



A CROSS- SECTIONAL STUDY TO ASSESS THE AWARENESS AMONG DENTAL STUDENTS OF PATIENT CARE PROTOCOL AS A PRECAUTIONARY MEASURE AGAINST AEROSOL TRANSMISSION

Prosthodontics

Basapogu Sreeramulu	Professor & Head of the Department, Department of Prosthodontics, Government Dental College & Hospital, Afzalgunj, Hyderabad, Telangana State-500012.
Githanjali Manchikalapudi	Assistant Professor, Department of Prosthodontics, Government Dental College & Hospital, Afzalgunj, Hyderabad, Telangana State-500012.
Reshma Raju*	Post Graduate student, Department of Prosthodontics, Government Dental College & Hospital, Afzalgunj, Hyderabad, Telangana State-500012.*Corresponding Author
Vavilikolanu Sneha Bharadwaj	Post Graduate student, Department of Prosthodontics, Government Dental College & Hospital, Afzalgunj, Hyderabad, Telangana State-500012.
Jandrajupalli Phebe	Post Graduate student, Department of Prosthodontics, Government Dental College & Hospital, Afzalgunj, Hyderabad, Telangana State-500012.

ABSTRACT

INTRODUCTION: A Dental Healthcare facility must be equipped with the right standards of patient safety protocol, in routine clinical practice, to respond appropriately during a pandemic. The possibility of viral transmission through aerosol- generating procedures is well documented. The strategical measures taken for patient protection play a crucial role in minimizing disease transmission and risk of cross contamination, not only during a pandemic outbreak but also in day-to-day clinical practice.

AIMS & OBJECTIVES OF THE STUDY: The objective of this questionnaire survey was to assess and evaluate the knowledge and awareness among the dental fraternity regarding basic patient protection protocol involving aerosol generating procedures.

MATERIALS AND METHODS: A cross-sectional study was carried out among dental students of Telangana and Andhra Pradesh, in the months of October and November 2020 using Google Form software. The data was grouped based on clinical experience of the respondents (in years) as Group I (0-2), Group II (2-5), Group III (5-10) and Group IV (>10), analyzed using statistical software (SPSS 22.0) and presented in terms of percentages.

RESULTS: Among the 506 participants of the survey, respondents under Group III exhibited relatively high awareness and knowledge of patient care protocols when compared to those under other groups, with statistically significant difference.

CONCLUSION: Dental students require constant updating and regular educational programs on patient care protocol to not only serve their practice but also the community as a whole, whenever a disease outbreak occurs.

KEYWORDS

Patient care protocol, Aerosol, Pandemic, Dental health care personnel.

INTRODUCTION:

The Dental Health care personnel (DHCP) are more prone to exposure of known or suspected sources of respiratory infections during aerosol generating procedures. They are categorized by the Occupational Safety and Health Administration (OSHA) as very high-risk exposure category, because they work in close proximity to the patient's oral cavity. Aerosol generating procedures, using high and low speed handpiece, ultrasonic scalers, air/water syringes and air polishing instruments have been proven by evidence-based studies as risky, due to viral transmission during a pandemic. Most dental procedures demand multiple visits of the patients, increasing the risk of disease transmission.^[1]

In the wake of the COVID-19 pandemic, there has been an increasing need for full informationally supported precautions to be undertaken by the DHCP and the patients respectively. Treatment must be rendered only if local, regional and national guidelines are adhered to and the clinical settings are safe for every visitor. It is extremely important to maintain and follow the precautions for patient care and remain pandemic-ready under every possible situation.^[2]

An online questionnaire survey study was conducted to assess the awareness among dental students for patient care protocol as a precautionary measure against aerosol transmission. The awareness of personal protection protocol has been so far emphasized among the dental fraternity. The strategical measures taken for patient protection also plays a crucial role in minimizing disease transmission and risk of cross contamination in the public.

OBJECTIVES OF THE STUDY:

To assess and evaluate the knowledge and awareness among the dental students on,
I. The basic patient protection protocol,

- II. The precautionary measures to be undertaken during aerosol procedures,
- III. The patient education before and after entry and exit of the dental healthcare facility,
- IV. Instructions to be given to the patient concerning prosthetic urgency.

MATERIALS AND METHODS:

A cross-sectional study was carried out among practicing dental students of Telangana and Andhra Pradesh, in the months of October and November 2020 using Google Form software. Participants were selected from senior residents, postgraduates, interns and juniors residents through convenience and snowball sampling.

A questionnaire with 20 multiple choice questions was created and elaborated using CDC and WHO guidelines. The questions were framed under two sections. The first section pertained to the awareness of the participants about patient health care protocol during aerosol procedures and the second part assessed the preventive measures they followed during aerosol procedures. The questionnaire was validated by pilot study after which it was forwarded to the sample population through social media.

STATISTICAL ANALYSIS:

The data was analyzed using SPSS 22.0 version and the results were expressed in percentage. ANOVA one-way test was used to determine the association of the study among the various respondents.

RESULTS:

A total of 506 responses were obtained. The data was grouped based on the clinical experience of the respondents (in years) as Group I (0-2), Group II (2-5), Group III (5-10) and Group IV (>10). Group III showed high awareness and implemented appropriate measures against aerosol transmission procedures.

Section 1: Dentist's Awareness of Patient Health Protocol Table No.1

Participants under Group III responded with the correct choices regarding teledentistry (79.3%), physical distancing (77.6%), preprocedural mouth rinses (70.7%) and criteria for HEPA filter installation (62.1%) in the dental operatory with statistically significant difference when compared to the other Groups. 93.8% of respondents in Group IV chose the correct options regarding the management of Prosthodontic urgencies during a pandemic which was statistically significant ($P=0.01$).

Section 2: Precautionary Measures Against Aerosol Transmission Table No.2

Respondents in every Group followed certain precautions for patient education and basic protection in the dental clinics during pandemic outbreaks. While the results are statistically significant, all the participants showed individual preference. Hence it can be emphasized that there is ambiguity in the knowledge of the participants regarding CDC and WHO guidelines for patient protection against aerosol transmission.

Table no 1: Dentist's awareness about patient health protocol

Questions	Respondents (Years of Experience)				Total (N=506)	P value
	Group I 0-2 (N=188)	Group II 2-5 (N=244)	Group III 5-10 (N=58)	Group IV >10 (N=16)		
	n (%)	n (%)	n (%)	n (%)		
Q1. Do you practise teledentistry	65 (34.6)	171 (70.1)	45 (77.6)	7 (43.8)	288 (56.9)	0.000
Q2. Teledentistry is helpful in..	137(72.9)	191 (78.3)	46 (79.3)	7 (43.8)	381 (75.3)	0.012
Q3. Upto how many days is a COVID-19 recovered patient considered a potential carrier	48 (25.5)	111 (45.5)	27 (46.6)	9 (56.3)	195 (38.5)	0.000
Q4. Instructions to be given to the patient, in case of denture urgency such as a removable denture causing trauma	126 (67.0)	193 (79.1)	50 (86.2)	15 (93.8)	384 (75.9)	0.001
Q5. What chemical do you suggest for disinfecting the prostheses at home						
Option a) 3% hydrogen peroxide (30 mins)	45 (23.9)	51 (20.9)	14 (24.1)	5 (31.3)	115 (22.7)	0.720
Option b) 0.2% chlorhexidine (10 mins)	124 (66.0)	185 (75.8)	44 (75.9)	11 (68.8)	364 (71.9)	0.129
Option c) 100% vinegar (6-8 hrs)	19 (10.1)	8 (3.3)	0 (0.0)	0 (0.0)	27 (5.3)	0.002
Q6. Do you ensure that the patient wears a mask till the dental operatory	159 (84.6)	229 (93.9)	55 (94.8)	16 (100.0)	459 (90.7)	0.003
Q7. Strategical distance to be maintained in the operatory and in the waiting area	102 (54.3)	191 (78.3)	45 (77.6)	12 (75.0)	350 (69.2)	0.000
Q8. Most effective proven preprocedural mouthrinse	118 (62.8)	172 (70.5)	41 (70.7)	7 (43.8)	338 (66.8)	0.069
Q9. Important criteria to select the appropriate HEPA filter	61 (32.4)	129 (52.9)	30 (51.7)	7 (43.8)	227 (44.9)	0.000
Q10. Ideal positioning of the HEPA filter	88 (46.8)	146 (59.8)	36 (62.1)	7 (43.8)	277 (54.7)	0.025
Q11. What material do you suggest for suturing	144 (76.6)	199 (81.6)	54 (93.1)	8 (50.0)	405 (80.0)	0.001

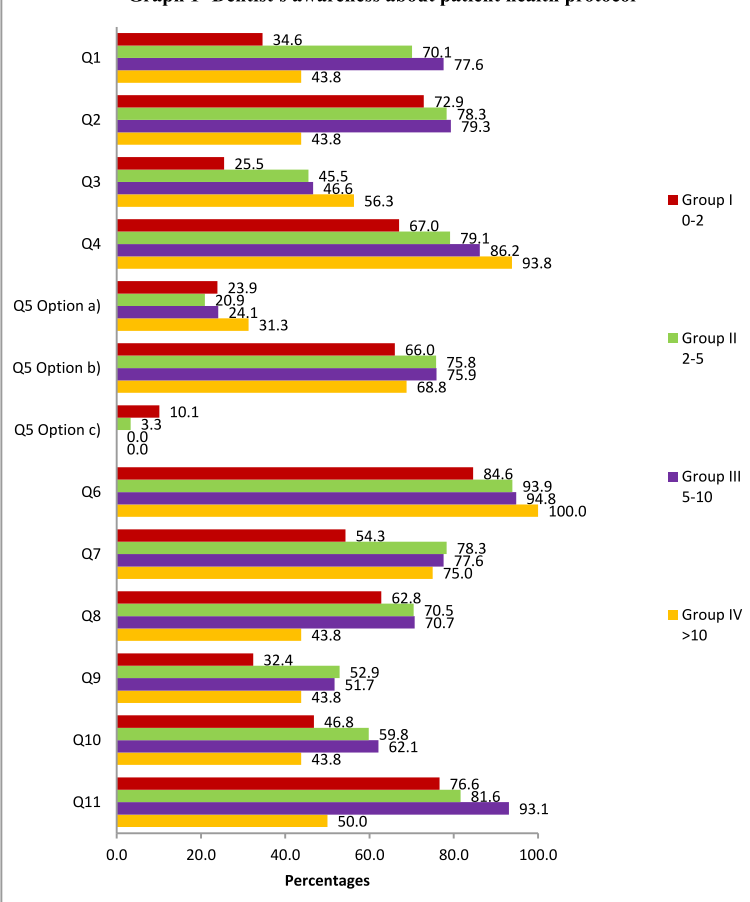
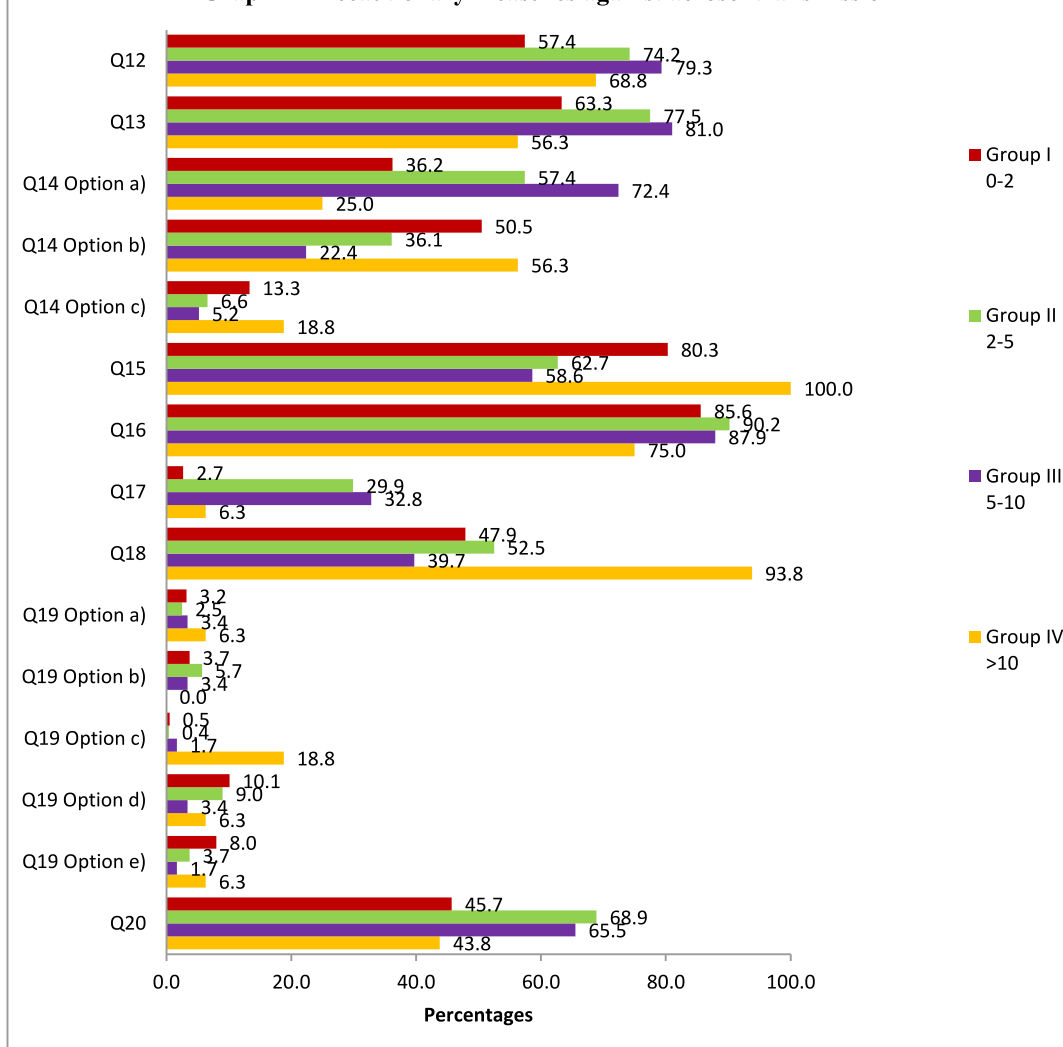
Graph 1 -Dentist's awareness about patient health protocol

Table no 2: Precautionary measures against aerosol transmission

Questions	Respondents (Years of Experience)				Total (N=506)	P value
	Group I 0-2 (N=188)	Group II 2-5 (N=244)	Group III 5-10 (N=58)	Group IV >10 (N=16)		
	n (%)	n (%)	n (%)	n (%)	n (%)	
Q12.Documentation of thorough medical history during every appointment	108 (57.4)	181 (74.2)	46 (79.3)	11 (68.8)	346 (68.4)	0.001
Q13.Is Pulse oximetry mandatory during screening	119 (63.3)	189 (77.5)	47 (81.0)	9 (56.3)	364 (71.9)	0.002
Q14.Hand hygiene in the dental operator						
Option a) Soap and water	68 (36.2)	140 (57.4)	42 (72.4)	4 (25.0)	254 (50.2)	0.000
Option b) 60% alcohol	95 (50.5)	88 (36.1)	13 (22.4)	9 (56.3)	205 (40.5)	0.000
Option c) Chlorhexidine based sanitizer	25 (13.3)	16 (6.6)	3 (5.2)	3 (18.8)	47 (9.3)	0.035
Q15.Disinfection of sphygmomanometers and thermometers	151 (80.3)	153 (62.7)	34 (58.6)	16 (100.0)	354 (70.0)	0.000
Q16.Dental treatment during multiple appointments in a day should be provided in individual treatment rooms	161 (85.6)	220 (90.2)	51 (87.9)	12 (75.0)	444 (87.7)	0.211
Q17.Is installation of sanitizing tunnels in the dental clinics mandatory	5 (2.7)	73 (29.9)	19 (32.8)	1 (6.3)	98 (19.4)	0.000
Q18. Disinfection of prostheses during the Prosthodontic procedures, requiring frequent removal from the patient's mouth	90 (47.9)	128 (52.5)	23 (39.7)	15 (93.8)	256 (50.6)	0.001
Q 19. Aerosol transmission reducing measures in routine clinical set up						
Option a) Rubber dam	6 (3.2)	6 (2.5)	2 (3.4)	1 (6.3)	15 (3.0)	0.827
Option b) High volume evacuator	7(3.7)	14 (5.7)	2 (3.4)	0 (0.0)	23 (4.5)	0.571
Option c) Air purification systems	1(0.5)	1 (0.4)	1 (1.7)	3 (18.8)	6 (1.2)	0.000
Option d) PPE	19(10.1)	22 (9.0)	2 (3.4)	1 (6.3)	44 (8.7)	0.453
Option e) UV light, HEPA filter	15(8.0)	9 (3.7)	1 (1.7)	1 (6.3)	26 (5.1)	0.134
Q20. Donning PPE while using trimmers and buff along with high vacuum suction	86 (45.7)	168 (68.9)	38 (65.5)	7 (43.8)	299 (59.1)	0.000

Graph -2 Precautionary measures against aerosol transmission

DISCUSSION:

In the wake of the existing pandemic, development of learning modules on pandemics, programs for strategic preparedness and response systems is essential to prevent the dental clinics from being the epicenter of cross infections. This questionnaire-based cross-sectional study was conducted to aid in development of a self learning module for undergraduate, postgraduate and residents who constituted the major population of beginners in clinical practice.

Centre for disease control and prevention (CDC) recommends use of teledentistry and triage protocols, telephonic screening and monitoring, scheduling treatment appointments and digital payment of fees.^[1] Teledentistry also helps in addressing Prosthodontic urgencies such as precautions to be followed when a removable denture causes trauma and the means of disinfecting a prosthesis at home.^[2] More than 3/4th of respondents understanding the need and scope of teledentistry indicates many students kept themselves updated of patient screening protocol during the pandemic. Studies by A. Evans^[3] and Ge. Z^[4] showed that the antimicrobial activity of chlorhexidine was comparable to povidone iodine but the efficacy of the former was proven to be better than the latter. Higher response rates with statistically insignificant difference was observed among Groups II, III and IV, who believed that chlorhexidine was the most effective pre-procedural mouth rinse. The dental office design also plays a major role in minimizing cross contamination. Installation of HEPA filters, extraoral vacuum evacuators, rubber dam, high power suction, Personal Protective Equipment (PPE) are few of the major strategies to decrease the amount of airborne pathogens.^[5,6] Less than 50% correct responses regarding these questions, across groups, indicates lack of awareness of dental office design.

A detailed medical history should be obtained from the patients during every visit.^[1] CDC recommends thermal screening and pulse oximetry to identify the potential infected individuals in order to prevent cross contamination.^[2] The recovered COVID-19 patient is considered potential carrier for 30 days. The sanitizing tunnels have no evidence in reducing the spread of infectious agents.^[1] Correct response from less than half the students stresses the need for clarity on COVID 19 disease.

CDC recommends the provision of dental treatment in individual patient rooms with closed door and negative pressure rooms to minimize contamination during aerosol procedures.^[1] Studies have shown that dental aerosol droplets are concentrated within two feet of the patient's mouth.^[7] These aerosol droplets can remain suspended in air and can be contagious to others who come in close contact. The DHCP must ensure that the patients, attenders, and staff maintain physical distance of 6 feet and that they wear masks at all time except during their treatment.^[1] Proper ventilation systems such as High - Efficiency Particulate Air filtration unit was proven to remove 99.97% of particles and reduce the viral load of the dental operatory environment.^[4] The HEPA filtration should be selected based on the Clean Air Delivery Rate. The placement of the HEPA filter is also critical. It must be placed near the patient's chair but not behind the DHCP. Basic hand hygiene practices can also go a long way in preventing contamination during pandemics.^[1] However a poor response to various measures in reducing aerosol transmission, except the use of PPE kits, indicates a pressing need for students to understand this critical aspect in prevention of cross contamination.

PPE should be worn, even by the lab personnel during trimming and buffing the prosthesis.^[2] 50.6% of dental students followed the protocol of disinfecting prosthesis in an intermediate level disinfectant during Prosthodontic procedures that required repeated removal of the prosthesis from the patient's mouth.^[4] For urgent surgical treatments the use of absorbable suture material was preferred.^[5]

CONCLUSION:

Dental settings should balance the need to provide necessary services while minimizing risk to patients and Dental Healthcare Professionals (DHCP). The awareness about basic patient screening protocol and patient instructions in management of prosthetic urgency is high among dental students. However, awareness and knowledge level regarding role of dental office design and other measures in preventing aerosol transmission is limited, more so in under graduate students, necessitating development of educational programs to fill the gap.

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