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Perception of dentists and patients about infection prevention and control in dental clinics: a review

Running Title: Infection prevention and control in dental clinics.

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Abstract

Dental procedures represent a significant risk of infection for both dentists and patients. However, good practices and behaviors towards infection control measures can protect both of them and significantly reduce this risk. Accordingly, the understanding of dentists' and patients' behavior is crucial. Through this systematic review, the perception of dentists, as well as patients about infection prevention and control in dental clinics, was explored. The medical literature was examined through four databases; Medline, OVID, Embase, and PubMed between 2010 and 2020. The used searching terms were: perception, practices, behavior, attitude, infection control, infection prevention, and dentist, patient, clinic, and dental. The following step was refining the outcomes only to comprise original research articles that examined the perception and behavior of dentists and patients towards infection prevention and control in outpatient dental clinics in different countries. Selected trials mentioned the population under investigation (patients or dentists). A total of 86 articles were retrieved. After the omission of review articles and including original research articles solely, 13 articles showed up, out of which 8 research articles were included. The perception of patients was evaluated in five studies, while the perception of dentists was evaluated in two studies, and one study evaluated the perception of dental students. The included studies covered the perception of 785 dentists, 512 dental students, and 1459 patients. Educational level, previous visits of patients, the gender of dentists, and their years of experience were all correlated to improved perception towards infection control. Perception of patients towards infection control measures require improvement, while dentists showed better perception compared to patients, particularly towards bloodborne infections.
Keywords: Dental practice, infection control, infection prevention, patients, dentists.
**Introduction**

The safety of patients and clinicians in medical practices that involve invasive interventions are becoming increasingly important [1]. It can significantly improve the provided medical service as well as treatment outcomes, in addition to reducing occupational hazards [2]. Infections and infection transmission are a significant public health issue that healthcare systems should seriously consider, particularly those involving dental practice [3].

Infections can be transmitted in dental practice through cross-contamination, where an infecting organism is transmitted through clinical tools among patients, and close contact with each other or creating more impacts on the treating dentists [4]. The mode of transmission can vary based on the nature and type of the procedure; this could be through saliva, blood, or air [5].

Accordingly, dentists should always ask about their patients' medical history to exclude any risk of being carriers for an infection and put themselves and other patients at risk [6]. However, it should be noted that some infections might have more prolonged incubation than usual, during which patients are considered infectious [7, 8]. Moreover, multiple infective agents have been identified, such as bacteria or viruses; among them most known are streptococcal infection and hepatitis [9].

Inadequate infection control measures can result in serious infections such as HIV and hepatitis [10]. Therefore, both patients and clinicians should be aware of the proper measures of infection prevention. This is particularly important for blood prone infections due to most of the dental procedures [11].
Consequently, the present systematic review evaluated the medical literature thoroughly over the past ten years to evaluate patients and dentists' perception and understanding of infection prevention and control practices in dental clinics.

**Materials and Methods**

The present systematic review was accomplished through the PRISMA checklist instructions for systematic review and meta-analysis [12]. This review was performed via reviewing electronic databases to determine eligible research studies between 2010 and 2020, through four databases: Medline, OVID, PubMed, and Embase databases.

The used searching terms were: perception, practices, behavior, attitude, infection control, infection prevention, dentist, patient, clinic, and dental. All the titles and abstracts resulted from this primary evaluation were examined thoroughly to avoid missing any potential research article. The outcomes were then evaluated to select only original research studies evaluating dentists' perception and behavior towards infection prevention and control in outpatient dental clinics in different countries. Selected trials mentioned the population under investigation (patients or dentists). Only articles in English were defined as articles of relevance, then included in the second stage.

The next stage was setting our inclusion criteria to choose the eligible research studies. Abstracts were evaluated manually to identify all the relevant studies. The inclusion criteria were mentioning the population under investigation (patients or dentists) and measuring the perception in outpatient dental clinics. Furthermore, the references of eligible research studies were examined to decide on any potential research studies. The last step was gathering the pre-defined extracted data from the final record of eligible
research studies and arranging them in an organized form. Review articles that had incomplete or overlapped data were excluded. Also, unavailable full-text articles or inappropriate study designs were excluded. The full description of the search strategy is shown in Figure 1.

**Figure 1**

The first step in the data review process comprised a preliminary review. Through a specially designed excel sheet, data was collected. Chosen data from eligible research
articles were then reviewed via the excel sheet. Any research studies produced by one research group evaluating similar variables were revised for any possible duplication.

Results

Following the evaluation of abstracts and examining them versus the eligibility criteria to determine which abstracts will be included, eight research studies were marked as eligible for inclusion [13-20]. Although these studies used different tools to measure dentists' and patients' perceptions, they were cross-sectional studies from different countries.

The perception of patients towards infection prevention and control in dental practice was evaluated in five studies [14, 15, 17, 19, 20]. In comparison, the perception of dentists was evaluated in two studies [13, 16], and only one study evaluated the perception of dental students [18]. The included studies covered the perception of 785 dentists, 512 dental students, and 1459 patients.

Patients with higher educational levels and those who had previous dental visits, while dentists with more years of experience and gender had better perception towards infection control measures. Perception about bloodborne infections should be improved, as detailed in Table 1.
<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Year</th>
<th>Study design</th>
<th>Sample size</th>
<th>population</th>
<th>Objective</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Khader et al.</td>
<td>2020</td>
<td>Cross-sectional</td>
<td>368</td>
<td>Dentists</td>
<td>To assess the awareness and perception towards the coronavirus disease (COVID-19) and infection control.</td>
<td>Almost 30.4% of dentists had completed a master or residency program in dentistry, 53.0% had training in infection control in dentistry, and 7.6% had training or lectures regarding COVID-19. Among the participants, 36.1% knew that the incubation period is within two weeks. Most dentists were aware of COVID-19 symptoms and ways of identifying patients at risk of having COVID-19, modes of transmission, and measures for preventing COVID-19 transmission in dental clinics. Among them, 74.7% asked patients to sit away from each other, wear masks while in the waiting room, and wash their hands before getting onto the dental chair to decrease disease transmission.</td>
</tr>
<tr>
<td>Ratnayake et al.</td>
<td>2018</td>
<td>Cross-sectional</td>
<td>427</td>
<td>patients</td>
<td>To evaluate the perception of patients about the risk of cross-infection and infection-control measures in outpatient dental clinics.</td>
<td>In this study, 75.2% were aware of infection transmission during dental treatments, and 72% stated that wearing gloves and masks by their dentists was important during dental treatment. Awareness was higher among patients with a higher educational level. Patients feared of potential transmission of bloodborne pathogens in the dental setting. Awareness of sterilization of dental instruments was low.</td>
</tr>
<tr>
<td>Ibrahim et al.</td>
<td>2017</td>
<td>Cross-sectional</td>
<td>225</td>
<td>patients</td>
<td>To identify the perception and behaviors of patients towards cross infections and infection control in dental practice.</td>
<td>In this study, 21.8% of the participants had a satisfactory level of knowledge about infections and infection control in dentistry. Social media was the most familiar source of information about dental infections. The educational level of patients was significantly correlated with the knowledge about dental infection. Positive attitudes were shown about infection control in dentistry. Regarding self-reported practice, 9.3% of participants would ask dentists about sterilization of dental instruments, wearing a face mask (13.3%) and gloves (16.4%) if they do not do so.</td>
</tr>
<tr>
<td>Dagher et al.</td>
<td>2017</td>
<td>Cross-sectional</td>
<td>417</td>
<td>dentists</td>
<td>To examine infection control practices and perception among dentists</td>
<td>In this cross-sectional study, 96% of the participants, showed concern about infection transmission, 90.6% were vaccinated against Hepatitis B, and 61.8% asked routinely about patients’ medical history. Only 43% used protective eyewear and 65% used autoclaves, though dry heat was still used. Gender was significantly associated with using personal protective equipment. Less compliance was correlated to fewer years of experience. Less than 5% scored “excellent” for infection control practices.</td>
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<tr>
<td>Bhaskar et al.</td>
<td>2015</td>
<td>Cross-sectional</td>
<td>456</td>
<td>patients</td>
<td>To measure the perception of dental patients towards infection control practices in dentistry.</td>
<td>Among the participants, 88.37% thought that the dentist should wear gloves while practicing, 67.54% thought that the dentist should wear a mask, and 50% thought they should wear eye goggles. However, 87.72% were concerned about the sterilization procedure, and 67.32% believed that infection could spread during treatment procedures.</td>
</tr>
<tr>
<td>Al-Maweri et al.</td>
<td>2015</td>
<td>Cross-sectional</td>
<td>512</td>
<td>Dental students</td>
<td>To evaluate the practices and behaviors towards infection control procedures.</td>
<td>Among the participants, 90% had been vaccinated against hepatitis, 37.4% were assessed for anti-HBs. Almost 98.8% reported always wearing gloves and 90.8% masks during dental clinics and 29.2% used protective eyewear. Students in the last academic year showed a significantly more positive attitude toward treating patients with infectious diseases than those of lower academic years. One-third reported having one or more occupational injuries while treating their patients.</td>
</tr>
</tbody>
</table>

Table 1. Shows included trials
<table>
<thead>
<tr>
<th>Study</th>
<th>Year</th>
<th>Study Design</th>
<th>Sample Size</th>
<th>Study Population</th>
<th>Objective</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smith et al.</td>
<td>2014</td>
<td>Cross-sectional</td>
<td>50</td>
<td>Patients</td>
<td>To assess the perception towards the risk of bloodborne viruses (BBVs) and variant Creutzfeldt-Jacob Disease (vCJD) after dental treatment.</td>
<td>Significant concerns of patients revolved around hand hygiene practices rather than risks from BBVs or vCJD. No patient had avoided or delayed a visit to the dentist because of concerns about cross-infection risks.</td>
</tr>
<tr>
<td>Baseer et al.</td>
<td>2013</td>
<td>Cross-sectional</td>
<td>301</td>
<td>Dental patients</td>
<td>To assess the perception and understanding of patients towards infection control measures in outpatient clinics.</td>
<td>Almost 99% agreed that dentists should wear gloves, face mask (93.7%), and spectacles (82.7%) while providing treatment. However, 60.1% knew that HIV and 30% knew that hepatitis-B infections could spread in dental clinics. Half of the patients felt that they were likely to contract AIDS, and 77.7% refused to attend clinics if they knew that AIDS and Hepatitis-B patients were treated there. Among the participants, 25.2% thought autoclave as the best method of sterilization. Significantly higher knowledge of infection control was observed among the routine dental visitors than first-time visitors to dental clinics.</td>
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</table>
Discussion

Dental practice usually involves invasive procedures, which increase the risk of infections among dental patients and dentists [3]. Accordingly, strict infection control measures are mandatory to reduce the incidence of infections [8]. The knowledge of patients about infection control in dental clinics would improve dentists' compliance with these measures [14]. Consequently, the assessment of patients and dentists’ perception will increase compliance with infection control measures [18].

The present review evaluated both patients and dentists' perception and behavior towards infection control and infection prevention in dental clinics. It has been demonstrated that patients had positive attitudes towards infection control strategies and infection prevention. However, their perception requires improvement, particularly towards bloodborne infections. Dentists showed better perception, which could be attributed to their specialty and academic studies.

Also, it has been demonstrated that patients’ education significantly influences their perception of infection control. While for dentists, it has been correlated to their years of experience and their gender.

Patients’ perception has been evaluated in five studies. Ratnayake et al. [14] examined the perception of the risk of cross-infection and infection control strategies. Almost three-quarters of the patients were aware of the risk of infection transmission and the importance of wearing gloves and masks. Additionally, Ratnayake et al. [14] demonstrated a significant correlation between patients’ education and awareness levels.
Like Ratnayake et al. [14], Ibrahim et al. [15] also confirmed the correlation between educational level and perception towards infection control measures. Moreover, social media was the most familiar source of information for patients. Also, patients showed positive behaviors and attitudes, though less than a quarter of the responders would ask their dentists to wear gloves, masks, and sterilize dental instruments.

On the contrary, in Bhaskar et al. study [17] more than half of the included patients would ask their dentists to wear protective tools. Furthermore, 87.7% were concerned about instruments’ sterilization during dental procedures. Smith et al. [19] examined the perception of patients, particularly on bloodborne infections. Smith et al. [19] revealed that patients were more aware of poor hand hygiene risk than the risk of cross-infection with a bloodborne virus.

Similarly, Baseer et al. [20] examined patients' perception of the infection with HIV or hepatitis B due to dental procedures. It has been shown that a larger proportion of patients were more concerned about the risk of HIV compared to hepatitis B in dental clinics. Patients who had previous visits to dental clinics had better perception and attitude towards infection control.

As for the perception of dentists, most recently, Khader et al.[13] examined the perception of dentists towards COVID-19 infections and infection control in dental clinics. Khader et al. [13] illustrated that almost a third of the dentists had adequate information about COVID-19 infection. Almost three-quarters of the dentists had good practice towards the prevention of COVID-19 infections in their dental clinics.
Also, Dagher et al. [16] examined the perception of dentists towards some bloodborne infections. Dagher et al. [16] showed a significant correlation between dentists' gender and protective equipment use. At the same time, higher compliance rates were associated with more experience. Surprisingly, Al-Maweri et al. [18] showed that dental students had a better perception of infection control, where 90% of the students were vaccinated against hepatitis B.

However, this review was limited by some obstacles. All the eligible studies for inclusion had a qualitative and cross-sectional design. These were limited by the patients’ and dentists’ views and their honesty while responding to the questions. Also, all the articles were limited by their lack of external validity. These limitations should be overcome in any future research studies.
**Conclusion**

The perception of dentists towards infection control measures in dental practice was better than the perception of patients. The knowledge of patients should be improved to improve their perception. Educational level and previous patients’ visits were significantly correlated with patients' perception. At the same time, years of experience and gender of dentists were significant influencers on the perception of dentists towards infection control measures in dental practice.

**Consent for participation:**

Not applicable.

**Conflict of Interest:**

The authors of this article declare that there is no conflict of interest regarding the publication.

**Ethical Approval:**

Not applicable

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References


