

Sustainable Cleft Care Through Education: The First Simulation-Based Comprehensive Workshop in the Middle East and North Africa Region

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Abstract

Objective: To describe the conduct of the first multidisciplinary simulation-based workshop in the Middle East/North Africa region and evaluate participant satisfaction.

Design: Cross-sectional survey-based evaluation.

Setting: Educational comprehensive multidisciplinary simulation-based cleft care workshop.

Participants: Total of 93 workshop participants from over 20 countries.

Interventions: Three-day educational comprehensive multidisciplinary simulation-based cleft care workshop.

Main Outcome Measures: Number of workshop participants, number of participants stratified by specialty, satisfaction with workshop, number of workshop staff, and number of workshop staff stratified by specialty.

Results: The workshop included 93 participants from over 20 countries. The response rate was 47.3%, and participants reported high satisfaction with all aspects of the workshop. All participants reported they would recommend it to colleagues (100.0%) and participate again (100.0%). No significant difference was detected based on participant specialty or years of experience. The majority were unaware of other cleft practitioners in their countries (68.2%).

Conclusion: Multidisciplinary simulation-based cleft care workshops are well received by cleft practitioners in developing countries, serve as a platform for intellectual exchange, and are only possible through strong collaborations. Advocates of international cleft surgery education should translate these successes from the regional to the global arena in order to contribute to sustainable cleft care through education.

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Introduction

Cleft lip and/or palate affect nearly 1 in 500 to 700 births, with varying global epidemiological nuances and rates (World Health Organization, 2003; Cubitt et al., 2014). Furthermore, the incidence of congenital cleft lip and/or palate in developing countries is estimated to be around 250 000 per year (Michael et al., 2008). According to the American Cleft Palate-Craniofacial Association (ACPA), the goal for patients affected with these deformities is to repair the cleft lip within the first year of life and, if present, repair the cleft palate prior to 18 months of age (ACPA, 2009). When these procedures are not performed in a timely fashion, patients are at a significantly increased risk for morbidity and mortality due to malnutrition and respiratory tract infections (Shkoukani et al., 2013).

Barriers preventing global equitable access to cleft care are numerous but can mostly be attributed to deficits in surgical expertise or financial resources. These barriers are most pronounced in developing regions of the Middle East, Africa, Asia, and Latin America and contribute significantly to the backlog of untreated patients in those areas (Persing et al., 2015; Massenburg et al., 2016). Although volunteer cleft surgery initiatives can provide surgical expertise and resources as well as training for local physicians in these regions to help alleviate the burden of the disease, their long-term sustainability and efficacy in cleft care capacity building remain controversial (Hubli and Noordhoff, 2013). Physician empowerment and education are critical to achieve autonomy in patient care within developing countries where deficits in cleft care exist. Numerous foundations have described training local surgeons from these countries by integrating them in the workflow of mission work, outreach cleft centers that they have established, or even by sponsoring them to attend training programs at their headquarters in developed countries (Zbar et al., 2000; Campbell et al., 2010; Campbell et al., 2014).

In light of increasing work hour restrictions, mandatory faculty supervision, and the evolving trend toward fellowship training and specialization, simulation has emerged as an essential component of medical and surgical education in developed countries (Selzer and Dunnington, 2013). However, financial and organizational restraints have limited its application in developing countries and settings. Furthermore, cleft conferences and workshops held in these countries frequently focus on a single aspect of cleft care rather than the multidisciplinary approach. With all of these issues in mind, we organized the first comprehensive multidisciplinary simulation-based workshop in the Middle East/North Africa region. In this study, we describe the proceedings of a workshop that we believe can be a model for future workshops around the world, report participant satisfaction with the workshop, and discuss the educational value of such initiatives.

Methods

Comprehensive Cleft Care Workshop Organization

Global Smile Foundation is a nonprofit organization dedicated to providing free comprehensive longitudinal care to children born with cleft lip and/or palate deformities. Over the last 31 years, Global Smile Foundation founders and volunteers have provided care to these patients in Latin America, Africa, Asia, and the Middle East. Areas of current active service include Guayaquil, Ecuador; San Salvador, El Salvador; Trujillo, Peru; Beirut, Lebanon; and Macapá, Brazil. Among these locations, cleft care centers providing comprehensive surgical, dental, speech, nursing, and psychosocial care have been established in Guayaquil, Ecuador; Beirut, Lebanon; and Macapá, Brazil. Violent conflicts in the Middle East have resulted in more than 1 million individuals taking refuge in Lebanon, a country of nearly 4 million inhabitants (The World Bank, 2018). With these major demographic shifts, we observed an increasing number of patients from various origins seeking cleft care at our center in Lebanon, which constituted the initial driver for organizing our workshop in Beirut.

Workshop Design

Strong partnership between Global Smile Foundation, cleft care organizations, academic leaders in cleft care from North America, Europe, and the Middle East, international and local health institutions, and stakeholders from the biomedical sector was critical in orchestrating the comprehensive simulation-based hands-on workshop. The 3-day workshop received endorsement from the ACPA and the European Association of Plastic Surgeons and was held from April 25, 2018 to April 27, 2018. The first and third day consisted of multidisciplinary didactic lectures of relevance to all cleft practitioners, covering surgical, speech, nursing, anesthetic, pediatric, psychosocial, and dental considerations and team-based approaches in cleft care. The second day consisted of surgical, speech and language pathology, and nursing hands-on breakout sessions with more focused curricula (www.cleftworkshop.org). The surgical breakout session included hands-on simulation sessions of cleft lip and cleft palate repairs using high-fidelity cleft lip and palate simulators (Simulare Medical, Toronto, Ontario, Canada), with 1 experienced surgical faculty member per 4 workshop participants, which provided the opportunity for real-time feedback, guidance, and live video demonstrations (Figure 1). Given the 1 to 4 faculty to participant ratio, faculty members were able to provide personalized feedback to workshop participants based on their performance on the surgical simulator, with repetition when necessary.



Figure 1. Workshop design including didactic lectures (upper), hands-on surgical simulation sessions using high-fidelity cleft lip and palate simulators (bottom left and right), as well as surgical, speech and language pathology, and nursing breakout sessions with live demonstrations and applications of didactic curricula.

Workshop Participant Satisfaction Form

At the conclusion of the workshop, participants were encouraged to fill out workshop satisfaction forms collecting deidentified data. The form collected information regarding age, specialty, professional position, years in current position, and data whether participants work with a cleft team in their country, would recommend the workshop to colleagues, would participate again in a similar workshop, and recommendations for workshop improvement. Participant satisfaction with the workshop was evaluated based on 5 parameters: content, design, instructors, results, and delivery. Each of the 5 parameters was evaluated through 2 subitems: objectives clarity and content relevance to profession for the content parameter, learning stimulation and difficulty appropriateness for the design parameter, preparedness and helpfulness for the instructors'

parameter, accomplishment of objectives and applicability of knowledge to profession for the results parameter, and delivery pace and suitability for the delivery parameter. Each of the subitems was graded from 1 to 5, with 1 representing strong dissatisfaction and 5 representing strong satisfaction. A score for each parameter over 10 was then generated by adding the scores of the 2 subitems for that parameter. An overall workshop satisfaction score over 50 was then generated by adding the score of the 5 parameters.

Data Analysis

Descriptive statistics were generated for all collected data. Stratified analyses of the 5 parameter scores and overall workshop satisfaction scores were performed using Student

Table 1. Specialty of Workshop Participants and Staff.^a

Workshop participants (N = 93)	n (%)
Speech and language pathologist	46 (49.4)
Surgeon	37 (39.8)
Nurse	10 (10.8)
Workshop staff (N = 47)	n (%)
Surgery faculty	11 (23.4)
Speech and language pathology faculty	3 (6.4)
Nursing faculty	3 (6.4)
Dentistry faculty	3 (6.4)
Anesthesiology faculty	2 (4.2)
Pediatrics faculty	1 (2.1)
Child psychology faculty	1 (2.1)
Volunteers	23 (49.0)

^aPercent indicates percentage within respective groups.

independent sample *t* test or analysis of variance (ANOVA). Parametric tests including the Student independent sample *t* test and ANOVA were used based on the central limit theorem and assumption of normal distribution ($n > 30$). Data analyses were performed using the Statistical Package for the Social Sciences (SPSS, version 23.0; IBM Corp, Armonk, New York).

Results

The total number of participants in the workshop was 93 including 46 (49.4%) speech and language pathologists (SLP), 37 (39.8%) surgeons, and 10 (10.8%) nurses. The workshop staff and faculty consisted of 47 individuals including 11 (23.4%) surgery faculty, 3 (6.4%) speech and language pathology faculty, 3 (6.4%) nursing faculty, 3 (6.4%) dentistry faculty, 2 (4.2%) anesthesiology faculty, 1 (2.1%) pediatrics faculty, 1 (2.1%) child psychology faculty, and 23 (49.0%) volunteers (Table 1). Countries of origin of workshop participants included Afghanistan, Bahrain, Belgium, England, Egypt, Ivory Coast, Jordan, Kuwait, Lebanon, Libya, Madagascar, Morocco, Tunisia, Nigeria, Saudi Arabia, Sudan, Syria, and the United States. Countries of origin of workshop faculty and staff included Australia, Belgium, Brazil, Columbia, the United Arab Emirates, Ecuador, India, Jordan, Lebanon, the Netherlands, Turkey, and the United States (Figure 2). The average number of years in practice of all workshop faculty was 13 years, with the majority of faculty (75%) having previously participated in international outreach cleft care work.

The response rate was 47.3%, with 44 participants completing the workshop satisfaction form. The mean age of these workshop participants was 32.4 (11.0) years, and the majority of participants were female (77.3%). Participants included SLP (56.8%), surgeons (29.5%), and nurses (13.6%) and consisted of independent practitioners (63.6%), trainees (11.4%), and students (25.0%). The majority of workshop participants had been in their current position for 5 years or more (54.5%), did not work with a cleft team in their countries (68.2%), would recommend the workshop to a colleague (100%), and would participate again in a similar workshop (100%). When asked about recommendations to improve the workshop, the most

frequent answer was to increase the content (43.2%) followed by increasing the duration of the workshop (25.0%), clarifying the objectives (22.7%), improving logistics (6.8%), and decreasing the content (2.3%; Table 2).

Analysis of participant responses demonstrated high satisfaction with workshop content (9.4 [0.8]), design (8.8 [1.1]), instructors (9.6 [0.9]), results (9.0 [1.2]), delivery (8.9 [1.1]), and overall satisfaction (45.6 [3.8]; Table 2). Stratified analysis did not show significant differences based on participant specialty, current position, or years in current position. Participants who worked with cleft teams in their countries were significantly more satisfied with the workshop instructions than participants who did not work with cleft teams (9.8 [0.5] vs 9.0 [1.3]; $P = .01$; Table 3).

The majority of participants were not sure whether there were other cleft practitioners in their countries (68.2%). When asked about the biggest obstacle to cleft care in their countries, the most frequent answer was the absence of multidisciplinary cleft teams (34.2%), followed by high cost (28.9%), poor training (21.1%), lack of awareness (5.3%), and patient travel (2.6%). When asked about interventions to improve cleft care in their countries, the most frequent answer was improving training (36.4%), followed by establishing multidisciplinary cleft teams (27.3%), establishing cleft centers (18.2%), increasing awareness (11.4%), and financial support (6.8%). The majority of participants learned about the workshop through a colleague, followed by their professional organization (12.5%), social media (12.5%), through the workshop staff (12.5%), and finally through e-mail (7.5%; Figure 3).

Discussion

Congenital clefts of the lip and/or palate affect nearly 250 000 births per year in developing countries (Michael et al., 2008). If untreated, these deformities lead to significant morbidity, mortality, and major economic disability (Magee et al., 2010; Shkoukani et al., 2013). Nevertheless, a significant backlog of untreated patients persists in developing nations (Persing et al., 2015). Major barriers facing access to comprehensive cleft care in these countries include cost burden and lack of surgical expertise and are most notable in developing regions of the Middle East, Africa, Asia, and Latin America (Massenburg et al., 2016). The Middle East and North Africa regions have recently witnessed significant political turmoil leading to major demographic shifts and associated strains on regional healthcare infrastructure (Gulland, 2013; Lancet, 2014; Webster, 2014; Burki, 2016; Mokdad et al., 2016; Waterston and Nasser, 2017; UNHCR, 2018a, 2018b, 2018c, 2018d). Cleft care was not spared from these events and repercussions, as demonstrated by a growing number of refugees with cleft lip and/or palate deformities seeking care at older age in the region, based on the senior author's (U.S.H.) experience. Although lack of resources was an obstacle to these patients receiving timely care, lack of surgical expertise and qualified cleft practitioners in their countries was the major deterrent from earlier cleft lip or palate repair. With these issues in mind,

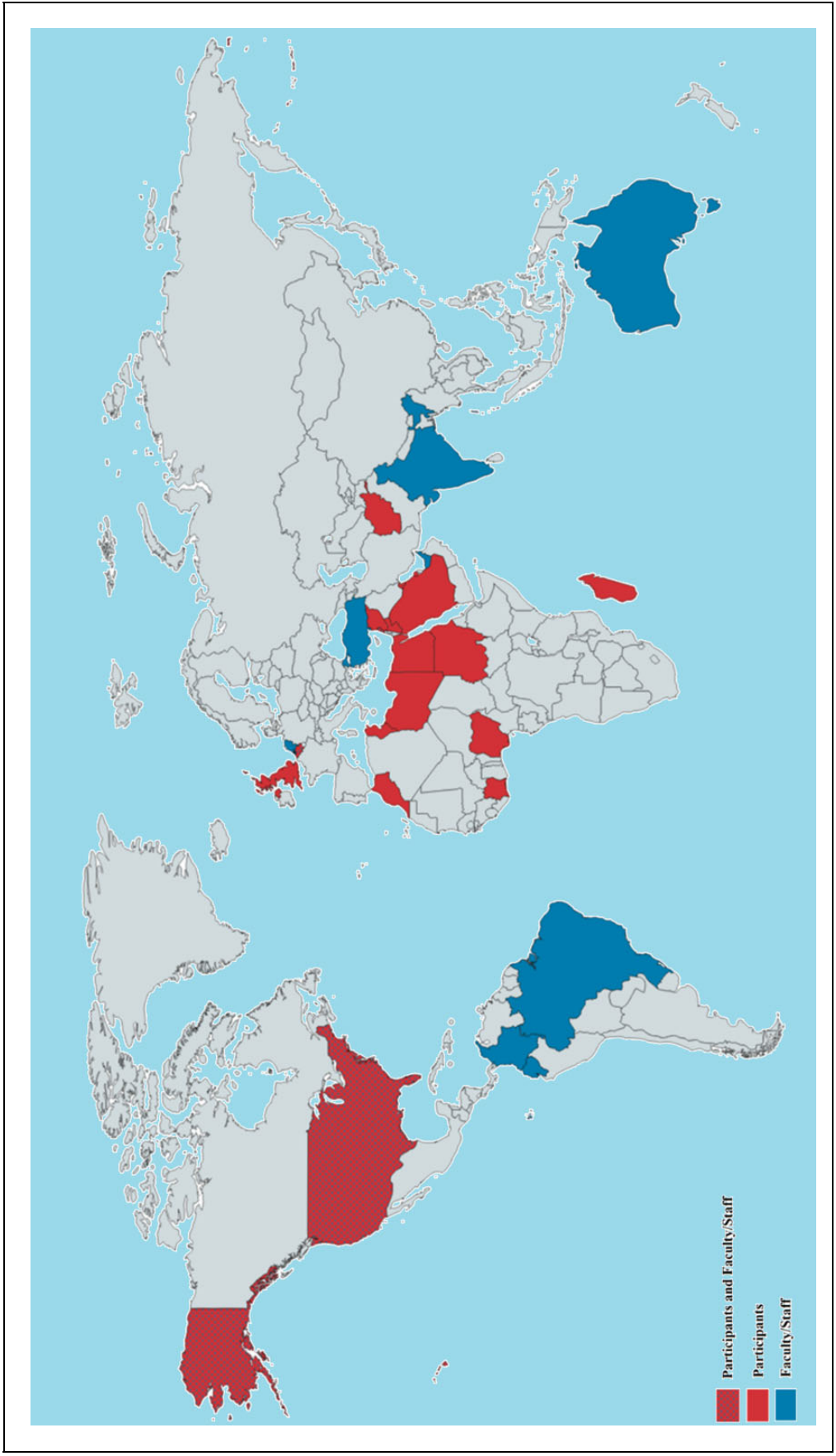


Figure 2. World map illustrating countries of origin of workshop participants and staff.

Table 2. Workshop Participants' Demographic Characteristics and Satisfaction Results.

Participant Data (N = 44)	
Age, mean (SD)	32.4 (11.0)
Gender, n (%)	
Male	10 (22.7)
Female	34 (77.3)
Specialty, n (%)	
Speech and language pathologist	25 (56.8)
Surgeon	13 (29.5)
Nurse	6 (13.6)
Position, n (%)	
Independent practitioner	28 (63.6)
Trainee	5 (11.4)
Student	11 (25.0)
Years in position, n (%)	
Less than 5	20 (45.5)
5 or more	24 (54.5)
Work with cleft team, n (%)	
Yes	14 (31.8)
No	30 (68.2)
Recommend workshop, n (%)	
Yes	44 (100)
No	0 (0)
Participate again, n (%)	
Yes	44 (100)
No	0 (0)
Workshop improvement, n (%)	
Clarify objectives	10 (22.7)
Improve logistics	3 (6.8)
Less content	1 (2.3)
More content	19 (43.2)
More time	11 (25.0)
Satisfaction with content, mean (SD)	9.4 (0.8)
Satisfaction with design, mean (SD)	8.8 (1.1)
Satisfaction with instructors, mean (SD)	9.6 (0.9)
Satisfaction with results, mean (SD)	9.0 (1.2)
Satisfaction with delivery, mean (SD)	8.9 (1.1)
Overall satisfaction, mean (SD)	45.6 (3.8)

Abbreviation: SD, standard deviation.

we sought to organize the first simulation-based comprehensive educational cleft care workshop in the Middle East and North Africa in an attempt to promote regional cleft care sustainability through capacity building and education.

The benefits of a standardized multidisciplinary approach in cleft care are well recognized (Allori et al., 2017; Hammoudeh et al., 2017; Perillo et al., 2018). Surgeons, speech pathologists, orthodontists, and nurses must be involved in the longitudinal care of patients with cleft lip and/or palate for optimal preoperative assessment, presurgical optimization, surgical repair, and postoperative follow-up from birth to adulthood. Comprehensive workshops are critical for appraisal of the role of multidisciplinary patient care and offer cleft practitioners a platform for multidisciplinary learning, intellectual exchange of practice experience, and networking with regional and international peers, colleagues, and international authorities in cleft care, as evidenced by our workshop participants, faculty, and

Table 3. Workshop Satisfaction Results Stratified by Participant Characteristics.

Participant Data (N = 44)	Specialty			Position			Years in Position			Work With Cleft Team		
	SLP	Surgeon	Nurse	IP	Trainee	Student	<5	≥5	P	Yes	No	P
Content, mean (SD)	9.3 (0.9)	9.6 (0.7)	9.2 (0.8)	9.5 (0.8)	9.6 (0.9)	8.9 (0.8)	9.5 (0.8)	9.3 (0.9)	.54	9.3 (0.9)	9.4 (0.8)	.73
Design, mean (SD)	8.7 (1.4)	9.2 (0.9)	8.8 (0.8)	9.1 (0.8)	8.8 (0.8)	8.2 (1.8)	8.7 (1.2)	8.9 (1.2)	.48	8.9 (1.3)	8.8 (1.1)	.84
Instructors, mean (SD)	9.7 (0.6)	9.5 (1.2)	9.0 (1.1)	9.6 (0.9)	9.6 (0.9)	9.4 (0.8)	9.5 (0.8)	9.6 (1.0)	.76	9.8 (0.5)	9.0 (1.3)	.01
Results, mean (SD)	8.8 (0.9)	9.2 (1.7)	9.0 (0.9)	8.9 (1.3)	9.4 (0.9)	8.8 (1.0)	9.2 (0.9)	8.8 (1.4)	.31	8.7 (1.3)	9.1 (0.9)	.47
Delivery, mean (SD)	8.8 (1.1)	9.2 (1.1)	8.7 (1.0)	8.7 (1.1)	9.0 (1.4)	9.4 (0.8)	9.0 (1.1)	8.9 (1.1)	.82	9.0 (1.1)	8.8 (1.1)	.61
Overall satisfaction, mean (SD)	45.3 (3.9)	46.6 (3.5)	44.7 (3.6)	45.9 (3.5)	46.4 (3.8)	44.6 (4.5)	45.8 (3.6)	45.5 (4.0)	.83	45.8 (3.9)	45.1 (3.5)	.58

Abbreviations: IP, independent practitioner; SD, standard deviation; SLP, speech and language pathologist.

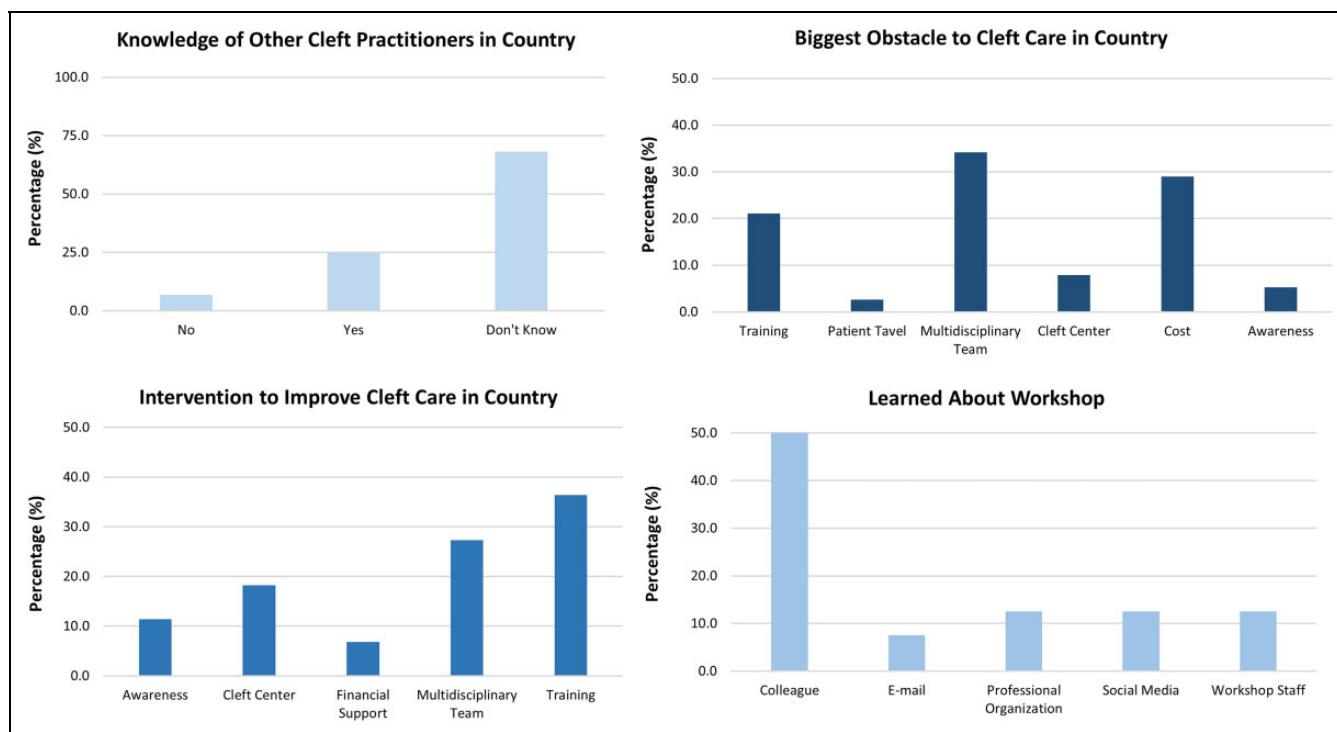


Figure 3. Workshop participant knowledge of other cleft practitioners in their country (upper left), biggest obstacle to cleft care in their country (upper right), intervention recommended to improve cleft care in their country (lower left), and how they learned about the workshop (lower right).

volunteers hailing from 30 countries distributed over 5 continents. This is further supported by our data analysis showing that more than half of participants completing our workshop satisfaction forms indicated that the absence of multidisciplinary cleft teams, or poor training, was the most significant obstacle facing cleft care in their countries. More importantly, more than half of the participants providing feedback regarding their satisfaction with the workshop indicated that they were unaware or unsure of the existence of other cleft practitioners in their countries. Furthermore, data generated from participants in such workshops also offer important insight into the real challenges facing cleft care and opportunities for improvement in the regions they are held in. Surprisingly, patient travel was least frequently reported as major obstacle to cleft care (2.6%), while financial support was least frequently reported as a suggested intervention to improve cleft care (6.8%) by participants, highlighting that stereotypes regarding barriers to cleft care in developing countries do not necessarily hold true in all developing settings and that cleft care initiatives in these countries should be well-informed of local challenges and needs for optimal effectiveness.

Simulation-based education has become a critical component of surgical and medical education in training programs throughout developed countries, where strict work hour limitations, mandatory faculty supervision, and a progressive shift toward subspecialty and fellowship training are jeopardizing trainee education (Rosen et al., 2009; Selzer and Dunnington, 2013; Diaz-Siso et al., 2016). Furthermore, trainees prefer

simulation-based educational tools as compared to textbook or traditional didactic learning (Beaubien and Baker, 2004; Waltzman et al., 2016). However, organizational and financial restraints have traditionally raised concerns regarding their widespread applicability in the outreach setting or developing countries. Nevertheless, online, freely available, easily accessible, digital surgical simulators provide a valuable tool capable of reaching surgeons around the globe. This was recently demonstrated by an online cleft surgery simulator reaching surgeons from more than 130 countries, accounting for nearly 95% of the world population, for a total screen time of nearly 1700 hours, with the majority of users attesting to its efficacy in cleft surgery education (Kantar et al., 2018). The same simulator demonstrated significant superiority over traditional textbook in teaching novice learners unilateral cleft lip repair markings, with the vast majority of learners expressing preference for the simulator over textbook as an educational tool (Plana et al., 2018). Hands-on simulators offer surgical trainees the unique opportunity for skills and performance assessment with real-time feedback and guidance through the procedure. High-fidelity cleft surgery simulators have been shown to provide a realistic learning experience for surgical trainees, with significant improvement in procedural knowledge, confidence, skills, and overall performance (Podolsky et al., 2017; Cheng et al., 2018; Podolsky et al., 2018). With these issues in mind, we incorporated hands-on surgical simulation sessions into our workshop, in addition to live speech therapy and nursing demonstrations in order to complement and apply the didactic

component. Review of satisfaction with workshop content, design, instructors, results, and delivery demonstrated excellent overall contentment among participants from all specialties with variable experience in cleft care.

Although our experience suggests that comprehensive simulation-based workshops are well received by cleft practitioners, we were unable to evaluate if and how learners incorporated the workshop material into their daily and long-term clinical practices. Future research efforts will focus on surveying the participants 1 year following the workshop to determine how they have incorporated learning points in their practice. We will attempt to determine whether the multifaceted structure of the workshop influenced practitioners to better appreciate and rely more heavily on multidisciplinary inclusive approaches including surgeons, speech pathologists, and nurses when treating patients with cleft lip and/or palate. Importantly, the breakdown sessions that were incorporated into the program have allowed the faculty from different specialties to interact very closely with each workshop participant and establish personal rapport, which we believe will be extremely useful in maintaining a close relationship with most workshop participants and genuinely evaluating how our intervention has affected their careers and practices. Another focus of future educational workshops will be to attempt to quantify the effect of the surgical simulation sessions on surgical skills, confidence, and approaches. Although there was overwhelming consensus among participants that the sessions were useful, we are unable to translate these subjective evaluations into actionable objective measures at this point. Furthermore, we acknowledge that caution should be exercised when engaging in educational workshops similar to the one described in this article, to avoid falsely instilling a heightened sense of competence in practitioners who are not capable of performing a cleft lip or palate repair, which can have negative implications on patients who might be treated by these practitioners. It is unreasonable to expect that participants will learn how to perform a cleft lip or palate repair in 3 days if they have not had any previous surgical exposure. We therefore limited surgeon participation in the workshop to individuals who were able to demonstrate that they are enrolled in a surgical training program or are currently practicing.

This study has many limitations that prevent us from drawing conclusions that are more actionable. Our analysis provides us with objective data regarding participant workshop overall and parameter-specific satisfaction. However, this information only provides an assessment of participant subjective impressions of the workshop. Participant satisfaction is certainly not a reliable metric to evaluate the effect of the workshop on cleft care knowledge acquisition or cleft surgery procedural confidence, knowledge, surgical skills acquisition, and the overall efficacy of our workshop as an educational tool in cleft care. Furthermore, the generic nature of the satisfaction forms prevented us from collecting specialty-specific data that would have allowed us to adjust and modify the specialty breakdown sessions accordingly. Nevertheless, all of these limitations are subjects of current as well as future research and have provided

us with extremely valuable insight regarding the design, implementation, and evaluation of our future international educational endeavors.

Conclusion

Comprehensive, multidisciplinary, simulation-based cleft care workshops are well received by cleft practitioners in developing countries, serve as a platform for intellectual exchange, sharing practice experiences, and networking, and are only possible through close collaborations between international authorities in cleft care, regional practitioners, and invested advocates of cleft care education from the biomedical industry sector. Stakeholders in international cleft surgery education should translate these successes from the regional to the global arena in order to validate previous accomplishments and contribute to sustainable cleft care through education.

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