

Infection control measures among dentists practising in Saudi Arabia

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كجزء من المسح الطبي الشامل لصحة الفم والأسنان لسكان المملكة العربية السعودية تمت دراسة المعلومات المتوفرة لدى أطباء الأسنان العاملين بالمملكة وطريقة عملهم وتصرفاتهم حيال تطبيق طرق مكافحة انتقال العدوى في عيادات طب الأسنان .

شارك في هذه الدراسة ٤٨١ طبيب وطبيبة أسنان يعملون في المناطق الخمسة الرئيسية بالمملكة وأجابوا على استبيان مكون من ١٢٨ سؤال . أوضحت النتائج أن ٩٢ % من الأطباء يستخدمون قفازات جديدة بعد كل مراجع بينما أجاب ٨٥.٣٢ % من أفراد العينة بأنهم يستخدمون قناع لحماية الوجه أثناء المعالجة وما نسبته ٥٠.٨٤ % من الأطباء أفادوا بأنهم يستخدمون نظارات لحماية أعينهم أثناء العمل .

كما دلت النتائج على أن ٩٨.٣٢ % من أطباء الأسنان العاملين بالمملكة يستخدمون إبر المخدر الموضعي ذات الاستخدام الواحد بينما أفاد ٢٧.١٤ % من أفراد العينة بأنهم يقومون بتعقيم للفضات اليدوية بعد كل مريض ، لكن ما نسبته ٩٠.٢ % من أفراد العينة أفادوا بأنه يتم تعقيم كل الأدوات التي يستخدمونها بالعبادة بجهاز التعقيم الذي يعمل بنظام بخار الهواء المضغوط .

وأوضحت الدراسة أن هناك زيادة بما نسبته ٨٩.٣ % في مجموع أطباء وطبيبات الأسنان الذين يطبقون معايير وطرق مكافحة انتقال العدوى بعيادات طب الأسنان بالمملكة لخوفهم من انتقال فيروس الإيدز لهم .

وعند تحليل الإجابات المتعلقة بمدى وجود قدر كافي من المعلومات لدى الأطباء عند معالجة مرض الإيدز أفاد ٢٦.٣ % من أفراد العينة بأنهم لا يتفقدون ونسبة ٨.٥ % لا يتفقدون بشدة بأن لديهم مثل هذه المعلومات .

ولمعرفة مدى اطمئنان أطباء الأسنان لمعالجة مرضى مصابون بمرض الإيدز أفاد ٣٧.٣ % من أفراد العينة بأنهم لا يشعرون بأمان عند معالجة هؤلاء المرضى .

نستنتج من هذه الدراسة بأن أطباء الأسنان العاملين بالمملكة العربية السعودية (التي تتطور بسرعة هائلة) يتبعون نظام متكامل لمكافحة انتقال العدوى ويطبقون معايير عالمية ولكن تبقى الحاجة مستمرة لتزويد الأطباء ببرامج تعليم طبي مستمر لتحديث معلوماتهم وتحسين معرفتهم في طرق مكافحة العدوى .

A national study of oral health care delivery system was conducted in Saudi Arabia. The methodology was based on the International Collaborative Study of Oral Health Outcomes (I CS-I). A part of that study was to survey the dental practitioners for their knowledge, attitudes and practices. A 128-item questionnaire was administered to dentists practicing in multiple countrywide locations (5 provinces) and the number of respondents totaled 481. Results showed that 92% used a new pair of gloves for each patient; 85.32% wore face masks; for all procedures; 50.84% used eyewear or glasses for all procedures; 98.32% used a sterilized disposable needle for each patient 27.14% sterilized with autoclave handpieces after each patient; 90.2% sterilized hand instruments in the autoclave after each use; and 89.3% reported enhanced implementation of infection control procedures since they learned about AIDS. Approximately 26.3% disagreed and 8.5% strongly disagreed that they had adequate infection control training to treat AIDS patients. Over 37.3% strongly agreed and 30.3% agreed that they felt unsafe treating AIDS patients. It is concluded that Saudi Arabia, a rapidly modernizing middle-income nation, is making excellent progress in implementing barrier techniques in the dental care delivery system. In view of worldwide AIDS epidemic, it is vital that adequate infection control continues and greater efforts made in this area with more information provided to dentists about AIDS.

Introduction

In dentistry, there is a major effort to re-evaluate methods of maintaining sterilization in the dental environment. The upsurge of new diseases such as AIDS and the recrudescence of diseases such as tuberculosis, hepatitis B, C, and D and other maladies have made it essential that strict sterilization be maintained. A survey¹ carried out in Canada on participants who attended the 1991 continuing education course on 'HIV and Infection Control in 1990s' indicated that the number of dentists who routinely adopt barrier protection techniques, e.g. use of gloves, was on the increase. Furthermore, 80% of the dentists were prepared to treat AIDS patients, a figure much

higher than 60% reported for US dentists in 1991.² In spite of this favorable response, most of the dentists had some reservations with regard to treating AIDS patients. Among the reservations expressed were personal safety, staff resistance, stigma attached to dentists known to be treating AIDS patients and non-disclosure of HIV status by infected individuals.

Although most dentists now accept the routine adoption of barrier protection techniques and routine autoclaving of instruments as effective infection control measures, a survey carried out in California³ showed that only 59% of orthodontists changed gloves between patients.

Furthermore, the orthodontists sterilized their instruments 66% of the time and pliers 49% of the time. Compared with general dentists, orthodontists' perception of risk, use of barrier

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protection and sterilization and disaffection procedures was lower in all the areas of California surveyed.

The improved infection control measures in dental practices in the United States have been attributed to at least three factors: continuing education courses on infection control, American Dental Association (ADA) education materials and the fear of contracting AIDS.⁴ Although the last factor had been particularly heightened by a report of a dentist who became HIV positive apparently from his professional practice, a survey by Klein et al⁵ indicated that dental professionals have a low occupational risk for HIV infection.

Because continuing education for dentists has played and continues to play such an important role in the attitude of dentists to infection control measures, it is important to identify the educational needs of dental practitioners. One way of achieving this is to survey dentists' opinion on the subject.

As a result of educational efforts in North America, the infection control practices were greatly improved.⁴⁷ For example, a greater number of dentists⁷ used gloves and other barrier techniques for all patients in 1988 than in 1986.⁸ In another survey,⁴ it was found that more general dentists used autoclaves for sterilization in 1988 than in 1986 (80% vs. 67%). Nevertheless, a third of the general dentists did not monitor their sterilization process. Of the 67% who did, only 21% used biological monitors, in contrast to 11% in 1986. Furthermore, only about half of the dentists had autoclavable handpieces in 1988.

To identify the lapses, if any, in the infection control measures adopted in Saudi Arabia,^{9,10} there is a need for a survey of the infection control practices in the country and this was one of the aims of this study.

The objective of this study was therefore to assess the knowledge, attitudes and infection control practices of dentists in five (5) provinces in Saudi Arabia.

Materials and Methods

As a part of the International Collaborative Study Part II (ICS-II), there is an existing protocol in Saudi Arabia for carrying out a national survey of oral diseases and outcomes. In this study, the survey of dentists' opinions was done through a questionnaire developed for this purpose. It is designed to gain greater information about the providers of oral health care in the country. It was mainly concerned with the perceptions,

perspectives, work productivity, training and problems of dentists providing services in Saudi Arabia. This questionnaire was administered to dentists in the primary sampling areas. Correlations were made with the responses we got from adults and children utilizing the services of these practitioners. The sample of dentists was acquired through a convenience sample. A dental symposium was organized for every city included in the survey and participating dentists answered the questionnaire during the event. It was felt that convening the dentists in a symposium would be very advantageous and would assure immediate response from them. This detailed questionnaire was answered by all practitioners, regardless of classification. Turnout was 80% in the regions covered.

Data were analyzed using the SAS statistical program running under VM System on an IBM 3080 mainframe. Multivariate statistics and regression analysis were used to analyze the data.

Results

Tables 1-7 show the different results of the study in the following categories: from the five provinces-Central (Cent), Eastern (East), Southern (South), Northern (North) and Western (West).

Demographics

The distribution of dentists in the sample by nationality were as follows: Saudis 11.02%, Egyptian 41.74%, other Arabs 22.67%, USA/European 8.9%, Indian/Pakistani 10.81% and others 4.87% (Table 1).

The distribution of dentists by the country where they obtained their basic dental training is: Saudi Arabia 10.08%, Egypt 51.89%, USA/Europe 9.82% and others 28.2% (Table 2).

Barrier Techniques

The results showed that 92.44% of respondents used plastic or rubber gloves for each patient. There was no significant relationship between years of experience and the tendency to use gloves between patients (Table 5A, 5B).

Approximately 85.32% of respondents used a facemask for all procedures and there was little change in this based on years of experience (Table 5A, 5B).

On the question of using protective eye wear, 50.84% of respondents used eye protection for all procedures. There was a slightly higher

Table 1. Nationalities of dentists from the Central, Eastern, Southern, Northern and Western province of Saudi Arabia.

Nationality	Province					Total
	Cent	East	South	North	West	
Saudi	18 (3.81)	15 (3.18)	4 (0.85)	4 (0.85)	11 (2.33)	52 (11.02)
Egyptian	66 (13.98)	11 (2.33)	55 (11.65)	37 (7.84)	28 (5.93)	197 (41.74)
Other Arabs	35 (7.42)	12 (2.54)	19 (4.03)	15 (3.18)	26 (5.51)	107 (22.67)
American/ European	10 (2.12)	31 (6.57)	0 (0.0)	1 (0.21)	0 (0.00)	42 (8.90)
Indian/ Pakistani	16 (3.39)	3 (0.64)	16 (3.39)	11 (2.33)	5 (1.06)	51 (10.81)
Others	13 (2.75)	3 (0.64)	3 (0.64)	3 (0.42)	2 (0.42)	23 (4.87)
Total	158 (33.47)	75 (15.89)	97 (20.55)	70 (14.83)	72 (15.25)	472 (100.00)

Table 2. Countries where respondents obtained their basic dental education (Bachelor's Degree) by region.

Country of Basic Training	Province					Total
	Cent	East	South	North	West	
Saudi Arabia	16 (4.03)	11 (2.77)	4 (1.01)	3 (0.76)	6 (1.51)	40 (10.08)
Egypt	70 (17.63)	13 (3.27)	48 (12.09)	40 (10.08)	35 (8.82)	206 (51.89)
USA/Europe	11 (2.77)	27 (6.80)	0 (0.00)	0 (0.00)	1 (0.25)	39 (9.82)
Others	36 (9.07)	11 (2.77)	25 (6.30)	17 (4.28)	23 (5.79)	112 (28.21)
Total	133 (33.50)	62 (15.62)	77 (19.40)	60 (15.11)	65 (16.37)	397 (100.00)

percentage of those with experience between 0-5 years using eye protection (Table 3,4,5A,5B).

Sterilization

The type of sterilization technique used in the clinics were examined in reference to the country of basic dental training (Table 6c). Findings indicated that 100% (the highest %) of USA/Europe-trained dentists used sterile disposable needles for each patient, while 97.5% (the lowest %) of Saudi Arabian-trained followed this procedure. Those who disinfected the working surface after each patient ranged from 61.54% (Saudi Arabian-trained) to 97.44% (USA/Europe-trained) ($P<0.05$). The widest range response was on sterilization using autoclave or dry heat for handpieces after each patient for this

Table 3. Countries where respondents obtained their higher dental education by region.

Country of Higher Trng.	Province					Total
	Cent	East	South	North	West	
Egypt	36 (18.18)	5 (2.53)	20 (10.10)	10 (5.05)	18 (9.09)	89 (44.95)
USA/Europe	46 (23.23)	21 (10.61)	5 (2.53)	4 (2.02)	2 (1.01)	78 (39.39)
Others	9 (4.55)	2 (1.01)	10 (5.05)	5 (2.53)	5 (2.53)	31 (15.66)
Total	91 (45.96)	28 (14.14)	35 (17.68)	19 (9.60)	25 (12.63)	198 (100.00)

Table 4. Professional experience of respondents by region.

Number of Years of Experience	Province					Total
	Cent	East	South	North	West	
0-5	20 (4.28)	12 (2.57)	5 (1.07)	5 (1.07)	9 (1.93)	51 (10.92)
6-10	32 (6.85)	11 (2.36)	29 (6.21)	16 (3.43)	11 (2.36)	99 (21.20)
Above 10	102 (21.84)	54 (11.56)	62 (13.28)	48 (10.28)	51 (10.92)	317 (67.88)
Total	154 (32.98)	77 (16.49)	96 (20.56)	69 (14.78)	71 (15.20)	467 (100.00)

Table 5A. Barrier techniques practiced by respondents according to location of practice in Saudi Arabia.

Barrier Techniques	Province					Total Positive Responses	Total Responses (n)
	Cent	East	South	North	West		
Plastic gloves for each patient	148 (93.67)	73 (94.81)	93 (93.94)	63 (87.50)	63 (87.50)	440 (92.44)	476
Face masks for all procedures	135 (84.91)	67 (87.01)	83 (83.84)	61 (87.14)	61 (84.72)	407 (85.32)	477
Protective eyewear for procedures	74 (46.54)	60 (77.92)	41 (41.41)	37 (53.62)	30 (41.67)	242 (50.84)	476

Table 5B. Barrier techniques practiced by respondents according to years of professional experience.

Barrier Techniques	Years of Experience			Total Positive Responses	Total Responses (n) *
	0-5	6-10	Above 10		
Plastic gloves for each patient	44 (88.00)	94 (94.95)	291 (92.38)	429 (92.46)	464
Face masks for all procedures	41 (82.00)	83 (83.84)	271 (85.76)	395 (84.95)	465
Protective eyewear for procedures	29 (58.00)	44 (44.90)	166 (52.53)	239 (51.51)	464

Table 5C. Barrier techniques practiced by respondents according to countries of basic training.

Country of Basic Training	Barrier Techniques		
	Plastic gloves for each patient	Face masks for all procedures	Protective eyewear for all procedures
Saudi Arabia	38 (95.00)	37 (92.50)	26 (65.00)
Egypt	195 (95.12)	170 (82.52)	94 (45.85)
USA/Europe	39 (100.00)	33 (84.62)	31 (79.49)
Others	98 (87.50)	94 (83.93)	56 (50.00)
Total Responses	370 (93.43)	334 (84.13)	207 (52.27)
Total (n)	396	397	396

Table 5D. Barrier techniques practiced by respondents according to countries of higher training.

Country of Higher Training	Barrier Techniques		
	Plastic gloves for each patient	Face masks for all procedures	Protective eyewear for all procedures
Egypt	86 (96.63)	73 (82.02)	40 (44.94)
USA/Europe	74 (94.87)	62 (79.49)	48 (61.54)
Others	29 (93.55)	26 (83.87)	15 (48.39)
Total Responses	189 (95.45)	161 (81.31)	103 (52.02)
Total (n)	198	198	198

Saudi Arabian trained was 17.50% and USA/Europe was 48.72% ($P < .05$). The lowest percentage who used sterilization or dry heat of hand instruments after each patient was 87.96% (others) and the highest percentage was 100% (USA/Europe) (Table 6C).

When years of experience were related to sterilization technique used, the only procedure which showed statistically significant relationship was disinfecting the working surfaces after each patient. The greater the experience, the more likely that this procedure would be carried out (Table 6B).

When the five regions, were compared, the barrier techniques of using gloves between all patients and using facemasks for all procedures, showed no significant difference of usages (Table 5A).

There was a significant difference among the five regions with respect to use of protective

Table 6A. Sterilization techniques practiced by respondents according to location.

Sterilization Techniques	Province					Total Positive Responses	Total (n)
	Cent	East	South	North	West		
Use Sterile disposable needle for each patient	153 (97.45)	76 (98.70)	98 (100.0)	67 (95.71)	73 (100.0)	467 (98.32)	475
Disinfects working surfaces after each patient	112 (72.26)	69 (89.61)	73 (73.74)	60 (85.71)	51 (69.86)	365 (77.00)	474
Sterilizes (autoclave or dry heat) handpieces after each patient	48 (31.37)	30 (38.96)	15 (15.31)	16 (23.19)	18 (25.35)	127 (27.14)	468
Sterilizes (autoclave or dry heat) hand Instruments after each patient	142 (92.21)	71 (92.21)	87 (88.78)	64 (91.43)	60 (84.51)	424 (90.21)	470

Table 6B. Sterilization techniques practiced by respondents according to years of professional experience.

Sterilization Techniques	Years of Experience			Total Positive Responses	Total (n)
	0-5	6-10	Above 10		
Use sterile disposable needle for each patient	46 (93.88)	98 (100.0)	310 (98.41)	454 (98.27)	462
Disinfects working surfaces after each patient	30 (60.00)	75 (75.76)	252 (80.51)	357 (77.27)	462
Sterilizes (autoclave or dry heat) hand pieces after each patient	5 (10.20)	28 (28.87)	89 (28.62)	122 (26.70)	457
Sterilizes (autoclave or dry heat) hand Instruments after each patient	41 (83.67)	88 (89.90)	285 (91.64)	414 (90.39)	458

eyewear for all procedures ($P < .01$) (Table 5A, 5B).

Over 98% of respondents used sterile disposable needles for each patient (Table 6A).

Discussion

In an era when we are experiencing an increased awareness of communicable infectious diseases such as tuberculosis and hepatitis and in which stories regarding the fear of the spread of

Table 6C. Sterilization techniques practiced by respondents according to countries of basic training.

Country of Basic Training	Sterilization Techniques			
	Use Sterile disposable needle for each patient	Disinfects working surfaces after each patient	Sterilizes (autoclave or dry heat) handpieces each patient	Sterilizes (autoclave or dry heat) hand Instruments after each patient
Saudi Arabia	39 (97.50)	24 (61.54)	7 (17.50)	37 (92.50)
Egypt	202 (98.06)	151 (74.02)	45 (22.28)	182 (89.66)
USA/Europe	39 (100.00)	38 (97.44)	19 (48.72)	39 (100.00)
Others	109 (99.09)	86 (77.48)	36 (33.33)	95 (87.96)
Total Responses	389 (98.48)	299 (76.08)	107 (27.51)	353 (90.51)
Total (n)	395	393	389	390

Table 6D. Sterilization techniques practiced by respondents according to countries of higher training.

Country of Higher Training	Sterilization Techniques			
	Use sterile disposable needle for each patient	Disinfects working surfaces after each patient	Sterilizes (autoclave or dry heat) handpieces each patient	Sterilizes (autoclave or dry heat) hand Instruments after each patient
Egypt	87 (97.75)	65 (73.86)	25 (28.74)	78 (89.66)
USA/Europe	75 (98.68)	60 (78.95)	25 (33.78)	39 (95.95)
Others	29 (96.67)	28 (90.32)	7 (23.33)	26 (86.67)
Total Responses	191 (97.95)	153 (78.46)	57 (29.84)	175 (91.62)
Total (n)	195	195	191	191

Table 7. Nationalities of respondents according to years of professional experience.

Nationality	Years of Experience			Total
	0-5	6-10	Above 10	
Saudi	31 (6.75)	12 (2.61)	7 (1.53)	50 (10.89)
Egyptian	7 (1.53)	50 (10.89)	134 (29.19)	191 (41.61)
Other Arabs	8 (1.74)	15 (3.27)	79 (17.21)	102 (22.22)
American/ European	2 (0.44)	3 (0.65)	37 (8.06)	42 (9.15)
Indian/ Pakistani	1 (0.22)	17 (3.70)	33 (7.19)	51 (11.11)
Others	1 (0.22)	1 (0.22)	21 (4.58)	23 (5.01)
Total	50 (10.89)	98 (21.35)	311 (67.76)	459 (100.00)

the HIV virus receive almost nightly news coverage, all health care professionals are taking extra precautions when providing care to the patients. The concern of occupational transmission of infectious diseases from patient to health care worker always remains as the main issue in the dental clinic infection control policy.¹²

The mean number of dentists using plastic or rubber gloves for each patient of 92.44% reflects the high standards of barrier techniques common in Saudi Arabia. Being a middle-income developing country, the Saudi Arabian government has invested considerable resources into quality health care. Dentistry has benefited from this policy. The same trend exists for face mask use (84.32%). However, a declining trend for use of protective eyewear (50.84%) indicates that more educational efforts are needed for practitioners on this precaution (Table 5A). Differences between regions for some procedures indicate that specific programs should be organized by regions to disseminate more information. The goal should be 100% use of these barrier techniques.

Sterilization technique results indicate that over 98.32% of Saudi Arabian dentists use sterile disposable needles for each patient. This reflects an overall strong policy implementation not using re-usable needles. The 77% who disinfect working surfaces after each patient indicate that the 19% who do not should be educated to begin this precaution.

An area of serious concern is the need to increase the number of practitioners in using the autoclave to sterilize their handpieces and instruments between patients. This has become the new international standard and organized dentistry in Saudi Arabia should stress this policy with strict implementation. This procedure along with others require greater investment of capital resources for implementation. However, in view of great risk of cross-infection to patients in the dental office, it is necessary to do this. Over 90% of respondents autoclave their instruments between patients, but the 10% who do not must be educated to comply. The 30% who autoclave their handpieces between patients are following the new standard, however, there is a need for intensive education in this area for dentists, dental administrators and for the authorities of health budgets. (Table 6A).

In an Ohio study,¹³ 80% of dentists reported sterilization of handpieces between patients, 69% of the dental clinics changed infection control protocols to include heat sterilization of

handpieces between patients while 24% reported disinfection between patients.

In those regions where resources are not present to implement these techniques, special efforts should be made to increase supply budgets to meet the needs of these practitioners. The presence of endemic hepatitis B and C in the country is a great risk to greater infection in the dental environment without these procedures. The international increase of AIDS also makes the establishment of nationwide strict sterilization and barrier guidelines necessary. There is perhaps no other issue in health care which surpasses the importance of sterilization and infection control.

Conclusion

Within the limitations of this study, it may be concluded that some infection control practices among dentists in Saudi Arabia are improving remarkably as evidenced by the use of glove and face masks. Other practices such as eyeglass protection and other procedures need to be implemented more vigorously in the Kingdom. Guidelines should be developed by the dental profession, which should mandate those who are not following proper procedures to begin to comply with updated international standards. More studies are needed in this area of research in the country.

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