

# Medical Education

## Effectiveness of a web-based learning module on oral health promotion for nursing and allied health professionals

HARSH PRIYA, O.P. KHARBANDA, DEEPAK AGARWAL, ANUPAMA IVATURI, PRIYANKA RAVI, ARPIT GUPTA, DESMIA HALDANE, TEENU XAVIER, MERIN LISA KURIAKOSE, METILDA ROBIN

### ABSTRACT

**Background.** Nursing and allied health professionals are helping hands for healthcare and are important in the training cascade. We aimed to develop and validate the effectiveness of a web-based learning module on oral health promotion among nursing and allied health professionals.

**Methods.** We developed and validated an oral health module focused on prevention and promotion for a web-based intervention among nurses and allied health professionals. Pre- and post-test assessment was conducted to evaluate the effectiveness of the programme.

**Results.** Of a total of 347 participants, 170 (48.9%) had a good knowledge score in the pre-test, and after attending the oral health module their number increased to 267 (76.9%). The mean difference between the pre-test and post-test scores was statistically significant ( $p < 0.005$ ).

**Conclusions.** Training of nurses and allied health professionals on oral health through a web-based module showed improvement in oral health literacy.

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### INTRODUCTION

The Global Burden of Disease Study (2016) estimated that oral diseases affected at least 3.58 billion people worldwide, with dental caries of the permanent teeth being the most prevalent of all conditions.<sup>1</sup> The majority of hospitalized patients do not have satisfactory oral hygiene; prolonged hospital stay increases gingival inflammation and dental plaque accumulation.<sup>2</sup>

All India Institute of Medical Sciences, New Delhi 110029, India  
HARSH PRIYA, ANUPAMA IVATURI, PRIYANKA RAVI  
Public Health Dentistry, Centre for Dental Education and Research

O.P. KHARBANDA, DESMIA HALDANE Centre for Dental Education and Research

DEEPAK AGARWAL Department of Neurosurgery  
TEENU XAVIER, MERIN LISA KURIAKOSE,  
METILDA ROBIN JPN Apex Trauma Centre

Postgraduate Institute of Medical Education and Research,  
Chandigarh, India

ARPIT GUPTA Oral Health Sciences Centre, Department of Public Health Dentistry

Correspondence to HARSH PRIYA; [drharshpriya@gmail.com](mailto:drharshpriya@gmail.com)

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The normal oral flora is altered in patients who stay in the intensive care unit (ICU) where aerobic microorganisms are replaced by Gram-negative organisms, and the micro-aspiration of oropharyngeal secretions are a risk factor in the development of ventilator-associated pneumonia (VAP).<sup>3</sup> Evidence suggests a strong association between poor oral health and increased risk for early-onset of VAP.<sup>4,5</sup>

One of the many barriers to quality oral healthcare includes a lack of attention to oral health by non-dental healthcare professionals. An interdisciplinary education should include collaborative practices between dental and other healthcare professionals.<sup>6</sup>

The evolution of information technologies and telecommunications has made the world wide web a low-cost and easily accessible tool for dissemination of information and knowledge.<sup>7</sup> Research has found web-based training systems to be successful in imparting continuous distance education in the fields of cytopathology, public health, premedication, antisepsis and nutrition.<sup>7–9</sup>

Evidence suggests that medical nurses have limited knowledge about oral health of pregnant women and misconceptions about oral health.<sup>10</sup> Nurses who had clinical requirements regarding oral health assessment during nursing education had greater oral health competencies.<sup>11</sup> Appropriate training and encouragement for the promotion of oral health and to provide suitable care for the prevention of dental diseases should be included in the curriculum of nurses training.<sup>12</sup>

Nurses and allied healthcare professionals can provide advice on preventive oral healthcare, including regular dental visits and can refer patients to dentists for examinations. We aimed to evaluate the effectiveness of a web-based learning module on oral health promotion among nursing and allied healthcare professionals. The objectives were to develop and validate a web-based learning module and to evaluate the effectiveness of this module among nursing and allied healthcare professionals using the pre-test and post-test questionnaires.

### METHODS

#### Online learning module

A web-based programme on oral health promotion was created for nurses and allied healthcare professionals such as laboratory technicians, operation theatre assistants, dietitians and radiographers employed at a tertiary care hospital. The programme included a module on oral health promotion in textual, illustrative, pictorial and animated formats to educate nurses about oral health. The information included a detailed description of normal oral structures, signs and symptoms of

common oral diseases, medically compromised patients vulnerable to dental problems, oral health promotion and prevention and primary level management of oral disease.

*Validation*

Five experts evaluated the module, and the pre-test and post-test questionnaires for content and face validity. The experts were asked to classify the necessity of each question based on a 3-point Likert scale into three categories: ‘necessary’, ‘useful but unnecessary’ and ‘unnecessary’. Based on the expert opinion, the contents were modified and two questions were removed.

*Data collection*

An e-invite to participate in the online module on oral health promotion was sent to 3000 nursing and allied healthcare professionals working at a tertiary care institute. Only 347 participated in the online module through the weblink sent in the e-invite. In this online study, participants were provided with an individual user id and password through which they could log in and complete the module within 3 months. Reminders for completing the module were sent through e-mail after 1 month and those who failed to complete the module were sent another reminder in the second month. Written informed consent was obtained from all the participants before the study.

Ten questions were assigned to each participant before (pre-test) and after (post-test) the intervention. Each correct answer was given a score of 1 and a wrong answer 0. The total correct responses by each participant were calculated, and the scores ranged from 0 to 10 for each participant. There was no specific time limit to fill the pre- and post-test questions. The scores were graded as poor (0–3), fair (4–7) and good (8–10).

*Ethical considerations*

Ethical approval was obtained from the institute ethics committee before the study.

*Statistical analysis*

The data were coded and analysed using SPSS version 19.0. The level of statistical significance was  $p < 0.005$ .

**RESULTS**

A total of 347 individuals participated in the web-based online module. A majority of participants were nursing officers (44.3%), 12.1% were senior nursing officers, 1.7% were senior nursing officers–high responsibility and only 0.8% were assistant nursing superintendents; 6.3% were allied health professionals and 34.5% did not mention their designation, as this field was not mandatory. The majority of participants were working in inpatient wards (22.4%) and trauma centre (21.9%). Other participants reported working at the neurosurgery unit (12.9%), cancer centre (9.7%), outpatient department (8.3%), ICU (5.4%) and cardiothoracic surgery unit (4.8%) (Table I).

About 49% (170/347) had a good knowledge score in the pre-test, whereas about 77% (267/347) had a good knowledge score in the post-test (Table II). There was a significant ( $p < 0.005$ ) difference between the mean (SD) values of the pre-test (7.39[1.89]) and post-test (8.43[1.47]; Table III). A fair knowledge score in the pre-test was obtained by 47.2% of the participants, which decreased to 20.1% participants in the post-test, as the good score increased (Table III).

TABLE I. Designations and departments of the participants (n=347)

Designation	Frequency (%)
Assistant nursing superintendent	3 (0.8)
Senior nursing officer–high responsibility	6 (1.7)
Senior nursing officer	42 (12.1)
Nursing officer	154 (44.3)
Allied health professionals	22 (6.3)
Not mentioned	120 (34.5)
<i>Department</i>	
Inpatient ward	78 (22.4)
Trauma centre	76 (21.9)
Neurosurgery unit	45 (12.9)
Cancer centre	34 (9.7)
Outpatient department	29 (8.3)
Intensive care unit	19 (5.4)
Cardiothoracic surgery unit	17 (4.8)
Chronic care unit	13 (3.7)
Operation theatre	11 (3.1)
Ophthalmology centre	9 (2.5)
Dental centre	9 (2.5)
Deaddiction centre	5 (1.4)
Not mentioned	2 (0.5)

TABLE II. Pre- and post-test scores of the participants (n=347)

Test score	Pre-test (%)	Post-test (%)
0	0	1 (0.2)
1	2 (0.5)	1 (0.2)
2	1 (0.2)	1 (0.2)
3	4 (1.1)	1 (0.2)
4	16 (4.6)	1 (0.2)
5	38 (10.9)	6 (1.7)
6	45 (12.9)	15 (4.3)
7	65 (18.7)	48 (13.8)
8	58 (16.7)	85 (24.4)
9	56 (16.1)	94 (27.0)
10	56 (16.1)	88 (25.3)

TABLE III. Graded pre- and post-test scores\*

Pre-test	Post-test			Total n (%)
	Poor (0–3)	Fair (4–7)	Good (8–10)	
Poor (0–3)	1	1	5	7 (2.0)
Fair (4–7)	1	48	115	164 (47.2)
Good (8–10)	2	21	147	170 (48.9)
Total (%)	4 (1.1)	70 (20.1)	267 (76.9)	

\*  $p < 0.005$  on McNemar–Bowker test

**DISCUSSION**

We intended to improve oral health literacy among nurses and allied health professionals through a web-based learning module. This might help to build an interprofessional oral health workforce to improve access and decrease disparities among hospitalized patients.

Nursing personnel are universal and are an indispensable workforce, particularly in tertiary healthcare settings. We involved nursing and allied health professionals in oral health promotion. A similar oral health programme conducted in Arizona (Neighborhood Outreach Action for Health) showed success in primary care teamwork when sharing oral healthcare

responsibilities with nurses, medical assistants and other members of the team.<sup>13</sup> In the Rochester Adolescent Maternity Programme, nurses were found to be 'drivers' in promoting oral health by assessing patients' dental needs and managing their consultations and referral, which was in line with our study.<sup>14</sup>

The web-based module consisted of textual, illustrative, pictorial and animated formats to educate the nurses about oral health. A similar study reported using a web-based training system with 2000 digital images and 20 case sessions and their study participants approved of the course content, methodology and learning activities for continuous distance education in cytopathology.<sup>7</sup>

The strength of the study is that the participants represented the different cadres of the nursing profession including nursing officers, senior nursing officers, senior nursing officer-high responsibility and assistant nursing superintendents. The allied health professionals included hospital attendants, sanitary attendants, operation theatre attendant and laboratory technicians. The wide variety of participants from different departments and different cadres might help in positively influencing the oral health of the hospitalized patient.

The limitations of our study included incomplete data of the participants as to their role and department. This information was not mandatory. Second, we evaluated the short-term effectiveness of the web-based programme on oral health promotion; hence, there is a need to evaluate the long-term effectiveness of this programme. Third, the learning process in this programme was based on the cognitive domain. Future training may be based on the affective and psychomotor domains to improve oral health promotion skills such as demonstrating brushing and flossing techniques.

We suggest that nurses and allied health professionals should be encouraged to be team members in improving the outcome, promotion and prevention oral health of inpatients. Nursing and allied health professionals may also collaborate with dental physicians in promoting oral health of patients treated for systemic diseases such as cancer, HIV/AIDS and nutritional deficiency.

### Conclusions

The web-based learning module on oral health promotion among the nursing and allied healthcare professionals was

effective as three-fourths of the participants obtained good scores in the post-test compared to the pre-test. Continuous web-based education at the workplace may help participants improve their knowledge. Providing adequate training and education on oral health to nurses and allied health professionals has the potential to improve the quality of oral healthcare of hospitalized patients.

*Conflicts of interest.* None declared

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