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Compliance with infection control recommendations in South African dental practices: a review of studies published between 1990 and 2007

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In a country where the prevalence of infectious diseases ranks among the highest in the world, infection control in health care facilities should not be debatable. This unfortunately does not seem to be the case in South African oral health care facilities. This study is a systematic review of available literature on the adherence of South African oral health care professionals to infection control recommendations. Nine focus areas were investigated with regard to infection control practices: knowledge of infectious occupational hazards; personal hygiene and care of hands; correct application of personal protective equipment; use of environmental barriers and disposable items; sterilisation (recirculation) of instruments and handpieces; disinfection (surfaces) and sound housekeeping; management of waste disposal; quality control of dental unit waterlines, biofilms and water; as well as other special considerations. Although South African studies are limited and most of them relied on self-reports, which could have resulted in a serious overestimation of compliance, even these studies indicate serious shortcomings with regard to infection control practices in oral health care facilities in this country. This review highlights opportunity for improvement. Furthermore, it identifies possibilities for future research in infection control and also opportunities to improve infection control education for all oral health care workers in the country.

Key words: Infection control, infectious diseases, oral health care, occupational hazards, personal hygiene, personal protective equipment, environmental barriers, sterilisation, disinfection, dental instruments, waste disposal, dental unit waterlines, biofilms, water

Since 1993, it has been recommended that South African dental practitioners adhere to the infection control (IC) guidelines issued by the US Centers for Disease Control and Prevention (CDC)[1]. In 1998, however, Edward-Miller reported that many health care facilities in South Africa lacked even basic infection control requirements such as water and electricity[2], therefore making it impossible to adhere to any form of recommendation.

It has been estimated that one drop of saliva may contain up to 600,000 bacteria[3] and in no other profession are people in such continuous contact with traumatised tissue, saliva and blood, thus increasing the risk of disease transmission[4]. In South Africa, however, the term 'high risk' takes on a new meaning should one consider the exceptionally high prevalence of infectious diseases in this country. Human immunodeficiency virus (HIV) infection among antenatal clinic attendees

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was 29.1% in 2006[5]. The Hepatitis B carrier rate had previously been estimated at 10-15% for rural populations and at 1-10% for urban populations[6]. Karim *et al.*[7] reported that 81% of females and 86% of males in their study tested positive for at least one hepatitis B serological marker; indicating an infection at some stage of their lives[7]. Although the hepatitis B infection rate should improve as a result of the fact that children born since 1995[5] are being immunised as part of the routine immunisation programme most of the adult population in this country, however, is still not immunised. Furthermore, South Africa records a tuberculosis infection rate among the highest in the world[8]. Oral health care professionals (OHCPs) should therefore be even more cautious of cross-infection and display a higher degree of compliance with current protective guidelines than many other medical colleagues. It is alarming, however, that in South Africa there are still many oral health care workers (OHCWs) who admit to not taking adequate steps to prevent cross-infection[9-24].

In 2005, both public and professional concern were raised after a media release by the Nelson Mandela Foundation[25], confirming that infection control practices in oral health care facilities were inadequate. Visible as well as invisible blood was detected in the facilities and on dental instruments. It was concluded that this was the result of a breakdown in infection control processes that had occurred in South Africa over an extended period of time[26].

This review of published research aims to determine to what extent South African OHCPs adhere to national infection control recommendations, and thereby to identify possible shortcomings. Knowledge of the latter could indicate a strategy for the improvement of infection control in oral health care facilities.

Research materials and methods

Various strategies were followed to identify information on IC research, published between 1990 and 2007, and applicable to South Africa only. This review of adherence to infection control practices included all OHCWs, namely dental practitioners, dental therapists, dental assistants, oral hygienists and students.

The outcome measures used as the baseline for infection control practices were selected according to international recommendations by the British Dental Association[27], CDC[1] and the Australian and New Zealand Dental Associations[28].

These outcomes focus on and include: knowledge of infectious hazards, personal hygiene and care of hands; wearing of personal protective equipment; environmental barriers; sterilisation (recirculation) of instruments and handpieces; disinfection (surfaces) and housekeeping; waste disposal; quality control and maintenance of dental unit waterlines, biofilms and water supply; and other special considerations.

Electronic databases were searched, including Medline (EBSCOhost), Academic Search Premier (EBSCOhost), Science Direct, SA ePublications, SACAT, ISAP by the National Library of South Africa, NEXUS current and completed research, UCTD (Theses and Dissertations at South African universities) and the South African Dental Association's publication library for the period 1990 till the end of September 2007. The search produced 77 publications of which 16 were selected. Publications containing quantitative data were selected, while those containing mere recommendations were excluded.

Results and discussion

In addition to the discussion below, key findings by the various authors are summarised in *Tables 1* and *2*.

Focus area one: knowledge of infectious hazards

As a standard precaution infection control guidelines and recommendations stipulate that the blood and body fluids of all patients should be treated as potentially infectious[1,27,28]. Lack of knowledge of hazards associated with infectious conditions was considered the reason oral health care providers took additional precautions when they treated confirmed HIV/AIDS patients as opposed to patients suffering from other infectious conditions[22,23,29]. Interesting to note was that respondents believed they could differentiate between infected and uninfected patients by just looking at them and that older dentists thought they were more at risk when working on an HIV-infected patient as compared to a hepatitis B-infected patient[22,23]. The majority of non-clinical personnel working in clinics thought that HIV infection could be transmitted through mosquito bites[21]. De Kock and Van Wyk[21] found that 26.8% of respondents did not know the difference between disinfection and sterilisation. Oosthuysen reported that 87% of respondents regarded each patient as a potential source of cross-infection[15], yet only 27.6% possessed an infection control manual with detailed protocols for sterilisation, exposure control or infection control techniques. In the Free State public dental care facilities 57.1% of respondents indicated that they had not received any infection control training in the past two years and that none of the clinics had devised any official infection control policy[14]. Only 30% of the respondents in this study knew that they had to wash their hands after removing gloves. Forty per cent, 27% and 10% respectively, believed gluteraldehyde, Jik® and Dettol® possessed sterilising properties[14]. Nemutandani *et al.*[30] reported that 49.1% of the dental assistants in his study had been given no formal training in infection control.

Table 1 Reported use of barrier protection[15]

	Gloves %	Masks %	Protective eyewear %
Practitioners			
Always	88.4	83.5	55
Sometimes	9.3	11.2	20.6
Never	0.9	3.7	15.3
Other	1	1.2	8.7
No response	0.4	0.4	0.4
Assistants			
Always	65.8	50.4	21.6
Sometimes	28.7	29	23.7
Never	3.2	15.4	50.6
Other	1.9	4.3	3.4
No response	0.4	0.9	0.7

Table 2 A comparison of infection control procedures among dentists in South Africa (adapted from Yengopal, Naidoo and Chikte, 2001[50])

Aspects Surveyed	Naidoo (1994/5) %	Yengopal, Naidoo and Chikte (1999/2000) %	Oosthuysen (2001) %
Routine glove use	87	97.1	88.4
Routine mask use	65	82	83.5
Routine eyewear use	64	53	55
Autoclave use	68	89.7	84.5
Slow speed handpiece autoclaving	28	39	
High speed handpiece autoclaving		45.6	} 43.8
Rubber dam use	2	40.6	
Needlestick injury (previous 6 months)	18	13.8	
Use of a post-exposure sharps protocol	6	33.3	27.7
Recapping needles (two-handed technique)	74	84.1	
Hepatitis vaccine	70	88.2	
Disinfect impressions	4	53.7	
Disinfect appliances		52.4	
Proper waste disposal	75	95.4	
Cross-infection control for burs	92	93.3	
Cross-infection control for curing light source	76	91	
Decontaminate –			
work surfaces,	90	98.5	
floor in surgery	70	80.6	
Cross-infection control for 3-in-1 tips	84	96.2	
Standard precautions, expensive but necessary	68	52.9	

Several other studies on various aspects of infection control reported the need for further training in and knowledge about standard precautions and infection control in South Africa[9-24].

Focus area two: personal hygiene and care of hands

Hand hygiene (e.g. hand washing, hand antisepsis, or surgical hand antisepsis) substantially reduces the numbers of potential pathogens on the hands and is considered the single most important procedure for reducing the risk of transmitting organisms to patients and OHCWs[1]. In South Africa several reports of inadequate compliance to this important infection control procedure have been recorded. Taps were operated mainly by hand (84%) and only 12% by elbow or 4% by foot[11]. The water supply in public dental clinics was found to be inadequate[21]. The majority of oral health care workers (83.2%) used an anti-bacterial liquid soap to wash their hands; however, a bar of soap was still the product of choice among 10.0% of respondents[15].

Although 86.6% of respondents acknowledged that hand washing is critical before and after patient contact, only 21.7% were observed doing it, indicating a considerable gap between the knowledge of this procedure and the actual clinical practice[14]. The failure to translate knowledge into practice on such an important aspect emphasises an urgent need for further education and training in this area among South African OHCPs, and possibly across the globe. In a study conducted in the Limpopo province only 50% of dental assistants washed their hands before and after putting on gloves[30]. Hand basins were used not only for hand washing, but also for cleaning dental equipment and discarding body fluids, as well as being a supply of water for patients[14]. It was found that 34.8% of oral health care workers wore jewellery while treating patients[14].

Focus area three: personal protective equipment

From the results of the study conducted in 1992, it would seem that OHCPs realised the importance of the routine use of gloves, masks and protective eyewear, recording an increase of 87%, 80% and 63% to 98%, 94% and 92% respectively when they were treating a known HIV-positive patient[20]. South African OHCPs cited high costs as reasons for not sustaining adherence to infection control measures[16,21]. Although private dental practitioners are charging patients for the use of barrier protection, not all were found to actually use these measures[10] or to change them between patients[15].

Gloves were found not to be available at all, or in insufficient quantities, in 21.4% of clinics, to change after every patient[21]. This was substantiated by Methar *et al.*[14] where a shortage was reported in 30% of clinics.

Routine glove use was reported by 88.4%, 87% and 97.1% of respondents in three studies conducted among Durban OHCPs[10,11,18]. Similarly, Oosthuysen[15] reported that most practitioners (88.4%) routinely wear gloves, as summarised in *Table 1*. The use of gloves by the dental assistant (65.8%) did not compare favourably with that of the dental practitioner (88.4%); 92% of the dental assistants in the Limpopo study reported wearing gloves[30].

Although the majority of respondents (89.1%) reported changing of gloves for each patient, some respondents (2.2%) also indicated washing gloved hands a few times and thus using the same pair of gloves for more than one patient[12,15]. Disregarding skin reactions to gloves being frequently reported by OHCPs[12], only latex gloves were available in clinics, irrespective of the procedures to be performed or the infection control risk involved[14]. Despite dental practitioners being aware of the necessity to wear gloves, masks and protective eyewear, the majority were found to only wear gloves[22,23].

To maintain high filterability, it is recommended that masks should be replaced before they become moist, preferably every 20 minutes[1,27,28,31]. Oosthuysen[15] found that 83.5% of practitioners wore masks, as opposed to only 50.4% of their assistants, during patient treatment. The reasons furnished for wearing masks were to prevent the transmission of respiratory infections, or in the event of patients or practitioners possibly suffering from halitosis. Only 30.4% of respondents changed their masks with every patient, meaning that masks were only replaced when visibly contaminated, soiled, wet, or stained. The frequency of changing masks varied from each patient, to every 2nd, 3rd, 4th, 5th or 10th patient, morning and afternoon, daily, after four to five days or even once a week[15]. In 1994 Naidoo[10] reported that 65% of practitioners wore masks, which is considerably less than the 83.5% reported by Oosthuysen in *Table 1*[15].

The fact that so few dental assistants are wearing masks is a cause for concern since they are exposed to the same occupational hazards as dentists and oral hygienists. It should be emphasised that masks should be worn by all OHCPs, including dental assistants, during patient treatment sessions and changed after each patient, or more frequently should the mask become visibly soiled or wet.

Protective eyewear not only prevents infection, but also physical injury from aerosols, spattering and accidental trauma caused by flying debris. It is therefore advisable that operators, practitioners, hygienists and assistants, as well as patients, use protective eyewear to prevent trauma and infections[32]. Similar to the findings regarding masks, Oosthuysen reported that 15% of practitioners wore protective eyewear, while 50.6% of their assistants never did so (*Table 1*)[15]. Naidoo, in 1994, reported that that 64% of dentists used protective eyewear, as opposed to the 52.9% found in a study by Yengopal *et al.*[10,11,18]. In 2007 it was reported that 78.6% of OHCWs knew they have to wear eye protection, but observation revealed that only 17.4% were actually doing so[14]. This does not compare well with international studies in which a 80.8-82.0% compliance was reported[33,34].

Protective clothing or the wearing of a uniform has only been discussed in four studies[9,12,14,21]. Rudolph and Ogunbodede[21] reported that 'laundered' protective uniforms were rarely available in dental clinics. De Kock and Van Wyk[35] reported the use of disposable gowns to be very low (3.6%), while 42.8% of those who wore washable gowns did not remove these uniforms before leaving the surgery or clinic, thus exposing the community and family members to potentially infectious agents. Other studies support the fact that the wearing of protective clothing was inadequate (17.4%) and furthermore that these items were neither clean nor replaced regularly[9,14].

Focus area four: environmental barriers

The constant touching of surfaces has been identified in dentistry as a special issue of concern[1]. Furthermore,

one needs to differentiate between clinical contact surfaces and general housekeeping surfaces. The clinical contact surfaces may often become contaminated with patient matter and thus present a risk for exposure and potential for disease transmission. Only one survey determined the use of protective barriers on equipment and it was found that only 23.3% of oral hygienists applied such barriers[12]. This could indicate a serious lack of resources to inform South African OHCWs concerning the effective and correct application of the recommended environmental barriers.

Focus area five: sterilisation

Most instruments used during dental procedures are in contact with the oral mucosa and/or penetrate tissue. This requires that re-usable instruments be thoroughly cleaned and sterilised with standardised methods that can be routinely monitored and verified[36]. Dental practitioners (69%) reported that their patients expressed concerns about contracting AIDS through dental procedures and asked questions about sterilisation practices[20]. Between 68.0-89.7% of respondents in three major studies reported that they autoclaved instruments[10.11,15,18]. Dry heat ovens or hot air sterilisers were used by 6%, 1% used chemical vapour and 4% used liquid sterilisation with chemicals only[15]. Boiling water was the method of choice among 22% of respondents[10,11,15]. Disinfection is still widely used to process critical instruments[9-11,14,15]. More than 50% of respondents reported incorrect processing of equipment and instruments[12]; more than 10% reported not having autoclaves in public dental clinics[21]; while 48.9% of respondents were not aware of the operational parameters (time, temperature and pressure) of their autoclaves[15]. Items were not disassembled prior to disinfection and sterilisation; 24.64% of dental items were found to be contaminated with blood immediately prior to being used on patients, with 19.4% of instruments revealing visible blood and extraction forceps recording the highest counts[9,14].

Scrubbing instruments by hand has been indicated as the preferred method (55.6%) for pre-sterilisation debridement[15]. Although manual cleaning is simple and cheap, the time involved in cleaning instruments properly and the added risk of injury by contaminated instruments cannot be ignored. It may therefore be appropriate to encourage more practitioners to make use of automated cleaners in order to protect staff members and improve cross-infection control, as recommended by the CDC[1].

Sterilisation failure rates have been recorded in many countries, including the USA 15%, Norway 33%, Germany 23%, Canada 4%, Denmark 2.3% to 7.3%, and UK 2%[40], emphasising the need for regular testing of effectiveness of autoclaves. The CDC recommends that equipment should be monitored for its ability to attain all the physical parameters of the sterilisation process and should include a combination of mechanical, chemical, and biological indicators[1]. Although the majority of respondents (70%) in the study by Oosthuysen indicated checking the effectiveness of their autoclaves, they do so by either observing gauges/lights on the autoclave only (31.2%), or by using commercially available colour changing strips/tapes (14.8%). Of the practitioners 90.9% indicated they never use biological or other tests to monitor autoclave effectiveness[15]. In the survey among oral hygienists only 1.8% of respondents confirmed using biological tests to monitor autoclave effectiveness[12].

Reliable and clear identification of sterilised instruments and other sterilised material is essential. Each facility should have a stock rotation policy in order to rotate stored sterile packages and use the oldest packs first[37]. Shelf life of the stored packets is thus event-related, indicating why sterilisation packages should be marked with the date of processing and which steriliser was used, as well as for identification purposes, in case of sterilisation failure[41]. The shelf-life of sterile packages depends upon the integrity of the package material and the environment where these packages are stored, as these surfaces and equipment can also become contaminated by direct contact or simply being exposed to air, expired air and dust[42].

The extent to which disinfection is still used to process critical instruments, together with the absence of verifiable proof of the success of each sterilisation cycle, is alarming and practitioners should be made aware of the serious consequences this could hold in the event of a complaint or query by patients.

Focus area six: disinfection (surfaces) and sound housekeeping

Environmental surfaces become contaminated not only by aerosol generated by dental equipment, but through direct touch, expired air or dust. It is important to realise that the effectiveness of a disinfecting solution depends on various factors, including the concentration and nature of contaminating microorganisms, the concentration of the chemical, the exposure time and the amount of accumulated bioburden[39]. Although 93.8% and 83.0% of respondents indicated disinfection of working areas and handles of lights, the availability of chemicals have been indicated as a problem by 37% of respondents[21]. Yengopal, *et al.*[18] reported that rinsing with water only was the preferred method for the disinfection of appliances (60.6%) and impressions (66.7%). Limited data are available on the use of disinfectants by South African OHCPs, which offers an opportunity for further investigation.

Focus area seven: waste management

Knowledge of a waste management policy seems to be lacking amongst OHCWs in South Africa, as evidenced by the findings that only 26.7% of those questioned were aware that such a policy exists[9,14], 25% of respondents disposed of sharps in the normal waste[10,11] and almost 50% of respondents did not have a waste disposal policy[21]. Although 96% of respondents indicated immediate disposal of used needles, 15.2% employed no special waste disposal system for sharps and needles[21]. Only one respondent indicated wearing gloves during handling of waste while in only 39% of cases waste was segregated according to the appropriate colour coding[14].

Focus area eight: dental unit waterlines, biofilms and water quality

It was encouraging to note that 76% of respondents flushed their waterlines after treating a patient[21]. In the survey of infection control procedures applied by oral hygienists, 50% reported flushing waterlines (30 seconds after each patient and 3 minutes at the beginning and end of the working day[12]. Even with anti-retraction valves, flushing of devices for a minimum of 20 to 30 seconds after each patient is recommended[1]. However, mechanical flushing alone cannot control contamination in waterlines[43].

To date, no published scientific evidence confirms a serious health risk for patients or OHCPs from contact with contaminated dental water, but researchers have found pathogens such as *Pseudomonas aeruginosa*, *Legionella* and non-tuberculosis *Mycobacterium* in dental unit tubing[44]. Exposing patients or personnel to water of poor microbiological quality is inconsistent with accepted infection control principles[45]. A reason for concern is the increasing number of vulnerable patients, for example the elderly, those with chronic conditions such as diabetes, people being treated for cancer, and patients with compromised immune systems[46]. No South African studies exist showing compliance with the various recommendations with regards to control of biofilms in the thin tubing and waterlines of the dental units and the quality of the water delivered through these systems[47]. In addition no South African studies exist concerning the availability and use of infection control policies and standard operating procedures in cases of 'boil water alerts in South Africa[47].

Focus area nine: Special considerations

Special considerations include: dental handpieces and other devices attached to air and waterlines; single-use or disposable devices (including saliva ejectors; dental radiology; pre-procedural mouth rinses; the dental laboratory; *Mycobacterium tuberculosis*; Creutzfeldt-Jakob disease and other prion diseases; and vaccination of OHCPs.

Dental handpieces and other devices attached to air and waterlines

A special area of concern in dentistry is bacterial contamination of dental handpieces and the methods applied to ensure safe application to patients after use[13,49]. The CDC recommends routine use of heat sterilisation after every patient wherever possible, i.e. steam under pressure or autoclaving, dry heat, or heat/chemical vapour, for all high-speed dental handpieces, low-speed handpiece components used intra-orally, and re-usable prophylaxis angles[1]. More than half of respondents (53.0%) reported that their preferred method for recycling handpieces was wiping with or soaking in a liquid chemical disinfectant[15], whereas between 28% and 39% autoclaved slow handpieces, and 43.8% and 45.6% the high speed handpieces[10,11,15,18]. Only 17% autoclaved their handpieces after every patient use[15]. Autoclaving handpieces is not a common procedure in South Africa and this indicates an urgent need for motivation to routinely follow this procedure[12]. These South African figures are extremely low when compared to international figures of 76.9-95.0% for routine heat sterilisation of handpieces[33]. Lack of sufficient handpieces and fear of equipment failure resulting from the heat of the sterilisation process are reasons provided for a reluctance to comply[50].

Dreyer and Hauman demonstrated that internal surfaces of dental handpieces become contaminated during normal dental procedures, with water-lines within the handpiece displaying the heaviest contamination, and concluded that autoclaving handpieces would possibly be the only effective way to sterilise both internal and external surfaces[13].

In a study conducted among dentists regarding their awareness of tuberculosis (TB), Naidoo and Mahommed[19] reported that two thirds of dentists sterilised suction and the 3-in one syringe tips. This indicates a need to promote the disposal of these items as the effective sterilisation thereof is extremely difficult.

Single-use or disposable devices (including saliva ejectors and 3-in-1 tips)

It was found that 1.5% of responding dentists re-used needles and 6.2% re-used cartridges and although these numbers are low:

"These practices are totally unacceptable from a moral, ethical and infection control point of view"[50].

It is suggested that further observational studies and other methods be applied to assess incorrect use or compliance with the correct practices. The use of a rubber dam as an infection control practice should be promoted since it is recommended for controlling the generation of saliva contaminated aerosol[42]. However, the use of rubber dam where possible may well minimise some forms of cross-infection, but should

not be seen as an alternative to the measures described based on heat sterilisation, to eliminate cross-infection. Between 2.0%-40.6% of dentists were found to use a rubber dam as an infection control practice[10,18,19].

Pre-procedural mouthrinses

The CDC lists the use of pre-procedural mouth rinses as part of standard precautions to reduce the risk of cross-infection[1]. This can be most beneficial prior to a procedure that requires the use of a polishing cup/brush or ultrasonic scaler, because a rubber dam cannot be used in such cases to control aerosols and spatter. With the aid of a dental assistant, high volume evacuation can be utilised as an additional infection control procedure[51].

Dental radiology

No publications concerning infection control during dental radiographic procedures have been documented in South Africa. Intra-oral x-ray film which is enclosed in a disposable plastic envelope is available. Following exposure of the film in its envelope it can be taken out of its disposable plastic outer envelope and processed without concern of any possible contamination.

Dental laboratory

Dentists did not disinfect impressions (46.3%) and appliances (47.6%) before sending them to the dental laboratory[50]. In an earlier study Naidoo reported that 96% of respondents did not disinfect impressions[10]. However, rinsing with water as the preferred method for disinfection of appliances (60.6%) and impressions (66.7%) does not comply with recommendations[1]. With regard to this aspect, in addition there seems to be a lack of effective communication and coordination between the laboratory and oral health care facility to ensure that appropriate cleaning and disinfection procedures are performed and appliances and prostheses delivered to the patient are free of contamination.

Mycobacterium tuberculosis

The prevalence of tuberculosis (TB) in South Africa is one of the highest in the world and accounts for 80% of all notifiable diseases in the country[19]. Only these authors have reported on this uniquely South African occupational hazard for OHCPs and the requirement to increase knowledge, and alter attitudes and behaviour in order to prevent transmission and management of this infection in oral health care facilities.

Creutzfeldt-Jakob disease (CJD) and other prion diseases

No published data on the occurrence of this condition or presence of prions in South Africa could be found in the literature that was searched.

Sharps injuries and post-exposure management

With the particularly high prevalence of HIV/AIDS in South Africa[5], the lack of use of antiretroviral agents as post exposure prophylaxis (PEP) after injuries caused by sharps is incomprehensible, complicated further by the lack of personnel capable of carrying out a proper risk assessment and counselling[16]. Many OHCPs work in remote rural areas and were only able to access PEP several days after an exposure incident - although the ideal time to start with PEP is within two hours of the exposure[16]. This state of affairs was confirmed in a survey in the Free State, in which only 6.7% of clinics had a sharps injury protocol at hand, although in 50% of cases staff was not aware of such a protocol. Meanwhile 43% of respondents said they were of the opinion that they could receive PEP within four hours after a sharps incident[9,14]. Of these respondents 26.6% reported a sharps injury in the past three years while administering local anaesthesia or while using two-handed re-capping of the needle[9,14]. Yengopal[18] reported that 13.8% of dentists had experienced a needle stick injury in the previous six months, with 84.1% of such dentists using the two-handed technique to recap needles. It is recommended that one never recaps a needle using both hands, nor point any sharp object at any part of the body[1]. Two-thirds of the injured dentists did not follow any specific protocol subsequent to their injury[50].

Hepatitis B vaccinations

The hepatitis B carrier rate in South Africa is very high[6]. All OHCPs and cleaners in the oral health care facility are constantly exposed to traumatised tissue, saliva and blood. Nevertheless, few studies have reported on hepatitis B immunisations among OHCPs in South Africa. Depending on antibody status, hepatitis B immunisations must be repeated every five years, yet Rudolph and Ogunbodede reported that almost 50% of dentists in their study had not received any hepatitis B vaccination in the previous 3 years[21]. De Kock and Van Wyk reported that while only 7.1% of hygienists had never been immunised, 26.8% required a booster. Among dentists, 88% had been immunised, of which 59.1% had been given a booster. Only 38.8% of the rest of their staff were immunised[50]. In 2007 it was reported that 62.7% of dental assistants in the Limpopo province had not been immunised at all[30]. In none of the studies was the immunisation status of cleaning staff determined.

Conclusion

Although studies on compliance with infection control guidelines exist, many aspects of this issue have not been studied. Of those which have been accorded attention to, the following problem areas were identified in order to improve compliance to infection control recommendations in South Africa:

Although gloves are worn they are not replaced for every patient and hands are not washed before and after donning them. Masks are worn by most dentists, but not their assistants, and are not replaced after every patient. Protective eyewear and clothing are not worn and cleaning of uniforms seems to be a problem. Hand scrubbing of instruments is still widely used. Most practitioners use autoclaves, but 90% of them have never used a biological indicator and many still use disinfectants. Boiling water is still used to sterilise appliances and waste segregation is not undertaken correctly. Handpieces are not sterilised between all patients and single-use items are re-used. Most of the dental practitioners seem to be immunised against hepatitis B, but many do not maintain boosters and most of the dental assistants are not immunised, while no data are available regarding cleaners. Also rural OHCPs do not have immediate access to PEP after sharps injuries. Waterlines are flushed, but no data are available with regards to the quality of the water from dental units used in South Africa.

With two exceptions, all other studies among South African OHCPs relied on self-reports, and consequently these results may represent a serious overestimation of correct behaviour. Despite this possibility, even these results indicate that a considerable gap exists between what is expected and the actual clinical performance by South African oral health care providers concerning infection control recommendations. Controlling diseases and preventing infections from spreading are more crucial than ever, and doing so is the responsibility of every member of the oral health care team. This review highlights opportunities for improvement and further research.

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