

**ORAL HEALTH PRACTITIONERS AND HIV/AIDS:
KNOWLEDGE, ATTITUDES AND PRACTICES**

Nkhensani C. Mathabathe

A research report submitted to the Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, in partial fulfilment of the requirement for the degree of Master of Public Health.

I Nkhensani C. Mathabathe declare that this research report is my own work. It is being submitted for the degree of Master of Public Health in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at this or any other university.

Signature

day of April 2006

**In loving memory of my late brother Alan and in
celebration of the life and love of my siblings
Harry, Lloyd, Tinyiko and Spencer.**

Abstract

South Africa is ranked as the country with largest number of people living with the Human Immunodeficiency Virus (HIV) in the world. Oral health care workers have a role to play in the national response to the HIV epidemic through the provision of quality oral health services. The aim of this study was to determine the knowledge, attitudes and practices of oral hygienists and dental therapists on HIV/AIDS. A total of 1160 questionnaires were mailed to 831 oral hygienists and 329 dental therapists registered with the Health Professionals Council of South Africa in 2000. The questionnaire covered: demographic factors; general and oral health-specific HIV/AIDS knowledge; attitudes towards HIV/AIDS patients; infection control practices and ethical/legal issues. The response rate was 27.4% (n=318), 255 oral hygienists and 63 dental therapists. Overall, respondents in this study illustrated sound knowledge on oral manifestations of HIV/AIDS and modes of transmission of the virus although 10% reported that the virus could be transmitted through mosquito bites and 25% agreed that HIV could be transmitted via saliva. Respondents reported compliance with basic infection control practices although 35% did not agree that infection control measures that protect against the hepatitis B virus could provide adequate protection against HIV. In addition 73.8% of the respondents reported that additional infection control measures must be taken in the treatment of HIV/AIDS patients in the dental surgery.

The results of this study indicate a need for continuous HIV professional education of oral hygienists and dental therapists in order to improve the quality of care provided to HIV infected patients.

TABLE OF CONTENTS

TITLE PAGE	i
DECLARATION	ii
DEDICATION	iii
ABSTRACT	iv
TABLE OF CONTENTS	v
LIST OF TABLES	vii
LIST OF FIGURES	viii
ACRONYMS AND ABBREVIATIONS	ix
1.0. INTRODUCTION	1
1.1 Background	1
1.2 Literature Review	6
1.2.1 South African studies	6
1.2.2 International studies	9
1.3 Motivation	12
1.4 Aims and Objectives	12
2.0 METHODS AND MATERIALS	13
2.1 Study design, population and sampling	13
2.2 Data collection	13
2.3 Analysis of data	14

2.4 Ethical consideration	14
3.0 RESULTS	15
3.1 Response rate	15
3.2 Demographic information	16
3.3 HIV Knowledge and skills	17
3.4 Oral manifestations of HIV/AIDS seen in dental surgery	18
3.5 Management of HIV/AIDS in the dental surgery	20
3.6 Infection control practices	21
3.7 HIV/AIDS Continuing education	23
3.8 Legal, Ethical and social issues surrounding HIV	26
3.9 Available support for managing HIV in the dental surgery	28
4. DISCUSSION	29
4.1 Limitations	35
5. CONCLUSION AND RECOMMENDATION	36
REFERENCES	38
APPENDICES	
A. Questionnaire	
B. Ethical Clearance Certificate	

LIST OF TABLES

TABLE	DESCRIPTION	PAGE
1	Number and percentage of respondents by job category	15
2	Level of agreement to statements relating to the transmission of HIV/AIDS	18
3	Respondents' assessment of the personal skills that are necessary for the management of HIV/AIDS in the dental surgery	20
4	Response to the question "Which of the following do you routinely do before, during or after treating patients?"	22
5	Responses (percentage and number) to questions relating to HIV/AIDS continuing education	23
6	Respondents' rating of the importance of continuing education on aspects of HIV/AIDS.	25
7	Responses to questions on the ethical and legal aspects of managing patients with HIV/AIDS in the dental practice.	26
8	Responses to general questions regarding the management of patients with HIV/AIDS in the dental practice	27
9	Percentage and number of respondents who have access to important items of support for the prevention of HIV infection.	28

LIST OF FIGURES

FIGURE	DESCRIPTION	PAGE
1	Percentage prevalence of HIV in pregnant women attending public sector antenatal clinics in South Africa, 1990 – 2002.	1
2	Percentage distribution of the respondents by province	16
3	Percentage of respondents with knowledge of the HIV prevalence in their work district.	17
4	Percentage of respondents that have seen selected oral manifestations of HIV/AIDS in their dental practices	19
5	Number and percentage of respondents that have previously taken an HIV test	21
6	Percentage provincial distribution of respondents' attendance at seminars/workshops where HIV/AIDS was discussed	23
7	Percentage of respondents who require additional education on HIV/AIDS by province	24

ACRONYMS AND ABBREVIATIONS

AIDS	Acquired Immunodeficiency Syndrome
CDC	Centers for Disease Control and Prevention
HIV	Human Immunodeficiency Virus
HSRC	Human Sciences Research Council
KAP	Knowledge, Attitudes and Practices Survey
KZN	Kwa-Zulu Natal
OHCW	Oral Health Care Workers
WHO	World Health Organization

1. 0 INTRODUCTION

1.1. Background

Sub-Saharan Africa remains by far the region worst affected by the Human Immunodeficiency Virus (HIV) epidemic. In 2003, an estimated 26.6 million people in this region were living with HIV, including the 3.2 million who became newly infected in 2003. Acquired Immune Deficiency Syndrome (AIDS) killed approximately 2.3 million people in the same year (UNAIDS, 2003). The prevalence of HIV/AIDS in South Africa has increased exponentially since the reported debut of the infection in the country. The HIV sero-prevalence in pregnant women attending Antenatal Clinics (ANC) has increased dramatically from 0.7% in 1990 to 22.4% in 2002 (Figure 1), (National Department of Health, 2003). Currently it is estimated that 5,3 million people are living with HIV, which qualifies South Africa as the country with the largest number of people living with the HI Virus. The Human Sciences Research Council (HSRC) estimated the prevalence of HIV amongst persons aged two years and older to be 11.4%. (Shisana, Hall, Maluleke et al, 2002)

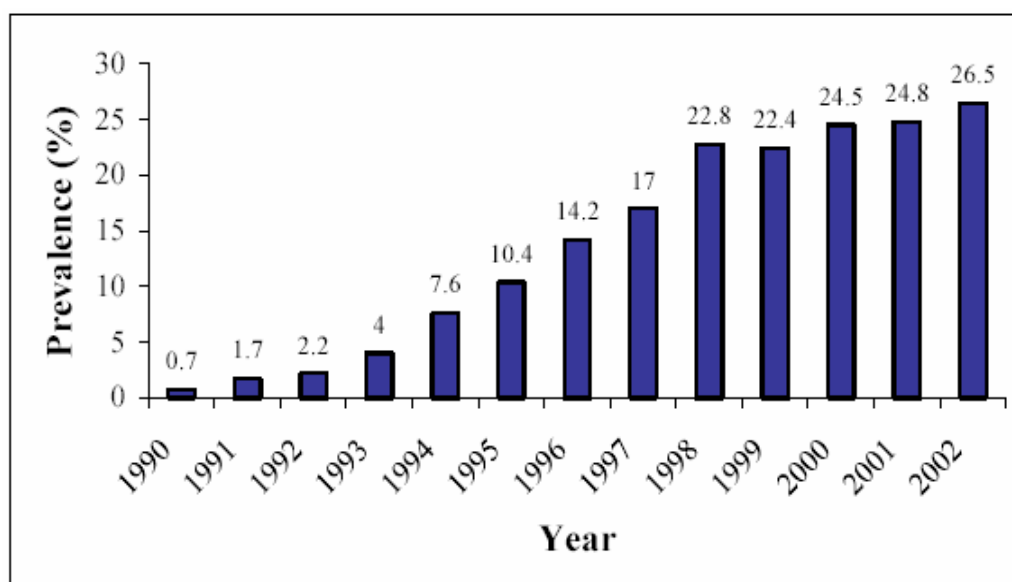


Figure 1. Percentage prevalence of HIV in pregnant women attending clinics of the public services in South Africa, 1990 – 2002.

The negative impact of the HIV epidemic is being felt in every sector of the country. In many communities around the country, households are battling to cope with caring for a severely ill household member, while dealing with the economic consequences of the person's illness. There is no doubt that health services are feeling the impact of this epidemic, and this is likely to get worse in the next 5 to 10 years (Johnson, Schierhout, Steinberg, et al, 2003). A recent survey found almost half (46.2%) of the patients admitted to public hospitals are HIV-infected. The HIV prevalence among health workers in public hospitals was estimated to be 16.3% (Shisana and Simbayi, 2002)

The HIV/AIDS and STD Strategic Plan for South Africa (2000 – 2005) highlights the impact that HIV/AIDS has on society and business. The strategy stresses the need to formulate a strong and shared vision of mobilization to focus all of the country's resources in the prevention and control of the epidemic (National Department of Health, 1999).

Oral health care workers (OHCW) are an important resource in the country's fight against the epidemic. Oral health is an integral part of general health and plays a role in the prevention, treatment and care HIV-infected people. Between 70% and 90% of HIV-infected individuals will have at least one oral manifestation at some time during the course of the infection, often with these manifestations being the first sign of infection (Arendorf, Bredekamp, Cloete and Sauer, 1998). Oral manifestations of HIV/AIDS are also potential markers of the progression of the disease. A number of oral lesions such as candidiasis, hairy leukoplakia and Kaposi's Sarcoma, are part of the World Health Organisation (WHO) and the Centres for Disease Control and Prevention (CDC) staging systems for HIV/AIDS (WHO 1990, CDC 1993_a, Badri and Maartens, 2001).

It is important to maintain adequate nutritional status in HIV infected children and adults. Malnutrition associated with HIV/AIDS can severely affect an already compromised immune system, leading to increases in rates of opportunistic infections and a decreased survival rate (Baylor College of Medicine, 2001). The oral cavity is the entry point into the digestive system, hence ill health in the mouth can contribute to low food intake and eventually to malnutrition. A 'diseased' mouth could also have an adverse impact on a person's social and sexual interactions as the mouth plays a very intimate and central role in that aspect of a person's life.

The practice of dentistry exposes OHCW and patients to a variety of microorganisms that are transmittable via blood, oral or respiratory secretions. Occupational exposures can occur percutaneously, i.e., through needlesticks or cuts from sharp instruments contaminated with infected blood or through contact of the eye, nose or mouth with infected blood. Cross infection can be from patient to OHCW, from OHCW to patient or from patient to patient (Heir and Zicchari, 1998).

The risk for HIV transmission from an infected OHCW to patients during invasive procedures is small and can be reduced with appropriate use of infection control precautions. It is associated with the circulating titre of the pathogen in blood, the procedures performed, techniques and infection-control precautions used and the medical condition of the OHCW. To date there has been only one case of reported HIV infection spread from an OHCW to 6 patients (CDC, 1993_b). This case elevated the concern of society with regard to the risk associated with visiting a dentist.

The dental surgery provides an ideal environment for cross-infection with pathogens other than HIV including cytomegalovirus, hepatitis B and C viruses, herpes simplex virus types 1

and 2, Mycobacterium Tuberculosis (TB), staphylococci, streptococci, and other viruses and bacteria that colonize or infect the oral cavity and respiratory tract. The risk of transmitting hepatitis B virus is about 30% per encounter, whereas the transmission of HIV with known contaminated blood is 0.3% (Heir and Zicchari, 1998). Of increasing concern, especially in South Africa, is the risk of transmission of TB in the dental surgery. It is estimated that at least 65% of HIV positive patients are infected with TB (Weyer, Lancaster, Brand, et al, 2003)

Universal precautions were introduced for use in the dental surgery with an aim of reducing the transmission of pathogens in the dental practice. The recommended infection control practices for dentistry that were developed by the Centres for Disease Control and Prevention (CDC 1993_c) are widely accepted and used in many countries. The guidelines outline specific recommendations related, among others, to vaccinations of OHCW; protective attire and barrier techniques; hand washing and care of hands; the use and care of sharp instruments and needles; sterilization or disinfection of instruments; cleaning and disinfection of the dental unit and environmental surfaces; use and care of handpieces, anti-retraction valves, and other intra-oral dental devices attached to air and water lines; use of extracted teeth in dental educational settings; disposal of waste material and single use disposable instruments

In 2003 the CDC released the latest guidelines, which consolidates previous recommendations and adds new ones for infection control in dental settings. Box 1 lists some of the latest updates and additional information. Of note is the change in terminology from what were commonly referred to as *universal precautions* to *standard precautions*.

Standard precautions integrate and expand the elements of universal precautions into a standard of care designed to protect OHCW and patients from pathogens that can be spread by blood or any other body fluid, excretion, or secretion. Standard precautions apply to

contact with 1) blood; 2) all body fluids, secretions, and excretions (except sweat), regardless of whether they contain blood; 3) non-intact skin; and 4) mucous membranes (CDC, 2003).

- The use of standard precautions rather than universal precautions
- Work restrictions for health care personnel infected with and occupationally exposed to infectious diseases
- Management of occupational exposures to blood borne pathogens including post exposure prophylaxis (PEP) for work exposures for Hepatitis B virus (HBV), Hepatitis C virus (HCV) and Human Immunodeficiency Virus (HIV)
- Selection and use of devices designed with features to prevent sharps injury
- Hand hygiene products and surgical hand antiseptics
- Sterilization of unwrapped instruments
- Infection control program evaluation and
- Research considerations

Box 1. Additional recommendation on the latest CDC guidelines for infection control in dental health care settings

It is recommended that OHCW adhere to these standard precautions for all patients they treat – regardless of the patient’s known or suspected health status, especially HIV status. In 1988 the World Health Organization (WHO) developed recommendations for a multifaceted, multinational and multidisciplinary strategy for a global oral health response to HIV/AIDS. Important facets of the strategy include: health promotion; health education; infection control; patient care; epidemiology and surveillance. Key to the success of the strategy is an adequately funded oral health care programme, which would be vital for HIV/AIDS prevention, treatment and research.

1.2 Literature review

1.2.1 South African studies

One of the earliest studies to determine the HIV/AIDS Knowledge, Attitude and Practices (KAP) of oral health workers was published in 1992 by Darling, Arendorf and Samaranayake. The study was carried out among 1000 South African dentists. At least 408 responded giving a response rate of 40.8%. A significant proportion of the respondents mentioned the commonly seen oral manifestations of HIV/AIDS as oral candidiasis (76%), Kaposi Sarcoma (74%) herpes infection (46%), hairy leukoplakia (34%) and ulcerative gingivitis (32%). In general the dentists were familiar with the methods of transmission of the HIV infection. However, 11% and 17% thought that insect bites and hairdressers respectively, could transmit HIV. Infection control practices of this group of dentists were found to be generally adequate with 87% reporting using gloves in routine dentistry, 63% wearing eye protection and 80% using masks. Despite the fact that 70% of the respondents agreed that HIV infection in dentistry is likely, a substantial number still considered it to be unlikely. The majority (82%) of respondents stated that care for HIV/AIDS patients should be delivered by dentists with special training in this field. This study set the scene for subsequent studies in South Africa that adapted similar methods of determining the HIV/AIDS KAP of OHCW.

A national survey was carried out in 1999 by Rudolph and Ogunbodede among employees who worked in dental public government clinics or hospitals. This was the first KAP study in South Africa that included non-dental personnel such as cleaners and secretaries. Of the 727 questionnaires distributed, 276 were returned yielding a response rate of 38%. The majority of the respondents were dentists (34%) and dental assistants (30%). The rest comprised oral hygienists (9%), dental therapists (8%), clinical management (3%) and other unspecified workers (11%). The commonly mentioned oral manifestations were oral candidiasis, Acute Necrotizing Ulcerative Gingivitis (ANUG), hairy leukoplakia and Kaposi Sarcoma. Although

six dental assistants and one dentist did not think the virus could be transmitted by semen, respondents in this study demonstrated good knowledge of methods of HIV transmission. Similar to the study by Darling et al (1992) carried out seven years earlier, 12,8% of respondents felt that HIV could be transmitted by a mosquito bite, although many in this group (the exact figure not mentioned) were considered to be non-clinicians.

In the previously mentioned national survey (Rudolph and Ogunbodede, 1999) adherence to infection control practices was found to be generally acceptable. However, in certain cases, the lack of adherence to recommended infection control measures was blamed on lack of resources. Seven clinicians and 7 dental assistants reported that there was non-availability of gloves or insufficient gloves for changing between patients, inadequate water supply and no autoclave (11,2% of all respondents). Other noteworthy results from this study were that:

- Of the clinicians, 25% said they could not make a tentative diagnosis of the early manifestation of HIV/AIDS.
- Almost 50% of the clinicians reported not having had immunization against hepatitis B virus in the past three years.
- The majority (85.9%) of the respondents indicated that they would like to attend a continuing education course on HIV/AIDS.

A survey of infection control practices among a sample of 75 dentists in Durban reported an increased use of barrier protective methods (gloves, masks and eyeglasses) during dental treatment (Yengopal, Naidoo and Chikte 2001) when compared, using non-statistical methods, to a previous study carried out 5 years earlier among the same study population (Naidoo. 1997). The survey also reported non-compliance with other infection control measures. For instance, only 45.2% and 39.7% of the dentists autoclaved their high speed and low speed handpieces respectively, after patient use. The study reported that although the percentages of dentists who re-used local anaesthetic cartridges (6%) and needles (1.5%)

were low, these practices are considered to be very dangerous and place patients at risk. However, a further comparisons between the two cross-sectional studies using statistical methods showed no significant improvement over the 5 year period in needlestick injuries, recapping of needles, cross-infection for bars and decontamination of surgery floors (Yengopal, Lallo, and Patel, 2003).

A study to determine the KAP of dentists with regards TB found that the infection control practices of the sampled dentists (n=78) were generally satisfactory, with 92%, 78% and 50% reporting wearing gloves, masks and eyeglasses respectively, during patient care (Naidoo and Mahommed, 2002). Five percent of the dentists in this survey reported being diagnosed with TB at least once since qualifying as a dentist.

De Kock and van Wyk (2001) carried out a survey among 56 oral hygienists in South Africa to determine their infection control practices. Although the study reported a good usage of barrier protective methods among the hygienists, some disturbing results were found. Only 34% used eye protection and 11.9% did not change gloves between patients. Infection control practices were found to be inadequate and this was confirmed by the small percentage (44.6%) of hygienists who reported being satisfied with infection control measures in their workplaces.

The reviewed South African studies indicate that overall OHCWs adhere to infection control measures in the dental surgery and display reasonably sound knowledge of HIV/AIDS and the management of HIV positive patients in the dental setting. However, the review also reveals gaps in certain areas of the OHCW knowledge of HIV/AIDS and infection control practices.

1.2.2 International studies

Aizawa et al (1998) conducted a survey to find potential risk factors for HIV transmission in the dental practice. Out of a sample of 747 dentists, they found that although most dentists did use gloves, masks and other protective garments, they did not use them during the full course of treatment. Usage was limited to treating patients in the “high-risk group” and for surgical treatment. Almost 13% of practitioners re-used an anaesthetic liquid cartridge. The results of this study confirmed results of a previous study by the same authors (Aizawa et. al, 1996). The latter study reported that despite 71.3% of the respondents expressing a belief that they have a moral responsibility to treat HIV- positive patients, only 15,6% were willing to do so.

Kitaura et al (1997) undertook an investigation of the knowledge of HIV/AIDS infection among 174 Japanese OHCW. The study sought to identify the source of HIV knowledge and attitudes of OHCW’s towards infected patients. All respondents reported that their major source of AIDS knowledge was derived from the media. Only 22.4% of the respondents had the same attitude towards treating HIV-positive and HIV-negative patients. More than 90% of respondents requested additional education on HIV/AIDS.

A survey of 500 dentists in Houston Texas, USA found that the experience of treating HIV-infected patients rather than knowledge alone influenced dentists’ behaviour towards HIV/AIDS positive patients (Quartey, 1998). This was demonstrated by a significant correlation between response to the statements “ever treating” an HIV-positive patient and the “willingness to treat” an AIDS or HIV-positive patient. Synder (1993) also demonstrated that having knowledge does not translate into desirable behaviour. He surveyed 300 dental hygienists in Pennsylvania, USA using 89 Likert-type questions to assess knowledge,

attitudes and practices on infection control. A low association between knowledge and adherence to infection control procedures was demonstrated.

In 1990, Siegal in a survey of 600 dentists in Ohio, reported that 48% of the respondents (n=305) felt capable of providing dental care to people with AIDS. Out of 294 responses, 69% were not willing to treat HIV patients and 31% would treat regular patients known to them only.

Several studies have reported oral health workers' concern and fear of treating patients that are known to be HIV positive or are suffering from AIDS. Horst (1993) reported that 73% of the responding dental hygienists had moderate to high fear levels for treating HIV-positive patients. Respondents in a study by Daniel, Silberman, Bryant et al (1996) suggested that HIV/AIDS patients be treated outside private practice and called for mandatory HIV testing of oral health care professionals.

Daniel (1998) performed a synthesis of literature on the knowledge, attitudes and practices of oral health care providers when treating HIV/AIDS patients by reviewing a total of 55 scientific articles. The synthesis concluded that although all the reviewed articles reported an increase in compliance with infection control measures, negative attitudes towards persons with HIV/AIDS were still found to exist.

In a survey of 1,000 dentists, Bennett et al (1995) assessed fear of cross infection, negative emotions and professional attitudes towards treating HIV positive patients. They reported that the best predictors of practitioner's attitudes towards HIV patients were: the age of the practitioner, friendship with HIV-infected people, and known HIV patients.

In a series of three studies McCarthy and colleagues (1996,1997 and 1999) conducted research to detect the influence of gender, the role of age- and population-based differences and non-response bias in the infection control practices, knowledge and attitudes of dentists in Ontario Canada concerning HIV/AIDS. The study showed a statistical difference in the

dentists' willingness to provide treatment for HIV/AIDS positive patients for age and population-based differences. There was no statistical difference between male and female practitioners in willingness to treat HIV-infected patients. On the contrary, Kunzel (1997) reported greater willingness among female dentists to treat HIV/AIDS patients.

The review of literature shows that most of the KAP studies in South Africa and internationally have focused mostly on dentists. Dental therapists and oral hygienists are an integral part of the oral health profession; their knowledge, attitudes and practices toward HIV/AIDS need further exploration in order to mobilise them as a key player in the fight against HIV/AIDS.

1.3 Motivation

Oral health personnel can play an essential role in the fight against HIV/AIDS. Studies which seek to assess OHCW knowledge, attitudes and practices towards HIV/AIDS yield important information, which could be useful in: -

1. Improving the quality of care provided in the dental surgery
2. HIV/AIDS and oral health policy formulation
3. Planning skills development and training programmes for OHCW
4. Evaluating previous training programmes
5. Refining existing international recommendations (e.g. Centers for Disease Control Infection Control Guidelines) to the South African context
6. Drawing up South African specific guidelines
7. Informing dental curricula for undergraduate and postgraduate students.

1.4 Aim and Objectives

Aim

The aim of the study was to determine the knowledge, attitudes and practices of oral hygienists and dental therapists on HIV and AIDS.

Objectives

The objectives were to: -

1. Assess the general and oral health specific knowledge of oral hygienists and dental therapists on HIV/AIDS
2. Explore the attitudes of dental therapists and oral hygienists towards patients with HIV/AIDS
3. Determine the infection control practices of dental therapists and oral hygienists.
4. Identify areas which are important to dental therapists and oral hygienists with respect to continuing education

2.0. METHODS AND MATERIALS

2.1. Study design, population and sampling

The study was a descriptive, cross-sectional survey. The sample comprised all oral hygienists and dental therapists registered with the South African Health Professionals' Board. The total sampling frame was one thousand, one hundred and sixty (1160) OHCW, made up of 831 oral hygienists and 329 dental therapists. The sampling frame containing details of the OHCW was purchased from the Health Professionals' Board of South Africa.

2.2 Data collection

The data was collected using a questionnaire with mostly closed ended questions covering, among others: demographic factors; general and oral health specific HIV/AIDS knowledge; attitudes towards HIV/AIDS patients; infection control practices and ethical/legal issues (Appendix 1). The questionnaire was modified from a previous study conducted at the Division of Public Oral Health, School of Public Health, Faculty of Health Sciences, University of the Witwatersrand. Hence it had been tested and tried on a wider sample before use in this survey. The questionnaire with an information letter was mailed to the 1160 OHCW by postal mail using the postal addresses provided on the sampling frame. A stamped return envelope was included in the mailed package for ease of response. A second set of mailing targeting non-respondents was planned three month after the initial mailing.

2.3. Analysis of data

Data was analysed on an IBM-compatible microcomputer using STATA Version 7. Quantitative data was analysed using simple proportions, chi-square, and t-tests and regression analysis as appropriate.

2.4. Ethical considerations

Ethical clearance was received from the Committee for Research on Human Subjects, University of the Witwatersrand (Appendix B). Protocol number – M990931. A covering information letter detailing the purpose of the research was attached to the questionnaire. The letter clearly stated the voluntary nature of the research indicating that participants were not at all obliged to response to the questionnaire.

3.0. RESULTS

3.1 Response Rate

One thousand one hundred and sixty (1160) questionnaires were mailed by post to 831 oral hygienists and 329 dental therapists nationally in South Africa. Two hundred and eighty one (281, 24%) responses were received from the first questionnaire mailing. To improve the response rate, questionnaires were re-mailed 3 month after the initial mailing only to those who had not responded initially. This resulted in an additional 62 responses giving a final number of 318 (27.4 %) questionnaires that were completed and returned. The response rate is shown on Table 1.

Table 1. Number and percentage of respondents by job category

Group	Respondents	Total number	Percentage
Hygienists	255	831	31%
Therapists	63	329	19%
Overall	318	1160	27%

Of the 318 who responded 255 were oral hygienists, 63 were dental therapists.

3.2. Demographic information

Figure 2 shows the provincial percentage distribution of the respondents overall and by profession respectively.

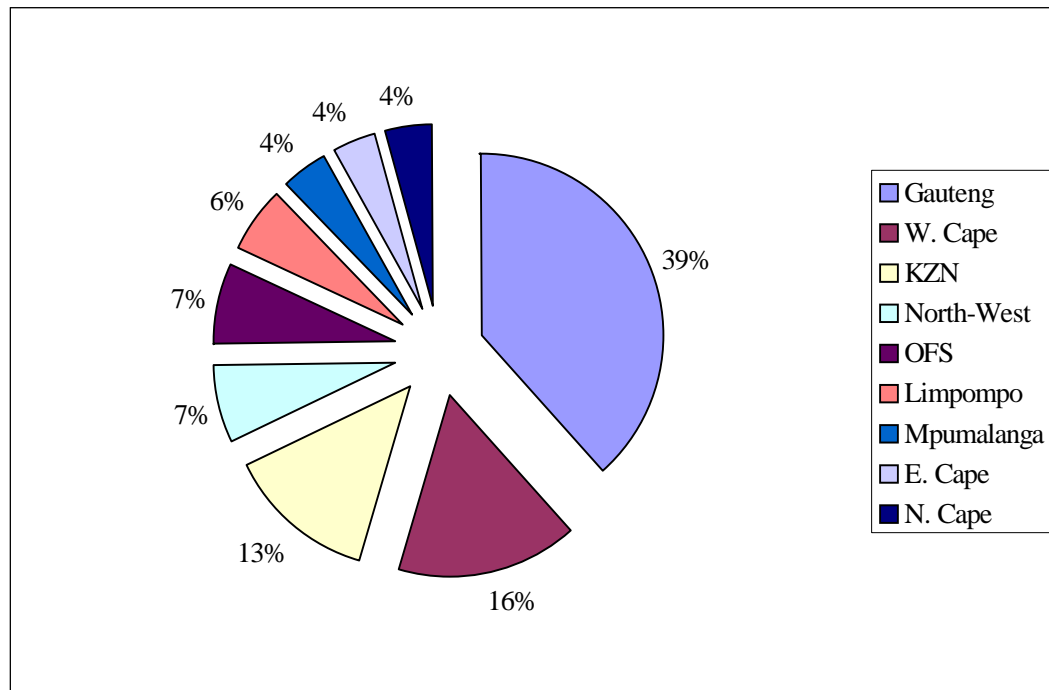


Figure 2. Percentage distribution of the respondents by province

The mean age (\pm SD) of the respondents was 31.4 (\pm 9.3) years (range 22 to 71 years). There was an equal gender distribution for dental therapists; 31 (49.2%) were female and 32 (50.8%) male. All the oral hygienists were female.

Just over 72% of the oral hygienists were in private practice compared to about 20% in the public sector. The dental therapists were almost equally distributed between public (49.2%) and private institutions (47.6%). The majority (95.6%) of the respondents had their professional and/or in-service training in South Africa. The mean number of years in current practice was 7.2 ± 5.78 (range 1 to 26 years) for oral hygienists and 5.99 ± 5.98 (range 1 to 24) for dental therapists.

3.3. HIV Knowledge and skills

A large percentage (68%) of the respondents did not know the prevalence of HIV in the district in which they worked (Figure 3).

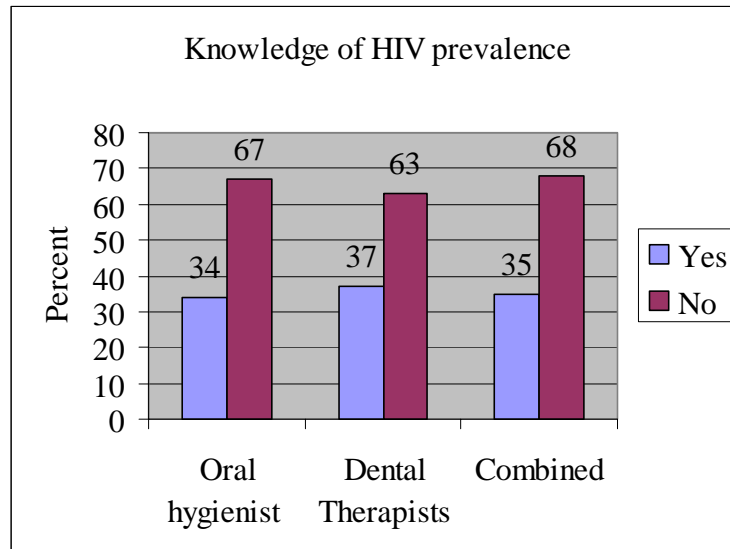


Figure 3. Percentage of respondents with knowledge of the HIV prevalence in their work district.

Table 2 illustrates the respondents' level of agreement with statements relating to their knowledge of HIV and AIDS. Generally respondents were well acquainted with the modes of HIV transmission. Eleven (11) respondents, eight (8) of which were oral hygienists, disagreed that HIV infection could be transmitted in semen. Of the 34 who agreed that mosquitoes are vectors in the transmission of the HI Virus, 32 were oral hygienist and two dental therapists. Approximately 35% of all respondents disagreed that infection control measures that protect against Hepatitis B could provide protection against HIV.

Table 2. Level of agreement to statements relating to the transmission of HIV/AIDS

STATEMENT	Agree		Disagree		Don't know		No response	
	%	n	%	n	%	n	%	n
HIV infection is transmitted in semen	91.5	291	3.2	10	0.9	3	4.4	14
HIV infection can be transmitted through saliva	25.7	82	60.1	191	6.8	22	7.4	23
HIV infection can be transmitted through mosquito bites	10.1	32	76.3	243	8.0	25	5.6	18
HIV infection can be transmitted through blood	95.0	302	0.9	3	0.0	0	4.1	13
Infection control measures that protect against Hepatitis B would provide adequate protection against transmission of HIV	51.9	165	34.8	111	8.8	28	4.5	14

3.4 Oral manifestation of HIV/AIDS seen in the dental surgery

Figure 4 shows the reported frequency of HIV oral manifestations as seen by the respondents.

The most commonly seen lesions were necrotizing ulcerative gingivitis (69%) and periodontitis (57%). The least common lesion seen was Non-Hodgkin's Lymphoma (7%).

Just over 50% of the respondents had seen oral candidiasis, which is reported to be one of the most common manifestations of HIV/AIDS in the mouth.

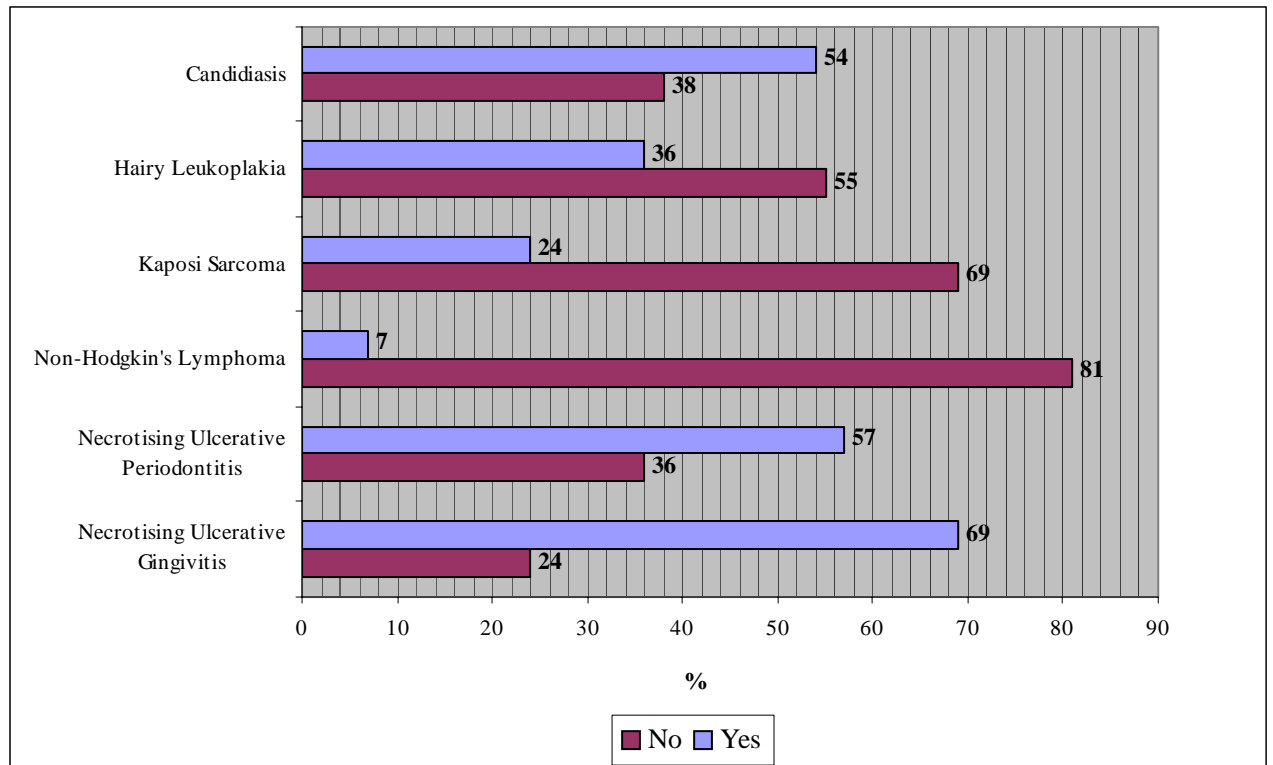


Figure 4. Percentage of respondents that have seen selected oral manifestations of HIV/AIDS in their dental practices

3.5. Management of HIV/AIDS in the dental surgery

Table 3 illustrate the respondents' assessment of the skills that are necessary for managing HIV/AIDS in their places of work.

Table 3. Respondents' assessment of the personal skills that are necessary for the management of HIV/AIDS in the dental surgery.

“Do you possess the skills necessary for”: -	Yes		No		Don't know		No response	
	%	n	%	n	%	n	%	n
Making a tentative diagnosis of the early oral manifestations of HIV/AIDS infection?	48.0	153	36.5	116	10.2	32	5.3	17
Establishing infection control procedures?	89.7	285	4.1	13	2.1	7	4.1	13
Communicating with patients affected by HIV in a manner that you consider appropriate and understandable?	63.2	201	21.5	68	11.2	36	4.1	13
Using appropriate routes of referral for diagnosis?	68.6	218	20.2	64	7.0	22	4.2	14
Counselling HIV positive patients?	25.3	80	60.9	194	8.8	28	5.0	16
Managing the oral opportunistic diseases associated with HIV?	40.7	129	42.2	134	11.8	38	5.3	17
Handling occupational exposure in the dental clinic?	62.4	198	21.5	68	11.2	36	4.1	16

With the exception of skills for infection control, a large percentage of respondents expressed a lack of other skills necessary for the management of HIV and associated oral manifestations in the dental surgery with 61% reporting a lack of counselling skills and 42% lacking the

skills necessary for the management of opportunistic diseases associated with HIV/AIDS, (Table 3).

3.6 Infection control practices

A robust measure of commitment to infection control by OHCW should be the extent to which practitioners take personal steps in preventing the spread of infection in the workplace by, for instance, firstly ensuring that they are up-to-date with recommended vaccinations such as hepatitis B and secondly, taking steps to know their HIV status.

Results show that 84% of the respondents in both categories reported having had a hepatitis B vaccination in the past three years (Figure 5). Results for HIV testing were not as encouraging, with only 13.4% having undertaken a voluntary HIV test, while most (56%) went for an HIV test for insurance reasons as shown below.

Reason for HIV test	Percentage
Insurance purposes	56%
Blood donation	13%
Needle-stick injury	10.7%
Voluntary	13.4%
Other	6.9%

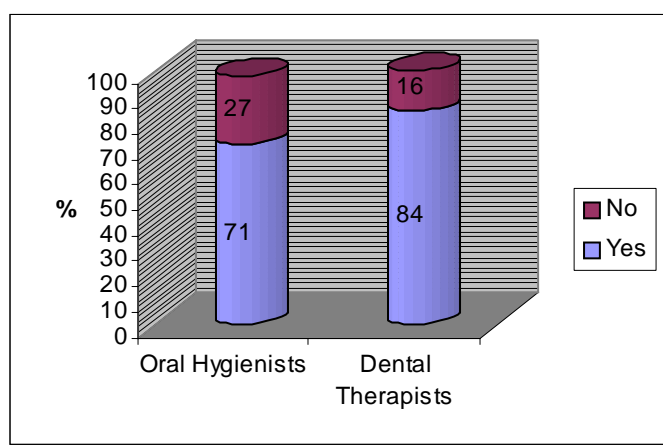


Figure 5. Number and percentage of respondents that have previously taken an HIV test

Respondents were asked to record their compliance with recommended infection control practices that should be adhered to before, during and /or after treating patients in the dental surgery. The responses in Table 4 have been sorted in ascending order of the affirmative response of “Yes”.

Table 4. Response to the question: “Which of the following do you routinely do before, during or after treating patients?”

Which of the following do you routinely do before, during or after treating patients?	Yes		No		No response	
	%	n	%	n	%	n
Use bleach or similar products when washing coats, etc.	41.8	133	52.1	166	6.1	19
Wear protective garments (white coat, green gown, apron etc)	54.3	173	42.2	134	3.5	11
Wash hands before removing gloves	54.5	173	41.1	131	4.4	14
Flush water lines after treating each patient	60.3	192	33.8	107	5.9	19
Sterilisation of hand pieces and attachments	63.4	202	32.2	102	4.4	14
Wash hands before putting on gloves	78.9	251	16.9	54	4.1	13
Wear a mask	86.5	275	10.0	32	3.5	11
Disinfect light handles	86.5	275	9.1	29	4.4	14
Immediately disposing needles used for injections	86.9	276	3.0	10	10.1	32
Use disposable items	88.8	282	7.4	24	3.8	12
Change gloves after each patient	89.1	283	6.7	21	4.1	13
Disinfect working surfaces	90.9	289	5.0	16	4.1	13
Wear gloves	93.8	298	2.6	8	3.5	11
Autoclave/chemoclave hand instruments	94.1	299	2.4	8	3.5	11

3.7. HIV/AIDS continuing education

The questionnaire contained 3 broad questions on respondents' participation in HIV/AIDS continuing education workshops or seminars. Responses are shown on Table 5.

Table 5. Responses (percentage and number) to questions relating to HIV/AIDS continuing education

Attendance for continuing education on HIV/AIDS	Yes		No		No response	
	%	n	%	n	%	n
Have you attended any seminar/workshop where HIV/AIDS was discussed in the last 2 years?	52	165	44	140	4	13
Do you think you need additional education on HIV/AIDS?	85	270	11	35	4	13
Would you like to attend a course on HIV/AIDS as part of the mandatory continuing professional education?	87	277	8	25	5	16

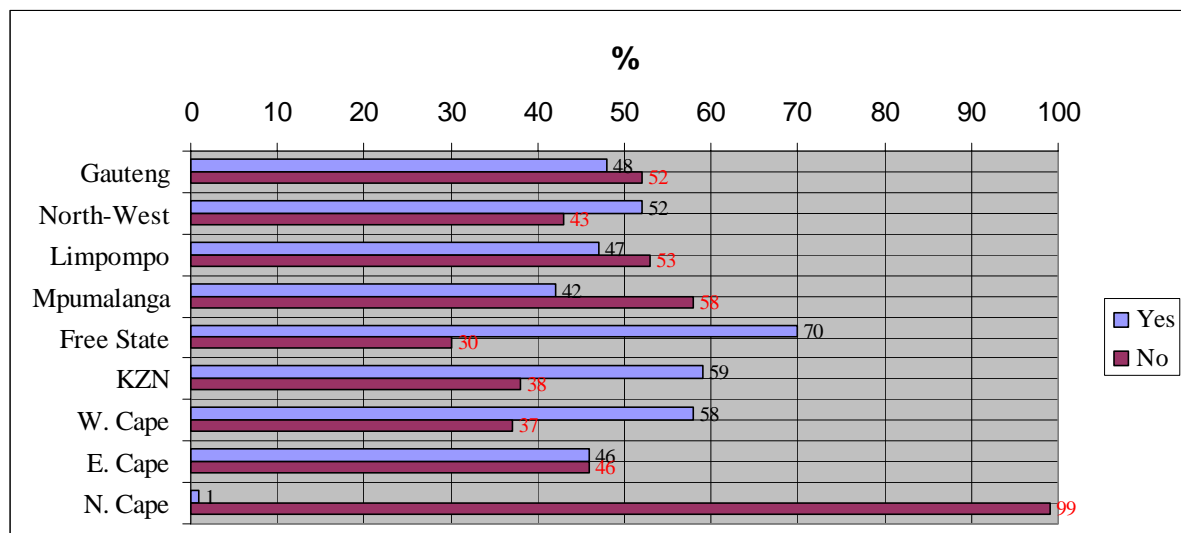


Figure 6. Percentage provincial distribution of respondents' attendance at seminars/workshops where HIV/AIDS was discussed.

The Free State province had the highest number (70%) of respondents who had attended a workshop where HIV/AIDS was discussed, followed by KZN (59%) and the Western Cape (58%). Only 1% of the respondents from the Northern Cape reported having attended such a seminar (Figure 6).

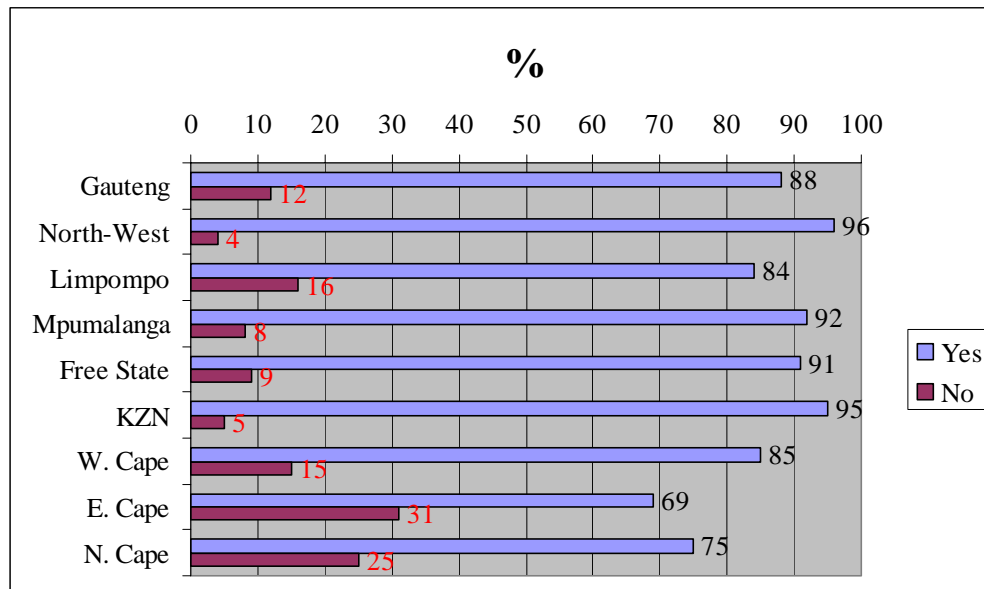


Figure 7. Percentage of respondents who require additional education on HIV/AIDS by province

Respondents from all provinces expressed a need for further training on HIV/AIDS, even among those that had reported a high previous attendance (Figure 7).

Table 6 shows the respondents' rating of HIV related topics for continuing education. All the topics were ranked as important with respondents indicating a willingness to attend courses where such topics would be discussed. The topics on HIV transmission, oral manifestations of HIV, the natural progression of HIV, treatment protocols, risk to health workers and patients were rated by more than 70% of respondents as 'very important' for inclusion in continuing education courses.

Table 6. Respondents' rating of the importance of continuing education on aspects of HIV/AIDS.

Topic	Very important		Important		Not Important		No Response	
	%	n	%	n	%	n	%	n
Epidemiology	52.4	167	39.1	124	3.0	10	5.5	17
Pathogenesis	56.8	181	35.2	112	1.5	5	6.5	21
Transmission	82.0	261	12.7	40	0.9	3	4.4	14
Oral and systemic manifestations	82.9	264	12.6	40	0.0	0	4.5	14
Natural history, treatment protocols, risks to health workers and patients	74.6	237	20.1	64	0.3	1	5	16
Legal and ethical issues	51.6	164	42.2	134	1.5	5	4.7	15
Psycho-social issues including counselling	47.3	150	44.7	142	3.8	12	4.2	13

3.8 Legal, ethical and social issues surrounding HIV

Table 7 and 8 show the OHCWs responses to questions on of legal, ethical and cost issues related to treating and referring HIV positive patients in the dental surgery. The question on the OHCW's 'legal obligation' to treating HIV positive patients received the highest number of uncertain responses indicated by the 15,6% that answered with a 'Don't know option'. Although the majority (81,5%) of the respondents agreed that they have a moral obligation to treat HIV positive patients, 22,6% agreed that these patients are best treated in government clinics rather than private settings where most of the respondents worked.

Table 7. Responses to questions on the ethical and legal aspects of managing patients with HIV/AIDS in the dental practice.

	Agree		Disagree		Don't Know		No Response	
	%	n	%	n	%	n	%	n
There is a legal obligation to treat HIV positive patients	56.9	181	23.3	74	15.6	50	4.2	13
There is an ethical obligation to treat HIV positive patients	81.5	259	8.2	26	6.2	20	4.1	13
Additional infection control precaution must be taken in the treatment of HIV/AIDS positive patients in the dental surgery	73.8	235	15.6	50	7.1	23	3.5	11
Any medical/dental information can only be divulged to a third party upon the authority of the patient	83.9	267	8.8	28	3.8	12	3.5	11
During referral of known HIV/AIDS cases, the health worker to whom a patient is referred must be informed of the patient's HIV status	87.4	278	8.5	27	0	0	4.1	13
Patients with HIV/AIDS are best treated in government clinics rather than in private settings	22.6	72	60.6	193	12.9	41	3.9	12

Despite the knowledge of the effectiveness of Standard precautions 71,8% of the OHCWs would support pre-operative HIV testing for every dental patient and 74% would support mandatory HIV testing for health care workers (Table 8).

Table 8. Responses to general questions regarding the management of patients with HIV/AIDS in the dental practice

	Yes		No		No Response	
	%	n	%	n	%	n
Do you think facilities in your clinic/practice are adequate to ensure infection control in the treatment of HIV/AIDS patients?	65.2	207	30.1	96	4.7	15
Are you concerned about losing patients if it is known that you treat HIV positive patients?	42.6	135	53.2	169	4.2	13
Are you concerned about the additional financial cost of infection control in your surgery?	19.8	63	74.6	237	5.6	18
Are you hesitant about treating HIV-positive patients?	45.0	143	50.6	161	4.4	14
Will you support routine pre-operative HIV testing for every dental patient?	71.8	228	22.3	71	5.9	19
Will you support mandatory HIV testing for health care workers?	73.8	235	22.3	71	3.9	12
Has any diagnosed HIV-infected patient been treated by you?	56.6	180	36.5	116	6.9	22

3.9. Available support for managing HIV in the dental surgery

Table 9. Percentage and number of respondents who have access to important items of support for the prevention of HIV infection.

Do you have access to:-	Yes		No		No response	
	%	n	%	n	%	n
Written code of ethics on the treatment of HIV/AIDS patients	15.3	49	80.0	254	4.7	15
Written post-exposure protocol for needle -sticks and cuts	34.1	108	61.5	196	4.4	14
Post-exposure medication	28.8	92	66.2	211	5	16
Written policy for HIV infected staff	11.2	36	83.8	266	5	16
Written policy on waste disposal	38.9	124	55.8	177	5.3	17
Continuing education courses, workshops and seminars on HIV/AIDS infection	36.9	117	58.4	186	4.7	15
Journal articles, books and other reports on HIV/AIDS	58.5	186	37.1	118	4.4	14

Table 9 shows a general lack of support items or materials important for the prevention and management of HIV in the dental practice. Eighty percent of respondents reported that they did not have access to written code of ethics on management of HIV/AIDS patients.

4.0 DISCUSSION

The Knowledge, Attitudes and Practices (KAP) of oral health care practitioners on HIV/AIDS have been widely studied in South Africa and abroad. However, in South Africa focus has been biased towards exploring only dentists as a group within oral health care workers. A challenge also rests in translating the findings of all the studies conducted in the past into action.

Overall, respondents in this study illustrated sound knowledge on oral manifestations of HIV/AIDS and modes of transmission of the virus (Table 2). However, there were some noteworthy yet disturbing gaps in knowledge. Firstly, 10% of the respondents said that the virus could be transmitted through mosquito bites and 8% did not know whether the statement was correct or not. Similarly, Rudolph and Ogunbodede (1999) reported that 12.8% of respondents, who were mostly non-clinicians, believed that mosquito bites could transmit the HI Virus. This study, which did not include non-clinical staff, shows that even oral health care workers are uncertain about this mode of transmission. Seven years earlier there was already uncertainty about insects as potential vectors for HIV with 11% of the respondents reporting that insects can transmit HIV (Darling, Arendorf and Samaranayake, 1992). This is despite evidence showing conclusively that the HI Virus cannot be transmitted via mosquito bites (Baylor College of Medicine, 2001).

Secondly, respondents displayed uncertainty about the transmission of the HI Virus via saliva – with 25% of respondents agreeing; 60% of respondents disagreeing and 14% of respondents unsure whether the virus could be transmitted through saliva. HIV has been isolated from most body fluids including saliva. However, transmission of the virus via saliva is only likely when the saliva is blood contaminated and the recipient oral mucosa has breakage, lacerations or ulceration (Greenspan et al, 1990).

Compared to other health professionals OHCW have a lower risk of being infected with HIV due to the relatively low amount of viral load in saliva, which contain anti-HIV activity (Heir and Zicchari, 1998). The introduction of rapid HIV testing kits, which use saliva as a testing medium could play a role in the confusion surrounding the infectivity of saliva if the science behind HIV testing is not well understood. It could be wrongly assumed that saliva contains a high concentration of transmittable virus particles detected by the oral test, while the fact is that the test detects HIV antibodies and not the virus itself.

A high number (82%) of respondents rated HIV transmission as a very important topic that should be included in continuing education workshops (Table 6). Such workshops would be useful in clarifying matters such as modes of transmission of the HI virus. Other topics that were rated as very important were the oral and systemic manifestations of HIV/AIDS (82.9%) and treatment protocols of HIV positive people (74.6%).

The respondents' knowledge on the prevalence of HIV in their districts was lacking, with more than 60% (65% of oral hygienists and 62% of dental therapists) not knowing the prevalence.

The efficacy of the standard infection control protocols has received wide review ever since it was discovered that HIV is the causative agent for AIDS (Bagg, 1996). It is now well known that standard infection control measures are effective in preventing occupational transmission of the virus in the dental surgery. In fact, OHCW are at a greater risk of contracting hepatitis B infection in the workplace, a risk of about 30% per encounter as compared to only 0.3% transmission risk for HIV (Udasin and Gochfeld, 1994). In spite of this knowledge, an

alarming 35% of respondents did not agree that infection control measures that protect against the hepatitis B virus would provide adequate protection against HIV. In addition 73.8% of the respondents agreed with the statement - *“additional infection control measures must be taken in the treatment of HIV/AIDS patients in the dental surgery.”*

This could be a reflection of the fear of contracting HIV that is ingrained in society largely due to the lack of knowledge of transmission and the view of HIV as a ‘death sentence’ as no cure has yet been found. The exaggerated concern displayed by the OHCW in this study of contracting HIV in the surgery is not matched by their personal prevention efforts in for instance getting to know their HIV status and undertaking vaccination against infectious organisms such as hepatitis B. Of the respondents who had an HIV test in the past, only 13.4% had the test voluntarily and 20% of the respondents had not had a HBV vaccination in the last three years.

Even though 56.6% reported having treated a patient with HIV, almost half of the practitioners (42.6%) reported a concern of losing patients if it was known that they treat HIV positive people and a staggering 71.8% would support routine pre-operative HIV testing for every dental patient. The value of such routine HIV testing is questionable as it is recommended that practitioners should adopt standard precautions when treating patients in the dental surgery. In fact, knowledge of a patient’s HIV status could promote discrimination against the patient. The practitioners’ behaviour towards HIV/AIDS patients could differ significantly compared to HIV negative patients exacerbating the stigma attached to those who are positive and could result in patients not disclosing their HIV status.

In 1995 the Complaints Committee Panel Decision of the Royal College of Dental Surgeons of Ontario ordered a dentist to appear in front of a disciplinary committee for what the panel

termed “*inappropriate behaviour*” towards an HIV positive patient. The patient accused the dentist of “over-dressing” during his second appointment after he had disclosed to the dentist his status at the first appointment. On investigation the panel ruled that the dentist had treated the patient with “*extra*” precautions than she would normally in the surgery (Harel-Raviv and Graham, 1997).

Application of the *Universal Blood and Body Fluid Precautions*, commonly known as Standard Precautions, developed in 1995 and updated in 2003 by the CDC would prevent such a situation from arising. The precautions recommend that all people (patients) should be treated as if they are infected with HIV or other pathogens (Centers for Disease Control and Prevention, 2003).

HIV and AIDS have been successfully classified as a disability under the Constitution of the Republic of South Africa and the Bill of Rights. Essentially this classification prohibits any discrimination against those living with HIV or AIDS under the Equality clause (The Constitution, 1996).

The CDC’s guidelines recommend hand washing before wearing gloves and after the removal of gloves following patient care. Generally OHCW in this study reported adhering to infection control measures during and after patient care. More than 90% reported wearing gloves during patient care. Disturbingly 17.6% reported not washing of hands before putting on gloves, 6.7% did not change gloves between patients and 10% did not wear masks. Rudolph and Ogunbodede (1999) reported that infection control practices of the OHCW in their study were ‘*fairly good to questionable*’. They found that oral hygienists were the least compliant in certain areas of infection control with 13% not wearing masks during patient treatment. In addition they found that the majority of the 42% of the respondents who did not wear protective clothing were oral hygienists.

Box 2 below is an extract from the CDC (2003) on the importance of hand care and gloving before, during and after patient care by OHCWs.

“Wearing gloves does not eliminate the need for hand washing. Hand hygiene should be performed immediately before donning gloves. Gloves can have small, unapparent defects or can be torn during use, and hands can become contaminated during glove removal. These circumstances increase the risk of operative wound contamination and exposure of the OHCW’s hands to microorganisms from patients. In addition, bacteria can multiply rapidly in the moist environments underneath gloves, and thus, the hands should be dried thoroughly before donning gloves and washed again immediately after glove removal”.

Box 2. Extract from CDC Guidelines 2003. pp 17

Lack of compliance to recommendation could be a result of limited resources, especially in isolated rural public health institutions. However, this statement does apply only to a limited extent to the respondents in this study as most (72% of hygienist and 47.6% of therapists) were based in private practices and in well-resourced provinces namely Gauteng and the Western Cape.

Infection control practices of oral hygienists were also found to be inadequate by De Kock and van Wyk (2001) in a survey on 56 oral hygienists in South Africa. The survey reported that only 34% used eye protection and 11.9% did not change gloves between patients. Only 44% of hygienists in the survey reported being satisfied with infection control measures in their workplaces.

Although 65.2% agreed that facilities in their practices were adequate to ensure good infection control measures, 22.6% agreed with the statement *“HIV/AIDS patients are best treated in government rather than private clinics”*. Such attitudes, opinions and views could promote stigmatisation and discrimination against HIV infected people and amount to human

rights violations. Those infected with the virus are often denied access to health care services, or denied basic medical treatment that is available to other parties (Strode and Grant, 2001).

The results of this study demonstrated a considerable gap in the skills of practitioners with regard to: the diagnosis and management of HIV-associated oral lesions, counselling and management of HIV positive patients and in handling occupational exposure in the dental clinic.

Oral health care workers could play a major role in the management of the HIV/AIDS epidemic. Oral manifestations are often the first presenting signs of HIV infection and play a significant role in predicting the progression of the disease. HIV-infected patients with oral hairy leukoplakia and oral candidiasis were shown to progress more rapidly to AIDS and death (Badri, Maartens and Wood, 2001). In addition proper management of oral conditions reduces morbidity and promotes food intake in HIV infected people thus reducing malnutrition.

The commonly seen oral lesion in this study was necrotising ulcerative gingivitis (seen by 69.2% respondents) followed by necrotising ulcerative periodontitis (56.6%). This was an unusual finding compared to other studies that show that the commonly seen oral lesion in HIV infected patients is candidiasis (Darling, Arendorf and Samaranayake 1992; Rudolph and Ogunbodede 1999). However, this could be a reflection of the nature of the work commonly practised by the respondents, which is mostly scaling and polishing of teeth. Hence, the focus on the periodontium especially the gingiva during the procedure could lead to easier identification of ulcerative gingivitis. However, it could also be a case of misdiagnosis as indicated by the 36.5% of the respondents who reported that they did not possess the skills to make a tentative diagnosis of the early oral manifestation of HIV/AIDS. In addition 42.2% reported that they are unable to manage the oral opportunistic infections associated with HIV.

Less frequently seen lesions were Non- Hodgkin's Lymphoma (not seen by 80.7% of respondents), Kaposi Sarcoma (not seen by 66.8%) and hairy leukoplakia (not seen by 55%).

Respondents showed a good understanding of the legal and ethical discussions around the treatment of HIV/AIDS patients. A relatively high number (15.6%) of respondents did not know whether there was a legal obligation on their part to treat HIV positive patients as compared to only 6% who were uncertain of their moral responsibility (Table 7).

Limitations

In general studies KAP studies have several known disadvantages. Firstly, knowledge and attitudes are not always a predictor of action. KAP studies often ignore the social and material context in which behaviour or practice occurs. The second criticism of the study is related to the rigidity of KAP questionnaires. The questions were pre-coded and may provide answers that some respondents might not otherwise be capable of formulating themselves. This study assumed that the respondents had previously given considerable thought about HIV/AIDS and hence developed attitudes about it. However, when an individual has no prior attitude to a subject they may have to construct a response on the spot, which might be transient, unstable and not useful. Thirdly, the reliability and validity of KAP studies have not been as good as frequently assumed. In responding to questions that seek to explore knowledge, respondents could simply verify in textbooks and other material.

A major limitation of this study is the low response rate that could limit inferring of findings to the entire source population. Only 318 (out of 1160) hygienists and therapist responded with a resultant response rate of 27.4%. The formulation of questions is another probable limitation in this study. The wording and phrasing of some of the questions was not clear and might have caused confusion and ambiguity.

5.0 Conclusion and Recommendations

The results of this study cannot be generalised to the general population of oral health care workers due to low response rate. The study, however, gives further insight into the knowledge, attitudes and practices of this important group of health care workers. An important recommendation for future studies is to identify more creative ways to gain representative responses to KAP surveys involving oral health care workers. Methods such as: handing out questionnaire in conferences; offering incentives; or linking questionnaire completion to continuing education points; should be investigated with an aim of increasing responses.

This study confirms findings of previous studies that show that OHCW, specifically oral hygienists and dental therapists, have sound general knowledge on this subject. However training programs should still pay particular attention to knowledge transfer on basic concepts of HIV/AIDS especially transmission.

Presently it is estimated that 1 in 4 people in the country is HIV positive. The rapid increase in the number of new cases of HIV means that oral health care workers will handle an increasing number of HIV positive patients at work. The need to improve the skills of OHCW in the diagnosis and management of oral manifestations of HIV/AIDS cannot be over-emphasized

There is a need to improve awareness of clinical signs and symptoms of underlying infection and the ability to refer patients for more investigations. HIV training of OHWC in South Africa has to a large extent been uncoordinated and often involved isolated efforts. The National Government of Health embarked on a massive HIV/AIDS training program for

health personnel, including OHCW. Academic institutions have also been involved in training. It is thus recommended that an audit (review and evaluation) of previous training programmes be carried out and results thereof be used in planning further training of OHCW.

This study further exposed the lack of essential skills necessary for effective management of HIV/AIDS patients in the dental surgery. Special attention should be placed on skills development for OHCW in the areas of communication with and counselling of HIV/AIDS patients. The dental curriculum at academic institutions should respond to this need and concentrate academic input on the affective learning domain with an aim of improving in these areas for undergraduate and postgraduate students.

OHCWs are considered role models in society. Their attitudes to patients with HIV/AIDS could influence those of the community in which they live. It is recommended that research should explore employing behaviour change theories with an aim of modifying the attitude and behaviours of OHCW towards HIV/AIDS patients.

HIV risks assessments of OHCW tend to focus solely on the occupational risk of transmission and often omit other potential contributory factors such as gender. The vast majority of oral hygienists in the country are female and almost half (49.2%) of dental therapists in this study were female. Dental practices also employ receptionists, dental nurses and secretaries who are mostly female. Women are a susceptible group in South Africa with a higher risk of contracting HIV both physiologically and politically (Shisana and Simbayi, 2002). The dental surgery should be used as a health – promoting workplace and a viable site where preventive strategies such as Voluntary Counselling and Testing (VCT) can be explored.

REFERENCES

1. Aizawa F, Yonemistu M, Aizawa Y, et al. (1996). [A survey on infection control practices, knowledge and attitudes toward AIDS/HIV among dental practitioners]. *Nippon Koshu Eisei Zasshi*, Vol. 43 No. 5, pp364 – 73.
2. Aizawa F, Yonemistu M, Akada H, et al. (1998). A survey of potential risk factors for HIV transmission through dental practice in Japan. *Asia Pacific Journal of Public Health*, Vol. 10, No.1, pp21-8.
3. Arendorf T, Sauer G, Bredekamp B, et al. Guidelines for the diagnosis and management of the oral manifestations of HIV infection and AIDS. Department of Oral Medicine and Periodontology, Faculty of Dentistry University of the Western Cape/ WHO collaborating centre for oral health, Cape Town. Undated.
4. Arendorf TM, Bredekamp B, Cloete CAC, et al (1998). Oral manifestations of HIV infection in 600 South African patients. *Journal of Oral Pathology and Medicine*, vol. 27, 176-179.
5. Badri M, Maartens G and Wood R. (2001). Predictors and Prognostic value of oral hairy leukoplakia and oral candidiasis in South African HIV-infected patients. *South Africa Dental Journal*. Vol.56, pp592-595.
6. Bagg J. (1996). Common Infectious Diseases. *Dental Clinics of North America*. Vol. 40, pp385-393.
7. Baylor College of Medicine. (2001). HIV Nursing Curriculum. Baylor International Pediatric AIDS Initiative, Baylor College of Medicine, Texas, USA. pp 97.
8. Bennet M, Weyant RJ, Wallisch JM, et al. (1995). Dentists' attitudes toward the treatment of HIV-positive patients. *Journal of the American Dental Association*. Vol. 126, No.4, pp509-514.
9. Centers for Disease Control and Prevention. (1993_a). CDC Recommended infection-control practices for dentistry. *Morbidity and Mortality Weekly Report*, 42 No. RR-8
10. Centers For Disease Control and Prevention. (1993_b). Investigations of Persons Treated by HIV-Infected Health Care Workers – United States. *Morbidity and Mortality Weekly Report*. 42 (17): 329-331
11. Centers for Disease Control and Prevention. (1993_c). Revised classification system for HIV infection and expanded surveillance definition for AIDS among adolescents and adults. *Morbidity and Mortality Weekly Report*, 41 No. RR-17
12. Centers for Disease Control and Prevention. (2003). Guidelines for Infection Control in Dental Health-Care Settings. *Morbidity and Mortality Weekly Report*, 19, 52, No. RR-17

13. Daniel SJ. (1998). Compliance with infection control procedures and attitudes of oral health care providers towards patients with HIV/AIDS: A synthesis of literature. *Journal of Dental Hygiene*. Vol. 72, No. 3, pp45-56.
14. Daniel SJ, Silberman SL, Bryant EM, et al. (1996). Infection control, knowledge and attitudes of Mississippi dental hygienists. *Journal of Dental Hygiene*. Vol. 70, No. 1, pp22-34.
15. Darling M, Arendorf T and Samaranayake LP. (1992). Oral care of HIV-infected patients: the knowledge and attitudes of South African dentists. *Journal of the Dental Association of South Africa*, Vol. 47; pp.399-402.
16. De Kock K and van Wyk CW. (2001). Infection control in South African oral hygiene practice. *South African Dental Journal*. Vol 56, No.12, pp584-587.
17. Greenspan D, Schiodt M, Greenspan JS, et al. 1990. AIDS and the Mouth, Diagnosis and Management of Oral Lesions. Copenhagen: Munksgaard.
18. Harel-Raviv M and Graham PE. (1997). The rights of dentists to take extra precautions when treating patients with the Human Immunodeficiency Virus. *Quintessence International*. Vol. 28, No.12, pp779 –783.
19. Heir J and Zicchari VB. (1998). Transmission of Infectious Disease in the Dental Setting. *The Mount Sinai Journal of Medicine*. Vol. 65, pp378-382.
20. Johnson S, Schierhout G, Steinberg M, et al. (2002). AIDS in the household. In Petrida I editor: *2001 South African Health Review*. Health Systems Trust, South Africa.
21. Kunzel C, Sadowsky D and Tseng CL. (1997). Comparing predictors of willingness to treat HIV+ patients for New York City male and female general practice dentists 50 years of age or younger. *Public Health Dentistry*. Vol. 57, No. 3, pp159-62.
22. McCarthy GM, Kovall JJ, MacDonald JK, et al. (1999). The role of age and population-based differences in the attitudes, knowledge and infection control practices of Canadian dentists. *Community Dentistry and Oral Epidemiology*. Vol.27, No. 4, pp298-304.
23. McCarthy GM and MacDonald JK. (1996). Gender differences in characteristics, infection control practices, knowledge and attitudes related to HIV among Ontario dentists. *Community Dentistry and Oral Epidemiology*. Vol. 24, No. 6, pp412-415.
24. McCarthy GM and MacDonald JK. (1997). Non-response bias in a national study of dentists' infection control practices and attitudes related to HIV. *Community Dentistry and Oral Epidemiology*. Vol. 25, No. 4, pp319-23.

- 25.Naidoo S. (1997). Dentists and cross- infection. *Journal of the Dental Association of South Africa*. Vol.52, pp165-167.
- 26.Naidoo S and Mahommed A. (2002). Knowledge, attitudes, behaviour and prevalence of TB infection among dentists in the Western Cape. *South African Dental Journal*, Vol. 57, No. 11, pp 476-478.
- 27.National Department of Health. (1999). HIV/AIDS and STD Strategic Plan for South Africa 2000 – 2005. Pretoria, South Africa.
- 28.National Department of Health. (2003). National HIV and Syphilis Antenatal Sero-prevalence Survey in South Africa, 2002. Pretoria, South Africa
- 29.Quartey JB. (1998). Impact of HIV on the practice of HIV in Houston, Texas. *Texas Dental Journal*. Vol. 115, No. 11, pp45-56.
- 30.Rudolph MJ and Ogunbodede EO. (1999). HIV infection and oral health care in South Africa. *South African Dental Journal*. Vol. 54, No. 12, pp594-601.
- 31.Shisana O and Simbayi L. (2002). The Nelson Mandela/Human Sciences Research Council Study of HIV/AIDS: South African national HIV prevalence, behavioural risks and mass media household survey 2002. Human Sciences Research Council, Cape Town, South Africa.
- 32.Shisana O, Hall E, Maluleke KR, et al. (2002). The impact of HIV/AIDS on the Health sector, National survey of health personnel, ambulatory and hospitalised patients and health facilities. National Department of Health, Pretoria South Africa.
- 33.Siegal M, Garcia AI, Odom JG, et al. (1990). Treating persons with AIDS: Report on a survey of Ohio dentists' knowledge, attitudes and practices in 1989. *Ohio Dental Journal*. Vol.64, No.1, pp8-13.
- 34.Strode A and Grant KB. (2001). The role of stigma and discrimination in increasing the vulnerability of children and youth infected with and affected by HIV/AIDS. Save The Children, South African Programme.
- 35.Synder GA. (1993). Pennsylvania dental hygienists' knowledge, attitudes and infection control practices in relation to AIDS and AIDS-patients. *Journal of Dental Hygiene*. Vol. 76, pp188-196.
- 36.The Constitution of the Republic of South Africa Act 108 of 1996.
- 37.Udasin IG and Gochfeld M. (1994). Implications of the Occupational Safety and Health Administration's Bloodborne Pathogen Standard for the Occupational Health Professional. *Journal of Occupational Medicine*. Vol36, pp548-555.
- 38.UNAIDS/WHO. (2003). AIDS epidemic update 2003. United Nations Joint programme on HIV/AIDS, Switzerland, Geneva.

39. Weyer K, Lancaster J, Brand J, et al. (2003). Survey of Tuberculosis Drug Resistance in Gauteng 2001 - 2002. Medical Research Council, Pretoria, South Africa.
40. World Health Organization. (1990). Acquired Immune-Deficiency Syndrome (AIDS): Interim proposal for a WHO staging system for HIV infection and disease. *Weekly Epidemiological Record*. 65:221-8.
41. Yengopal V, Naidoo S and Chikte UM. (2001). Infection control among dentists in private practice in Durban. *South African Dental Journal*. Vol. 56, No. 12, pp580-584.
42. Yengopal V, Lalloo R and Patel N. (2003). Statistics in Dentistry: A case study in infection control. 2003. Abstract: XXXVII Scientific Meeting of the South African Division of the International Association of Dental Research Conference;