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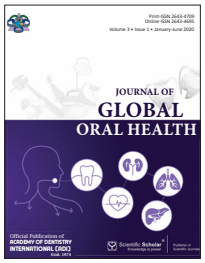

Research Article

A learner-centered global oral health education approach

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ABSTRACT

Objectives: The present research indicates an increased interest in global health among dental students. We focused on developing our future dental practitioners with the skills and capacity to treat underserved populations as international experiences.

Materials and Methods: This pilot explored the perspective of dental learners regarding global oral health knowledge who had experienced mission trips. Participants were assessed with a validated global oral health survey to understand their existing knowledge. Gaps in training were noted and a global oral health interactive module was created to address international community service learning approaches. Later, all students who intended to participate in a global oral health education or mission trip were administered the same validated pre-test. Finally, on the completion of mission trips or global oral health experiences, the same post-global oral health questionnaire survey was administered to assess knowledge gained.

Results: Thirty-two dental students (Female = 18 and Male = 14) and learners who had completed mission trips to Jamaica and the Dominican Republic were invited to complete the pre-survey. Twenty-seven students completed the pre-survey in its entirety. About 41% (11/27) were not aware of developed and developing countries' oral healthcare systems. Participant dental learners (56%) expressed limited cultural competency. They also expressed the lack of global health ethics (52%) awareness (knowledge).

Conclusion: Results indicated that students benefited from a structured global oral health module, where their perspectives shifted positively. The results suggested that a shift from "mission trip" perspectives to a global oral health readiness is feasible as a student empowerment approach.

Keywords: Dental mission trips, Global oral health, Basic package of oral care, Global oral health disparities, Global oral health course, Oral health disparities

INTRODUCTION

Dental disease is the most prevalent condition worldwide where health systems are evolving to meet the oral health needs of their populations through workforce development.[1] Despite the growing need for global oral health education, dental education continues to neglect global health as core teaching.[2] Dental schools are creating experiential learning opportunities by integrating global health into their curriculum.[3] Global health is considered a necessary component of dental student education to adequately prepare them as global citizens in serving vulnerable populations.[4]

To test the feasibility of global oral health training, we developed and implemented a pilot pedagogy training module with a focus on pre-global oral health education exposure. The

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goal was to introduce dental students with an increased understanding of international service-learning, by exploring their existing global oral health knowledge and desired level of training. This experiential learning initiative approach aligns with global oral health objectives from the World Health Organization (WHO) and Federation of Dentistry International (FDI),[5] including: (1) To develop oral health programs that are centered at determinants of health, (2) to promote social justice and ethical practices of providers, and (3) to reduce oral health disparities between different socioeconomic groups within a country and inequalities in oral health across countries.[5]

MATERIALS AND METHODS

We designed an educational module to highlight access to care and preventive oral health education as an upstream approach based on a survey finding. Second, we utilized the findings from the survey taken by the dental learners after the completed mission trips to create the educational module.

Our research questions targeted (1) the learners' perspectives on global health exposure before and after an international service-learning or mission trip and (2) how global oral health systems knowledge can impact dental learners' service-learning. We hypothesized that students prepared with a basic level of global health training would gain an appreciation and have a greater understanding of their global oral health service-learning programs.

The pilot study was implemented in three phases. Phase I was the existing data collection or administration of the validated global oral health survey. Phase II was the didactic planning, design, and administration of the pre-survey assessment of dental students' knowledge (similar to Phase I) of a global oral health module designed for those intending to take future mission trips. Phase III was the post-survey administration after completing mission trips or global oral health experiences. In summary, Phase II included the pre-survey, Phase III implemented the post-care survey on an experiential trip. The pre-and post-care surveys were identical and results were compared.

The survey tool

During Phase I, a validated global oral health survey [Table 1] was administered to dental students and recent graduates (learners) exposed to the charitable dental missions. This questionnaire consisting of 21 items that included the demographics was powered in Qualtrics [Table 1].[2,6] The global oral health-related questions were linked to the curriculum content of the global oral health course as described by Karim *et al.*[2] During this phase, we examined our dental learners' existing opinions and knowledge of global oral health for those students who had completed global oral health mission trips.

Table 1: The global oral health survey.

Q.1	Would you volunteer as a dentist in an international setting or other developing country?
Q.2	Are you aware about oral health care systems of developed and developing countries?
Q.3	Have you been trained to serve the underserved population?
Q.4	Has your dental education prepared you to understand the status of oral health conditions globally, especially in developing countries?
Q.5	Have you been trained for cultural competence in addressing international oral health issues?
Q.6	Are you aware about global health ethics?
Q.7	Global oral health status information is essential to address international health issues?
Q.8	Information about oral health-care systems in developed and developing information about oral health-care systems in developed and developing world is essential to address global oral health issues?
Q.9	Information about oral health-care systems in developed and developing world is essential to address global oral health issues?
Q.10	Training in cultural competence is essential to address global oral health issues.
Q.11	Awareness about global health ethics is essential to address international oral health issues
Q.12	Who created Basic Package of Oral Care (BPOC)?
Q.13	BPOC includes: (a) Oral treatment, (b) oral urgent treatment, (c) pit and fissure sealants, (d) ART, (e) affordable fluoride tooth paste, and (f) affordable tooth brush
Q.14	Primary health-care strategy includes: (a) Equity, (b) prevention, (c) community participation, (d) appropriate technology, (e) intersectoral approach
Q.15	Which among the following is the world's main dental/oral health non-governmental organizations or NGOs?
Q.16	This organization mandate is to bring the world of dentistry, represent the dental profession of the world, and stimulate and facilitate the exchange of information across all borders with the aim of optimal oral health for all people.

**Key: Q.1-6: Knowledge of global oral health information. Q.7-11: Assess dental student's perspective on global oral health. Q.12-16: Awareness and attitude of dental students toward Basic Package of Oral Care

Source: Karim A, Mascarenhas AK, Dharamsi S. A Global Oral Health Course: Isn't It Time? J Dent Educ. 2008;72:1238–46

The didactic planning

The information from Phase I was used to create a training module for dental students as a global oral health plan (Phase II) that included service-learning and social determinants of health (SDH). The ultimate aim was to formalize training in global oral health and prepare dental students for international community service-learning while equipping them with a basic global oral health understanding.

The module preparation and design

Developing curriculum for global oral health, training focused on determinants of health is a component of Global Health Competency domains. This domain addresses social, economic, and environmental factors that determine health, and that health is more than the absence of disease.[7]

Key findings from the Phase I survey were instrumental in designing the interactive SoftChalk[8] module. The module, titled *Global Oral Health Plan*, trained students in global oral health topics, global health systems, and addressed their knowledge gaps as identified in the pre-survey. Efforts were made to ensure that the module did not duplicate existing curricular content. As a result, a student-centered elective was created to include primary oral health-care principles and the Basic Packages for Oral Care (BPOC).[9] Global evidence-based practices were emphasized using upstream preventive approaches connecting student interest to a meaningful experiential global oral health service-learning. The module introduced topics including global oral health, oral health inequalities, and resources, primary oral health care. It included the BPOC component of the WHO global oral health programs,[9] affordable fluoride toothpaste,[9] atraumatic restorative treatment,[9] the role of World Dental Federation (FDI), NGO or Non-governmental Organizations, with an emphasis on global health volunteer immersion.[10] The module also focused on cultural adaptation and equitable delivery of oral healthcare during global oral health exposures.

All components of this pilot study were determined to be exempt from the Institutional Review Board oversight by HSC20180542N as *Global Oral Health Education from the Dental Student Perspective: An Educational Module*.

RESULTS

Participants

Thirty-two dental learners (Female = 18 and Male = 14) and learners who had attended mission trips to Jamaica and the Dominican Republic in 2018 and 2019 were invited to complete the pre-survey. They included two freshmen, five sophomores, six juniors, 12 senior students, and seven recent graduates as current residents as learners.

Twenty-seven learners completed the initial survey (same as pre-survey) in its entirety. About 74% (20/27) had previous global mission trip experiences and 26% (7/27) had not. Of the 20 who had previous exposure to global mission trips, 80% (16/20) had 1 week of exposure, 10% (2/20) had 2 weeks of exposure, and 10% (2/20) had between 2 and 4 weeks of exposure. About 41% (11/27) were not aware of developed and developing countries' oral health-care systems [Table 2].

Global oral health pre-questionnaire indicated that the students surveyed perceived their present dental school training has not prepared them to understand global oral health. About 56% (15/27) reported a lack of cultural competence training in addressing international oral health issues. About 52% (14/27) were not aware of the global health ethics. About 59% (16/27) did not know what constituted the Basic Package of Oral Care,[9] and 56% (15/27) did not understand the primary healthcare strategies of equity, prevention, community participation, appropriate technology, and intersectoral approaches. About 81% (22/27) did not realize that the FDI is the world's primary oral health NGO. About 74% (20/27) did not know that FDI facilitates the exchange of information across borders to encourage optimal oral health for all people.

Outcomes

During the Phase III, 12 dental students completed the module, pre-care training before their trip, and post-care evaluation after their Jamaica, Dominican Republic mission trips or the Ethiopia Global Oral Health Outreach (M = 5, F = 7). Before this training, dental students surveyed did not know which organization is the world's leading oral health non-governmental organization [Table 2]. The post-questionnaire survey analysis with a Wilcoxon signed-rank test did not yield statistical significance; however, the medians for both scores increased from pre to post despite not being statistically significant [Table 3 and Figure 1].

It is noteworthy to highlight that participant dental students (56%) expressed limited global cultural competency. They also expressed the lack of global health ethics (52%) awareness (knowledge). At the same time, they agreed that cultural competence training (89%) and awareness of global health ethics (96%) are essential to address international oral health issues (perception). At a minimum, this educational global oral health design provided the participant dental students with opportunities to learn about global communities and a chance at gaining knowledge and insights into the utilization of a global community service-learning model.

Table 2: The participant's post-mission trip knowledge and attitude before module development.

Pre	Groups	Knowledge mean (SD)	Attitude Mean (SD)
n=32	DS1	3.5 (2.1)	3.0 (1.4)
	DS2	4.4 (1.3)	1.4 (1.1)
	DS3	5.2 (1.5)	2.3 (1.4)
	DS4	3.6 (1.7)	1.9 (0.9)
	Postgraduates/ Residents	4.9 (1.5)	2.7 (1.8)
	Overall	4.3 (1.6)	2.1 (1.3)

Table 3: The participant's pre- and post-trip knowledge and attitude scores post-module delivery.

Pre	Groups	Knowledge mean (SD)	Attitude mean (SD)
n=12	DS1	5 (*)	4 (*)
	DS2	5.0 (0.0)	2.0 (1.0)
	DS3	5.3 (1.5)	1.7 (1.5)
	DS4	3.0 (1.9)	2.0 (1.2)
	Postgraduates/Residents	-	-
	Overall	4.3 (1.7)	2.1 (1.2)
Post	**Groups**	**Knowledge mean (SD)**	**Attitude mean (SD)**
n =12	DS1	6 (*)	4 (*)
	DS2	5.0 (1.0)	2.0 (1.0)
	DS3	6.0 (0.0)	3.3 (0.6)
	DS4	4.0 (2.0)	3.0 (1.2)
	Postgraduates/Residents	-	-
	Overall	4.9 (1.6)	2.9 (1.1)
	Wilcoxon rank sum test results		
	Groups	**Knowledge**	**Attitude**
n=12	Median Pre-score (IQR)	5 (3–5)	2 (1–3)
	Median Post-score (IQR)	5.5 (4.5–6)	3 (2.5–4)
	Exact *P* value	0.102	0.092

	Distribution of dental students according to the gender and class						
	Gender	**DS1**	**DS2**	**DS3**	**DS4**	**Post graduates**	**Total**
n =12	Male	0 (0.0)	2 (16.7)	1 (8.3)	2 (16.7)	0 (0.0)	5 (41.7)
	Female	1 (8.3)	1 (8.3)	2 (16.7)	3 (25.0)	0 (0.0)	7 (58.3)
	Total	1 (8.3)	3 (25.0)	3 (25.0)	5 (41.7)	0 (0.0)	12 (100.0)

IQR: Interquartile range

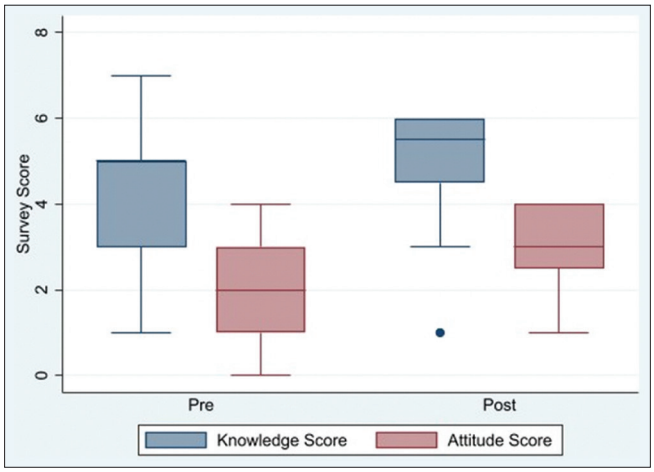

Figure 1: The participant's knowledge and attitude score differences between the pre- and post-survey (*n*=12).

DISCUSSION

A review of early existing perspectives of our dental students revealed a lack of a global oral health with a limited understanding of the global oral health-care system. Moreover, students surveyed could not quantify the impacts of global oral health on the host country's communities they served, other than the "feel good" phenomenon. The survey revealed that most participants perceived global oral health status as an essential mechanism to address international health issues. However, like the traditional oral health volunteers, they could not offer a strategic plan towards community empowerment.[11]

The pre-care survey highlighted the need for a tailored global oral health training module based on student perspectives. That fact led to developing a sustainable module to enhance student engagement in global oral health where both the students and the population served benefited from outreach interventions. This approach addresses the complexities that determine global oral health, disease burden, and health systems worldwide. It was an attempt to enhance student global health training without duplicating existing training. As a result of the proposed training, dental student participants gained knowledge and awareness in preparation for their future global oral health trips.

The pre-care experience of this pilot gathered perspectives of the dental students who had completed mission trips. From the results of this pre-survey, a student-centered elective global oral health module was offered, inclusive of the principles of primary oral health care and the BPOC delivery. This study shows promising results in integrating

competency-based global oral health into the dental curriculum, considerations of institutional culture need to be assessed and addressed.[12] It is hoped that eventually, every dental student could receive a foundation in global oral health and not only those who elect to do so. We concluded that dental students with an interest in exploring a wider *world* of *dentistry* would benefit from a global oral health elective training.

Recommendations

We recommend an upstream global oral health education model with a focus on poverty and health literacy related to poor oral health. There is a strong need to develop future oral health practitioners to treat the underserved global populations by creating international community-based learning opportunities for them. International exchange programs that provide field experiences i n developing countries and underserved areas of the world (1) foster global oral health advancements and (2) promote an appreciation for cultural diversity and socioeconomic disparity in the communities that dental graduates will be serving.[13]

We propose an education model to focus on global cultural humility training, the impact of SDH, and health literacy related to poor oral health. Since community-based learning is expanding globally to offer dental students opportunities for international experiences, we aspired to add global oral health community service-learning training at our institution [Figure 1]. It was essential to teach an immersive global oral health approach to preventive oral health care, as compared to mission trip approaches that mainly focus on urgent clinical treatments.

Limitations

This pilot study's limitations included a small sample size that decreased statistical power and generalizability. Participant students also had a high level of interest in the topic and therefore, served as a convenience sample. To better assess the impact of the module based on present results, efforts need to focus on a more comprehensive student evaluation and larger number of participants in subsequent years.

CONCLUSION

The perceived needs of dental students were addressed by enhancing the gaps in global oral health knowledge and expanding their outlook of serving the global underserved communities. This pilot led to developing a sustainable global oral health training model by focusing on the complexities that determine oral health, disease burden, and health systems worldwide. The training affirmed the present literature viewpoint that lists poverty, lack of access to affordable oral health services among reasons that providers as students aspire to address the burden of global oral health disease.

Efforts yielded that an upstream model could enhance dental student educational efforts if it includes: (1) The understanding of the global health systems, (2) the implementation of community-centered oral health needs assessment, (3) provider cultural and ethical awareness of the population served, (4) collaborative efforts with local Non-governmental Organizations or NGO's and community organizers, and (5) the preventive applications of all forms of fluoride as the global oral health outreach. Thus, a shift from "mission trip" perspectives to a global oral health readiness is feasible as a student empowerment approach.

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Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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