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Project ECHO: a Potential Best-Practice Tool for Training Healthcare Providers in Oral Cancer Screening and Tobacco Cessation

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Abstract
The oral cancer pandemic and inadvertent tobacco consumption have rendered timely oral cavity screening and tobacco cessation essential, skills which most healthcare providers (HCPs) lack. Project "Extension for Community Healthcare Outcomes" (ECHO) is a proven best-practice tool for virtual telementoring of primary care providers by experts at academic health centers, in managing complex medical conditions in rural, expert-deficient setups. For the first time, our organization in India has utilized this method for training HCPs in oral cancer screening, across the country and abroad. The program comprised eight, weekly, hour-long sessions, on oral cancer screening and tobacco cessation, hosted online by our Organization (hub) through the Zoom web-conferencing application, with 48 HCPs (spokes) attending from their respective locations (pan-India, $n = 47$; Libya, $n = 1$). Each session comprised one expert-led didactic and two participant-led case presentations, culminating with educative discussions. Participants filled out online, program-evaluation (pre and post) questionnaires having 10 similar, multiple-choice questions each (score for every correct response = 1); total responses were later statistically analyzed. Lesser participants completed the post-evaluation questionnaire which could be due to it being optional, their busy schedule, or apprehension of being assessed. The program evaluation results illustrate a significant knowledge gain among participants regarding oral cancer screening and tobacco cessation, i.e., from a mean knowledge score of 6.7 in pre-evaluation to 7.4 in post-evaluation ($p < 0.05$). Thus, the ECHO model can be utilized as a convenient, cost-effective, large-scale, best-practice, telementoring tool for training HCPs in oral cancer screening and tobacco cessation, especially in populous, resource-deficient countries.

Keywords Healthcare providers · Telementoring · Oral cancer screening · Tobacco cessation · Project ECHO

Introduction

Oral cancer is one of the most common cancers globally, having a higher incidence among men than in women [1]. Oral cavity and lip cancers are widely prevalent in Southern Asia (examples: India and Sri Lanka) and the Pacific Islands (Papua New Guinea has the highest global incidence rate in both genders). It is also the leading cause of cancer mortality among Indian and Sri Lankan males [2]. The majority of the cases present at their advanced stages to a healthcare facility, which in turn reduces survival rates owing to delayed diagnosis. Hence, early detection of oral cancer provides the best chance for long-term survival and improved treatment outcomes [3]. The recent Global Adult Tobacco Survey (GATS)—2 reported 28.6% tobacco users (of both smoked and smokeless forms) in India; this survey also reported a wide usage of non-tobacco/areca nut-based products such as pan masala without tobacco (4.8%), betel quid without tobacco (8.7%), and areca nut alone (8%) [4]. The uses of tobacco, areca nut, and alcohol are the prominent risk factors in oral cancer, thereby deeming their cessation essential [1, 5].

The Ministry of Health and Family Welfare, Government of India, launched the operational guidelines for the prevention, screening, and control of the common cancers in India (oral, breast, and cervical cancer) in August 2016, intended to be rolled out among the existing healthcare providers (HCPs) at the various healthcare facility levels [6]. However, the HCPs are not actively involved in the same, in spite of

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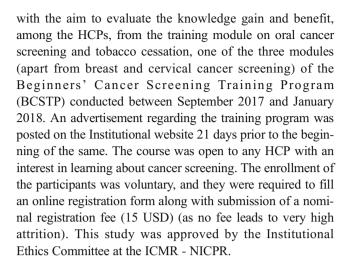
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emphasizing the prevention of non-communicable diseases (NCDs), including cancer, possibly due to the lack of sensitization/essential training among the majority [7].

The Project Extension for Community Health Outcome (ECHO) is an online knowledge-sharing portal, developed in 2003 by Dr. Sanjeev Arora at the Health Sciences Center, University of New Mexico, with the objective of "moving knowledge" rather than the patients or doctors [7–9]. It was mainly developed to assist primary care providers (PCPs) in rural New Mexico in managing hepatitis C virus (HCV)–infected patients [8, 9]. The Project ECHO utilizes a virtual hub and spoke model for telemedicine, which facilitates learning among the rural PCPs, along with supervision by experts at academic health centers; this, in turn, increases the ability of the PCPs to manage complex medical cases. This model is now being utilized worldwide in the telementoring of a variety of other medical conditions such as those pertaining to rheumatology or dermatology, asthma, chronic pain, musculoskeletal disorders, complex regional pain syndrome, dementia, inflammatory bowel disease, diabetes, hypertension, epilepsy, and liver disorders, and also in female, and mental health, palliative, and transgender care [9]. However, for the first time, our organization in India utilized the ECHO model for training HCPs in oral cancer screening (along with tobacco cessation), across the country and abroad.

The Indian Council of Medical Research - National Institute of Cancer Prevention and Research (ICMR NICPR)-ECHO hub in Noida (India) conducted the aforementioned virtual training module on oral cancer screening and tobacco cessation among HCPs across India and abroad (Libya) which has shown promising results in effectively sensitizing and training such personnel in this area of cancer prevention, also being the first such initiative to the best of our knowledge; this training module also included sessions on tobacco cessation. The MD Anderson Cancer Center, Texas, was the first to extend the ECHO model to train care providers working in community-based mental health centers (local mental health authorities—LMHAs) in Texas, in smoking cessation among patients of mental illness, through Project TEACH (Tobacco Education and Cessation in the Health System) which was started in 2014 [8]. The National Institute of Mental Health and Neurosciences (NIMHANS), India, followed suit by starting the Virtual tele-ECHO clinics through the Virtual Knowledge Network (VKN) among district tobacco cessation counselors [10]. However, oral cancer screening is not included in these programs. Also, in view of the lack of uptake of oral cancer screening recommendations by HCPs in India, the telementoring model like ECHO may be utilized.

Methodology

An interventional study, of pre- and post-evaluation design, was performed between December 2017 and January 2018,

with the aim to evaluate the knowledge gain and benefit, among the HCPs, from the training module on oral cancer screening and tobacco cessation, one of the three modules (apart from breast and cervical cancer screening) of the Beginners' Cancer Screening Training Program (BCSTP) conducted between September 2017 and January 2018. An advertisement regarding the training program was posted on the Institutional website 21 days prior to the beginning of the same. The course was open to any HCP with an interest in learning about cancer screening. The enrollment of the participants was voluntary, and they were required to fill an online registration form along with submission of a nominal registration fee (15 USD) (as no fee leads to very high attrition). This study was approved by the Institutional Ethics Committee at the ICMR - NICPR.

The training module was hosted online by the NICPR-ECHO hub through the Zoom web-conferencing application. The group of participants comprised a total of 48 enthusiastic HCPs (spokes) from across India ($n = 47$), and Libya ($n = 1$), enrolled on an individual basis. It included a diversity of HCPs varying from doctors to public health professionals alike. The participants joined the meetings from their respective locations through their computer systems, tablets, or mobile phones. The BCSTP encompassed a total of 20 sessions of which oral screening and tobacco cessation module comprised 8, 1-h-long sessions, on a weekly basis on a designated day, for a total of 8 weeks, during the aforementioned period (December 2017–January 2018). Prior to the commencement of the module, the participants were asked to participate in an online survey (in English) comprising of 10 multiple choice questions on the various aspects of oral cancer screening and tobacco cessation, with the objective of assessing their inherent knowledge level on these topics. A 10-point scale was used for scoring the responses of the participants, wherein every correct response was scored as 1, and wrong or no replies as 0.

Each meeting was initiated by the hub representative by introducing the topic of discussion and the expert didactic presenter for that particular day. Thereafter, the ECHO meeting began with a brief didactic presentation, extending for about 20–30 min, on a specific topic, presented by one of the team experts at the hub or an external expert in the concerned area. The didactics comprised PowerPoint presentations on a variety of topics covering the different facets of oral cancer screening, including sessions on tobacco cessation (Table 1). This was followed by a brief discussion or a round of Q&A (questions and answers) among the presenters and the participants.

Next, two pre-decided participating HCPs presented a case (new/ongoing) each on an oral potentially malignant disorder (OPMD) or oral cancer and shared their personal experience during the same; the cases to be presented

Table 1 List of didactics for the training module

Sl. No.	Topic of didactic	Learning objectives
1	Introduction to oral cancer and tobacco control/cessation	• Burden of oral cancer • Prevalence, incidence, and mortality of oral cancer • Causes, signs, and symptoms, risk factors • Role of tobacco in oral cancer • Common sites of oral cancer
2	Modalities of oral cancer screening	• Screening and diagnostic modalities of oral cancer • Efficacy of oral examination • Technique of oral examination • Operational framework of Ministry of Health and Family Welfare, India, for oral cancer screening
3	Potentially malignant and malignant lesions of the oral cavity: what next?	• Types of benign lesions • Role of cytology/histology in confirmation • Medical and surgical management of benign lesions • Staging of oral cancer • Stage-wise treatment of malignant oral lesions • Survival
4	Tobacco cessation: non-pharmacological management	• About tobacco use, nicotine addiction • Benefits of quitting tobacco • Identification and assessment • 5 As (ask, advise, assess, assist, arrange) and 5 Rs (relevance, risks, rewards, roadblocks, repetition)
5	Pharmacological methods for tobacco cessation	• Nicotine replacement therapy: Gums Patches Lozenges Others: nasal spray, inhalers • Non-nicotine therapy: Bupropion Varenicline Others: nortriptyline, clonidine etc.
6	How to start a tobacco cessation clinic at your facility	• Target population • Program design • Infrastructural requirements • Budget • Capacity building
7	m-Health in tobacco cessation	• Background • Importance of m-Health in population-based tobacco cessation • Evidence of efficacy of m-Health in tobacco cessation • Importance of m-Health in tobacco cessation training
8	How to improve cancer screening in India	• Better information, education, and communication activities to popularize cancer screening • Empowering health care providers with cancer screening knowledge • Better linkages to secondary and tertiary health facilities • Better management of call/recall • Improvement in infrastructure for better cancer management

were sent a day or two in advance to the hub, for verification and approval for presentation at the ECHO meeting. These case presentations were also followed by interactive discussions between the presenters, participants, and experts. Discussions in both phases were facilitated/moderated by one of the hub experts.

Finally, the participants were requested to fill a post-evaluation, online questionnaire (having the same questions as the pre-evaluation questionnaire), at the end of the last session of the training module. The scoring system was the same as for the pre-evaluation questionnaire (correct reply = 1, incorrect or no reply = 0).

Statistical Analysis

The information thus collected was entered into Excel, and data was analyzed by employing the SPSS software version 21. The chi-square test was performed to assess the impact of the training program on the number of correct responses for each question of the evaluation questionnaire, i.e., the association between the questions, and the pre- and post-evaluations. The paired t test was applied to determine the increase in the knowledge level of the participants after the training.

Results

The 48 participating HCPs comprised 31% ($n = 15$) medical doctors and dentists each, 25% ($n = 12$) health workers (nurses, midwives, auxiliary nurse midwife-ANM, general nurse and midwife-GNM), 10% ($n = 5$) public health professionals or researchers, and 2% ($n = 1$) cytotechnologists. Of the total 48 participants who filled out the pre-evaluation questionnaires, 83% ($n = 40$) participants completed the post-evaluation questionnaires, while 17% ($n = 8$) did not. The program evaluation results illustrated a significant knowledge gain among the participants regarding oral cancer screening and tobacco cessation; from a mean knowledge score of 6.7 in pre-evaluation, a rise in the score to 7.4 was seen at the time of post-evaluation ($p = 0.001$) (Table 2). The training showed a significant association or impact on the knowledge regarding the best pharmacotherapeutic agent for tobacco cessation (varenicline). Overall, a significant impact was seen of the training module on the number of participants ($n = 9$, 22.5%) answering all 10 questions correctly (Table 3).

Table 2 Change in knowledge level after the ECHO training

Evaluation type	Mean score	n	Standard deviation	p value
Pre-evaluation	6.68	40	2.188	0.001*
Post-evaluation	7.43	40	2.099	

*Significance, $p < 0.05$

Discussion

The training course showed a significant rise in knowledge as ascertained from the post-evaluation scores of the participants. Similar favorable outcomes (knowledge gain) resulting from the ECHO learning model, assessed using the pre- and post-test comparison, have been reported earlier. Hariprasad et al. (2018) reported an average knowledge level score of 14.4 from the baseline score of 6.3, after the ECHO training 6 months post the initial 3-day in-person training on oral, breast, and cervical cancer screening of HCPs in the tribal primary healthcare center of Gumballi (India) [7]. Masi et al. (2012) reported a significant increase both in the mean number of correct answers on the 26-item hypertension knowledge test (from 13.11 to 17.44, $p < .01$) and on the 7-item hypertension management self-efficacy scale (from 4.68 to 5.41, $p < .01$) among the PCPs in the intervention group in Chicago's south side [11]. The positive outcome in the current study could be attributed to both the informative didactics delivered by experts in the concerned fields, and practical, evidence-based learning through the medium of case presentations by the participants. Even those who were not able to present cases benefitted from others' presentations, thereby highlighting the importance of co-learning [8]. Apart from this, the time designated during each session for questions and interaction among the participants and the experts facilitated further knowledge enhancement. However, a slight attrition rate of 17% was also noted in the post-evaluation phase which could be owing to the questionnaires being optional, busy schedules of the participating HCPs, or due to an apprehension of being assessed. With regard to the relative effectiveness of the questions, some questions scored better than the others as most of the participants being dentists had some retained prior knowledge regarding the clinical topics taught to them earlier as part of their dental training curriculum, but not regarding epidemiology, and the national guidelines. Also, although a decline in the number of correct responses was noticed for some questions in the post-evaluation, the number of wrong responses also largely declined for the majority of the questions, indicating the effectiveness of the training. The results could, however, be improved further by adopting a hybrid model involving in-person training after the online sessions, for skill enhancement, which are being conducted in subsequent courses.

The ECHO model is a best-practice tool which can be compared favorably with other training tools such as in-person training. Poland et al. (2018) [12], Ciullo et al. (2018) [13], and Panait et al. (2006) [14] compared in-person training and telementoring of medical students in different medical procedures like the focused assessment with sonography for trauma (FAST) examination, mechanical ventilation, and laparoscopy respectively, and reported almost similar efficacy of both. Hariprasad et al. (2018) showed a

Table 3 Frequency of responses for each question of the evaluation questionnaires and impact of the training on the same

Question		Pre-evaluation		Post-evaluation		p value
		n	%	n	%	
Oral cancer is the…. most common cancer in India:						
a. 1st	Correct	25	52.1	23	57.5	0.434
b. 2nd	Wrong	23	47.9	15	37.5	
c. 3rd$	Did not reply	0	0.0	2	5.0	
d. 4th	Total	48	100	40	100	
The following are the risk factors for oral cancer:						
a. Alcohol	Correct	40	83.3	35	87.5	0.389
b. Tobacco	Wrong	8	16.7	4	10.0	
c. Areca nut	Did not reply	0	0.0	1	2.5	
d. All of the above$	Total	48	100.0	40	100.0	
The following modalities are employed for tobacco cessation:						
a. Nicotine replacement therapy	Correct	36	75.0	29	72.5	0.945
b. Non-nicotine therapy	Wrong	12	25.0	10	25.0	
c. Both a and b$	Did not reply	0	0.0	1	2.5	
d. None of the above	Total	48	100.0	40	100.0	
What are the early signs of oral cancer?						
a. White patch in mouth	Correct	42	87.5	37	92.5	0.441
b. Red patch in mouth	Wrong	6	12.5	3	7.5	
c. A non-healing ulcer	Did not reply	0	0.0	0	0.0	
d. All of the above$	Total	48	100.0	40	100.0	
The following is the most affordable, feasible, and effective method for population-based screening of oral cancer:						
a. Biopsy	Correct	42	87.5	38	95.0	0.223
b. Oral visual examination$	Wrong	6	12.5	2	5.0	
c. Vital staining	Did not reply	0	0.0	0	0.0	
d. Cytology	Total	48	100.0	40	100.0	
Oral cancer screening must be done for the following age group and at the following frequency:						
a. 20–60 years, once in every 5 years	Correct	30	63.5	28	70.0	0.543
b. 30–65 years, once in every 5 years$	Wrong	17	35.4	12	30.0	
c. 40–60 years, once in every 2 years	Did not reply	1	2.1	0	100.0	
d. 35–65 years, once in every 2 years	Total	48	100.0	40	100.0	
The following potentially malignant lesion has the highest rate of malignant transformation:						
a. Oral submucous fibrosis	Correct	16	33.3	20	50.0	0.113
b. Erythroplakia$	Wrong	32	66.7	20	50.0	
c. Leukoplakia	Did not reply	0	0.0	0	0.0	
d. Oral lichen planus	Total	48	100.0	40	100.0	
The following potentially malignant disorder is caused mainly due to areca nut consumption:						
a. Leukoplakia	Correct	33	68.8	28	70.0	0.758
b. Erythroplakia	Wrong	15	31.3	11	27.5	
c. Oral submucous fibrosis$	Did not reply	0	0.0	1	2.5	
d. Oral lichen planus	Total	48	100.0	40	100.0	
Tobacco contains the following addiction causing agent:						
a. Arecoline	Correct	44	91.7	39	97.5	0.239
b. Nicotine$	Wrong	4	8.3	1	2.5	
c. Guvacoline	Did not reply	0	0.0	0	0.0	
d. Amphetamine	Total	48	100.0	40	100.0	
The following pharmacological agent is highly effective in tobacco cessation:						
a. Bupropion	Correct	13	27.1	19	47.5	0.044*
b. Clonidine	Wrong	34	70.8	20	50.0	
c. Varenicline$	Did not reply	1	2.1	1	2.5	

Table 3 (continued)

Question		Pre-evaluation		Post-evaluation		*p* value
		n	*%*	*n*	*%*	
d. Amlodipine	Total	48	100.	40	100.0	
Overall correct answer givers	Correct	3	6.3	9	22.5	0.027*
	Wrong	45	93.8	31	77.5	
	Did not reply	0	0.0	0	0.0	
	Total	48	100.0	40	100.0	

*Significance, *p* < 0.05

$ Correct answer

marked increase in the knowledge level of their study participants (primary HCPs) after the in-person training, which further increased after the ECHO telementoring sessions [7]. Therefore, telementoring is not a replacement for in-person training but a feasible, effective modality when the latter is unavailable.

The ECHO model has proven to be a relatively cost-effective tool. Due to being a virtual telementoring–based model, the various expenses otherwise incurred in an in-person training program, such as that for venue rentals, travel, accommodation, and food for all the individuals involved, are markedly reduced [7]. Both the trainees and also the trainers could attend the meetings from the comfort of their respective locations. The ECHO meetings utilize a simple web-conferencing application called Zoom which is freely available online and can be easily used even on a mobile phone, in addition to a computer system; it has video, audio, and even manual text/chat interfaces. Joining the sessions only requires a meeting ID provided in advance by the host and an internet connection.

This training module also proved apt for HCPs, especially in the urban settings, having busy schedules, as the sessions were conducted only once a week, lasting for a duration of about 1 h each.

The limitation of this study is the lack of longitudinal follow-up of the spokes to know their adaptation of the learnings into their practice.

Conclusion

The ECHO model can be utilized as a feasible, large-scale, best-practice, telementoring tool for training HCPs in oral cancer screening and tobacco cessation alike, especially in populous, resource-deficient countries, such as India affected by this major public health issue. Such pieces of training and sensitization among healthcare professionals need to be encouraged and expanded to a larger number, in a continuous manner in the future. These initiatives are sure to contribute in a major way to the overall mission of oral cancer prevention and early detection, which is the need of the hour in India.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflicts of interest.

Ethical Approval All procedures performed in the study were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments.

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