3.82 | 0.67 | |
| ***Total population (n=197)*** | *1* | *2* | *6* | *90* | *1* | *3.83* | *0.6* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

### 5.9.8. Remove the used local anaesthetic needles from the syringe

Of the total respondents, 84% indicated that they are always responsible for removing the used local anaesthetic needle from the syringe. However, respondents across the categories indicated differences in percentages. With $p<0.01$, significantly more private-sector respondents were always responsible for removing the used local anaesthetic needle from the syringe (Table 5-8).

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**Table 5-8 Remove the used LA needle from the syringe**

| Respondent categories | Percentage per response option | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|
| | Never | Seldom | Often | Always | Not indicated | | | |
| Private sector (n=121) | 1 | 1 | 2 | 96 | 1 | 3.91 | 0.5 | **<0.01 |
| Public sector (n=76) | 5 | 22 | 7 | 66 | 0 | 3.33 | 1 | |
| Formally trained (n=84) | 2 | 8 | 4 | 86 | 0 | 3.73 | 0.72 | *0.1* |
| In-service trained (n= 113) | 3 | 10 | 4 | 83 | 1 | 3.65 | 0.83 | |
| ***Total population (n=197)*** | *3* | *10* | *4* | *82* | *1* | *3.69* | *0.78* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

### 5.9.9. Remove the used local anaesthetic ampule from the syringe

Of the total respondents, 83% indicated that they are always responsible for removing the used local anaesthetic ampule from the syringe. However, respondents across the categories indicated differences in percentages. With $p<0.01$, significantly more respondents in the private sector indicated that they are always responsible for removing the used local anaesthetic ampule from the syringe (Table 5-9).

**Table 5-9 Remove the local anaesthetic ampule from the syringe**

| Respondent categories | Percentage per response option | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|
| | Never | Seldom | Often | Always | Not indicated | | | |
| Private sector (n=121) | 2 | 1 | 2 | 96 | 0 | 3.92 | 0.44 | ***<0.01* |
| Public sector (n=76) | 7 | 20 | 9 | 63 | 1 | 3.26 | 1.08 | |
| Formally trained (n=84) | 4 | 8 | 5 | 83 | 0 | 3.68 | 0.78 | *0.98* |
| In-service trained (n= 113) | 4 | 8 | 4 | 83 | 1 | 3.65 | 0.84 | |
| ***Total population (n=197)*** | *4* | *9* | *5* | *81* | *1* | *3.66* | *0.81* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

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### 5.9.10. Processing of contaminated instruments

Several steps are required to sterilise instruments effectively. Therefore, five items surveyed respondents' responsibility to process the used instruments. The beginning of instrument processing starts with removing the contaminated instruments from the clinical area. The process ends with the safe storage of the sterile instruments to prevent contamination and ensure that sterile instruments are available for the following procedure.

#### 5.9.10.1 Carry contaminated instruments to the designated sterilisation area

Of the total population, 97% indicated that they are responsible for carrying the contaminated instruments to the designated sterilisation area. Participants in the respective respondent categories reported similar percentages. The Chi-square test results did not indicate statistically significant differences between respondent categories concerning their responsibility to carry the contaminated instruments to the designated sterilisation area (Table 5-10).

**Table 5-10 Carry contaminated instruments to the designated sterilisation area**

| Respondent categories | Percentage per response option | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|
| | Never | Seldom | Often | Always | Not indicated | | | |
| Private sector (n=121) | 0 | 0 | 0 | 100 | 0 | 4 | 0 | *0.19* |
| Public sector (n=76) | 3 | 1 | 3 | 92 | 1 | 3.82 | 0.71 | |
| Formally trained (n=84) | 1 | 0 | 1 | 98 | 0 | 3.95 | 0.34 | *0.95* |
| In-service trained (n= 113) | 1 | 1 | 1 | 96 | 1 | 3.91 | 0.51 | |
| ***Total population (n=197)*** | *1* | *1* | *1* | *96* | *1* | *3.93* | *0.45* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

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#### 5.9.10.2 Pre-clean instruments

Of the total respondents, 90% indicated that they are always responsible for pre-cleaning instruments before sterilisation. Furthermore, all the respondent categories reported similar percentages. The Chi-square test results did not show any statistically significant difference between respondent categories concerning their responsibility to pre-clean instruments before sterilisation (Table 5-11).

**Table 5-11 pre-clean instruments**

| Respondent categories | Percentage per response option | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|
| | Never | Seldom | Often | Always | Not indicated | | | |
| Private sector (n=121) | 0 | 6 | 5 | 88 | 1 | 3.8 | 0.61 | *0.73* |
| Public sector (n=76) | 0 | 3 | 5 | 92 | 0 | 3.89 | 0.39 | |
| Formally trained (n=84) | 0 | 2 | 4 | 94 | 0 | 3.92 | 0.35 | *0.43* |
| In-service trained (n= 113) | 0 | 6 | 6 | 87 | 1 | 3.78 | 0.64 | |
| ***Total population (n=197)*** | *0* | *4* | *5* | *90* | *1* | *3.84* | *0.54* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

#### 5.9.10.3 Usage of packing for sterilisation purposes

Of the total population, 85% indicated that they are responsible for placing instruments in a sterilisation pouch/package before sterilisation. Participants in the respective respondent categories reported a similar percentage. The Chi-square test results did not indicate statistically significant differences between respondent categories concerning their responsibility to place instruments in a sterilisation pouch/package before sterilisation (Table 5-12).

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**Table 5-12 Place instruments in sterilisation pouch/pack instruments for sterilisation**

| Respondent categories | Percentage per response option | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|
| | Never | Seldom | Often | Always | Not indicated | | | |
| Private sector (n=121) | 2 | 8 | 10 | 80 | 0 | 3.69 | 0.7 | *0.18* |
| Public sector (n=76) | 0 | 3 | 5 | 92 | 0 | 3.89 | 0.39 | |
| Formally trained (n=84) | 0 | 7 | 5 | 86 | 0 | 3.81 | 0.55 | *0.37* |
| In-service trained (n= 113) | 2 | 5 | 11 | 82 | 0 | 3.73 | 0.64 | |
| ***Total population (n=197)*** | *1* | *6* | *7* | *86* | *0* | *3.77* | *0.6* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

#### 5.9.10.4 Sterilisation of instruments

Of the total population, 84% indicated that they are responsible for sterilising instruments. Participants in the respective respondent categories reported a similar percentage. The Chi-square test results did not show statistically significant differences between those employed in the different sectors or between respondents with varying types of training concerning their responsibility to sterilise instruments (Table 5-13).

**Table 5-13 Sterilise instruments**

| Respondent categories | Percentage per response option | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|
| | Never | Seldom | Often | Always | Not indicated | | | |
| Private sector (n=121) | 3 | 7 | 10 | 79 | 1 | 3.62 | 0.83 | *0.25* |
| Public sector (n=76) | 0 | 3 | 5 | 92 | 0 | 3.89 | 0.39 | |
| Formally trained (n=84) | 0 | 6 | 6 | 88 | 0 | 3.82 | 0.52 | *0.59* |
| In-service trained (n= 113) | 4 | 5 | 10 | 81 | 1 | 3.65 | 0.81 | |
| ***Total population (n=197)*** | *2* | *6* | *8* | *83* | *1* | *3.73* | *07* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0*

*.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

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#### 5.9.10.5 Storage of sterile instruments

Of the total respondents, 80% indicated that they are responsible for storing the sterile instruments. This pattern was similar across all respondent categories. The Chi-square test results did not show statistically significant differences between respondents employed in the different sectors or respondents with varying types of training concerning their responsibility to store sterile instruments (Table 5-14).

**Table 5-14 Storage of sterile instruments**

| Respondent categories | Percentage per response option | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|
| | Never | Seldom | Often | Always | Not indicated | | | |
| Private sector (n=121) | 2 | 3 | 10 | 83 | 1 | 3.73 | 0.72 | *0.37* |
| Public sector (n=76) | 1 | 1 | 4 | 93 | 1 | 3.88 | 0.54 | |
| Formally trained (n=84) | 0 | 2 | 11 | 87 | 0 | 3.85 | 0.42 | *0.49* |
| In-service trained (n= 113) | 3 | 3 | 5 | 88 | 2 | 3.74 | 0.79 | |
| ***Total population (n=197)*** | *1* | *2* | *7* | *89* | *1* | *3.79* | *0.66* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

### 5.9.11. Care of contaminated dental handpieces

Of the total population, 94% (n=185) indicated that they are always responsible for cleaning dental handpieces after use on patients. The Chi-square test results did not show statistically significant differences between those employed in the different sectors or between respondents with varying types of training concerning their responsibility to sterilise contaminated dental handpieces (Table 5-15).

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**Table 5-15 Cleaning of handpieces after use on patients**

| Respondent categories | Percentage per response option | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|
| | Never | Seldom | Often | Always | Not indicated | | | |
| Private sector (n=121) | 0 | 1 | 2 | 95 | 1 | 3.93 | 0.43 | *0.43* |
| Public sector (n=76) | 0 | 3 | 4 | 91 | 3 | 3.8 | 0.73 | |
| Formally trained (n=84) | 0 | 1 | 5 | 94 | 0 | 3.93 | 0.3 | *0.48* |
| In-service trained (n= 113) | 0 | 2 | 2 | 94 | 3 | 3.84 | 0.7 | |
| ***Total population (n=197)*** | *0* | *2* | *3* | *93* | *2* | *3.88* | *0.57* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

## 5.10. Discussion

Overall, 197 dental assistants participated in this study. A total of 121 participants employed in the private sector participated in the study. Additionally, 76 participants employed in the public sector also participated. When grouping the total respondents according to their type of training, 84 FT respondents and 113 IST respondents participated in the study.

Additional demographic information revealed that 88% of the total respondents were female, and 7% were male. This gender distribution of dental assistants is consistent with other studies that reported a higher percentage of female dental assistants (Qudeimat, Farrah and Owais, 2006; Mustafa, Khaliq Humam and Al-Mosuli, 2015). Furthermore, 34% of the respondents fall within the 25-35 age group. Overall, 90% of respondents worked in general OHCFs. Of these OHCFs, 78% were primarily located within urban areas. Also, 34% of respondents worked between 5 and 10 years, and 32% worked as dental assistants for more than 15 years.

The FDI policy statement on Infection Prevention and Control in Dental Practices hold the dentists responsible for establishing an IPC protocol to prevent and or limit the spread of infection in dental practices for their patients, their staff and themselves (FDI, 2021). Furthermore, guiding IPC documents made it clear

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that it is the responsibility of the dentist/employer to make all staff aware of the standards of infection control required in the workplace (Puttaiah and Kohli, 2003; Dental Council _ Dublin, 2015; Oosthuysen, 2015; CDC, 2017; Duse, 2017; Department of Health_RSA, 2020). However, Hartshorne (2010) expressed concern that "dentists appear to have no interest in day-to-day infection control issues". He further referred to dentists assigning IPC tasks to dental assistants.

While implementing and oversight of the recommended infection prevention and control rests with the principal dentist(s), the overall responsibility to execute effective IPC measures rests on each individual within the OHCT (Oosthuysen *et al.*, 2010; CDC, 2016; Dhonkal *et al,* 2018; Royal College of Dental Surgeons of Ontario, 2018; Oosthuysen *et al.*, 2020). Dental assistants are an integral part of the OHCT. Moreover, dental assistants are the most significant component of the dental workforce (The DALE Foundation, 2018).

Within South-African OHCFs, there is a lack of specifically dedicated individuals to manage the IPC processes (Oosthuysen *et al.*, 2010; Oosthuysen, 2015). Furthermore, Mustafa, Khaliq Humam and Al-Mosuli (2015) reported that dental assistants mostly perform the practical IPC measures to prevent disease transmission within OHCFs. On the other hand, within hospital settings, senior nurses or "infection control nurses "who received some infection control training are responsible for infection control in the patient wards (Duerink *et al.*, 2013).

In a comprehensive study about the value of dental assistants, 99% of dentists indicated that sterilisation and disinfection duties were delegated to the dental assistants (The DALE Foundation, 2018). Similarly, dental assistants in Iran told their main tasks to be cooperation with the dentist, infection control and equipment preparation (Baghban, Asgari and Paper, 2022). Furthermore, 8% of dental assistants from both the public and private sectors in the United Emirates Arabia (UAE) believed that they are the main

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responsible partners for IPC. In contrast, the rest of the dental assistants indicated that IPC is the responsibility of all OHCWs (Mustafa, Khaliq Humam and Al-Mosuli, 2015).

In the current study, between 90% and 70% of respondents confirmed being always responsible for performing the identified IPC tasks. More than 90% of dental assistants were always responsible for performing IPC duties such as disinfection of working surfaces between patients, changing suction tips after each patient, setting out the appropriate instruments for the dental procedure, carrying contaminated instruments to the designated sterilisation area, pre-cleaning of instruments and cleaning of the dental handpieces after being used on patients. More than 80% were always responsible for maintaining the clinical site during patient treatment, removing the used local anaesthetic needle and ampule from the syringe, and bagging, sterilising, and storing instruments. However, at $a=0.05$, significantly more respondents in the private sector reported that they are always responsible for the disinfection of working surfaces $(p<0.01)$. maintaining the clinical area $(p=0.02)$ and removing the local anaesthetic needles and ampules from the syringe $(p<0.01)$.

Furthermore, less than 70% of the population reported always being responsible for performing duties such as preparing the clinical area, flushing the waterlines between patients, and changing the 3-in-1 tips after every patient. At $a=0.05$, significantly more IST-dental assistants reported always being responsible for flushing waterlines between patients $(p<0.01)$. Likewise, a low percentage (15.8%) of dental students at the College of Dentistry at Jazan University in Saudi Arabia flushed their waterlines (Kanaparthy *et al.*, 2016)

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# Chapter 6

# IPC Knowledge

## 6.1. Introduction

Breaches in infection prevention and control (IPC) measures within the OHCF can lead to the transmission of infectious diseases among patients, OHCWs, and their significant others (CDC, 2016). However, when the required IPC measures are known to the OHCWs, breaches in IPC can be avoided (Upendran and Geiger, 2020). Furthermore, to avoid human error in the IPC process, Oosthuysen *et al.* (2020) recommended that a knowledgeable and accountable team member be assigned to be responsible for infection control measures within the OHCFs. Therefore, dental assistants responsible for performing IPC measures within OHCFs should have sufficient knowledge of IPC measures.

This chapter reports the results and discusses the findings across items that probed dental assistants' knowledge of IPC measures. Fifty items surveyed eleven knowledge aspects (KAs) across the seven IPC themes (Table 6-1).

**Table 6-1 Outline of IPC themes, number of knowledge aspects, and number of knowledge items used in the IPC Knowledge domain:**

| Infection Prevention and Control themes | Number of Knowledge Aspects (KAs) | Number of items |
|---|---|---|
| 1. IPC training and continuous professional development | 3 | 9 |
| 2. Infectious diseases and risks | 4 | 15 |
| 3. Disinfection and sterilisation | 2 | 7 |
| 4. Vaccination | 1 | 4 |
| 5. Hand hygiene | 1 | 3 |
| 6. Personal protective equipment | 1 | 4 |

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| Infection Prevention and Control themes | Number of Knowledge Aspects (KAs) | Number of items |
|---|---|---|
| 7. Health care related waste management | 2 | 8 |
| Total | 11 | 50 |

Results of the knowledge items are presented in table format. Each table reflects the *percentage*, the *mean*, and *standard deviation* of the total study population (n=197) and the different respondent categories. The tables also display the results of the Chi-square tests *(p-value)* with $alpha = 0.05$. These tests confirmed whether a significant difference existed between respondents employed in the Private sector (n=121) versus the public sector (n=76). In addition, the Chi-square tests also confirmed whether a significant difference existed between FT (n=84) versus IST respondents (n=113).

Knowledge items with the correct response received one point, and zero points were allocated to an incorrect answer. The average knowledge score of the total respondents was considered excellent (>75%,) good (74%-51%), moderate (50% - 26%) and weak (<25%) (Kumar and Rahman, 2017).

## 6.2. IPC theme 1: IPC training and continuous professional development

This study probed three KAs related to IPC training and continuous professional development (CPD). The focus was on respondents' self-perceived IPC knowledge level, preference for using different sources to obtain IPC information, and IPC guidelines. Table 6-2 outlines the KAs and the purpose of the items within the respective KAs.

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**Table 6-2 Purpose of the different knowledge aspects within IPC theme 1: IPC training and continuous professional development**

| Knowledge aspects | Purpose of items within respective knowledge aspect |
|---|---|
| **Knowledge aspect 1:** Perceived level of IPC knowledge | 1) To survey the respondents` self-perceived level of IPC knowledge |
| **Knowledge aspect 2:** Preference for IPC information sources | 2) To survey the respondents` preference for five IPC knowledge sources:<br>2.1 Oral health care team members<br>2.2 Books and journals<br>2.3 University of Technology<br>2.4 Internet searches and videos<br>2.5 Continuous professional development<br>Respondents ranked their preference for the listed resources. Their first choice showed the source they mainly used, then descended to the fifth choice for the source they least used to gain IPC information |
| **Knowledge aspect 3:** IPC guidelines | 3) To survey the respondents` awareness in terms of IPC guidelines:<br>3.1 If responds are aware that IPC guidelines existed<br>3.2 To assess if respondents know whether an IPC guideline is available in their oral health care facility.<br>3.3 To assess the respondents` awareness of the contents of the IPC guidelines. |

### 6.2.1. Respondents' self-perceived level of IPC knowledge

The first item probed respondents about their perceived level of knowledge about IPC measures. Overall, 49% of the total respondents perceived their IPC knowledge as above average. Nevertheless, 32% of the total respondents regarded their IPC knowledge as average. This pattern was similar among FT and IST respondents (Table 6-3). However, the Chi-square test confirmed a significant difference between respondents employed in the respective sectors regarding their perceived level of IPC knowledge. At $p=0.001$, significantly more respondents employed in the private sector perceived their IPC knowledge as above average. In contrast, significantly more respondents in the public sector ($p=0.001$) perceived their level of IPC knowledge as average (Table 6-3).

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**Table 6-3 IPC theme 1 KA-1: Dental assistants' self-perceived IPC knowledge level**

| Respondent categories | Percentage (%) per response option | | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|---|
| | Extensive | > Average | Average | < Average | None | Not indicated | | | |
| Private sector [n=121] | 17 | 55 | 21 | 1 | 0 | 5 | *3.74* | *1.08* | ***0.001** |
| Public sector [n= 76] | 3 | 39 | 49 | 4 | 0 | 5 | *3.25* | *0.98* | |
| Formally trained [n=84] | 10 | 55 | 31 | 1 | 0 | 4 | *3.6* | *0.87* | *0.45* |
| In-service trained [n=113] | 13 | 46 | 33 | 2 | 0 | 7 | *3.49* | *1.19* | |
| **Total respondents [n=197]** | 12 | 49 | 32 | 2 | 0 | 6 | *3.55* | *1.07* | |

*> Average = greater than average; < Average = less than average;* ***SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01***

### 6.2.2. Preference for IPC information sources

Of the total respondents, 21% preferred consultation with other OHCT members as their first choice to obtain IPC information. A similar percentage of the total respondents indicated this source as their second choice. Furthermore, 35% of the total respondents did not show their preference to consult with other members of the OHCT to obtain IPC information. This pattern was similar among the different respondent categories. With $alpha = 0.05$, the Chi-square test results did not confirm any statistically significant differences concerning respondents' preference to consult with OHCT to obtain IPC information (Table 6-4).

**Table 6-4 Dental assistants' preference to consult with members of the oral health care team (OHCT) to obtain IPC information**

| Respondent categories | Percentage per response option | | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|---|
| | 1st choice | 2nd choice | 3rd choice | 4th choice | 5th choice | Not indicated | | | |
| Private sector [n=121] | 24 | 23 | 12 | 4 | 2 | 35 | *2.58* | *2.08* | *0.57* |
| Public sector [n= 76] | 18 | 20 | 16 | 9 | 1 | 36 | *2.38* | *1.99* | |
| Formally trained [n=84] | 19 | 30 | 15 | 8 | 1 | 27 | *2.76* | *1.91* | *0.07* |
| In-service trained [n=113] | 24 | 16 | 12 | 4 | 3 | 42 | *2.31* | *2.12* | |
| **Total respondents [n=197]** | 21 | 22 | 14 | 6 | 2 | 35 | *2.50* | *2.04* | |

***SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01***

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#### 6.2.2.1 Respondents' preference to use books and journals to obtain IPC information

Overall, 9% of the total respondents preferred books and journals as their first choice to obtain IPC information. In contrast, 20% of the total respondents chose this resource as their second. A further 35% of the total respondents did not show their preference for this source of information. This pattern was similar among all the respondent categories. Furthermore, at $alpha = 0.05$, the Chi-square test results did not confirm any statistically significant differences in respondents' preference to obtain IPC information by reading books and journals (Table 6-5).

**Table 6-5 Dental assistants' preference to read books and journals to obtain IPC information**

| Respondent categories | Percentage per response option | | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|---|
| | 1st choice | 2nd choice | 3rd choice | 4th choice | 5th choice | Not indicated | | | |
| Private sector [n=121] | 10 | 24 | 18 | 8 | 5 | 35 | *2.21* | *1.86* | *0.21* |
| Public sector [n= 76] | 7 | 14 | 18 | 12 | 13 | 36 | *1.83* | *1.71* | |
| Formally trained [n=84] | 12 | 24 | 21 | 10 | 8 | 25 | *2.43* | *1.79* | *0.17* |
| In-service trained [n=113] | 6 | 18 | 16 | 10 | 8 | 42 | *1.80* | *1.78* | |
| **Total respondents [n=197]** | 9 | 20 | 18 | 10 | 8 | 35 | *2.07* | *1.81* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

#### 6.2.2.2 Respondents' preference to use resources obtained from the University of to get IPC information

Overall, 23% of the total respondents preferred using resources from the University of Technology (UoTs) as their first choice to obtain IPC information. Furthermore, 41% of the total respondents did not show their preference for this source of information. However, a significant difference occurred between respondents with different training types. At $p<0.001$, significantly more FT respondents preferred to use the resources from the University of Technology to obtain IPC information (Table 6-6).

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**Table 6-6 Dental assistants' preference to use information from a University of Technology to obtain IPC information**

| Respondent categories | Percentage per response option | | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|---|
| | 1st choice | 2nd choice | 3rd choice | 4th choice | 5th choice | Not indicated | | | |
| Private sector [n=121] | 18 | 8 | 7 | 2 | 20 | 45 | *1.68* | *2.00* | *0.44* |
| Public sector [n= 76] | 26 | 8 | 8 | 5 | 16 | 37 | *2.13* | *2.11* | |
| Formally trained [n=84] | 43 | 14 | 10 | 1 | 6 | 26 | *3.07* | *2.16* | ***0.001* |
| In-service trained [n=113] | 5 | 4 | 5 | 4 | 27 | 54 | *0.94* | *1.38* | |
| **Total respondents [n=197]** | 23 | 8 | 8 | 3 | 17 | 41 | *1.85* | *2.04* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

#### 6.2.2.3 Respondents' preference to use internet searches and videos to obtain IPC information

Overall, 7% of the total respondents indicated using the internet and videos as their first choice to obtain IPC knowledge. Furthermore, 39% of the total respondents did not reveal their preference to use this source, whereas 21% indicated it was their third choice. However, this pattern was different among respondents with different types of dental assisting training. At $p=0.03$, significantly more FT respondents indicated this source as their third choice to obtain IPC information (Table 6-7).

**Table 6-7 Dental assistants' preference to search the internet and watch videos to obtain IPC information**

| Respondent categories | Percentage per response option | | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|---|
| | 1st choice | 2nd choice | 3rd choice | 4th choice | 5th choice | Not indicated | | | |
| Private sector [n=121] | 9 | 10 | 17 | 10 | 12 | 41 | *1.72* | *1.76* | *0.50* |
| Public sector [n= 76] | 4 | 13 | 24 | 7 | 16 | 37 | *1.72* | *1.65* | |
| Formally trained [n=84] | 8 | 12 | 30 | 7 | 14 | 29 | *2.10* | *1.70* | **0.03* |
| In-service trained [n=113] | 6 | 11 | 12 | 10 | 13 | 48 | *1.43* | *1.67* | |
| **Total respondents [n=197]** | 7 | 11 | 21 | 8 | 14 | 39 | *1.71* | *1.71* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

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#### 6.2.2.4 Respondents' preference to attend CPD (CPD) seminars to obtain IPC information

Overall, 17% of the total respondents preferred attending CPD seminars as their first choice to obtain IPC knowledge. A similar percentage of the total respondents chose this source as their second choice. However, 34% of respondents did not show their preference for using this source. Furthermore, the Chi-square tests with $alpha = 0.05$ confirmed that significantly more IST respondents did not indicate their preference to attend CPD events to obtain IPC information (Table 6-8).

**Table 6-8 Dental assistants' preference to attend continuous professional development seminars to obtain IPC information**

| Respondent categories | Percentage per response option | | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|---|
| | 1st choice | 2nd choice | 3rd choice | 4th choice | 5th choice | Not indicated | | | |
| Private sector [n=121] | 12 | 17 | 16 | 9 | 12 | 35 | *2.15* | *1.89* | *0.18* |
| Public sector [n= 76] | 25 | 16 | 7 | 8 | 11 | 34 | *2.37* | *2.08* | |
| Formally trained [n=84] | 27 | 18 | 10 | 11 | 10 | 25 | *2.64* | *1.98* | ***0.01** |
| In-service trained [n=113] | 10 | 15 | 14 | 7 | 12 | 42 | *1.94* | *1.91* | |
| **Total respondents [n=197]** | 17 | 18 | 12 | 8 | 11 | 34 | *2.25* | *1.96* | |

*SD= Standard deviation: p-value = Chi-Square test result with Alpha = 0.05; *Significant difference; **Highly significant difference*

### 6.2.3. IPC guidelines

#### 6.2.3.1 Awareness of the existence of IPC guidelines

Two-thirds of the total respondents confirmed that they know that IPC guidelines exist. In contrast, 27% of the total respondents indicated the opposite. The Chi-square test with alpha = 0.05 confirmed significant differences among the different respondent categories. Significantly more respondents employed in the private sector *($p<0.001$)* and significantly more IST respondents *($p=0.02$)* confirmed that they know that IPC guidelines exist (Table 6-9).

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**Table 6-9 Dental assistants' awareness of the existence of IPC guidelines**

| Respondent categories | Percentage per response option | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|
| | Yes | No | Not sure | | | |
| Private sector [n=121] | 76 | 17 | 7 | *1.69* | *0.61* | ***0.001* |
| Public sector [n= 76] | 53 | 38 | 9 | *1.43* | *0.66* | |
| Formally trained [n=84] | 60 | 34 | 6 | *1.54* | *0.61* | **0.02* |
| In-service trained [n=113] | 73 | 17 | 10 | *1.63* | *0.66* | |
| **Total respondents [n=197]** | *65* | *27* | *8* | *1.59* | *0.64* | |

*SD= Standard deviation: p-value = Chi-Square test result with Alpha = 0.05; *Significant difference; **Highly significant difference*

#### 6.2.3.2 Awareness of the availability of IPC guidelines within oral health care facilities

Overall, 62% of the total respondents confirmed being aware that IPC guidelines are available within their OHCFs. However, 28% of the total respondents were unsure if IPC guidelines are available within their OHCFs. Furthermore, the percentages reported by the respective respondent categories varied. The Chi-square test results with $alpha = 0.05$ confirmed that significantly more respondents in the private sector $(p<0.0001)$ are aware of the availability of IPC guidelines within their OHCFs. However, significantly more respondents in the public sector were unsure whether IPC guidelines are available within their OHCFs. Furthermore, at $p=0.02$, significantly more IST respondents were aware of the availability of IPC guidelines within their OHCFs (Table 6-10).

**Table 6-10 Dental assistants' awareness of the availability of IPC guidelines within their oral health care facilities**

| Respondent categories | Percentage per response option | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|
| | Yes | No | Not sure | | | |
| Private sector [n=121] | 76 | 2 | 22 | *1.54* | *0.84* | ***0.0001* |
| Public sector [n= 76] | 46 | 20 | 34 | *1.12* | *0.89* | |

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| Respondent categories | Percentage per response option | | | Mean | SD | p-value (alpha = 0.05) |
|---|---|---|---|---|---|---|
| | Yes | No | Not sure | | | |
| Formally trained [n=84] | 55 | 14 | 31 | 1.24 | 0.90 | *0.02 |
| In-service trained [n=113] | 72 | 4 | 24 | 1.48 | 0.86 | |
| **Total respondents [n=197]** | 62 | 10 | 28 | 1.34 | 0.88 | |

*SD= Standard deviation: p-value = Chi-Square test result with Alpha = 0.05; *Significant difference; **Highly significant difference*

#### 6.2.3.3 Familiarity with the content of IPC guidelines

Overall, 52% of the total respondents were familiar with the contents of the IPC guidelines. However, a third (33%) of the total respondents reported that they were not sure about their familiarity with the content of the IPC guidelines (Table 6-11). Furthermore, the percentages reported by the different respondent categories varied. The Chi-square test results with $alpha = 0.05$ confirmed a highly significant difference $(p<0.0001)$ between respondents in the private and public sectors. On the other hand, no significant difference occurred between respondents with different training types (Table 6-11).

**Table 6-11 Dental assistants' familiarity with the content of IPC guidelines**

| Respondent categories | Percentage per response option | | | Mean | SD | p-value (alpha = 0.05) |
|---|---|---|---|---|---|---|
| | Yes | No | Not sure | | | |
| Private sector [n=121] | 73 | 2 | 25 | 1.48 | 0.87 | **0.0001 |
| Public sector [n= 76] | 43 | 13 | 43 | 0.11 | 0.94 | |
| Formally trained [n=84] | 52 | 10 | 38 | 1.14 | 0.95 | 0.06 |
| In-service trained [n=113] | 68 | 5 | 27 | 1.14 | 0.89 | |
| **Total respondents [n=197]** | 59 | 8 | 33 | 1.29 | 0.92 | |

*SD= Standard deviation: p-value = Chi-Square test result with Alpha = 0.05; *Significant difference; **Highly significant difference*

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## 6.3. IPC theme 2: Infectious diseases and risks

IPC theme 2 probed four KAs about infectious diseases and risks within OHCFs (Table 6-12). These KAs focused on respondents' awareness of the possibility of disease transmission within OHCFs, their knowledge of five types of micro-organisms transmitted within OHCFs, respondents` knowledge of four modes of disease transmission, and respondent's awareness of the possibility of experiencing an OEI and the steps to manage an OEI (Table 6-12).

**Table 6-12 Purpose of the different knowledge aspects within IPC theme 2: Infectious diseases and risks**

| Knowledge aspect (KA) | Purpose of items within respective knowledge aspect |
|---|---|
| **Knowledge aspect 1:** Possibility of disease transmission within OHCFs | 1) To survey if respondents are aware of the possibility of disease transmission within OHCFs |
| **Knowledge aspect 2:** Types of micro-organisms transmitted within OHCFs | 2) To survey respondents' knowledge of the types of micro-organisms transmitted within OHCFs.<br>2.1 Herpes simplex virus<br>2.2 Hepatitis B virus<br>2.3 Tuberculosis bacterium (TB)<br>2.4 Human Immune virus (HIV)<br>2.5 Prions. |
| **Knowledge aspect 3:** Modes of disease transmission | 3) To survey respondents' knowledge about possible modes of disease transmission:<br>3.1 direct contact,<br>3.2 indirect contact,<br>3.3 inhalation and<br>3.4 ingestion |
| **Knowledge aspect 4:** Occupational exposure and management | 4) To survey respondents' awareness of OEI<br>5) To survey respondents' knowledge of the management of occupational exposure injuries |

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### 6.3.1. Awareness of the possibility of disease transmission within oral health care facilities

Of the total respondents, 96% confirmed that there is a possibility for disease transmission within OHCFs. This percentage was similar among all the respondent categories. Furthermore, at $alpha = 0.05$, the Chi-square test results did not confirm any statistically significant differences between the different respondent categories regarding their awareness of the possibility of disease transmission within OHCFs (Table 6-13).

**Table 6-13: Dental assistants' awareness of the possibility of disease transmission within OHCFs**

| Respondent categories | Percentage per response option | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|
| | Yes | No | Not sure | | | |
| Private sector [n=121] | 93 | 1 | 2 | *1.96* | *0.27* | *0.17* |
| Public sector [n= 76] | 93 | 0 | 7 | *1.87* | *0.50* | |
| Formally trained [n=84] | 98 | 0 | 2 | *1.95* | *0.30* | *0.63* |
| In-service trained [n=113] | 95 | 1 | 4 | *1.90* | *0.42* | |
| **Total respondents [n=197]** | *96* | *1* | *4* | *1.92* | *0.38* | |

### 6.3.2. Knowledge of the types of micro-organisms that can be transmitted within oral health care facilities

#### 6.3.2.1 Herpes simplex virus

Overall, a high percentage (82%) of the total respondents were aware of the possibility of transmitting the Herpes simplex virus (HSV) within OHCFs. However, variation in percentages occurred between respondents working in the respective sectors. The Chi-square test results with $alpha = 0.05$ confirmed that significantly more respondents in the public sector know about the possibility that HSV

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transmission can occur within the OHCFs. In contrast, significantly more respondents in the private sector were unsure *(p<0.01)* (Table 6-14).

**Table 6-14 Dental assistants' awareness of the possibility for the transmission of Herpes simplex virus within oral health care facilities**

| Respondent categories | Percentage per response option | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|
| | Yes | No | Not sure | | | |
| Private sector [n=121] | 76 | 1 | 23 | *1.53* | *0.85* | ***0.01* |
| Public sector [n= 76] | 92 | 1 | 7 | *1.86* | *0.51* | |
| Formally trained [n=84] | 83 | 2 | 15 | *1.68* | *0.73* | *0.9* |
| In-service trained [n=113] | 81 | 1 | 18 | *1.63* | *0.77* | |
| **Total respondents [n=197]** | *82* | *1* | *17* | *1.65* | *0.75* | |

*SD= Standard deviation: p-value = Chi-Square test result with Alpha = 0.05; *Significant difference; **Highly significant difference*

#### 6.3.2.2 Hepatitis B virus

Of the total respondents, 89% were aware of the possibility of transmitting Hepatitis B-virus within OHCFs. Furthermore, less than 10% of the total respondents were unsure of the possibility of transmitting the Hepatitis B virus within OHCFs. This pattern was similar among all the respondent categories. At $alpha = 0.05$, the Chi-square test results did not confirm any statistically significant differences between the respective respondent categories about their awareness of the possibility of transmitting the Hepatitis B virus within OHCFs (Table 6-15).

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**Table 6-15 Dental assistants' awareness of the possibility of the transmission of Hepatitis B virus within oral health care facilities**

| Respondent categories | Percentage per response option | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|
| | Yes | No | Not sure | | | |
| Private sector [n=121] | 89 | 2 | 9 | *1.80* | *0.59* | *0.8* |
| Public sector [n= 76] | 92 | 1 | 7 | *1.86* | *0.51* | |
| Formally trained [n=84] | 93 | 0 | 7 | *1.86* | *0.52* | *0.54* |
| In-service trained [n=113] | 88 | 3 | 9 | *1.79* | *0.59* | |
| **Total respondents [n=197]** | *89* | *2* | *9* | *1.82* | *0.56* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha = 0.05*

#### 6.3.2.3 Tuberculosis bacterium (TB)

A high percentage of the total respondents (94%) were aware of the possibility of transmitting Tuberculosis bacterium (TB) within OHCFs. This pattern was similar among all the respondent categories. Furthermore, at $alpha = 0.05$, the Chi-square test results did not confirm any statistically significant differences between respondent categories regarding their awareness of the possibility of transmitting Tuberculosis bacterium (TB) within OHCFs (Table 6-16).

**Table 6-16 Dental assistants' awareness of the possibility of the transmission of Tuberculosis bacterium (TB) within oral health care facilities**

| Respondent categories | Percentage per response option | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|
| | Yes | No | Not sure | | | |
| Private sector [n=121] | 93 | 1 | 6 | *1.88* | *0.48* | *0.8* |
| Public sector [n= 76] | 95 | 1 | 4 | *1.91* | *0.41* | |
| Formally trained [n=84] | 98 | 0 | 2 | *1.95* | *0.30* | *0.23* |
| In-service trained [n=113] | 91 | 2 | 7 | *1.84* | *0.53* | |
| **Total respondents [n=197]** | *94* | *1* | *5* | *1.89* | *0.45* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha = 0.05*

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#### 6.3.2.4 Human Immune virus (HIV)

A high percentage of the total respondents (89%) were aware of the possibility of the transmission of HIV within OHCFs. However, 3% to 12% of respondents across the various categories were unsure whether there is a possibility for HIV transmission within OHCFs. This pattern was similar among all the respondent categories. Furthermore, at $alpha = 0.05$, the Chi-square test results did not confirm any statistically significant differences between the respective respondent categories about their awareness of the possibility of transmitting Human Immunodeficiency Virus (HIV) within OHCFs (Table 6-17).

**Table 6-17 Dental assistants' awareness of the possibility of the transmission of Human Immunodeficiency Virus (HIV) within oral health care facilities**

| Respondent categories | Percentage per response option | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|
| | Yes | No | Not sure | | | |
| Private sector [n=121] | 86 | 2 | 12 | *1.76* | *0.63* | *0.49* |
| Public sector [n= 76] | 97 | 1 | 3 | *1.93* | *0.34* | |
| Formally trained [n=84] | 94 | 2 | 4 | *1.93* | *0.34* | *0.78* |
| In-service trained [n=113] | 86 | 2 | 12 | *1.75* | *0.65* | |
| **Total respondents [n=197]** | *89* | *2* | *8* | *1.83* | *0.54* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha = 0.05*

#### 6.3.2.5 Prions

More than half of the total respondents (53%) indicated that they were unsure about the transmission of prions with OHCFs. In contrast, only 42% of the total respondents confirmed the possibility of transmitting prions within OHCFs. This pattern was similar among all the respondent categories. Furthermore, at $alpha = 0.05$, the Chi-square test results did not confirm any statistically significant differences between the respective respondent categories about their awareness of the possibility of transmitting Prions within OHCFs (Table 6-18).

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**Table 6-18 Dental assistants' awareness of the possibility for the transmission of Prions within oral health care facilities**

| Respondent categories | Percentage per response option | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|
| | Yes | No | Not sure | | | |
| Private sector [n=121] | 36 | 7 | 57 | *0.79* | *0.95* | *0.08* |
| Public sector [n= 76] | 51 | 3 | 46 | *1.05* | *0.99* | |
| Formally trained [n=84] | 43 | 2 | 55 | *1.93* | *0.34* | *0.33* |
| In-service trained [n=113] | 42 | 7 | 51 | *0.91* | *0.96* | |
| **Total respondents [n=197]** | *42* | *5* | *53* | *0.89* | *0.97* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha = 0.05*

### 6.3.3. Knowledge of the different modes of disease transmission

#### 6.3.3.1 Direct contact

Of the total respondents, 79% confirmed that direct contact is a mode of disease transmission within OHCFs. However, between 8% and 15% of respondents were unsure. This pattern was similar among all the respondent categories. Furthermore, at $alpha = 0.05$, the Chi-square test results did not confirm any statistically significant differences between the respective respondent categories about their awareness of direct contact as a mode of disease transmission (Table 6-19).

**Table 6-19 Dental assistants' awareness of direct contact as a mode of disease transmission**

| Respondent categories | Percentage per response option | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|
| | *Yes* | *No* | Not sure | | | |
| Private sector [n=121] | *81* | 7 | 12 | *1.69* | *0.68* | *0.45* |
| Public sector [n= 76] | 76 | 12 | 12 | *1.64* | *0.69* | |
| Formally trained [n=84] | 83 | 8 | 8 | *1.75* | *0.60* | *0.35* |
| In-service trained [n=113] | 76 | 9 | 15 | *1.61* | *0.74* | |
| **Total respondents [n=197]** | *79* | *9* | *12* | *1.67* | *0.68* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha = 0.05*

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#### 6.3.3.2 Splatter or splash

Of the total respondents, 89% confirmed awareness of the possibility of disease transmission resulting from splatter or splash with contaminated bodily fluids such as saliva or blood. This pattern was similar among all the respondent categories. Furthermore, at $alpha = 0.05$, the Chi-square test results did not confirm any statistically significant differences between the respective respondent categories regarding their awareness of splatter or splash as a disease transmission mode within OHCFs (Table 6-20).

**Table 6-20 Dental assistants' awareness of splatter or splash as a disease transmission mode**

| Respondent categories | Percentage per response option | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|
| | *Yes* | *No* | Not sure | | | |
| Private sector [n=121] | 89 | 2 | 9 | *1.79* | *0.59* | *0.53* |
| Public sector [n= 76] | 91 | 4 | 5 | *1.86* | *0.48* | |
| Formally trained [n=84] | 89 | 4 | 7 | *1.82* | *0.54* | *0.92* |
| In-service trained [n=113] | 89 | 3 | 8 | *1.81* | *0.56* | |
| **Total respondents [n=197]** | *89* | *3* | *8* | *1.82* | *0.55* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha = 0.05*

#### 6.3.3.4 Needlestick injury

Of the total respondents, 97% confirmed that disease transmission due to needlestick injuries is possible. This percentage was similar among all the respondent categories. Furthermore, at $alpha = 0.05$, the Chi-square test results did not confirm any statistically significant differences between the respective respondent categories regarding their awareness of needlestick injury as a disease transmission mode (Table 6-21).

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**Table 6-21 Dental assistants' awareness of needlestick injury direct contact as a disease transmission mode**

| Respondent categories | Percentage per response option | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|
| | *Yes* | *No* | Not sure | | | |
| Private sector [n=121] | 97 | 1 | 2 | *2.11* | *1.85* | *0.81* |
| Public sector [n= 76] | 97 | 1 | 1 | *1.96* | *0.26* | |
| Formally trained [n=84] | 99 | 1 | 0 | *1.99* | *0.11* | *0.51* |
| In-service trained [n=113] | 95 | 1 | 4 | *2.10* | *1.94* | |
| **Total respondents [n=197]** | *97* | *1* | 2 | *2.15* | *2.04* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha = 0.05*

#### 6.3.3.5 Inhalation of droplets

Of the total respondents, 80% were aware of the possibility of transmission through the inhalation of droplets. However, 17% of the total respondents were unsure about the inhalation of droplets as a disease transmission mode. This pattern was similar among all the respondent categories. Furthermore, at $alpha = 0.05$, the Chi-square test results did not confirm any statistically significant differences between the respective respondent categories about their awareness of droplet inhalation as a disease transmission mode (Table 6-22).

**Table 6-22 Dental assistants' awareness of inhalation of droplets as a disease transmission mode**

| Respondent categories | Percentage per response option | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|
| | *Yes* | *No* | Not sure | | | |
| Private sector [n=121] | 77 | 4 | 19 | *1.58* | *0.79* | *0.46* |
| Public sector [n= 76] | 84 | 3 | 13 | *1.71* | *0.69* | |
| Formally trained [n=84] | 87 | 2 | 11 | *1.76* | *0.63* | *0.10* |
| In-service trained [n=113] | 75 | 4 | 21 | *1.53* | *0.83* | |
| **Total respondents [n=197]** | *80* | *4* | *17* | *1.63* | *0.76* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha = 0.05*

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#### 6.3.3.6 Injury with a contaminated instrument

Of the total respondents, 97% indicated that diseases could spread due to an injury with a contaminated instrument. This percentage was similar among all the respondent categories. Furthermore, at $alpha = 0.05$, the Chi-square test results did not confirm any statistically significant differences between the respective respondent categories about their awareness that an injury with a used instrument is a mode of disease transmission within OHCFs (Table 6-23).

**Table 6-23 Dental assistants' awareness of an injury with a used instrument as a disease transmission mode**

| Respondent categories | Percentage per response option | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|
| | *Yes* | *No* | Not sure | | | |
| Private sector [n=121] | 99 | 0 | 1 | *1.98* | *0.18* | *0.11* |
| Public sector [n= 76] | 93 | 3 | 4 | *1.89* | *0.42* | |
| Formally trained [n=84] | 99 | 1 | 0 | *1.99* | *0.11* | *0.51* |
| In-service trained [n=113] | 95 | 1 | 4 | *1.92* | *0.38* | |
| **Total respondents [n=197]** | *97* | *1* | *2* | *1.95* | *0.3* | |

***SD= Standard deviation: p-value = Chi-Square test result at Alpha = 0.05***

#### 6.3.3.7 Indirect contact

Of the total respondents,44% confirmed that indirect contact is a mode of disease transmission within OHCFs. On the other hand, more than 21% indicated the opposite, and 35% were unsure about indirect contact as a disease transmission mode within OHCFs. This pattern was similar among all the respondent categories. Furthermore, at $alpha = 0.05$, the Chi-square test results did not confirm any statistically significant differences between the respective respondent categories regarding their awareness of indirect contact as a disease transmission mode within OHCFs (Table 6-24).

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**Table 6-24 Dental assistants' awareness of indirect contact as a disease transmission mode**

| Respondent categories | Percentage per response option | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|
| | Yes | No | Not sure | | | |
| Private sector [n=121] | 41 | 19 | 40 | *1.03* | *0.90* | *0.15* |
| Public sector [n= 76] | 49 | 25 | 26 | *1.22* | *0.84* | |
| Formally trained [n=84] | 44 | 20 | 36 | *1.12* | *0.89* | *0.93* |
| In-service trained [n=113] | 44 | 22 | 34 | *1.1* | *0.88* | |
| **Total respondents [n=197]** | *44* | *21* | *35* | *1.11* | *0.89* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha = 0.05*

#### 6.3.3.8 Ingestion

Among the total respondents, 60% indicated that disease transmission could occur due to ingestion. However, 31% of the total respondents were unsure that ingestion is a mode of disease transmission within OHCFs. This pattern was similar among all the respondent categories. Furthermore, at *alpha = 0.05*, the Chi-square test results did not confirm any statistically significant differences between the respective respondent categories about their awareness of ingestion as a disease transmission mode within OHCFs (Table 6-25).

**Table 6-25 Dental assistants' awareness of ingestion as a disease transmission mode**

| Respondent categories | Percentage per response option | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|
| | Yes | No | Not sure | | | |
| *Private sector [n=121]* | 60 | 5 | 35 | *1.29* | *0.94* | *0.11* |
| Public sector [n= 76] | 62 | 13 | 25 | *1.37* | *0.86* | |
| Formally trained [n=84] | 65 | 6 | 29 | *1.14* | *0.89* | *0.35* |
| In-service trained [n=113] | 56 | 11 | 33 | *1.26* | *0.93* | |
| **Total respondents [n=197]** | *60* | *9* | *31* | *1.32* | *0.92* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha = 0.05*

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### 6.3.4. Occupational exposure injuries

#### 6.3.4.1 Risk of occupational exposure injuries

Of the total respondents, 91% confirmed that they are aware of the risk of occupational exposure injuries within OHCFs. This percentage was similar among all the respondent categories. Furthermore, at $alpha = 0.05$, the Chi-square test results did not confirm any statistically significant differences between the respective respondent categories about their awareness of the risk of experiencing an occupational exposure injury within their OHCFs (Table 6-26).

**Table 6-26 Dental assistants' awareness of the risk of occupational exposure injuries**

| Respondent categories | Percentage per response option | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|
| | Yes | No | Not sure | | | |
| Private sector [n=121] | 93 | 6 | 1 | *1.88* | *0.48* | *0.07* |
| Public sector [n= 76] | 88 | 5 | 7 | *1.83* | *0.50* | |
| Formally trained [n=84] | 91 | 4 | 5 | *1.88* | *0.42* | *0.29* |
| In-service trained [n=113] | 91 | 7 | 2 | *1.84* | *0.53* | |
| **Total respondents [n=197]** | *91* | *6* | *3* | *1.86* | *0.48* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha = 0.05*

#### 6.3.4.2 Management of an occupational exposure incident

Overall, 71% of the total respondents confirmed that the first step is to inform the supervisor when an OEI happens. However, less than 50% of the total respondents correctly ordered the steps to manage occupational exposure. Furthermore, 54% to 16% of respondents did not include all the listed OEI management steps (Table 6-27).

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**Table 6-27 Dental assistants' knowledge of the steps required to manage an occupational exposure incident**

| OEI management steps | | Percentage total respondents (*n=197*) | |
|---|---|---|---|
| | | Correctly placed | Not included |
| 1. | Report the incidence to the supervisor | 71 | 16 |
| 2. | Receive counselling from a qualified counsellor | 4 | 33 |
| 3. | Consult with the occupational health and safety officer | 9 | 26 |
| 4. | If the patient is known, get consent from the patient to do blood tests | 6 | 30 |
| 5. | Take PEP irrespective of the patient's status | 11 | 27 |
| 6. | Get blood tests for the patient | 9 | 29 |
| 7. | Took PEP because the patient had a positive status; | 5 | 54 |
| 8. | Consult with your medical practitioner | 45 | 45 |

## 6.4. IPC theme 3: Disinfection and sterilisation

IPC theme 3 probed two KAs about disinfection and sterilisation (Table 6-28). The first KA investigated if respondents reported that there is a difference between disinfection and sterilisation. In short, disinfection is a bacteriostatic process that reduces the number of micro-organisms. On the other hand, sterilisation is a bactericidal process that destroys all micro-organisms (ICIP, 2019; Rutala, Weber and Committee, 2019). The classification of the different instruments directly impacts the processing of the instruments (Kohli, Puttaiah and Kohli, 2003; Royal College of Dental Surgeons of Ontario, 2010a; Rutala and Weber, 2016). The 2nd KA probed respondents' knowledge of classifying six dental instruments as critical or non-critical instruments (Table 6-28).

**Table 6-28 The purpose of the different knowledge aspects within IPC theme 3: Disinfection and sterilisation**

| Knowledge aspects | Purpose of items within respective knowledge aspect |
|---|---|
| **Knowledge aspect 1:** Difference between disinfection and sterilisation | 1) To assess respondents` knowledge of the difference between disinfection and sterilisation |

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| Knowledge aspects | Purpose of items within respective knowledge aspect |
|---|---|
| **Knowledge aspect 2:** Difference between critical and non-critical instruments | 2) To assess respondents` knowledge of the classification of five different instruments, namely:<br>2.1 Extraction forceps<br>2.2 Orthodontic instruments<br>2.3 Endodontic instruments<br>2.4 Burs<br>2.5 Mouth mirrors<br>2.6 Dental handpieces |

### 6.4.1. Differentiation between disinfection and sterilisation

Overall, 91% of the total respondents reported that there is a difference between disinfection and sterilisation. Furthermore, with $alpha = 0.05$, the Chi-square test results did not confirm any statistically significant differences between the respective respondent categories about their awareness of the difference between disinfection and sterilisation (Table 6-29).

**Table 6-29 Dental assistants' awareness of the difference between disinfection and sterilisation**

| Respondent categories | Percentage per response option | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|
| | Yes | No | Not sure | | | |
| Private sector [n=121] | 91 | 3 | 6 | *1.85* | *0.49* | *0.94* |
| Public sector [n= 76] | 90 | 3 | 7 | *1.84* | *0.52* | |
| Formally trained [n=84] | 92 | 4 | 4 | *1.89* | *0.43* | *0.42* |
| In-service trained [n=113] | 89 | 3 | 8 | *1.81* | *0.56* | |
| **Total respondents [n=197]** | *91* | *3* | *6* | *1.85* | *0.5* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha = 0.05*

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### 6.4.2. Knowledge of the classification of instruments as critical or non-critical

According to Spaulding's classification criteria, the items in KA-2 of IPC theme 3 surveyed respondents' knowledge about classifying different dental instruments as critical or non-critical. The dental instruments listed included: extraction forceps, orthodontic instruments, endodontic instruments, burs, mouth mirrors, and dental handpieces.

#### 6.4.2.1 Extraction forceps

Overall, 85% of the total respondents confirmed that extraction forceps are critical instruments. However, variation in percentages occurred between respondents working in the respective sectors. The Chi-square test results with $alpha = 0.05$ did not confirm a significant difference between respondents with different training types. However, at $p=0.02$, significantly more respondents employed in the private sector (92%) versus 79% of respondents employed in the public sector reported that extraction forceps are critical instruments (Table 6-30).

**Table 6-30 Dental assistants' knowledge of the classification of extraction forceps**

| Respondent categories | Percentage per response option | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|
| | Yes | No | Not sure | | | |
| Private sector [n=121] | 92 | 2 | 7 | *1.84* | *0.53* | ***0.02** |
| Public sector [n= 76] | 79 | 8 | 13 | *1.74* | *0.70* | |
| Formally trained [n=84] | 89 | 8 | 8 | *1.81* | *0.57* | *0.44* |
| In-service trained [n=113] | 85 | 6 | 9 | *1.79* | *0.63* | |
| **Total respondents [n=197]** | *85* | *6* | *9* | *1.8* | *0.61* | |

*SD= Standard deviation: p-value = Chi-Square test result with Alpha = 0.05; *Significant difference; **Highly significant difference*

#### 6.4.2.2 Orthodontic instruments

Overall, less than 60% of respondents reported orthodontic instruments as critical instruments. A further 13% of total respondents reported the opposite, and 30% were unsure. This pattern was similar

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among all the respondent categories. Furthermore, at $alpha = 0.05$, the Chi-square test results did not confirm any statistically significant differences in respondents' knowledge of orthodontic instruments' classification (Table 6-31).

**Table 6-31 Dental assistants' knowledge of the classification of orthodontic instruments**

| Respondent categories | Percentage per response option | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|
| | Yes | No | Not sure | | | |
| Private sector [n=121] | 60 | 17 | 24 | *1.32* | *0.86* | *0.07* |
| Public sector [n= 76] | 53 | 9 | 38 | *1.21* | *0.93* | |
| Formally trained [n=84] | 62 | 12 | 26 | *1.33* | *0.88* | *0.47* |
| In-service trained [n=113] | 53 | 15 | 32 | *1.23* | *0.90* | |
| **Total respondents [n=197]** | *57* | *13* | *30* | *1.27* | *0.89* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha = 0.05*

#### 6.4.2.3 Endodontic instruments

Across the respective respondent categories, variation occurred in the percentage of respondents who correctly classified endodontic instruments. Of the total respondents, 71% indicated that endodontic instruments are critical instruments. A further 23% of the total respondents were unsure of the classification of endodontic instruments. The results of the Chi-square test with $alpha = 0.05$ confirmed that significantly more respondents in the private sector $(p<0.01)$ classified endodontic instruments as critical instruments (Table 6-32).

**Table 6-32 Dental assistants' knowledge of the classification of endodontic instruments**

| Respondent categories | Percentage per response option | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|
| | Yes | No | Not sure | | | |
| Private sector [n=121] | 81 | 3 | 16 | *1.65* | *0.74* | ***<0.01* |
| Public sector [n= 76] | 59 | 9 | 32 | *1.32* | *0.91* | |
| Formally trained [n=84] | 79 | 4 | 18 | *1.58* | *0.79* | *0.24* |

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| | | | | | |
|---|---|---|---|---|---|
| In-service trained [n=113] | 68 | 7 | 25 | *1.45* | *0.86* |
| **Total respondents [n=197]** | *71* | *6* | *23* | *1.51* | *0.83* |

*SD= Standard deviation: p-value = Chi-Square test result with Alpha = 0.05; *Significant difference; **Highly significant difference*

#### 6.4.2.4 Burs

Among the total respondents, 85% classified burs as critical instruments, 9% showed the opposite, and 6 % were unsure. This pattern was similar across the different respondent categories. Furthermore, at $alpha = 0.05$, the Chi-square test results did not confirm any statistically significant differences between the respective respondent categories regarding their knowledge of the classification of burs (Table 6-33).

**Table 6-33 Dental assistants' knowledge of the classification of burs**

| Respondent categories | Percentage per response option | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|
| | Yes | No | Not sure | | | |
| Private sector [n=121] | 88 | 3 | 9 | *1.79* | *0.59* | *0.09* |
| Public sector [n= 76] | 78 | 11 | 11 | *1.71* | *0.63* | |
| Formally trained [n=84] | 84 | 5 | 11 | *1.74* | *0.64* | *0.66* |
| In-service trained [n=113] | 85 | 7 | 8 | *1.77* | *0.58* | |
| **Total respondents [n=197]** | *85* | *9* | *6* | *1.76* | *0.61* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha = 0.05*

#### 6.4.2.5 Mouth mirrors

Respondents' knowledge varied concerning the classification of mouth mirrors as critical instruments. Of the total respondents, 73% indicated that mouth mirrors are critical instruments. However, variation occurred in the percentages reported between the different respondent categories. The Chi-square test results with $alpha = 0.05$ confirmed a highly significant difference between respondents

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employed in the different sectors. At $p<0.01$, significantly more respondents in the private sector classified mouth mirrors as critical instruments (Table 6-34).

**Table 6-34 Dental assistants' knowledge of the classification of mouth mirrors**

| Respondent categories | Percentage per response option | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|
| | Yes | No | Not sure | | | |
| Private sector [n=121] | 81 | 9 | 10 | *1.72* | *0.65* | ***<0.01* |
| Public sector [n= 76] | 61 | 26 | 13 | *1.49* | *0.70* | |
| Formally trained [n=84] | 70 | 19 | 11 | *1.60* | *0.68* | *0.55* |
| In-service trained [n=113] | 75 | 13 | 12 | *1.64* | *0.68* | |
| **Total respondents [n=197]** | *73* | *16* | *11* | *1.60* | *0.68* | |

*SD= Standard deviation: p-value = Chi-Square test result with Alpha = 0.05; *Significant difference; **Highly significant difference*

#### 6.4.2.6 Dental handpieces

Variation occurred in the responses related to classifying dental handpieces as critical instruments. Of the total respondents, 77% confirmed that dental handpieces are critical instruments. However, the percentage of affirmative responses varied between the different respondent categories. The Chi-square test results with $alpha = 0.05$ confirmed a highly significant difference between respondents employed in the different sectors. At $p<0.01$, significantly more respondents in the private sector correctly classified dental handpieces (Table 6-35).

**Table 6-35 Dental assistants' knowledge of the classification of dental handpieces as critical instruments**

| Respondent categories | Percentage per response option | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|
| | Yes | No | Not sure | | | |
| Private sector [n=121] | 87 | 7 | 6 | *1.82* | *0.52* | ***<0.01* |
| Public sector [n= 76] | 62 | 20 | 18 | *1.46* | *0.77* | |
| Formally trained [n=84] | 74 | 13 | 13 | *1.58* | *0.73* | *0.51* |
| In-service trained [n=113] | 80 | 11 | 9 | *1.73* | *0.60* | |
| **Total respondents [n=197]** | *77* | *12* | *11* | *1.58* | *0.73* | |

*SD= Standard deviation: p-value = Chi-Square test result with Alpha = 0.05; *Significant difference; **Highly significant difference*

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## 6.5. IPC theme 4: Vaccination

This study surveyed respondents' knowledge about the specific diseases against which OHCW must receive a vaccine. The list included three diseases for which vaccinations are available, namely Hepatitis A, Hepatitis B, and Influenza. Also included in the list is one disease for which no current vaccination exists, namely Hepatitis C (Table 6-36).

**Table 6-36 Purpose of the different knowledge aspects within IPC theme 4: Vaccination**

| Knowledge aspects | Purpose of items within respective knowledge aspect |
|---|---|
| **Knowledge aspect 1:** Vaccination of oral health care workers against specific diseases | 1) To survey if respondents know the required vaccination regime for oral health care workers in terms of the following diseases:<br>1.1 Hepatitis A<br>1.2 Hepatitis B<br>1.3 Hepatitis C<br>1.4 Influenza |

### 6.5.1. Hepatitis A

Among the total respondents, 75% confirmed that OHCWs need vaccination against hepatitis A. Furthermore, 20% of the total respondents were unsure, and 5% indicated the opposite. However, variation in percentage occurred among respondents employed in the respective sectors. At $p<0.01$, significantly more respondents in the public sector indicated that OHCWs do not need vaccination against Hepatitis A (Table 6-37).

**Table 6-37 Dental assistants' knowledge of vaccination of oral health care workers against Hepatitis A**

| Respondent categories | Percentage per response option | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|
| | Yes | Not sure | No | | | |
| Private sector [n=121] | 79 | 21 | 1 | *1.58* | *0.81* | ***<0.01* |
| Public sector [n= 76] | 70 | 25 | 11 | *1.5* | *0.81* | |

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| | | | | | | |
|---|---|---|---|---|---|---|
| Formally trained [n=84] | 76 | 19 | 5 | *1.57* | *0.8* | *0.93* |
| In-service trained [n=113] | 74 | 21 | 4 | *1.53* | *0.82* | |
| **Total respondents [n=197]** | *75* | *20* | *5* | *1.55* | *0.81* | |

*SD= Standard deviation: p-value = Chi-Square test result with Alpha = 0.05; *Significant difference; **Highly significant difference*

### 6.5.2. Hepatitis B

Among the total respondents, 92% reported that OHCWs need vaccination against Hepatitis B. Only 7% of the total population were unsure. This pattern was similar among all the respondent categories. Furthermore, at $alpha = 0.05$, the Chi-square test results did not confirm any statistically significant differences between the respective respondent categories about their knowledge of Hepatitis B vaccination for OHCWs (Table 6-38).

**Table 6-38 Dental assistants' knowledge of vaccination of oral health care workers against Hepatitis B**

| Respondent categories | Percentage per response option | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|
| | Yes | Not sure | No | | | |
| Private sector [n=121] | 93 | 6 | 1 | *1.88* | *0.48* | *0.62* |
| Public sector [n= 76] | 89 | 9 | 1 | *1.8* | *0.59* | |
| Formally trained [n=84] | 94 | 5 | 1 | *1.89* | *0.44* | *0.53* |
| In-service trained [n=113] | 90 | 9 | 1 | *1.81* | *0.58* | |
| **Total respondents [n=197]** | *92* | *7* | *1* | *1.85* | *0.52* | |

*SD= Standard deviation: p-value = Chi-Square test result with Alpha = 0.05; *Significant difference; **Highly significant difference*

### 6.5.3. Hepatitis C

Overall, only 5% of the total respondents reported that Hepatitis C vaccination was not available yet, and 21% were unsure. Furthermore, 74% indicated that OHCWs need vaccination against Hepatitis

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C. This pattern was similar among all the respondent categories. Again, at *alpha = 0.05*, the Chi-square test results did not confirm any statistically significant differences between the respective respondent categories regarding their knowledge of vaccination against hepatitis C (Table 6-39).

**Table 6-39 Dental assistants' knowledge of vaccination of oral health care workers against Hepatitis C**

| Respondent categories | Percentage per response option | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|
| | Yes | Not sure | No | | | |
| Private sector [n=121] | 77 | 21 | 2 | *1.55* | *0.83* | ***0.05** |
| Public sector [n= 76] | 70 | 21 | 9 | *1.49* | *0.82* | |
| Formally trained [n=84] | 75 | 19 | 6 | *1.56* | *0.8* | *0.61* |
| In-service trained [n=113] | 73 | 23 | 4 | *1.5* | *0.85* | |
| **Total respondents [n=197]** | *74* | *21* | *5* | *1.53* | *0.82* | |

*SD= Standard deviation: p-value = Chi-Square test result with Alpha = 0.05; *Significant difference; **Highly significant difference*

### 6.5.4. Influenza

Of the total respondents, 70% confirmed that OHCW must receive vaccination against Influenza. However, 22% were unsure, and a further 8% said it was unnecessary to receive vaccination against Influenza. This pattern was similar among all the respondent categories. Furthermore, at *alpha = 0.05*, the Chi-square test results did not confirm any statistically significant differences between the respective respondent categories regarding their knowledge about vaccination of OHCWs against Influenza (Table 6-40).

**Table 6-40 Dental assistants' knowledge of vaccination of oral health care workers against Influenza**

| Respondent categories | Percentage per response option | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|
| | Yes | Not sure | No | | | |
| Private sector [n=121] | 69 | 25 | 6 | *1.45* | *0.87* | *0.38* |
| Public sector [n= 76] | 70 | 20 | 10 | *1.5* | *0.81* | |

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| | | | | | | |
|---|---|---|---|---|---|---|
| Formally trained [n=84] | 75 | 19 | 6 | *1.56* | *0.8* | *0.35* |
| In-service trained [n=113] | 65 | 26 | 9 | *1.4* | *0.87* | |
| **Total respondents [n=197]** | *70* | *22* | *8* | *1.47* | *0.84* | |

***SD= Standard deviation: p-value = Chi-Square test result with Alpha = 0.05; *Significant difference; **Highly significant difference***

## 6.6. IPC theme 5: Hand hygiene

This IPC theme's KA focuses on whether respondents know that their hand hygiene practices influence others. Therefore, the list included three categories of people affected by the hand hygiene practices of OHCWs (Table 6-41).

**Table 6-41 Purpose of items within the knowledge aspect of IPC theme 5: Hand hygiene**

| Knowledge aspects | Purpose of items within respective knowledge aspect | |
|---|---|---|
| **Knowledge aspect 1:** People affected by the hand hygiene practices of an oral health care worker | 1. | To survey respondents` awareness that their hand hygiene affects themselves as well as others, namely: |
| | 1.1 | Patients |
| | 1.2 | The family of the health care worker. |
| | 1.3 | The health care worker |

### 6.6.1. Persons directly or indirectly affected by the hand hygiene practices of dental assistants

A high percentage of the total respondents confirmed that their hand hygiene practices affect patients (94%), families (94%), and other OHCWs (93%). This pattern was similar among all the respondent categories. Furthermore, at $alpha = 0.05$, the Chi-square test results did not confirm any statistically significant differences between the respective respondent categories about their knowledge of persons directly or indirectly affected by their hand hygiene practices (Table 6-42).

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**Table 6-42 Dental assistants' knowledge of persons directly or indirectly affected by their hand hygiene practices**

| Persons affected | | Respondent categories | Percentage per response option | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|
| | | | Yes | No | Not sure | | | |
| 1.1 | Patients | Private sector [n=121] | 97 | 3 | 0 | *1.93* | *0.36* | *0.18* |
| | | Public sector [n= 76] | 91 | 7 | 3 | *1.88* | *0.49* | |
| | | Formally trained [n=84] | 94 | 5 | 1 | *1.87* | *0.49* | *0.97* |
| | | In-service trained [n=113] | 95 | 4 | 1 | *1.95* | *0.35* | |
| | | **Total respondents [n=197]** | *94* | *1* | *4* | *1.91* | *0.41* | |
| 1.2 | Family of the health care worker | Private sector [n=121] | 97 | 2 | 1 | *1.94* | *0.32* | *0.08* |
| | | Public sector [n= 76] | 89 | 9 | 1 | *1.84* | *0.57* | |
| | | Formally trained [n=84] | 95 | 5 | 0 | *1.88* | *0.48* | *0.71* |
| | | In-service trained [n=113] | 93 | 5 | 2 | *1.92* | *0.40* | |
| | | **Total respondents [n=197]** | *94* | *5* | *1* | *1.90* | *0.44* | |
| 1.3 | The health care worker | Private sector [n=121] | 97 | 3 | 0 | *1.93* | *0.36* | *0.06* |
| | | Public sector [n= 76] | 88 | 11 | 1 | *1.82* | *0.60* | |
| | | Formally trained [n=84] | 95 | 5 | 0 | *1.88* | *0.48* | *0.63* |
| | | In-service trained [n=113] | 92 | 7 | 1 | *1.89* | *0.47* | |
| | | **Total respondents [n=197]** | *93* | *6* | *1* | *1.89* | *0.47* | |

***SD= Standard deviation: p-value = Chi-Square test result with Alpha = 0.05; *Significant difference; **Highly significant difference***

## 6.7. IPC theme 6: Personal protective equipment (PPE)

IPC theme 6 surveyed the respondents' knowledge about the proper use of personal protective equipment (PPE). The KA within this IPC theme incorporated statements about the appropriate use of four PPE items: masks, heavy-duty gloves, examination gloves, and eyewear. Table 6-43 outlines the KA, the purpose of items, and statements about PPE.

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**Table 6-43 Purpose of the knowledge aspects and items within IPC theme 6: Personal protective equipment**

| Knowledge aspects | Purpose of items within respective knowledge aspect |
|---|---|
| **Knowledge aspect 1 (KA1):** Appropriate use of PPE | 1) To survey respondents` knowledge about using different PPE items. The items included statements about:<br>1.1 Replacing masks when wet.<br>1.2 Use heavy-duty gloves when cleaning equipment.<br>1.3 Changing examination gloves between patients only if they are visibly contaminated.<br>1.4 Use of eyewear only when anticipating heavy splatter during a dental procedure. |

### 6.7.1. The use of masks

Across all the respondent categories, a high percentage of respondents (93%) reported that wet face masks should be replaced. This pattern was similar among all the respondent categories. Furthermore, at $alpha = 0.05$, the Chi-square test results did not confirm any statistically significant differences between the respective respondent categories about their knowledge of replacing masks when wet (Table 6-44).

**Table 6-44 Dental assistants' knowledge about the replacement of wet masks**

| Respondent categories | Percentage per response option | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|
| | Yes | No | Not sure | | | |
| Private sector [n=121] | 93 | 1 | 6 | 1.88 | 0.48 | *0.1* |
| Public sector [n= 76] | 92 | 5 | 3 | 1.91 | 0.33 | |
| Formally trained [n=84] | 95 | 2 | 3 | 1.98 | 0.35 | 0.44 |
| In-service trained [n=113] | 91 | 3 | 6 | 1.85 | 0.50 | |
| **Total respondents [n=197]** | *93* | *3* | *4* | *1.89* | *0.43* | |

*SD= Standard deviation: p-value = Chi-Square test result with Alpha = 0.05; *Significant difference; **Highly significant difference*

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### 6.7.2. The use of heavy-duty gloves

Among the total respondents, 93% were aware that they must use heavy-duty gloves when cleaning equipment. Less than 5% indicated the opposite or were unsure. This pattern was similar among all the respondent categories. Furthermore, at $alpha = 0.05$, the Chi-square test results did not confirm any statistically significant differences between the respective respondent categories about their knowledge of using heavy-duty gloves when cleaning equipment (Table 6-45).

**Table 6-45 Dental assistants' knowledge about the use of heavy-duty gloves when cleaning equipment**

| Respondent categories | Percentage per response option | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|
| | Yes | No | Not sure | | | |
| Private sector [n=121] | 93 | 1 | 6 | 1.78 | 0.61 | *0.98* |
| Public sector [n= 76] | 92 | 5 | 3 | 1.54 | 0.77 | |
| Formally trained [n=84] | 95 | 2 | 2 | 1.67 | 0.75 | 0.44 |
| In-service trained [n=113] | 91 | 3 | 6 | 1.73 | 0.67 | |
| **Total respondents [n=197]** | *93* | *3* | *4* | *1.69* | *0.69* | |

*SD= Standard deviation: p-value = Chi-Square test result with Alpha = 0.05; *Significant difference; **Highly significant difference*

### 6.7.3. The use of examination gloves

Since this statement contains a condition regarding the replacement of gloves, the correct answer to the statement was "No". Among the respondents, 71% disagreed, whereas 24% agreed, and 5% were unsure if gloves should be replaced only when visibly contaminated. This pattern was similar among all the respondent categories. Furthermore, at $alpha = 0.05$, no statistically significant differences occurred between the respective respondent categories about their knowledge of replacing gloves only when visibly contaminated (Table 6-46).

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**Table 6-46 Dental assistants' knowledge about the replacement of gloves only when visibly contaminated**

| Respondent categories | Percentage per response option | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|
| | Yes | No | Not sure | | | |
| Private sector [n=121] | 26 | 69 | 4 | *1.65* | *0.56* | *0.42* |
| Public sector [n= 76] | 21 | 71 | 8 | *1.63* | *0.63* | |
| Formally trained [n=84] | 19 | 77 | 4 | *1.77* | *0.50* | *0.14* |
| In-service trained [n=113] | 28 | 65 | 7 | *1.63* | *0.63* | |
| **Total respondents [n=197]** | *24* | *71* | *5* | *1.64* | *0.59* | |

*SD= Standard deviation: p-value = Chi-Square test result with Alpha = 0.05; *Significant difference; **Highly significant difference*

### 6.7.4. The use of eyewear

The statement that probed respondents' knowledge of the use of eyewear contained a condition that implied that eyewear should only be used if heavy splatter is anticipated. Therefore, the correct answer to this item is "No". Of the total respondents, 66% showed the correct answer, 25% indicated the opposite, and 9% were unsure. This pattern was similar among all the respondent categories. Furthermore, at $alpha = 0.05$, the Chi-square test results did not confirm any statistically significant differences between the respective respondent categories regarding their knowledge of the use of eyewear (Table 6-47).

**Table 6-47 Dental assistants' knowledge of the conditional use of eyewear**

| Respondent categories | Percentage per response option | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|
| | Yes | No | Not sure | | | |
| Private sector [n=121] | 26 | 64 | 10 | *1.55* | *0.67* | *0.82* |
| Public sector [n= 76] | 24 | 68 | 8 | *1.61* | *0.63* | |
| Formally trained [n=84] | 25 | 69 | 6 | *1.67* | *0.57* | *0.40* |
| In-service trained [n=113] | 25 | 64 | 12 | *1.50* | *0.71* | |
| **Total respondents [n=197]** | *25* | *66* | *9* | *1.57* | *0.66* | |

*SD= Standard deviation: p-value = Chi-Square test result with Alpha = 0.05; *Significant difference; **Highly significant difference*

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## 6.8. IPC theme 7: Health care related waste management

IPC theme 7 surveyed two KAs about health care related waste (HCRW) management. First, it probed respondents' awareness of the difference between health care related and domestic or household waste. After that, it explores respondents' knowledge of the correct waste disposal method for different waste items. Table 6-48 outlines the purpose of the KAs and items.

**Table 6-48 Purpose of the different knowledge aspects within IPC theme 7: Health care related waste management**

| Knowledge aspects | Purpose of items within respective knowledge aspect |
|---|---|
| **Knowledge aspect 1:** Difference between domestic (household) waste and health care related waste | 1) To assess if respondents know that there is a difference between domestic (household) waste and health care related waste |
| **Knowledge aspect 2:** Disposal methods of health care related waste items | 2. To assess respondents' knowledge of the correct disposal method for the different waste items, namely:<br>2.1 Used needles<br>2.2 Waste containing bodily fluids<br>2.3 Extracted teeth<br>2.4 Used examination gloves<br>2.5 Household waste items<br>2.6 Scalpel blades<br>2.7 Dental packaging material<br><br>The listed waste disposal methods were stated:<br>1) Anatomical waste disposable bags, also known as red bags in the South-African context<br>2) Sharps containers<br>3) Municipality waste services<br>4) Other |

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### 6.8.1. Difference between domestic (household) waste and health care related waste (HCRW)

Of the respondents, 91% confirmed a difference between domestic (household) health care related waste (HCRW), and 8% were unsure. This pattern was similar among all the respondent categories. Furthermore, at $alpha = 0.05$, the Chi-square test results did not confirm any statistically significant differences between the respective respondent categories regarding their knowledge of the difference between domestic (household) waste and HCRW (Table 6-49).

**Table 6-49 Dental assistants' knowledge of the difference between domestic (household) waste and health care related waste (HCRW)**

| Respondent categories | Percentage per response option | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|
| | Yes | No | Not sure | | | |
| Private sector [n=121] | 92 | 1 | 7 | *1.86* | *0.51* | *0.82* |
| Public sector [n= 76] | 89 | 0 | 11 | *1.78* | *0.61* | |
| Formally trained [n=84] | 93 | 0 | 7 | *1.86* | *0.52* | *0.42* |
| In-service trained [n=113] | 90 | 1 | 9 | *1.81* | *0.56* | |
| **Total respondents [n=197]** | *91* | *1* | *8* | *1.83* | *0.55* | |

*SD= Standard deviation: p-value = Chi-Square test result with Alpha = 0.05; *Significant difference; **Highly significant difference*

### 6.8.2. Disposal of health care related waste items

This KA focused on the correct disposal methods of different waste items. The seven waste items generated within OHCFs in this list included: used needles, gauze items contaminated with bodily fluid and saliva, extracted teeth, used examination gloves, household waste items, scalpel blades, and packaging materials of dental products. Respondents matched the type of waste item with the waste disposal method. In Table 6-50, the highlighted columns show the correct waste disposal method for the respective waste items.

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Overall, more than 90% of the total respondents reported the correct waste disposal method for used needles, waste containing bodily fluids, extracted teeth, used gloves, household waste items and scalpel blades. In contrast, only 72% indicated the correct method for disposing dental packaging materials, namely, municipality waste services. Furthermore, the percentage of correct responses varied across the respondent categories in this item. The Chi-square test results with $alpha = 0.05$ confirmed a significant difference between respondents employed in the different sectors. At $p<0.04$, significantly more respondents in the private sector indicated the correct waste disposal method for dental packaging materials (Table 6-50).

**Table 6-50 Dental assistants' knowledge of the correct disposal method of different waste items**

| Waste items | Respondent categories | Percentage per response option | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|
| | | Other | Red bag | Sharps container | Municipality | | | |
| 1.9.1 Used Needles | Private sector [n=121] | 1 | 0 | 99 | 0 | *1.98* | *0.18* | *0.58* |
| | Public sector [n= 76] | 1 | 1 | 97 | 0 | *1.96* | *0.26* | |
| | Formally trained [n=84] | 1 | 0 | 99 | 0 | *1.98* | *0.22* | *0.83* |
| | In-service trained [n=113] | 1 | 1 | 98 | 0 | *2* | *0.2* | |
| | **Total respondents [n=197]** | *1* | *1* | *98* | *0* | *1.97* | *0.21* | |
| 1.9.2 Waste containing bodily fluids such as blood and saliva | Private sector [n=121] | 1 | 99 | 0 | 0 | *0.99* | *0.09* | *0.13* |
| | Public sector [n= 76] | 3 | 93 | 0 | 4 | *1.05* | *0.43* | |
| | Formally trained [n=84] | 1 | 98 | 0 | 1 | *1.01* | *0.25* | *0.90* |
| | In-service trained [n=113] | 2 | 96 | 0 | 2 | *1* | *0.3* | |
| | **Total respondents [n=197]** | *2* | *97* | *0* | *2* | *1.02* | *0.28* | |
| 1.9.3 Extracted teeth | Private sector [n=121] | 1 | 99 | 0 | 0 | *0.99* | *0.09* | *0.23* |
| | Public sector [n= 76] | 4 | 93 | 1 | 1 | *1* | *0.33* | |
| | Formally trained [n=84] | 1 | 98 | 1 | 0 | *1* | *0.16* | *0.66* |
| | In-service trained [n=113] | 3 | 96 | 0 | 1 | *0.99* | *0.25* | |
| | **Total respondents [n=197]** | *2* | *97* | *1* | *1* | *0.99* | *0.21* | |
| 1.9.4 Used gloves | Private sector [n=121] | 2 | 96 | 0 | 2 | *1* | *0.22* | *0.83* |
| | Public sector [n= 76] | 4 | 95 | 0 | 1 | *1.05* | *0.43* | |

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| Waste items | Respondent categories | Percentage per response option | | | | Mean | SD | p-value (alpha = 0.05) |
|---|---|---|---|---|---|---|---|---|
| | | Other | Red bag | Sharps container | Municipality | | | |
| | Formally trained [n=84] | 1 | 99 | 0 | 0 | 0.98 | 0.15 | 0.25 |
| | In-service trained [n=113] | 4 | 93 | 0 | 3 | 1.05 | 0.4 | |
| | **Total respondents [n=197]** | 3 | 95 | 0 | 2 | 1.02 | 0.32 | |
| 1.9.5 Household waste items | Private sector [n=121] | 2 | 2 | 0 | 96 | 2.9 | 0.5 | 0.83 |
| | Public sector [n= 76] | 4 | 1 | 0 | 95 | 2.9 | 0.6 | |
| | Formally trained [n=84] | 1 | 0 | 0 | 99 | 2.96 | 0.3 | 0.25 |
| | In-service trained [n=113] | 4 | 3 | 0 | 93 | 2.81 | 0.7 | |
| | **Total respondents [n=197]** | 3 | 2 | 0 | 95 | 2.9 | 0.6 | |
| 1.9.6 Scalpel blades | Private sector [n=121] | 2 | 5 | 93 | 0 | 1.9 | 0.4 | 0.51 |
| | Public sector [n= 76] | 5 | 7 | 88 | 0 | 1.8 | 0.5 | |
| | Formally trained [n=84] | 1 | 6 | 93 | 0 | 1.92 | 0.3 | 0.30 |
| | In-service trained [n=113] | 5 | 5 | 89 | 0 | 1.84 | 0.5 | |
| | **Total respondents [n=197]** | 4 | 6 | 91 | 0 | 1.9 | 0.4 | |
| 1.9.7 Dental packaging of materials | Private sector [n=121] | 4 | 6 | 0 | 91 | 2.51 | 0.9 | ***0.04** |
| | Public sector [n= 76] | 2 | 21 | 0 | 77 | 2.21 | 1.1 | |
| | Formally trained [n=84] | 9 | 4 | 24 | 63 | 2.39 | 0.98 | 0.28 |
| | In-service trained [n=113] | 4 | 0 | 27 | 69 | 2.4 | 1 | |
| | **Total respondents [n=197]** | 5 | 2 | 22 | 72 | 2.4 | 0.99 | |

*SD= Standard deviation: p-value = Chi-Square test result with Alpha = 0.05, *Significant difference; **Highly significant difference*

## 6.9. Discussion of IPC Knowledge

### 6.9.1. Introduction

Health care workers should be aware that knowledge is power (Alhumaid *et al.*, 2021). It is fundamental for HCWs to have sufficient knowledge of IPC measures (Pegram and Bloomfield, 2015; WHO, 2016b, 2020; Samuel and Mathew, 2019). On the one hand, good knowledge of IPC measures has been reported among health care workers in governmental health care facilities in Addis Ababa

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(Geberemariyam, Donka and Wordofa, 2018). Good IPC knowledge was found among dental students at Sana 'a University, Yemen (Halboub, Al-Maweri, Al-Jamaei, Tarakji and Al-Soneidar, 2015), and adequate knowledge of IPC was shown by 78% of dentists and dental assistants at Primary Health Care Centres in Makkah, Saudi Arabia had (Bandugh *et al.*, 2018). Yet, a lack of knowledge about IPC measures was previously shown among HCWs at government hospitals in Indonesia (Duerink *et al.*, 2013*),* South West Ethiopia (Yakob and Lamaro, 2015) and Sierra Leone (Mandoh *et al.*, 2017)*);* North East Ethiopia (Assefa, Diress and Adane, 2020), among dental students in Central India (Singh *et al.*, 2011), and OHCWs in the Free State (Mehtar *et al.*, 2007).

Therefore, 50 items were used to survey eleven aspects of dental assistants' knowledge across the seven IPC themes in this study. The discussion outlines the findings of total respondents' (n=197) according to each knowledge aspect (KA) within the respective IPC themes. It further elaborates on the notable findings that emerged from the comparisons between the individual categories, namely respondents employed in the Private sector (n=121) versus respondents employed in the public sector (n=76) and FT respondents (n=84) versus IST respondents (n=113). At $alpha = 0.05$, the results of the Chi-Square with $p<0.01$ were deemed significant.

The interpretation of the results was based on the total respondents' average knowledge score. Results were classified as excellent (>75%,) good (74%-51%), moderate (50% - 26%) and weak (<25%) (Kumar and Rahman, 2017). Across multiple knowledge, attitude and practice studies that surveyed infection prevention and control measures within OHCFs, the focus was not specifically on dental assistants. Therefore, the respondents' knowledge of IPC measures was compared with other health care professionals, such as dentists, dental students, and nurses.

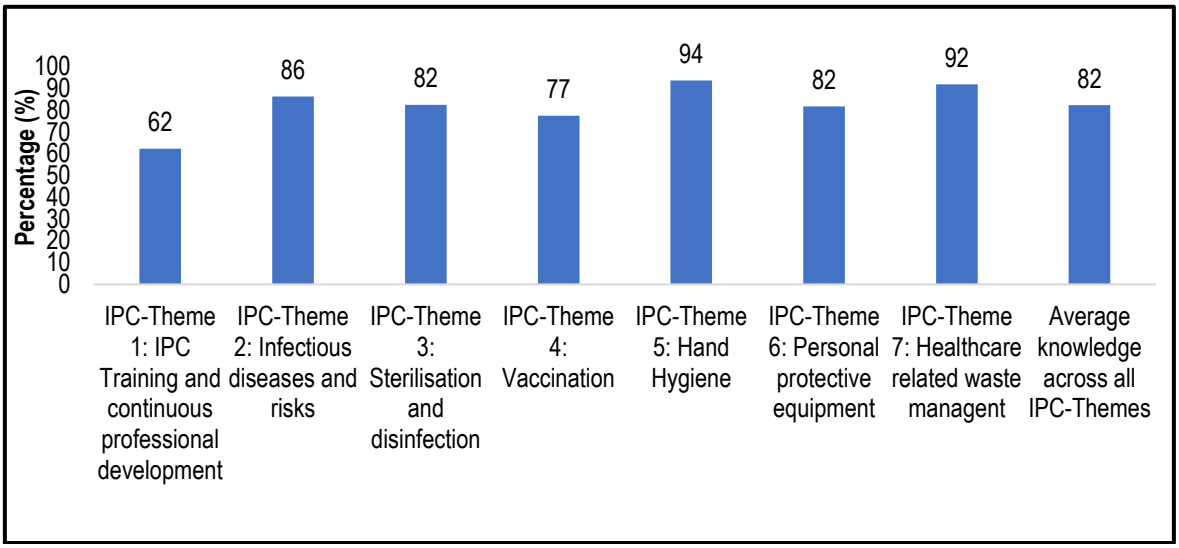
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### 6.9.2. Average IPC Knowledge score of the total respondents across the respective IPC themes

On average, 82% of respondents correctly answered the 50 items that probed IPC knowledge. Even though this result is interpreted as excellent, previous studies have shown variation in IPC knowledge among HCWs. Some researchers reported higher percentages of IPC knowledge among different categories of HCWs, with 95% amongst health care workers (HCWs) in Governmental Health care Facilities in Addis Ababa (Geberemariyam *et al.*, 2018); 86% amongst dentists in the Russian Federation (Budnyak *et al.*, 2012); 85% among dental practitioners in mainland Tanzania's government dental clinics (Christian and Kikwilu, 2014). On the other hand, other researchers reported a lower percentage of IPC knowledge among different categories of HCWs, with 73.6% among health sciences students at King Saud bin Abdul-Aziz University for Health Sciences, Saudi Arabia (Khubrani *et al.*, 2018); 58% among dental professionals in a dental college in Bangalore (Pavithran *et al.*, 2015); 57.4% for HCWs in Ethiopia (Yazie *et al.*, 2019); and 50% among Iranian dentists and dental students (Khanghahi *et al.*, 2013).

Furthermore, in the current study, the average IPC knowledge result per IPC theme indicated that more than 75% of respondents provided the correct answers to the knowledge items across six out of the seven IPC themes. Only in IPC theme 1: IPC training and continuous professional development the average knowledge was below 70% (Figure 6-1). Interestingly, among dental assistants in Pakistan, those working in private practices (76.30) had higher mean knowledge scores than those working public health care facilities (74.25%). In comparison, those with less than two years of experience (75.61%) had higher scores compared to those with 2–5 years of experience (73.96%) (Mahdi *et al.*, 2021a).

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*IPC = Infection prevention and control*

**Figure 6-1 Average IPC-Knowledge score of the total respondents across all the items in the respective IPC themes**

Further discussion of the IPC knowledge of the total respondents and the different respondent categories for the individual IPC themes, as reflected in Figure 6-1, follows in the remaining sections.

### 6.9.3. IPC training and continuous professional development

This study probed respondents' preference for IPC information sources, including consulting OHT members, books and journals, resources from the University of Technology, the internet and videos, and CPD attendance. Overall, respondents' preferences for IPC information resources varied. Likewise, the same tendency to use multiple IPC information sources was observed among HCWs who used informal and formal sources to obtain IPC information (Alhumaid *et al.* 2021).

Overall, resources obtained from the University of Technology (UoT) were the most preferred IPC information source, with 23% of the respondents indicating it as their first choice. In contrast, a much

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higher percentage (89.5%) of nurses showed formal teaching as their primary source of IPC information (Khubrani *et al*., 2018*;* Chisanga, 2017). Furthermore, in the current study, significantly more FT respondents indicated using resources obtained from the UoT as their first choice to get IPC information *($p= 0.01$)*. Similarly, health care students at four health care schools at Rouen University in France also indicated that teaching during the curriculum was the primary source of IPC information (Tavolacci *et al.,* 2008).

The second most preferred source of IPC information was consultation with other members of the OHCT, as indicated by 21% of the total respondents. This percentage was similar among the respective respondent categories, with no significant differences between the respective respondent categories. Similarly, among health care professionals in Northwest Ethiopia, 22.3% preferred to consult a colleague to obtain information about safety precautions (Yazie *et al*., 2019). However, in other studies, even a higher percentage of respondents preferred to consult with colleagues. Among hospital health care workers in Italy, 47.1% chose to consult other health care professionals (Albano *et al*., 2014), and 35% of dental students at Weill Cornell Medical College in Qatar preferred to obtain information from their classmates (Ibrahim and Elshafie, 2016).

Several guidance documents confirmed that it is a requirement for OHCWs to attend continuing professional development (CPD) (Surgeons, 2012; The Royal Australian College of General Practitioners, 2014; WHO, 2016b; HPCSA, 2017a; Saudi Arabia _ Ministry of Health and Ministry of Health: Saudi Arabia, 2018; Department of Health_RSA, 2020a). The attendance of CPD seminars emerged as the third preferred choice to obtain IPC information, as indicated by 17% of the total respondents. However, significantly more FT respondents indicated that they prefer attending CPD-seminars to get IPC information ($p=0.01$).

Less than 10% of the total respondents indicated using the internet and videos and books and journals as their first choice to obtain IPC information. In contrast, less than 1% of undergraduate health

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professional students at Makerere University College of Health Sciences in Uganda indicated using the internet and media to obtain IPC information (Nalunkuma *et al*., 2021). However, among health care workers at non-teaching public hospitals located in Naples and Avellino in Italy, 45% used the internet and 63.5% used public media as an information source *(*Albano *et al*., 2014). Furthermore, in the current study, significantly more FT respondents preferred using the internet and videos to obtain IPC information *($p=0.01$)*. However, significantly more IST respondents did not indicate their preference to use the internet and videos to get IPC information *($p=0.03$)*.

Other prominent findings surfaced in the items about IPC guidelines. Within the current study, more than 60% of the respondents were aware that IPC guidelines existed and that these guidelines were available in their OHCFs. In addition, significantly more respondents in the private sector ($p=0.001$), and IST respondents ($p=0.02$), reported that IPC guidelines existed and that IPC guidelines were available within their OHCFs. However, previous research reported lower awareness about the availability of IPC guidelines within OHCFs within South-African OHCFs (Mehtar *et al.*, 2007; Oosthuysen *et al.*, 2010). This pattern of lower percentages of awareness emerged in other countries as well, with 29% of India's dentists (Mathew and Luke, 2016), 47.8% of HCWs in the West Arsi District of Southeast Ethiopia, and 47.9% of health care professionals in northwest Ethiopia, confirmed that IPC guidelines and manuals were available in their departments (Geberemariyam, Donka and Wordofa, 2018; Yazie, Sharew and Abebe, 2019).

In contrast to these results, other studies reported that higher percentages of respondents confirmed that IPC guidelines were available and accessible within their respective health care facilities. Among oral hygienists in the US, 77% indicated that IPC guidelines were available (Garland, 2013), and 71.7% of health care workers in governmental health care facilities in Addis Ababa were aware of the availability of IPC guidelines within their facilities (Sahiledengle *et al.*, 2018).

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Furthermore, 57% of respondents in the current study confirmed that they are familiar with the content of IPC guidelines. However, significantly more respondents in the private sector ($p= 0.0001$) were familiar with the contents of the IPC guidelines. In contrast, 86% of oral hygienists in the USA (Garland, 2013) and 84.2% of Zambian nurses (Chisanga 2017) indicated they were familiar with IPC guidelines.

### 6.9.4. Infectious diseases and risks

Of the total respondents, 96% reported that disease transmission is possible within OHCFs. This finding is similar to Halboub *et al*. (2015), who found that 95.8% of dental students were aware of transmitting infectious diseases within dental clinics. Furthermore, in Lebanon, 96% of private dentists in Lebanon expressed their concern about the possibility of disease transmission within OHCFs (Dagher *et al*., 2017). Likewise, 89% of HCWs in Ethiopia considered their work environment a risk for disease transmission (Yazie *et al*., 2019). However, fewer dental assistants in Jeddah, Saudi Arabia, had sufficient knowledge about disease transmission in general (AlDakhil *et al*., 2019).

In this study, more than 80% of the total respondents reported that there is a possibility of transmitting Herpes simplex, Hepatitis B, TB and HIV within OHCFs. However, at $p=0.01$, significantly more respondents in the public sector were aware of the possibility of transmitting the Herpes simplex virus within OHCF. Italian dentists had high awareness that transmission of Hepatitis and Influenza is possible with OHCFs (Petti, Messano and Polimeni, 2011). A similar percentage of HCPs in Ethiopia were aware of the transmission mechanisms of infectious agents (Yazie *et al*., 2019). Still, only 61.5% of dentists in East Jerusalem acknowledged the possibility of transmitting Mycobacterium tuberculosis within OHCFs (Al-Khatib *et al*., 2006).

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Additionally, in the current study, more than 80% of the respondents were knowledgeable about direct contact, splatter or sprays, needle stick injuries, injuries with contaminated instruments, and inhalation as modes of disease transmission. But only 60% were aware of ingestion, and 44% were aware of indirect contact as a disease transmission mode. Knowledge about indirect contact as a mode of disease transmission seems to be a problem among HCWs, as only 56.1% of medical students in western Saudi Arabia had correct knowledge that the hands of the HCWs constitute a significant vehicle to indirectly transmit potentially detrimental microbes among patients on the health care premises (Bakarman *et al*., 2019).

On the other hand, several studies focused on respondents' knowledge about the transmission mode of specific infectious diseases such as Hepatitis B. For example, dental and oral hygiene students at a University in Pretoria have good knowledge about the transmission mode of Hepatitis B (Madiba *et al*., 2018) and medical students at Northern Border University, Arar, Kingdom of Saudi Arabia (Alhowaish *et al.*, 2017). Less than 15 years ago, inadequate knowledge about the mode of transmission of micro-organisms such as HBV, HCV, and Herpes simplex virus (HSV) type 1 and 2, HIV, Mycobacterium tuberculosis and other viruses and bacteria were found among Turkish dentists (Yüzbasioglu *et al*., 2009). Likewise, Al-Shamiri *et al*. (2018) found that respondents in his study had inadequate knowledge about HBV transmission through controversial transmission modes such as saliva, breast milk, sneezing, or coughing. The same among dental students at a university in Columbia, only 47.5% had adequate knowledge of transmission of bloodborne diseases (Myers *et al.*, 2012).

Overall, 91% of the total respondents were aware of the risk of OEI within OHCFs, and respondents' knowledge of the respective steps to manage an occupational exposure incident varied. However, 71% of the total respondents correctly placed the first step in managing an OEI, namely, to inform the supervisor when an OEI occurred. Still, less than 11% rightly ordered the remaining steps to manage

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an OEI. Among dental professionals in Bangalore, India, 50% indicated that they were unaware of the procedures to report an OEI (Pavithran *et al.*, 2015). In contrast, 37% of dental students at a university in Columbia had adequate knowledge about OEI management (Myers *et al.*, 2012).

Overall, 45% of the total respondents preferred their private medical practitioner to manage the OEI further. Other OEI management steps were either not included or incorrectly ordered by the respondents. Only 4% and 11% of the total respondents correctly placed the OEI management steps. Knowledge about procedures to manage an OEI was also low among enrolled dental students at the Columbia University College of Dental Medicine. Only 25% correctly answered the questions about post-exposure management (Myers *et al.*, 2012).

### 6.9.5. Disinfection and sterilisation

Overall, 90% of respondents in this study reported that disinfection and sterilisation are different processes. Rutala *et al.* (2019) mentioned that the degree of risk for infection involved in items would determine whether an item is categorised as critical, semi-critical, or non-critical. This knowledge of the instrument classification system will guide whether to disinfect or sterilise a specific instrument (Ling *et al.*, 2018).

In the current study, respondents' knowledge of the correct classification of instruments varied. Overall, 70% and more of the total respondents correctly classified extraction forceps (85%), dental handpieces (77%), mouth mirrors (73%), and endodontic instruments (70%). In contrast to this finding, a higher percentage (82.2%) of dental assistants in Nigeria correctly classified endodontic instruments Enabulele and Omo (2018). Additionally, significantly more respondents in the private sector correctly classified extraction forceps ($p=0.02$), mouth mirrors ($p=0.01$) and dental handpieces ($p=0.01$).

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Furthermore, knowledge about the classification of orthodontic instruments was lower, as only 54% of respondents in the current study, with significantly more respondents in the private sector who correctly classified endodontic instruments *(p=0.01)*. Knowledge about the classification of dental instruments is not only lacking among dental assistants, as only 11.2% of dentists in Russia had a good understanding of the instrument classification system (Budnyak *et al*., 2012).

### 6.9.6. Vaccination

The percentage of respondents who correctly answered the items probing respondents' knowledge about the required vaccination for OHCWs varied. Among the total respondents, 75% reported that it is optional that OHCWs to receive vaccination against Hepatitis A. However, a significant difference between respondents employed in the respective sectors occurred. Significantly more respondents employed in the public sector indicated that OHCWs do not need vaccination against Hepatitis A *(p =0.001)*. However, it is recommended that adults older than 19 years receive two doses of the Hepatitis A vaccine if some other risk factor, such as the occupation of the person, is present (Kim *et al.*, 2015).

Furthermore, 92% of the respondents reported that OHCWs must receive vaccination against Hepatitis B. This percentage is higher in comparison to previous studies. Abdela *et al*. (2016) said that 84.6% of medicine and health sciences students in Northwest Ethiopia reported that a vaccine could prevent Hepatitis B infection. However, among dental students in Saudi Arabia, 66.3% knew that a vaccine against HBV infection is available (Saquib *et al.*, 2019). Additionally, 70% of respondents were unaware that no Hepatitis C vaccine is available yet. Likewise, 66% of dentists in Iran indicated that a vaccine against Hepatitis C is available (Rostamzadeh *et al.*, 2018).

Concerning the recommendation for vaccination of OHCWs against Influenza, 74% of respondents indicated affirmative responses. However, 20% of respondents indicated uncertainty. In contrast, 96%

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of undergraduates and interns and 100% of staff at a dental institution in Faridabad city, Haryana, had adequate knowledge about Influenza vaccination (Palwankar *et al.,* 2015). Furthermore, Wicker *et al.* (2012) indicated that 91% of German OHCWs have sufficient information about the Influenza vaccine.

### 6.9.7. Hand hygiene

On average, 94% of the total respondents provided correct answers to items probing respondents' knowledge about the effect of their hand hygiene on other persons. Furthermore, no significant differences occurred between respondent categories related to their understanding of persons directly or indirectly affected by their hand hygiene practices.

However, previous studies on hand hygiene knowledge yielded lower percentages than this study. At a hospital in Ethiopia, 77.3% of HCWs were knowledgeable about the effect of their hand hygiene on others (Abdela *et al*., 2016). Likewise, 74% of dentists in Bengaluru (Bangalore) knew that hand hygiene prevents infection in patients (Naik *et al*., 2014). However, only 51.6% of medical, dental, and nursing students in Western Saudi Arabia were aware that the unclean hands of HCWs were the leading cause of disease transmission in a health care setting (Bakarman *et al*., 2019). Ultimately, Baier *et al*. (2020) concluded that the knowledge of hand hygiene of "Generation Z" dental students, trainee nurses and medical technical assistants was worthy of improvement. In a cross-sectional study conducted among undergraduate students in a Tertiary Care Teaching Institute in Navi Mumbai, Maharashtra, India, Thakker and Jadhav (2015) concluded that medical students had better hand hygiene knowledge than dental and nursing students.

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### 6.9.8. Personal protective equipment

On average, 82% of respondents provided correct answers to items probing knowledge about PPE. However, studies conducted in other countries found that more respondents were knowledgeable about PPE. 86% of dentists in the Russian Federation had average knowledge of PPE (Budnyak et al., 2012). Likewise, 85% of dental practitioners in government dental clinics in mainland Tanzania were knowledgeable about PPE use (Christian and Kikwilu, 2014). On the other hand, other studies reported lower average percentages of knowledge about PPE amongst health care workers. In Pakistan, 72.5% of dental assistants working at Multan Medical and Dental College Multan "had a decent learning about the PPE" (Khubrani *et al*., 2018). An average of 73.6% of health sciences students at King Saud bin Abdulaziz University for Health Sciences in Saudi Arabia were knowledgeable about PPE. In contrast, 58% of dental professionals at a dental college in Bangalore (Javaid *et al*., 2019), 57.4% of HCWs in Ethiopia (Yazie, *et al*., 2019) and 50% of Iranian dentists and dental students had adequate knowledge about PPE (Khanghahi *et al*., 2013). Whereas Shankar *et al*. (2020) reported that first-year dental students at Saveetha Dental College had very little knowledge of PPE.

Of the total respondents, 93% confirmed that replacing wet masks and using heavy-duty gloves when cleaning equipment is essential. Furthermore, less than 25% of respondents indicated an affirmative response to change examination gloves only when visibly contaminated in the statement about the conditional use of PPE. In contrast to this finding, 38.3% of Ethiopia's health care workers said there is no need to change gloves between patients if the gloves are not visibly contaminated (Geberemariyam *et al*., 2018).

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### 6.9.9. Health care related waste management

Overall, an average of 92% of the respondents provided correct answers to the items probing knowledge about health care related waste (HCRW) management. In contrast to this result, several researchers concluded that the knowledge about HCRW measures among health care workers was inadequate (La *et al.*, 2005; Narang *et al.*, 2012; Bansal *et al.*, 2013; Kapoor *et al.*, 2014; Jannathul Feridoz and Krishnan, 2018; Raghuvanshi *et al.*, 2018; Sharma *et al.*, 2020). Similarly, a significant difference $(p=0.000)$ in knowledge about HCRW management was found among students in different years of study at a private dental institution in Chennai (Deeksheetha *et al.*, 2020).

Also, 90% of respondents within the current study reported a difference between domestic (household) and health care related waste (HCRW). This result is consistent with the findings of other researchers, as 91.9% of interns, postgraduates and faculty enrolled at the Manipal College of Dental Sciences, Manipal correctly indicated the categories of waste generated in an OHCF (Puri *et al.*, 2019). On the other hand, other researchers reported slightly lower percentages, with 81.6% of health care professionals in Northwest Ethiopia were familiar with the different categories of waste generated within a health care facility (Yazie *et al.*, 2019); 80% of private practitioners and 100% of institution associated dentists in North India were familiar with the different waste categories (Raghuvanshi *et al.*, 2018) and 79.7% of dentists in private practices from district central Karachi were knowledgeable about the different waste categories (Naz *et al.*, 2020).

More than 90% of the respondents indicated the correct disposal method for the seven listed waste items. However, 72% of the respondents in the current study reported the proper disposal method for dental packaging materials. Furthermore, a significant difference between respondents occurred. With $p=0.04$, significantly more respondents in the private sector indicated the appropriate disposal method for dental packaging materials. In contrast, only 55.9% of students and staff at the Manipal College of Dental Sciences, Manipal, had adequate knowledge of the handling of hospital waste (Puri

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*et al*., 2019). Furthermore, Yazie *et al*. (2019) expressed concern about the danger of infectious waste items mixed with general waste. In addition, when considering the expense of the disposal of infectious waste items, it is undesirable to mix household waste items with infectious waste items (WHO, 2014a)

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# Chapter 7

# Attitude towards IPC

## 7.1. Introduction

This study surveyed twenty-eight aspects of dental assistants' attitudes within the seven IPC themes. Within each IPC theme, the discussion summarises the total respondents' (n=197) attitudes towards the respective attitude aspects (AA). After that, it elaborates on the notable findings that emerged from fifty-nine (59) items used to survey respondents' attitudes towards infection prevention and control measures. However, across multiple knowledge, attitude and practice studies that surveyed infection prevention and control measures within OHCFs, the focus was not specifically on dental assistants. Furthermore, published literature that compared dental assistants' attitudes towards IPC measures across the different employment sectors or between differently trained dental assistants is scarce or non-existent. In those cases, the respondents' attitudes towards IPC measures were compared with other health care professionals, such as dentists, dental students, and nurses.

Respondents' attitude toward the set statements was gauged using a Likert-type scale response option for most of the statements. However, a Yes or No response applied to some of the statements.

**Table 7-1 Summary of IPC-Attitude Domain: IPC themes, number of attitude aspects, and number of attitude items**

| IPC theme number | Name of IPC theme | Number of Attitude aspects | Number of items |
|---|---|---|---|
| 1 | IPC training and continuous professional development | 2 | 4 |
| 2 | Infectious diseases and risks | 7 | 7 |
| 3 | Disinfection and sterilisation | 4 | 12 |
| 4 | Vaccination | 4 | 4 |

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| IPC theme number | Name of IPC theme | Number of Attitude aspects | Number of items |
|---|---|---|---|
| 5 | Hand hygiene | 3 | 7 |
| 6 | Personal protective equipment (PPE) | 3 | 14 |
| 7 | Health care related waste (HCRW) management | 4 | 6 |
| 8 | Barriers to effective IPC | 1 | 5 |
| ***Total*** | | ***28*** | ***59*** |

The researcher presented the result of each item in a table format. Each table shows the *percentage*, the *mean*, and *standard deviation* of the total respondents (n=197) and the respective respondent categories. Furthermore, the tables also display the results of the Chi-square tests *(p-value)* with *alpha = 0.05*. These tests confirmed if a significant difference existed between respondents employed in the Private sector (n=121) versus the public sector (n=76) and between FT (n=84) versus IST respondents (n=113).

The respondents' attitudes were interpreted as either positive or negative, depending on the level of agreement with the statements. Higher scores of agreement with positively stated items and higher scores of disagreement with negatively worded items denoted a positive attitude (Bonetti *et al.*, 2009)

## 7.2. IPC theme 1: IPC training and continuous professional development

Training related to infection prevention and control (IPC) aims to enhance the professional integrity of health care workers (HCWs). Furthermore, a positive attitude towards IPC measures increases the safety of patients and OHCWs during the delivery of treatment. Therefore, aspects within IPC theme 1: IPC training and continuous professional development, surveyed respondents' attitudes towards

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formal and informal IPC training opportunities. Table 7-2 outlines the purpose of the items within respective attitude aspects.

**Table 7-2 Purpose of the different attitude aspects and items within IPC theme 1**

| Attitude aspects | Purpose of items within respective attitude aspects | |
|---|---|---|
| **Attitude aspect 1:** IPC training within the oral health care facility | 1) | To assess respondents' attitudes towards three opportunities to obtain IPC training within OHCFs, namely |
| | 1.1 | upon the appointment of new OHC staff as well as |
| | 1.2 | when new IPC products and |
| | 1.3 | equipment arrives at the facility |
| **Attitude aspect 2:** IPC training opportunities outside the oral health care facility | 2) | To assess respondents' attitudes towards possible IPC training opportunities outside the OHCF |
| | 2.1 | specific reference to continuous professional development (CPD) events |

### 7.2.1. IPC training opportunities within oral health care facilities

Across the three items that probed respondents' attitudes towards IPC training opportunities within OHCFs, more than 80% of the total respondents indicated agreement. This percentage was similar across all the respondent categories. Furthermore, across all three listed IPC training opportunities with OHCFs, the Chi-square test with $alpha = 0.05$ indicated no significant differences between respondents employed in the different sectors nor between differently trained respondents (Table 7-3).

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**Table 7-3 Respondents' attitude toward IPC training opportunities within oral health care facilities**

**1. IPC training upon appointment as new OHC staff**

| Respondent categories | Response options (%) | | | | | | Mean | SD | p-value (alpha = 0.05) |
|---|---|---|---|---|---|---|---|---|---|
| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Not indicated | | | |
| Private sector [n=121] | 2 | 2 | 7 | 33 | 53 | 3 | 4.22 | 1.17 | 0.44 |
| Public sector [n= 76] | 0 | 4 | 5 | 24 | 61 | 7 | 4.21 | 1.36 | |
| Formally trained [n=84] | 2 | 4 | 6 | 25 | 61 | 2 | 4.31 | 1.15 | 0.48 |
| In-service trained [n=113] | 1 | 2 | 6 | 33 | 52 | 6 | 4.15 | 1.31 | |

| Total respondents (n=197) | Disagreement | Neutral | Agreement | Not Indicated |
|---|---|---|---|---|
| | 4 | 6 | 85 | 5 |

**2. IPC training upon arrival of new IPC products**

| Respondent categories | Response options (%) | | | | | | Mean | SD | p-value (alpha = 0.05) |
|---|---|---|---|---|---|---|---|---|---|
| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Not indicated | | | |
| Private sector [n=121] | 2 | 1 | 3 | 43 | 48 | 3 | 4.25 | 1.08 | 0.08 |
| Public sector [n= 76] | 3 | 7 | 4 | 33 | 45 | 9 | 3.83 | 1.57 | |
| Formally trained [n=84] | 4 | 5 | 4 | 35 | 50 | 4 | 4.12 | 1.27 | 0.38 |
| In-service trained [n=113] | 1 | 2 | 4 | 42 | 44 | 7 | 4.06 | 1.33 | |

| Total respondents (n=197) | Disagreement | Neutral | Agreement | Not Indicated |
|---|---|---|---|---|
| | 7 | 4 | 83 | 6 |

**3. IPC training upon arrival of new IPC equipment**

| Respondent categories | Response options (%) | | | | | | Mean | SD | p-value (alpha = 0.05) |
|---|---|---|---|---|---|---|---|---|---|
| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Not indicated | | | |
| Private sector [n=121] | 2 | 2 | 5 | 38 | 50 | 4 | 4.2 | 1.18 | 0.40 |
| Public sector [n= 76] | 3 | 5 | 4 | 30 | 49 | 9 | 3.89 | 1.57 | |
| Formally trained [n=84] | 4 | 4 | 4 | 33 | 52 | 4 | 4.17 | 1.26 | 0.54 |
| In-service trained [n=113] | 1 | 3 | 5 | 36 | 47 | 8 | 4.02 | 1.41 | |

| Total respondents (n=197) | Disagreement | Neutral | Agreement | Not Indicated |
|---|---|---|---|---|
| | 6 | 4 | 84 | 6 |

*SD= Standard deviation: p-value = Chi-Square test result with Alpha = 0.05; *Significant difference; **Highly significant difference*

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### 7.2.2. IPC training opportunities outside oral health care facilities

Overall, 73% of the total respondents agreed that it is necessary to receive yearly IPC training. This percentage was similar across all the respondent categories. Furthermore, the Chi-square test with *alpha =0.05* indicated no significant differences between the respondents employed in the respective sectors nor between differently trained respondents (Table 7-4).

**Table 7-4 Respondents' attitude towards IPC training yearly outside of oral health care facilities**

| Respondent categories | Response options *(%)* | | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|---|
| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Not indicated | | | |
| Private sector [n=121] | 6 | 9 | 7 | 36 | 36 | 7 | 3.68 | 1.51 | *0.31* |
| Public sector [n= 76] | 9 | 5 | 5 | 24 | 50 | 7 | 3.80 | 1.62 | |
| Formally trained [n=84] | 7 | 5 | 8 | 33 | 43 | 4 | 3.89 | 1.39 | *0.40* |
| In-service trained [n=113] | 7 | 10 | 4 | 29 | 41 | 9 | 3.6 | 1.66 | |
| ***Total respondents (n=197)*** | ***Disagreement*** | | ***Neutral*** | | ***Agreement*** | | ***Not Indicated*** | | |
| | 15 | | 5 | | 73 | | 7 | | |

*SD= Standard deviation: p-value = Chi-Square test result with Alpha = 0.05; *Significant difference; **Highly significant difference*

## 7.3. IPC theme 2: Infectious diseases and risks

Respondents' attitudes towards seven aspects of infectious diseases and risks were probed. These aspects addressed various issues such as standard precautions, working with a patient with a known infectious disease, priority of IPC practices, and whether respondents are confident that the IPC measures they apply efficiently prevent disease transmission within OHCFs. Table 7-5 outlines the seven attitude aspects and the purpose thereof.

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**Table 7-5 Purpose of the different attitude aspects and items within IPC theme 2**

| Attitude aspects | Purpose of items within respective knowledge aspect |
|---|---|
| **Attitude aspect 1:** Standard precautions | 1) To assess respondents' attitudes towards the use of the same precautions for all patients |
| **Attitude aspect 2:** IPC routine when working on a patient with a known infectious disease | 2) To assess respondents' attitudes towards using the same IPC routine when working on a patient with a known infectious disease |
| **Attitude aspect 3:** Possibility of disease transmission within their OHCFs | 3) To assess respondents' attitudes towards the possibility of disease transmission within their OHCFs |
| **Attitude aspect 4** Comfortability with IPC measures applied when working on a patient with a known infectious disease | 4) To assess if respondents feel comfortable with their IPC measures when working on a patient with a known infectious disease |
| **Attitude aspect 5** Priority of IPC measures | 5) To assess if respondents view IPC measures as a priority |
| **Attitude aspect 6** Team effort put into IPC | 6) To assess if respondents view teamwork as necessary when performing IPC tasks |
| **Attitude aspect 7** Confidence that the IPC measures applied to prevent the transmission of diseases | 7) To assess respondents' level of confidence with the IPC measures used when seeing patients |

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### 7.3.1. Standard precautions

Overall, 90% of the total respondents indicated agreement that the same precautions be used on all patients, irrespective of the patient's health status. Furthermore, the Chi-square test with $alpha = 0.05$ showed no significant differences between the respondents employed in the respective sectors nor between differently trained respondents (Table 7-6).

**Table 7-6 Same precautions are to be used for all patients irrespective of their health status**

| Respondent categories | Response options *(%)* | | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|---|
| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Not indicated | | | |
| Private sector [n=121] | 3 | 2 | 4 | 17 | 74 | 1 | 4.53 | 1 | *0.27* |
| Public sector [n= 76] | 3 | 1 | 3 | 25 | 63 | 5 | *4.29* | 1.31 | |
| Formally trained [n=84] | 1 | 2 | 1 | 17 | 77 | 1 | 4.63 | 0.89 | *0.17* |
| In-service trained [n=113] | 4 | 1 | 5 | 22 | 64 | 4 | 4.29 | 1.27 | |

| *Total respondents (n=197)* | *Disagreement* | *Neutral* | *Agreement* | *Not Indicated* |
|---|---|---|---|---|
| | 4 | 3 | 90 | 3 |

*SD= Standard deviation: p-value = Chi-Square test result with Alpha = 0.05; *Significant difference; **Highly significant difference*

### 7.3.2. IPC routine when working on a patient with a known infectious disease

The principle of standard precautions should be consistently adhered to when rendering treatment in general. The IPC routine should be sufficient to prevent disease transmission even when working on a patient with a known infectious disease. Therefore, this aspect probed respondents' attitudes towards changing the usual IPC measures when working on a patient with a known infectious disease. A positive attitude was associated with the "No" response, and a negative attitude was related to this item's "Yes" response option.

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Across the total respondents, an equal percentage of respondents indicated opposing responses to this item, with 43% who indicated "Yes" and 43% who indicated "No". Within the respective employment sectors, a slightly lower percentage (38%) of respondents in the private sector indicated "Yes", whereas 50% of respondents in the public sector indicated "Yes". On the other hand, a higher percentage of FT respondents (51%) indicated "No", whereas were slightly lower percentage of IST respondents (37%) indicated "No". However, the Chi-square test with $alpha = 0.05$ indicated that significantly more respondents in the public sector indicated that they would change their IPC routine when working on a patient with a known infectious disease, and significantly more FT respondents stated the opposite (Table7-7).

**Table7-7 Change your IPC routine when working on a patient with a known infectious disease**

| Respondent categories | Response options (%) | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|
| | Yes | No | Not indicated | | | |
| Private sector [n=121] | 38 | 45 | 17 | 1.21 | 0.71 | *0.01 |
| Public sector [n= 76] | 50 | 39 | 11 | 1.29 | 0.67 | |
| Formally trained [n=84] | 38 | 51 | 11 | 1.29 | 0.65 | *0.01 |
| In-service trained [n=113] | 46 | 37 | 17 | 1.28 | 0.74 | |
| Total respondents (n=197) | 43 | 43 | 14 | | | |

*SD= Standard deviation: p-value = Chi-Square test result with Alpha = 0.05; *Significant difference; **Highly significant difference*

### 7.3.3. Possibility for disease transmission within OHCF

In response to the statement that there is a possibility for disease transmission within OHCFs, 64% of the total respondents indicated an affirmative answer. Furthermore, the Chi-square test at $alpha = 0.05$ confirmed a highly significant difference between respondents in the respective working sectors $(p<0.01)$. Significantly more respondents in the public sector (76%) versus 56% of

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respondents in the private sector indicated an affirmative response that there is a possibility for disease transmission within the OHCFs (Table 7-8).

**Table 7-8 Possibility for disease transmission within OHCF**

| Respondent categories | Response options (%) | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|
| | Yes | No | Not indicated | | | |
| Private sector [n=121] | 56 | 30 | 14 | 1.42 | 0.73 | ***<0.01* |
| Public sector [n= 76] | 76 | 8 | 17 | 1.64 | 0.74 | |
| Formally trained [n=84] | 64 | 22 | 14 | 1.5 | 0.74 | *0.99* |
| In-service trained [n=113] | 64 | 21 | 15 | 1.51 | 0.75 | |
| ***Total respondents (n=197)*** | *64* | *21* | *15* | | | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

### 7.3.4. Comfortability with IPC practices when assisting a patient with a known infectious disease

Overall, only 39% of the total respondents indicated that they always feel comfortable with their IPC practices. Additionally, a slightly higher percentage of respondents in the private sector (46%) indicated that they always feel comfortable with their IPC practices. In contrast, a somewhat lower rate of respondents in the public sector (32%) reported the same. On the other hand, 32% of FT respondents versus 18% of IST said they more often feel comfortable with their IPC measures when working on a patient with an infectious disease. However, the Chi-square test with $alpha = 0.05$ indicated no significant differences between respondents employed in the respective sectors or respondents with different training types (Table 7-9).

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**Table 7-9 Comfortability with IPC practices when assisting a patient with a known infectious disease**

| Respondent categories | Response options *(%)* | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|
| | Never | Less often | More often | Always | Not indicated | | | |
| Private sector [n=121] | 7 | 18 | 22 | 46 | 7 | 2.95 | 1.23 | 0.26 |
| Public sector [n= 76] | 11 | 26 | 26 | 32 | 5 | 2.68 | 1.18 | |
| Formally trained [n=84] | 7 | 21 | 32 | 36 | 4 | 2.89 | 1.09 | 0.15 |
| In-service trained [n=113] | 9 | 21 | 18 | 44 | 8 | 2.81 | 1.31 | |
| ***Total respondents (n=197)*** | 8 | 21 | 29 | 39 | 5 | | | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

### 7.3.5. IPC is a priority

Overall, 90% of the respondents indicated agreement that IPC is a priority within their respective OHCFs. This percentage was similar across the different respondent categories. Furthermore, the Chi-square test with $alpha = 0.05$ indicated no significant differences between the respondent employed in the respective sectors or respondents with varying types of training (Table 7-10).

**Table 7-10 IPC is a priority**

| Respondent categories | Response options *(%)* | | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|---|
| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Not indicated | | | |
| Private sector [n=121] | 2 | 1 | 5 | 23 | 66 | 2 | 4.42 | 2.95 | 0.96 |
| Public sector [n= 76] | 1 | 1 | 4 | 25 | 67 | 1 | 4.51 | 0.92 | |
| Formally trained [n=84] | 1 | 1 | 5 | 21 | 71 | 0 | 4.61 | 0.74 | 0.74 |
| In-service trained [n=113] | 3 | 1 | 4 | 26 | 63 | 4 | 4.35 | 1.19 | |
| ***Total respondents (n=197)*** | ***Disagreement*** | | ***Neutral*** | | ***Agreement*** | | ***Not Indicated*** | | |
| | 3 | | 5 | | 90 | | 2 | | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

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### 7.3.6. IPC is a team effort

Overall, 86% of the total respondents indicated agreement that IPC is a team effort within their OHCFs. This percentage was similar across the different respondent categories. Furthermore, the Chi-square test with $alpha = 0.05$ indicated no significant differences between respondents employed in the respective sectors or respondents with different types of training showed a positive attitude in perceiving IPC as a team effort (Table 7-11).

**Table 7-11 IPC is a team effort**

| Respondent categories | Response options *(%)* | | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|---|
| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Not indicated | | | |
| Private sector [n=121] | 2 | 1 | 7 | 28 | 60 | 2 | 4.34 | 1.1 | *0.77* |
| Public sector [n= 76] | 1 | 3 | 5 | 26 | 59 | 5 | 4.24 | 1.29 | |
| Formally trained [n=84] | 1 | 1 | 7 | 23 | 67 | 1 | 4.49 | 0.92 | *0.34* |
| In-service trained [n=113] | 3 | 2 | 5 | 31 | 54 | 5 | 4.16 | 1.32 | |
| ***Total respondents (n=197)*** | ***Disagreement*** | | ***Neutral*** | | ***Agreement*** | | ***Not Indicated*** | | |
| | 4 | | 6 | | 86 | | 4 | | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

### 7.3.7. Confidence that IPC measures applied are sufficient to prevent disease transmission

On average, 87% of the total respondents indicated agreement that the IPC measures they apply are sufficient to prevent disease transmission. However, the percentage of respondents employed in the respective sectors varied. A total of 71% of respondents in the private sector versus 53% of respondents in the public sector strongly agreed. Furthermore, the results of the Chi-square tests confirmed that significantly more respondents in the private sector ($p=0.04$) are confident that the

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IPC measures they apply within the OHCFs, are sufficient to prevent disease transmission (Table 7-12).

**Table 7-12 Confident that IPC measures applied are sufficient to prevent the transmission of disease**

| Respondent categories | Response options *(%)* | | | | | | *Mean* | *SD* | *p-value (alpha = 0.05))* |
|---|---|---|---|---|---|---|---|---|---|
| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Not indicated | | | |
| Private sector [n=121] | 3 | 0 | 2 | 21 | 71 | 2 | 4.52 | 1.02 | ***0.04** |
| Public sector [n= 76] | 4 | 4 | 5 | 26 | 53 | 8 | 3.96 | 1.54 | |
| Formally trained [n=84] | 1 | 2 | 4 | 24 | 64 | 5 | 4.33 | 1.25 | *0.67* |
| In-service trained [n=113] | 5 | 1 | 4 | 23 | 64 | 4 | 4.28 | 1.3 | |
| ***Total respondents (n=197)*** | ***Disagreement*** | | ***Neutral*** | | ***Agreement*** | | ***Not Indicated*** | | |
| | 6 | | 4 | | 87 | | 3 | | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

## 7.4. IPC theme 3: Disinfection and sterilisation

A health worker's positive attitude towards disinfection and sterilisation can play a role in combating the spread of micro-organisms and disease. Therefore, the focus was on four aspects of respondents' attitudes towards disinfection and sterilisation measures. These aspects surveyed respondents' attitudes towards disinfection of items, the instrument sterilisation routine, biological monitoring and record-keeping of the sterilisation process. Table 7-13 further outlines the purpose of the items within each of the four attitude aspects.

**Table 7-13 Purpose of the different attitude aspects and items within IPC theme 3**

| Attitude aspects | Purpose of items within respective knowledge aspect |
|---|---|
| **Attitude aspect 1:** Disinfection of items | **To survey if respondents find it acceptable only to disinfect the listed items:**<br>1.1 Suction tips<br>1.2 Working surfaces |

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| Attitude aspects | Purpose of items within respective knowledge aspect |
|---|---|
| | 1.3 Instruments used within the oral cavity<br>• Impression trays<br>• Extraction forceps<br>• Orthodontic instruments<br>• Endodontic instruments |
| **Attitude aspect 2:**<br>Instrument sterilisation routine | **To survey respondents' attitudes towards the inclusion of listed instruments processing actions before placement of instruments into the sterilisation device:**<br>2.1 Hand wash instruments before sterilisation<br>2.2 Clean instruments in the instrument washer before sterilisation<br>2.3 Clean instruments in an ultra-sonic bath before sterilisation<br>2.4 Placement of instruments in a sterilisation pouch |
| **Attitude aspect 3**<br>Biological monitoring | **To survey respondents' attitudes towards biological monitoring** |
| **Attitude aspect 4**<br>Record keeping of the sterilisation processes | **To survey respondents' attitudes towards record keeping of the sterilisation processes** |

### 7.4.1. Disinfection of items

The respondents' attitudes towards processing a disposable item, surfaces, and four instruments that encounter blood and saliva were probed. The standard practice is that disposable items are used once and then discarded. Items that encounter blood and saliva should be autoclaved. Disinfection applies only to surfaces and items that cannot be placed in an autoclave should. In this case, cold sterilisation methods are prescribed using a high-level disinfectant. The statement probed respondents' attitude

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towards these recommended standard practices by stating that "it is sufficient to only disinfect the listed items and instruments before re-use on the next patient".

#### 7.4.1.1 Suction tips

Items intended to be used only once, such as suction tips, should be discarded and not be processed for re-use. Thus, disagreement with the statement is indicative of a positive attitude. Overall, 91% of the total respondents indicated disagreement with the idea that it is enough to disinfect suction tips before using them on the next patient. This percentage was similar across the respective categories. Furthermore, the Chi-square test with $alpha = 0.05$ indicated no significant differences between the respondent employed in the different sectors nor between the differently trained respondents (Table 7-14).

**Table 7-14 Disinfection of suction tips**

| Respondent categories | Response options *(%)* | | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|---|
| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Not indicated | | | |
| Private sector [n=121] | 88 | 3 | 1 | 1 | 7 | 0 | 1.3 | 1 | *0.80* |
| Public sector [n= 76] | 86 | 4 | 1 | 1 | 5 | 3 | 1.3 | 1 | |
| Formally trained [n=84] | 94 | 2 | 1 | 1 | 1 | 1 | 1.1 | 0.6 | *0.14* |
| In-service trained [n=113] | 81 | 5 | 1 | 1 | 10 | 2 | 1.5 | 1.2 | |
| ***Total respondents (n=197)*** | ***Disagreement*** | | ***Neutral*** | | ***Agreement*** | | ***Not indicated*** | | |
| | 91 | | 1 | | 7 | | 1 | | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

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#### 7.4.1.2 Working surfaces

Since working surfaces cannot be sterilised, it is recommended to disinfect them with an approved disinfection solution that can decrease and eliminate micro-organisms on the surfaces. Thus, agreement with the statement is indicative of a positive attitude. Overall, 61% of the total respondents agreed with the statement, while 34% disagreed that it is enough to disinfect working surfaces. This pattern was similar across the respective categories. Furthermore, the Chi-square test with alpha =0.05 indicated no significant differences between the respondent employed in the different sectors nor between the differently trained respondents (Table 7-15).

**Table 7-15 Disinfection of working surfaces**

| Respondent categories | Response options *(%)* | | | | | | *Mean* | *SD* | *p-value (alpha = 0.05))* |
|---|---|---|---|---|---|---|---|---|---|
| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Not indicated | | | |
| Private sector [n=121] | 31 | 4 | 5 | 28 | 31 | 1 | 3.2 | 1.69 | *0.37* |
| Public sector [n= 76] | 22 | 8 | 3 | 25 | 39 | 3 | 3.43 | 1.7 | |
| Formally trained [n=84] | 29 | 6 | 5 | 25 | 35 | 0 | 3.31 | 1.66 | *0.78* |
| In-service trained [n=113] | 27 | 5 | 3 | 28 | 34 | 3 | 3.27 | 1.72 | |
| ***Total respondents (n=197)*** | ***Disagreement*** | | ***Neutral*** | | ***Agreement*** | | ***Not indicated*** | | |
| | 34 | | 4 | | 61 | | 1 | | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

#### 7.4.1.3 Instruments used within the oral cavity

Instruments that are possibly contaminated with blood and saliva should always be sterilised. Overall, 79% and more of the total respondents duly indicated disagreement that it is not enough only to disinfect instruments such as impression trays, extraction forceps, orthodontic instruments, and endodontic instruments. This pattern was similar for all the respondent categories across three of the four listed items. However, the percentage of disagreement among respondents with different training

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types varied in the item that referred to orthodontic instruments. Furthermore, the Chi-square test with *alpha = 0.05* confirmed a significant difference between the respondents with different training types regarding orthodontic instruments. Significantly more FT respondents (93%) versus 77% if IST disagreed that it is enough only to disinfect orthodontic instruments *(p=0.02)* (Table 7-16).

**Table 7-16 Disinfection of instruments used within the oral cavity**

| **1) Impression trays** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Respondent categories** | **Response options *(%)*** | | | | | | ***Mean*** | ***SD*** | ***p-value (alpha = 0.05)*** |
| | **Strongly disagree** | **Disagree** | **Neutral** | **Agree** | **Strongly agree** | **Not indicated** | | | |
| Private sector [n=121] | 73 | 7 | 4 | 9 | 7 | 0 | 1.69 | 1.28 | *0.25* |
| Public sector [n= 76] | 63 | 14 | 4 | 5 | 10 | 3 | 1.78 | 1.38 | |
| Formally trained [n=84] | 67 | 13 | 6 | 11 | 4 | 0 | 1.71 | 1.19 | *0.11* |
| In-service trained [n=113] | 71 | 8 | 3 | 5 | 11 | 2 | 1.73 | 1.41 | |
| ***Total respondents (n=197)*** | ***Disagreement*** | | ***Neutral*** | | ***Agreement*** | | ***Not indicated*** | | |
| | *16* | | *4* | | *79* | | *1* | | |
| **2) Extraction forceps** | | | | | | | | | |
| Private sector [n=121] | 83 | 3 | 2 | 2 | 10 | 1 | 1.5 | 1.27 | *0.79* |
| Public sector [n= 76] | 80 | 7 | 1 | 1 | 8 | 3 | 1.42 | 1.17 | |
| Formally trained [n=84] | 89 | 5 | 1 | 2 | 2 | 1 | 1.24 | 0.8 | *0.07* |
| In-service trained [n=113] | 76 | 4 | 2 | 1 | 14 | 3 | 1.65 | 1.44 | |
| ***Total respondents (n=197)*** | ***Agreed*** | | ***Neutral*** | | ***Disagreed*** | | ***Not indicated*** | | |
| | *10* | | *1* | | *87* | | *2* | | |
| **3) Orthodontic instruments** | | | | | | | | | |
| Private sector [n=121] | 75 | 8 | 3 | 2 | 8 | 3 | 1.5 | 1.22 | *0.65* |
| Public sector [n= 76] | 72 | 12 | 1 | 3 | 5 | 7 | 1.37 | 1.09 | |
| Formally trained [n=84] | 81 | 12 | 2 | 2 | 2 | 0 | 1.33 | 0.84 | ***0.02**** |
| In-service trained [n=113] | 69 | 8 | 8 | 3 | 2 | 11 | 1.53 | 1.36 | |
| ***Total respondents (n=197)*** | ***Agreed*** | | ***Neutral*** | | ***Disagreed*** | | ***Not indicated*** | | |
| | *7* | | *6* | | *82* | | *5* | | |

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| 4) Endodontic instruments | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Respondent categories | Response options (%) | | | | | | Mean | SD | p-value (alpha = 0.050 |
| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Not indicated | | | |
| Private sector [n=121] | 75 | 8 | 3 | 2 | 8 | 4 | 1.46 | 1.23 | 0.65 |
| Public sector [n= 76] | 72 | 12 | 1 | 3 | 5 | 7 | 1.3 | 1.03 | |
| Formally trained [n=84] | 81 | 12 | 2 | 2 | 2 | 1 | 1.25 | 0.8 | 0.10 |
| In-service trained [n=113] | 69 | 8 | 3 | 2 | 11 | 7 | 1.51 | 1.36 | |
| Total respondents (n=197) | Agreed | | Neutral | | Disagreed | | Not indicated | | |
| | 8 | | 3 | | 84 | | 5 | | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

### 7.4.2. Instrument sterilisation routine

Several actions need to be performed during the instrument sterilisation process. Respondents' attitudes towards four possible steps to process instruments before placement into the sterilisation device were probed. These actions included handwashing instruments, using an instrument washer, an ultrasonic bath, and bagging instruments before sterilisation. Agreement with the statements indicated a positive attitude towards the listed action as part of the instrument sterilisation routine.

#### 7.4.2.1 Instrument processing actions before placement of instruments into sterilisation device

Respondents' attitudes towards four actions relating to instrument processing before placement in the autoclave were surveyed. These actions included: handwashing instruments, using an instrument washer, using an ultrasonic bath and packaging instruments into a sterilisation pouch before placing them into the sterilisation device. Across all four items, more than 90% of the total respondents indicated agreement. This percentage was similar among all the respondent categories. Furthermore,

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the Chi-square test with $alpha = 0.05$ showed significant differences between respondents employed in the respective sectors and respondents with different training types (Table 7-17).

**Table 7-17 Cleaning of instruments before placement into the sterilisation device**

**Hand wash instruments before sterilisation**

| Respondent categories | Response options (%) | | | | | | Mean | SD | p-value (alpha = 0.05) |
|---|---|---|---|---|---|---|---|---|---|
| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Not indicated | | | |
| Private sector [n=121] | 2 | 1 | 2 | 22 | 73 | 1 | 4.61 | 0.83 | 0.80 |
| Public sector [n= 76] | 1 | 1 | 0 | 28 | 67 | 3 | 4.5 | 1.01 | |
| Formally trained [n=84] | 2 | 1 | 1 | 21 | 74 | 1 | 4.61 | 0.89 | 0.82 |
| In-service trained [n=113] | 1 | 1 | 1 | 27 | 68 | 2 | 4.54 | 0.92 | |

| Total respondents (n=197) | Disagreement | Neutral | Agreement | Not indicated |
|---|---|---|---|---|
| | 2 | 1 | 95 | 2 |

**Clean instruments in the instrument washer before sterilisation**

| Respondent categories | Response options (%) | | | | | | Mean | SD | p-value (alpha = 0.05) |
|---|---|---|---|---|---|---|---|---|---|
| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Not indicated | | | |
| Private sector [n=121] | 1 | 2 | 2 | 25 | 69 | 1 | 4.58 | 0.81 | 0.95 |
| Public sector [n= 76] | 0 | 0 | 4 | 25 | 70 | 1 | 4.61 | 0.77 | |
| Formally trained [n=84] | 0 | 0 | 5 | 20 | 74 | 1 | 4.64 | 0.75 | 0.54 |
| In-service trained [n=113] | 1 | 2 | 2 | 28 | 66 | 1 | 4.55 | 0.82 | |

| Total respondents (n=197) | Disagreed | Neutral | Agreed | Not indicated |
|---|---|---|---|---|
| | 1 | 3 | 95 | 1 |

**Clean instruments in an ultra-sonic bath before sterilisation**

| Respondent categories | Response options (%) | | | | | | Mean | SD | p-value (alpha = 0.05) |
|---|---|---|---|---|---|---|---|---|---|
| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Not indicated | | | |
| Private sector [n=121] | 1 | 1 | 6 | 20 | 70 | 2 | 4.5 | 1.01 | 0.27 |
| Public sector [n= 76] | 3 | 4 | 8 | 20 | 59 | 7 | 4.09 | 1.46 | |
| Formally trained [n=84] | 0 | 2 | 8 | 14 | 70 | 5 | 4.38 | 1.23 | 0.48 |
| In-service trained [n=113] | 3 | 2 | 5 | 24 | 63 | 4 | 4.32 | 1.21 | |

| Total respondents (n=197) | Disagreed | Neutral | Agreed | Not indicated |
|---|---|---|---|---|
| | 4 | 6 | 95 | 5 |

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| Placement of instruments in a sterilisation pouch | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Respondent categories | Response options *(%)* | | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Not indicated | | | |
| Private sector [n=121] | 2 | 2 | 2 | 20 | 74 | 1 | 4.59 | 0.89 | *0.40* |
| Public sector [n= 76] | 4 | 1 | 1 | 17 | 71 | 5 | 4.34 | 1.37 | |
| Formally trained [n=84] | 2 | 1 | 1 | 13 | 81 | 1 | 4.65 | 0.92 | *0.35* |
| In-service trained [n=113] | 3 | 3 | 2 | 23 | 66 | 4 | 4.37 | 1.21 | |
| ***Total respondents (n=197)*** | ***Disagreed*** | | ***Neutral*** | | ***Agreed*** | | ***Not indicated*** | | |
| | *4* | | *2* | | *91* | | *5* | | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05*

### 7.4.3. Biological monitoring

The equipment used for sterilisation purposes must always function on an ultimate level. Biological monitoring confirms that the autoclave device can destroy micro-organisms. Overall, 80% of the total respondents agreed with biological monitoring as part of the sterilisation routine. However, the percentage of respondents employed in the respective sectors varied. Furthermore, the Chi-square test results confirmed a significant difference between respondents employed in the different sectors, with significantly more respondents in the private sector $(p<0.01)$ who agree with biological monitoring as part of the sterilisation routine (Table 7-18).

**Table 7-18 Biological monitoring**

| Respondent categories | Response options *(%)* | | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|---|
| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Not indicated | | | |
| Private sector [n=121] | 2 | 2 | 2 | 19 | 71 | 3 | 4.45 | 1.15 | ***<0.01** |
| Public sector [n= 76] | 3 | 5 | 16 | 20 | 45 | 12 | 3.63 | 1.69 | |
| Formally trained [n=84] | 4 | 2 | 10 | 12 | 67 | 6 | 4.18 | 1.46 | *0.16* |

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| In-service trained [n=113] | 1 | 4 | 6 | 25 | 57 | 7 | 4.54 | 1.42 |

| Total respondents (n=197) | Disagreement | Neutral | Agreement | Not indicated |
|---|---|---|---|---|
| | 5 | 6 | 82 | 7 |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

### 7.4.4. Record keeping of sterilisation processes

Keeping a record of the successful processing of instruments enables the OHCF to have evidence that those instruments were successfully sterilised. Of the total respondents, 95% agreed with record keeping of the successful sterilisation process. This percentage was similar amongst all the respondent categories. Furthermore, the Chi-square test with $alpha = 0.05$ indicated no significant differences between the respondent categories (Table 7-19).

**Table 7-19 Record keeping of successful sterilisation process**

| Respondent categories | Response options *(%)* | | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|---|
| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Not indicated | | | |
| Private sector [n=121] | 1 | 1 | 1 | 20 | 77 | 0 | 4.73 | 0.61 | *0.15* |
| Public sector [n= 76] | 0 | 4 | 3 | 25 | 64 | 4 | 4.38 | 1.15 | |
| Formally trained [n=84] | 1 | 2 | 2 | 15 | 79 | 1 | 4.67 | 0.81 | *0.46* |
| In-service trained [n=113] | 0 | 2 | 1 | 27 | 68 | 2 | 4.54 | 0.92 | |

| Total respondents (n=197) | Disagreement | Neutral | Agreement | Not indicated |
|---|---|---|---|---|
| | 3 | 1 | 95 | 1 |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

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## 7.5. IPC theme 4: Vaccination

Respondents' attitude toward vaccination often determines if they will follow through with actions (Andani *et al.*, 2022). Even though vaccines are not available for all infectious diseases, vaccination assists in improving the immunity of people against infectious diseases. Within the OHC sphere, regulations required that OHCWs be vaccinated against specific diseases as part of IPC measures. Hence, IPC theme 4 surveyed the respondents' attitudes towards vaccination against the four listed diseases. Agreement with being vaccinated against the diseases where a vaccine is available indicated a positive attitude (Table 7-20).

**Table 7-20 Purpose of the different attitude aspects and items within IPC theme 4**

| Attitude aspects | Purpose of items within respective knowledge aspect |
|---|---|
| **Attitude aspect 1:** Respondents' willingness to be vaccinated | To survey respondents' attitudes towards receiving vaccines against the following diseases:<br>1.1 Hepatitis A<br>1.2 Hepatitis B<br>1.3 Hepatitis C<br>1.4 Influenza |

### 7.5.1. Hepatitis A

Vaccination against Hepatitis A is advisable but is currently optional for OHCWs. Overall, 61% of the total respondents agreed that OHCWs be vaccinated against Hepatitis A. However, variation in percentages amongst the different respondent categories occurred. Furthermore, the results of the Chi-square tests confirmed a significant difference between respondents employed in the respective sectors and between respondents with varying types of training. Significantly more respondents employed in the private sector (80%) versus 68% of the respondents in the public sector agreed with being vaccinated against Hepatitis A $(p=0.03)$. In addition, significantly more FT respondents (81%)

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versus 71% of IST respondents agreed with being vaccinated against Hepatitis A *(p=0.02)* (Table 7-21).

**Table 7-21 Respondents' attitude towards vaccination against Hepatitis A**

| Respondent categories | Response options *(%)* | | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|---|
| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Not indicated | | | |
| Private sector [n=121] | 1 | 0 | 13 | 22 | 58 | 6 | 4.19 | 1.3 | *0.03 |
| Public sector [n= 76] | 3 | 7 | 12 | 13 | 55 | 11 | 3.8 | 1.69 | |
| Formally trained [n=84] | 1 | 4 | 14 | 17 | 64 | 0 | 4.39 | 0.94 | *0.02 |
| In-service trained [n=113] | 2 | 2 | 12 | 20 | 51 | 13 | 4.39 | 0.94 | |
| ***Total respondents (n=197)*** | ***Disagreement*** | | ***Neutral*** | | ***Agreement*** | | ***Not indicated*** | | |
| | 34 | | 4 | | 61 | | 1 | | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

### 7.5.2. Hepatitis B

Vaccination against Hepatitis B is mandatory for all OHCWs in South-Africa. Overall, 90% of the total respondents agreed that OHCWs be vaccinated against Hepatitis B. However, the percentage agreement varied between respondents who were differently trained. Furthermore, the results of the Chi-square tests confirmed a significant difference between respondents with different training types, with $p=< 0.01$, significantly more FT respondents (96%) versus 84% IST respondents agreed with being vaccinated against Hepatitis B (Table 7-22).

**Table 7-22 Respondents` attitude towards vaccination against Hepatitis B**

| Respondent categories | Response options *(%)* | | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|---|
| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Not indicated | | | |
| Private sector [n=121] | 1 | 0 | 1 | 14 | 79 | 6 | 4.52 | 1.24 | *0.19* |
| Public sector [n= 76] | 1 | 0 | 4 | 7 | 78 | 11 | 4.28 | 1.6 | |

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| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Formally trained [n=84] | 1 | 0 | 2 | 7 | 89 | 0 | 4.83 | 058 | **<0.01 |
| In-service trained [n=113] | 1 | 0 | 2 | 14 | 70 | 13 | 4.12 | 1.71 | |

| Total respondents (n=197) | Disagreement | Neutral | Agreement | Not indicated |
|---|---|---|---|---|
| | 1 | 2 | 90 | 7 |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

### 7.5.3. Hepatitis C

Even though no vaccine is available for Hepatitis C, respondents' attitudes towards vaccination against Hepatitis C were surveyed. Therefore, disagreement with the statement would indicate that respondents are aware of this fact. Overall, 75% of the total respondents agreed that OHCWs be vaccinated against Hepatitis C. However, the percentage agreement varied between respondents who were differently trained. Furthermore, at $alpha = 0.5$, the results of the Chi-square tests confirmed a significant difference between respondents with different training types, with $p=0.01$, significantly more FT respondents (81%) versus 72% of IST respondents agreed with being vaccinated against Hepatitis C. However, considerably more IST respondents (13%) versus 0% FT did not indicate a response to this item (Table 7-23).

**Table 7-23 Respondents' attitude toward vaccination against Hepatitis C**

| Respondent categories | Response options *(%)* | | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|---|
| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Not indicated | | | |
| Private sector [n=121] | 2 | 0 | 13 | 24 | 55 | 6 | 4.14 | 1.32 | *0.09* |
| Public sector [n= 76] | 3 | 5 | 12 | 16 | 54 | 11 | 3.82 | 1.67 | |
| Formally trained [n=84] | 2 | 4 | 13 | 19 | 62 | 0 | 4.35 | 1 | *0.01 |
| In-service trained [n=113] | 2 | 1 | 12 | 22 | 50 | 13 | 3.77 | 1.71 | |

| Total respondents (n=197) | Disagreement | Neutral | Agreement | Not indicated |
|---|---|---|---|---|
| | 4 | 13 | 75 | 8 |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

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### 7.5.4. Influenza

It is recommended that OHCWs receive vaccination against Influenza yearly. Overall, 71% of respondents agreed with vaccination against Influenza. Furthermore, 15% of the total respondents indicated a neutral stance, 7% stated disagreement, and 7% did not respond to the item. However, differences in the percentage agreement between respondents who are differently trained were recorded. At $alpha = 0.05$, the results of the CH-square tests confirmed a significant difference between respondents with different training types. With $p=0.01$, significantly more FT respondents (79%) versus 62% of IST respondents agreed that OHCWs must be vaccinated against Influenza (Table 7-24).

**Table 7-24 Respondents' attitude towards vaccination against Influenza**

| Respondent categories | Response options *(%)* | | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|---|
| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Not indicated | | | |
| Private sector [n=121] | *3* | *2* | *17* | *31* | *40* | *6* | *3.85* | *1.38* | *0.26* |
| Public sector [n= 76] | *3* | *7* | *13* | *20* | *47* | *11* | *3.71* | *1.66* | |
| Formally trained [n=84] | *1* | *5* | *14* | *27* | *52* | *0* | *4.25* | *0.96* | ***0.01** |
| In-service trained [n=113] | *4* | *4* | *17* | *26* | *36* | *13* | *3.46* | *1.71* | |
| ***Total respondents (n=197)*** | ***Disagreement*** | | ***Neutral*** | | ***Agreement*** | | ***Not indicated*** | | |
| | 7 | | 15 | | 71 | | 7 | | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

## 7.6. IPC theme 5: Hand hygiene

Hand hygiene is one of the elements of standard precautions which apply to every health care setting (CDC, 2003b, 2017). Therefore, respondents' attitudes towards three aspects related to hand hygiene were surveyed. The first aspect addressed respondents' attitudes regarding the importance of hand

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hygiene as an intervention to promote IPC. In the second aspect, three negatively stated items surveyed respondents' attitudes towards reasons that caused respondents to neglect their hand hygiene practices. The final aspect explored respondents' attitudes towards factors that hindered hand hygiene practices (Table 7-25).

**Table 7-25 Purpose of the different attitude aspects within the IPC theme**

| Attitude aspects | Purpose of items within respective attitude aspect |
|---|---|
| **Attitude aspect 1:** Importance of hand hygiene to promote IPC | **To survey respondents' attitudes towards the importance of hand hygiene as an intervention to promote IPC** |
| **Attitude aspect 2:** Reasons why hand hygiene practices might be neglected | **To survey respondents' attitudes about why hand hygiene practices might be neglected. Three negatively stated items included:**<br>2.1 Handwashing is not such a necessary action<br>2.2 There is not enough time to wash hands as frequently as required<br>2.3 If my hands still look clean, it is not necessary to wash them |
| **Attitude aspect 3:** Factors that hinder hand hygiene practices | **To survey respondents' attitudes about other factors that kept respondents from performing handwashing:**<br>3.1 My handwashing is kept to a minimum due to skin irritations<br>3.2 Inadequate facilities (e.g., no running water or basins to wash hands in) make it difficult to wash hands regularly<br>3.3 Tending to the patient's needs makes me forget to apply proper hand hygiene |

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### 7.6.1. Importance of hand hygiene as an intervention to promote IPC

On average, 57% of respondents agreed, whilst 27% disagreed that hand hygiene is necessary to promote IPC within OHCFs. This pattern was similar across all the respondent categories. Furthermore, the Chi-square test with $alpha = 0.05$ indicated no significant differences between respondents employed in the respective sectors or respondents with different training types (Table 7-26).

**Table 7-26 Importance of hand hygiene as an intervention to promote IPC**

| Respondent categories | Response options *(%)* | | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|---|
| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Not indicated | | | |
| Private sector [n=121] | 22 | 5 | 2 | 21 | 37 | 13 | 3.06 | 1.96 | *0.44* |
| Public sector [n= 76] | 17 | 11 | 5 | 20 | 34 | 13 | 3.04 | 1.89 | |
| Formally trained [n=84] | 29 | 5 | 5 | 23 | 29 | 11 | 2.86 | 1.88 | *0.06* |
| In-service trained [n=113] | 14 | 9 | 2 | 19 | 42 | 15 | 3.19 | 1.96 | |
| ***Total respondents (n=197)*** | ***Disagreement*** | | ***Neutral*** | | ***Agreement*** | | ***Not indicated*** | | |
| | 27 | | 2 | | 57 | | 13 | | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

### 7.6.2. Factors that make it difficult to perform effective hand hygiene practices

Several factors might influence effective hand hygiene practices. Three negatively stated items were used to survey factors that influence hand hygiene. More than 90% of the total respondents disagreed with two statements. These statements referred to: "that hand hygiene is not an important action" and "it is not necessary to wash hands if they are not visibly soiled". Furthermore, for the statement that "there is not enough time to wash hands as frequently as required", 85% of the total respondents indicated disagreement. Similar percentages were noted across all the respondent categories. In addition, the Chi-square test with $alpha = 0.05$ showed no significant differences between the

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respondents employed in the respective sectors nor between differently trained respondents (Table 7-27).

**Table 7-27 Factors that influence hand hygiene – negatively stated**

| Respondent categories | Response options *(%)* | | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|---|
| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Not indicated | | | |
| **Handwashing is not such a necessary action** | | | | | | | | | |
| Private sector [n=121] | 81 | 12 | 1 | 4 | 0 | 2 | 4.58 | 1.12 | *0.82* |
| Public sector [n= 76] | 78 | 16 | 0 | 0 | 0 | 4 | 4.54 | 1.17 | |
| Formally trained [n=84] | 83 | 13 | 0 | 2 | 0 | 1 | 4.17 | 0.86 | *0.60* |
| In-service trained [n=113] | 77 | 13 | 1 | 4 | 0 | 4 | 4.45 | 1.3 | |
| ***Total respondents [n=197]*** | ***Disagreement*** | | ***Neutral*** | | ***Agreement*** | | ***Not indicated*** | | |
| | *93* | | *1* | | *3* | | *3* | | |
| **There is not enough time to wash hands as frequently as required** | | | | | | | | | |
| Private sector [n=121] | 56 | 24 | 5 | 7 | 2 | 5 | 4.09 | 1.39 | *0.33* |
| Public sector [n= 76] | 66 | 24 | 3 | 1 | 0 | 7 | 4.3 | 1.3 | |
| Formally trained [n=84] | 64 | 21 | 7 | 5 | 1 | 1 | 4.4 | 1 | *0.09* |
| In-service trained [n=113] | 57 | 26 | 2 | 5 | 2 | 9 | 4.04 | 1.55 | |
| **Total respondents (n=197)** | *Disagreed* | | *Neutral* | | *Agreed* | | *Not indicated* | | |
| | *85* | | *5* | | *5* | | *5* | | |
| **If my hands still look clean, it is not necessary to wash them** | | | | | | | | | |
| Private sector [n=121] | 72 | 22 | 2 | 0 | 0 | 2 | 4.54 | 1.03 | *0.83* |
| Public sector [n= 76] | 74 | 20 | 1 | 0 | 0 | 3 | 4.57 | 1.41 | |
| Formally trained [n=84] | 79 | 18 | 1 | 0 | 1 | 1 | 4.69 | 0.79 | *0.52* |
| In-service trained [n=113] | 68 | 24 | 2 | 0 | 3 | 4 | 4.44 | 1.15 | |
| ***Total respondents (n=197)*** | *Disagreed* | | *Neutral* | | *Agreed* | | *Not indicated* | | |
| | *94* | | *1* | | *2* | | *3* | | |

***SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01***

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### 7.6.3. Factors that possibly kept respondents from performing handwashing

Several factors within and outside the control of the OHCWs might keep respondents from performing handwashing. Three reasons were listed: skin irritations, facilities, and tending to patient needs. Overall, the percentage of the total respondents who disagreed that the specific factors kept them from performing handwashing were as follows: skin irritations (85%), facilities (74%), and tending to patient needs (84%). Respondents across the different categories indicated similar percentages in the items related to skin irritations and tending to patients' needs. However, a variation in the percentages of respondents employed in the different sectors was noted in one item. Furthermore, the Chi-square test with $alpha = 0.05$ indicated a significant difference between the respondent employed in the different sectors. Significantly more respondents employed in the private sector (83%) versus 70% of respondents employed in the public sector categories disagreed that facilities are a reason that prevented them from performing handwashing $(p=0.03)$ (Table 7-28).

**Table 7-28 Reasons that kept respondents from performing handwashing**

| Respondent categories | Response options *(%)* | | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|---|
| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Not indicated | | | |
| **My handwashing is kept to a minimum due to skin irritations** | | | | | | | | | |
| Private sector [n=121] | 62 | 21 | 4 | 3 | 5 | 5 | 1.54 | 1.11 | *0.47* |
| Public sector [n= 76] | 50 | 30 | 4 | 1 | 7 | 8 | 1.61 | 1.17 | |
| Formally trained [n=84] | 60 | 23 | 5 | 5 | 5 | 2 | 1.68 | 1.17 | *0.25* |
| In-service trained [n=113] | 56 | 26 | 4 | 1 | 1 | 9 | 1.48 | 1.09 | |
| ***Total respondents (n=197)*** | ***Disagreement*** | | ***Neutral*** | | ***Agreement*** | | ***Not indicated*** | | |
| | 85 | | 4 | | 7 | | 4 | | |
| **Inadequate facilities (e.g., no running water or basins to wash hands in) make it difficult to wash hands regularly** | | | | | | | | | |
| Private sector [n=121] | 62 | 21 | 4 | 6 | 2 | 5 | 1.5 | 1 | ***0.03** |
| Public sector [n= 76] | 45 | 25 | 1 | 9 | 8 | 12 | 1.8 | 1.4 | |
| Formally trained [n=84] | 58 | 23 | 4 | 10 | 1 | 5 | 1.6 | 1.1 | *0.30* |

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| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| In-service trained [n=113] | 53 | 23 | 3 | 5 | 6 | 10 | 1.6 | 1.3 | |
| ***Total respondents (n=197)*** | *Disagreed* | | *Neutral* | | *Agreed* | | *Not indicated* | | |
| | 76 | | 4 | | 12 | | 8 | | |

**Tending to the patient's needs makes me forget to apply proper hand hygiene**

| **Respondent categories** | **Response options *(%)*** | | | | | | ***Mean*** | ***SD*** | ***p-value (alpha = 0.05)*** |
|---|---|---|---|---|---|---|---|---|---|
| | **Strongly disagree** | **Disagree** | **Neutral** | **Agree** | **Strongly agree** | **Not indicated** | | | |
| Private sector [n=121] | 59 | 30 | 4 | 3 | 1 | 3 | 1.5 | 0.8 | *0.07* |
| Public sector [n= 76] | 59 | 20 | 1 | 9 | 0 | 11 | 1.4 | 1 | |
| Formally trained [n=84] | 58 | 25 | 7 | 7 | 0 | 2 | 1.6 | 0.9 | *0.11* |
| In-service trained [n=113] | 59 | 27 | 0 | 4 | 1 | 9 | 1.3 | 0.9 | |
| ***Total respondents (n=197)*** | *Disagreed* | | *Neutral* | | *Agreed* | | *Not indicated* | | |
| | 84 | | 3 | | 6 | | 7 | | |

***SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01***

## 7.7. IPC theme 6: Personal protective equipment

The use of personal protective clothing is an integral part of infection prevention and control measures. Personal protective equipment (PPE) forms a barrier between the OHCW and any substance that have the potential to harbour pathogens (Royal College of Dental Surgeons of Ontario, 2010a). The use of PPE ensures that the safety of OHCW and the patients are not jeopardised (Fasunloro and Owotabe, 2004). Hence in IPC theme 6, three aspects of respondents' attitudes towards PPE were surveyed. These aspects focused on: the use of PPE, possible factors that inhibit PPE use, and if respondents change their PPE habits when working on a patient with a known infectious disease. Table 7-29 outlines the purpose of the items in the respective aspects that surveyed respondents' attitudes towards PPE.

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**Table 7-29 Purpose of the different attitude aspects and items within IPC theme 6**

| Attitude aspects | Purpose of items within respective knowledge aspect |
|---|---|
| **Attitude aspect 1:**<br>The use of PPE | **To assess respondents' attitudes towards the use of PPE, namely:**<br>1. 1. Masks,<br>1. 2. Gloves,<br>1. 3. Eyewear and<br>1. 4. Protective clothing during dental treatment. |
| **Attitude aspect 2:**<br>Possible factors that inhibit the use of PPE | **To assess if respondents' attitudes towards possible factors that inhibit the use of PPE:**<br>2.1 Limited availability of PPE<br>2.2 Comfortability of PPE<br>2.3 The time it takes to put on and remove PPE<br>2.4 The costs of PPE<br>2.5 Patients fearing PPE<br>2.6 OHCWs being used to working without PPE<br>2.7 OHCWs do not regard PPE as important<br>2.8 Ignorance on the part of OHCW<br>2.9 Employer restrictions |
| **Attitude aspect 3**<br>Changed PPE habits when working on patients with a known infectious disease | **To assess if respondents tend to change their PPE habits when working on a patient with a known infectious disease** |

### 7.7.1. Personal protective equipment to be used

The use of personal protective equipment (PPE) protects the OHCW from being exposed to pathogens during the delivery of dental treatment. PPE commonly used during the delivery of health care services includes examination gloves, surgical masks, protective eyewear, and protective clothing (Ziady, 2010). Therefore, respondents` attitudes towards using PPE such as masks, gloves, eyewear and

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protective clothing during dental treatment were probed. Respondents' indication of agreement with the statement was indicative of a positive attitude towards the use of the specific PPE item.

#### 7.7.1.1 Examination gloves

The use of examination gloves protects the OHCWs' hands against direct contact with blood or bodily substances. Overall, 96% of the total respondents agreed that examination gloves should be used when performing dental procedures. This percentage was similar across all the respondent categories. Furthermore, the Chi-square test with $alpha = 0.05$ indicated no significant differences between the respondents employed in the different sectors nor between respondents with varying types of training (Table 7-30).

**Table 7-30 Respondents' attitude towards the use of gloves**

| Respondent categories | Response options *(%)* | | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|---|
| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Not indicated | | | |
| Private sector [n=121] | 0 | 2 | 2 | 2 | 95 | 0 | 3.88 | 0.58 | *0.75* |
| Public sector [n= 76] | 0 | 3 | 0 | 0 | 97 | 0 | 3.89 | 0.64 | |
| Formally trained [n=84] | 0 | 2 | 1 | 0 | 96 | 0 | 3.88 | 0.65 | *0.86* |
| In-service trained [n=113] | 0 | 2 | 1 | 2 | 96 | 0 | 3.89 | 0.57 | |
| ***Total respondents (n=197)*** | ***Disagreement*** | | ***Neutral*** | | ***Agreement*** | | ***Not indicated*** | | |
| | *2* | | *1* | | *96* | | *1* | | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

#### 7.7.1.2 Surgical masks

The use of surgical masks protects the OHCW from inhaling airborne pathogens. Of the total respondents, 86% agreed that surgical masks should always be used. However, the percentages of respondents employed in the different working sectors varied. Furthermore, at $alpha = 0.05$, the Chi-square test results confirmed a significant difference. With $p=0.02$, significantly more respondents in

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the private sector (92%) versus 79% of respondents in the public sector agreed that masks should always be used (Table 7-31).

**Table 7-31 Respondents' attitudes towards the use of masks**

| Respondent categories | Response options *(%)* | | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|---|
| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Not indicated | | | |
| Private sector [n=121] | 0 | 0 | 5 | 2 | 92 | 2 | 3.82 | 0.67 | *0.02 |
| Public sector [n= 76] | 0 | 1 | 4 | 13 | 79 | 3 | 3.64 | 0.84 | |
| Formally trained [n=84] | 0 | 1 | 3 | 8 | 86 | 2 | 3.74 | 0.78 | 0.42 |
| In-service trained [n=113] | 0 | 0 | 6 | 4 | 88 | 2 | 3.76 | 0.72 | |

| *Total respondents (n=197)* | *Disagreement* | *Neutral* | *Agreement* | *Not indicated* | |
|---|---|---|---|---|---|
| | *1* | *4* | *86* | *7* | *2* |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

#### 7.7.1.3 Protective eyewear

The use of protective eyewear prevents splatters, sprays, or pieces of material from entering the eyes of the OHCW. Of the total respondents, 73% agreed that protective eyewear should always be used. However, the percentages of respondents employed in the different working sectors varied. Furthermore, at $alpha = 0.05$, the Chi-square test results confirmed a significant difference. With $p=0.04$, significantly more respondents in the private sector (64%) versus 47% of respondents in the public sector strongly agreed that protective eyewear should always be used (Table 7-32).

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**Table 7-32 Respondents' attitudes towards the use of protective eyewear**

| Respondent categories | Response options *(%)* | | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|---|
| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Not indicated | | | |
| Private sector [n=121] | 3 | 12 | 4 | 17 | 64 | 17 | 3.33 | 1.08 | ***0.04** |
| Public sector [n= 76] | 12 | 21 | 4 | 16 | 47 | 16 | 2.91 | 1.23 | |
| Formally trained [n=84] | 8 | 15 | 4 | 17 | 56 | 17 | 3.13 | 1.17 | *0.94* |
| In-service trained [n=113] | 5 | 15 | 4 | 17 | 59 | 17 | 3.19 | 1.15 | |
| ***Total respondents (n=197)*** | ***Disagreement*** | | ***Neutral*** | | ***Agreement*** | | ***Not indicated*** | | |
| | *6* | | *4* | | ***73*** | | *17* | | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

#### 7.7.1.4 Protective clothing

Protective clothing prevents spatters and sprays from contacting other parts of the OHCW's body. Protective clothing needs to be worn only within the clinical area to avoid the possible transfer of pathogens from one place of the OHCFs to other sites within and outside the OHCFs. Overall, 44% of the total respondents indicated that protective clothing should always be used when performing dental procedures. In contrast, 20% of the total respondents indicated that protective clothing should never be used. This pattern was similar across all the respondent categories. Furthermore, the Chi-square test with $alpha = 0.05$ showed no significant differences between the respondents employed in the different sectors nor between respondents with varying types of training (Table 7-33).

**Table 7-33 Respondents' attitude towards the use of protective clothing**

| Respondent categories | Response options *(%)* | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|
| | Never | Seldom | Often | Always | Not indicated | | | |
| Private sector [n=121] | 16 | 16 | 15 | 42 | 12 | 2.6 | 1.45 | *0.08* |
| Public sector [n= 76] | 25 | 12 | 14 | 46 | 3 | 2.76 | 1.34 | |
| Formally trained [n=84] | 18 | 14 | 21 | 43 | 4 | 2.82 | 1.26 | *0.12* |
| In-service trained [n=113] | 20 | 14 | 10 | 44 | 12 | 2.55 | 1.5 | |

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| | | | | | |
|---|---|---|---|---|---|
| ***Total respondents (n=197)*** | *20* | *4* | *15* | *44* | *7* |

***SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.***

### 7.7.2. Possible factors that prevent you from wearing full PPE

Several reasons why a dental assistant may find it challenging to wear personal protective clothing. Therefore, respondents' attitudes towards the possible reasons that prevented them from wearing full PPE were surveyed. Respondents' attitudes towards nine possible reasons for not wearing PPE were probed. The possible reasons included: limited availability of PPE, comfortability of PPE, the time it takes to put on and remove PPE, the costs related to PPE, patients' fear of PPE, OHCW's being used to work without PPE, OHCW does not regard PPE as necessary, ignorance on the part of OHCW, and employer restrictions. The "Never" response option implied that respondents do not perceive the specific reason as a factor that prevented them from wearing full PPE when dental procedures are performed.

#### 7.7.2.1 Availability of PPE

The availability of personal protective equipment (PPE) could be a reason for non-compliance with IPC measures. Overall, 42% of the total respondents indicated that PPE availability was never a reason for non-compliance with the required PPE for effective IPC measures. This percentage was similar between respondents with different training types, but the percentages of respondents employed in the different sectors varied. Furthermore, with $alpha = 0.05$, the Chi-square test results confirmed a significant difference between respondents employed in the respective sectors. With $p = 0.01$, significantly more respondents in the private sector (50%) versus 29% of respondents in the public sector indicated that PPE availability was never a factor that led to not wearing the required PPE. On the other hand, 38% of respondents in the public sector versus 13% of the respondents in

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the private sector indicated that PPE availability was always a factor that led to not wearing the required PPE (Table 7-34).

**Table 7-34 Availability of PPE**

| Respondent categories | Response options *(%)* | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|
| | Never | Seldom | Often | Always | Not indicated | | | |
| Private sector [n=121] | 50 | 14 | 11 | 13 | 12 | 1.64 | 1.22 | ***< 0.01* |
| Public sector [n= 76] | 29 | 12 | 12 | 38 | 9 | 2.41 | 1.47 | |
| Formally trained [n=84] | 46 | 14 | 10 | 21 | 8 | 1.93 | 1.34 | *0.74* |
| In-service trained [n=113] | 42 | 13 | 11 | 23 | 11 | 1.94 | 1.4 | |
| ***Total respondents (n=197*** | *42* | *13* | *11* | *24* | *10* | | | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

#### 7.7.2.2 Comfortability of PPE

The comfortability of personal protective equipment (PPE) could be a reason for non-compliance with IPC measures. Overall, 52% of the total respondents indicated that the comfortability of PPE was never a reason for non-compliance with the required PPE for effective IPC measures, whereas 17% indicated the opposite. However, these percentages varied between respondents employed in the different sectors. Furthermore, with $alpha = 0.05$, the Chi-square test results confirmed a significant difference between respondents employed in the respective sectors. With $p = 0.03$, significantly more respondents in the private sector (60%) versus 41% of respondents in the public sector indicated that the comfortability of PPE was never a factor that led to not wearing the required PPE. On the other hand, 25% of respondents in the public sector versus 13% of the respondents in the private sector

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indicated that the comfortability of PPE was always a factor that led to not wearing the required PPE (Table 7-35).

**Table 7-35 Comfortability of PPE**

| Respondent categories | Response options *(%)* | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|
| | Never | Seldom | Often | Always | Not indicated | | | |
| Private sector [n=121] | 60 | 12 | 5 | 12 | 12 | 1.44 | 1.14 | ***0.03** |
| Public sector [n= 76] | 41 | 11 | 12 | 25 | 12 | 1.97 | 1.42 | |
| Formally trained [n=84] | 57 | 11 | 7 | 15 | 10 | 1.62 | 1.23 | *0.79* |
| In-service trained [n=113] | 52 | 11 | 8 | 17 | 12 | 1.66 | 1.32 | |
| ***Total respondents (n=197)*** | *52* | *11* | *8* | *17* | *12* | | | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

#### 7.7.2.3 The time it takes to put on and take off PPE

The time it takes to put on and remove protective equipment (PPE) can be inconvenient, leading to difficulty wearing PPE. Overall, 57% of the total respondents indicated that the time it takes to put on and remove protective equipment was never a reason for non-compliance with the required use of PPE. This percentage was similar across the different respondent categories. Furthermore, with $alpha = 0.05$, the Chi-square test results did not confirm a significant difference between respondents employed in the respective sectors or respondents with different training types (Table 7-36).

**Table 7-36 Time it takes to don and doff PPE**

| Respondent categories | Response options *(%)* | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|
| | Never | Seldom | Often | Always | Not indicated | | | |
| Private sector [n=121] | 56 | 11 | 6 | 10 | 17 | 1.35 | 1.14 | *0.14* |

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Public sector [n= 76] | 51 | 4 | 12 | 17 | 16 | 1.63 | 1.35 | |
| Formally trained [n=84] | 62 | 10 | 7 | 8 | 13 | 1.36 | 1.07 | *0.25* |
| In-service trained [n=113] | 54 | 8 | 8 | 13 | 17 | 1.53 | 1.34 | |
| ***Total respondents (n=197)*** | 57 | 8 | 8 | 11 | 16 | | | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

#### 7.7.2.4 The cost related to Personal protective equipment

The cost of personal protective equipment may also be a probable reason for non-compliance with IPC measures related to PPE. Overall, 62% of the total respondents indicated that the costs associated with PPE were never a reason for non-compliance with the required PPE for effective IPC measures. This percentage was similar between respondents with different training types, but the percentages of respondents employed in the different sectors varied. Furthermore, with $alpha = 0.05$, the Chi-square test results confirmed a significant difference between respondents employed in the respective sectors. With $p=0.01$, significantly more respondents in the public sector respondents (14%) versus 2% of the respondents in the private sector indicated that the costs related to PPE were always a factor that led to not wearing the required PPE (Table 7-37).

**Table 7-37 Costs related to PPE**

| Respondent categories | Response options *(%)* | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|
| | Never | Seldom | Often | Always | Not indicated | | | |
| Private sector [n=121] | 66 | 9 | 4 | 2 | 19 | 1.03 | 0.77 | ***0.01.* |
| Public sector [n= 76] | 57 | 9 | 5 | 14 | 14 | 1.49 | 1.24 | |
| Formally trained [n=84] | 65 | 11 | 6 | 6 | 12 | 1.25 | 0.92 | *0.44* |
| In-service trained [n=113] | 62 | 9 | 5 | 7 | 17 | 1.18 | 1.06 | |
| ***Total respondents (n=197)*** | *62* | *9* | *5* | *7* | *17* | | | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value*

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#### 7.7.2.5 Patients that fear PPE

Patients that fear personal protective equipment can lead that required PPE are not always used. Overall, 60% of the total respondents indicated that patients who fear PPE were never a reason for non-compliance with the required use of PPE. This percentage was similar across the different respondent categories. Furthermore, with $alpha = 0.05$, the Chi-square test results did not confirm a significant difference between respondents employed in the respective sectors or respondents with different training types (Table 7-38).

**Table 7-38 Patients that fear PPE**

| Respondent categories | Response options *(%)* | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|
| | Never | Seldom | Often | Always | Not indicated | | | |
| Private sector [n=121] | 62 | 12 | 9 | 2 | 16 | 1.19 | 0.87 | *0.17* |
| Public sector [n= 76] | 57 | 9 | 11 | 9 | 14 | 1.43 | 1.15 | |
| Formally trained [n=84] | 68 | 8 | 10 | 2 | 12 | 1.21 | 0.84 | *0.3* |
| In-service trained [n=113] | 60 | 11 | 10 | 5 | 15 | 1.34 | 1.09 | |
| ***Total respondents (n=197)*** | *60* | *11* | *10* | *5* | *15* | | | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

#### 7.7.2.6 Being used to work without PPE

Being accustomed to working without PPE can be a limitation when IPC measures are applied to wear PPE. Overall, 54% of the total respondents indicated that being used to work without PPE was never a reason for non-compliance with the required use of PPE. This percentage was similar across the different respondent categories. Furthermore, with $alpha = 0.05$, the Chi-square test results did not confirm a significant difference between respondents employed in the respective sectors or respondents with different training types (Table 7-39).

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**Table 7-39 Being used to work without PPE**

| Respondent categories | Response options *(%)* | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|
| | Never | Seldom | Often | Always | Not indicated | | | |
| Private sector [n=121] | 55 | 7 | 4 | 10 | 24 | 1.21 | 1.16 | *0.21* |
| Public sector [n= 76] | 54 | 5 | 4 | 21 | 16 | 1.61 | 1.39 | |
| Formally trained [n=84] | 63 | 7 | 1 | 12 | 17 | 1.29 | 1.14 | *0.14* |
| In-service trained [n=113] | 54 | 7 | 4 | 14 | 21 | 1.42 | 1.35 | |
| ***Total respondents (n=197)*** | *54* | *7* | *4* | *14* | *21* | | | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

#### 7.7.2.7 Not regarding PPE as a necessity

Not regarding PPE as a necessity can be a limitation to wearing PPE. Overall, 68% of the total respondents indicated that not considering PPE as a necessity was never a reason for non-compliance with the required use of PPE. This percentage was similar across the different respondent categories. Furthermore, with $alpha = 0.05$, the Chi-square test results did not confirm a significant difference between respondents employed in the respective sectors or respondents with different training types (Table 7-40).

**Table 7-40 PPE not regarded as a necessity**

| Respondent categories | Response options *(%)* | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|
| | Never | Seldom | Often | Always | Not indicated | | | |
| Private sector [n=121] | 68 | 2 | 5 | 7 | 17 | 1.17 | 1.02 | *0.45* |
| Public sector [n= 76] | 67 | 0 | 3 | 14 | 16 | 1.33 | 1.22 | |
| Formally trained [n=84] | 74 | 1 | 1 | 10 | 14 | 1.14 | 0.97 | *0.34* |
| In-service trained [n=113] | 68 | 2 | 4 | 10 | 17 | 1.3 | 1.19 | |
| ***Total respondents (n=197)*** | *68* | *2* | *4* | *10* | *17* | | | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

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#### 7.7.2.8 Employer restrictions

Employer restrictions about the regular replacement of PPE can be a limitation that may lead to undesirable attitudes towards wearing PPE. Overall, 60% of the total respondents indicated that employer restrictions were never a reason for non-compliance with the required PPE for effective IPC measures. This percentage was similar between respondents with different training types, but the percentages of respondents employed in the different sectors varied. Furthermore, with $alpha = 0.05$, the Chi-square test results confirmed a significant difference between respondents employed in the respective sectors. With $p=0.03$, significantly more respondents in the private sector (66%) versus 50% of respondents in the public sector indicated that employer restrictions were never a factor that led to not wearing the required PPE. On the other hand, 17% of respondents in the public sector versus 5% of the respondents in the private sector indicated that employer restrictions were always a factor that led to not wearing the required PPE (Table 7-41).

**Table 7-41 Employer restrictions**

| Respondent categories | Response options *(%)* | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|
| | Never | Seldom | Often | Always | Not indicated | | | |
| Private sector [n=121] | 66 | 6 | 3 | 5 | 20 | 1.07 | 0.91 | ***0.03** |
| Public sector [n= 76] | 50 | 9 | 5 | 17 | 18 | 1.53 | 1.33 | |
| Formally trained [n=84] | 62 | 8 | 4 | 10 | 17 | 1.27 | 1.09 | *0.91* |
| In-service trained [n=113] | 60 | 7 | 4 | 10 | 19 | 1.23 | 1.13 | |
| ***Total respondents (n=197)*** | 60 | 7 | 4 | 10 | 19 | | | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

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### 7.7.3. Change PPE habits when working on a patient with a known infectious disease

Standard precautions imply that the same infection prevention and control (IPC) measures are used for all patients. Therefore, if standard precautions are adhered to, the IPC measures applied are sufficient to reduce the risk of disease transmission even when working on a patient with a known infectious disease. Hence, the "No" response option to the statement about changing IPC measures implied that respondents positively favour the IPC measures. Of the total respondents, 40% indicated an affirmative response. This pattern was similar across all the respondent categories. Furthermore, the Chi-square test) showed no significant differences between respondents employed in the respective sectors and respondents with different training types (Table 7-42).

**Table 7-42 Change PPE habits when working on a patient with a known infectious disease**

| Respondent categories | Response options *(%)* | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|
| | No | Not sure | Yes | Not indicated | | | |
| Private sector [n=121] | 50 | 0 | 38 | 12 | 1.26 | 0.66 | *0.7* |
| Public sector [n= 76] | 45 | 0 | 42 | 13 | 0.08 | 0.69 | |
| Formally trained [n=84] | 50 | 0 | 40 | 10 | 1.27 | 0.66 | *0.6* |
| In-service trained [n=113] | 47 | 0 | 39 | 14 | 1.27 | 0.67 | |
| ***Total respondents (n=197)*** | *48* | *0* | *40* | *12* | | | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

## 7.8. IPC theme 7: Health care related waste management

A portion of the waste generated in OHCFs is by nature hazardous (WHO, 2014a). These hazards include items contaminated with blood and bodily fluids, sharps, amalgam, chemicals used for disinfection, and x-ray development and fixing solutions used in some OHCFs (CDC, 2003b). Hence, in IPC theme 7, respondents' attitudes towards four aspects of health care related waste (HCRW)

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management were probed. These aspects focussed on the segregation of HCRW, HCRW as a source that could spread disease, the risk of inadequate HCRW management, and HCRW training. **Table 7-43** outlines the purpose of the different items that surveyed respondents' attitudes towards HCRW management.

**Table 7-43 Purpose of the different attitude aspects and items within IPC theme 7**

| Attitude aspects | Purpose of items within respective knowledge aspect |
|---|---|
| **Attitude aspect 1:** Segregation of HCRW | 1) To survey respondents' attitudes towards HCRW segregation |
| **Attitude aspect 2:** HCRW is a source that could spread disease | 2) To survey respondents' attitudes about the potential of HCRW to spread diseases |
| **Attitude aspect 3** Risk of inadequate HCRW management | 3) To survey respondents' attitudes towards the risks that inadequate HCRW management poses |
| **Attitude aspect 4** HCRW training | 4) To survey respondents' attitudes towards the need for OHCWs to receive HCRW management training |

### 7.8.1. Segregation of HCRW before disposal

Segregation of waste at the point of generation ensures that potentially infectious waste does not land up at general landfills where it can pose a risk to the public and the environment. Overall, 94% of respondents agreed that waste must be segregated before disposal. This percentage was similar across all the respondent categories. Furthermore, the Chi-square test with $alpha = 0.05$ indicated no significant differences between the respondents employed in the respective sectors or respondents with different training types (Table 7-44).

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**Table 7-44 Necessity to separate waste before discarding it**

| Respondent categories | Response options *(%)* | | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|---|
| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Not indicated | | | |
| Private sector [n=121] | 2 | 1 | 1 | 25 | 69 | 2 | 4.52 | 1.01 | *0.88* |
| Public sector [n= 76] | 3 | 3 | 0 | 24 | 70 | 1 | 4.51 | 1 | |
| Formally trained [n=84] | 0 | 1 | 0 | 20 | 77 | 1 | 4.7 | 0.72 | *0.48* |
| In-service trained [n=113] | 4 | 2 | 1 | 27 | 64 | 3 | 4.38 | 1.15 | |
| ***Total respondents (n=197)*** | ***Disagreement*** | | ***Neutral*** | | ***Agreement*** | | ***Not indicated*** | | |
| | 4 | | 1 | | 94 | | 1 | | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

### 7.8.2. Waste generated in the OHCF has the potential to spread disease

Waste generated in the clinical area of the OHCFs is often contaminated with blood and saliva. It thus carries the risk of transferring disease-causing micro-organisms. Overall, 83% of respondents agreed that waste generated within OHCF could spread diseases. This percentage was similar across all the respondent categories. Furthermore, the Chi-square test with $alpha = 0.05$ indicated no significant differences between the respondents employed in the respective sectors or respondents with different training types (Table 7-45).

**Table 7-45 Possibility that health care related waste can spread diseases**

| Respondent categories | Response options *(%)* | | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|---|
| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Not indicated | | | |
| Private sector [n=121] | 1 | 2 | 6 | 28 | 58 | 5 | 4.25 | 1.25 | *0.61* |
| Public sector [n= 76] | 3 | 7 | 7 | 22 | 57 | 5 | 4.08 | 1.41 | |
| Formally trained [n=84] | 0 | 8 | 5 | 26 | 57 | 4 | 4.21 | 1.22 | *0.13* |
| In-service trained [n=113] | 3 | 1 | 7 | 26 | 58 | 6 | 4.16 | 1.38 | |

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| Total respondents (n=197) | Disagreement | Neutral | Agreement | Not indicated |
|---|---|---|---|---|
| | 6 | 6 | 83 | 5 |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

### 7.8.3. The risk that inadequate HCRW management poses risks to others

Overall, 83% and more of respondents agreed that inadequate HCRW management poses a risk to the OHCW (88%), others (83%), and the environment (89%). Similar percentages were recorded across all the respondent categories for the three items. Furthermore, the Chi-square test with *alpha =0.05* indicated no significant differences between the respondents employed in the respective sectors or respondents with different training types (Table 7-46).

**Table 7-46 Risk that inadequate HCRW management poses**

| 1) Oral health care workers | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Respondent categories | Response options *(%)* | | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Not indicated | | | |
| Private sector [n=121] | 0 | 1 | 2 | 28 | 64 | 6 | 4.37 | 1.22 | *0.23* |
| Public sector [n= 76] | 4 | 0 | 5 | 21 | 61 | 9 | 4.07 | 1.59 | |
| Formally trained [n=84] | 0 | 0 | 4 | 25 | 69 | 2 | 4.56 | 09 | *0.22* |
| In-service trained [n=113] | 3 | 1 | 3 | 26 | 58 | 11 | 4.03 | 1.61 | |
| *Total respondents (n=197)* | *Disagreement* | | *Neutral* | | *Agreement* | | *Not indicated* | | |
| | 2 | | 3 | | 88 | | 7 | | |
| **2) People outside of the oral health care facility** | | | | | | | | | |
| Private sector [n=121] | 1 | 2 | 2 | 23 | 65 | 7 | 4.3 | 1.35 | *0.12* |
| Public sector [n= 76] | 5 | 4 | 7 | 26 | 51 | 7 | 3.95 | 1.51 | |
| Formally trained [n=84] | 0 | 4 | 6 | 21 | 64 | 5 | 4.32 | 1.23 | *0.32* |

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| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| In-service trained [n=113] | 4 | 3 | 2 | 27 | 57 | 8 | 4.04 | 1.54 | |
| ***Total respondents (n=197)*** | ***Disagreement*** | | ***Neutral*** | | ***Agreement*** | | ***Not Indicated*** | | |
| | 6 | | 4 | | 83 | | 7 | | |
| **3) Environment** | | | | | | | | | |
| Private sector [n=121] | 1 | 2 | 2 | 21 | 69 | 4 | 4.44 | 1.17 | *0.29* |
| Public sector [n= 76] | 4 | 0 | 4 | 28 | 58 | 7 | 4.16 | 1.42 | |
| Formally trained [n=84] | 0 | 2 | 4 | 26 | 67 | 1 | 4.54 | 0.84 | *0.20* |
| In-service trained [n=113] | 4 | 1 | 2 | 22 | 64 | 8 | 4.18 | 1.51 | |
| ***Total respondents (n=197)*** | ***Disagreement*** | | ***Neutral*** | | ***Agreement*** | | ***Not Indicated*** | | |
| | 3 | | 3 | | 89 | | 5 | | |

***SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01***

### 7.8.4. Health care related waste management training

Training about health care related waste (HCRW) is integral to any IPC training activities. Therefore, this item probed respondents' attitudes towards the training of OHCWs in HCRW management. Overall, 91% of respondents agreed about the need for dental assistants to receive training in HCRW management. Furthermore, the Chi-square test with $alpha = 0.05$ indicated no significant differences between the respondent employed in the respective sectors nor between the differently trained respondents (Table 7-47).

**Table 7-47 OHC staff members need training on HCRW management**

| Respondent categories | Response options *(%)* | | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|---|
| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Not indicated | | | |
| Private sector [n=121] | 1 | 1 | 5 | 21 | 69 | 3 | 4.47 | 1.08 | *0.48* |
| Public sector [n= 76] | 1 | 0 | 0 | 29 | 63 | 7 | 4.33 | 1.31 | |
| Formally trained [n=84] | 0 | 0 | 1 | 25 | 73 | 1 | 4.67 | 0.7 | *0.22* |
| In-service trained [n=113] | 2 | 1 | 4 | 23 | 63 | 7 | 4.23 | 1.4 | |

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| Total respondents (n=197) | Disagreement | Neutral | Agreement | Not indicated |
|---|---|---|---|---|
| | 2 | 3 | 91 | 4 |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

## 7.9. Discussion of attitudes towards IPC

### 7.9.1. Introduction

The attitude towards infection prevention and control often influences how compliance with the recommended measures will be executed. Previously, direct relation has been found between attitude and practices, where respondents with a positive attitude were more likely to implement the required practices (Akintunde, 2017).

A total of 59 items surveyed twenty-eight aspects of dental assistants' attitudes towards the seven IPC themes. The discussion outlines the findings of total respondents' (n=197) according to each attitude aspect (AA) within the respective IPC themes. It further elaborates on the notable findings that emerged from the comparisons between the individual categories, namely respondents employed in the Private sector (n=121) versus respondents employed in the public sector (n=76) and FT respondents (n=84) versus IST respondents (n=113).

Across multiple knowledge, attitude and practice studies that surveyed infection prevention and control measures within OHCFs, the focus was not specifically on dental assistants. Therefore, the respondents' attitudes towards IPC measures were compared with other health care professionals, such as dentists, dental students, and nurses.

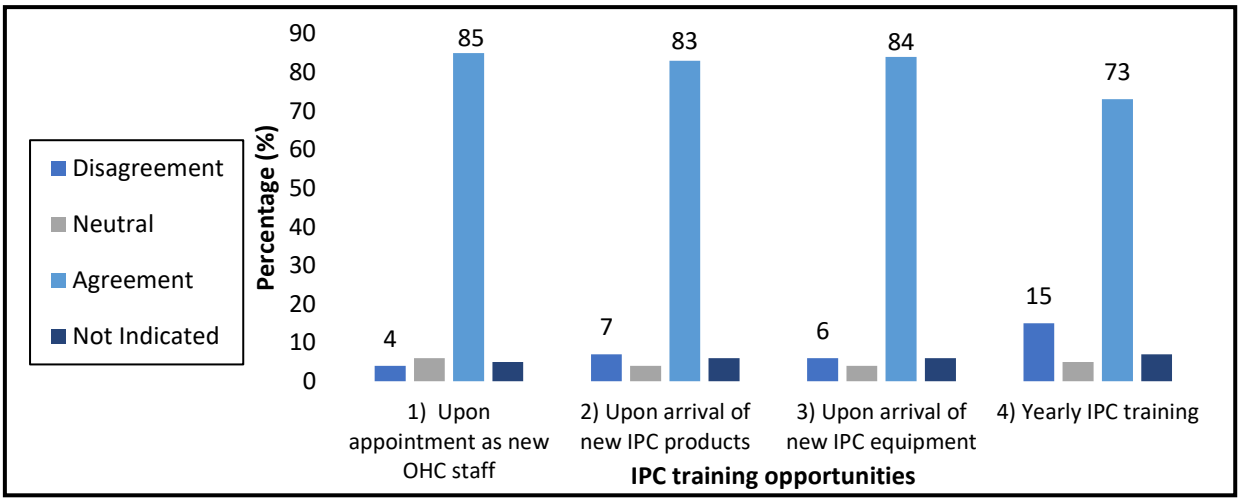
The respondents' attitudes were interpreted as either positive or negative, depending on the level of agreement with the statements. Higher scores of agreement with positively stated items and higher scores of disagreement with negatively worded items denoted a positive attitude (Bonetti *et al.*, 2009)

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### 7.9.2. Respondents' attitudes towards IPC training and continuous professional development

Training that focuses on IPC measures within OHCFs plays a critical role in ensuring good attitudes of OHCWs towards IPC measures (AL-Essa and AlMutairi, 2017). To bring about positive changes in the attitudes of OHCWs toward IPC measures, researchers agree that continuing education about IPC infection control is essential for OHCWs, including dental assistants (Cheng *et al.*, 2020), oral hygienists (Moon, Lee and Han, 2017) and dental students (Acosta-Gío *et al.*, 2008; Ehsani *et al.*, 2013). In addition, Elawady *et al.* (2021) concluded that efforts are warranted to enhance attitude towards IPC to deliver safe OHC services. Therefore, items in IPC theme 1: surveyed respondents' attitudes towards three IPC training opportunities within OHCFs and yearly IPC training (Figure 7-1).

Overall, respondents in the current study portrayed a positive attitude towards all IPC training opportunities. The results were similar across the respective respondent categories. Similarly, among nursing professionals, a positive attitude is vital for IPC implementation, and IPC training for all staff is essential (Houben *et al.*, 2022).




***Agreement indicative of positive attitude and disagreement indicative of negative attitude***

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**Figure 7-1 Summary of respondents' attitude towards IPC training opportunities**

### 7.9.3. Respondents' attitudes toward Infectious diseases and risks

Standard precautions are described as a set of precautions designed to prevent the transmission of bloodborne pathogens when providing health care (CDC, 2003b, 2016b). The fundamental principle of standard precautions is to regard all patients as possibly infected (Cleveland *et al.*, 2016; Collins and Kelsch, 2021). Therefore, respondents must have a positive attitude towards standard precautions for all patients to minimise or prevent the transmission of bloodborne diseases (Figure 7-2).

Overall, respondents displayed a positive attitude towards standard precautions, with 90% who agreed that the standard precautions must be used for all patients irrespective of their health status. No significant differences in the attitudes of the respective respondent categories were confirmed. In contrast, only 60% of OHCWs in private dental clinics in Jeddah, Saudi Arabia, considered all patients in the dental clinic as possibly having an infectious disease (Alahdal *et al.*, 2019). Furthermore, among surgeons and physicians in Iran, the attitude toward standard precautions was low (Askarian *et al.*, 2007).

It is likely that OHCWs, with a positive attitude towards using standard precautions and applying them meticulously, would not consider changing their standard IPC routine when working on a patient with an infectious disease. However, in a literature review, it was evident that this view is different in various parts of the world, as only 36% of dentists from South Korea but 83% of dentists from Thailand indicated a positive response to the idea that a dentist should treat all patients alike, regardless of infectious disease status (Puttaiah *et al.*, 2011). This study found that an equal percentage (43%) of the total respondents indicated opposing responses to this item. Since less than 50% of respondents indicated agreement with the statement, the results are interpreted as a negative attitude.

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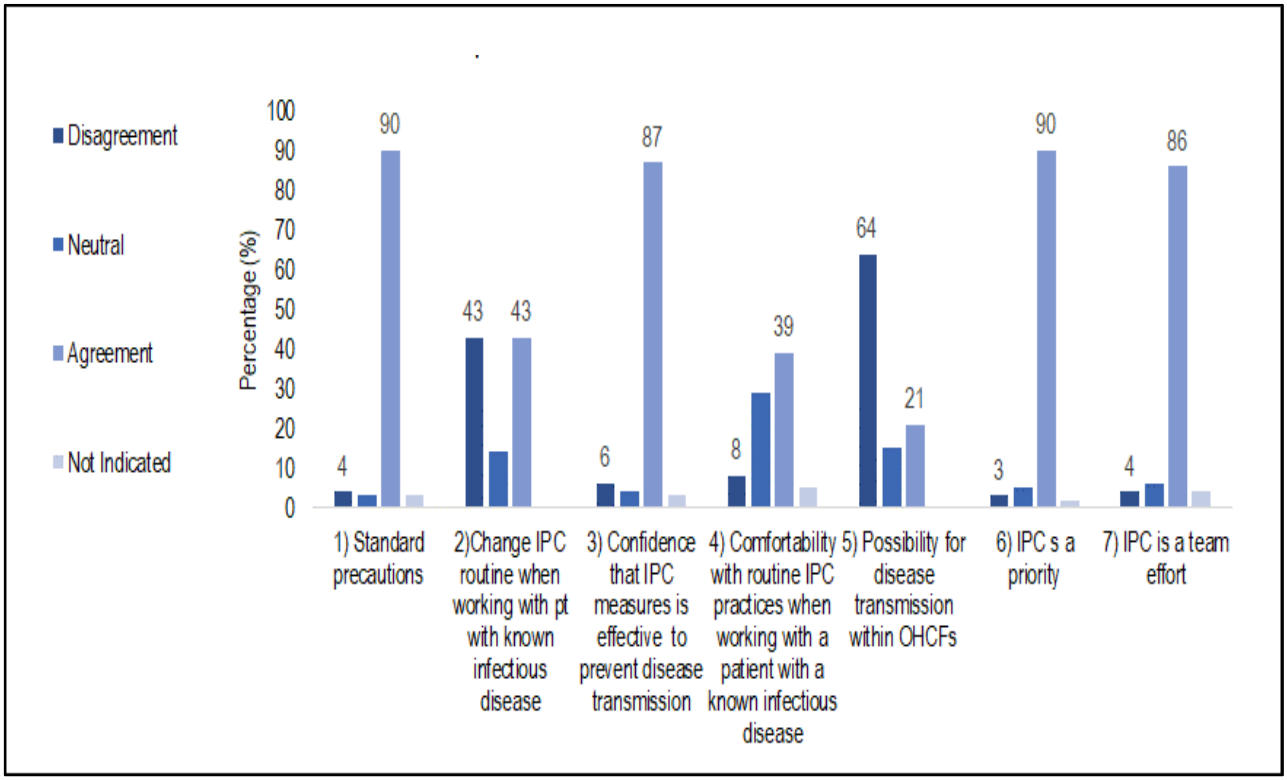
However, the current study showed significantly more FT respondents displayed a positive attitude. Still, significantly more respondents in the public sector indicated a negative attitude by reporting that they would consider changing their IPC routine when working on a patient with a known infectious disease. Similarly, negative attitudes towards the treatment of HIV+ patients were previously recorded. Dental auxiliaries (87.6) of in Nigeria believed that extra infection control precautions are needed when treating HIV-positive patients (Azodo *et al*., 2009).

Coherent to the latter finding, respondents' confidence that their IPC measures are sufficient to prevent disease transmission varied. Less than 40% of the total respondent indicated that they always feel comfortable with the IPC measures they apply when working on a patient with a known infectious disease. However, significantly more respondents in the private sector were confident that the IPC measures they apply within the OHCFs, are sufficient to prevent disease transmission within their OHCFs *($p=0.4$)*. In contrast, 77.10% of OHCWs in private dental clinics in Jeddah felt confident with their IPC measures when treating patients with infectious (Alahdal *et al,.*2019). In contrast, among medicine and health sciences students in Northwest Ethiopia, 55.7% of the students think that all patients need to be tested for Hepatitis B before receiving any health care services, which indicates a negative attitude toward patients with HBV (Abdela *et al.*, 2016). Furthermore, 61.4% of Iranian dentists expressed discomfort about treating HIV+ patients (Askarian *et al*., 2006). Among nursing students at Sabya College in Saudi Arabia, 48.3% had a negative attitude toward hepatitis B infected patients (Modawi *et al*., 2020). Li *et al*. (2015) also described the attitude of Chinese dental interns towards treating patients with HBV infection as less favourable.

The risk of disease transmission within OHCFs is a reality (Unakal *et al*., 2017). However, only 64% of the total respondents disagreed about the possibility of disease transmission within their OHCFs. This finding could be because 90% of the total respondents had a positive attitude towards the priority

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IPC received. Furthermore, 86% of respondents confirmed that IPC is a team effort (Figure 7-2). This positive attitude towards teamwork when performing IPC measures aligns with the findings of Laneve *et al*., (2019). They reported that an appropriate workflow relationship between the oral health care team members is critical to maintaining the highest standard of IPC.




***Agreement indicative of positive attitude and disagreement indicative of negative attitude***

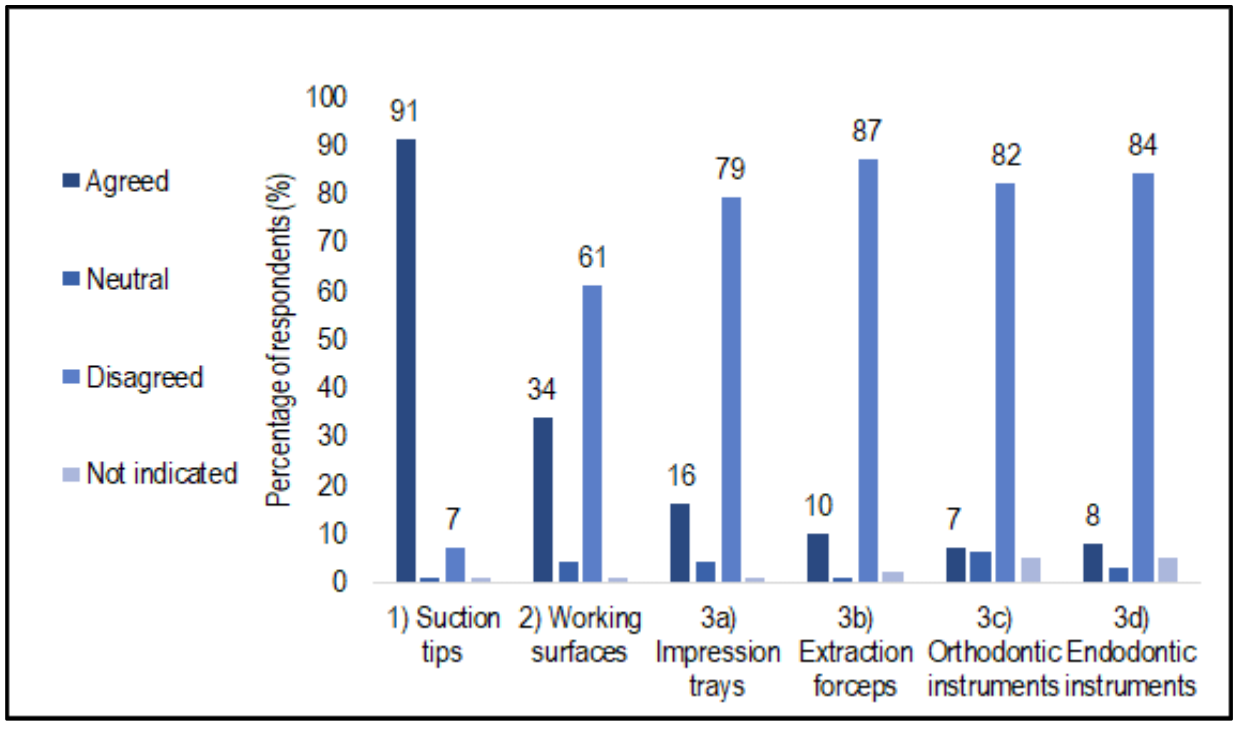
**Figure 7-2 Summary of respondents' attitude towards aspects of infectious diseases and risks**

### 7.9.4. Respondents' attitudes towards disinfection and sterilisation

Disinfection and sterilisation are two distinct processes of infection prevention and control. Disinfection aims to reduce or minimise the count of micro-organisms, whereas sterilisation eliminates or destroys the micro-organisms (FDI, 2009; CDC, 2016a; WHO, 2016b). Therefore, this study surveyed dental assistants' attitudes toward four aspects of disinfection and sterilisation: disinfection of different instruments and equipment, the instrument decontamination routine before sterilisation, biological monitoring and record-keeping of the sterilisation process (Figure 7-3).

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By disagreeing that it is acceptable only to disinfect instruments such as impression trays, extraction forceps, and endodontic instruments, the respondents portrayed a positive attitude towards the processing of these instruments before using them on the next patient. In the statement that it is enough only to wipe/rinse off (disinfect) orthodontic instruments, significantly more FT respondents strongly disagreed and showed a positive attitude towards the correct method to process orthodontic instruments before using them on the next patient. Respondents employed in the respective sectors and respondents with different training types portrayed a positive attitude by disagreeing that it is enough only to disinfect suction tips. Furthermore, in the current study, *r*espondents employed in the respective sectors and respondents with different training types portrayed a positive attitude by agreeing that it is acceptable to disinfect surfaces. About 82.2% of dental assistants in Nigeria thought infection could always be transmitted from patient to patient if unsterilised files were used for endodontic treatment (Enabulele and Omo, 2018).




***Agreement indicative of positive attitude and disagreement indicative of negative attitude***

**Figure 7-3 Summary of respondents' attitude towards only disinfecting different items**

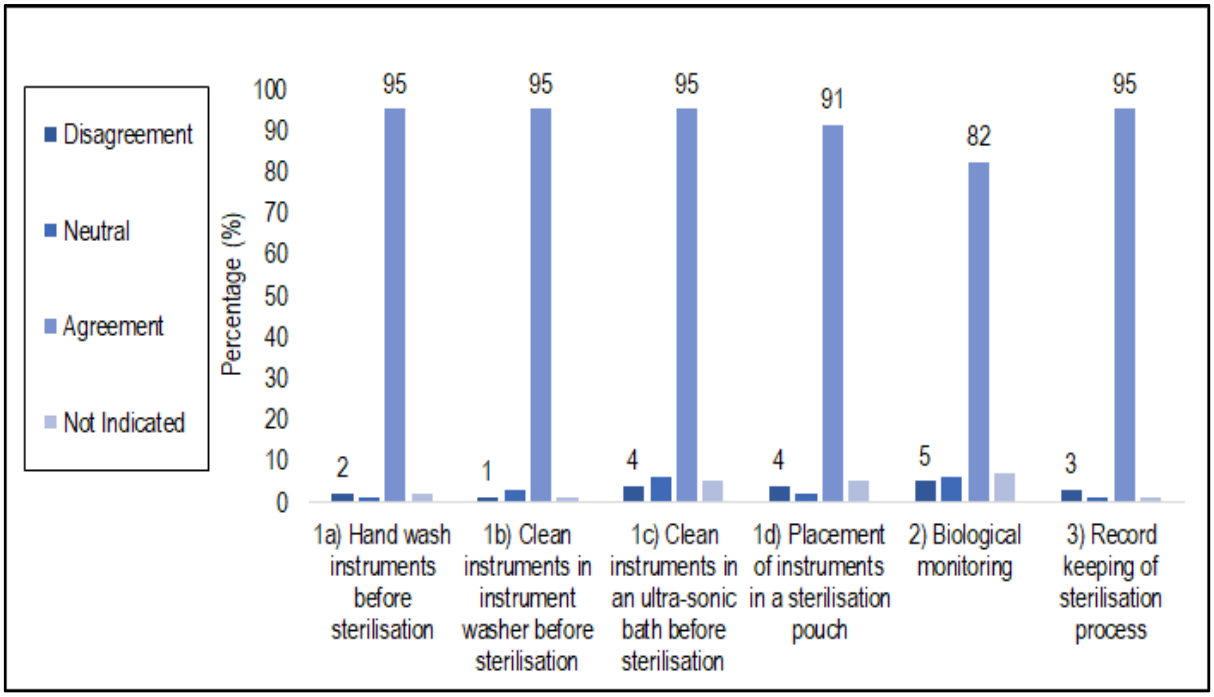
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Pre-cleaning all visible blood and debris from instruments is usually the first step in processing instruments. This cleaning can be done manually, using an instrument washer or an ultra-sonic bath. After pre-cleaning, instruments should be placed in protective packaging before being put in the autoclave (Rutala *et al.*, 2019; Oosthuysen, *et al.* 2020).

The results of biological monitoring serve as evidence that sterilisation devices work effectively. Overall, respondents portrayed a positive attitude towards biological monitoring as part of the sterilisation routine, as 82% of respondents indicated agreement. Alahdal *et al*. (2019) did not report respondents' attitudes toward biological monitoring. Still, the report that only 38.4% of OHCWs in private dental clinics in Jeddah used biological spore tests to check the effectiveness of their autoclaves.

Furthermore, printouts of autoclave sterilisation cycles and sterilisation indication strips inside and outside the instrument sterilisation pouch also prove successful sterilisation. Overall, respondents portrayed a positive attitude towards record keeping of successful sterilisation processes as part of the sterilisation routine. Of the total respondents, 95% indicated a level of agreement. Respondents employed in the respective sectors and respondents with different training types portrayed a positive attitude by agreeing with record keeping as part of the sterilisation process (SCDEP, 2011). In contrast, an exceptional low scores in the use of administrative controls, with emphasis on the lack of record-keeping in South-African OHCFs (Oosthuysen, 2015).

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*Agreement indicative of positive attitude and disagreement indicative of negative attitude*

**Figure 7-4 Summary of respondents' attitude towards aspects of instrument pre-cleaning routine, biological monitoring and record-keeping of the sterilisation process**

### 7.9.5. Respondents' attitudes toward vaccination

Health care workers must be vaccinated against diseases that represent a substantial risk for transmission in health care settings (CDC, 2003b, 2011b, 2016b). Generally, IPC guidelines recommend that health care workers be vaccinated against Hepatitis B, measles, mumps, rubella, varicella, tetanus, pertussis, diphtheria and influenza (Department of Health_RSA, 2007; Talbot, 2014; IAC, 2017; OSAP, 2019). However, the directives and legislation regarding vaccination for HCWS varied across countries. For example, recommendations about vaccination against Hepatitis A, Typhoid, Poliomyelitis, Meningitis, and Tuberculosis vaccines are not always addressed (Petti, Messano and Polimeni, 2011). Furthermore, the vaccination debate has been an extended controversy (Tafuri *et al.*, 2009; Pelullo *et al.,* 2014; Fortunato *et al.,* 2015; Haviari *et al.,* 2015; Lytras *et al.,* 2016; Gualano *et al.*, 2019).

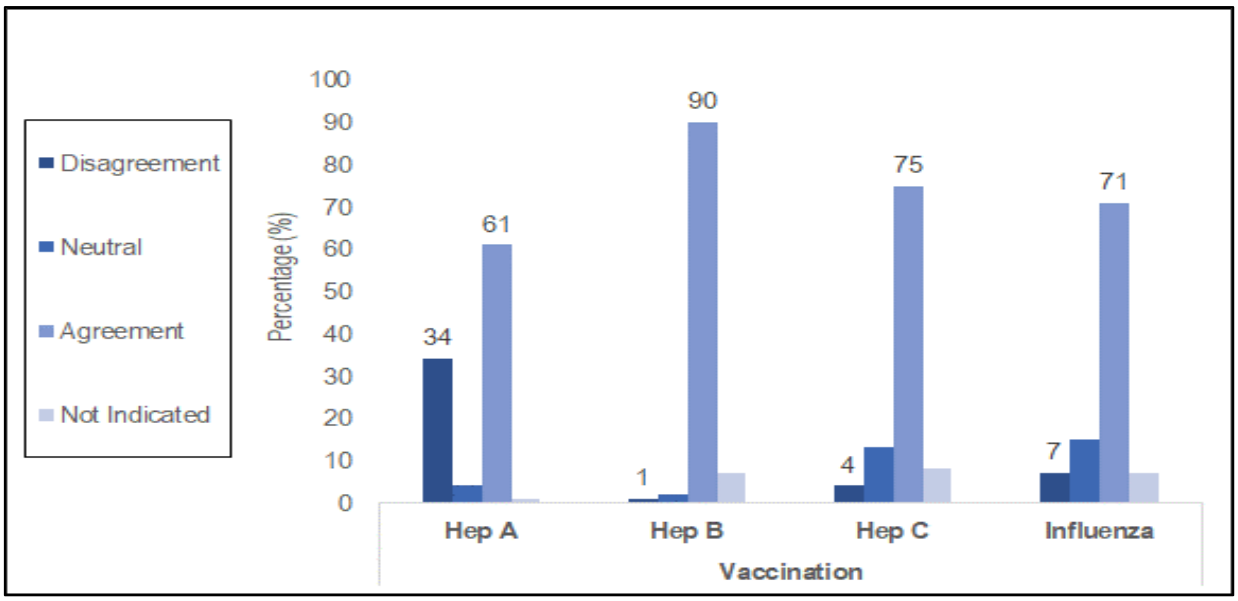
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Nevertheless, this study surveyed respondents' attitudes towards receiving the vaccination against three strains of Hepatitis and Influenza. Recently, recommendations about COVID-19 vaccination were added (IAC, 2017; Collins, 2020; Collins and Kelsch, 2021). Since data for this study were collected before the onset of the Covid-19 pandemic, respondents' attitude towards receiving Covid - 19 vaccination was not investigated.

In the current study, the percentage of respondents with a positive attitude towards vaccination against Hepatitis A was the lowest, with 61% who indicated agreement. The highest percentage of respondents agreed that OHCW should be vaccinated against Hepatitis B (90%). These results showed that respondents portrayed a positive attitude towards vaccination against Hepatitis B. Furthermore, in the current study, more FT respondents show a positive attitude toward vaccination against Hepatitis B $(p=<0.01)$. Similarly, other studies reported positive attitudes toward vaccination against Hepatitis B (Abdela *et al.*, 2016). Even for vaccination against Hepatitis C, which is not available yet, 75% of respondents indicated agreement. Furthermore, significantly more FT respondents portrayed a positive attitude towards vaccination against Hepatitis C $(p=0.01)$.

Vaccination against Influenza has been around for decades, with the continuous development of the vaccine to combat new influenza strains. It is widely endorsed that HCWs be vaccinated against influenza annually (Citron and Lunn, 1988; CDC, 2011b; Talbot, 2014; Kim *et al.*, 2015; Black *et al.,* 2017; IAC, 2017; Royal College of Dental Surgeons of Ontario, 2018). Respondents in the current study portrayed a positive attitude towards vaccination against Influenza, as 71% of respondents indicated agreement. However, among respondents with different training types, significantly more FT respondents portrayed a positive attitude towards vaccination against Influenza $(p=0.01)$. In contrast, medical students at a German University hospital described a negative attitude towards vaccination against Influenza (Lehmann *et al.*, 2015).

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***Agreement indicative of positive attitude and disagreement indicative of negative attitude***

**Figure 7-5 Summary of respondents' attitude towards vaccination against specific diseases**

### 7.9.6. Respondents' attitudes toward hand hygiene

Hand hygiene has been repeatedly indicated as a critical measure to prevent the spread of diseases (CDC, 2003a, 2016b; WHO, 2009b, 2017; Otieno, Kihara and Mua, 2020). Furthermore, researchers agree that a good attitude toward hand hygiene may increase the hand hygiene practices of HCWs (Cruz and Bashtawi, 2016; Da Costa, Ambrosano and Pinelli, 2016). Hence this study surveyed respondents' attitudes toward the importance of hand hygiene as an intervention to promote IPC within OHCFs. Respondents portrayed a positive attitude towards this aspect, as 90% indicated agreement. A higher percentage of participants, 93.8%, who worked in a facility where hand hygiene is encouraged, believed that practising hand hygiene prevents the spread of diseases (Li *et al.*, 2015). In contrast, amongst Saudi nursing students, only 57% were aware that effective hand hygiene reduces the spread of infectious diseases (Cruz and Bashtawi, 2016),

Furthermore, the current surveyed respondents' attitudes towards hand hygiene practices negatively. Respondents portrayed a positive attitude by disagreeing that: "handwashing is not such an important

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action" and "and "if my hands still look clean, it is not necessary to wash them" (85%). Similarly, participants in previous research recognised the importance of hand hygiene practices, and they acknowledged that their hand hygiene could be further improved (Naranjo 2014; Li *et al.,* 2015). Furthermore., in the current study, 94% of respondents disagreed that "there is not enough time to wash hands as frequently as required" (94%). However, in other students, respondents perceived the lack of time as a factor that hampered their hand hygiene practices (Omogbai *et al.,* 2011; Naik *et al.,* 2014; Li *et al.,* 2015).

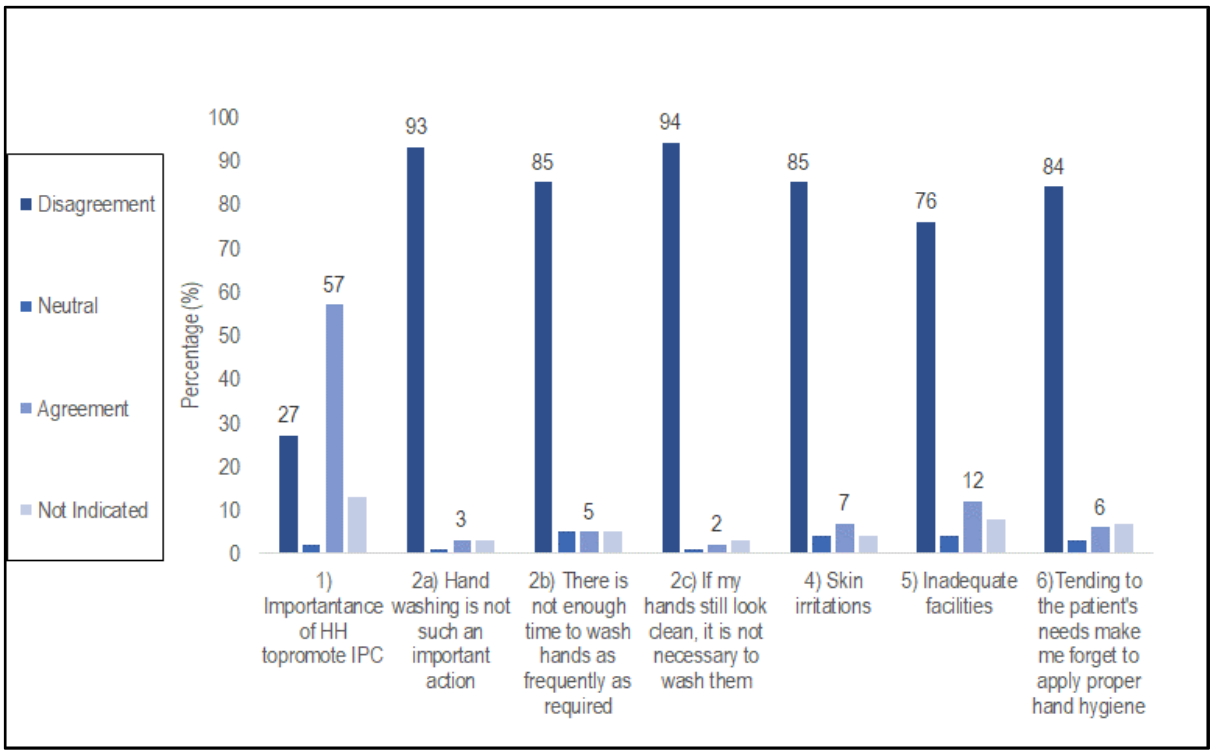
Respondents perceived different factors as barriers to effective hand hygiene (Omogbai *et al.,* 2011; Li *et al.,* 2015; Diwan *et al.,* 2016). Therefore, the current study surveyed elements that could be perceived as barriers to effective hand hygiene practices, namely, skin irritations, inadequate facilities and tending to patients' needs, which they perceived as influencing their hand hygiene regimes. Overall, a low percentage of respondents agreed that the listed factors were barriers to performing hand hygiene.

Less than 30% of respondents in the current study agreed about skin irritations, whereas 43.1% of dentists in Bangalore city indicated that hand hygiene products were detrimental to their skin (Naik *et al.*, 2014). However, Visscher *et al.* (2006) suggested that the use of products that minimise irritant dermatitis and maintain effective skin can substantially diminish the element of skin irritations as a reason that hampers respondents' hand hygiene practices.

Furthermore, less than 15% of respondents in the current study agreed that inadequate facilities kept them from performing hand hygiene. However, significantly more respondents employed in the public sector agreed that inadequate facilities are a factor that prevented them from performing handwashing *($p=0.03$)*. Likewise, HCWS in sub-Saharan African countries mentioned that infrastructural deficits and poorly positioned facilities contributed to them not optimally performing hand hygiene practices (Ataiyero and Graham 2019).

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Regarding tending to patients' needs, only 6% of respondents in the current study indicated agreement that the workload is an element that hampered optimal hand hygiene. In contrast, a higher percentage of dentists and dental students at a Nigerian Tertiary Dental Clinic (Omogbai *et al.,* 2010), HCWs in a rural Indian teaching hospital (Diwan *et al.*, 2016) and HCWS in sub-Saharan Africa (Ataiyero, *et al.*, 2019) reported that workload and tending to patients' needs were elements that negatively influenced their hand hygiene practices. However, 34.8% of HCWs at two tertiary hospitals in Nigeria mentioned excess workload as a major challenge that hampered the execution of routine IPC measures (Ogoina *et al.,* 2015).




***Agreement indicative of positive attitude and disagreement indicative of negative attitude towards the positive stated items and vice versa for the negatively stated items***

**Figure 7-6 Summary of respondents' attitude towards aspects related to hand hygiene**

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### 7.9.7. Respondents' attitudes towards personal protective equipment

The use of PPE, namely examination gloves, masks, eyewear and protective clothing, is recommended as standard practices when delivering OHC services (CDC, 2003a, 2016b, 2017; Cleveland *et al.*, 2012; APIC, 2016; Department of Health_RSA, 2020b; Department of Health_RSA and Republic of South-Africa National Department of Health, 2020; Elawady *et al.*, 2021) during all dental procedures. Therefore, this study surveyed respondents' attitudes towards using the four PPE items and surveyed respondents' attitudes towards possible factors that inhibit using these PPE items.

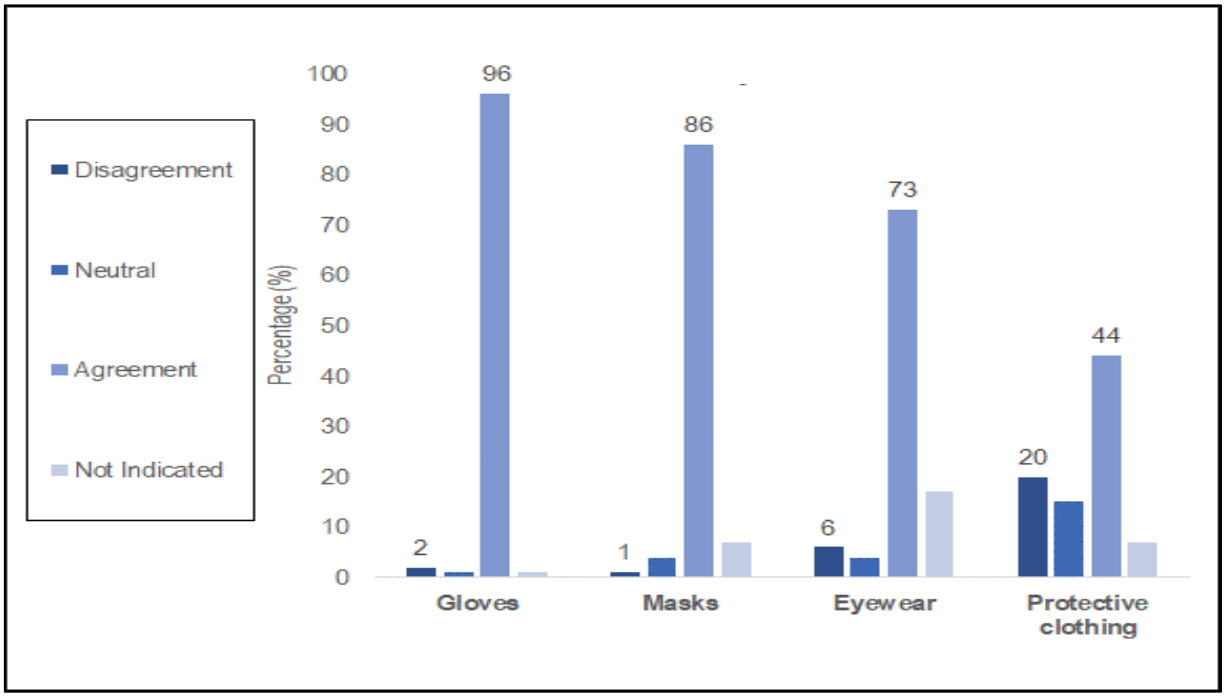
Except for the item probing respondents' use of protective clothing, respondents in this study portrayed a positive attitude towards the use of gloves and eyewear and agreed that surgical masks (Figure 7-7). Similarly, 89% of HCWs at Gondar University referral hospital had a positive attitude toward using PPE (Yazie *et al.,* 2019). Furthermore, 96% of dental practitioners working in government dental clinics in Tanzania indicated a positive attitude in terms of wearing a new pair of gloves for each patient (Christian and Kikwilu 2014). However, lower percentages have been reported in other studies. Among dental assistants in Multan, Pakistan, 68% of participants from the private sector versus 75% of respondents from the public sector have a good or positive attitude towards the use of PPE (Javaid *et al.*, 2019).

Respondents portrayed a positive attitude towards the wearing of masks. In the current study, 86% of the total respondents agreed that surgical masks should always be used (Figure 7.7). However, significantly more respondents in the private sector agreed that masks should always be used *($p=0.02$)*. Similarly dental practitioners in Tanzania portrayed a positive attitude towards the use of masks, as 81.5% indicated that it is necessary to put on a fresh mask whenever attending to a patient (Christian and Kikwilu, 2014).

In contrast with the previous three PPE items, only 44% of respondents employed in the respective sectors and respondents with different training types indicated agreement and 20% disagreed that

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protective clothing should always be used (Figure 7-7). This shows that respondents in the current study are negatively inclined towards the wearing of protective clothing. In contrast, 95.2% of dental practitioners working in government dental clinics in Tanzania showed a positive attitude in terms of using protective clothing, in their case, putting on an overcoat whenever attending to patients (Christian and Kikwilu, 2014).

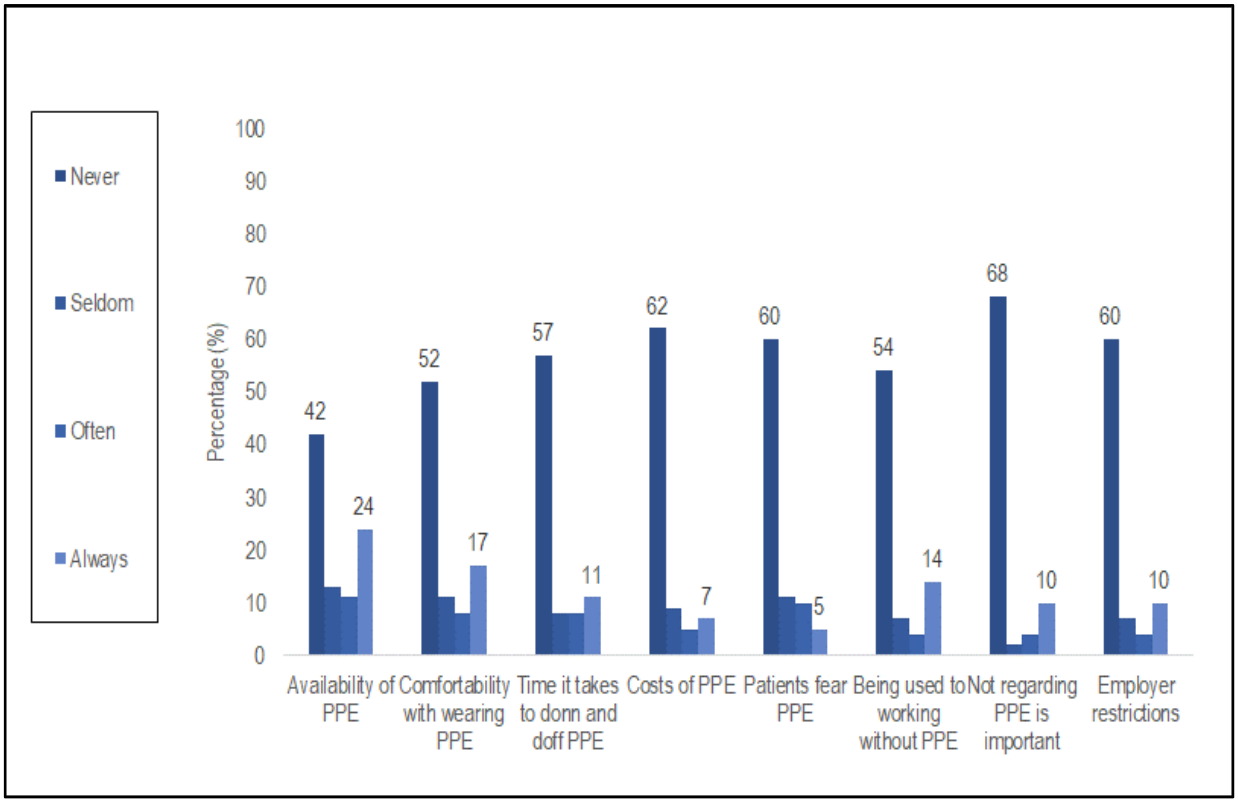



***PPE =Personal protective equipment; Agreement indicative of positive attitude and disagreement indicative of negative attitude***

**Figure 7-7 Summary of respondents' attitude towards the use of PPE items in general**

This study also surveyed respondents' attitudes towards eight factors that might prevent respondents from wearing PPE. These factors referred to limited availability of PPE; comfortability of PPE, the time it takes to put on and remove PPE, the costs of PPE, patients fearing PPE, OHCWs being used to work without PPE, OHCWs do not regard PPE as necessary and ignorance on the part of OHCW. Overall, less than 25% of the total respondents indicated the listed factors as reasons that influence their use of PPE. The availability of PPE was the most agreed upon reason for not wearing PPE, as 24% of respondents indicated availability as the reason for not wearing PPE (Figure 7-8).

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***PPE =Personal protective equipment***

**Figure 7-8 Summary of respondents' attitude towards factors that influence the use of PPE**

### 7.9.8. Respondents' attitudes toward health care related waste management

Distinct categories of waste are generated within OHCFs.(WHO, 2014b). The category of waste relevant to the attitude aspects of the study is known as hazardous waste. Hazardous waste refers to waste containing substances that are harmful to humans or the environment (Allen, 2015). Therefore, this study probed respondents' attitudes towards the segregation of HCRW; inadequate management of HCRW, the risk that HCRW pose a to people and the environment and HCRW training.

Overall, more than 80% of respondents indicated agreement with the four aspects of HCRW that were surveyed (Figure 7-9). This result portrayed those respondents who had a positive attitude towards HCRW. Likewise, 91.82% of dental students in Nepal had a positive attitude toward the safe management of HCRW (Singh *et al.*, 2018). Previously, 100% of dentists, dental students and faculty

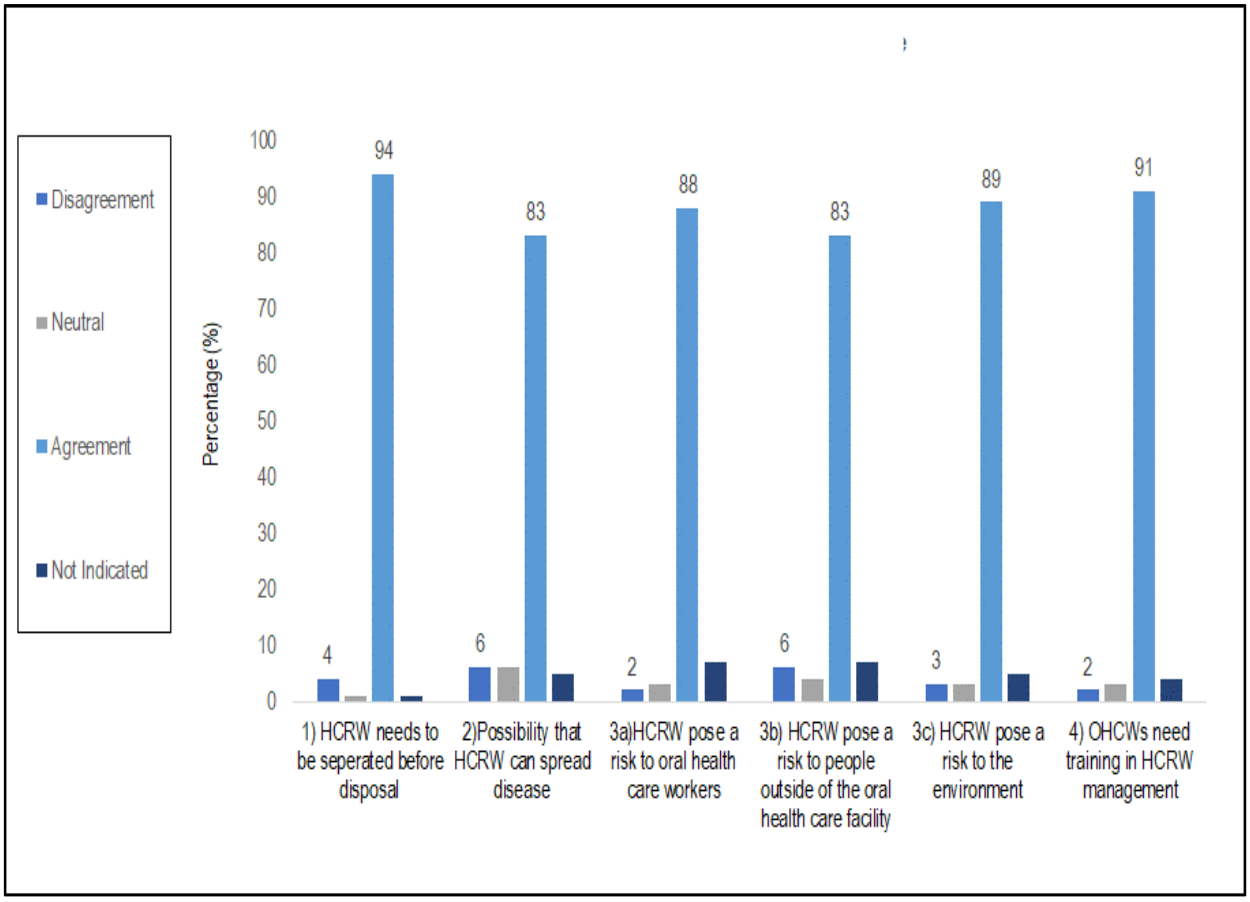
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working at three dental teaching institutes, and private practitioners in and around Delhi, India, agreed about the respective HCRW statements (Sood and Sood, 2011). At Belgrade University, significantly more dental students (82.8%) showed more positive attitudes compared to medical students (58.8%) who had a positive attitude (Ilić-Živojinović *et al.*, 2019). On the other hand, other studies reported a lower percentage of HCWs who portrayed a positive attitude towards aspects of HCRW management. Among HCWs at health care facilities in the Eastern Free State, 75.4% did not view the safe management of medical waste as a priority (Mahasa and Ruhiiga, 2014). Furthermore, they pointed out that the attitude of HCWs in the more prominent and specialised facilities portrayed a more positive attitude towards managing medical waste than HCWs in smaller facilities (Mahasa and Ruhiiga, 2014).

Regarding respondents' attitudes towards specific aspects of HCRW, 94% of respondents indicated agreement that it is necessary to separate waste at the point of generation. Furthermore, more than 80% of the total respondents agreed that exposure to hazardous health care waste could result in disease or infection and poses a risk to people and the environment (Figure 7-9). Similarly, Puri *et al.*, (2019) reported that 84% of respondents within the dental field confirmed that inadequate HCRW management contributes to environmental pollution and the spread of diseases.

Concerning HCRW management training, respondents in the current study portrayed a positive attitude. Of the total respondents, 91% agreed that OHCWs should receive training on HCRW management (Figure 7-9). This positive attitude ,of HCWs towards HCRW training were also reported in other studies (Kumar and Rahman2017; Ilić-Živojinović *et al.*, 2019).

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***HCRW = Health care related waste; Agreement indicative of positive attitude and disagreement indicative of negative attitude***

**Figure 7-9 Summary of respondents' attitude towards aspects of health care related waste**

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# Chapter 8

# IPC Practices

## 8.1. Introduction

Dental assistants play a crucial role in rendering safe dental treatment to patients who visit OHCFs. Breaches in IPC measures within the OHCF can lead to the transmission of infectious diseases among patients, OHCWs, and their significant others (CDC, 2016). Therefore, dental assistants should perform adequate and correct IPC measures.

This chapter reports the results and discusses the findings across items that probed dental assistants' IPC practices. The IPC practices of dental assistants were viewed within the scope of professional practices of South-African dental assistants (HPCSA, 2012). In addition, this study also surveyed barriers to practising effective IPC measures as experienced by the respondents. In total, 60 items surveyed respondents' practices related to 25 practices aspects (PAs) across seven IPC themes (Table 8-1).

**Table 8-1 Summary of the IPC themes, number of practice aspects and number of practice items that surveyed the IPC Practice domain**

| IPC theme number | Name of IPC theme | Number of Practice aspects | Number of items |
|---|---|---|---|
| 1 | IPC training and continuous professional development | 3 | 10 |
| 2 | Infectious diseases and risks | 3 | 9 |
| 3 | Disinfection and sterilisation | 4 | 20 |
| 4 | Vaccination | 1 | 4 |
| 5 | Hand hygiene | 5 | 10 |
| 6 | Personal protective equipment (PPE) | 5 | 4 |
| 7 | Health care related waste (HCRW) management | 3 | 3 |
| 8 | Barriers to effective IPC practices | 1 | |
| ***Total*** | | ***25*** | ***60*** |

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The IPC practices of respondents are presented in separate tables for each item. Each table shows the *percentage*, the *mean*, and *standard deviation* of the total respondents (n=197) and the respective respondent categories. Furthermore, these tables display the results of the Chi-square tests *(p-value)* with *alpha=0.05*. The Chi-square test compared the statistics of respondents according to their employment sector and according to the type of dental assisting training they received. The comparison between the various categories was: Private sector (n=121) versus public sector (n=76) and FT (n=84) versus IST (n=113).

Practice items with an acceptable response received one point, and zero points were allocated to an unacceptable response. The average practice score of the total respondents was considered excellent (>75%,) good (74%-51%), moderate (50% - 26%) and weak (<25%) (Kumar and Rahman, 2017).

## 8.2. IPC theme 1: IPC training and continuous professional development

Within IPC theme 1: IPC training and continuous professional development training practice aspects that make up and outline the purpose of each aspect. The Health Professions Council of South-Africa (HPCSA) produces a set of guidelines related to continuous professional development (CPD). These guidelines addressed the importance of CPD events to increase effective practices across various aspects of the tasks OHCWs performed (HPCSA, 2017). Therefore, IPC theme 1: IPC training and continuous professional development, focussed on three practical aspects, namely: IPC training received, respondents' last attendance at a CPD event, and surveyed the factors that prevented respondents from attending CPD events. Table 8-2 further describes the purpose of the items that surveyed respondents' practices related to IPC training and continuous professional development.

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**Table 8-2 Purpose of the different practical aspects within IPC theme 1: IPC training and CPD**

| Practice aspects (PAs) | Purpose of items |
|---|---|
| PA-1: IPC training received | To survey if respondents received IPC training on four occasions, namely:<br>1. Upon appointment as a new OHC staff member<br>2. When new IPC products arrived<br>3. When new IPC equipment arrived<br>4. Yearly |
| PA-2: Last CPD event attended | To survey how long-ago respondents attended a CPD event. Six timeframes were indicated on the questionnaire. |
| PA-3: Factors that prevented respondents from attending CPD events | To survey the factors that prevented respondents from attending CPD events. Five factors were listed:<br>1. Not being aware of the event<br>2. Date of the event<br>3. The timeslot of the event was not suitable<br>4. Cost of the event<br>5. Topics of the event did not apply to dental assistants |

### 8.2.1. IPC training received

When considering the four IPC training event types, a similar percentage of affirmative responses that ranged in the mid-'50s occurred in three of the events. Of the total respondents, 57% confirmed affirmative answers to the item probing IPC training received when new IPC equipment arrived. However, only 47% of the total respondents confirmed that they received IPC training every year (Table 8-3).

At alpha =0.05, the results of the Chi-square tests confirmed significant differences across three items. Significantly more respondents employed in the private sector ($p < 0.01$) and IST respondents ($p=0.02$) confirmed that they received IPC training when new IPC products arrived. In contrast, significantly more respondents in the public sector indicated that they did not receive IPC training

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every year. On the other hand, significantly more respondents employed in the private sector were unsure whether they received yearly IPC training ($p=0.04$).

**Table 8-3 IPC training that dental assistants received**

| IPC training events | Respondent categories | Response options *(%)* | | | *Mean* | *SD* | *p-value (alpha =0.05)* |
|---|---|---|---|---|---|---|---|
| | | Yes | No | Not sure | | | |
| **1. Upon appointment as a new OHC staff member** | Private sector [n=121] | 59 | 26 | 16 | 1.4 | 0.6 | *0.06* |
| | Public sector [n=76] | 50 | 41 | 9 | 1.4 | 0.7 | |
| | Formally trained [n=84] | 51 | 39 | 10 | 1.4 | 0.7 | *0.09* |
| | In-service trained [n=113] | 58 | 26 | 16 | 1.4 | 0.8 | |
| | ***Total respondents [197]*** | *54* | *33* | *13* | *1.4* | *0.7* | |
| **2. When new IPC products arrived** | Private sector [n=121] | 68 | 16 | 16 | 1.5 | 0.8 | ***<0.01** |
| | Public sector [n=76] | 38 | 41 | 21 | 1.2 | 0.8 | |
| | Formally trained [n=84] | 47 | 36 | 17 | 1.3 | 0.7 | ***0.02** |
| | In-service trained [n=113] | 63 | 18 | 19 | 1.4 | 0.8 | |
| | ***Total respondents [197]*** | *55* | *27* | *18* | *1.4* | *0.8* | |
| **3. When new IPC equipment arrived** | Private sector [n=121] | 70 | 17 | 13 | 1.6 | 0.7 | ***<0.01** |
| | Public sector [n=76] | 42 | 41 | 17 | 1.3 | 0.7 | |
| | Formally trained [n=84] | 51 | 35 | 14 | 1.4 | 0.7 | *0.08* |
| | In-service trained [n=113] | 65 | 20 | 15 | 1.5 | 0.8 | |
| | ***Total respondents [197]*** | *57* | *28* | *15* | *1.4* | *0.7* | |
| **4. Yearly IPC training** | Private sector [n=121] | 41 | 31 | 28 | 1.1 | 0.8 | ***0.04** |
| | Public sector [n=76] | 45 | 42 | 13 | 1.3 | 0.7 | |
| | Formally trained [n=84] | 37 | 38 | 25 | 1.1 | 0.8 | *0.43* |
| | In-service trained [n=113] | 46 | 34 | 20 | 1.2 | 0.8 | |
| | ***Total respondents [197]*** | *42* | *36* | *22* | *1.2* | *0.8* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

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### 8.2.2. Last attendance of a CPD event

Discussion of IPC issues at CPD events enables dental assistants to reflect on their IPC practices and learn best practices to apply IPC measures within their OHCFs. In this study, 70% of the total respondents attended a CPD event during the 18 months preceding the survey, while 13% confirmed that they had never attended an IPC-CPD event previously. At an *alpha = 0.05*, no significant differences occurred between respondents employed in the respective sectors or respondents with different training types (Table 8-4).

**Table 8-4 Last attendance of a continuous professional development event**

| Respondent categories | Response options *(%)* | | | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|---|---|
| | Not indicated | < 6 months | 6 – 18 months | 18 – 24 months | 24 – 36 months | 36 – 60 months | Never | | | |
| Private sector [n=121] | 2 | 42 | 28 | 8 | 2 | 2 | 16 | 2.4 | 1.8 | *0.7* |
| Public sector [n= 76] | 1 | 38 | 38 | 7 | 4 | 3 | 9 | 2.2 | 1.5 | |
| Formally trained [n=84] | 1 | 40 | 36 | 7 | 1 | 4 | 11 | 2.2 | 1.6 | *0.6* |
| In-service trained [n=113] | 2 | 41 | 29 | 8 | 4 | 1 | 15 | 2.4 | 1.8 | |
| ***Total respondents [197]*** | *2* | 40 | 33 | *7* | *3* | *2* | *13* | *2.3* | *1.7* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

### 8.2.3. Factors that prevented attendance of CPD events that discussed IPC matters

This study surveyed five factors that might influence dental assistants' attendance at a CPD event. Across four of the five listed factors, less than half of the total respondents confirmed it as factors that prevented respondents from attending a CPD event. Furthermore, only 30% of the total respondents indicated that topics that did not apply to assistants as a factor that prevented them from attending CPD events. In contrast, 60% of the total respondents stated the costs of CPD events as a factor that led to the non-attendance of a CPD event.

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**Table 8-5 Factors that prevented dental assistants from attending CPD events**

| Factors | Respondent categories | Response options *(%)* | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|
| | | Yes | No | Not indicated | | | |
| **1. Not aware of the event** | Private sector [n=121] | 40 | 49 | 11 | *1.3* | *0.6* | ***0.03** |
| | Public sector [n= 76] | 59 | 36 | 5 | *1.5* | *0.6* | |
| | Formally trained [n=84] | 51 | 42 | 7 | *1.4* | *0.6* | *0.6* |
| | In-service trained [n=113] | 45 | 45 | 10 | *1.4* | *0.7* | |
| | ***Total respondents [197]*** | ***49*** | ***43*** | ***8*** | ***1.4*** | ***0.6*** | |
| **2. Date of the event** | Private sector [n=121] | 42 | 43 | 15 | *1.3* | *0.7* | *0.4* |
| | Public sector [n= 76] | 41 | 50 | 9 | *1.3* | *0.6* | |
| | Formally trained [n=84] | 42 | 48 | 10 | *1.3* | *0.7* | *0.8* |
| | In-service trained [n=113] | 42 | 44 | 14 | *1.3* | *0.7* | |
| | ***Total respondents [197]*** | ***42*** | ***46*** | ***12*** | ***1.3*** | ***0.7*** | |
| **3. Time of the event** | Private sector [n=121] | 44 | 43 | 13 | *1.3* | *0.7* | *0.1* |
| | Public sector [n= 76] | 33 | 58 | 9 | *1.2* | *0.6* | |
| | Formally trained [n=84] | 42 | 50 | 8 | *1.3* | *0.6* | *0.4* |
| | In-service trained [n=113] | 38 | 48 | 14 | *1.2* | *0.7* | |
| | ***Total respondents [197]*** | ***39*** | ***50*** | ***11*** | ***1.3*** | ***0.7*** | |
| **4. Cost of the event** | Private sector [n=121] | 58 | 30 | 12 | *1.5* | *0.7* | ***0.03** |
| | Public sector [n= 76] | 61 | 34 | 5 | *1.6* | *0.6* | |
| | Formally trained [n=84] | 68 | 27 | 5 | *1.6* | *0.6* | ***0.05** |
| | In-service trained [n=113] | 52 | 35 | 12 | *1.4* | *0.7* | |
| | ***Total respondents [197]*** | ***60*** | ***32*** | ***8*** | ***1.5*** | ***0.7*** | |
| **5. Topics of the event did not apply to dental assistants** | Private sector [n=121] | 28 | 57 | 15 | *1.2* | *0.9* | *0.6* |
| | Public sector [n= 76] | 33 | 59 | 8 | *1.4* | *0.9* | |
| | Formally trained [n=84] | 30 | 61 | 9 | *1.3* | *0.8* | *0.3* |
| | In-service trained [n=113] | 30 | 56 | 14 | *1.3* | *1.0* | |
| | ***Total respondents [197]*** | ***30*** | ***58*** | ***12*** | ***1.3*** | ***0.9*** | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

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The results of the Chi-square tests with alpha=0.05 confirmed significant differences between respondent categories across two of the five factors that were listed. Significantly more respondents in the public sector indicated that unawareness of the CPD events and the costs of attending a CPD were reported. In addition, at $p=0.05$, significantly more FT respondents confirmed that the cost of CPD events was a reason for not attending CPD events (Table 8 5).

## 8.3. IPC theme 2: Infectious diseases and risks

Within IPC theme 2: Infectious diseases and risks, the focus was on three practical aspects, namely: respondents' exposure to patients with a known infectious disease, the occurrence of occupational injuries and the types of occupational exposure injuries experienced. Table 8-6 further describes the purpose of the items that surveyed respondents' practices related to infectious diseases and risks.

**Table 8-6 Purpose of the different practical aspects within IPC theme 2**

| Practical aspects | Purpose |
|---|---|
| PA-1: Exposure to patients with a known infectious disease | To determine the number of respondents who previously worked on a patient with a known infectious disease |
| PA-2: Occupational Exposure injury (OEI) | To determine the number of respondents who experienced an occupational exposure injury. |
| PA-3: Type of occupation exposure injuries | To determine the type of OEI experienced by respondents. Seven kinds of OEI that can occur were listed in the questionnaire. |

### 8.3.1. Exposure to patients with known infectious diseases

Overall, 74% of the total respondents confirmed that they had previously worked on a patient with a known infectious disease. However, 10% of the total respondents were unsure whether they had

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previously worked on a patient with a known infectious disease. At $alpha = 0.05$, the results of the Chi-square tests confirmed a significant difference between respondents employed in the respective sectors. With $p=0.01$, significantly more respondents in the private sector confirmed that they had previously worked on a patient with a known infectious disease (Table 8-7).

**Table 8-7 Dental assistants who assisted patients with known infectious disease**

| Respondent categories | Response options (%) | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|
| | Yes | No | Not sure | Not indicated | | | |
| Private sector [n=121] | 69 | 21 | 10 | 0 | 1.71 | 0.63 | ***0.01*** |
| Public sector [n= 76] | 80 | 9 | 11 | 0 | 1.48 | 0.82 | |
| Formally trained [n=84] | 73 | 18 | 9 | 0 | 1.55 | 0.78 | *0.81* |
| In-service trained [n=113] | 73 | 15 | 12 | 0 | 1.58 | 0.74 | |
| ***Total respondents [197]*** | *74* | *16* | *10* | *0* | *1.57* | *0.76* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

### 8.3.2. Occupational exposure injury (OEI)

All OHCW are potentially at risk of exposure to an injury at the workplace (Health and Safety Authority, 2016). Therefore, practical aspect two (PA-2) probed how many of the respondents had previously experienced an OEI during the usual tasks they perform within their OHCFs. Of the total respondents, 48% confirmed experiencing an OEI, and 5% were not sure if they had experienced an occupational exposure injury (OEI) in the past. This pattern was similar across all the respondent categories. Minimal variation in the *mean* and *standard deviation (SD)* occurred. At $alpha = 0.05$, the results of the Chi-square tests did not indicate any significant differences between the respondents employed in the different sectors nor between respondents with varying types of training (Table 8-8).

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**Table 8-8 Dental assistants who experienced an occupational exposure injury (OEI)**

| Respondent categories | Response options (%) | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|
| | Yes | No | Not sure | Not indicated | | | |
| Private sector [n=121] | 47 | 48 | 5 | 0 | 1.41 | 0.59 | *0.91* |
| Public sector [n= 76] | 47 | 47 | 5 | 0 | 1.41 | 0.59 | |
| Formally trained [n=84] | 46 | 49 | 5 | 0 | 1.44 | 0.59 | *0.78* |
| In-service trained [n=113] | 49 | 46 | 5 | 0 | 1.41 | 0.59 | |
| ***Total respondents [197]*** | *48* | *47* | *5* | *0* | *1.41* | *0.59* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

### 8.3.3. Types of occupational exposure injury (OEI)

Overall, the percentage of affirmative responses to the seven possible OEI listed varied. Of the total respondents, 27% confirmed that they experienced OEI during instrument cleaning. In contrast, 6% of the total respondents confirmed that OEI resulted from an incorrectly positioned instrument. In addition, the respondents mentioned four other types of OEI: injuries when opening a local anaesthetic tin, injuries when repacking instruments into drawers, needle stick injuries after taking patients' HGT, and injuries when placing the scalpel blades into the holder (Table 8-9).

Chi-square tests with $alpha = 0.05$ confirmed significant differences between respondent categories. Only in one out of the seven items was no significant difference between the respondent categories. This item surveyed respondents' OEI due to removing the local anaesthetic needle from the syringe. Significant differences were confirmed across the remaining six items between respondents employed in the respective sector. Overall, significantly more respondents in the private sector reported these different OEIs ($p = 0.02$) (Table 8-9).

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Furthermore, the Chi-square test result confirmed significant differences between respondents with different training types across two items. First, OEI because of sudden movement of the patient was reported by 99% of FT respondents versus 92% of IST respondents ($p=0.03$). Furthermore, 99% of FT respondents versus 91% of IST respondents confirmed injuries due to an incorrectly positioned. instrument on the instrument tray ($p=0.02$) (Table 8-9).

**Table 8-9 IPC theme 2_PA-3: Types of occupational exposure injuries experienced**

| Types of occupational exposure injuries | Respondent categories | Response options (%) | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|
| | | Yes | No | | | |
| 1. Injured while cleaning instruments | Private sector [n=121] | 37 | 63 | 0.23 | 0.42 | **<0.01 |
| | Public sector [n= 76] | 19 | 81 | 0.3 | 0.46 | |
| | Formally trained [n=84] | 25 | 75 | 0.25 | 0.44 | 0.06 |
| | In-service trained [n=113] | 27 | 73 | 0.27 | 0.44 | |
| | *Total respondents [197]* | *27* | *73* | *0.26* | *0.44* | |
| 2. Injured while recapping a needle | Private sector [n=121] | 38 | 62 | 0.23 | 0.42 | **<0.01 |
| | Public sector [n= 76] | 5 | 95 | 0.11 | 0.31 | |
| | Formally trained [n=84] | 13 | 87 | 0.13 | 0.34 | 0.14 |
| | In-service trained [n=113] | 21 | 79 | 0.21 | 0.41 | |
| | *Total respondents [197]* | *19* | *81* | *0.18* | *0.38* | |
| 3. Splash into the eyes or face | Private sector [n=121] | 30 | 70 | 0.19 | 0.4 | **<0.01 |
| | Public sector [n= 76] | 15 | 85 | 0.23 | 0.42 | |
| | Formally trained [n=84] | 26 | 74 | 0.26 | 0.44 | 0.11 |
| | In-service trained [n=113] | 17 | 83 | 0.17 | 0.38 | |
| | *Total respondents [197]* | *22* | *79* | *0.21* | *0.41* | |
| 4. Injured when removing the needle from the syringe | Private sector [n=121] | 24 | 76 | 0.14 | 0.35 | 0.12 |
| | Public sector [n= 76] | 15 | 85 | 0.24 | 0.74 | |
| | Formally trained [n=84] | 13 | 87 | 0.13 | 0.34 | 0.11 |
| | In-service trained [n=113] | 22 | 78 | 0.22 | 0.66 | |
| | *Total respondents [197]* | *19* | *81* | *0.18* | *0.55* | |
| 5. Injured when removing a bur from the handpiece | Private sector [n=121] | 17 | 83 | 0.1 | 0.3 | **<0.01 |
| | Public sector [n= 76] | 4 | 96 | 0.1 | 0.2 | |
| | Formally trained [n=84] | 8 | 92 | 0.08 | 0.28 | 0.74 |
| | In-service trained [n=113] | 10 | 90 | 0.1 | 0.3 | |
| | *Total respondents [197]* | *10* | *90* | *0.09* | *0.3* | |

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| Types of occupational exposure injuries | Respondent categories | Response options (%) | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|
| | | Yes | No | | | |
| 6. Injured with the instrument when the patient moved suddenly | Private sector [n=121] | 22 | 78 | 0.07 | 0.26 | **<0.01 |
| | Public sector [n= 76] | 2 | 98 | 0.02 | 0.15 | |
| | Formally trained [n=84] | 1 | 99 | 0.01 | 0.11 | *0.03 |
| | In-service trained [n=113] | 8 | 92 | 0.08 | 0.27 | |
| | *Total respondents [197]* | *8* | *92* | *0.05* | *0.22* | |
| 7. Injured with instruments that were not properly positioned on the instrument tray | Private sector [n=121] | 14 | 86 | 0.1 | 0.3 | **<0.01 |
| | Public sector [n= 76] | 0 | 100 | 0 | 0 | |
| | Formally trained [n=84] | 1 | 99 | 0.01 | 0.11 | *0.02 |
| | In-service trained [n=113] | 9 | 91 | 0.09 | 0.29 | |
| | *Total respondents [197]* | *6* | *94* | *0.06* | *0.23* | |
| Other types of OEI reported by less than 10% of the respondents | 1) Injured when opening L/A tin; 2) Injured when repacking instruments into drawers; 3) Pricked after taking patients HGT; 4) Injured when inserting scalpel blade into the holder | | | | | |

***SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01***

## 8.4. IPC theme 3: Disinfection and sterilisation

Within OHCFs, all surfaces, devices and equipment have the potential to become contaminated with micro-organisms (WHO, 2016b). When appropriate practices to reduce and eliminate micro-organisms are not in place, micro-organisms may continue to grow on surfaces, equipment and instruments (Monarca *et al.*, 2000). This proliferation of bacteria micro-organisms may lead to disease transmission to patients and staff (Ziady, 2010a). Therefore, OHCWs must adhere to standard infection prevention and control measures through effective disinfection and sterilisation practices before patients are consulted, during the delivery of patient care, and after the patient has left the OHCF (Laneve *et al.*, 2019).

When instruments, handpieces and other equipment are used for intra-oral invasive procedures, they must be sterilised before being re-used on the next patient (Rutala *et al.*, 2019). Different devices can

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be used for sterilisation purposes, including steam under pressure (autoclave), chemical (formaldehyde) vapour, and dry heat.

Within IPC theme 3: Disinfection and sterilisation, the focus was on four practical aspects, namely: Instrument sterilisation routine, the type of sterilisation device used, respondents' use of cold/chemical sterilisation and respondents' practices related to sterilisation of dental handpieces. Table 8-10 further outlines the purpose of the different practical aspects that surveyed respondents' disinfection and sterilisation practices.

**Table 8-10 Purpose of the different practical aspects within IPC theme 3: Disinfection and sterilisation**

| Practical aspects (PA) | Purpose |
|---|---|
| PA-1: Instrument sterilisation routine | To survey respondents' instrument sterilisation practices. |
| PA-2: Type of sterilisation device used | To survey what type of sterilisation devices are used in OHCFs. |
| PA-3: The use of cold/chemical sterilisation | To survey if cold or chemical sterilisations are used. |
| PA-4Dental handpiece sterilisation routine | To survey the handpiece sterilisation practices of respondents. |

### 8.4.1. Instrument sterilisation routine

Six actions that should form part of the instrument sterilisation routine were listed in sequence. Overall, the percentage of affirmative responses to always perform the indicated actions varied. Across the total respondents, the highest affirmative response of 91% was indicated for the action always to hand wash instruments before sterilisation. In contrast, the lowest affirmative response of 58% was reported using biological monitoring as part of the sterilisation process.

Furthermore, differences in the percentage of affirmative responses occurred between the respective respondent categories. The results of the Chi-square tests with $alpha = 0.05$ confirmed several

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significant differences between respondents employed in the different sectors. Significantly more, respondents in the private sector reported that they use an instrument washer *(p=0.03)*, always place instruments in a sterilisation pouch before sterilisation ***(p<0.01)***, and always perform biological monitoring ***(p<0.01)***. On the other hand, significantly more respondents in the public sector reported keeping a record of the sterilisation process ***(p<0.01)*** (Table 8-11).

**Table 8-11 Instrument sterilisation routine**

| Actions | Respondent categories | Response options (%) | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|---|
| | | Never | Seldom | Often | Always | Not indicated | | | |
| 1 Hand wash instruments before sterilisation | Private sector [n=121] | 1 | 0 | 6 | 92 | 1 | 3.78 | 0.75 | *0.84* |
| | Public sector [n= 76] | 2 | 2 | 4 | 90 | 2 | 3.89 | 0.51 | |
| | Formally trained [n=84] | 2 | 2 | 5 | 89 | 2 | 3.84 | 0.68 | *0.90* |
| | In-service trained [n=113] | 0 | 0 | 5 | 94 | 1 | 3.8 | 0.72 | |
| | ***Total respondents [197]*** | *1* | *1* | *5* | *91* | *2* | *3.82* | *0.67* | |
| 2 Clean instruments in the instrument washer before sterilisation | Private sector [n=121] | 3 | 4 | 3 | 88 | 2 | 3.69 | 0.89 | ***0.03** |
| | Public sector [n= 76] | 15 | 3 | 4 | 73 | 5 | 3.26 | 1.33 | |
| | Formally trained [n=84] | 9 | 4 | 5 | 77 | 5 | 3.36 | 1.27 | *0.54* |
| | In-service trained [n=113] | 6 | 3 | 2 | 86 | 3 | 3.62 | 1 | |
| | ***Total respondents [197]*** | *8* | *4* | *3* | *81* | *4* | *3.53* | *1.1* | |
| 3 Clean instruments ultra-sonic bath before sterilisation | Private sector [n=121] | 10 | 4 | 6 | 68 | 12 | 3.1 | 1.47 | *0.13* |
| | Public sector [n= 76] | 18 | 4 | 13 | 57 | 8 | 2.92 | 1.44 | |
| | Formally trained [n=84] | 18 | 6 | 8 | 60 | 8 | 2.7 | 1.5 | *0.33* |
| | In-service trained [n=113] | 10 | 3 | 9 | 67 | 11 | 3.11 | 1.46 | |
| | ***Total respondents [197]*** | 14 | 4 | 9 | 63 | 10 | 3.03 | 1.46 | |
| 4 Bag instruments before sterilisation | Private sector [n=121] | 0 | 2 | 5 | 90 | 3 | 3.82 | 0.7 | ***<0.01** |
| | Public sector [n= 76] | 13 | 6 | 12 | 62 | 7 | 3.09 | 1.35 | |
| | Formally trained [n=84] | 8 | 2 | 8 | 79 | 3 | 3.3 | 1.22 | *0.31* |
| | In-service trained [n=113] | 3 | 4 | 7 | 81 | 5 | 3.55 | 1.07 | |
| | ***Total respondents [197]*** | *6* | *4* | *8* | *78* | *4* | *3.54* | *1.06* | |

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| Actions | Respondent categories | Response options (%) | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|---|
| | | Never | Seldom | Often | Always | Not indicated | | | |
| 5 Perform biological monitoring | Private sector [n=121] | 3 | 4 | 5 | 79 | 9 | 3.44 | 1.24 | ***<0.01* |
| | Public sector [n= 76] | 29 | 13 | 13 | 33 | 12 | 2.26 | 1.47 | |
| | Formally trained [n=84] | 15 | 8 | 10 | 60 | 7 | 2.61 | 1.51 | *0.72* |
| | In-service trained [n=113] | 12 | 7 | 7 | 63 | 11 | 2.99 | 1.48 | |
| | ***Total respondents [197]*** | *15* | *8* | *9* | *58* | *10* | *2.98* | *1.45* | |
| 6 Keep a record of the successful sterilisation process | Private sector [n=121] | 16 | 12 | 18 | 54 | 0 | 3.8 | 0.69 | ***<0.01* |
| | Public sector [n= 76] | 1 | 3 | 4 | 92 | 0 | 2.89 | 1.31 | |
| | Formally trained [n=84] | 11 | 4 | 13 | 68 | 4 | 3.05 | 1.31 | *0.13* |
| | In-service trained [n=113] | 3 | 8 | 7 | 79 | 3 | 3.56 | 0.97 | |
| | ***Total respondents [197]*** | *7* | *6* | *10* | *74* | *3* | *3.45* | *1.07* | |

***SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01***

### 8.4.2. Type of sterilisation device used

From the list of five types of sterilisation devices, the use of a Statim autoclave with a flash cycle was reported by 90% of the total respondents. In contrast, the affirmative responses to using other sterilisation devices varied, with 34% using an autoclave, 8% using modified pressure cookers and ultra-violet sterilisers, and 12% using dry-heat sterilisers. Furthermore, the Chi-square test results with alpha = 0.05 confirmed significant differences between respondent categories across four items. Significantly more respondents in the public sector confirmed using an autoclave without a flash cycle *($p=0.02$)*. Furthermore, significantly more respondents employed in the public sector did not indicate a response to the item probing the use of modified pressure cookers *($p=0.02$)*. In contrast, significantly more respondents employed in the private sector *($p<0.01$)* and IST respondents *($p=0.04$)* did not indicate a response to the use of dry heat sterilisers. Furthermore, significantly more

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respondents employed in the private sector *(p=0.04)* and FT respondents-*(p=0.05)* did not indicate a response to the use of ultra-violet sterilisers (Table 8-12).

**Table 8-12 Type of sterilisation device used**

| Type of sterilisation device used | Respondent categories | Response options (%) | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|
| | | Yes | No | Not indicated | | | |
| 1) Autoclave | Private sector [n=121] | 26 | 26 | 48 | 1.93 | 0.5 | ***0.02** |
| | Public sector [n= 76] | 43 | 28 | 29 | 1.79 | 0.57 | |
| | Formally trained [n=84] | 39 | 30 | 31 | 1.82 | 0.54 | *0.06* |
| | In-service trained [n=113] | 28 | 24 | 48 | 1.89 | 0.55 | |
| | ***Total respondents [197]]*** | *34* | *20* | *46* | *1.88* | *0.53* | |
| 2) Modified pressure cooker | Private sector [n=121] | 6 | 36 | 58 | 0.49 | 0.62 | ***0.02** |
| | Public sector [n= 76] | 10 | 53 | 37 | 0.74 | 0.64 | |
| | Formally trained [n=84] | 6 | 48 | 46 | 0.61 | 0.53 | *0.33* |
| | In-service trained [n=113] | 10 | 38 | 52 | 0.58 | 0.66 | |
| | ***Total respondents [197]*** | *8* | *44* | *48* | *0.58* | *0.64* | |
| 3) Dry heat steriliser | Private sector [n=121] | 17 | 26 | 57 | 0.61 | 0.77 | ****<0.01** |
| | Public sector [n= 76] | 18 | 47 | 35 | 0.84 | 0.71 | |
| | Formally trained [n=84] | 13 | 44 | 43 | 0.73 | 0.67 | ***0.04** |
| | In-service trained [n=113] | 21 | 27 | 52 | 0.7 | 0.8 | |
| | ***Total respondents [197]*** | *12* | *36* | *52* | *0.7* | *0.75* | |
| 4) Ultra-violet steriliser | Private sector [n=121] | 7 | 33 | 60 | 0.48 | 0.63 | ***0.04** |
| | Public sector [n= 76] | 11 | 49 | 40 | 0.7 | 0.65 | |
| | Formally trained [n=84] | 4 | 48 | 48 | 0.52 | 0.54 | ***0.05** |
| | In-service trained [n=113] | 11 | 33 | 56 | 0.56 | 0.69 | |
| | ***Total respondents [197]*** | *8* | *41* | *51* | *0.56* | *0.65* | |
| 5) Statim autoclave with flash cycle | Private sector [n=121] | 93 | 3 | 4 | 0.83 | 0.93 | *0.4* |
| | Public sector [n= 76] | 87 | 5 | 8 | 1.14 | 0.84 | |
| | Formally trained [n=84] | 92 | 2 | 6 | 1.16 | 0.93 | *0.59* |
| | In-service trained [n=113] | 89 | 5 | 6 | 0.84 | 0.91 | |
| | ***Total respondents [197]]*** | *90* | *4* | *6* | *0.95* | *0.91* | |

***SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01***

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### 8.4.3. The use of cold / chemical sterilisation method

Only 15% Of the total respondents indicated that they use cold sterilisation. However, of those who use cold sterilisation methods, 63% indicated that they used a high-level disinfectant. Furthermore, at alpha = 0.05, the Chi-square tests results did not confirm any significant differences between the respondents employed in the different sectors nor between respondents with varying types of training (Table 8-13).

**Table 8-13 The use of Cold / Chemical sterilisation method**

| Cold / Chemical sterilisation | Respondent categories | Response options | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|
| | | Yes | No | Not sure | Not indicated | | | |
| 1) Use of cold/chemical sterilisation | Private sector [n=121] | 15 | 83 | 0 | 2 | 1.83 | 0.54 | *0.59* |
| | Public sector [n= 76] | 15 | 80 | 0 | 5 | 1.75 | 0.54 | |
| | Formally trained [n=84] | 17 | 79 | 0 | 4 | 1.77 | 0.5 | *0.9* |
| | In-service trained [n=113] | 13 | 83 | 0 | 4 | 1.8 | 0.48 | |
| | ***Total respondents [197]*** | *15* | *81* | *0* | *4* | *1.8* | *0.54* | |
| 2) Intermediate level disinfectant | Private sector [n=121] | 2 | 12 | 20 | 66 | 0.66 | 1.04 | *0.72* |
| | Public sector [n= 76] | 3 | 13 | 9 | 75 | 0.39 | 0.77 | |
| | Formally trained [n=84] | 2 | 11 | 14 | 75 | 0.29 | 0.68 | *0.2* |
| | In-service trained [n=113] | 3 | 13 | 18 | 66 | 0.65 | 1 | |
| | ***Total respondents [197]*** | *2* | *12* | *15* | *70* | *0.56* | *0.95* | |
| 3) High-level disinfectant used | Private sector [n=121] | 66 | 3 | 2 | 29 | 0.08 | 0.93 | *0.26* |
| | Public sector [n= 76] | 59 | 3 | 3 | 35 | 1.29 | 0.1 | |
| | Formally trained [n=84] | 58 | 5 | 0 | 37 | 1.96 | 0.96 | *0.46* |
| | In-service trained [n=113] | 67 | 2 | 4 | 27 | 1.47 | 0.93 | |
| | ***Total respondents [197]*** | *63* | *3* | *2* | *32* | *1.36* | *0.95* | |

***SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01***

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### 8.4.4. Dental handpiece sterilisation routine

Six actions that form part of the dental handpiece sterilisation routine were listed. Overall, the percentage of affirmative responses to continually practice the respective actions listed varied. Of the total respondents, less than 50% confirmed that they always run the handpiece for 10 – 20 seconds before disconnecting it from the hose and disassembling the handpiece to reach the inner parts, with an average of 38% and 39% in the respective items. Furthermore, 58% of the total respondents confirmed that they always dry the dental handpiece and 59% the handpiece in an autoclave. In contrast, 88% of the total respondents reported that they always clean the outer surfaces with disinfectant, and 80% reported that they always oil the dental handpiece as part of their handpiece sterilisation routine.

This pattern was similar across the different respondent categories in five of the actions listed. However, in the item probing respondents' practice of oiling the dental handpiece, the results of the Chi-square tests with alpha=0.05 indicated a significant difference of $(p=0.03)$. In this item, 87% of the respondents employed in the private sector versus 72% of respondents in the public sector indicated that they always oil the dental handpiece (Table 8-14).

**Table 8-14 Dental handpiece sterilisation routine**

| Actions | Respondent categories | Response options (%) | | | | | *Mean* | *SD* | *p-value (alpha =0.05)* |
|---|---|---|---|---|---|---|---|---|---|
| | | Never | Seldom | Often | Always | Not indicated | | | |
| 1) Run the handpiece for 10 – 20 seconds before disconnecting it from the hose | Private sector [n=121] | 12 | 20 | 21 | 40 | 7 | 2.79 | 1.28 | 0.35 |
| | Public sector [n= 76] | 17 | 12 | 28 | 34 | 9 | 2.58 | 1.37 | |
| | Formally trained [n=84] | 14 | 17 | 26 | 38 | 5 | 2.78 | 1.31 | 0.90 |
| | In-service trained [n=113] | 13 | 17 | 21 | 38 | 11 | 2.62 | 1.38 | |
| | ***Total respondents [197]*** | *14* | *16* | *24* | *38* | *8* | *2.7* | *1.32* | |

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| Actions | Respondent categories | Response options (%) | | | | | *Mean* | *SD* | *p-value (alpha =0.05)* |
|---|---|---|---|---|---|---|---|---|---|
| | | Never | Seldom | Often | Always | Not indicated | | | |
| 2) Clean the outer surfaces with disinfectant | Private sector [n=121] | 0 | 2 | 3 | 93 | 2 | 3.87 | 0.59 | *0.07* |
| | Public sector [n= 76] | 0 | 3 | 10 | 82 | 5 | 3.63 | 0.96 | |
| | Formally trained [n=84] | 0 | 1 | 6 | 91 | 2 | 3.79 | 0.78 | *0.54* |
| | In-service trained [n=113] | 0 | 3 | 6 | 88 | 3 | 3.75 | 0.82 | |
| | ***Total respondents [197]*** | *0* | *2* | *7* | *88* | *3* | *3.78* | *0.76* | |
| 3) Disassemble the handpiece to reach the inner parts | Private sector [n=121] | 13 | 19 | 16 | 37 | 14 | 2.5 | 1.46 | *0.66* |
| | Public sector [n= 76] | 17 | 18 | 15 | 42 | 8 | 2.66 | 1.38 | |
| | Formally trained [n=84] | 20 | 21 | 17 | 37 | 5 | 2.59 | 1.32 | *0.33* |
| | In-service trained [n=113] | 11 | 17 | 15 | 40 | 17 | 2.52 | 1.51 | |
| | ***Total respondents [197]*** | *15* | *19* | *16* | *39* | *11* | *2.56* | *1.43* | |
| 4) Oil the handpiece | Private sector [n=121] | 1 | 1 | 9 | 87 | 2 | 3.8 | 0.65 | ***0.03** |
| | Public sector [n= 76] | 3 | 8 | 13 | 72 | 4 | 3.47 | 1.03 | |
| | Formally trained [n=84] | 1 | 6 | 12 | 80 | 1 | 3.64 | 0.8 | *0.31* |
| | In-service trained [n=113] | 2 | 2 | 10 | 83 | 4 | 3.68 | 0.89 | |
| | ***Total respondents [197]]*** | *2* | *4* | *11* | *80* | *3* | *3.68* | *0.83* | |
| 5) Dry the handpiece and place it in a sterilisation pouch | Private sector [n=121] | 11 | 11 | 18 | 57 | 3 | 3.15 | 1.18 | *0.06* |
| | Public sector [n= 76] | 16 | 8 | 9 | 60 | 7 | 3.01 | 1.39 | |
| | Formally trained [n=84] | 18 | 12 | 19 | 48 | 3 | 2.89 | 1.27 | *0.72* |
| | In-service trained [n=113] | 9 | 8 | 12 | 66 | 5 | 3.25 | 1.23 | |
| | ***Total respondents [197]]*** | *13* | *10* | *14* | *58* | *5* | *3.1* | *1.26* | |
| 6. Sterilise the handpiece in an autoclave | Private sector [n=121] | 12 | 12 | 16 | 57 | 3 | 3.12 | 1.2 | *0.2* |
| | Public sector [n= 76] | 17 | 8 | 7 | 63 | 5 | 3.05 | 1.37 | |
| | Formally trained [n=84] | 21 | 11 | 11 | 55 | 2 | 2.93 | 1.31 | *0.13* |
| | In-service trained [n=113] | 8 | 10 | 14 | 63 | 5 | 3.22 | 1.22 | |
| | ***Total respondents [197]*** | *15* | *10* | *12* | *59* | *4* | *3.1* | *1.27* | |

***SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01***

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## 8.5. IPC theme 4: Vaccination

Vaccination against infectious agents is essential for disease prevention (Kohli, Puttaiah and Kohli, 2003). Therefore, it is recommended that OHCWs be vaccinated against diseases such as Hepatitis B since it forms a part of effective infection prevention and control practices (Schillie *et al.*, 2013). Furthermore, for comprehensive protection against Hepatitis B, the three required vaccination shots must be received within six months. After that, the immunity levels must be checked, and booster shots administered if needed.

Within IPC theme 4: Vaccination, the focus was on four practical aspects related to vaccination, namely: if respondents were against Hepatitis B, the number of Hepatitis B vaccination shots received, the period since Hepatitis B vaccination was received, if respondents' level of immunity were checked, and booster shot received. Table 8-15 outlines the purpose of the items that surveyed respondents' practices of Hepatitis B vaccination.

**Table 8-15 Purpose of the different practical aspects within IPC theme 4: Hepatitis B vaccination**

| Practical aspects (PA) | Purpose of items |
|---|---|
| Hepatitis B Vaccination practices | 1. To survey the number of the respondents that are vaccinated against Hepatitis B<br>2. To survey the number of Hepatitis B vaccine shots respondents received<br>3. To survey how long-ago respondents were vaccinated against Hepatitis B \<br>4. To survey if respondents checked their level of immunity and if a booster Hepatitis B vaccine was administered. |

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### 8.5.1. Hepatitis B- vaccination status of respondents

It is recommended to vaccinate all health care workers against Hepatitis B. There is a risk for dental assistants to be exposed to blood or blood-contaminated bodily fluids. Therefore, they should be vaccinated against Hepatitis B before the onset of their clinical duties (Schillie *et al.*, 2018). Overall, 88% of the total respondents indicated an affirmative response that they were vaccinated against Hepatitis B, whereas 9% were not vaccinated, and 3 % did not indicate a reply. A similar pattern was observed across all the respondent categories. Minimal deviation in the *mean* and *stand deviation* occurred. The results of the CH-square test with $alpha = 0.05$ did not indicate any significant difference between respondents employed in the respective sectors nor between respondents with different training types (Table 8-16).

**Table 8-16 Hepatitis B- vaccination status of dental assistants**

| Respondent categories | Response options (%) | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|
| | Yes | No | Not indicated | | | |
| Private sector [n=121] | 92 | 5 | 3 | 1.88 | 0.41 | *0.11* |
| Public sector [n= 76] | 84 | 13 | 3 | 1.82 | 0.45 | |
| Formally trained [n=84] | 90 | 8 | 1 | 1.89 | 0.35 | *0.43* |
| In-service trained [n=113] | 88 | 8 | 4 | 1.83 | 0.48 | |
| ***Total respondents [197]*** | *88* | *9* | *3* | *1.86* | *0.43* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

### 8.5.2. Number of HBV vaccine doses received

For effective vaccination against Hepatitis B, three Hepatitis B vaccination shots need to be administered to the individual within six months (CDC, 2013). Overall, less than 50% of the participants in this study received all three vaccination shots. Of the total respondents, 45% indicated that they received all three required Hepatitis B vaccination shots. A further 23% of the total respondents

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received two vaccination shots, 16% received only one Hepatitis B vaccination shot, and 16% did not indicate a response to this item. Moreover, percentages diverted from the total respondents across the respondent categories were noted. The Chi-square tests set at $alpha = 0.05$ confirmed significant differences between the respondent categories. Within the respective employment sectors, 58% of the respondents employed in the private sector versus 29% of respondents in the public sector confirmed that they received all three Hepatitis B vaccination shots ($p<0.01$). A further 8% of respondents in the private sector versus 22% of respondents in the public sector did not respond to the number of Hepatitis B vaccination shots received. Furthermore, at $p=0.03$, 31% of FT respondents versus 14% of IST respondents indicated that they received only two Hepatitis B vaccination shots. Only 9% of FT respondents versus 17% of IST respondents did not show a response to this item (Table 8-17).

**Table 8-17 Number of HBV vaccine doses received**

| Respondent categories | Response rating (%) | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|
| | 1 Dose | 2 Doses | 3 Doses | Not indicated | | | |
| Private sector [n=121] | 18 | *16* | 58 | 8 | 2.23 | 1.02 | ***<0.01* |
| Public sector [n= 76] | 18 | *16* | 29 | 22 | 1.66 | 1.13 | |
| Formally trained [n=84] | 17 | 31 | 43 | 9 | 2.07 | 0.99 | **0.03* |
| In-service trained [n=113] | 19 | 14 | 50 | 17 | 1.96 | 1.17 | |
| ***Total respondents [197]*** | *16* | *23* | *45* | *16* | *2.01* | *1.1* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

### 8.5.3. The period since the administration of the HBV vaccine

Children born after 1991 should have received Hepatitis B vaccination as part of their infancy vaccinations. Thus an increase in the number of health care workers who have already received routine Hepatitis B vaccination during childhood is expected (Schillie *et al.*, 2018). Of the total

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respondents, 72% indicated that their Hepatitis B vaccinations were administered within the previous five years. In addition, 14% were vaccinated more than five years ago, and 14% did not indicate a response to the item (Table 8-18). This pattern was similar across all the respondents with different training types. However, the percentages reported by respondents employed in the different sectors varied. Of the respondents who reported receiving their Hepatitis B vaccinations within the last year, 26% were employed in the private sector, and 14% were employed in the public sector. The results of the CH-square test at alpha=0.05 confirmed this difference as significant, as $p=0.02$ (Table 8-18).

**Table 8-18 Period since the administration of Hepatitis B- vaccine**

| Respondent categories | Response options (%) | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|
| | < 1 year | 1 - 3 years | 3 - 5 years | > 5 years | Not indicated | | | |
| Private sector [n=121] | 26 | 29 | 26 | 10 | 9 | 2.01 | 1.14 | ***0.02** |
| Public sector [n= 76] | 14 | 20 | 26 | 18 | 21 | 2.07 | 1.42 | |
| Formally trained [n=84] | 21 | 27 | 26 | 14 | 11 | 2.12 | 1.22 | *0.86* |
| In-service trained [n=113] | 22 | 24 | 26 | 12 | 16 | 1.96 | 1.27 | |
| ***Total respondents [197]*** | *21* | *25* | *26* | *14* | *14* | *2.03* | *1.25* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

### 8.5.4. Post-vaccination serological checks

The recommendation is that blood tests be done at least a year after administering the third HBV vaccine dose to confirm the required level of zero-conversion (Schillie *et al.*, 2013). Furthermore, immunity levels need to be rechecked after five years to determine if a booster shot is necessary (Schillie *et al.*, 2018). Of the total respondents, only 33% indicated that they checked their immunity level after administering the third dose of the Hepatitis vaccine (Table 8-19). Minimal fluctuations occurred in the *mean* and *standard deviation*. However, the results of the Chi-square tests with *alpha =0.05* indicated a significant difference between respondents employed in the respective

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sectors. In comparison, significantly more respondents employed in the private sector (42%) versus respondents employed in the public sector (21%) indicated that they checked their HBV immunity ($p < 0.01$). No significant differences occurred between respondents with different training types (Table 8-19).

**Table 8-19 Checked Hepatitis B immunity levels**

| Respondent categories | Response options (%) | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|
| | Yes | No | Not indicated | | | |
| Private sector [n=121] | 42 | 45 | 13 | 1.29 | 0.69 | ***<0.01* |
| Public sector [n= 76] | 21 | 64 | 15 | 1.07 | 0.6 | |
| Formally trained [n=84] | 36 | 52 | 12 | 1.24 | 0.65 | *0.8* |
| In-service trained [n=113] | 33 | 52 | 15 | 1.18 | 0.67 | |
| ***Total respondents [197]*** | *33* | *53* | *14* | *1.2* | *0.66* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

## 8.6. IPC theme 5: Hand hygiene

Effective hand hygiene practices are the single most effective method to prevent disease transmission (Pittet, 2001; Cole, 2006; de Amorim-Finzi *et al*., 2010; Bakarman *et al*., 2019). The practice of frequently washing hands is also applicable to the general population, more so for staff involved in delivering health care services. Hand hygiene is an essential part of infection prevention and control practices to prevent the spread of diseases (Department of Health_RSA, 2020a). Furthermore, using an antibacterial hand wash is vital when performing hand hygiene. After washing hands, the failure to properly dry the hands can lead to complications such as dermatitis. Therefore care should be taken as to the method used to dry hands (Bednarsh, Eklund and Cuny, 2015). The recommendation is that paper towels should be used for drying hands after they have been washed (Department of Health_RSA, 2020a). As a supplement to handwashing, alcohol-based hand sanitiser gel or sprays

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also can reduce or eliminate micro-organisms on the hands (CDC, 2017). Before and after contact with the patient and other potential sources of micro-organisms, effective hand hygiene practices are a central part of infection prevention and control measures.

Within IPC theme 5: Hand hygiene, the focus was on five practical aspects, namely: respondents' handwashing practices, the type of soap they use for handwashing purposes, respondents' use of alcohol-based rubs as supplementation to hand hygiene, their hand drying methods and the availability of visible hand hygiene instructions. Table 8-20 further describes the purpose of the different practical aspects related to hand hygiene.

**Table 8-20 Purpose of the different practical aspects within IPC theme 5: Hand hygiene**

| Practical aspects (PA) | Purpose |
|---|---|
| PA-1: Handwashing practices | To survey the incidence of respondents' handwashing practices. |
| PA-2: Type of soap used for handwashing purposes | To survey the ratio in the use of liquid versus bar-soap |
| PA-3: Alcohol-based rubs as supplementation to hand hygiene | To survey the use of alcohol-based rubs to supplement handwashing |
| PA-4: Hand drying methods | To survey the method that respondents use to dry their hands. |
| PA-5: Visible hand hygiene instructions | To survey the availability of posters that illustrate the correct handwashing technique. |

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### 8.6.1. Handwashing practices

The hands of OHCWs may serve as reservoirs for pathogens. Therefore hand hygiene is a crucial factor in minimising the spread of micro-organisms (CDC, 2016b). OHCWs' hands should be washed when visibly soiled and at several other handwashing moments, including before putting on and removing gloves (CDC, 2016a). Overall, the handwashing practices of the total respondents varied across the three handwashing scenarios listed (Table 8-21). Of the total respondents, an affirmative response of 67% for the practice of washing hands before putting on gloves. Furthermore, 77% of the total respondents indicated affirmative responses for the practice of always washing hands after taking off gloves and before leaving the clinical area. However, in one item, variations occurred in the percentages of the respective respondent categories.

The Chi-square test results with $alpha=0.05$ confirmed a significant difference in the item probing respondents' practice of always washing hands before putting on gloves. With $p<0.01$, significantly more respondents working in the private sector (79%) and significantly more FT respondents (57%) indicated that they always wash their hands before putting on gloves (Table 8-21).

**Table 8-21 Handwashing practices**

| **1. Washing of hands before putting on gloves** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Respondent categories** | **Response options** | | | | | ***Mean*** | ***SD*** | ***p-value (alpha = 0.05)*** |
| | **Never** | **Seldom** | **Often** | **Always** | **Not indicated** | | | |
| Private sector [n=121] | 1 | 4 | 17 | 79 | 0 | 3.73 | 0.58 | *****< 0.01*** |
| Public sector [n= 76] | 3 | 17 | 25 | 55 | 0 | 3.33 | 0.85 | |
| Formally trained [n=84] | 4 | 12 | 27 | 57 | 0 | 3.38 | 0.83 | *****< 0.01*** |
| In-service trained [n=113] | 0 | 7 | 14 | 79 | 0 | 3.72 | 0.59 | |
| ***Total respondents [197]*** | *2* | *10* | *21* | *67* | *0* | *3.57* | *0.72* | |
| **2. Washing of hands after taking off gloves** | | | | | | | | |
| Private sector [n=121] | 1 | 4 | 22 | 73 | 0 | 3.66 | 0.64 | *0.25* |
| Public sector [n= 76] | 0 | 7 | 12 | 82 | 0 | 3.75 | 0.57 | |

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Formally trained [n=84] | 0 | 7 | 17 | 76 | 0 | 3.69 | 0.6 | 0.62 |
| In-service trained [n=113] | 1 | 4 | 19 | 76 | 0 | 3.7 | 0.63 | |
| ***Total respondents [197]*** | *0* | *5* | *18* | *77* | *0* | *3.7* | *0.61* | |

**3. Washing of hands before leaving the clinical area**

| Respondent categories | Response options | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|
| | Never | Seldom | Often | Always | Not indicated | | | |
| Private sector [n=121] | 0 | 4 | 18 | 78 | 0 | 3.74 | 0.53 | 0.08 |
| Public sector [n= 76] | 1 | 12 | 11 | 76 | 0 | 3.67 | 0.7 | |
| Formally trained [n=84] | 0 | 8 | 17 | 75 | 0 | 3.67 | 0.63 | 0.82 |
| In-service trained [n=113] | 1 | 7 | 15 | 78 | 0 | 3.74 | 0.58 | |
| ***Total respondents [197]*** | *0* | *8* | *15* | *77* | *0* | *3.71* | *0.6* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

### 8.6.2. Type of soap used to wash hands

When performing hand hygiene, a liquid-antibacterial hand wash is preferable to bar soap (CDC, 2016b). Across the respondents, 85% indicated that they always use liquid soap to wash their hands. Furthermore, 74% of the total respondents indicated that they never use bar soaps to wash their hands. This pattern was similar across all the respondent groups. Minimal fluctuations occurred in the *mean and standard deviation.* The results of the Chi-square tests with $alpha=0.05$ did not confirm any significant differences between the respondents employed in the different sectors nor between respondents with different training types (Table 8-22).

**Table 8-22 Type of soap used to wash hands with**

| 1) Liquid soap | Response options (%) | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|
| | Never | Seldom | Often | Always | Not indicated | | | |
| Private sector [n=121] | 3 | 2 | 8 | 85 | 2 | 3.7 | 0.81 | 0.87 |
| Public sector [n= 76] | 3 | 0 | 11 | 84 | 2 | 3.71 | 0.83 | |

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Formally trained [n=84] | 2 | 2 | 7 | 89 | 0 | 3.81 | 0.59 | *0.54* |
| In-service trained [n=113] | 4 | 1 | 11 | 81 | 3 | 3.63 | 0.95 | |
| ***Total respondents [197]*** | *3* | *1* | *9* | *85* | *2* | *3.71* | *0.82* | |
| **2) Bar soap** | | | | | | | | |
| Private sector [n=121] | 80 | 12 | 3 | 2 | 3 | 1.21 | 0.62 | *0.12* |
| Public sector [n= 76] | 76 | 20 | 3 | 8 | 2 | 1.46 | 0.92 | |
| Formally trained [n=84] | 76 | 17 | 4 | 3 | 0 | 1.35 | 0.72 | *0.73* |
| In-service trained [n=113] | 75 | 14 | 3 | 4 | 4 | 1.28 | 0.78 | |
| ***Total respondents [197]*** | *74* | *16* | *3* | *4* | *2* | *1.31* | *0.76* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

### 8.6.3. Hand hygiene supplementation with an alcohol-based gel

As a supplement to handwashing, alcohol-based hand sanitiser gel or sprays also can reduce or eliminate micro-organisms on the hands (CDC, 2017). Across the total respondents, 14% indicated never, 16% indicated seldom, 24% indicated often, and 41% indicated that they always use alcohol-based gel to supplement their handwashing. However, a different pattern emerged in the percentage reported by respondents employed in the different sectors. The Chi-square tests with $alpha=0.05$ confirmed significant differences between the respondent employed in the respective sectors. At $p<0.01$, 49% of respondents in the private sector versus 34 % of respondents in the public sector indicated that they always supplement their hand hygiene with an alcohol-based gel or sanitiser spray (Table 8-23).

**Table 8-23 Hand hygiene supplementation with an alcohol-based gel**

| Respondent categories | Response options (%) | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|
| | Never | Seldom | Often | Always | Not indicated | | | |
| Private sector [n=121] | 10 | 3 | 33 | 49 | 5 | 3.11 | 1.17 | ***< 0.01** |
| Public sector [n= 76] | 18 | 29 | 16 | 34 | 3 | 2.61 | 1.21 | |

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Formally trained [n=84] | 13 | 15 | 29 | 39 | 4 | 2.87 | 1.18 | 0.84 |
| In-service trained [n=113] | 13 | 12 | 25 | 46 | 4 | 2.95 | 1.23 | |
| ***Total respondents [197]*** | *14* | *16* | *24* | *41* | *4* | *2.91* | *1.21* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

### 8.6.4. Hand-drying methods

It is recommended that single-use disposable paper towels be made available for drying hands after being washed (Department of Health_RSA, 2020a). Overall, 80% of the total respondents indicated always using paper towels to dry their hands. In contrast, the affirmative responses to the last two methods varied between 4% and 16% between the different respondent categories. Minimal fluctuations occurred in the *mean and standard deviation*. Results of the Chi-square tests confirmed significant differences between the respondent categories. At $p=0.03$, 86% of respondents in the private sector versus 74% of respondents employed in the public sector indicated they always use paper towels to dry their hands. On the other hand, at $p<0.01$, 71% of respondents in the private sector versus 50% of respondents employed in the public sector indicated they never use linen towels to dry their hands. No significant differences occurred between formally and IST respondents (Table 8-24).

**Table 8-24 Hand-drying methods used**

| **1) Disposable paper towels** | **Response options (%)** | | | | | ***Mean*** | ***SD*** | ***p-value (alpha = 0.05)*** |
|---|---|---|---|---|---|---|---|---|
| | **Never** | **Seldom** | **Often** | **Always** | **Not indicated** | | | |
| Private sector [n=121] | 2 | 2 | 7 | 86 | 3 | 3.69 | 0.92 | ***0.03** |
| Public sector [n= 76] | 0 | 11 | 13 | 74 | 2 | 3.55 | 0.89 | |
| Formally trained [n=84] | 0 | 5 | 10 | 83 | 2 | 3.71 | 0.77 | 0.86 |
| In-service trained [n=113] | 2 | 5 | 9 | 80 | 4 | 3.58 | 1 | |
| ***Total respondents [197]]*** | *1* | *6* | *10* | *80* | *3* | *3.63* | *0.91* | |

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| 2. Fabric / linen towels | Response options (%) | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|
| | Never | Seldom | Often | Always | Not indicated | | | |
| Private sector [n=121] | 71 | 8 | 4 | 4 | 13 | 1.17 | 0.85 | ***< 0.01* |
| Public sector [n= 76] | 50 | 11 | 17 | 16 | 6 | 1.86 | 1.25 | |
| Formally trained [n=84] | 65 | 12 | 11 | 7 | 5 | 1.5 | 1 | *0.18* |
| In-service trained [n=113] | 61 | 7 | 8 | 10 | 14 | 1.38 | 1.13 | |
| **3. Air dryer** | | | | | | | | |
| Private sector [n=121] | 49 | 21 | 7 | 10 | 13 | 1.52 | 1.13 | *0.65* |
| Public sector [n= 76] | 57 | 21 | 4 | 7 | 11 | 1.37 | 0.98 | |
| Formally trained [n=84] | 55 | 26 | 6 | 8 | 5 | 1.58 | 0.98 | *0.05* |
| In-service trained [n=113] | 50 | 17 | 6 | 9 | 18 | 1.37 | 1.13 | |
| ***Total respondents [197]*** | *52* | *21* | *6* | *8* | *13* | *1.46* | *1.07* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

### 8.6.5. Visible hand hygiene instructions in OHCF

Visible hand hygiene instructions aim to remind OHCWs to regularly wash their hands, using the correct handwashing technique (Ziady, 2010a). Overall, 86% of respondents indicated affirmative responses concerning the availability of a handwashing poster in their OHCFs. However, differences in the percentage of affirmative responses of the respondents employed in the respective sectors occurred. The Chi-square test results with alpha = .05 confirmed a significant difference between respondents employed in the respective sectors. Of the respondents working in the private sector, 92% versus 76% of respondents working in the public sector indicated an affirmative response ($p<0.01$) to the existence of a handwashing poster. No significant difference occurred between respondents with different training types (Table 8-25).

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**Table 8-25 Visible hand hygiene instructions in OHCF**

| Respondent categories | Response options | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|
| | Yes | No | Not sure | Not indicated | | | |
| Private sector [n=121] | 92 | 5 | 0 | 3 | 1.93 | 0.36 | ***< 0.01* |
| Public sector [n= 76] | 76 | 8 | 0 | 16 | 1.67 | 0.64 | |
| Formally trained [n=84] | 87 | 7 | 0 | 6 | 1.81 | 0.53 | *0.67* |
| In-service trained [n=113] | 90 | 4 | 1 | 5 | 1.85 | 0.49 | |
| ***Total respondents [197]*** | *86* | *6* | *0* | *8* | *1.83* | *0.5* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

## 8.7. IPC theme 6: Personal protective equipment

The use of appropriate personal protective equipment (PPE) forms part of effective infection prevention and control practices (CDC, 2003). The use of gloves protects both patient and dental personnel (WHO, 2009). The wearing of masks by the OHCW protects against large aerosols that project onto the face and expose facial mucous membranes. Eyewear aims to protect the eyes and face against the impact of splatters and sprays of bodily fluids that might contain pathogens (Jones *et al.*, 2020). Furthermore, protective clothing is critical to safeguard the rest of the body of the OHCW.

Within IPC theme 6: Personal protective clothing, the focus was on the use of examination gloves, masks, protective eyewear, and protective clothing when performing different tasks and respondents' glove replacement practices. Table 8-26 outlines the practical aspects and the purpose of the items.

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**Table 8-26 Purpose of the different practical aspects within IPC theme 6: Personal protective clothing**

| Practical Aspect (PA) | Purpose |
|---|---|
| PA-1: Gloves<br>PA-2: Masks<br>PA-3: Protective eyewear<br>PA-4: Protective clothing | To survey the use of the specified PPE items during different procedures. The listed procedures included:<br>1) surgical procedures,<br>2) prophylaxis (scaling and polishing),<br>3) orthodontic procedures,<br>4) disinfecting surfaces,<br>5) cleaning dental instruments,<br>6) cleaning dental equipment,<br>7) doing procedures in which blood or splatter is anticipated<br>8) when working on a patient with a known infectious disease. |
| PA-5: Glove replacement practices | To survey respondents' glove replacement practices in the three sketched scenarios. |

### 8.7.1. The use of gloves during different procedures

The use of gloves protects the hands of the OHCW against exposure to blood and saliva (CDC, 2016b). Overall, the total respondents' affirmative responses to using gloves during the respective procedures varied. The total respondents reported an average of 66% for using gloves during the individual procedures. Below average percentage of affirmative responses occurred in three of the eight procedures. Of the total respondents, 55% indicated using gloves during orthodontic procedures, 39% used gloves when cleaning dental instruments, and 64% used gloves when cleaning dental equipment (Table 8-27).

The Chi-square tests with $alpha = 0.05$ confirmed no significant differences between respondents with different training types. However, significant differences between respondents employed in the different sectors occurred in four of the listed procedures (Table 8-27). In comparison, significantly more respondents in the private sector versus respondents in the public sector confirmed using gloves

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during surgical procedures and scaling and polishing *($p<0.01$)*. Additionally, significantly more respondents in the private sector than those in the public sector confirmed using gloves when disinfecting surfaces (*$p=0.04$*) and cleaning dental instruments *($p=0.02$)*.

**Table 8-27 Dental assistants' usage of gloves during different procedures**

| Procedures | % Total respondents [n=197] | Work sector (%) | | Training type (%) | | *p-value (alpha = 0.05)* | |
|---|---|---|---|---|---|---|---|
| | | Private [n=121] | Public [n=76] | FT [n=84] | IST [n=113] | *Private / Public* | *FT / IST* |
| 1. Surgical procedure | 79 | 89 | 67 | 77 | 83 | ***<0.01** | *0.65* |
| 2. Scaling and polishing | 80 | 88 | 71 | 80 | 82 | ***<0.01** | *0.31* |
| 3. Orthodontic procedure | 55 | 55 | 55 | 60 | 51 | *0.25* | *0.92* |
| 4. Disinfecting surfaces | 75 | 80 | 67 | 79 | 73 | ***0.04** | *0.33* |
| 5. Cleaning dental instruments | 39 | 46 | 29 | 39 | 40 | ***0.02** | *0.94* |
| 6. Cleaning of dental equipment | 64 | 61 | 67 | 64 | 63 | *0.83* | *0.4* |
| 7. Anticipating blood and splatter | 67 | 69 | 66 | 67 | 68 | *0.83* | *0.68* |
| 8. Assisting a patient with a known communicable disease | 71 | 71 | 71 | 67 | 74 | *0.24* | *1* |
| ***Total respondents' average use of gloves across procedures = 66%*** | | | | | | | |

*FT= Formally trained at University of Technology; IST= In-service trained; * Significant p-value = < 0.05; ** highly significant p-value < 0.0*

### 8.7.2. The use of masks during different procedures

The use of masks during the delivery of dental treatments protects the OHCW from inhaling particles that might contain pathogens (CDC, 2016b). Overall, the percentage of affirmative responses to the use of masks ranged between 65% and 93% of the total respondents. The average affirmative response to using masks during dental procedures and IPC activities was 80%. Below average

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percentages were reported in four of the eight procedures listed. Of the total respondents, 78% used masks during orthodontic procedures, 71% used masks when disinfecting surfaces, 67% used masks when cleaning dental instruments, and 65% used masks when cleaning dental equipment. This pattern was similar across all the respondent categories. At $alpha=0.05$, the Chi-square test results did not confirm any significant differences between the respondents employed in the different sectors or between respondents with different training types (Table 8-28).

**Table 8-28 Dental assistants' usage of masks during different procedures**

| Procedures | % Total respondents [n=197] | Work sector (%) | | Training type (%) | | *p-value (alpha = 0.05)* | |
|---|---|---|---|---|---|---|---|
| | | Private [n=121] | Public [n=76] | FT [n=84] | IST [n=113] | *Private / Public* | *FT / IST* |
| 1) Surgical procedure | 93 | 93 | 95 | 93 | 94 | *0.79* | *0.55* |
| 2) Scaling and polishing | 91 | 92 | 91 | 92 | 91 | *0.9* | *0.82* |
| 3) Orthodontic procedure | 78 | 92 | 91 | 68 | 63 | *0.47* | *0.82* |
| 4) Disinfecting surfaces | 71 | 71 | 71 | 68 | 73 | *0.39* | *0.1* |
| 5) Cleaning dental instruments | 67 | 65 | 70 | 68 | 66 | *0.83* | *0.52* |
| 6) Cleaning dental equipment | 65 | 64 | 66 | 67 | 64 | *0.67* | *0.85* |
| 7) Anticipating blood and splatter | 85 | 89 | 80 | 83 | 88 | *0.4* | *0.08* |
| 8) Assisting a patient with a known communicable disease | 90 | 90 | 89 | 89 | 90 | *0.82* | *0.9* |
| ***Total respondents' average use of masks across procedures = 80%*** | | | | | | | |

*FT= Formally trained at University of Technology; IST= In-service trained; * Significant $p\text{-}value$ = < 0.05; ** highly significant $p\text{-}value$ < 0.01*

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### 8.7.3. Use of protective eyewear during different procedures

The use of protective eyewear during dental procedures and other cleaning activities within the OHCFs prevents potentially hazardous substances from getting into the eyes of the OHCW (CDC, 2016b). The affirmative response to using protective eyewear during the respective procedures varied, with an average of 65% affirmative responses across the different procedures.

An above-average percentage of respondents indicated using eyewear when assisting patients during surgical procedures (76%), scaling and polishing (77%), when blood and splatter were anticipated (76%) and when assisting a patient with a known infectious disease (79%). In contrast, a below-average percentage of respondents confirmed using eyewear when assisting during orthodontic procedures (43%), when disinfecting surfaces (48%), when cleaning dental instruments (60%), and when cleaning dental equipment (50%) (Table 8-29).

This pattern was similar across all the respondent categories. The results of the Chi-square tests with $alpha = 0.05$ confirmed no significant differences between respondents with different training types concerning their usage of protective eyewear during the listed procedures. However, a significant difference between respondents employed in the respective sectors occurred. At $p=0.02$, significantly more respondents employed in the private sector indicated the use of protective eyewear when anticipating blood or splatter during procedures (Table 8-29).

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**Table 8-29 Dental assistants' usage of protective eyewear during different procedures**

| Procedures | % Total respondents [n=197] | Work sector (%) | | Training type (%) | | *p-value (alpha=0.05)* | |
|---|---|---|---|---|---|---|---|
| | | Private [n=121] | Public [n=76] | FT [n=84] | IST [n=113] | *Private / Public* | *FT / IST* |
| 1) Surgical procedure | 76 | 76 | 75 | 75 | 76 | *0.17* | *0.7* |
| 2) Scaling and polishing | 77 | 74 | 80 | 77 | 75 | *0.53* | *0.9* |
| 3) Orthodontic procedure | 53 | 48 | 50 | 56 | 57 | *0.78* | *0.08* |
| 4) Disinfecting surfaces | 48 | 53 | 47 | 45 | 45 | *0.45* | *0.18* |
| 5) Cleaning dental instruments | 60 | 66 | 53 - | 55 | 65 | *0.13* | *0.23* |
| 6) Cleaning dental equipment | 50 | 55 | 53 | 50 | 43 | *0.79* | *0.36* |
| 7) Anticipating blood and splatter | 76 | 83 | 68 | 75 | 79 | ***0.02** | *0.53* |
| 8) Assisting a patient with a known communicable disease | 79 | 83 | 74 | 79 | 81 | *0.1* | *0.74* |
| ***Total respondents' average use of protective eyewear across procedures = 65%*** | | | | | | | |

*FT= Formally trained at University of Technology; IST= In-service trained; * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

### 8.7.4. Use of protective clothing during different procedures

The use of protective clothing forms a barrier for the OHCW against splatters and sprays of blood and saliva and other potentially hazardous substances (CDC, 2016b). Overall, the total respondents' affirmative responses to using protective clothing during the respective procedures varied, with an

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average of 50% across the different procedures. However, an above-average percentage of respondents indicated using protective clothing when assisting patients with a known infectious disease (91%) and when anticipating blood and splatter during procedures (96%). In contrast, a below-average percentage of respondents confirmed using protective clothing during orthodontic procedures (7%), when disinfecting surfaces (33%), when cleaning dental instruments (47%), and when cleaning dental equipment (12%) (Table 8-30).

The Chi-square tests with $alpha = 0.05$ confirmed no significant differences between respondents with different training. However, within three of the listed procedures, significant differences occurred between respondents employed in the different sectors. Significantly more respondents employed in the private sector indicated the use of protective clothing during scaling and polishing $(p=0.01)$ and when disinfecting surfaces $(p=0.04)$. Conversely, significantly more respondents in the public sector $(p=0.04)$ indicated the use of protective clothing during orthodontic procedures.

**Table 8-30 Dental assistants' usage of protective clothing during different procedures**

| Procedures | % Total respondents [n=197] | Working sectors% | | Training Types % | | *p-value (alpha = 0.05)* | |
|---|---|---|---|---|---|---|---|
| | | Private [n=121] | Public [n=76] | Formally trained [n=84] | In-service trained [n=113] | ***Private / Public*** | ***FT / IST*** |
| 1) Surgical procedure | 55 | 50 | 62 | 60 | 50 | *0.09* | *0.45* |
| 2) Scaling and polishing | 61 | 71 | 50 | 57 | 67 | ***0.01** | *0.3* |
| 3) Orthodontic procedure | 7 | 3 | 12 | 7 | 6 | ***0.02** | *0.79* |
| 4) Disinfecting surfaces | 33 | 26 | 41 | 30 | 34 | ***0.04** | *0.57* |
| 5) Cleaning dental instruments | 47 | 45 | 49 | 43 | 50 | *0.66* | *0.35* |

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| Procedures | % Total respondents [n=197] | Working sectors% | | Training Types % | | *p-value (alpha = 0.05)* | |
|---|---|---|---|---|---|---|---|
| | | Private [n=121] | Public [n=76] | Formally trained [n=84] | In-service trained [n=113] | ***Private / Public*** | ***FT / IST*** |
| 6) Cleaning dental equipment | 12 | 12 | 12 | 10 | 13 | *0.95* | *0.42* |
| 7) Anticipating blood and splatter | 91 | 92 | 91 | 93 | 90 | *0.82* | *0.52* |
| 8) Assisting a patient with a known communicable disease | 96 | 94 | 97 | 95 | 99 | *0.3* | *0.91* |
| ***Total respondents' average use of protective clothing across procedures = 50%*** | | | | | | | |

*FT= Formally trained at University of Technology; IST= In-service trained; * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

### 8.7.5. Glove replacement practices

To prevent the transmission of pathogens between patients, OHCWs must replace their gloves between patients. Replacement of gloves is also required when torn during treatment and when it is visibly contaminated (CDC, 2016b). Across the total respondents, 94% indicated affirmative responses to always replacing gloves after every patient. Furthermore, 96% always replace gloves when torn, and 87% always replace gloves when visibly contaminated. This pattern was similar across the individual respondent categories. The *mean and SD* of all the items about glove replacement practices showed minimal fluctuation. Across all the items in IPC theme 6, PA-5, the Chi-square test results with alpha=0.05 did not confirm any significant differences between respondents employed in the different sectors nor between respondents with different training types (Table 8-31).

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**Table 8-31 Dental assistants' glove replacement practices**

| **1. Replace gloves after every patient** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Respondent categories** | **Response options (%)** | | | | | ***Mean*** | ***SD*** | ***p-value (alpha = 0.05)*** |
| | **Never** | **Seldom** | **Often** | **Always** | **Not indicated** | | | |
| Private sector [n=121] | 0 | 0 | 0 | 99 | 1 | 3.97 | 0.36 | *0.07* |
| Public sector [n= 76] | 0 | 0 | 7 | 92 | 1 | 3.89 | 0.52 | |
| Formally trained [n=84] | 0 | 0 | 5 | 93 | 2 | 3.99 | 0.11 | *0.1* |
| In-service trained [n=113] | 0 | 0 | 5 | 93 | 2 | 3.89 | 0.56 | |
| ***Total respondents [197]*** | *0* | *0* | *4* | *94* | *2* | *3.93* | *0.43* | |
| **2) Replace gloves when the gloves get torn during treatment** | | | | | | | | |
| Private sector [n=121] | 0 | 0 | 0 | 99 | 1 | 3.88 | 0.63 | *0.7* |
| Public sector [n= 76] | 0 | 0 | 7 | 92 | 1 | 3.78 | 0.86 | |
| Formally trained [n=84] | 0 | 0 | 1 | 99 | 0 | 3.95 | 0.11 | *0.1* |
| In-service trained [n=113] | 0 | 0 | 5 | 93 | 2 | 3.76 | 0.91 | |
| ***Total respondents [197]*** | *0* | *0* | *3* | *96* | *1* | *3.84* | *0.73* | |
| **3) Replace gloves when the gloves are visibly contaminated** | | | | | | | | |
| Private sector [n=121] | 0 | 2.5 | 2 | 93 | 2.5 | 3.84 | 0.68 | *0.1* |
| Public sector [n= 76] | 1 | 7 | 7 | 80 | 5 | 3.55 | 1.05 | |
| Formally trained [n=84] | 0 | 5 | 4 | 89 | 2 | 3.88 | 0.55 | *0.8* |
| In-service trained [n=113] | 1 | 3 | 4 | 88 | 4 | 3.62 | 1.01 | |
| ***Total respondents [197]*** | *1* | *4* | *4* | *87* | *4* | *3.73* | *0.73* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

## 8.8. IPC theme 7: Health care related waste management

Due to the invasive nature of dental treatments, waste items generated within OHCFs are often contaminated with blood and saliva. All material contaminated with blood and saliva is considered infectious waste that can transmit disease-causing micro-organisms to humans and harm the environment (Koolivand, Gholami-Borujeni and Nourmoradi, 2015). Consequently, negligent practices

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of HCRW management lead to harm to OHCWs, others, or the environment (HPCSA, 2016, WHO, 2017).

Within IPC theme 7: Health care related waste (HCRW) management, the focus was on three practical aspects, namely: respondents' use of a registered HCRW removal agency, record keeping of HCRW removal activities, and respondents' practice of waste segregation before disposal. Table 8-32 outlines the purpose of the items that surveyed respondents' practices related to IPC training and continuous professional development.

**Table 8-32 Purpose of the different practical aspects within IPC theme 7: Health care related waste (HCRW) management**

| Practical Aspect (PA) | Purpose |
|---|---|
| PA-1: HCRW removal agency | To survey if respondents made use of a registered HCRW removal agency. |
| PA-2: Record keeping of HCRW removal activities | To survey if respondents kept a record of HCRW removal activities. |
| PA-3: Waste segregation before disposal | To survey if respondents segregate waste and dispose of different waste items separately. |

### 8.8.1. The use of a registered HCRW removal agency

It is required that health care related waste (HCRW) items be disposed of by a registered waste removal agency (WHO, 2014a). Of the total respondents, 90% reported using a registered HCRW removal agency. This pattern was similar across all the respondent categories, with minimal fluctuation of the *mean and SD*. At $alpha = 0.05$, the results of the Chi-square tests did not indicate any significant differences between the respondents employed in the different sectors nor between respondents with different training types.

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**Table .8-33 The use of a registered HCRW removal agency**

| Respondent categories | Response options (%) | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|
| | Yes | No | Not sure | Not indicated | | | |
| Private sector [n=121] | 93 | 3 | 4 | 0 | 1.88 | 0.43 | *0.2* |
| Public sector [n= 76] | 86 | 4 | 10 | 0 | 1.75 | 0.64 | |
| Formally trained [n=84] | 92 | 2 | 6 | 0 | 1.86 | 0.47 | *0.7* |
| In-service trained [n=113] | 87 | 6 | 7 | 0 | 1.82 | 0.56 | |
| ***Total respondents [197]*** | *90* | *3* | *7* | *0* | *1.83* | *0.52* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

### 8.8.2. Record keeping of HCRW removal activities

Of the total respondents, 80% indicated an affirmative response to record-keeping of waste removal activities. However, the percentage of affirmative responses varied between the respective respondent categories. Highly significant differences with $(p<0.01)$ were confirmed between the respondents in the different sectors and between respondents with different training types. In Table 8-34, 92% of the respondents in the private sector versus 60% of respondents in the public sector indicated an affirmative response. Furthermore, 28% of respondents from the public sector versus 4% of respondents in the private sector were unsure if records of the HCRW removal activities were kept at their OHCFs. Between the respondents who were differently trained, an affirmative response to record-keeping of HCRW removal activities was indicated by 92% of FT respondents versus 75% of IST respondents.

**Table 8-34 Record keeping of HCRW removal activities**

| Respondent categories | Response options (%) | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|
| | Yes | No | Not sure | Not indicated | | | |
| Private sector [n=121] | 92 | 4 | 4 | 0 | 1.75 | 0.66 | ***<0.01* |
| Public sector [n= 76] | 60 | 12 | 28 | 0 | 1.33 | 0.89 | |

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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Formally trained [n=84] | 92 | 4 | 4 | 0 | 1.58 | 0.78 | **<0.01 |
| In-service trained [n=113] | 75 | 21 | 4 | 0 | 1.60 | 0.78 | |
| ***Total respondents [197]]*** | *80* | *10* | *10* | *0* | *1.59* | *0.78* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

### 8.8.3. Separate disposal of different waste types

Overall, 92% of the total respondents indicated affirmative responses to the practice of separating different waste types and separate disposal thereof. However, the percentages of respondents employed in the different working sectors varied. Furthermore, the results of the Chi-square tests at $alpha = 0.05$ confirmed a significant difference. At $p<0.01$, significantly more respondents in the public sector (8%) than respondents in the private sector (8%) were unsure if the waste generated within the OHCFs practice was separately disposed of after it was taken from the facility.

**Table 8-35 Separate disposal of different waste types**

| Respondent categories | Response options (%) | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|
| | Yes | No | Not sure | Not indicated | | | |
| Private sector [n=121] | 94 | 3 | 3 | 0 | 1.91 | 0.39 | **<0.01 |
| Public sector [n= 76] | 88 | 4 | 8 | 0 | 1.80 | 0.57 | |
| Formally trained [n=84] | 92 | 4 | 4 | 0 | 1.88 | 0.45 | *0.7* |
| In-service trained [n=113] | 91 | 3 | 6 | 0 | 1.86 | 0.48 | |
| ***Total respondents [197]*** | *92* | *3* | *5* | *0* | *1.87* | *0.47* | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

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## 8.9. Barriers to effective infection prevention and control

Infection prevention and control are central features of patient safety and excellent care (CDC, 2016b). Therefore, the attitude of health care workers regarding barriers to IPC is often a predictor of how accurate IPC tasks will be performed (Ward, 2014). Several barriers to effective IPC have been identified in previous research among health care workers. Hence, respondents' experiences of five factors that made it challenging to execute IPC effectively were surveyed. Table 8-36 outlines the purpose of the items that probed barriers to implementing effective IPC practices.

**Table 8-36 Purpose of the different attitude aspects and items relating to barriers to effective Infection prevention and control**

| Purpose of items |
|---|
| To assess if respondents perceived the following factors as barriers to effective IPC: |
| 1. 1. Limited time |
| 1. 2. Number of patients seen |
| 1. 3. Number of practitioners that the dental assistant needs to assist |
| 1. 4. Limited PPE |
| 1. 5. Lack of guidance with regards to IPC procedures |

### 8.9.1. Limited time

The percentage of the respondents who indicated opposing responses concerning limited time making it challenging to execute IPC effectively was closely ranked. Of the total respondents, 43% disagreed, and 38% agreed that limited time is a barrier to executing IPC measures effectively within OHCFs. However, within the respective working sectors, the percentage of respondents who indicated disagreement and respondents who indicated a neutral stance varied. Furthermore, at $alpha=0.05$, the results of the Chi-square tests confirmed a significant difference $(p=0.02)$ between respondents employed in the respective sectors. Among the respondents employed in the private sector, 38%

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respondents indicated disagreement, and 17% showed a neutral stance. In contrast, 48% of respondents employed in the public sector stated agreement, and 4 % showed a neutral stance about the statement that limited time is a barrier to executing IPC measures effectively.

**Table 8-37 Limited time**

| Respondent categories | Response options *(%)* | | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|---|
| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Not indicated | | | |
| Private sector [n=121] | 17 | 21 | 17 | 26 | 14 | 4 | 2.88 | 1.44 | ***0.02* |
| Public sector [n= 76] | 30 | 18 | 4 | 28 | 11 | 9 | 2.42 | 1.62 | |
| Formally trained [n=84] | 20 | 24 | 14 | 26 | 8 | 7 | 2.57 | 1.46 | *0.54* |
| In-service trained [n=113] | 23 | 18 | 11 | 27 | 16 | 5 | 2.8 | 1.57 | |
| ***Total respondents (n=197)*** | ***Disagreement*** | | ***Neutral*** | | ***Agreement*** | | ***Not indicated*** | | |
| | 43 | | 13 | | 38 | | 6 | | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

### 8.9.2. Number of patients seen

Overall, 47% of the total respondents disagreed that the number of patients seen is a factor that makes it challenging to execute IPC effectively. However, within the respective working sectors, the percentage of respondents who indicated disagreement varied. At $alpha=0.05$, the results of the Chi-square tests confirmed a significant difference between respondents employed in the respective sectors ($p<0.01$). Significantly more respondents in the private sector (15%) versus 5% of respondents in the public sector preferred to be neutral about the number of patients being a barrier to executing IPC measures effectively.

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**Table 8-38 Number of patients seen as a barrier to effective infection prevention and control measures**

| Respondent categories | Response options *(%)* | | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|---|
| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Not indicated | | | |
| Private sector [n=121] | 17 | 30 | 15 | 26 | 8 | 4 | 2.68 | 1.36 | ***0.01* |
| Public sector [n= 76] | 33 | 16 | 5 | 28 | 9 | 9 | 2.37 | 1.61 | |
| Formally trained [n=84] | 17 | 29 | 11 | 27 | 10 | 7 | 2.63 | 1.46 | *0.56* |
| In-service trained [n=113] | 27 | 21 | 12 | 27 | 8 | 5 | 2.5 | 1.46 | |
| ***Total respondents (n=197)*** | ***Disagreement*** | | ***Neutral*** | | ***Agreement*** | | ***Not indicated*** | | |
| | 47 | | 11 | | 36 | | 6 | | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

### 8.9.3. Number of practitioners the dental assistant needs to assist

Overall, 49% of the total respondents disagreed that the number of practitioners that the dental assistant needs was a barrier to effectively executing IPC measures. However, 54% of respondents in the private sector versus 44% of respondents in the public sector indicated disagreement. Moreover, the results of the Chi-square tests confirmed a significant difference between respondents employed in the different sectors ($p<0.005$). Significantly more respondents in the private sector disagreed that the number of practitioners whom the dental assistant needs to assist is a barrier to executing IPC measures effectively.

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**Table 8-39 Number of practitioners which the dental assistant needs to assist as a barrier to effective infection prevention and control measures**

| Respondent categories | Response options *(%)* | | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|---|
| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Not indicated | | | |
| Private sector [n=121] | 21 | 33 | 12 | 20 | 10 | 4 | 2.53 | 1.38 | ***0.005* |
| Public sector [n= 76] | 30 | 14 | 5 | 30 | 8 | 12 | 2.36 | 1.63 | |
| Formally trained [n=84] | 21 | 21 | 12 | 27 | 11 | 7 | 2.63 | 1.52 | *0.61* |
| In-service trained [n=113] | 27 | 29 | 8 | 21 | 8 | 7 | 2.34 | 1.45 | |

| *Total respondents (n=197)* | *Disagreement* | *Neutral* | *Agreement* | *Not indicated* |
|---|---|---|---|---|
| | 49 | 9 | 35 | 7 |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.*

### 8.9.4. Limited PPE supplies

Overall, 43% of the respondents disagree that limited PPE is a barrier to effectively executing IPC measures within OHCFs. However, variation occurred between the respondents employed in the different sectors. At $alpha=0.05$, the results of the Chi-square tests confirmed a significant difference between respondents employed in the respective sectors. Significantly more respondents in the public sector ($p<0.008$) agreed that limited PPE supplies prevented them from effectively executing IPC measures within their OHCFs (Table 8-40).

**Table 8-40 Limited PPE supplies**

| Respondent categories | Response options *(%)* | | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|---|
| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Not indicated | | | |
| Private sector [n=121] | 19 | 25 | 17 | 17 | 13 | 9 | 2.53 | 1.52 | ***0.008* |
| Public sector [n= 76] | 28 | 14 | 3 | 26 | 16 | 13 | 2.49 | 1.76 | |
| Formally trained [n=84] | 20 | 19 | 11 | 25 | 17 | 8 | 2.74 | 1.62 | *0.61* |
| In-service trained [n=113] | 24 | 22 | 12 | 17 | 12 | 12 | 2.35 | 1.6 | |

| *Total respondents (n=197)* | *Disagreement* | *Neutral* | *Agreement* |
|---|---|---|---|
| | 43 | 11 | 36 |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

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### 8.9.5. Lack of guidance about the IPC measures that are applied in the OHCF

Overall, 44% of the total respondents disagreed that a lack of guidance about IPC measures makes it challenging to execute them effectively. However, in the respective employment sectors contrasting opinions were found. With $p=0.005$, the results of the Chi-square tests confirmed a significant difference. In total, 49% of the respondents in the private sector versus 38% of respondents in the public sector disagreed. On the other hand, 29% of the respondents in the private sector versus 46% of respondents in the public sector agreed that the lack of guidance about IPC measures makes it challenging to execute IPC effectively - 8-41).

**Table 8-41 Lack of IPC guidance**

| Respondent categories | Response options *(%)* | | | | | | *Mean* | *SD* | *p-value (alpha = 0.05)* |
|---|---|---|---|---|---|---|---|---|---|
| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Not indicated | | | |
| Private sector [n=121] | 21 | 28 | 17 | 17 | 12 | 6 | 2.55 | 1.45 | ***0.005* |
| Public sector [n= 76] | 24 | 14 | 4 | 29 | 17 | 12 | 2.66 | 1.75 | |
| Formally trained [n=84] | 17 | 21 | 18 | 24 | 13 | 7 | 2.74 | 1.5 | *0.19* |
| In-service trained [n=113] | 26 | 24 | 7 | 19 | 15 | 9 | 2.48 | 1.62 | |
| ***Total respondents (n=197)*** | ***Disagreement*** | | | ***Neutral*** | | | ***Agreement*** | | |
| | 44 | | | 12 | | | 36 | | |

*SD= Standard deviation: p-value = Chi-Square test result at Alpha =0.05 * Significant p-value = < 0.05; ** highly significant p-value < 0.01*

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## 8.10. Discussion of IPC-Practices

### 8.10.1. Introduction

This study surveyed twenty-five aspects of dental assistants' practices across the seven IPC themes. The discussion summarises the notable findings of the total respondents (n=197) regarding IPC practices across the practice aspects (PAs) within each IPC theme. It also referred to the significant difference in the IPC practices between respondents employed in the private and public sectors and between FT and IST dental assistants.

Across multiple knowledge, attitude and practices studies that surveyed infection prevention and control measures within OHCFs, the focus was not specifically on dental assistants. Therefore, the respondents' attitudes towards IPC measures were compared with other health care professionals, such as dentists, dental students, and nurses.

The interpretation of the results was based on the average practice score of the total respondents. The average practice score of the total respondents was considered excellent (>75%,) good (74%-51%), moderate (50% - 26%) and weak (<25%) (Kumar and Rahman, 2017). *(<25%) (Kumar and Rahman, 2017).*

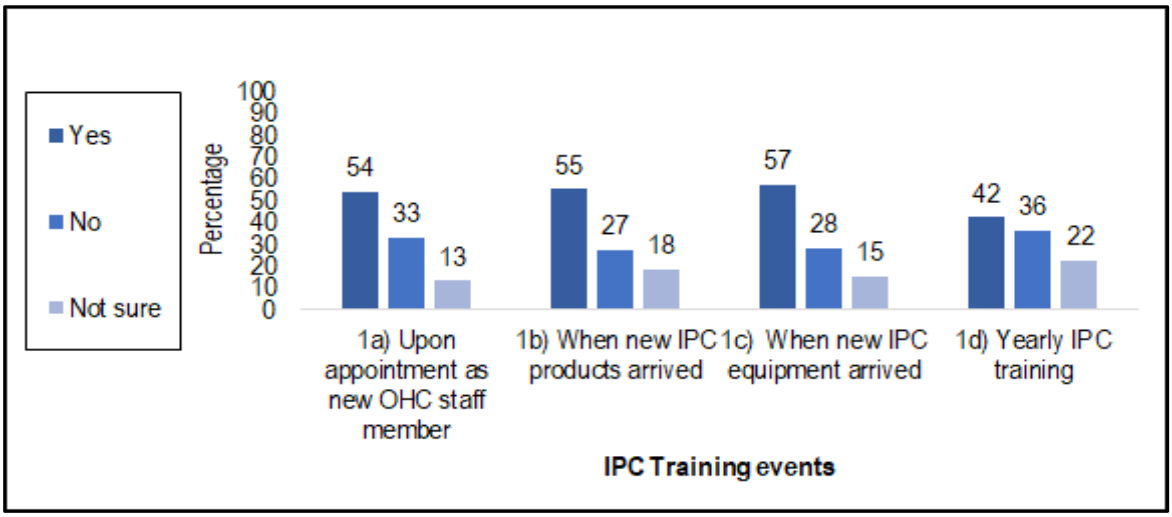
### 8.10.2. IPC training and continuous professional development

Researchers continuously appealed for ongoing infection prevention and control (IPC) training for OHCWs (Puttaiah *et al.*, 2010; Singh *et al.*, 2011; Ehsani *et al.*, 2013; Halboub, *et al.*, 2015; Mustafa *et al.*, 2015; Pavithran *et al.*, 2015; Dagher *et al.*, 2017; Duse, 2017; Alahdal *et al.*, 2019; Oosthuysen *et al.*, 2020a). IPC training upon appointment, when new IPC products and equipment arrive, and annual IPC training appropriate to the assigned duties of the health care workers (HCWs) are critical components of an effective IPC regime (Petty, 2006). In addition, HCWs who received training in

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infection prevention are more likely to apply effective IPC measures (Geberemariyam *et al*., 2018). Hence, the current study surveyed respondents' practices related to IPC training and continuous professional developments and investigated the reasons that prevented respondents from attending CPD events where IPC measures were discussed.

Previous research indicated that the attendance at CPD events varied. On the one hand, a higher percentage (63%) of dental assistants regularly attended IPC courses (Mustafa, Khaliq Humam and Al-Mosuli (2015). In contrast, 86.7% of nursing staff in Zambia indicated that they did not participate in in-service IPC training (Chisanga, 2017), and only 49% OHCWs in private Dental Clinics in Jeddah, Saudi Arabia, received continued educational courses in infection control (Alahdal *et al.*, 2019). A further concern is that significantly more respondents in the private sector reported receiving IPC training when new IPC products and equipment arrived ($p=0.01$) and were unsure if they received yearly IPC training. In addition, significantly more FT respondents did not receive IPC training when new IPC equipment arrived $(p=0.02)$.

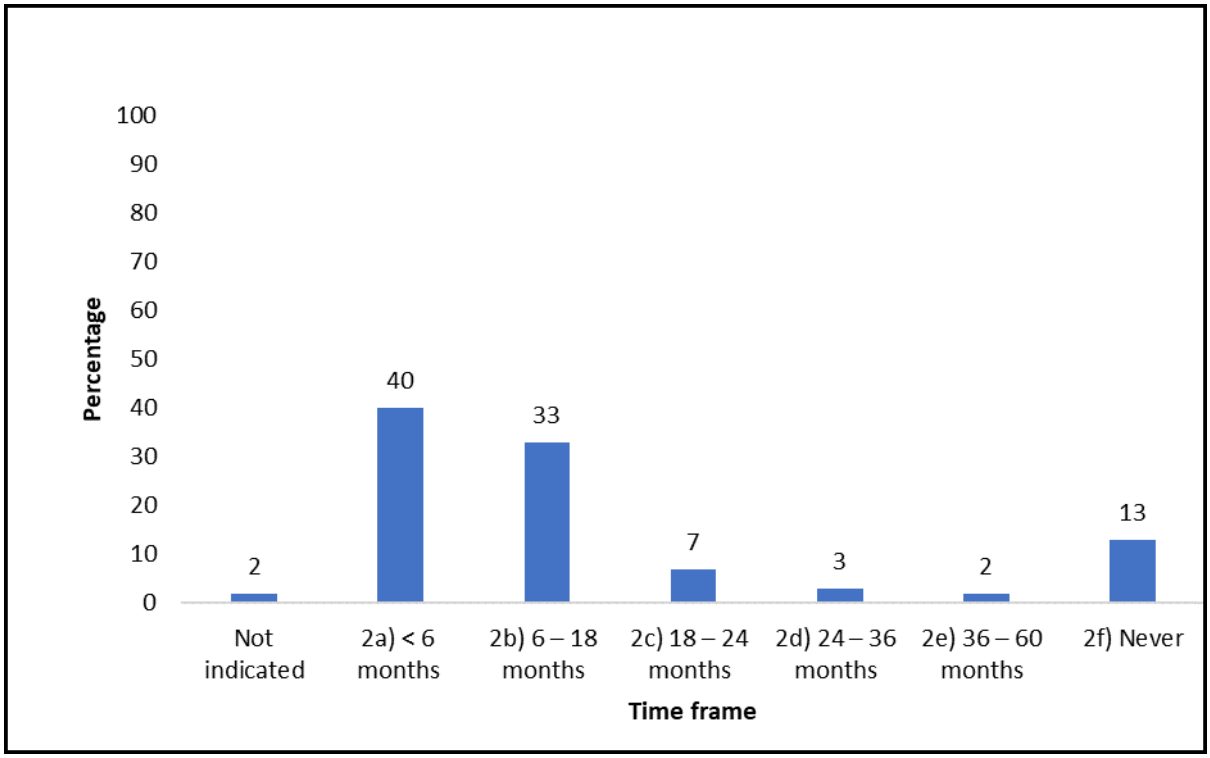



***OHC = Oral health care; IPC = Infection prevention and control***

**Figure 8-1 IPC training received by respondents**

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Continuous professional development (CPD) aims to ensure that health care workers keep track of new developments within their professions and refresh and review existing effective practices (HPCSA, 2016a, 2017a). Overall, respondents reported excellent practices in terms of attendance at CPD events where IPC issues were discussed. Of the total respondents, more than 80% confirmed attendance at a CPD event within the last 24 months before the study. In contrast, 63% of dental assistants in UAE regularly attended IPC courses, but a timeframe or explanation of the term "regular" is lacking (Mustafa, Khaliq Humam and Al-Mosuli, 2015).




***CPD = Continuous professional development***

**Figure 8-2 Respondents' last attendance at a CPD event**

Respondents confirmed several reasons for the non-attendance of a CPD event that addressed IPC matters. Overall, 60% of the respondents indicated the cost of CPD events as a reason for non-attendance. In addition, significantly more FT respondents stated that the costs of CPD events deter them from attending the CPD events. Of the other factors, 49% of the total respondents indicated not being aware of the event, with significantly more respondents in the public sector that confirmed it as

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a reason for non-attendance. A further 42% of the total respondents indicated the date of the event as a reason for not attending CPD events. There was a need for infection control education for HCWS at dental clinics in Khartoum State, Sudan, after graduation (Idris, 2012).

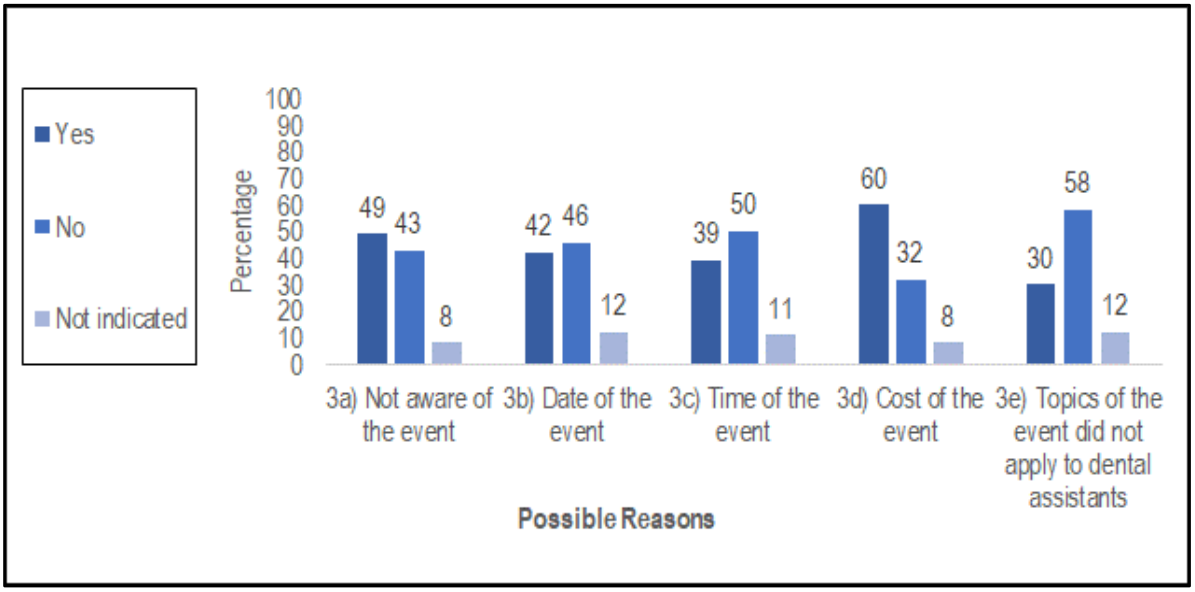



**Figure 8-3 Possible reasons for not attending CPD events**

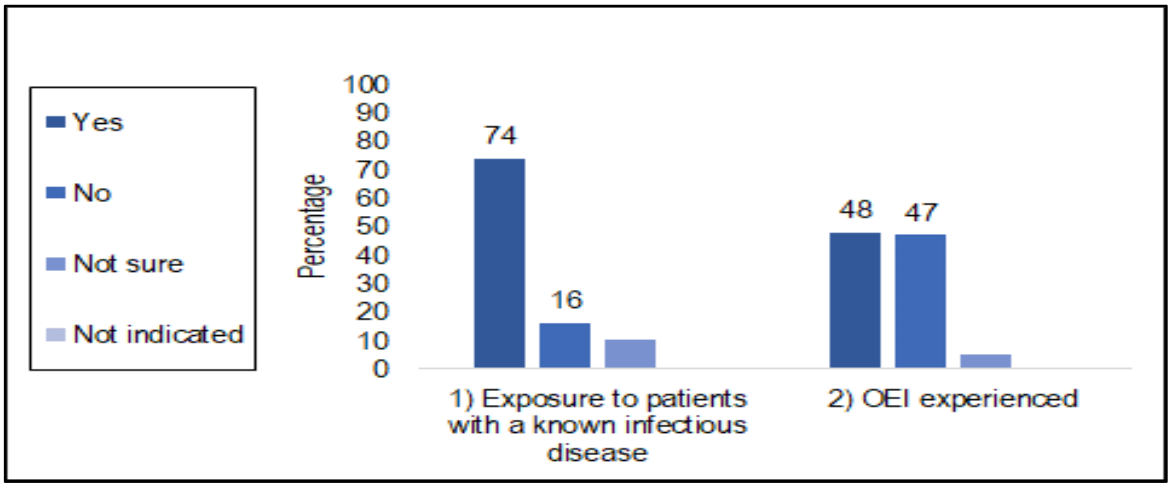
### 8.10.3. Infectious diseases and risks

Due to the high burden of infectious diseases within South-Africa, the possibility exists for OHCWs to render services to patients with infectious diseases (Rothe *et al*., 2013). This study confirmed this notion, as 74% of respondents previously worked on a patient with a known infectious disease (Figure 8-4).

A contributing factor that increases the risk of transmission of blood-borne pathogens within OHCFs is that dental procedures are performed within the relatively small oral cavity where blood and saliva are ever-present (Younai *et al.,* 2001). In addition, a variety of sharp dental instruments are used when rendering dental treatment, which makes the risk of injuries occurring within the OHC environment more likely. In the current study, 48% of the total respondents confirmed that they had previously

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experienced an OEI (Figure 8-4). With specific reference to dental assistants and needle stick injuries, 50% of dental assistants employed in the public OHCFs in Limpopo, South -Africa (Nemutandani *et al*., 2007), 42% of all dental assistants at the School of Dentistry of the University Hospital Freiburg, Germany (Mutters *et al*., 2014), and 41% of dental assistants in Nigeria experienced a needlestick and sharps injury (Azodo *et al*., 2010). Among other OHCWs, the incidence of different OEI varied across previous studies. In 2015, 22% of dental staff and students at a University in KZN sustained a percutaneous injury (Moodley and Naidoo 2015), 79% of dental professionals in Bangalore, India (Pavithran *et al*., 2015) and 62% of the dental students at Sana 'a University, Yemen (Halboub *et al*., 2015) who experienced an OEI. In contrast, 19.2% of dental students at the Columbia University College of Dental Medicine experienced an OEI (Myers *et al*., 2012).




***OEI = Occupational exposure injury***

**Figure 8-4 Respondents' exposure to patients with an infectious disease and occupational exposure incidents (OEI) experienced**

Health care workers are exposed to various possible injuries while performing their daily duties (CDC, 2003b; Reddy and Doshi, 2017; Shivakumar, Sahana and Prashant, 2017). In addition to the seven types of OEI listed in the current study, respondents mentioned four other kinds of OEI that they had previously experienced. This included: injuries when opening a local anaesthetic tin, injuries when

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repacking instruments into drawers, needle stick injuries after taking patients' HGT, and injuries when placing the scalpel blades into the holder.

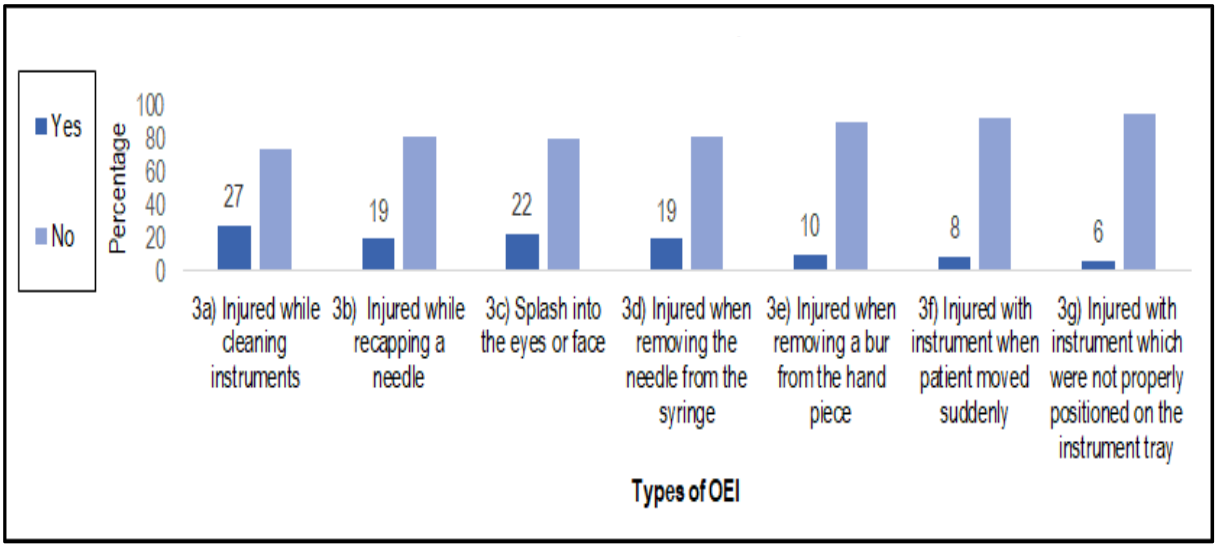
Overall, 10% and less of the respondents experienced injuries when removing a used bur from the dental handpiece, injuries with instruments when a patient suddenly moved, and injuries due to an incorrectly positioned instrument). The highest percentage of OEI occurred during the instrument cleaning process (27%). The current study exceeded previously reported OEI, where 21.6% of dental faculty members and students at KSU had been pricked by a sharp instrument while treating patients (Alharbi *et al*., 2019).

Furthermore, in the current study, 22% of the OEI resulted from a splash into the eyes and face. This was similar to HCWs in West Arsi District, Southeast Ethiopia, who also experienced OEI resulting from blood and bodily fluid splashes (Geberemariyam, Donka and Wordofa, 2018). Apart from OEI because of removing the needle from the syringe, significantly more respondents employed in the private sector experienced OEI across six of the listed OEI. Furthermore, significantly more IST respondents experienced an OEI with an instrument when the patient suddenly moved $(p=0.03)$ and because of an improperly positioned instrument on the instrument tray $(p=0.02)$. However, among dentists and dental nurses at a Jordanian University Teaching, OEI resulting from blood splashes to the eyes, nose, or mouth was more among dental staff than among dental nurses (Qudeimat, Farrah and Owais, 2006).

The prevalence of needle stick injuries (NSIs) among OHCWs remains to be a concern (Guruprasad and Chauhan, 2011; Matsuda *et al.*, 2011; Gichki *et al.*, 2015; Pavithran *et al.*, 2015; King and Strony, 2019). In the current study, 19% of the total respondents experienced NSIs when recapping a needle, and a similar percentage experience NSIs when removing a needle from the local anaesthetic syringe. However, a higher percentage of NSIs were reported by other researchers, with 27.5% NSI among dental professionals in Bangalore, India, and 41.80% of these NSIs occurred during device recapping (Pavithran *et al*., 2015). Geberemariyam *et al.* (2018) also detected a high prevalence of needle stick

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injuries among health care workers in West Arsi District, Southeast Ethiopia. Amongst dental students at the Columbia University College of Dental Medicine, 25% of the OEI resulted from NSI (Myers *et al*., 2012). In contrast, Yengopal *et al*. (2001) reported that only 13.8% of dentists experienced NSI in the last six months before their study. Interestingly, among dentists and dental nurses at a Jordanian University Teaching Centre, the dental nurses were more prone than dental staff to percutaneous injuries (Qudeimat, Farrah and Owais, 2006).




***OEI = Occupational exposure injuries***

**Figure 8-5 Occupational exposure injuries experienced by respondents**

### 8.10.4. Disinfection and sterilisation

Disinfection and sterilisation are critical components of infection prevention and control measures, ensuring that pathogens are not transmitted (Ziady, 2010a; Rutala *et al.*, 2019). Substantiated instrument sterilisation processes must be followed to ensure the safe re-use of instruments in OHCFs (Oosthuysen, 2015; Mahdi *et al.*, 2021b). Hence this study surveyed respondents' instrument sterilisation practices.

Appropriate cleaning of dental instruments before sterilisation is essential in the instrument sterilisation routine (Campbell *et al.*, 2016; Rutala and Weber, 2016). This cleaning can be done manually or using

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specialised devices (Bagg *et al.*, 2007). Respondents in the current study reported a combination of actions as part of cleaning instruments before sterilisation. In the present study, manual cleaning, where respondents used their hands to pre-clean instruments, was reported the most (91%). Similarly, 96% of dentists in Scotland (Bagg *et al.,* 2007) and 79% of dentists in private clinics in Lebanon (79%) used manual cleaning. However, less than 20% used specialised cleaning devices such as ultrasonic baths and instrument washers (Dagher *et al.*, 2017).

Ultra-sonic baths and instrument washers provide a safer and more effective system forted pre-clean dental instruments (Bagg *et al.*, 2007). In the current study, 81% of respondents reported using an instrument washer, and 63% used an ultra-sonic clear. However, significantly more respondents employed in the private sector used an instrument washer $(p = 0.03)$. In contrast, an earlier study found that 92% of general dental practices in the UK had ultrasonic baths. Still, they did not use automated washer-disinfectors or instrument washers at that stage (Bagg *et al.*, 2007). The effectiveness of cleaning instruments in an ultrasonic bath versus an instrument washer was researched. On the one hand, instruments with complex surface structures, such as endodontic instruments cleaned in an ultrasonic bath, had significantly less debris than those cleaned in an instrument washer disinfector (Perakaki *et al.*, 2007). On the other hand, the Dental Council of Dublin (2015) preferred that OHCWs use instrument washers as they deemed instrument washers "more efficient at pre- sterilisation cleaning than ultrasonic cleaners" (Dublin Dental Council, 2015).

In the seven steps of the sterilisation process, Oosthuysen *et al.*, (2020) indicated the packaging or wrapping of instruments as the fourth step, monitoring and verification of instrument sterilisation as the sixth step. In the current study, respondents' practices of wrapping instruments before placing them in the sterilisation device and monitoring the sterilisation process varied. Of the total respondents, 78% reported that they place instruments in a sterilisation pouch before placing them in the sterilisation device. In addition, significantly more respondents in the private sector confirmed that they bag instruments before placing them in the sterilisation devices $(p = .0.01)$. In contrast to this

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result, a higher percentage of respondents (88%) wrap instruments before placing them in the sterilisation device (Mohiuddin and Dawani, 2015).

Practices to monitor and verify the instrument sterilisation process were lacking among the respondents in the current study. Only 58% of respondents reported biological monitoring as part of their sterilisation routine, but significantly more respondents in private practices reported that they perform biological monitoring *(p=0.01)*. Likewise, among dental practices in the municipality of São Paulo, 33.80% were not monitoring the autoclave sterilisation cycles, and 83.21% did not use chemical and biological indicators (Matsuda, Grinbaum and Davidowicz, 2011).

Regarding record-keeping of the sterilisation process, 74% of the total respondents confirmed that they keep a record of it. However, significantly more respondents in the public sector confirmed compliance with this practice *(p=0.01)*. Previously, poor adherence was reported, as only 1% of practices kept a record of instrument sterilisation activities, even though the process of instrument cleaning had been audited at 6% of the surgeries, with 90% of these being internal audits and 10% extrinsic audits (Bagg *et al.*, 2007).

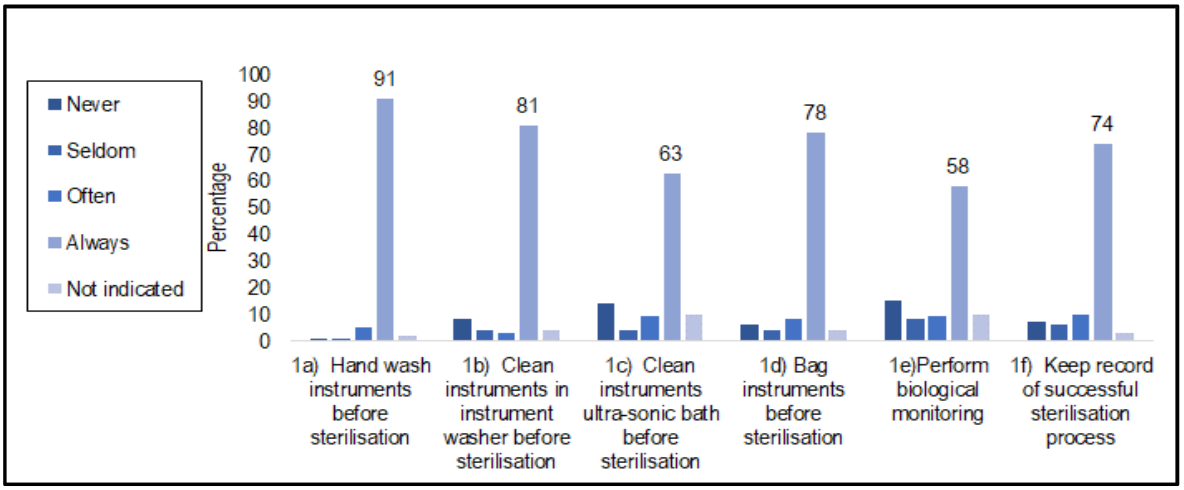



**Figure 8-6 Respondents' routine practices during the instrument sterilisation process**

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Several types of sterilisation devices are available to sterilise dental instruments that are heat resistant (Rutala, Weber and Committee, 2019). Across the five types of sterilisation devices listed, 90% of respondents reported using a Statim autoclave with a flash cycle. A higher percentage (94.3%) of dental students in Central India (Singh *et al.,* 2011), and 89.7% of dentists in private practices in Durban (Yengopal *et.al.,* 2001) used an autoclave to sterilise instruments.

Regarding the other sterilisation devices listed, the percentage of respondents who confirmed using the various sterilisation devices ranged between 34% and 8%. Furthermore, significantly more respondents in the public sector reported the use of an autoclave *(p=0.02)*, dry heat sterilisers *(p=0.02)*, modified pressure cookers *(p=0.01),* and ultra-violet sterilisers *(p=0.04)*. In addition, significantly more IST respondents reported the use of dry heat and ultra-violet sterilisers. Similarly, 90% of dental students in Babylon indicated the use of autoclaves, whereas only 10% indicated the use of dry heat for the sterilisation of instruments (Zaidan, 2018).

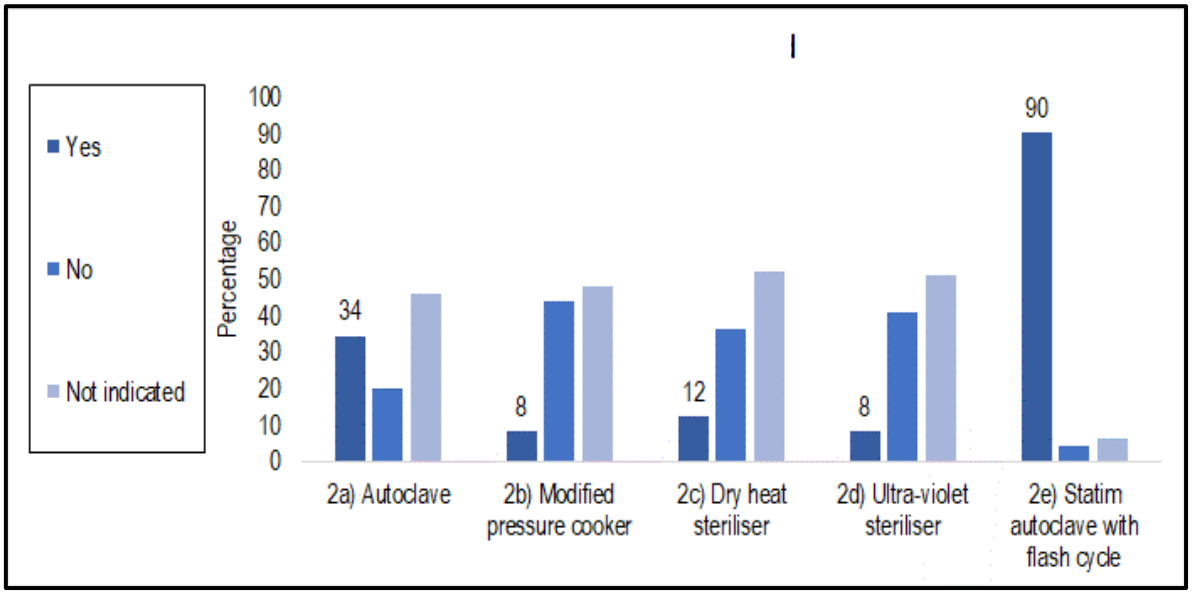



**Figure 8-7 Type of sterilisation devices used**

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Cold or chemical sterilisation methods are indicated for not heat-resistant instruments (CDC, 2019). Overall, only 15% of respondents confirmed the use of cold/chemical sterilisation. Furthermore, 63% of these respondents indicated using a high-level disinfectant for sterilisation purposes. This practice is in line with recommendations that state that a high-level disinfectant should be used when performing cold sterilisation (CDC, 2016b; Laneve *et al.*, 2019)

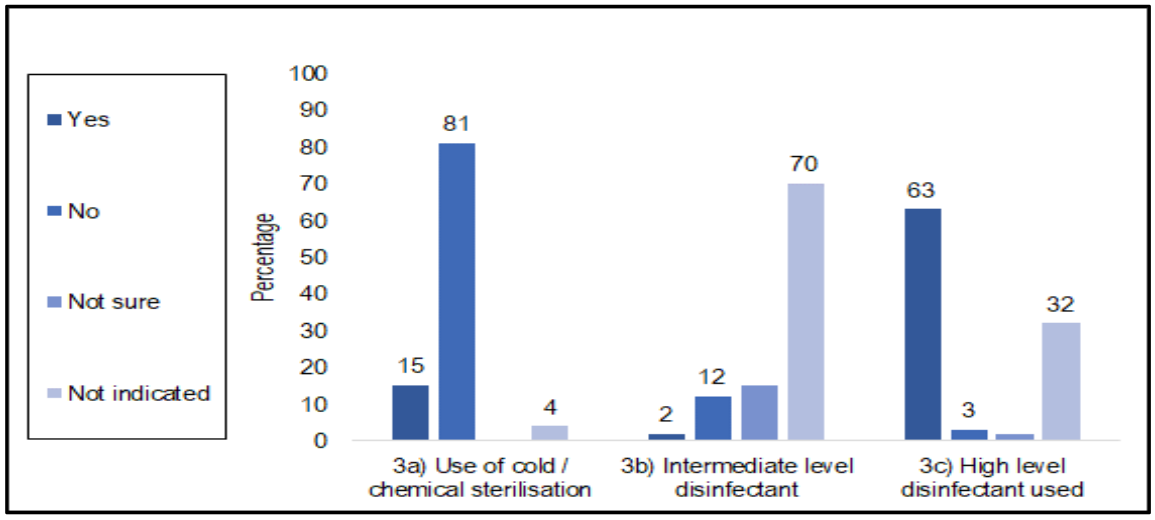



**Figure 8-8 Respondents' use of cold sterilisation and the level of disinfectant used**

The routine of cleaning dental handpieces must be a meticulous process (Oosthuysen, Potgieter and Fossey, 2020), as dental handpieces' inner parts and outer surfaces can become contaminated and pose a risk of spreading pathogens (Rutala, Weber and Committee, 2019). Therefore, this study surveyed respondents' practices of six items related to the processing of handpieces.

Overall, variation occurred in the percentage of respondents who always performed the listed actions during their handpiece sterilisation routine. During the manual cleaning of dental handpieces, the recommended practice is to flush the dental handpieces with water for 20 seconds before removing them from the coupling and clean and decontaminate both inner and outer surfaces of the dental handpieces (Oosthuysen *et.al.*, 2020). However, poor practices were reported in terms of running the

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handpiece for 20-30 seconds before removing it from the hose (38% of total respondents) and disassembling the handpiece to reach the inner parts (39% of total respondents).

However, excellent practices were reported by the total respondents for cleaning the outer surfaces of the dental handpiece (88%) and always oiling the dental handpieces (80%). Furthermore, significantly more respondents in the private sector reported oiling the dental handpiece $(p=0.03)$.

Previously, difficulties regarding the sterilisation of handpieces using the autoclave were reported. Dentists only used cold disinfection for dental handpieces as none of the dentists used an autoclave to sterilise dental handpieces (Lovelock, 1988). In the current study, results closer to the threshold of inadequate practices for dental handpiece sterilisation were reported for two of the actions listed. Only 58% of respondents said they always placed the dental handpiece in a sterilisation pouch, and 59% reported using an autoclave to sterilise the dental handpiece. Other research reported a higher percentage of respondents who sterilise dental handpieces using an autoclave. Among dental practitioners in public OHCFs in Karachi, Pakistan, 92% used an autoclave to sterilise the dental handpieces (Mohiuddin and Dawani, 2015). Furthermore, 77.8% of OHCW who were older than 50 years and 77.2% of OHCW who were younger than 26 years indicated using an autoclave for dental handpiece sterilisation. In contrast, at a dental hospital in Kenya, 44% of the OHCWs older than 40 years and 75% of the OHCWs between 26 and 40 years were satisfied with sterilising the dental handpiece by wiping it with a chemical agent (Butt *et al.*, 2019). Although 89.7% of dentists had autoclaves in their practices, none of the dentists autoclaved dental handpieces, but these instruments were just cold disinfected. The sterilisation practices of the different dental handpieces also varied, with 45.2% autoclaving their high-speed handpieces but only 39.7% autoclaving their slow handpieces(Yengopal, Naidoo and Chikte, 2001). Furthermore, in the current study, poor practices were reported in terms of running the handpiece for 20-30 seconds before removing it from the hose (38%) and disassembling the handpiece to reach the inner parts (39%).

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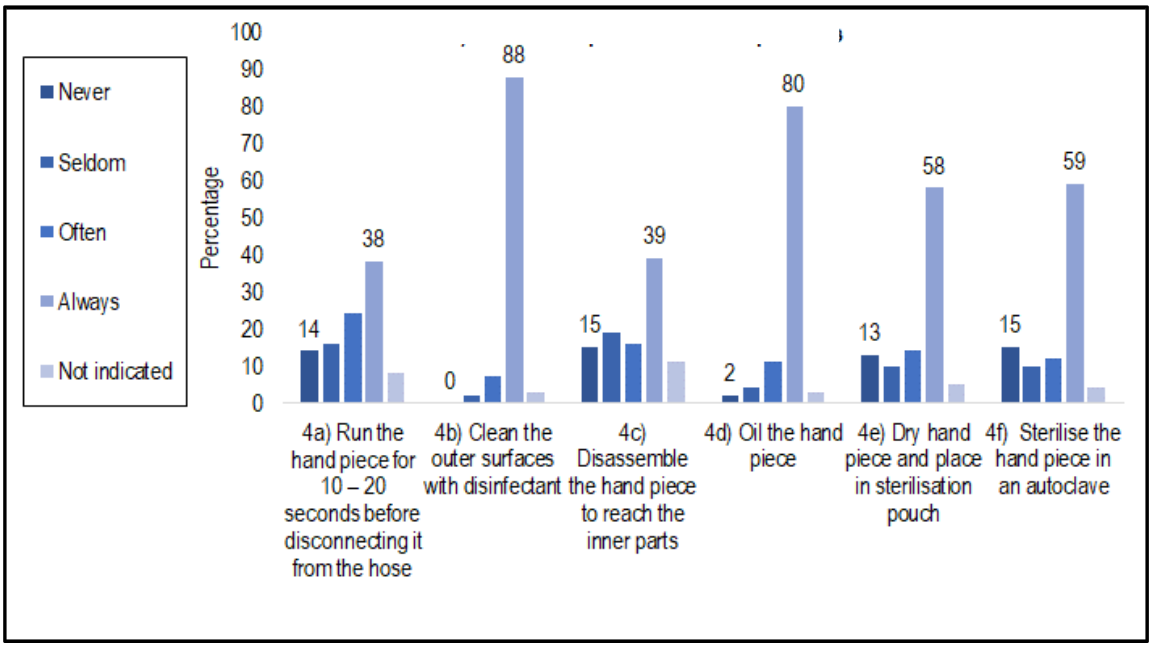



**Figure 8-9 Respondents' practices during the dental handpiece sterilisation routine**

### 8.10.5. Vaccination

Vaccination of OHCWs against Hepatitis B is recommended, and in several countries, including South-Africa, it is mandatory (Naidoo, 2008; Ziady, 2010b; Department of Health_RSA and Republic of South-Africa National Department of Health, 2020; Oosthuysen, Potgieter and Fossey, 2020a). The focus of this section of the study was explicitly aimed at the Hepatitis B vaccination of respondents.

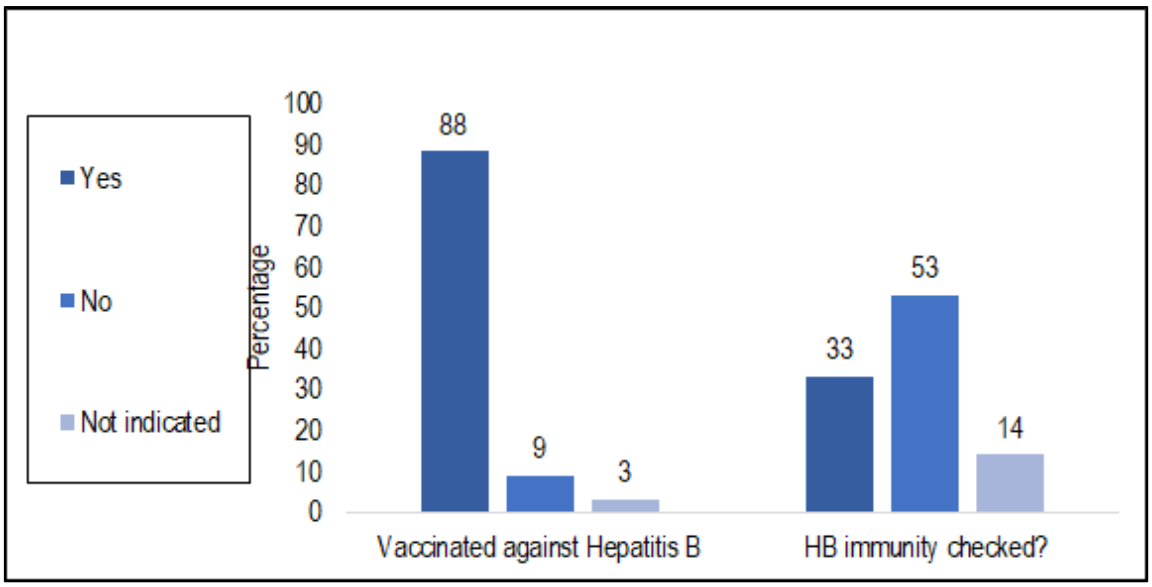
A high percentage of respondents in the current study reported being vaccinated against Hepatitis B (88%). This percentage is higher than previous findings, where between 27% to 68% of respondents in Sub Saharan Africa were vaccinated against Hepatitis B (Rothe *et al.*, 2013), and 37.3% of dental assistants in Limpopo province, South-Africa (Nemutandani *et al.*, 2007). In contrast, 90% of dentists in private practices in Durban (Yengopal *et al.*, 2001); 93% of OHCWs in private dental clinics in Jeddah (Alahdal *et al.*, 2019); 90.2% of in OHCWs in private dental clinics in Lebanon (Dagher *et al.*, 2017); 81.5% of dental professionals in Bangalore, India (Pavithran *et al.*, 2015) and 71.7% of the students at Sana`a University were vaccinated against Hepatitis B (Halboub *et al.*, 2015).

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On the other hand, a lower percentage of OHCW were vaccinated against Hepatitis B: 66% of dental students in Latin America (Acosta-Gío *et al.*, 2008); 38.8% of the undergraduate dental students in Central India (Singh *et al.*, 2011); 51.8% dental auxiliaries in Nigeria (Azodo, *et al*., 2010) and 34% of dental assistants in private dental clinics in Lebanon were vaccinated against Hepatitis B (Dagher *et al*., 2017). In addition, the pattern is that the vaccination rate of other staff working in OHCFs is less than that of dentists (Yengopal *et al.*, 2001)

A further recommended practice is for HCWS to get serologic testing and receive a vaccine booster after the administration of the third dose of the hepatitis B vaccine (CDC, 2011; Schillie *et al.,* 2013; Talbot, 2014; Malewezi *et al.,* 2017; Oosthuysen *et al.*, 2020). The current study results indicated that respondents' compliance with the practices to do a follow-up after their vaccination is poor. Only 33% of the total respondents, but significantly more respondents in the private sector, indicated that their immunity level was checked after receiving all three Hepatitis B doses $(p=0.01)$. Overall, compliance rates for post-vaccination serology varied across other studies as well, with 50.4% of undergraduate dental students (Kumar and Rahman, 2017), and *9.5%* of senior dental students at Sana 'a University (Halboub *et al.*, 2015)

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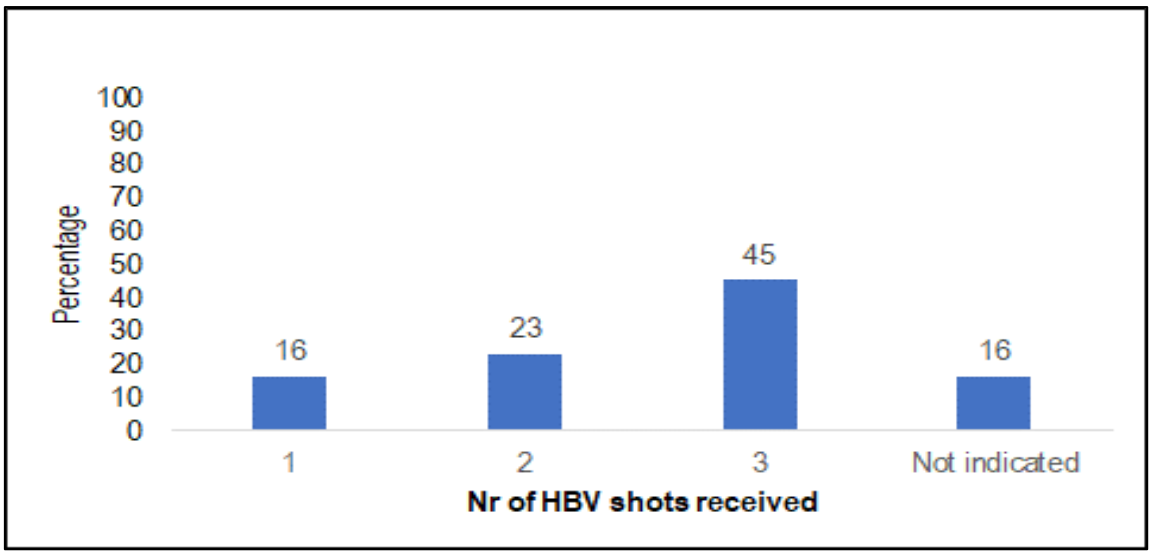



*HB = Hepatitis B*

**Figure 8-10 Hepatitis B vaccination status**

Dental assistants' compliance with receiving a total of three Hepatitis B vaccination doses was poor. Only 45% of respondents in the current study, with significantly more respondents in the private sector, confirmed that they received all three Hepatitis B vaccination doses *(p=0.01)*. Across other studies, the percentages of respondents who received all three doses were also low, with 50% of dental students at Sana 'a University in Yemen (Halboub *et al.*, 2015); 42.3% among senior dental students at the University of Sharjah in the United Arab Emirates (Rahman *et al.*, 2013), 41% among dental students and interns in Saudi Arabia (Al-Shamiri *et al.*, 2018), between 19% and 58% of dental students in Latin America (Acosta-Gío *et al.*, 2008), and only 2% of students in medicine and health sciences in Northwest Ethiopia (Abdela *et al.*, 2016) who completed the prescribed Hepatitis B vaccination regime by receiving all three vaccination doses.

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*HBV = Hepatitis B vaccination*

**Figure 8-11 Number of Hepatitis B vaccination doses received**

### 8.10.6. Hand hygiene

Hands are the carrier of many micro-organisms, and when hand hygiene opportunities are missed, the risk of transmission of pathogens to patients and others increases (WHO, 2009a). Therefore, this section of the study surveyed respondents' hand hygiene practices on specific occasions, namely before putting on gloves, after removing gloves, and before leaving the clinical area. It furthermore probed respondents' use of an alcohol-based hand sanitiser (ABHS) as an adjunct to handwashing and the method used to dry the hands after washing it.

Of the total respondents, 67% reported that they wash their hands before putting on gloves, but 77% said they always wash their hands after taking off their gloves and before leaving the clinical area. In addition, significantly more respondents in the private sector reported always washing their hands before putting on gloves *($p=0.01$)*. Similarly, a higher percentage of HCWs in the emergency departments in Italy always wash their hands after taking off gloves than before putting on gloves, with 52% and 79% in the respective instances (Parmeggiani *et al.*, 2010). In contrast, 93.3% of dental practitioners in a Public OHCF in Karachi, Pakistan, washed their hands before and after treatments

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(Mohiuddin and Dawani, 2015), and 78.2% of health care students washed their hands between patients (Tavolacci *et al.,* 2008).

Furthermore, 41% of respondents in the current study confirmed that they always supplement their hand hygiene by using an ABHS (Figure 8-12). In addition, significantly more respondents in the private sector reported always using ABHS to supplement their hand hygiene practices *(p=0.01)*. In contrast, 57.6% of dentists in Bangalore city generally use an ABH sanitiser to supplement hand hygiene (Naik *et al.*, 2014). However, 24% of general practice dentists use ABH sanitisers in their OHCFs (Myers *et al.*, 2008). Furthermore, Li *et al.* (2015) explained that HCWs in Inner Mongolia, China, did not use ABHS. In contrast, the current study did not focus on the reasons for respondents' non-usage of ABHS to supplement their hand hygiene practices. In terms of drying hands, 80% of respondents in the current study use disposable paper towels.

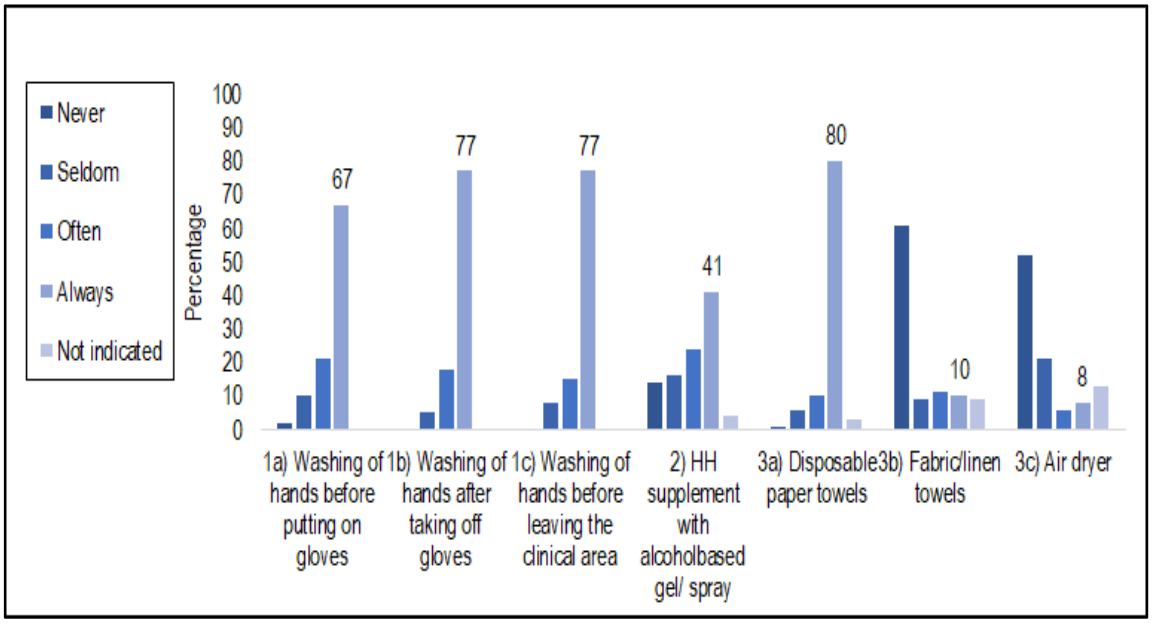



**Figure 8-12 Hand hygiene practices**

HCWs must always wash their hands correctly (Peters *et al.*, 2019). The presence of a chat that illustrates the correct hand hygiene was suggested to increase awareness of and the application of

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the proper technique when hand hygiene is performed (Kilpatrick *et al.*, 2011). Overall, 86% of respondents in the current study confirmed visible hand hygiene instructions available in their OHCFs.

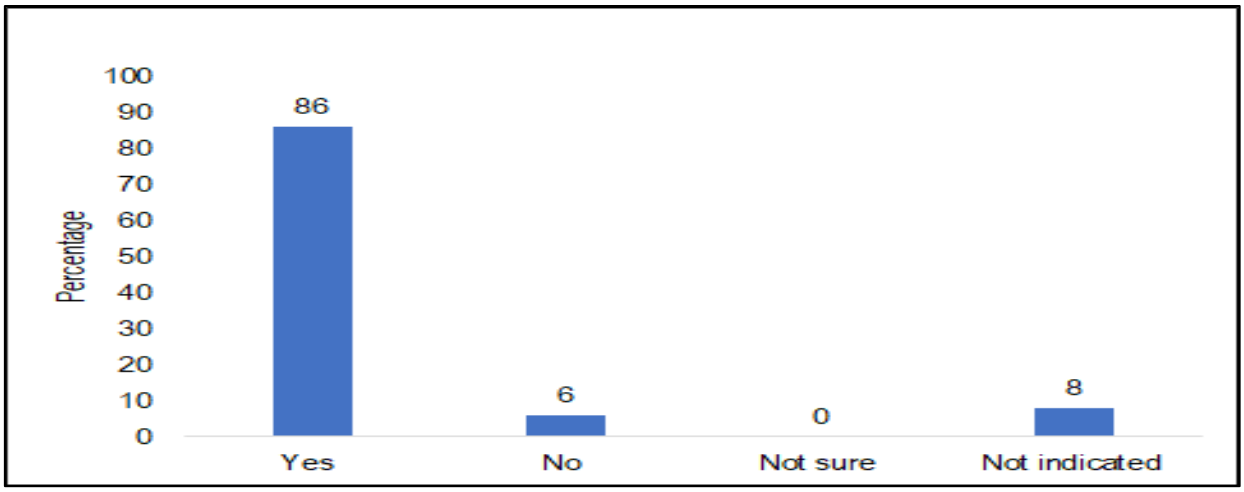



**Figure 8-13 Availability of handwashing instructions in the OHCFs**

### 8.10.7. Personal protective equipment (PPE)

#### 8.10.7.1 Respondents' usage of examination gloves across different procedures

In the current study, the average use of gloves was 66% of the total respondents. The average use of gloves differed from previous findings. On the one hand, higher percentages for the use of gloves were found: 100 *%* of OHCWs at a dental hospital in Kenya (Butt *et al.*, 2019); 96.7% *of* dental faculty members and students at KSU (Alharbi *et al.*, 2019). On the other hand, *57.3% of* HCWs in the emergency departments in Italy always used gloves (Parmeggiani *et al.*, 2010).

Overall, respondents' use of gloves during the different procedures varied. More than 70% of respondents always used gloves during surgical procedures, scaling and polishing, disinfecting surfaces assisting patients with a known communicable disease. Furthermore, the percentage of respondents who use gloves when blood and splatter are anticipated and when cleaning dental equipment ranged within the 60s. However, significantly more respondents in the private sector

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confirmed using gloves during surgical procedures *(p=0.01)*, scaling and polishing *(p=0.01)*, disinfecting surfaces *(p=0.04)*, and when cleaning dental instruments *(p=0.02)*.

For adequate protection when cleaning dental instruments, heavy-duty gloves instead of examination gloves are prescribed (Pandit *et al.*, 2015; Javaid *et al.*, 2019). Since 39% of respondents confirmed the use of examination gloves when cleaning dental instruments, the likelihood is higher for an OEI to occur (Rutala and Weber, 2016). In contrast to this finding, 99% of OHCW in general dental practices in the UK wore gloves when cleaning instruments (Bagg 2007).

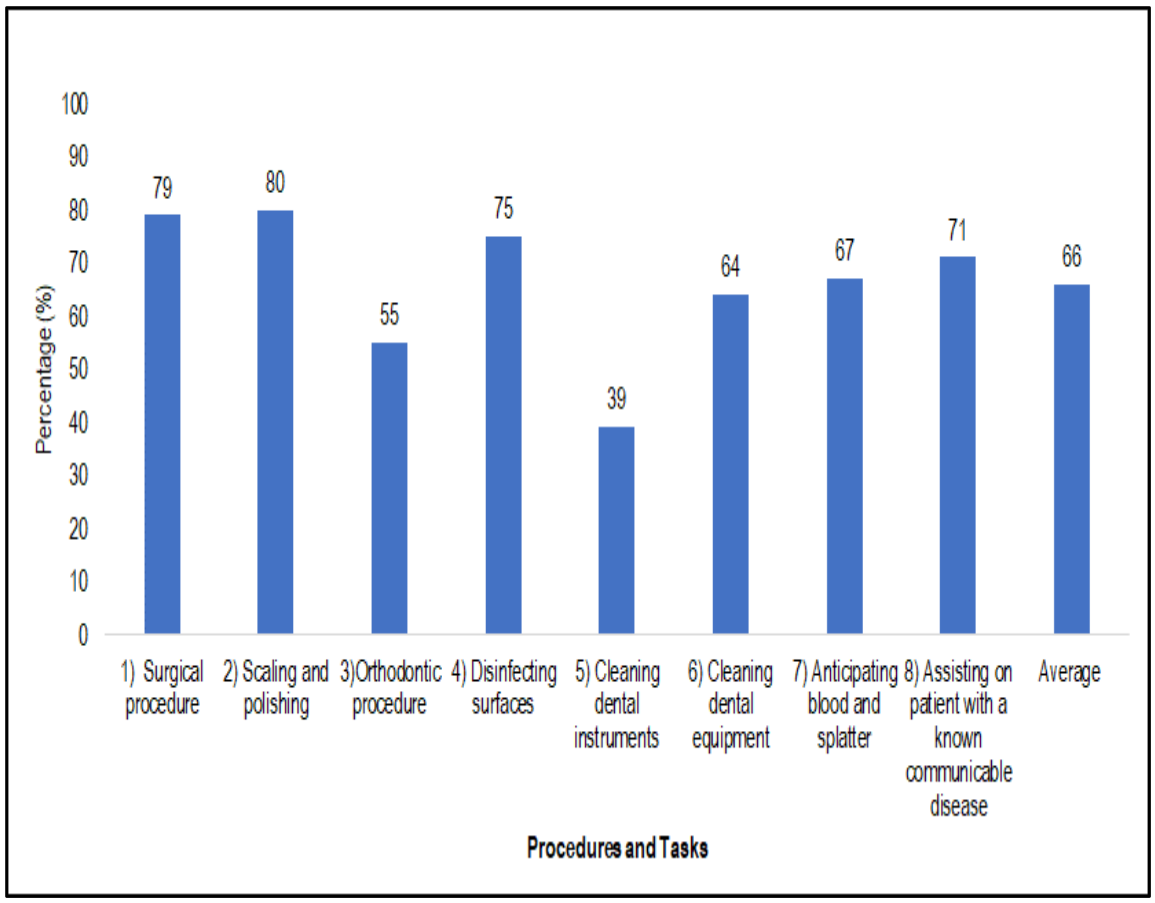



**Figure 8-14 Respondents reported the use of gloves during different procedures**

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#### 8.10.7.2 Respondents' use of masks during different procedures

On average, 80% of respondents used masks across the eight listed procedures and actions. In addition, no significant difference in the use of masks across the different procedures occurred between respondents employed in the different sectors nor between respondents with varying types of training. In recent studies, the reported use of face masks was higher, with 92,2% among dental faculty members and students at KSU (Alharbi et al., 2019) and 94.3% of OHCW in private dental clinics in Jeddah, Saudi Arabia (Alahdal *et al.*, 2019).

Concerning respondents' use of face masks during specific procedures, more than 80% of respondents confirmed using masks during surgical procedures, scaling and polishing, anticipating blood and splatter, and assisting a patient with a known infectious disease. The percentage of respondents who confirmed using masks during orthodontic procedures and when disinfecting surfaces ranged between 71% and 78% for the respective procedures. However, a lower percentage of respondents in the current study used face masks when cleaning dental instruments (67%) and equipment (65%). In contrast, less than 50% of OHCW in general dental practices in the UK use a protective face mask when manually washing instruments (Bagg 2007).

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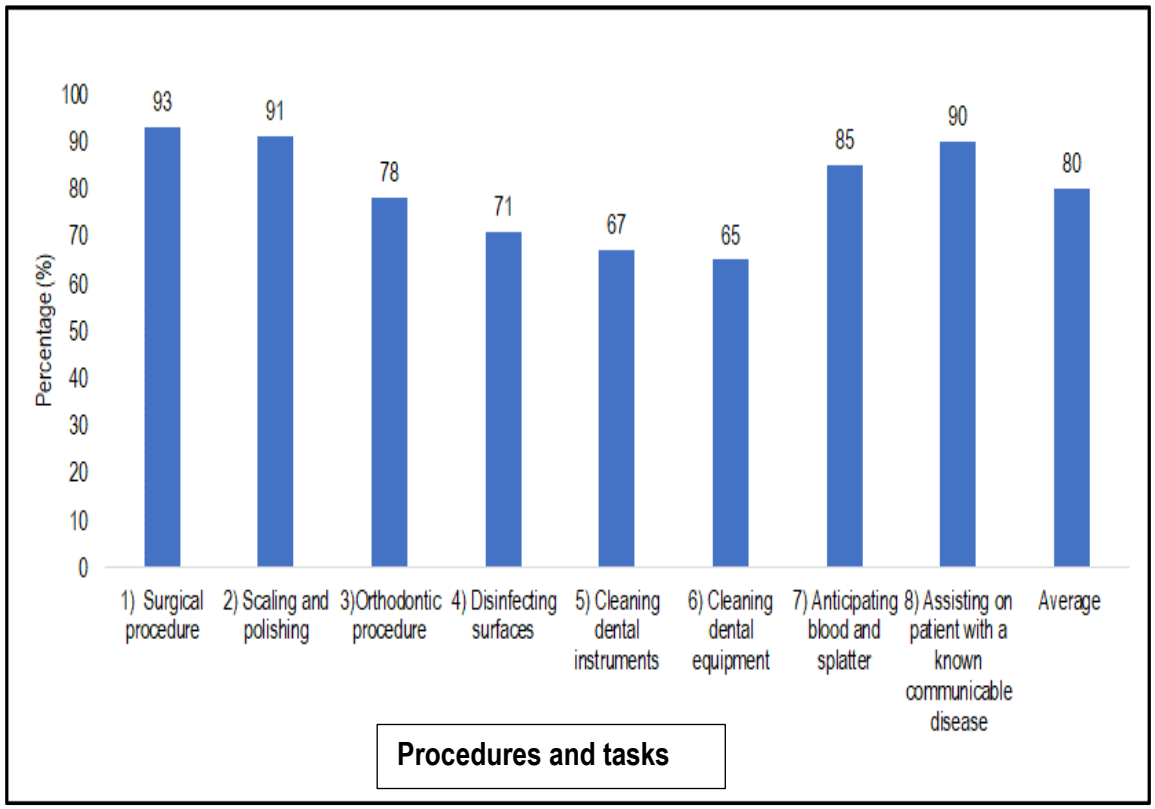



**Figure 8-15 Respondents' reported use of masks during different procedures**

#### 8.10.7.3 Respondents' use of protective eyewear

Overall, respondents' use of protective eyewear varied across the listed eight procedures and actions. An average of 50% indicated that respondents' practices of using protective eyewear were inadequate. Previous studies showed variation in the percentage of respondents who use masks. Lower use of protective eyewear was found, with 5% among Nigerian OHCWs (Aluko *et al.*, 2016) and only 5% of OHCWs at a dental hospital in Kenya (Butt *et al.*, 2019). The result of the current study was like the findings of Bagg (2007), where 49% of OHCW in general dental practices in the UK indicated that they use eye protection. In contrast, recent research confirmed that a higher percentage of respondents used protective eyewear as part of their routine PPE, with 54.4% of dental faculty members and students at KSU (Alharbi et al., 2019) and 75.9% of OHCWs in private dental clinics in Jeddah (Alahdal et al., 2019).

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Across the eight listed procedures, extremeness in the percentage of respondents who confirmed the use of protective eyewear occurred (Figure 8-16). On the one hand, poor practices in using protective eyewear were noted across specific dental procedures such as orthodontics and when performing IPC tasks such as disinfecting surfaces and cleaning dental instruments and equipment. On the other hand, more than 90% of respondents reported using protective eyewear when assisting a patient with a known infectious disease (96%) and when blood and splatter were anticipated (91%). In contrast, 69% OHCWs at a dental hospital in Kenya (Butt *et al.*, 2019) and 44.3% of HCWs in Trinidad and Tobago (Unakal *et al.*, 2017) used protective eyewear only when the procedure involved blood splashes.

In the current study, respondents confirmed using protective eyewear when assisting during surgical procedures and scaling and polishing, with 55% and 61% for the respective procedures (Figure 8-16). Furthermore, significantly more respondents in the private sector indicated using protective eyewear when assisting during the following procedures: scaling and polishing $(p=0.01)$ and when disinfecting surfaces $(p=0.04)$. On the other hand, significantly more respondents in the public sector reported using protective eyewear when assisting during orthodontic procedures $(p=0.02)$. In contrast, significantly more respondents in the private sector used eyewear when anticipating blood and splatter ($p=0.02$).

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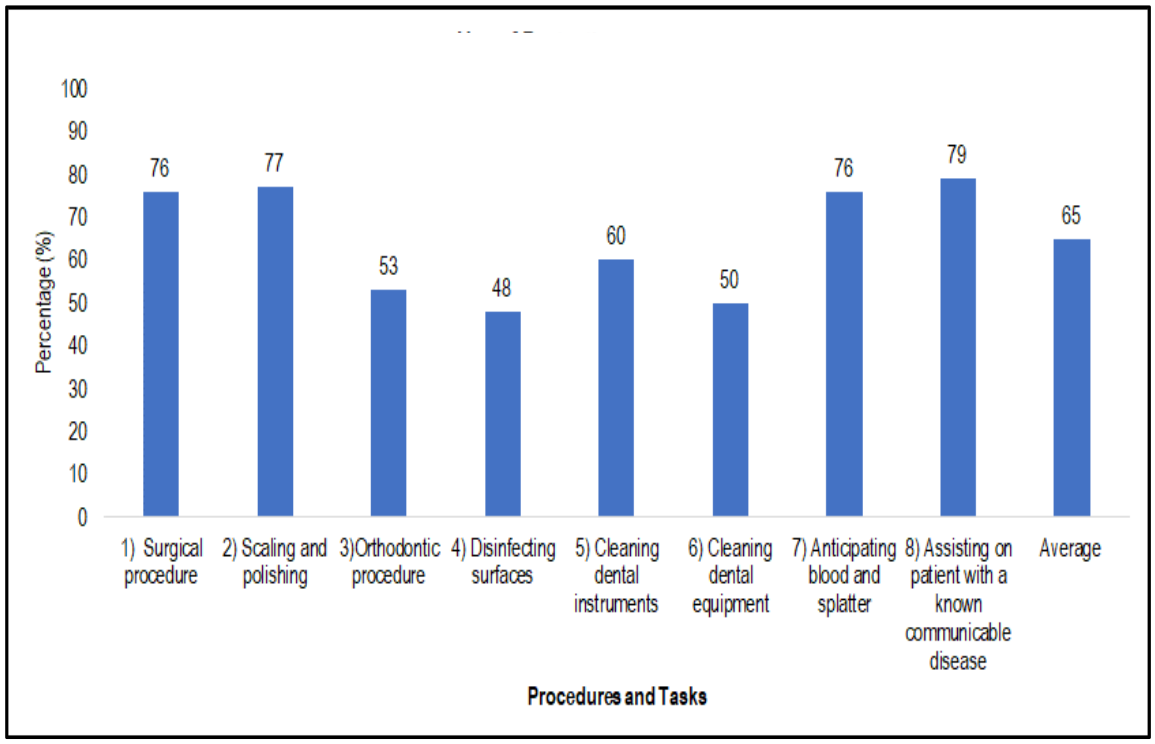



**Figure 8-16 Respondents' use of protective eyewear during different procedures**

#### 8.10.7.4 Respondents' use of protective clothing during different procedures

Overall, respondents reported use of protective clothing varied across the eight listed procedures and actions. The average of 50% indicated that respondents' practices of using protective clothing were inadequate. In contrast, 70% of dental faculty members and students at KSU (Alharbi *et al.*, 2019) and 72.7% of OHCWs in private dental clinics in Jeddah (Alahdal *et al.*, 2019) always wear a disposable gown while treating patients. On the other hand, 39.7% of HCWs in Trinidad and Tobago wore protective clothing during every procedure (Unakal *et al.*, 2017).

When looking at respondents' use of protective clothing during the different procedures, more than 90% of respondents confirmed that they use protective clothing when assisting a patient with known infectious diseases and when blood and splatter are anticipated. Furthermore, 55% and 61% of respondents confirmed using protective clothing when assisting during surgical procedures and

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scaling and polishing (Figure 8-17). However, significantly more respondents in the private sector indicated the use of protective clothing when assisting with scaling and polishing *(p=0.01)*. In addition, 47% of respondents in the current study used protective clothing when cleaning dental instruments, whereas Bagg (2007) found that less than 10% of OHCW in general dental practices in the UK used waterproof overalls when cleaning instruments.

In contrast, less than 15% of the total respondents used protective clothing during orthodontic procedures and when cleaning dental equipment (Figure 8-17). Moreover, significantly more respondents in the public sector reported using protective clothing when assisting during orthodontic procedures *(p=0.02)*. In addition, 33% of the total respondents, but significantly more respondents in the private sector, indicated the use of protective clothing when disinfecting surfaces *(p=0.04)*.

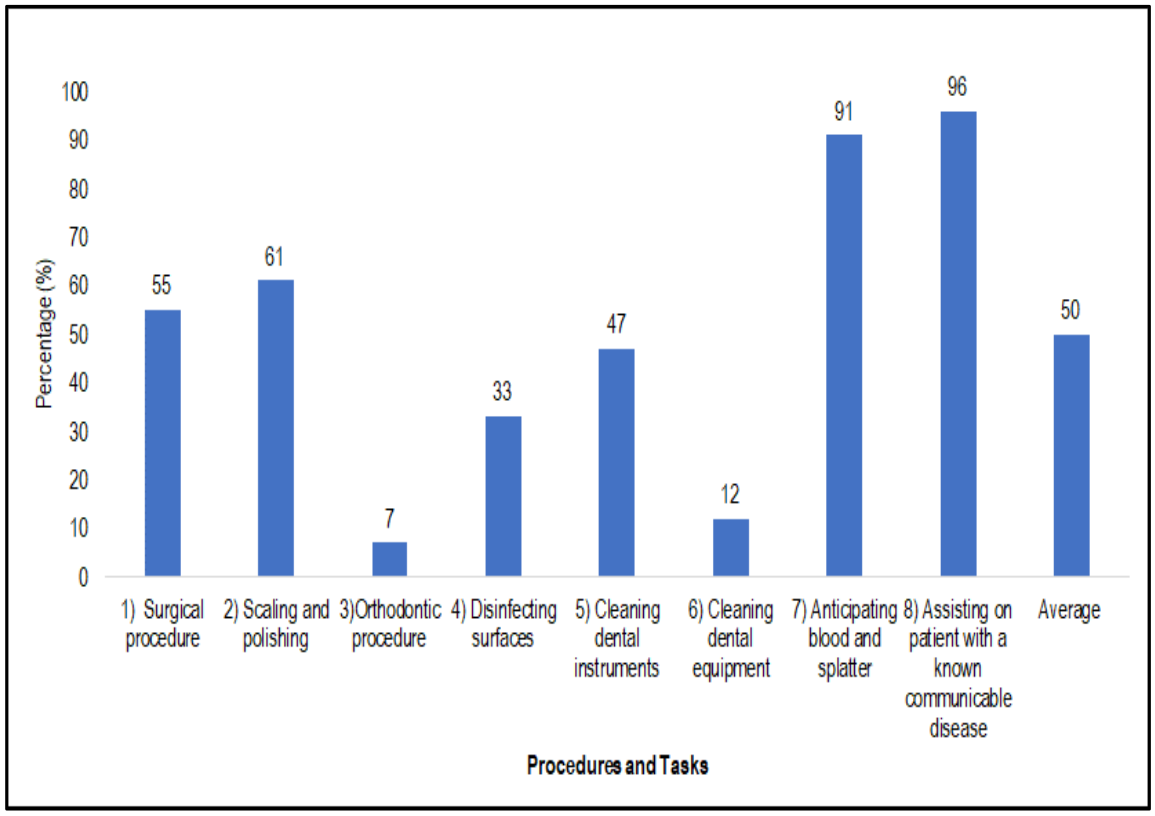



**Figure 8-17 Respondents reported use of protective clothing during different procedures**

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#### 8.10.7.5 Glove replacement practices

Overall, the reported glove replacement practices of respondents were sound (Figure 8-18). In the current study, more than 85% of respondents replaced their gloves after every patient, when gloves get torn during procedures and when gloves are visibly contaminated. These percentages are lower than OHCWs in private dental clinics in Jeddah, where 98.8% changed their gloves between patients and when their gloves were torn (Alahdal *et al.*, 2019)

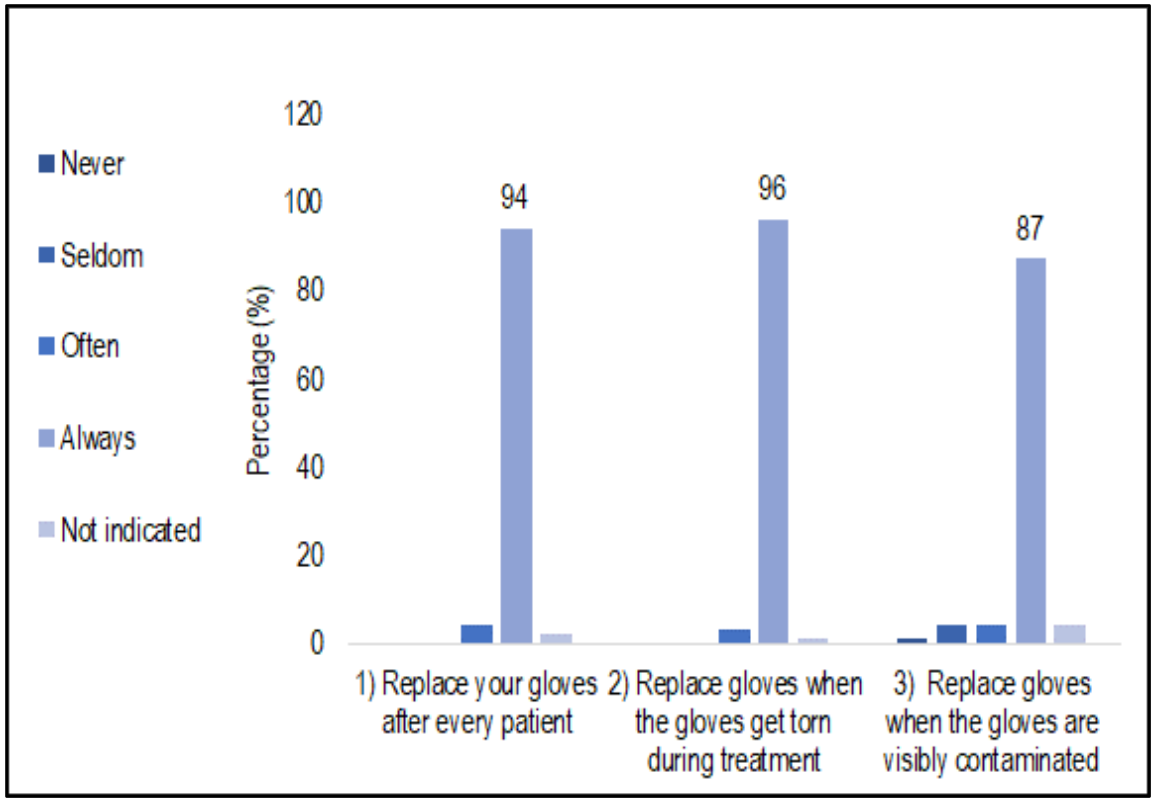



**Figure 8-18 Respondents' glove replacement practices**

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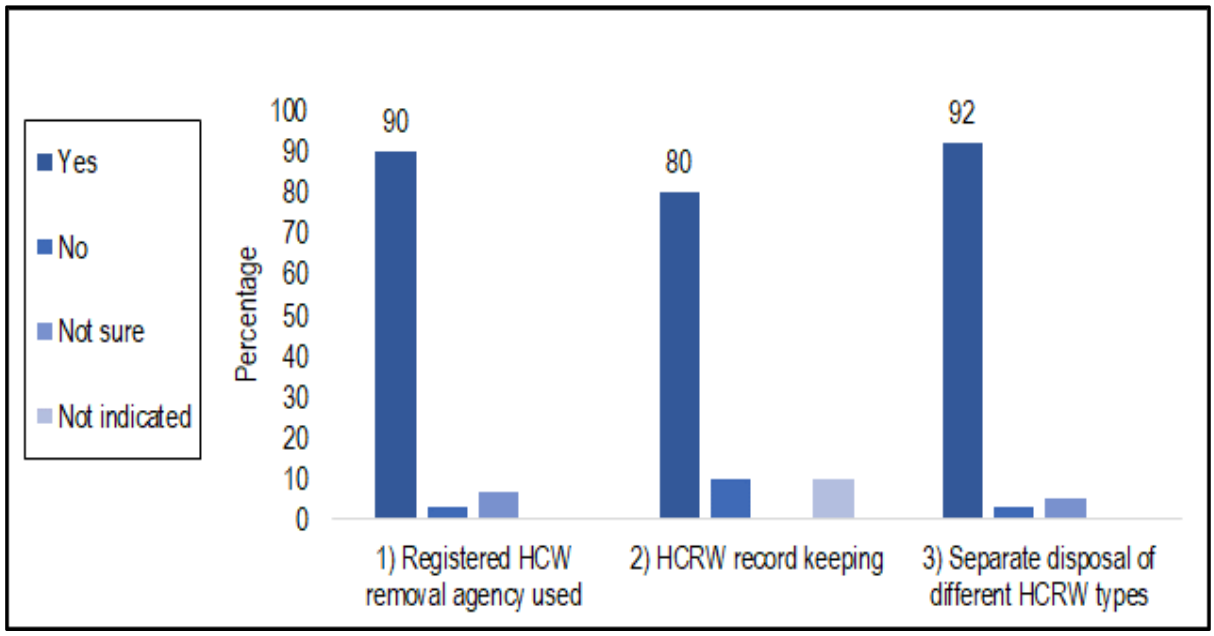
### 8.10.8. Health care related waste (HCRW) management

Guideline documents about health care related waste (HCRW) stated that HCF needs to use a registered waste removal agency to dispose of infectious or hazardous waste. It furthermore prescribed meticulous record-keeping of waste removal activities. In addition, the separation of waste must occur at the point of generation. Moreover, the disposal should happen in the manner prescribed for the different waste categories (WHO, 2014a; HPCSA, 2016b). Therefore, the three practice aspects surveyed respondents' use of a registered waste removal agency, recordkeeping of waste removal activities, and waste segregation before disposal.

Overall, the percentage of respondents who indicated affirmative responses to the listed HCRW practices was above 80% (Figure 8-19). However, significantly more respondents in the private sector and FT respondents reported keeping a record of HCRW removal activities $(p=0.01)$. In addition, significantly more respondents in the public sector were unsure about the record-keeping of HCRW removal activities.

Furthermore, 92% of respondents in the current study confirmed that the different types of waste are correctly and separately disposed of (Figure 8-19). However, significantly more respondents in the public sector were unsure whether the hazardous waste collected from the HCFs was correctly disposed of $(p=0.01)$. In contrast, 100% of students at Saveetha Dental College in Chennai segregated the waste material before disposal (Kumar and Rahman, 2017), and 76% of dentists in India segregated waste correctly (Bansal *et al*., 2013). On the other hand, it transpired that the waste was not segregated at some health care facilities and was dumped together irrespective of the nature of the waste (Mahasa and Ruhiiga, 2014; Kumar *et al*., 2015).

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HCRW = health care related waste

**Figure 8-19 Summary of HCRW practices of the total respondents**

### 8.10.9. Barriers to effective infection prevention and control practices

This study surveyed if respondents perceived the listed factors as barriers that could make it challenging to execute IPC effectively. These factors referred to limited time, the number of patients seen, the number of practitioners that the dental assistant needs to assist, limited PPE and lack of guidance regarding IPC procedures.

In general, less than 40% of the total respondents indicated agreement with the listed factors as barriers to practising effective IPC measures. On the contrary, a marginally higher percentage of respondents indicated disagreement. An equal percentage (38%) of respondents agreed that limited time and the number of patients seen were factors that influence their IPC practice. However, significantly more respondents in the public sector disagreed that limited time $(p=0.02)$ was a barrier to effective IPC practices. On the other hand, significantly more respondents in the private sector indicated a neutral stance about limited time $(p=0.01)$ as a barrier to effective IPC practices.

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Furthermore, significantly more respondents in the public sector disagreed about the number of patients seen as a barrier to effective IPC practice. Still, significantly more respondents in the private sector indicated a neutral stance. In contrast, among OHCWs at a dental hospital in Kenya, 53% agreed that lack of time hindered infection control practices (Butt *et al*., 2019). In addition, an equal percentage (36%) of respondents confirmed that limited PPE supply and lack of guidance about IPC measures were barriers to their IPC practices. Similarly, dental therapist in Zimbabwe attributed their non-compliance with IPC to the non-availability of gloves and disinfectants (Chidzonga, Makoni and Mahomva, 2006). Furthermore, significantly more respondents in the public sector agreed that limited PPE supplies $(p=0.008)$ and the lack of guidance about IPC measures $(p=0.005)$ made it challenging to execute IPC effectively.

Another 35% of respondents confirmed that the number of practitioners they assist was a barrier to applying IPC practice effectively. However, significantly more respondents in the private sector disagreed that the number of practitioners whom the dental assistant needs to assist made it challenging to practice IPC measures effectively $(p=0.005)$. Even though OHCWs in Kenya and elsewhere indicated several reasons that constitute barriers to IPC, a lack of time was not meant as a barrier to IPC measures (Ashton *et al.*, 1994; Banks *et al.*, 1994; Sarll *et al.*, 1996; Butt *et al.*, 2019).

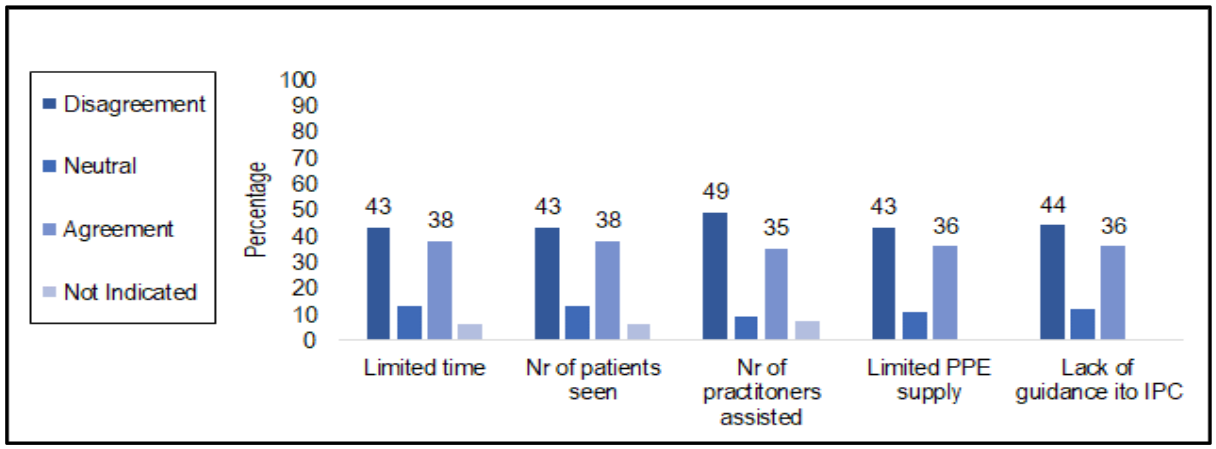



**Figure 8-20 Barriers to IPC practices**

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# Chapter 9

# Conclusions and Recommendations

## 9.1. Introduction

Across the full spectrum of health care services, effective infection prevention and control (IPC) measures are critical to prevent the spread of infection. Therefore, all personnel who render health care services must be knowledgeable about IPC measures, convey a positive attitude towards IPC and apply effective IPC practices. However, published literature on dental assistants' knowledge of, attitude towards and practices of measures were few and far apart. Therefore, this study was set out to determine:

1. The IPC duties that dental assistants performed.
2. Dental assistants' knowledge of aspects within the identified IPC themes
3. Dental assistants' attitudes towards aspects within the identified IPC themes.
4. Dental assistants' practices within the identified IPC themes.
5. The barriers to perform effective IPC measures within OHCFs.
6. If differences exist in the IPC-KAP of dental assistants employed in the public sector versus dental assistants employed the private sector.
7. If differences exist in the IPC-KAP of dental assistants who were formally trained (FT) versus dental assistants who were in-service trained (IST).

The questionnaire was completed by n = 197 dental assistants, of whom n = 76 were employed in the public sector, and n = 121 were employed in the private sector. Of the dental assistants 58% (n = 113) were in-service trained, and 42% (n = 84) were FT. This pattern of having more IST dental assistants was also recorded in 2003, when 28.5% of IST and 15.8% of FT dental assistants responded to a survey conducted in South-African OHCFs (Oosthuysen, 2003). More than 90% of the dental assistants were females, similar to other countries where the dental assisting profession attracted more females than males (Kracher *et al.*, 2017).

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## 9.2. Dental assistants' IPC duties

The IPC duties- surveyed in this study were aligned with the recommended scope of practice for dental assistants in South-African OHCFs (HPCSA, 2012). Overall, more than 80% of the dental assistants reported that they are always responsible for performing twelve (12) of the fifteen (15) IPC tasks, as surveyed in Chapter 5. The responsibility of dental assistants in the overall execution of IPC related tasks within OHCFs was marginally higher than the results of Oosthuysen (2003), where 72.2% of dentists confirmed that dental assistants executed the disinfection and sterilisation procedures within their OHCFs.

However, less than 70% of the dental assistants in the current study reported that they always perform tasks such as preparation of the clinical area. Furthermore, it was also previously reported that general cleaning staff usually perform the housekeeping tasks within OHCFs, such as dusting and cleaning floors and walls (Oosthuysen, 2003). Other IPC related tasks that less than 70% of dental assistants in the current study performed were flushing the waterlines between patients and changing the 3-in-1 tips after every patient. However, significantly more IST dental assistants always flushed waterlines between patients $(p < 0.01)$. This is of particular concern as the recommendations of the CDC stated dental waterlines be flushed at the beginning of the clinic day to reduce the microbial load (CDC, 2003b, 2016b). Furthermore, the results imply that adherence to the recommended steps for treating dental unit waterlines as set out by Oosthuysen, *et al.,* (2020), is lacking.

## 9.3. Dental assistants' knowledge of IPC measures

The obligation of OHCWs to maintain current knowledge of infection prevention and control is emphasised by national and international authoritative agencies within the dental fraternity (IPC Accreditation board for Africa - IABA; Petty, 2006; Saskatchewan IPC standards, 2019; Department of

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Health_RSA, 2020b; Oosthuysen, *et al.*, 2020; FDI, 2021).

This study found that the majority (42%) of dental assistants perceived their level of IPC knowledge as average. A further 39% perceived their IPC knowledge to be above average, and 12% considered it to be excellent. This finding implied that dental assistants` actual knowledge across the seven IPC themes would also be above average.

On the one hand, this expectation was met as 80%, and more dental assistants were knowledgeable about infectious diseases and risks, sterilisation and disinfection, hand hygiene, personal protective equipment, and health care related waste. On the other hand, dental assistants recorded lower percentages in knowledge related to IPC training and continuous professional development and vaccination, with an average of 62% and 77% across aspects in the respective themes. Yet, in comparison with other studies, these percentages of IPC knowledge, in general, are still higher than previously reported, with 58% for dental professionals in a Dental College in Bangalore (Pavithran *et al.*, 2015), 57.4% for HCWs in Ethiopia (Yazie *et al.*, 2019) and 50% among Iranian dentists and dental students (Moradi *et al.*, 2013).

It was evident that dental assistants' preference for resources to obtain IPC information differed. Furthermore, the dental assistants who participated in the current study did not make maximum use of the listed five IPC information sources. Their usage of the listed IPC resources was 23% for resources obtained from the University of Technology (UoT), 21% indicated consultation with other members of the OHCT, and 20% indicated attending CPD events. Less than 10% stated the internet, videos, books and journals as their first choice to obtain IPC information. Similarly, undergraduate health professional students at Makerere University College of Health Sciences in Uganda indicated several IPC information sources, with the most popular source IPC information sources being "self-learning, informal, practical learning and formal curricular teaching", with less than 10% who indicated

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infection control courses, the internet and media as IPC information sources (Nalunkuma *et al.*, 2021). A further concern is that less than 65% of dental assistants in the current study were aware that IPC guidelines existed, knew that IPC guidelines were available within their OHCFs and were sure of the content of IPC guidelines. However, previous research reported lower awareness about the availability of IPC guidelines within OHCFs within South-African OHCFs (Mehtar *et al*., 2007; Oosthuysen *et al*., 2010). This pattern of lower percentages of HCWs being aware of IPC guidelines and the contents thereof emerged in other countries as well, with less than 50% of HCWs in northwest Ethiopia and in the West Arsi District of Southeast Ethiopia (Geberemariyam *et al*., 2018; Yazie *et al*., 2019). These findings are in stark contrast to the results of other researchers, who found that 82% of Zambian nurses were familiar with infection guidelines (Chisanga, 2017) and 86% of U.S. dental hygienists were familiar with infection control guidelines (Garland, 2013). In addition, significantly more respondents in the private sector $(p=0.001)$, and IST respondents $(p=0.02)$, reported that IPC guidelines existed and that IPC guidelines were available within their OHCFs.

Even though there is a much lower risk of transmitting prions, it poses problems to dentistry (Jakubovics *et al*., 2014). Hence it is of concern that only 42% of dental assistants were knowledgeable about the transmission of prions within OHCFs. Furthermore, only 44% of dental assistants confirmed indirect contact as a disease transmission mode within OHCFs. This uncertainty could lie in the misinterpretation of the term "indirect contact", as actions of indirect contact were included in the listed examples of the modes of transmission within OHCFs.

Although dental assistants were aware of the risk of occupational exposure incidents (OEI), they were not knowledgeable about the correct management of an OEI. The same trend occur in other studies, as only 50% of dental professionals in India were aware of the procedures to report an OEI (Pavithran *et al.*, 2015). Knowledge about procedures to manage an OEI were also low among dental students

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at the Columbia University College of Dental Medicine, as only 25% correctly answered the questions about post-exposure management (Myers et al., 2012). These results confirm that dental assistant's knowledge about their facilities' protocol to manage OEI is of concern.

In the current study, dental assistants lacked knowledge about the classification of endodontic instruments, mouth mirrors, dental handpieces, and orthodontic instruments. This lack of overall understanding of the classification of all instruments would impact whether dental assistants correctly process the respective instruments before being used on the next patient (Oosthuysen *et al.,* 2020*)*. It was previously documented that diseases were transmitted as result of not or incorrect processing of instruments (Perz *et al*., 2010; Cleveland *et al*., 2016; Volgenant and De Soet, 2018). This lack of knowledge of instruments classification poses a real threat as diseases can be transmitted if the appropriate processing is not applied.

A lower percentage of dental assistants were aware of the need to be vaccinated against Hepatitis A In addition, dental assistants were uncertain about the need for HCWs to be vaccinated against Influenza, although it has been recommended by several experts (Kim *et al.,* 2015; IAC, 2017; Kim *et al.,* 2018). However, even though no vaccine is yet available for Hepatitis C, a misconception about a Hepatitis C vaccine exists, as 74% of dental assistants indicated that OHCWs must be vaccinated against Hepatitis C. Likewise, among dentists in Iran, 66% were under the impression that a vaccine against Hepatitis C is available (Rostamzadeh *et al*., 2018). These findings highlight the lack of knowledge about vaccines recommended for OHCWs.

This lack of knowledge about the management of an OEI, classification of instruments, vaccinations, and other aspects as mentioned above, could be addressed during IPC-training sessions within OHCFs, and especially at CPD events. The recent Covid pandemic called for adjustments and

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improvements in IPC products, techniques, and procedures. Therefore, if a culture of lifelong learning is activated amongst dental assistants as well as the remainder of the OHCT, that will enable them to be on par with knowledge and aligned with IPC measures required to keep track with the required changes and improvement of IPC measures across the globe.

## 9.4. Dental assistants' attitude toward IPC measures

Overall, dental assistants within all the respective categories portrayed a positive attitude towards all IPC training opportunities. An increase in IPC training opportunities within OHCFs and outside the OHCF, such as CPD sessions, were particularly welcomed by dental assistants. A similar positive attitude towards IPC training was also displayed among nursing and midwifery students (Ward, 2014), oral hygienists at the dental institutions located in Seoul and Gyeonggi (Moon *et al*., 2017), among dental students in Latin America (Acosta-Gío *et al*., 2008), and among dental students in Babou (Ehsani *et al*., 2013).

Dental assistants portrayed a positive attitude towards standard precautions, with a high percentage (90%) of agreement that standard precautions be used for all patients. In contrast, an equal percentage (43%) of dental assistants indicated opposing responses about changing their everyday IPC routine when working on a patient with a known infectious disease. Even though significantly more FT respondents displayed a positive attitude, significantly more respondents in the public sector indicated a negative attitude by reporting that they would consider changing their IPC routine when working on a patient with a known infectious disease $(p=0.01)$. This finding confirms that dental assistants still portray a negative attitude towards patients with a known infectious disease. Similarly, a negative attitude towards patients with infectious diseases was also noted among dental auxiliaries in Nigeria, of whom 25.3% would not consider assisting dentists in treating HIV-positive patients, and

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87.6% believed that extra infection control precautions are needed when treating HIV-positive patients (Azodo *et al*., 2009).

In terms of disinfection of single-use items and critical instruments, dental assistants indicated strong disagreement, which indicated a positive attitude towards items intended for single-use. Furthermore, a positive attitude was portrayed towards correctly processing the instruments according to the class the items or instruments resort under. Dental assistants strongly disagreed that critical instruments such as extraction forceps only need to be disinfected before being used on another patient. However, significantly more FT dental assistants portrayed a positive attitude towards the correct method to process orthodontic instruments. Furthermore, a positive attitude towards all the actions that form part of the instrument sterilisation routine was portrayed.

In terms of the vaccination regime of OHCWs, dental assistants portrayed a positive attitude towards vaccination against Hepatitis B, with 90% who agreed. However, significantly more dental assistants who were FT portrayed a positive attitude towards Hepatitis B vaccination $(p=< 0.01)$. Compared with the percentage of agreement for vaccination against Hepatitis B, the dental assistants who agreed with vaccination against Hepatitis A and Influenza were lower at 67% and 75% for respective conditions. However, significantly more FT dental assistants portrayed a positive attitude towards vaccination against Influenza $(p=0.01)$. In contrast, medical students at a German University hospital described a negative attitude towards vaccination against Influenza (Lehmann *et al.*, 2015). Regarding vaccination against Hepatitis C, three-quarters of dental assistants indicated agreement, with significant more FT dental assistants who supported vaccination against Hepatitis C $(p=0.01)$. Yet, a vaccine against Hepatitis C is not available yet (CDC, 2011; IAC, 2017; Collins 2021).

Overall dental assistants portrayed a consistently positive attitude towards the importance of hand

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hygiene. An astounding 90% of dental assistants indicated a positive response as they agreed that hand hygiene is a critical intervention to promote IPC within OHCFs. The results of the follow-up items underlined dental assistants' positive attitude toward hand hygiene by disagreeing that: "handwashing is not such an important action" and "and "if my hands still look clean, it is not necessary to wash them". Furthermore, dental assistants did not consider limited time, skin irritations, inadequate facilities and tending to patients' needs as factors that prevented them from performing good hand hygiene practices.

Dental assistants overall displayed a positive attitude towards the use of gloves, eyewear, and surgical masks. Other researchers also reported that their respondents portrayed a positive attitude towards wearing the different PPE items during procedures *(*Yazie *et al., 2019,* Christian and Kikwilu *2014).* Interestingly, Javaid *et al., (2019),* reported that among dental assistants in Multan, Pakistan, significantly more respondents from the public sector portrayed positive attitude towards the use of PPE. However, in the current study, dental assistants' attitude toward using protective clothing was not as convincing as the other PPE items, as less than 50% believed that protective clothing should always be used. This result is in contrast with the findings of Christian and Kikwilu, (2014) where more than 90% Tanzanian dental practitioners portrayed a positive attitude towards the use of protective clothing whenever attending to patients.

In terms of health care related waste (HCRW) management, dental assistants portrayed a positive attitude towards aspects of HCRW. These positive attitudes were reflected towards the concepts of segregating waste types at the point of generation, acknowledging that HCRW poses a risk to people and the environment and would welcome opportunities to receive HCRW training. The positive attitude of dental assistants toward HCRW is comparable to the findings among dental students in Nepal (Singh, Ghimire and Agrawal, 2018) and OHCWs in Delhi, India (Sood and Sood, 2011) and dental

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students at Belgrade University (Ilić-Živojinović *et al*., 2019). Furthermore, no statistically significant differences were confirmed between the distinct categories of respondents concerning their attitudes towards the aspects of HCRW.

## 9.5. Dental assistants' IPC practices

Dental assistants' overall attendance of IPC training sessions and continuous professional development events was low (< 60%), with only 40% who received yearly IPC training within their respective OHCFs. In addition, significantly more respondents in the private sector received IPC training when new IPC products and equipment arrived *(p=0.01).* In addition, significantly more FT respondents did not receive IPC training when new IPC equipment arrived *(p=0.02)*.

In contrast to the IPC training within OHCFs, the current study found that within the last 24 months before the survey, 80% of dental assistants attended a CPD event where IPC measures were discussed. Previously, less than 60% of South-African dentists reported attending CPD events where IPC issues were discussed (Oosthuysen, 2003). However, less than 10% of nurses in Zambia regularly attended in-service training/workshops related to infection prevention and control (Chisanga, 2017).

Furthermore, the current study revealed that the cost of CPD events, unawareness of upcoming CPD events and the date and time of the CPD event that clashed with their schedules, were the leading reasons for non-attendance of CPD events among dental assistants. Significantly more FT respondents stated that the costs of CPD events deter them from attending the CPD events, and significantly more respondents in the public sector were not aware of CPD events. These are factors that the organisers of CPD events should consider in supporting dental assistants to attend future CPD events where IPC measures are discussed. However, several events were presented online in

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the current situation with the Covid pandemic. It would be interesting to ascertain whether the change in the presentation mode was a solution to increase dental assistants' attendance at CPD sessions.

The risk of dental assistants working on patients with infectious diseases is real. Almost three quarters (74%) of dental assistants previously worked on a patient with a known infectious disease. Furthermore, the incidence of occupational exposure incidents (OEI) among dental assistants is high, as half (48%) of the dental assistants previously experienced an occupational exposure injury. The most common OEI experienced by dental assistants was OEI during the instrument cleaning process (27%); OEI resulted from a splash into the eyes and face and NSI when recapping a needle and removing a needle from the local anaesthetic syringe. Furthermore, significantly more dental assistants employed in the private sector experienced OEI $(p=0.01)$. Other researchers reported varying percentages of OEI among respondents, with 5% among dental assistants employed in the public OHCFs in Limpopo, South-Africa (Nemutandani *et al*., 2007), and 41% of dental auxiliaries in Nigeria (Azodo *et al*., 2010).

Dental assistants' practices indicated that different methods were used to pre-clean instruments before sterilisation. In this study, 91% of respondents indicated manual cleaning. Whereas 96% of dentist in Scotland (Bagg et al., 2007) and 79% of dentists in private clinics in Lebanon (79%) used manual cleaning (Dagher et al., 2017). The use of automated instrument washers and ultra-sonic cleaners were widespread, as 81% and 63% of dental assistants in the current study used the respective devices. However, significantly more respondents employed in the private sector used an instrument washer $(p=0.03)$. However, 92% of general dental practices in the UK had ultrasonic baths (Bagg et al., 2007), but less than 20% dentists in private clinics in Lebanon used specialised cleaning devices such as ultrasonic baths and instrument washers. Furthermore, 78% of dental assistants put their instruments in a sterilisation pouch before placing them in the sterilisation device., but significantly

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more respondents in the private sector confirmed placing instruments in a sterilisation pouch as part of their routine instrument sterilisation practices $(p=0.01)$.

The use of a Statim autoclaves with a flash cycle for sterilisation of instruments were indicated by 90% of respondents in this study. In comparison with other studies, varying percentages in the use of a Statim autoclave with a flash cycle were reported. A higher percentage (94.3%) of dental students in Central India (Singh *et al*., 2011). Previously, 89.7% of dentists in private practices in Durban used an autoclave to sterilise instruments (Yengopal *et.al*., 2001). In addition, 74% of the dental assistants confirmed that they keep a record of the sterilisation process. However, significantly more dental assistants employed in the public sector reported maintaining records of the sterilisation process $(p=0.01)$. Even though only 15% of dental assistants in this study reported using the cold/chemical sterilisation method, it is of concern that 37% of those who used the cold/chemical sterilisation method did not use a high-level disinfectant, since the use of a high-level disinfectant for sterilisation purposes is a definite requirement (Oosthuysen *et al.,* 2020).

Dental assistants' routine practices to clean dental handpieces require attention. Based on the recommendations for the care of dental handpieces (Oosthuysen, *et al.*, 2020), dental assistants' practices of only cleaning the outer surfaces and oiling the dental handpieces is not enough to safely reuse the dental handpiece on another patient. In the current study, significantly more dental assistants in the private sector reported that they always placed the dental handpiece in a sterilisation pouch and sterilised it in an autoclave $(p=0.01)$. Over the years, studies reported variation in percentage of respondents who sterilise dental handpieces using an autoclave. Amongst dentists in Durban, 5.2% autoclaved their high-speed handpieces but only 39.7% autoclaved their slow handpieces(Yengopal, *et.al.*, 2001). Oosthuysen (2003) reported 43.8% of dental practitioners in South-African OHCFs, and Mohiuddin and Dawani, (2015) reported that 92% of dental practitioners in public OHCFs in Karachi, Pakistan used an autoclave to sterilise their dental handpieces. Furthermore, more than 70% of

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OHCW at a dental hospital in Kenya who were older than 50 years and younger than 26 years indicated using an autoclave for dental handpiece sterilisation (Butt et al., 2019).

Although 88% of dental assistants indicated that they were vaccinated against Hepatitis B, only 45% received all three Hepatitis B vaccination doses. It is alarming that more than half (55%) of the dental assistants were not fully vaccinated against Hepatitis B because they received less than the prescribed three vaccine doses. Similarly, another researcher also found that the percentage of respondents who received all three Hepatitis B doses was also low, with 50% of dental students at Sana 'a University in Yemen (Halboub *et al*. 2015); 42.3% of senior dental students at the University of Sharjah in the United Arab Emirates (Rahman *et al*., 2013); between 19% and 58% of dental students in Latin America (Acosta-Gío *et al*., 2008b), and only 2% of students in medicine and health sciences in Northwest Ethiopia (Abdela *et al*., 2016) completed the prescribed Hepatitis B vaccination regime by receiving all three vaccination doses. Furthermore, in the current study, significantly more dental assistants employed in the private sector received all three Hepatitis B vaccination doses and checked their immunity levels *(p=0.01).*

A high percentage (86%) of dental assistants had visible hand hygiene instructions in their OHCFs, but their hand hygiene practices were not as desired. Only 77% of dental assistants always wash their hands after taking off their gloves and before leaving the clinical area practices. Still, even fewer (67%) dental assistants washed their hands before putting on gloves. However, this percentage is higher than what was reported by Oosthuysen (2003), with only 53% of South-African dental practitioners who washed their hands before and after seeing patients. In addition, significantly more dental assistants in the private sector always washed their hands before putting on gloves *(p=0.01).* In contrast, 93.3% of dental practitioners in a Public OHCF in Karachi, Pakistan, washed their hands before and after treatments (Mohiuddin and Dawani, 2015), and 78.2% of health care students washed

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their hands between patients (Tavolacci et al., 2008). HCWs in the emergency departments in Italy always wash their hands after taking off gloves than before putting on gloves, with 52% and 79% in the respective instances (Parmeggiani et al., 2010).

The positive side to dental assistants' handwashing practises is that they use disposable paper towels to dry their hands. In contrast, supplementing hand hygiene by using an alcohol-based hand sanitiser (ABHS) is still lacking among two-thirds of dental assistants. However, significantly more dental assistants employed in the private sector always supplement their hand hygiene using an ABHS.

This study found fluctuation in dental assistants' overall practices in using the different PPE during dental treatments and when performing IPC duties. The use of the individual PPE items whilst performing the different dental procedures and IPC tasks varied. The tendency was that higher percentages of dental assistants used all the PPE items gloves, masks, protective eyewear and protective clothing when assisting during surgical procedures, when assisting a patient with known communicable disease and when anticipating blood and splatter during procedures.

The average use of gloves was 66% across the listed procedures. However, significantly more respondents in the private sector confirmed the use of gloves during surgical procedures *($p=0.01$),* scaling and polishing *($p=0.01$),* disinfecting surfaces *($p=0.04$)* and when cleaning dental instruments *($p=0.02$)*. Previously, higher percentages for the use of gloves were found: among 100% of the OHCWs at a dental hospital in Kenya (Butt *et al*., 2019) and 95.2% among dental students and faculty at KSU (Alharbi *et al*., 2019). In contrast, 57.3% of HCWs in the emergency departments in Italy reported the use of gloves (Parmeggiani *et al*., 2010). However, the current study found that a high percentage (85%) of dental assistants always replaced their gloves after every patient when gloves were torn during procedures and visibly contaminated.

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The average use of 50% for protective clothing was recorded across the listed procedures. Significantly more respondents in the private sector confirmed the use of protective clothing during scaling and polishing *(p=0.01)* and when disinfecting surfaces *(p=0.04).* On the other hand, significantly more dental assistants employed in the public sector use protective clothing when assisting during orthodontic procedures *(p=0.02).* In this study, the average use of protective eyewear was 65%, with significantly more respondents in the private sector who confirmed the use of eyewear when anticipating blood and splatter *(p=0.02).* In contrast to this, previously only 21.6% of dental assistants in South-African OHCFs always worn protective eye wear (Oosthuysen, 2003). From these results, it is evident that dental assistants' use of all items PPE when performing procedures is still inadequate.

Dental assistants portrayed good HCRW practices, as a high percentage (92%) of dental assistants correctly disposed of the different waste types. In contrast, even more (100%) of students at Saveetha Dental College in Chennai segregated the waste material before disposal (Kumar and Rahman, 2017), but only 76% of dentists in India segregated waste correctly (Bansal et al., 2013). On the other hand, across other studies it transpired that waste was not segregated at some health care facilities and was dumped together irrespective of the nature of the waste (Mahasa and Ruhiiga, 2014; Kumar et al., 2015). Furthermore, significantly more dental assistants in the private sector and FT dental assistants kept a record of HCRW removal activities *(p=0.01)*, whereas significantly more dental assistants in the public sector were unsure about the record-keeping of HCRW removal activities and whether the hazardous waste collected from the HCFs was correctly disposed of *(p=0.01)* by the waste removal agency.

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## 9.6. Barriers to IPC

In previous studies that probed the barriers to IPC OHCWs experience, variation in the combination of reasons occurred. This can be attributed to the fact that circumstance within different OHCFs is unique and thus a general barrier that is applicable to all OHCFs is not practicable. However, a variety of factors do pose a barrier to effective IPC practices.

Overall, less than 25% of dental assistants considered limited availability of PPE; comfortability of PPE, the time it takes to put on and remove PPE, the costs of PPE, patients fearing PPE, OHCWs being used to work without PPE as reasons that prevented them from wearing PPE. Previously, a higher percentage (53%) of OHCWs at a dental hospital in Kenya indicated a lack of time hindered their infection prevention and control practices (Butt *et al.*, 2019). Sarll *et al.*, (1996) also reported in his study that dental assistants indicated high workloads and lack of time as reasons for not always completing cross-infection control procedures. However, in the current study, significantly more dental assistants in the private sector indicated a neutral stance about limited time $(p=0.01)$, but significantly more dental assistants in the public sector disagreed that limited time and the number of patients seen were barriers to applying effective IPC practices $(p=0.02)$. Significantly more dental assistants in the private sector disagreed that the number of practitioners whom the dental assistant needs to assist made it challenging to practice IPC measures effectively $(p=0.005)$. In the current study, significantly more dental assistants in the public sector agreed that limited PPE supplies $(p=0.008)$ and the lack of guidance about IPC measures $(p=0.005)$ made it challenging to execute IPC effectively. Similarly, dental therapist in Zimbabwe attributed their non-compliance with IPC to the non-availability of gloves and disinfectants (Chidzonga, *et.al.*, 2006).

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### 9.6.1. Recommendations of the researcher on the identified gaps in the IPC-knowledge, -attitude and practises of dental assistants

The findings of this research substantiate previous recommendations of national and international researchers. Various stakeholders influence infection prevention and control within OHC settings. Therefore, the proposals to address the identified gaps in the IPC KAP of dental assistants in South-Africa are directed at three distinct stakeholders:

1. Dental assistants:
    i) To increase the use of the available IPC resources, especially journals and books and the websites of reputable organisations such as CDC, WHO, OSAP and ICAN.
    ii) To attend IPC training opportunities within their OHCFs, participate in the discussion of IPC issues in their OHCFs, and play an active role in the informal facilitation of IPC topics that would be of value to all OHCT members.
    iii) To be proactive in being informed about upcoming CPD events. This could be achieved by being an active member of an association for dental professionals, e.g., DAASA, OHASA, SADA, and others, making the necessary arrangements to attend these events.
    iv) To be acquainted with IPC policies, guidelines and manuals available in the OHCF and diligently and consistently apply the recommended IPC.
    v) To actively partake in National IPC campaigns.

2) Employers of dental assistants:
    i) To have dedicated staff coordinate, monitor, and evaluate IPC within the OHCF.
    ii) To ensure that OHCF has appropriate IPC policies, guidelines, and manuals.
    iii) If an IPC guideline is not yet available in the OHCFs, the suggestion is to use existing IPC guidelines, policies and frameworks from the CDC, Department of Health, and

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even IPC guidelines from other OHCFs a starting point to formulate a specific IPC guideline for the OHCF.

iv) To ensure that standard operations procedures (SOPs) for the different IPC duties that need to be executed are available and updated according to recent changes in national documents and that this information is disseminated to all OHCT members.

v) To make provision for staff to attend yearly IPC training.

vi) To encourage discussion of IPC issues and informal IPC training within the OHCF.

vii) To encourage participation in National IPC campaigns

3. National gatekeepers of IPC

i) Collaboration between Government and HPCSA to appoint IPC specialists to implement, monitor and evaluate National IPC programmes aimed at OHCFs.

ii) IPC specialists in collaboration with existing IPC training programmes at Higher Educational Institutions to expand on the available IPC training opportunities of the OHCT.

The researcher supports the call of previous researchers to increase the IPC KAP through continuing in-service educational programs for HCWs, as done among Intensive Care Nurses in Egypt (Eskander, *et al*., 2013); nursing staff in Palestinian Hospitals (Fashafsheh *et al*., 2016), medical doctors (Ibrahim and Elshafie, 2016), OHCWs at a dental hospital in Kenya (Butt *et al*., 2019); and dental assistants in the United Arab Emirates (Ahmed *et al*., 2014). Furthermore, in a recent global study, 54.5% of the countries implemented IPC core components at a national level through in-service IPC training (Tartari *et al*., 2021). Moon et al. (2017) found an increase in the infection control practices of oral hygienists after completing a period of IPC training. This finding makes it feasible to consider increasing the IPC-training events within OHCFs that are facilitated by all the members of the OHCT so that the OHCT and patients' safety are increased through improved IPC KAP of dental assistants.

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## 9.7. Limitations of the study

This reach was done before the onset of the Covid19 pandemic and therefore did not reflect the IPC KAP of dental assistants during the pandemic.

Furthermore, the nature of public OHC service providers varies across provinces, and the nature of private OHCFs differs from practice to practice. To maintain consistency in the grouping of participants, only dental assistants employed at OHCFs in the public sector within the central region of South-Africa, and dental assistants employed by a specific private OHC service provider group who managed OHCFs across South-Africa, were included in the study. These groupings pose a constraint to the generalisability of the study. Hence, the results of dental assistants in the public service are only generalisable to dental assistants employed in public OHCFs within the Central South-Africa region. In contrast, the results of dental assistants employed in the private sector are only generalisable to dental assistants within the specific private OHC service provider group in South-Africa.

Another aspect to consider is that self-administered questionnaires and group-administered questionnaires where the researcher was present were used during data collection. Self-reported data often have the potential for bias in various forms. Respondents might have a selective memory or recall events at a specific time as if they occurred at another time. Furthermore, respondents might attribute positive possibilities and outcomes to their agency but attribute adverse events to external forces and exaggerating or diminishing events.

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## 9.8. Recommendations for further research

- It was beyond the scope of this study to determine the relationship between the three domains, and no calculations were performed to find if a correlation exists between the IPC knowledge, attitudes, and practices of dental assistants. Therefore, the recommendation is to analyse the findings further to determine if and how the three domains (KAP) influence each other.
- A larger population can be used in further KAP dental assistant research and then be compared with the outcomes of this study.

- A comparison between this study and the possible changes in the IPC KAP of dental assistants during the Covid 19 pandemic and post Covid pandemic would be interesting.

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# Appendix A: Ethical approval HSREC

UNIVERSITY OF THE FREE STATE
UNIVERSITEIT VAN DIE VRYSTAAT
YUNIVESITHI YA FREISTATA

UFS·UV
HEALTH SCIENCES
GESONDHEIDSWETENSKAPPE

**Health Sciences Research Ethics Committee**

20-Sep-2018

Dear **Mrs Philida Schoonwyk**

Ethics Clearance: **Dental assistants' Knowledge, Attitude and Practices of Infection Prevention and Control in Central South-African Oral Health Care Facilities**

Principal Investigator: **Mrs Philida Schoonwyk**

Department: **CUT - Central University of Technology**

**APPLICATION APPROVED**

Please ensure that you read the whole document

With reference to your application for ethical clearance with the Faculty of Health Sciences, I am pleased to inform you on behalf of the Health Sciences Research Ethics Committee that you have been granted ethical clearance for your project.

Your ethical clearance number, to be used in all correspondence is:**UFS-HSD2018/1273/2509**

The ethical clearance number is valid for research conducted for one year from issuance. Should you require more time to complete this research, please apply for an extension.

We request that any changes that may take place during the course of your research project be submitted to the HSREC for approval to ensure we are kept up to date with your progress and any ethical implications that may arise. This includes any serious adverse events and/or termination of the study.

A progress report should be submitted within one year of approval, and annually for long term studies. A final report should be submitted at the completion of the study.

The HSREC functions in compliance with, but not limited to, the following documents and guidelines: The SA National Health Act. No. 61 of 2003; Ethics in Health Research: Principles, Structures and Processes (2015); SA GCP(2006); Declaration of Helsinki; The Belmont Report; The US Office of Human Research Protections 45 CFR 461 (for non-exempt research with human participants conducted or supported by the US Department of Health and Human Services- (HHS), 21 CFR 50, 21 CFR 56; CIOMS; ICH-GCP-E6 Sections 1-4; The International Conference on Harmonization and Technical Requirements for Registration of Pharmaceuticals for Human Use (ICH Tripartite), Guidelines of the SA Medicines Control Council as well as Laws and Regulations with regard to the Control of Medicines, Constitution of the HSREC of the Faculty of Health Sciences.

For any questions or concerns, please feel free to contact HSREC Administration: 051-4017794/5 or email EthicsFHS@ufs.ac.za.

Thank you for submitting this proposal for ethical clearance and we wish you every success with your research.

Yours Sincerely

Dr. SM Le Grange
Chair : Health Sciences Research Ethics Committee

**Health Sciences Research Ethics Committee**
**Office of the Dean: Health Sciences**
T: +27 (0)51 401 7795/7794 | E: ethicsfhs@ufs.ac.za
IRB 00006240; REC 230408-011; IORG0005187; FWA00012784
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# Appendix B: Ethical approval DoH

health
Department of Health
FREE STATE PROVINCE

11 July 2018

Mrs. PM Schoonwyk
Dept. of Life Sciences
CUT

**Dear Mrs. PM Schoonwyk**

**Subject: Dental Assistants Knowledge, Attitude and Practice of Infection Prevention and Control in Central South African Oral Health Care Facilities.**

- Please ensure that you read the whole document, Permission is hereby granted for the above – mentioned research on the following conditions:
- Participation in the study must be voluntary.
- A written consent by each participant must be obtained.
- Serious Adverse events to be reported to the Free State department of health and/ or termination of the study
- Ascertain that your data collection exercise neither interferes with the day to day running of the Selected Institutions nor the performance of duties by the respondents or health care workers.
- Confidentiality of information will be ensured and please do not obtain information regarding the identity of the participants.
- **Research results and a complete report should be made available to the Free State Department of Health on completion of the study (a hard copy plus a soft copy).**
- Progress report must be presented not later than one year after approval of the project to the Ethics Committee of The University of the Free State and to Free State Department of Health.
- Any amendments, extension or other modifications to the protocol or investigators must be submitted to the Ethics Committee of The University of the Free State and to Free State Department of Health.
- **Conditions stated in your Ethical Approval letter should be adhered to and a final copy of the Ethics Clearance Certificate should be submitted to** sebeelats@fshealth.gov.za or lithekom@fsheatlh.gov.za **before you commence with the study**
- No financial liability will be placed on the Free State Department of Health
- Please discuss your study with the institution manager/CEOs on commencement for logistical arrangements
- Department of Health to be fully indemnified from any harm that participants and staff experiences in the study
- Researchers will be required to enter in to a formal agreement with the Free State department of health regulating and formalizing the research relationship (document will follow)
- You are encouraged to present your study findings/results at the Free State Provincial health research day
- Future research will only be granted permission if correct procedures are followed see http://nhrd.hst.org.za

Trust you find the above in order.
Kind Regards

**Dr D Motau**
**HEAD: HEALTH**
**Date:** 19/07/18

**Head : Health**
PO Box 227, Bloemfotein, 9300
4th Floor, Executive Suite, Bophelo House, cnr Maitland and, Harvey Road, Bloemfotein
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# Appendix C: Ethical approval Medicross Health Care Group

**Medicross Healthcare Group (Pty) Ltd**
**A Netcare Group Company**

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**27 February 2018**

**LETTER CONFIRMING KNOWLEDGE OF NON-TRIAL RESEARCH TO BE CONDUCTED IN THIS NETCARE FACILITY**

Dear Philida Martina Schoonwyk

**Re Dental Assistants Knowledge, Attitude and Practice of Infection Prevention and Control in Central South African Oral Health Care Facilities (Title of research project)**

We hereby confirm knowledge of the above named research application to be made to the Netcare Research Operations Committee and in principle agree to the research application for Medicross Oral Health Care Facilities, subject to the following:

1. That the data collection may not commence prior to receipt of FINAL APPROVAL from the Netcare Research Operations Committee.
2. A copy of the research report will be provided to the Netcare Research Operations Committee once it is finally approved by the tertiary institution, or once complete.
3. Netcare has the right to implement any recommendations from the research.
4. That the Hospital/Site/Division Management reserves the right to withdraw the approval for research at any time during the process, should the research prove to be detrimental to the subjects / Netcare or should the researcher not comply with the conditions of approval.

**Operations Centre**: 1st Floor, Building 2, Sunninghill Crescent Office Park, No 3 Eglin Road, Sunninghill, Johannesburg, 2157
Private Bag X13, Rivonia, 2128, **Tel:** (0) 10 2056600 – **Fax:** (0) 10 2056653
Directors: WN van der Merwe (Managing Director), RH Friedland, OJ van Schalkwyk, LM Semono Company Secretary: L Bagwandeen

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# Appendix D: Consent letter

Central University of Technology, Free State

## CONSENT TO PARTICIPATE IN RESEARCH

Dear Dental Assistant

You have been asked to participate in a research study.

You have been informed about the study by P.M.Schoonwyk, student nr: 213098660.

You may contact Philida Schoonwyk at 0848388385 any time if you have questions about the research.

You may contact the Secretariat of the Ethics Committee of the Faculty of Health Sciences, UFS at telephone number (051) 4052812 if you have questions about your rights as a research subject.

Your participation in this research is voluntary, and you will not be penalized or lose benefits if you refuse to participate or decide to terminate participation.

I received an explanation of the research study in the form of a written information sheet.

I understand what my involvement in the study means and I voluntarily agree to participate.

---------- ---------- Signature of Participant

Date

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# Appendix E: Final Questionnaire

Central University of Technology, Free State

**QUESTIONNAIRE**

**INFECTION PREVENTION AND CONTROL (IPC)**

**P.M. SCHOONWYK – 213098660**

This research is done as part of Studies towards a Masters Degree

**Project Title: Dental Assistants Knowledge, Attitude and Practices in Infection Prevention and Control Processes in Central South African Oral Health Care Facilities / Practices.**

This research is aimed at Dental assistants working in private and public Oral Health care facilities.

By completing the questionnaire, you consent to participate in the study;

Your participation in the research is voluntary;

As participant in this survey, you will remain anonymous;

All information provided will be kept confidential;

Your honest opinion and rating will be greatly appreciated.

Please complete all sections, questions and sub-questions.

**This questionnaire will explore the following aspects of IPC:**

Section 1: Demographic Information of Respondents

Section 2: IPC Training and Continuous Professional Development

Section 3: Knowledge of Infectious Diseases and Risks

Section 4: Disinfection and Sterilisation

Section 5: IPC duties

Section 6: Vaccination

Section 7: Hand washing

Section 8: Personal Protective Equipment (PPE)

Section 9: Waste Disposal

Section 10: General views of IPC

**THANK YOU FOR COMPLETING THIS QUESTIONNAIRE**

| **Section 1: Demographic Information** ***(Mark the appropriate box with an X)*** | | | | | |
|---|---|---|---|---|---|
| **1.1 Gender** | | | | Male ☐ | Female ☐ |
| **1.2 Age group** | 18 – 25 years ☐ | >25 - 35 years ☐ | >35 - 45 years ☐ | >45-55 years ☐ | >55 years ☐ |



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**1.3 Sector you are working in**

Private Sector: ☐

Public Sector: ☐

SAMHS ☐

**1.4 Indicate the type of oral health care services that are provided at the oral health care facility where you are working.**

General Dental services ☐ * Specialist Dental Service ☐

***Specify the Dental Specialist:** ☐

**1.5 Name of the province where you are working in.** ☐

**1.6 Name of the district where your oral health care facility is located.** ☐

**1.7 Select the type of area where your oral health care facility is located.**

**Rural area** ☐ **Urban area** ☐

**1.8 The number of years that you have been working as a dental assistant.**

>1 - 5 years ☐ >5 -10 years ☐ >10-15 years ☐ >15 years ☐

**1.9 Select the type of training you received as dental assistant.**

In service Training ☐ * University of Technology / Technicon ☐ * Other ☐

* Specify Other ☐

**Section 2: Infection Prevention and Control (IPC) Training and Continuous Professional Development (CPD)**

**2.1 How would you rate your current level of IPC knowledge?**

None ☐ Below average ☐ Average ☐ More than average ☐ Extensive ☐

**2.2 Rate the sources whom you gained IPC knowledge from, by scoring a maximum of 5 for the source that you get the most knowledge from, going down to 4, 3, 2,and 1 for the source which you have never**

a) Discussion of IPC with oral health care team members ☐

b) Reading books and journals regarding IPC ☐

c) Formal training at University ☐

d) Doing internet searches / watching videos about IPC ☐

e) Attending CPD events ☐



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**2.3 When last did you attend a CPD event / workshop / course where IPC were discussed? (Please select the appropriate time frame.)**

| Less than 6 months ago | >6 - 18 months ago | >18-24 months ago | >24-36 months ago | >36 - 60 months ago | Never |
|---|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

**2.4 Did the following factors ever kept you from attending CPD event / workshop / course which dealt with IPC in the past? (Please respond to ALL of the reasons listed.)**

| | No | Yes |
|---|---|---|
| a) You were not aware of CPD event/ workshop / course taking place | ☐ | ☐ |
| b) The date of the CPD event / workshop / course | ☐ | ☐ |
| c) The time of the CPD event / workshop / course | ☐ | ☐ |
| d) The cost of the CPD event / workshop or course | ☐ | ☐ |
| e) The topics of the CPD event were not applicable to the scope of practice for dental assistants. | ☐ | ☐ |

**2.5 Is IPC training needed in the following events? (Please respond to each event listed.)**

| | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|
| a) Upon appointment as new dental assistant in the practice | ☐ | ☐ | ☐ | ☐ | ☐ |
| b) When the practice gets new IPC products | ☐ | ☐ | ☐ | ☐ | ☐ |
| c) When the practice gets new IPC equipment | ☐ | ☐ | ☐ | ☐ | ☐ |
| d) On a yearly basis | ☐ | ☐ | ☐ | ☐ | ☐ |

**2.6 Did you receive IPC training in the following events? (Please respond to each event listed.)**

| | No | Not sure | Yes |
|---|---|---|---|
| a) Upon appointment as new dental assistant in the practice | ☐ | ☐ | ☐ |
| b) When the practice gets new IPC products | ☐ | ☐ | ☐ |
| c) When the practice gets new IPC material and equipment | ☐ | ☐ | ☐ |
| d) On a yearly basis | ☐ | ☐ | ☐ |



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| | No | Yes |
|---|---|---|
| **2.7 Do you know about any written document(s) that provides guidelines about IPC matters in oral health care facilities?** | ☐ | ☐ |

*If YES, please continue to answer a, b, c and d.*

| | No | Not sure | Yes |
|---|---|---|---|
| a) Is there a copy of this document available in your oral health care facility? | ☐ | ☐ | ☐ |
| b) Are you familiar with the contents of this document? | ☐ | ☐ | ☐ |
| c) Did you ever made use or refer to this document in the past? | ☐ | ☐ | ☐ |

d) Please indicate under which circumstances you as dental assistant would make use of such a document?

| | No | Yes |
|---|---|---|
| **2.8 Do you feel it is necessary for an oral health care facility to have a written IPC policy / guide / manual?** | ☐ | ☐ |

**Section 3: Infectious Diseases and Occupational risks**

| | No | Not sure | Yes |
|---|---|---|---|
| **3.1 Do you think it is possible that diseases can be transmitted in oral health care facilities?** | ☐ | ☐ | ☐ |

**3.2 Can the following pathogenic agents (germs) be transmitted in an oral health care facility / practice?**

| | No | Not sure | Yes |
|---|---|---|---|
| a) Herpes Virus (HSV) | ☐ | ☐ | ☐ |
| b) Hepatitis B Virus (HBV) | ☐ | ☐ | ☐ |
| c) Tuberculosis (TB) | ☐ | ☐ | ☐ |
| d) Human Immuno deficiency Virus (HIV) | ☐ | ☐ | ☐ |
| e) Prions | ☐ | ☐ | ☐ |

**3.3 Can diseases be transmitted in the following ways?**

| | No | Not sure | Yes |
|---|---|---|---|
| a) Direct contact | ☐ | ☐ | ☐ |
| b) Splatter or splash during a procedure | ☐ | ☐ | ☐ |
| c) Needle stick injury | ☐ | ☐ | ☐ |
| d) Inhalation of droplets | ☐ | ☐ | ☐ |



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| *3.3 continue...* | No | Not sure | Yes |
|---|---|---|---|
| e) Injury with used instrument | ☐ | ☐ | ☐ |
| f) Indirect contact | ☐ | ☐ | ☐ |
| g) Ingestion | ☐ | ☐ | ☐ |

| | No | Not sure | Yes |
|---|---|---|---|
| **3.4 Will you able to know beforehand if a patient had an infectious disease?** | ☐ | ☐ | ☐ |

| | No | Not sure | Yes |
|---|---|---|---|
| **3.5 Have you ever worked on a patient who had a communicable disease?** | ☐ | ☐ | ☐ |

| | No | Not sure | Yes |
|---|---|---|---|
| **3.6 Should you change your IPC practices when working on a patient with a known infectious disease?** | ☐ | ☐ | ☐ |

| | Never | Less often | More often | Always |
|---|---|---|---|---|
| **3.7 How often do you feel comfortable with your IPC practices whilst assisting on a patient who have an infectious disease?** | ☐ | ☐ | ☐ | ☐ |

| | No | Not sure | Yes |
|---|---|---|---|
| **3.8 Do you think that there is a possibility that diseases can be transmitted in the oral health care facility where you work?** | ☐ | ☐ | ☐ |

| | No | Not sure | Yes |
|---|---|---|---|
| **3.9 Did you ever experience an occupational exposure incident?** | ☐ | ☐ | ☐ |

*If YES, please select only the type of exposure(s) you experienced in your work as dental assistant:*

| | |
|---|---|
| Injured while cleaning instruments | ☐ |
| Injured while recapping a needle | ☐ |
| Splash into eyes / face | ☐ |
| Injured when removing the needle | ☐ |
| Injured when removing a bur from handpiece | ☐ |
| Injured with instrument when patient moved suddenly | ☐ |
| Injured with instrument which were not properly positioned on instrument tray | ☐ |

Specify any other: ☐



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| | No | Not sure | Yes |
|---|---|---|---|
| **3.10 Do you consider occupational exposure such as needle stick injury, a risk to you as dental assistant?** | ☐ | ☐ | ☐ |

**3.11 Please indicate how you will manage a needle stick injury. Place number 1 to the first step that you will take and then continue numbering all the steps in the sequence that you will complete it. Indicate "Not applicable" (N/A) to the steps that you deem to be unnecessary.**

a) Immediately get blood test of the patient ☐

b) Take PEP only if the patient have a positive status ☐

c) Report the incident to your supervisor ☐

d) Consult with your own private medical practitioner ☐

e) Get blood test of the patient report the incident to your supervisor ☐

f)Take post exposure prophylaxis (PEP) irrespective of the patients status ☐

g) Receive counseling from a qualified counselor ☐

h) If the patient is known, get consent from the patient. ☐

i) Consult with the occupational health and safety officer ☐

| | Strongly disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|
| **3.12 The same precautions should be used for all patients irrespective of their status.** | ☐ | ☐ | ☐ | ☐ | ☐ |
| **3.13 IPC is a team effort in the oral health care facility / practice where you work.** | ☐ | ☐ | ☐ | ☐ | ☐ |
| **3.14 IPC is a priority in the oral health care facility / practice where you work.** | ☐ | ☐ | ☐ | ☐ | ☐ |

**Section 4: Infection Prevention and Control (IPC) duties of the Dental Assistant**

**4.1 Who usually performs the IPC duties such as surface disinfection and sterilisation in your oral health care facility? (Please tick next to each category listed.)**

| | Never | Seldom | Often | Always |
|---|---|---|---|---|
| a) Dentist | ☐ | ☐ | ☐ | ☐ |
| b) Oral hygienist | ☐ | ☐ | ☐ | ☐ |
| c) Dental Assistant | ☐ | ☐ | ☐ | ☐ |
| d) Other: Specify..... | ☐ | | | |



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**4.2 How often are you responsible to perform the following tasks in the oral health care facility / practice where you are working? (Please indicate the frequency next to each task listed.)**

| | Never | Seldom | Often | Always |
|---|---|---|---|---|
| a) Prepare the clinical area before patient treatm | ☐ | ☐ | ☐ | ☐ |
| b) Disinfect the working surfaces between each patient | ☐ | ☐ | ☐ | ☐ |
| c) Flush the waterlines between patients | ☐ | ☐ | ☐ | ☐ |
| d) Change the 3-in-1 tips after each patient | ☐ | ☐ | ☐ | ☐ |
| e) Change suction tips after each patient | ☐ | ☐ | ☐ | ☐ |
| f) Set-out the appropriate instruments for the dental procedure | ☐ | ☐ | ☐ | ☐ |
| g) Maintain the clinical area during patient treatment | ☐ | ☐ | ☐ | ☐ |
| h) Remove the used local aneasthetic needle from the syringe | ☐ | ☐ | ☐ | ☐ |
| i) Remove the used local aneasthetic ampule from syringe | ☐ | ☐ | ☐ | ☐ |
| j) Carry contaminated instruments to the designated sterilisation area | ☐ | ☐ | ☐ | ☐ |
| k) Pre-clean instruments | ☐ | ☐ | ☐ | ☐ |
| l) Package instruments for sterilisation | ☐ | ☐ | ☐ | ☐ |
| m) Sterilise instruments | ☐ | ☐ | ☐ | ☐ |
| n) Storage of sterilised instruments | ☐ | ☐ | ☐ | ☐ |
| o) Take care of handpieces after they have been used on the patient | ☐ | ☐ | ☐ | ☐ |
| p) Specify other IPC duties which you perform that is not listed above: | | | | |

**Section5: Disinfection and Sterilisation**

| | No | Not sure | Yes |
|---|---|---|---|
| **5.1 Is there a difference between disinfection and sterilisation?** | ☐ | ☐ | ☐ |

**5.2 It is enough to only wipe / rinse off the following items before they are used on the next patient. (Please indicate your opinion for each item listed.)**

| | Strongly disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|
| a) Suction tips | ☐ | ☐ | ☐ | ☐ | ☐ |
| b) Impression trays | ☐ | ☐ | ☐ | ☐ | ☐ |
| c) Working surfaces | ☐ | ☐ | ☐ | ☐ | ☐ |



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*5.2 Continue*

| | Strongly disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|
| d) Extraction instruments | ☐ | ☐ | ☐ | ☐ | ☐ |
| e) Orthodontic instruments | ☐ | ☐ | ☐ | ☐ | ☐ |
| f) Endodontic instruments | ☐ | ☐ | ☐ | ☐ | ☐ |

**5.3 Do you feel it is necessary to perform the following actions during your instrument sterilisation routine?**

| | Strongly disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|
| a) Hand wash instruments before sterilsation | ☐ | ☐ | ☐ | ☐ | ☐ |
| b) Clean instruments in instrument washer before sterilsation | ☐ | ☐ | ☐ | ☐ | ☐ |
| c) Clean instruments using an ultra-sonic bath before sterilisation | ☐ | ☐ | ☐ | ☐ | ☐ |
| d) Bag instruments before sterilisation | ☐ | ☐ | ☐ | ☐ | ☐ |
| e) Perform biological monitoring | ☐ | ☐ | ☐ | ☐ | ☐ |
| f) Keep record of successful sterilisation process | ☐ | ☐ | ☐ | ☐ | ☐ |

**5.4 How often do you perform the following actions during your instrument sterilisation routine? (Please indicate the frequency for each action listed)**

| | Never | Seldom | Often | Always |
|---|---|---|---|---|
| a) Hand wash instruments before sterilsation | ☐ | ☐ | ☐ | ☐ |
| b) Clean instruments in instrument washer before sterilsation | ☐ | ☐ | ☐ | ☐ |
| c) Clean instruments using an ultra-sonic bath before sterilisation | ☐ | ☐ | ☐ | ☐ |
| d) Bag instruments before sterilisation | ☐ | ☐ | ☐ | ☐ |
| e) Perform biological monitoring | ☐ | ☐ | ☐ | ☐ |
| f) Keep record of sterilisation proce: | ☐ | ☐ | ☐ | ☐ |

**5.5 Please select the sterilisation device(s) which are used in the oral health care facility / practice where you work.**

| | No | Yes |
|---|---|---|
| a) Autoclave | ☐ | ☐ |
| b) Modified pressure cooker | ☐ | ☐ |
| c) Dry heat steriliser | ☐ | ☐ |
| d) Ultra-violet steriliser | ☐ | ☐ |
| e) Statim autoclave with flash cycle | ☐ | ☐ |



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| | No | Yes |
|---|---|---|
| **5.6 Do you ever make use of chemical liquid / cold sterilisation methods?** | ☐ | ☐ |

| | |
|---|---|
| **5.7 When using chemical liquid sterilisation method, how long do you keep the instruments in the solution?** | |

| | | No | Not sure | Yes |
|---|---|---|---|---|
| **5.8 What type of cold sterilization agent do you use?** | High level disinfectant | ☐ | ☐ | ☐ |
| | Intermediate level disinfectant | ☐ | ☐ | ☐ |

**5.9 When processing the handpiece after patient care, how often do the following actions form part of your routine? (Please indicate the frequency for every action listed.)**

| | Never | Seldom | Often | Always |
|---|---|---|---|---|
| a) Run the handpiece for 10 - 20 seconds before disconnecting it from the hose. | ☐ | ☐ | ☐ | ☐ |
| b) Clean the outer surfaces with disinfectant. | ☐ | ☐ | ☐ | ☐ |
| c) Disassemble the handpiece, to clean the inner parts. | ☐ | ☐ | ☐ | ☐ |
| d) Oil the handpiece | ☐ | ☐ | ☐ | ☐ |
| e) Dry handpiece and pack in sterilisation pouch | ☐ | ☐ | ☐ | ☐ |
| f) Sterilise the handpiece in an autoclave. | ☐ | ☐ | ☐ | ☐ |

**5.10 Are the following items regarded as critical instruments?**

| | No | Not sure | Yes |
|---|---|---|---|
| a) Extraction forceps | ☐ | ☐ | ☐ |
| b) Orthodontic instruments | ☐ | ☐ | ☐ |
| c) Endodontic instruments | ☐ | ☐ | ☐ |
| d) Burs | ☐ | ☐ | ☐ |
| e) Mouth mirrors | ☐ | ☐ | ☐ |
| f) Dental handpiece | ☐ | ☐ | ☐ |



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## Section 6: Vaccination

**6.1 Is it necessary for dental assistants to be vaccinated against the following diseases?**

| | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|
| a) Hepatitis A | ☐ | ☐ | ☐ | ☐ | ☐ |
| b) Hepatitis C | ☐ | ☐ | ☐ | ☐ | ☐ |
| c) Influenza | ☐ | ☐ | ☐ | ☐ | ☐ |
| d) Hepatitis B | ☐ | ☐ | ☐ | ☐ | ☐ |

| | No | Yes |
|---|---|---|
| **6.2 Were you vaccinated against Hepatitis B?** | ☐ | ☐ |

a) If yes, how many Hepatitis B vaccine shots did you receive? **1** ☐ **2** ☐ **3** ☐

b) If yes, how long ago did you receive your Hepatitis B Vaccine? Less than 1year ago ☐ > 1-3 years ago ☐ >3 -5 years ago ☐ More than 5 years ☐

| | No | Yes |
|---|---|---|
| c) Did you ever check your level of immunity after you received your Hepatitis B vaccines? | ☐ | ☐ |

**6.3 Did you receive vaccines to protect you from other infectious diseases such as:**

| | No | Not sure | Yes |
|---|---|---|---|
| a) Mump: | ☐ | ☐ | ☐ |
| b) Rubella | ☐ | ☐ | ☐ |
| c) Chicken pox | ☐ | ☐ | ☐ |
| d) Diphtheria | ☐ | ☐ | ☐ |
| e) Tetanus | ☐ | ☐ | ☐ |
| f) Polio | ☐ | ☐ | ☐ |

## Section 7: Hand Hygiene

| | Never | Seldom | Often | Always |
|---|---|---|---|---|
| **7.1. How regularly do you wash your hands before putting on gloves?** | ☐ | ☐ | ☐ | ☐ |
| **7.2 How regularly do you wash your hands after taking off gloves?** | ☐ | ☐ | ☐ | ☐ |



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| | Never | Seldom | Often | Always |
|---|---|---|---|---|
| **7.3 How regularly do you wash your hands before leaving the clinical area?** | ☐ | ☐ | ☐ | ☐ |

**7.4. Indicate your level of agreement with listed statements which might influence your hand hygiene practice:**

| | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|
| a) Hand washing is not such an important action. | ☐ | ☐ | ☐ | ☐ | ☐ |
| b) There is not enough time to spend on hand hygiene practices. | ☐ | ☐ | ☐ | ☐ | ☐ |
| c) If my hands still look clean, it is not necessary to wash them. | ☐ | ☐ | ☐ | ☐ | ☐ |
| d) Hand washing is kept to a minimum due to skin irritations. | ☐ | ☐ | ☐ | ☐ | ☐ |
| e) Inaccessible supplies / facilities makes it difficult to regularly wash hands. | ☐ | ☐ | ☐ | ☐ | ☐ |
| f) Tending to patients needs makes me forget to apply proper hand hygiene . | ☐ | ☐ | ☐ | ☐ | ☐ |
| g) Hand washing is the single most effective intervene- tion to promote infection control in clinical settings | ☐ | ☐ | ☐ | ☐ | ☐ |

| | Never | Seldom | Often | Always |
|---|---|---|---|---|
| **7.5 Do you use liquid hand soap to wash your hands with?** | ☐ | ☐ | ☐ | ☐ |
| **7.6 Do you use bar soap to wash your hands with?** | ☐ | ☐ | ☐ | ☐ |
| **7.7 Do you supplement your hand washing routine with an alcohol based gel or sanitary spray?** | ☐ | ☐ | ☐ | ☐ |

**7.8 How often do you use the following to dry your hands with? (Please indicate frequency for each option listed.)**

| | Never | Seldom | Often | Always |
|---|---|---|---|---|
| a) Disposable paper towels | ☐ | ☐ | ☐ | ☐ |
| b) Fabric towels | ☐ | ☐ | ☐ | ☐ |
| c) Air dryer | ☐ | ☐ | ☐ | ☐ |
| d) Other: Specify | | | | |

**7.9 Indicate your level of agreement for each of the following statements:**

| | No | Not Sure | Yes |
|---|---|---|---|
| a) Effective hand hygiene practices prevent the spread of disease to patients. | ☐ | ☐ | ☐ |
| b) Effective hand hygiene practices prevent the spread of disease to the family of the health care worker. | ☐ | ☐ | ☐ |
| c) Effective hand hygiene practices prevent the spread of disease to the healthcare worker. | ☐ | ☐ | ☐ |



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| 7.10 In the practice where I work is a hand washing poster / sticker that shows how to wash my hands correctly. | No | Not Sure | Yes |
|---|---|---|---|
| | ☐ | ☐ | ☐ |

**Section 8: Personal Protective Equipment (PPE)**

**8.1 How often do you use the following PPE during patient treatment? (Please indicate frequency for each item listed)**

| | Never | Seldom | Often | Always |
|---|---|---|---|---|
| a) Gloves | ☐ | ☐ | ☐ | ☐ |
| b) Masks | ☐ | ☐ | ☐ | ☐ |
| c) Protective eyewear | ☐ | ☐ | ☐ | ☐ |
| d) Protective clothing | ☐ | ☐ | ☐ | ☐ |
| e) Protective shoes / Closed shoes | ☐ | ☐ | ☐ | ☐ |

**8.2 Which of the following PPE do you usually put on in the following scenarios?**

| | Mask | Eye Wear | Sterile Gloves | Heavy duty gloves | Protective clothing |
|---|---|---|---|---|---|
| a) When you assist during a surgical procedure | ☐ | ☐ | ☐ | ☐ | ☐ |
| b) When you assist during a scaling and polishing | ☐ | ☐ | ☐ | ☐ | ☐ |
| c) When you assist during an orthodontic procedure | ☐ | ☐ | ☐ | ☐ | ☐ |
| d) When you disinfect surfaces in the operatory | ☐ | ☐ | ☐ | ☐ | ☐ |
| e) When you clean instruments | ☐ | ☐ | ☐ | ☐ | ☐ |
| f) When you clean dental equipment | ☐ | ☐ | ☐ | ☐ | ☐ |
| g) When a lot of splatter and blood is anticipated | ☐ | ☐ | ☐ | ☐ | ☐ |
| h) When you work on patients with a known communicable disease | ☐ | ☐ | ☐ | ☐ | ☐ |

**8.3 Do you replace your gloves in the following instances? (Please indicate frequency for each instance listed.)**

| | Never | Seldom | Often | Always |
|---|---|---|---|---|
| a) After every patient | ☐ | ☐ | ☐ | ☐ |
| b) When they are torn during treatment | ☐ | ☐ | ☐ | ☐ |
| c) When they are visibly contaminated | ☐ | ☐ | ☐ | ☐ |



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**8.4 How often do the following reasons prevent you from wearing full PPE during all procedures? (Please indicate frequency for each reason listed.)**

| | Never | Seldom | Often | Always |
|---|---|---|---|---|
| a) Availability of PPE | ☐ | ☐ | ☐ | ☐ |
| b) Comfortability of PPE | ☐ | ☐ | ☐ | ☐ |
| c) The time it takes to put on and d | ☐ | ☐ | ☐ | ☐ |
| d) PPE is too expensive | ☐ | ☐ | ☐ | ☐ |
| e) PPE scares the patients | ☐ | ☐ | ☐ | ☐ |
| f) Because you are used to work wi | ☐ | ☐ | ☐ | ☐ |
| g) PPE is not necessary for dental a | ☐ | ☐ | ☐ | ☐ |
| h) Ignorance | ☐ | ☐ | ☐ | ☐ |
| i) Employer restrictions | ☐ | ☐ | ☐ | ☐ |
| j) Other: Specify | ☐ | | | |

**8.5 Indicate if the following statements are correct:**

| | No | Not Sure | Yes |
|---|---|---|---|
| a) A mask that becomes wet needs to be replaced | ☐ | ☐ | ☐ |
| b) When cleaning contaminated instruments, you need to wear heavy duty gloves. | ☐ | ☐ | ☐ |
| c) Gloves need to be changed between patients only if they are visibly contaminated. | ☐ | ☐ | ☐ |
| d) Eye wear needs to be worn only if heavy of splatter is anticipated. | ☐ | ☐ | ☐ |

**8.6Would you change your personal protection habits if you know you were in contact with a patient infected with HIV or hepatitis B?**

| No | Not Sure | Yes |
|---|---|---|
| ☐ | ☐ | ☐ |

**Section 9: Waste Management**

| | No | Not sure | Yes |
|---|---|---|---|
| **9.1. There is a difference between domestic waste and health care related waste (HCRW)?** | ☐ | ☐ | ☐ |
| **9.2 Do the oral health care facility / practice were you work make use of the services of a registered (special) waste removal agency in addition to municipality waste removal services?** | ☐ | ☐ | ☐ |
| **9.3 Do the oral health care facility / practice keep record of the biological hazardous / contaminated waste removal activities?** | ☐ | ☐ | ☐ |

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| | No | Not sure | Yes |
|---|---|---|---|
| **9.4 Do you discard the different types of waste generated in the oral health care facility / practice separately?** | ☐ | ☐ | ☐ |

**9.5 Indicate your level of agreement with regards to each of the following statements:**

| | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|
| a) It is necessary to separate waste before discarding it. | ☐ | ☐ | ☐ | ☐ | ☐ |
| b) Waste generated in an oral health care facility have the potential to spread | ☐ | ☐ | ☐ | ☐ | ☐ |
| c) Inadequate management of healthcare waste represents immediate risks for healthcare professionals. | ☐ | ☐ | ☐ | ☐ | ☐ |
| d) Inadequate management of healthcare waste pose a risk to people outside of the dental clinic. | ☐ | ☐ | ☐ | ☐ | ☐ |
| e) Inadequate management of healthcare waste pose a risk to the environment. | ☐ | ☐ | ☐ | ☐ | ☐ |
| f) Oral health care staff need training on health care waste management. | ☐ | ☐ | ☐ | ☐ | ☐ |

**9.6 Indicate the correct method to discard the items listed.**

| | Red Bag | Sharps | Municapality |
|---|---|---|---|
| a) Used needles | ☐ | ☐ | ☐ |
| b) Waste containing bodily fluids such as saliva and blood. | ☐ | ☐ | ☐ |
| c) Extracted teeth | ☐ | ☐ | ☐ |
| d) Gloves | ☐ | ☐ | ☐ |
| e) Household waste | ☐ | ☐ | ☐ |
| f) Chemicals such as X-ray Developing solutions | ☐ | ☐ | ☐ |
| g) Amalgam | ☐ | ☐ | ☐ |
| h) Scalpel blades | ☐ | ☐ | ☐ |
| i) Packaging of dental materials | ☐ | ☐ | ☐ |

**Section 10: General views of IPC**

| | Strongly | Disagree | Neutral | Agree | Strongly |
|---|---|---|---|---|---|
| **10.1 Infection prevention and control processes is a time** | ☐ | ☐ | ☐ | ☐ | ☐ |

| | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|
| **10.2 Infection prevention and control products are expensive.** | ☐ | ☐ | ☐ | ☐ | ☐ |



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**10.3 The following reasons makes it difficult to execute effective infection prevention and control**

| | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|
| a) Limited time | ☐ | ☐ | ☐ | ☐ | ☐ |
| b) Number of patients seen | ☐ | ☐ | ☐ | ☐ | ☐ |
| c) Number of practitioners whom the dental assistant needs to help | ☐ | ☐ | ☐ | ☐ | ☐ |
| d) Limited PPE supply | ☐ | ☐ | ☐ | ☐ | ☐ |
| e) Lack of guidance with regards to effective infection prevention and control procedures. | ☐ | ☐ | ☐ | ☐ | ☐ |
| f) Other reasons : Please s | | | | | |

| **10.4 I am confident that the IPC measures I apply is sufficient to prevent the transmission of disease.** | Strongly Disagree | Disagree | Not Sure | Agree | Strongly Agree |
|---|---|---|---|---|---|
| | ☐ | ☐ | ☐ | ☐ | ☐ |

**10.5 Please write down any comments, concerns or suggestions with regards to infection prevention and control in oral health care facilities or practices.**

**Begin to type here>**

**THANK YOU FOR COMPLETING THE QUESTIONNAIRE**



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