Assessment of adherence to infection prevention and control guidelines among dentists in the West Bank and Jerusalem

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Abstract

Background: Adherence to infection prevention and control (IPC) guidelines is mandatory in healthcare service provision.

Aims: We assessed the knowledge and adherence to IPC guidelines among dentists in the West Bank and Jerusalem.

Methods: A self-administered questionnaire was distributed to a convenience sample of dentists in the West Bank and Jerusalem between 12 March 2019 and 9 May 2019. The total sample comprised 395 dentists, categorized into good compliance and fair compliance according to a scale developed from 32 questions. The Chi-squared test was used to compare the 2 categories. Data were analysed using *SPSS*, version 25.

Results: Overall compliance with IPC guidelines was low; only 18.5% of respondents reported good compliance. Compliance with basic principles such as wearing gloves and changing them for each patient and using autoclaves to sterilize equipment was high. Good compliance was significantly associated with age, years of experience, and year of graduation, $P = 0.045$, $P = 0.036$ and $P = 0.007$, respectively. Providers in the north of West Bank and public sector workers were significantly associated with good compliance, $P = 0.018$ and $P \leq 0.0001$, respectively. Experiencing a needle stick injury and the number of needle stick injuries experienced were significantly inversely associated with good compliance, $P \leq 0.001$.

Conclusion: Based on our results, there is a need for substantial improvements in compliance with IPC guidelines by dentists in the West Bank and Jerusalem; mandatory education and training regulated by governing institutions would be very helpful.

Keywords: dentists, guidelines, infection prevention and control, compliance, knowledge, West Bank, Jerusalem

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Introduction

Infection prevention and control (IPC) is a basic component of dental practice to ensure a secure working environment and preserve the health of dental staff and patients (*1,2*). Transmission of infection is bidirectional, from patient to dental staff and vice versa. Infection may also be transmitted from patient to patient through contaminated instruments (*1,3,4*). Implementation of universal precautions, immunization against infectious diseases, use of personal protective equipment, disinfection, sterilization and proper handling and exposure management of sharp instruments are the main strategies recommended by the World Health Organization (WHO) to protect healthcare workers (*5*). The United States Centers for Disease Control and Prevention (US CDC) issued guidelines that provides detail information the infection control elements for dental staff (*1*). In 2017, the Palestinian Ministry of Health published a manual of policies and procedures for infection control in health institutions; which includes policies pertaining to the dental department and a checklist for the evaluation of dental clinics (*6*).

IPC principles are similar around the world, but adherence to the guidelines varies widely between countries, and even among dentists within a country (*7,8*). A significant variation was found between developed and developing countries. Lack of knowledge and a shortage of resources are common reasons for noncompliance with IPC principles in developing countries (*7*). Compliance with the guidelines may be affected by the experience and education of the dentist and the presence of clear and comprehensive policies for application and monitoring of the procedures. It may also be related to the dentist's behaviours regarding IPC procedures. Sometimes compliance is influenced by the perception of ethical and legal responsibility of the dentist to their patients and the community (*2,9*).

Although the risk of cross-infection in the dental setting is low, transmission of infection is still a possibility and should not be neglected (*10*). With asymptomatic infection or long incubation period, symptoms may appear weeks or months after the actual transmission and may exacerbate the risk of transmission in the dental setting, thus making it difficult to conduct retrospective inquiry to assess the possibility of health-care-associated infection (*2,3*). Most exposures to contagious materials

in dental practice are preventable and can be avoided by considering every patient as potentially infected and therefore observing IPC precautions strictly (*8,10–12*).

The objectives of this study were to identify dentists' knowledge and perceptions of the risk associated with transmission of infection in dental clinics in the West Bank and Jerusalem and to assess the dentists' compliance with IPC principles.

Methods

This cross-sectional survey was conducted using the convenience sampling method to identify dentists' routine practices regarding IPC precautions in the West Bank and Jerusalem between 12 March 2019 and 9 May 2019. A self-administered questionnaire was developed based on previous literature, US CDC guidelines and the Ministry of Health manual (*1,6,13,14*) as no validated questionnaires to measure IPC procedures were available. The questionnaire was posted on the official dentists' Facebook and WhatsApp groups, and sent by email to dentists whose emails were available. To increase the response rate, we distributed hard copies of the questionnaire at the dental scientific day held in Jericho on 5 April 2019, and in Jenin, Hebron and Ramallah. The dentists were informed that the questionnaire was distributed through the 3 channels to prevent duplicate response.

In the West Bank and Jerusalem 3373 dentists were licensed to practice dentistry according to the Palestinian Dental Association records for 2019. The eligibility criteria for our study were: dentists registered with the Palestinian Dental Association and working with a valid license in the West Bank and Jerusalem.

Using an online sample size calculator (http://www.raosoft.com/samplesize.html), the sample size was 345, assuming a 50% adherence to infection guidelines with a 5% margin of error and a confidence level of 95%. In total, 449 questionnaires were returned; 155 were returned from the 185 hard copies distributed. Dentists in training who graduated in 2018 were excluded. Another 23 respondents were excluded during data entry because they had missing data, so the final number of participants was 395. A test survey was conducted with 12 dentists selected randomly from the Palestinian Dental Association list to ensure the clarity, unambiguousness and relevance of the questions, and to estimate the time required to complete the questionnaire. The questions were modified based on their feedback. The average time to answer the questions was 10–15 minutes, and the test respondents were excluded from the main study. The final version of the questionnaire comprised 46 questions inquiring about the dentists' personal information, training and education, vaccination against hepatitis B virus, personal protection equipment, dental waste management and sterilization methods used.

Overall compliance with IPC principles was measured by amassing the correct answers from participants and building a scale from 32 questions with internal consistency (Cronbach's alpha) 0.76 (questionnaire available on request). For yes/no questions, "yes" was considered the correct answer, while "always" was considered the correct answer for frequency questions. Open questions were correctly answered as: single-handed recapping of needles, disposing of the sharps box in a special container, using only autoclave or autoclave with other sterilization methods, using biological indicators for monitoring the sterilization cycle with other indicators, and using only sodium hypochlorite (NaOCL) for surface disinfection. The answers were considered correct if they complied with the directives in the US CDC and local Ministry of Health manuals (*1,6*). The number of correct answers ranged between 7 and 30 from the total of 32, and compliance was ranked into 2 categories. Dentists who answered < 66% of questions correctly were assessed as having fair compliance; 81.5% (n = 322) of our participants were in this category. Dentists who answered ≥ 66% of questions correctly were assessed as having good compliance; 18.5% (n = 73) of our participants were in this category. This categorization is similar to that used in a 2017 study conducted in Lebanon which categorized dentists' compliance according to their correct answers: excellent 86–100%, good 66–85%, fair 50–65%, poor < 50% (*13*).

Data were entered into *SPSS*, version 25, for statistical analysis. Univariate analysis was carried out for all variables. Bivariate analysis using the chi-squared test was carried out to assess the association between compliance of dentists regarding the demographic variables and experience with needle stick injuries (NSIs). The significance level was set at $P < 0.05$.

Ethical approval for this study was obtained from the institutional review board at the Community and Public Health Institute of Birzeit University. Participation was voluntary, and the data collected were treated confidentially and anonymously.

Results

Our sample comprised 395 dentists. Just over half (53.2%) were males. Mean age was 34.4 years, with 52.9% (n = 208) aged ≤ 32 years. Details of the demographic characteristics are illustrated in Table 1.

In general, participants were not interested in education and training regarding IPC: only 26.1% (n = 103) had had been trained in IPC after graduation from dental school. Seventy-six percent (n = 300) affirmed the need for more training and knowledge about IPC principles. Just under half of the participants (46.6%) (n = 184) believed that they had the right to refuse to treat patients who had an infectious disease, while 23.3% (n = 92) were not willing to treat patients with infectious diseases. Almost all the respondents (98.0%, n = 387) were vaccinated against hepatitis B virus but only 75.2% (n = 297) had received the booster dose.

Compliance with personal protection practices (for both the practitioner and the patient) and the disposal of medical wastes is summarized in Table 2. Almost all

(99.0%) our participants said they always wore gloves while treating a patient and 98.5% always changed their gloves between patients.

Needle stick injuries were prevalent among the dentists in our sample: 80.0% (n = 316) of participants had ever experienced NSIs. The average number of NSIs in the previous 5 years was 3.5, and 48.9% (n = 193) had experienced NSIs more than twice during the period. Autoclaving was the dominant method of sterilization 98.0% (n = 387); only 11.6% (n = 46) used biological indicators alone or with other indicators for monitoring the sterilization cycle.

Dentists aged ≤ 45 years showed good compliance compared with other age groups (P = 0.045) (Table 3). Those who graduated before 2004 showed greater compliance than recently graduated dentists (P = 0.007) and those who had ≥ 20 years of experience were the most committed (P = 0.036). Working in the public sector was highly significantly associated with good compliance (P < 0.0001). The experience of having had an NSI was inversely associated with good compliance (P < 0.0001). Low compliance was associated with a greater number of NSIs (P = 0.0010) (Table 3).

Table 1 Demographic characteristics of the dentists

Characteristic	N (%)	Missing values N
Sex		
Males	210 (53.2)	0
Females	185 (46.8)	
Age		
32>=	208 (52.9)	2
33-44	115 (29.3)	
45<=	70 (17.8)	
Residency		
North of WB	102 (26.2)	6
Middle of WB	173 (44.5)	
South of WB	114 (29.3)	
Graduation year (BDS)		
2003≥	89 (22.7)	3
2004-2011	148 (37.8)	
2012≤	155 (39.5)	
Graduation country		
Palestine	220 (55.7)	0
Arab countries	92 (23.3)	
Other countries	83 (21.0)	
Dental sector		
Public	28 (7.1)	0
Private	367 (92.9)	
Main practice region		
Urban	290 (73.4)	0
Rural	90 (22.8)	
Camp	15 (3.8)	
Specialization field		
General practitioner	344 (87.1)	0
Specialist	51 (12.9)	
Experience years		
9≥	221 (56.2)	2
10-19	108 (27.5)	
20≤	64 (16.3)	

Discussion

In this survey, overall adherence to IPC principles was low, similar to the findings of studies conducted in the Islamic Republic of Iran and Saudi Arabia (*15–17*). The low compliance may be due to financial reasons; following IPC principles increases the financial burden on dentists (*14,18*). In a previous research, compliance rate increased among clinics with repeated inspection visits by the licensing office (*18*). Moderate compliance with IPC principles was reported among Palestinian dentists, and excellent compliance among Jordanian dentists during the COVID-19 pandemic (*18,19*).

The older dentists in our study showed better compliance with IPC principles. This confirmed the association between good compliance, graduation year and years of experience. Our findings support the findings of previous studies conducted in Lebanon and the Islamic Republic of Iran (*13,15*); older dentists may

Table 2 Personal protection practices and disposal of medical waste among dentists (n = 395) in the West Bank and Jerusalem, 2019

Personal protection practices	No. (%)
Always wear gloves during patient treatment	391 (99.0)
Always change gloves between patients	389 (98.5)
Always use soap for handwashing	350 (88.6)
Always wear a face mask	327 (82.8)
Always change visibly contaminated laboratory coats/gowns	322 (81.5)
Always wear double gloves with a patient known to have an infectious disease	307 (77.7)
Always use a paper towel to dry their hands	300 (75.9)
Always wash hands after gloving	296 (74.9)
Always remove gloves while walking around	278 (70.4)
Always wear a uniform with long sleeves	278 (70.4)
Recap the needle using a single-handed method	243 (61.5)
Dispose of the sharps box in a special container	225 (57.0)
Always wear sterile gloves during surgical procedures	216 (54.7)
Always decontaminate their hands using disinfectant solution	208 (52.7)
Always wash hands before gloving	165 (41.8)
Always change the face mask for each patient	67 (17.0)
Always wear eye-protection during patient treatment	67 (17.0)
Use yellow bags for disposing of non-sharps waste	66 (16.7)
Use red bags for disposing of infectious waste	23 (5.8)

Table 3 Association between good compliance and risk factors among dentists (*n* = 395) in the West Bank and Jerusalem, 2019

Independent variable	Good compliance[a] (%)	*P*-value
Sex		
Male	20.6	0.2764
Female	16.2	
Age (years)		
≤ 32	16.8	0.0453
33–44	14.8	
≥ 45	28.6	
Residence		
North of West Bank	26.5	0.0180
Middle of West Bank	19.1	
South of West Bank	11.4	
Graduation year		
Before 2004	29.2	0.0070
2004–2011	13.5	
After 2011	16.1	
Years of experience		
≤ 9	15.8	0.0363
10–19	16.7	
≥ 20	29.7	
Country of graduation		
Palestine	15.5	0.0869
Arab country	18.5	
Other country	26.5	
Sector		
Public	46.4	< 0.0001
Private	16.3	
Main practice region		
Urban	18.3	0.0769
Rural	15.6	
Camp	40.0	
Specialty		
General practitioner	17.4	0.1670
Specialist	25.5	
Licensed clinic		
Yes	19.1	0.1470
No	5.6	
Have you experienced a needle stick injury?		
Yes	14.6	0.0001
No	34.2	
How many times in the last 5 years?		
≤ 2	24.8	0.0010
> 2	11.9	

[a]*22–30% of answers correct.*

have acquired sufficient information and knowledge about IPC during their years of work experience, which they did not have when they graduated (*13*,*15*). However, in a report from Palestine and Saudi Arabia, younger dentists showed greater compliance than older dentists (*20*,*21*). This could be due to the IPC programme introduced recently as part of the education and training in dental schools (*20*,*21*) or the absence of such a program at graduation for older dentists with no development for their qualifications. (*22*).

The majority of the participants in our study were working in private clinics, and level of compliance was greater in public sector clinics. Mandatory rules in public clinics may have increased compliance among dentists despite the poor education and knowledge among the staff (*15*). Other studies showed greater levels of compliance in private clinics due to the greater availability of resources, less work pressure and the fewer patients seeking dental care (*18*,*19*,*22*).

Good compliance was significantly associated with residence; dentists who lived in the north of Palestine were the most compliant. There is no obvious explanation for how residence affects compliance; a study conducted in 2 cities in the north of Palestine, Nablus and Tulkarm, attributed increased compliance in Tulkarm City to the activities of the dental association and the Ministry of Health in Tulkarm, including scientific days, conferences and periodic monitoring of dental clinics, all of which increase awareness, knowledge and application of optimal IPC measures (*18*).

This and some other studies have shown inverse relationship between compliance with IPC principles and NSIs, an increase in the number of NSIs will increase the potential for infectious disease transmission because NSIs are the main route of infection for bloodborne diseases (*23*–*25*).

Nowadays COVID-19 is a major challenge that dentists face in the delivery of safe healthcare, especially in developing countries where resources are low and there are doubts about the reality of COVID-19 (*26*,*27*). Dental procedures generate aerosols, and proximity to patients put dentists at risk of infection as these aerosols are often contaminated with patients' body fluids and tissues (*4*,*12*,*26*,*27*). Organizations such as the US CDC and WHO have recommended using high-level IPC measures, especially personal protective equipment such as face shields and N95 masks (*4*,*27*,*28*).

In a study in Taiwan, dentists showed improvement in their knowledge, attitudes and behaviours toward IPC measurements because of COVID-19 (*29*); there was a significant improvement in the use of head caps, face shields, eye masks and surface disinfection. The WHO recommends that dentists be updated about IPC measures through continuing education programmes and webinars (*27*). Increasing knowledge and education

about IPC reduces the dentist's apprehension about the chances of infection transmission during dental treatment and creates a positive attitude toward their patients (*30*).

Our study had a number of limitations. It depended on a self-administrated questionnaire, thus overestimation in reporting positive attitudes may be found for some questions. Selection bias could occur if dentists who chose to participate in the study differed in their characteristics from those who did not participate. The sample may not be representative, so we could not generalize the results, as we depended on convenience sampling for data collection.

Conclusion

Unsatisfactory knowledge and practices regarding IPC were observed among Palestinian dentists in the West Bank and Jerusalem. Dentists need to improve their behaviours and always observe IPC guidelines when attending to patients. There is a need for mandatory and regular training courses on IPC for dentists, supervised by the regulatory institutions. Further studies are needed to explore the reasons for noncompliance to IPC guidelines by dentists with a view to addressing them.

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Competing interests: None declared.

Évaluation de l'adhésion aux lignes directrices en matière de prévention et de contrôle des infections chez les dentistes de Cisjordanie et de Jérusalem

Résumé

Contexte : Le respect des lignes directrices en matière de prévention et de contrôle des infections (PCI) est obligatoire dans la prestation des services de santé.

Objectifs : Nous avons évalué la connaissance et le respect des lignes directrices PCI chez les dentistes de Cisjordanie et de Jérusalem.

Méthodes : Un questionnaire auto-administré a été distribué dans un échantillon de commodité de dentistes en Cisjordanie et à Jérusalem entre le 12 mars et le 9 mai 2019. L'échantillon total comprenait 395 dentistes, classés en deux catégories : bonne observance et observance moyenne, selon une échelle établie à partir de 32 questions. Le test du khi carré a été utilisé pour comparer les deux catégories. Les données ont été analysées à l'aide du logiciel SPSS (version 25).

Résultats : La conformité globale aux lignes directrices PCI était faible ; seulement 18,5 % des répondants ont indiqué une bonne observance. Le respect des principes de base, notamment le port de gants et leur changement pour chaque patient et l'utilisation d'autoclaves pour stériliser, le matériel était élevé. Une bonne observance était significativement associée à l'âge avancé, aux années d'expérience et à l'année d'obtention du diplôme, p = 0,045, p = 0,036 et p = 0,007, respectivement. Les prestataires du nord de la Cisjordanie et les agents du secteur public étaient fortement liés à une bonne observance, p = 0,018 et $p \leq$ 0,001, respectivement. Le fait d'avoir connu une blessure par piqûre d'aiguille et le nombre de blessures par piqûre d'aiguille subies étaient significativement inversement associés à une bonne observance, $p \leq$ 0,001.

Conclusion : D'après nos résultats, il est nécessaire d'améliorer sensiblement le respect des lignes directrices PCI ; une éducation et une formation obligatoires réglementées par les institutions dirigeantes seraient très utiles.

تقييم التزام أطباء الأسنان في الضفة الغربية والقدس بالمبادئ التوجيهية للوقاية من العدوى ومكافحتها

روان الشريف، عبد اللطيف حسيني

الخلاصة

الخلفية: يعد الالتزام بالمبادئ التوجيهية للوقاية من العدوى و مكافحتها ضروريا عند تقديم خدمات الرعاية الصحية.

الأهداف: هدفت هذه الدراسة الى تقييم مدى معرفة أطباء الأسنان في الضفة الغربية والقدس بالمبادئ التوجيهية للوقاية من العدوى ومكافحتها ومدى تقيُّدهم بها.

طرق البحث: وُزع استبيان يملؤه المجيبون بأنفسهم على عينة غير احتمالية مُيسَّرة من أطباء الأسنان في الضفة الغربية والقدس في المدة من 12 مارس/ آذار 2019 إلى 9 مايو/ أيار 2019. وشملت العينة الإجمالية 395 طبيب أسنان، صُنفوا ما بين فئة الملتزمين جيدًا وفئة الملتزمين على نحو مقبول، وفقًا لمقياس مُستنبَط من 32 سؤالًا. واستُخدم اختبار مربع كاي لمقارنة الفئتين. وحُللت البيانات باستخدام الإصدار 25 من برنامج SPSS.

النتائج: كان الامتثال للمبادئ التوجيهية للوقاية من العدوى ومكافحتها منخفضًا بشكل عام؛ وأفاد 18.5٪ فقط من المجيبين بالتزامهم جيدًا. وكان الالتزام بالمبادئ الأساسية، من قَبيل ارتداء القفازات وتغييرها لكل مريض واستخدام أجهزة التعقيم بالبخار (الأوتوكلاف)، مرتفعًا. وكان

الالتزام الجيد مرتبطًا ارتباطًا كبيرًا بالتقدم في العمر (القيمة الاحتمالية = 0.045) وسنوات الخبرة (القيمة الاحتمالية = 0.036) وسنة التخرج (القيمة الاحتمالية = 0.007) . وأظهر مقدمو الخدمات في شمال الضفة الغربية والعاملون في القطاع العام ارتباطًا قويًّا بالالتزام الجيد، فكانت القيمة الاحتمالية = 0.018 و P ≥ 0.0001 على التوالي. وكان التعرض لإصابات ناجمة عن الوخز بالإبر وعدد الإصابات الناجمة عن الوخز بالإبر يرتبطان بشدة عكسيًّا بالالتزام الجيد، فكانت القيمة الاحتمالية ≥ 0.001.

الاستنتاجات: بناء على النتائج التي توصلنا إليها، ثمة حاجة إلى إدخال تحسينات كبيرة على التزام أطباء الأسنان في الضفة الغربية والقدس بالمبادئ التوجيهية للوقاية من العدوى ومكافحتها. وفي هذا الصدد، سيكون التعليم والتدريب الإجباريان اللذان تنظمهما المؤسسات المعنية مفيديْنِ للغاية.

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