

*Full Length Research Paper*

## Risks of infection on odontological procedures

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**This study assesses the routine adopted by dentists in Alfenas, Minas Gerais, during clinic practices, regarding to biosecurity procedures usage. In this study, 41 participants were randomly selected out of a roll provided by the Odontology Regional Council in Minas Gerais (CRO-MG), and were divided into three groups considering gender, general or specialized activity and period of college graduation. Misconceptions were found regarding to hand hygiene, clinical procedures done with bare hands and absence of protocol that should be adopted in case of accidents with sharpened objects. The results show the performances done with lack of information or standardization that improve the adoption of conduct that validates the procedures for biological protection.**

**Key words:** Odontology, biosecurity, risks to biological agents, biological contamination, hand washing.

### INTRODUCTION

Equipment, drug and material manufacturers shadow odontology closely, so that, this professional practice is influenced by market demands. As a result, odontology has become a profession whose techniques are honorable due to achievements in both quality and sophistication levels on multiple specialties, according to Secco and Pereira (2004). However, its practices in several specialties, is not always exerted by a skillful and qualified professional, thus, misleading experts during the performance of clinical tasks, resulting in failure in infections control.

The oral cavity is a body region which is characterized by having a resident microbiota. Due to this particularity, it is expected that the dentist adopts fundamental rules as a way of preventing cross-infection. Precautions must be adopted during the handling of activities where it may be possible to avoid contact to body fluids such as blood, excretions, skin wound and mucosa (Santos et al., 2008).

Protector barrier usage can be extremely efficient in reduction of contact with blood and organic secretions, being therefore mandatory for the utilization of personal protection equipment (PPE) during odontological procedures. Professionals must limit the microorganism propagation by preparing the dental consulting room before initiating any procedure in each patient. The planning avoids the contact of gloved hands with materials and equipments. For surfaces that cannot be easily decontaminated, the use of disposable covers that increase the efficiency of infections control, with lower cost, and less time spent in disinfection is indicated according to the Ministry of Health (2003).

According to Lehotsky et al. (2010), hands disinfection failure before surgical procedures, has been considered the main cause of nosocomial infections worldwide, contributing to propagation of multiresistant pathogens and being responsible for development of postoperative complications. So, infections understood as a clinical problem play an important role on a social level.

Risk of infection by HIV to the health professional caused by an accident with sharp object is small (around 0.3%), although, the average incidence of seroconversion

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after an accident of contaminated sharp object with hepatitis B virus, varies from 22 to 31%. For hepatitis C virus, risk of infection reaches 1.8%, however, there is no prophylaxis before and after exposure to hepatitis C virus, up to the present time, according to data provided by the Center for Disease Control and Prevention (CDC, 2001).

Historically, it was noticed that hands are the main vector for infection disseminations. The non-visible saliva impregnated in several spots and easily neglected in the odontological room's routine, as well as cleaning procedures and disinfections between patients attendance making surfaces free of contamination is a hard challenge. Silva et al. (2003) show the possibility of transfer (30%) of microorganisms such as *Streptococcus pyogenes*, *Staphylococcus aureus*, and *Streptococcus pneumonia* from a patient to another, and the main vectors of this were professional hands.

It was also observed that these microorganisms can survive for at least 48 h after being deposited on surfaces. Jennifer et al. (2012) highlighted that patients' biological material may contain a high concentration of viruses and pathogenic bacteria, and may cause diseases from simple colds to hepatitis.

The risk of infection through odontological procedures was increased due to the closeness between professionals and patient, and the use of high rotation devices working with water sprays, producing a thousand of particles which were spread into the air.

The objective of this study was to show the possible risks of infection present in the exercise of multiple odontological specialties, stimulating the change of behavior and assuring elaboration of effective action rules, in order to prevent biological risks.

## METHODOLOGY

This research was developed starting from a list of 120 names of Surgeon Dentists (SD), provided by the Odontology Regional Council in Minas Gerais (CRO-MG), intermediated by the Regional Office in Alfenas. Then, 41 professionals were randomly selected from those that enrolled to participate in the survey. After the selection, professionals were sought after in their workplaces and were informed about the nature of the study. The participants had to sign up a term of knowledge and permission.

In this research the participants are dentists from both genders, specialists and general clinical dentists, who perform their activities in private and public clinics. Professionals were organized in three groups considering gender, activity (general or specialist), and period of college graduation which was also subdivided into under 15 years or over 15 years, according to Table 1.

Among the 21 professionals who participated in the research, 6 were specialized professionals in dental prosthesis, 4 were orthodontist, another 4 were endodontists, 2 were periodontists, 1 was an oral pathologist, 1 was a pedodontist. The remaining were general practitioners.

This study tried to define the routine adopted during the exercise of clinical activities, regarding to attitudes taken on procedure such as hand hygiene (HH), wearing gloves, conduct adopted in case of

accidents with sharp objects, and other questions that involved knowledge and action. For data collection questionnaire with questions about the work routine was used as shown in Table 2.

After signing up the term of knowledge and permission, questions were asked directly to the professional by only one examiner. The visit for the questionnaire application was scheduled in order to match the beginning of a clinical procedure. Then, for right after getting the answers, the dentist was told to act according to his/her normal working routine, and, therefore, having freedom to wash hands before wearing gloves. Professionals who had chosen to wash their hands, did it using soap available in their own office.

Analysis of variance, Fisher's exact test and Chi square test with 5% level of significance were carried out on the collected data according to Arango (2005) article. Values of  $P < 0.05$  were considered to be statistically significant. This research was carried out after the Ethics Committee in Research had authorized the realization of the project, under Protocol number 216/10, in November 25, 2010.

## RESULTS AND DISCUSSION

According to data obtained, it was verified that 20% of the professionals who have participated in the research do not have the habit of washing hands before wearing gloves; according to the professionals, it is considered unnecessary. In the same way, Myers et al. (2008) verified in a study made in New York, that 25% of the general practitioner dentists have inappropriate hands hygiene. This issue was also studied by Beaver (2007), in which he found among other questions, the beliefs that gloves can replace the need of washing hands, and according to Agbor and Azodo (2010), only 63.4% of the interviewed reported that they are used to washing hands.

However, the evidences show that the occurrence of infection in patients was reduced from 0.52 in 1,000 cases to 0.24 in 1,000, at the end of two years, after the stimulus for a better hands hygiene according to Carvalho et al. (2009). Studies about infection controls clarify that the acquired knowledge is not enough to change the habits on practices, showing a gap between that and its adhesion (Tipple et al., 2010).

The lack of orientation and professional examples in washing hands were excuses to low or no habit of washing hands (Santos et al., 2008), proving that the preparation of the professional is deficient in critical perspective in relation to the professional practice.

All the dentists surveyed answered that they wear gloves for all procedures, according to the Question I in the Figures 1, 2 and 3. This finding agrees with Granville-Garcia et al. (2009), whose study shows that gloves were worn by the entire sample. It was verified that this regional study fits in the biosecurity standards when analyzed using gloves. Although, data obtained in other regions or countries show that the use of gloves was not incorporated by all professionals, according to studies made in Turkey, where only 96.3% of the dentists wear glove (Yüzbasıoğlu et al., 2009). In Iran, 84.2% of

**Table 1.** Number of professionals who participated in the research according to gender, performed activity and period of college graduation.

Gender		Activity		Period of college graduation	
Male	Female	SD.	SGD.	Under 15 years	Over 15 years
22	19	20	21	23	18

SD. = Surgeon Dentist; SGD. = Surgeon General Dentist.

**Table 2.** Questions about the routine and actions taken during the clinical activities.

No.	Question	Response
I	Do you use gloves in all the procedures?	YES( ) NO( )
II	Do you think there is any procedure that does not require wearing gloves? Which one?	YES( ) NO( )
III	Have you ever had an accident with sharp objects?	YES( ) NO( )
		Nothing ( )
IV	What did you do?	Washed the hands ( ) Sought for medical help ( )
V	What do you consider most important when buying clinical gloves?	Price ( ) Quality ( )
VI	Have you ever finished a procedure with a damaged glove?	YES( ) NO( )
VII	Have you ever used over-glove?	YES( ) NO( )
VIII	Do you work with a dental auxiliary?	YES( ) NO( )
IX	Does the dental auxiliary use gloves?	YES( ) NO( )

the professionals wear gloves during treatment or procedure, in which only 93.9% of them wear a new pair of gloves for each patient (Askarian et al., 2007). In China, there was a raise in the number of dentists who use and change gloves for each patient seen (from 63.25 to 99.22%) between 2000 and 2010 (Su et al., 2012), while in Jordania, only 73.3% of dentists are used to wear gloves (Al Negrish et al., 2008).

Although, the incorporation of the use of gloves as a protective barrier in clinical practice was verified, and literature shows that the odontology's exercise is deficient in biosecurity rules. It is evident that, when dentists were asked about the possibility of existence of some procedure that could be made without wearing gloves: 11 male dentists and 4 female dentists answered "yes", denoting an inconsistent behavior relative to the answer given previously, as shown in Figure 1, question II. The result shows that women are more careful or follow the rules more carefully than men do. These data is confirmed by a study made in Washington, USA, when female professionals were responsible for the highest number of notifications about accidents with sharp objects during clinical practices (Shah et al., 2006).

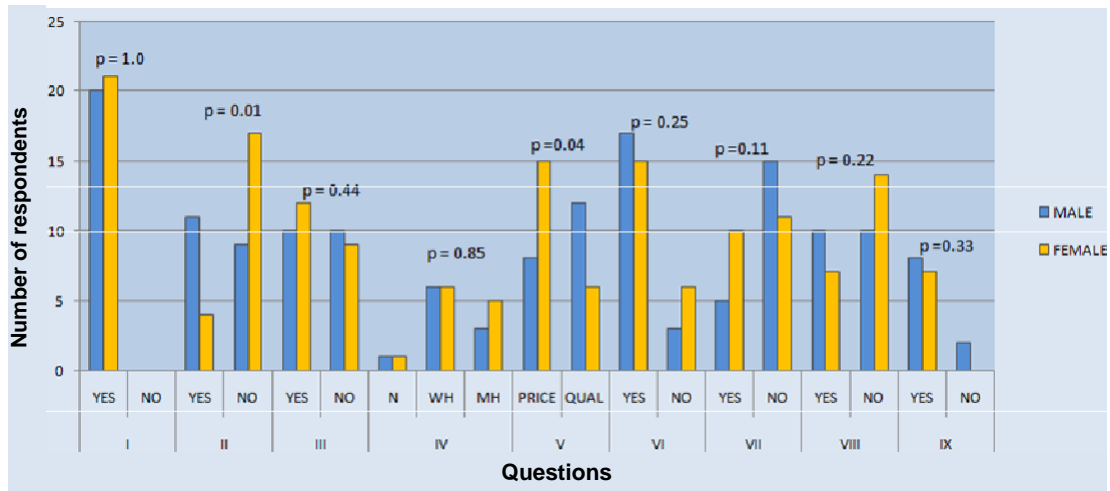
Considering professionals' qualification and the time elapsed since the college graduation (Figures 2 and 3, Question II), it is observed that the answer was also

affirmative, not having significant difference between groups. This finding agrees to Martins et al. (2010) and Farias et al. (2007) who showed that professionals did not wear gloves all the time.

The procedures pointed as the ones possible to be performed without wearing gloves were associated to mold making and realization of clinical exams where the disposable wooden spatula is used.

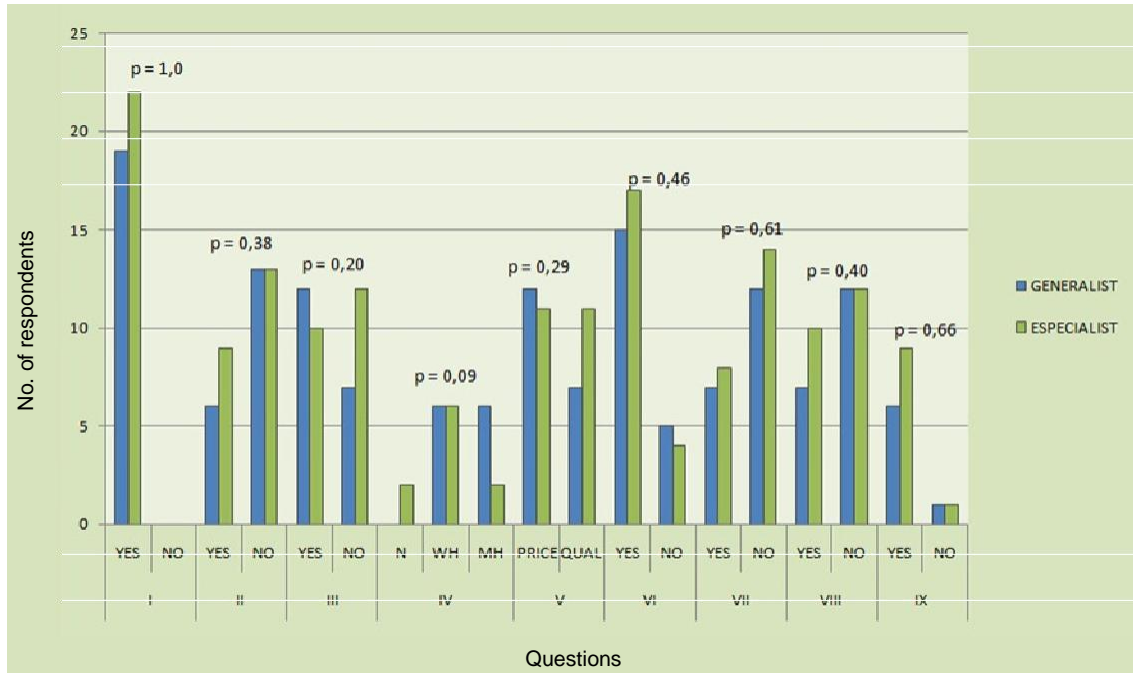
Gloves have been underestimated in realization of parallel tasks and this show that the professionals only see health risk when they are in straight contact with the patient, not taking into account the presence of organic material impregnated in the surfaces. The results corroborate with those of Melo et al. (2008) and Lima and Pinheiro (2008), who show negligence in contact with the patient's biological material. The same conduct is found in a study made in a German city, where 26% of the dentists did not use enough personal protection equipment during general patient's examination, and 9% of them use the same conduct during surgical interventions (Hübner et al., 2012). Possibly, these findings justify the common post-surgical infections and high occurrence of hepatitis B and C, Herpes simplex, and other infections among professionals in odontology.

Question III has collected data about the number of professionals who had already gotten hurt during clinical



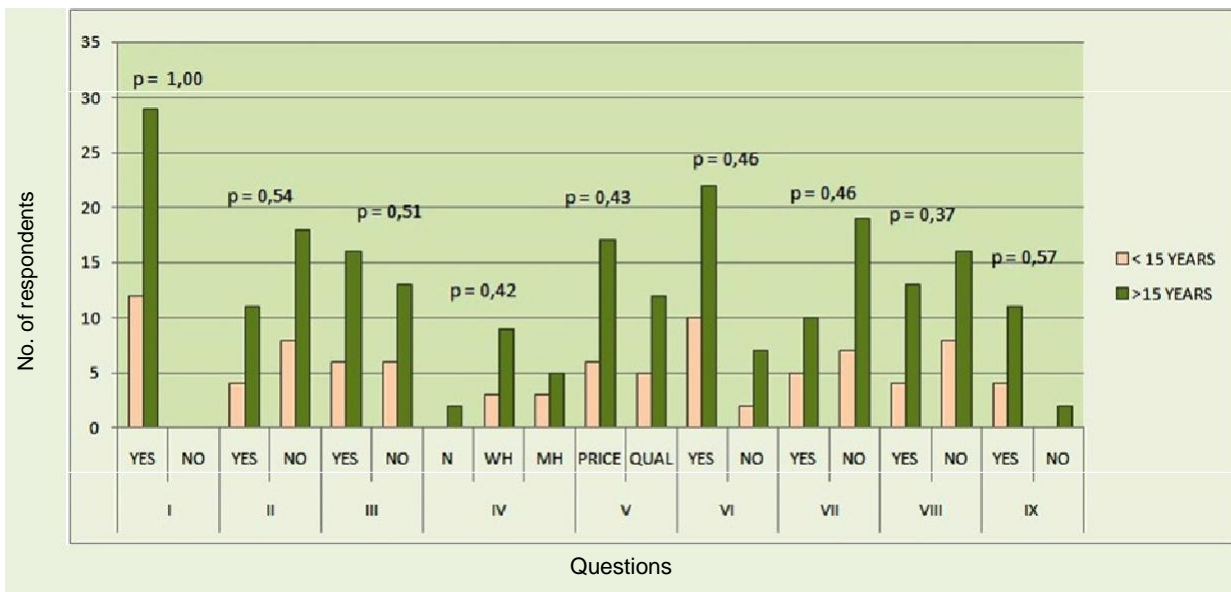
**Figure 1.** Displaying of replies and statistical results according to gender. Considered statistically meaningful for values of P<0.05.

(I) Do you use gloves in all the procedures? YES ( ) NO ( ); (II) Do you think there is any procedure that does not require wearing gloves? YES ( ) NO ( ) Which one? (III) Have you ever had an accident with sharp objects? YES ( ) NO ( ) What did you do? (IV) What do you consider most important when buying clinical gloves? PRICE ( ) QUALITY ( ); (V) Have you ever finished a procedure with a damaged glove? YES ( ) NO ( ); (VI) Have you ever used over-glove? YES ( ) NO ( ); (VII) Do you work with a dental auxiliary? YES ( ) NO ( ); (VIII) Does the dental auxiliary use gloves? YES ( ) NO ( ). N= nothing; WH= washed the hands; MH= medical help; Price= Price; Qual= Quality.



**Figure 2.** Displaying of replies and statistical results according to activity. Considered statistically meaningful for values of P<0.05.

(I) Do you use gloves in all the procedures? YES ( ) NO ( ); (II) Do you think there is any procedure that does not require wearing gloves? YES ( ) NO ( ) Which one? (III) Have you ever had an accident with sharp objects? YES ( ) NO ( ) What did you do? (IV) What do you consider most important when buying clinical gloves? PRICE ( ) QUALITY ( ); (V) Have you ever finished a procedure with a damaged glove? YES ( ) NO ( ); (VI) Have you ever used over-glove? YES ( ) NO ( ); (VII) Do you work with a dental auxiliary? YES ( ) NO ( ); (VIII) Does the dental auxiliary use gloves? YES ( ) NO ( ). N= nothing; WH= washed the hands; MH= medical help; Price= Price; Qual= Quality.



**Figure 3.** Displaying of replies and statistical results according to period of graduation. Considered statistically meaningful for values of  $P < 0.05$ .

(I) Do you use gloves in all the procedures? YES ( ) NO ( ); (II) Do you think there is any procedure that does not require wearing gloves? YES ( ) NO ( ) Which one? (III) Have you ever had an accident with sharp objects? YES ( ) NO ( ) What did you do? (IV) What do you consider most important when buying clinical gloves? PRICE ( ) QUALITY ( ); (V) Have you ever finished a procedure with a damaged glove? YES ( ) NO ( ); (VI) Have you ever used over-glove? YES ( ) NO ( ); (VII) Do you work with a dental auxiliary? YES ( ) NO ( ); (VIII) Does the dental auxiliary use gloves? YES ( ) NO ( ). N= nothing; WH= washed the hands; MH= medical help; Price= Price; Qual= Quality.

procedures (Figure 1). It was found that 50% of men answered affirmative, and 57.1% of women had the same answer. An elevated accident rate was also found in a survey held by Farias et al. (2007), who verified that 71.5% of the professionals reported that they had already suffered accidents with sharp objects. When asked about what action was usually taken after an injury, question IV (Figures 1, 2 and 3), it was noticed that there was no standard procedure. The answers vary from none attitude taken and going back to work normally, or taking off gloves and washing hands with water and soap, to dentists that seek for medical help and submit themselves to necessary measures, according to the manual: "Management of Occupational Exposures to HBV, HCV, and HIV and Recommendations for Post exposure Prophylaxis" (CDC, 2001).

Traumas caused by sharp objects stand out among the events responsible for inoculation of HBV or HCV during professional's practices, and the habit of recapping needles using both hands have potentially been associated to these accidents. In general, sixteen thousand of infections for HCV, sixty thousand for HBV and a thousand for HIV, might have happened in the year 2000, worldwide, among health professionals due to percutaneous lesions. These infections might contaminate 39, 37 and 4.4%, respectively (Prüss-Üstün et al., 2005).

These data confirm a vicious professional practice, and is exemplified in Farias et al. (2007), who says that the habit of recapping needles using both hands is always done by 37.6% of the professionals.

This conduct did not present any significative difference statistically, indicating that it depends on a standard individual's behavior or knowledge on biological risks, and it is independent to gender, qualification or graduation time. The reason described by those who did not take any action after an injury was the ignorance of what attitude should be taken. Despite the apparent influence that time could have affected over professionals' formation, there was no statistical significance in the answer ( $P=0.42$ ). The most common conduct among professionals continues being hand washing with water and soap.

In the same way, a study made by Nogueira (2011) shows a high prevalence of accidents involving blood between dentists and dental auxiliaries. Hand washing with water and soap and use of alcohol (70°C) were the procedures most commonly adopted after an accident, due to the absence of any protocol in the working place. The high incidence of accidents described by researches should be minimized by a conscious action of dentists, based on a standard protocol, which could make possible a real protection against biological risks.

Although, the unpreparedness is clear, mainly when the saliva is characterized as a hazardous body fluid; regarding to transmission of HIV, Hepatitis B virus, and possibly Hepatitis C virus, it is necessary for a medical evaluation post-exposure (Nogueira, 2011). The situation is severe, because it is not always possible to distinguish saliva with or without visible blood, making indispensable a correct utilization of protective barriers on daily practice.

Expense has been strongly taken into account over the field and it was shown in the question about the criterion used in buying gloves. The result showed the difference of behavior among genders, because the determinant criterion for women was price and for men it was quality, according to Question V, in Figure 1. According to Pinto and Paula (2003) to many professionals, the adoption of the protocol of biosecurity on daily practice might give the impression of increase in spending, mostly, when a lot of patients attend to the facility at the same day. But, this is not plausible, as additional costs are very low for setting up a basic disinfection system. When the variables of specialty and period of college graduation are considered, it is noticed that there is no statistical significance in the answers, indicating that this factor does not impact directly on the conduct (Figures 2 and 3, Question V).

This research verified that the majority of professionals have already finished a clinical procedure wearing a damaged glove. This conduct was found in all segments interviewed, not showing significant differences among gender, qualification level or graduation period. Thus, once again, it is mandatory that a deeper academic formation of dentists and consciousness about their own role as health professionals, capable of developing reasonable actions and executing them in favor of their own security as well as for their patients' should be considered. It makes sense to question the effectiveness of the dentistry education. For those who answered that they never had finished a procedure wearing damaged gloves, they affirm when they saw the problem they replaced them immediately, because they consider important the integrity of gloves during the procedure (Figures 1, 2 and 3, Question VI).

The negligence about this principle is justified by tumultuous places and mainly by lack of adequate standardization, according to Soldá et al. (2009). Although, gloves represent the main barrier between professional and patient, the index of perforations is high and can reach up to 78%, particularly during urgency procedures, implicating an increased risk. Oliveira Neto et al. (2009) found perforations rates in periodontal procedures higher than in surgical procedures. Clinical evidences show that the duration time and kind of procedure are directly related to perforation indexes.

Relating to utilization of over-glove, Question VII, it became clear that using over-gloves is not part of the professional routine, which is independent of the variant

considered, not having statistically significant difference in the sectors surveyed. This present behavior is a shame, as over-glove is an excellent method of preventing the contact with the patients' biological material, in multiple daily routines such as filling clinical forms, opening drawers and other situations, chiefly when the dentist does not work with a dental auxiliary. Lima and Pinheiro (2008) highlight the rules: never try to disinfect gloves when they are bloodstained or contaminated with other organic fluids; never treat high risk patients using no sterile gloves; never answer the phone or open a door or drawers wearing gloves. The wearing of over-gloves is indicated for all these situations.

This research also shows the existence of dental auxiliaries who do not use gloves during clinical procedures, according to Questions VIII and IX of Figures 1, 2 and 3. In the group of the generalist, specialists and period of college graduation, the situation is similar with no statistical difference among the groups. Same findings were also found by Carmo (2006), who verified that specialized professionals did not demonstrated knowledge and conduct that differentiate them from professionals who only have graduate diploma. The actual practice of the profession is a result of emphasis given to individualist character that characterizes the odontology since its beginning (Luz, 2009).

Formation procedures on human resources are complexes, involving conceptual changes, facing knowledge and necessary values to construction of a new order. Changes imply in conflicts and pressures and demand a long time for maturation (Luz, 2009). For this reason, public investments in health, constant professional actualizations and periodical assessments that presume the creation of strategies that promote necessary changes to a conscious professional exercise, scientifically based and pertinent to actual challenges are needed.

## Conclusion

It was verified that inadequateness on dentists' conduct on biological risks has made the procedures in this field a high risk activity for everyone involved. It has seen ignorance about the importance of hands hygiene, failure on contact with patients' biological material, besides a high rate of accidents with sharpened objects. In the working places, there is no protocol or rules that offer protection against biological contamination. Awareness campaigns is recommended through programs of continuing education intermediated by public institutions involved with health care professionals to ensure a conscious exercise, and based on the recognition of risks and their consequences. Given this situation, it is necessary to rethink the training of dentists in order to get subsidies for the improvement of their conduct and make them suited to the professional challenges.

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