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# The First Hybrid International Educational Comprehensive Cleft Care Workshop

**Rami S. Kantar, MD, MPH[1,2,3], Elçin Esenlik, DDS, PhD[4], Omar S. Al Abyad, MD[1], Antonio Melhem, MD[1], Robert A. Younan, MD[1], Mario Haddad, MD[1], Kristen Keith, RN[1], Serena Kassam, DMD[1,5], Beyhan Annan, MPH[1], Charanya Vijayakumar, BDS, MDS[1,6], Arnaud Picard, MD, PhD[7], Bonnie L. Padwa, DMD, MD[8], Brian Sommerlad, FRCS[9], Cassio Eduardo Raposo-Amaral, MD, PhD[10], Christopher R. Forrest, MD, Msc, FRCS, FACS[11], David A. Gillett, MBBS[12], Derek M. Steinbacher, MD, DMD[13], Christopher M. Runyan, MD, PhD[14], Daniela Y. S. Tanikawa, MD[15], David K. Chong, MBBS, FRACS[16], David M. Fisher, MD, FRSCS, FACS[11], Hans Mark, MD[17], Halil Ibrahim Canter, MD, PhD[18], Joseph E. Losee, MD[19], Krishna G. Patel, MD, PhD[1,20], Larry D. Hartzell, MD[21], Adam B. Johnson, MD, PhD[1,21], Marcus Vinícius Martins Collares, MD, PhD[22], Nivaldo Alonso, MD, PhD[23], Philip Kuo-Ting Chen, MD[24], Raymond Tse, MD[25], Robert J. Mann, MD[26], Jose Rolando Prada-Madrid, MD[27], Shinji Kobayashi, MD[28], Syed Altaf Hussain, MS, FRCS[6], Ann Kummer, PhD[29], Debbie A. Sell, PhD, LCSLT, FRCSLT[30], Valerie J. Pereira, PhD[31], Kelly Mabry, PhD, CCC/SLP[32], Courtney K. Gonsoulin, MS, CCC/SLP[33], Martin Persson, PhD[34], Gareth Davies, PhD[35], Navil F. Sethna, MD[1,36], Jennifer C. Munoz-Pareja, MD[1,37], Anne Marie Kuijpers-Jagtman, DDS, PhD, FDSRCS[38,39,40], Barry H. Grayson, DDS[41], Bruno Grollemund, DDS[42], Daniela G. Garib, DDS, MSc, PhD[43], Maria Costanza Meazzini, DMD, MMSc[44], Om P. Kharbanda, MDS, MMEd, MOrthRCS, FDSRCS[45], Pedro E. Santiago, DMD, MBA[46], Prasad Nalabothu, DMD, PhD[47], Puneet Batra, BDS, MDS, MOrth (RCS Edin)[48], Erin Stieber, JD[49], Dushyant Prasad, MBBS[50], Hugh Brewster, M.ED[51], Ruben Ayala, MD, MPH[52], Elif Erbay, DDS, PhD[53], M. Okan Akcam, DDS, PhD[54], J. Peter W. Don Griot, MD, PhD[3], Raj M. Vyas, MD[1,55], Roberto L Flores, MD[41,49], Corstiaan C. Breugem, MD, PhD[3], and Usama S. Hamdan, MD[1]**

[1] Global Smile Foundation, Norwood, USA
[2] The University of Maryland Medical System/Shock Trauma, Baltimore, USA
[3] Amsterdam University Medical Center, Department of Plastic and Reconstructive Surgery, Amsterdam, the Netherlands
[4] Faculty of Dentistry, Akdeniz University, Antalya, Turkey
[5] British Columbia Children's Hospital, Vancouver, Canada
[6] Cleft and Craniofacial Center, Sri Ramachandra University, Chennai, India
[7] Université de Paris, Hôpital Necker-Enfants Malades, Paris, France
[8] Children's Hospital and Harvard Medical School, Boston, USA
[9] Great Ormond Street Hospital for Children NHS Foundation Trust, London, UK
[10] Institute of Plastic and Craniofacial Surgery, SOBRAPAR Hospital, Campinas, Brazil
[11] Division of Plastic and Reconstructive Surgery, The University of Toronto and Hospital for Sick Children, Toronto, Canada
[12] Division of Plastic and Reconstructive Surgery, Perth Children's Hospital, Perth, Australia
[13] Division of Plastic Surgery, Yale University School of Medicine, New Haven, USA
[14] Forest School of Medicine, Winston-Salem, USA

**Abstract**

*Objective:* Describe the first hybrid global simulation-based comprehensive cleft care workshop, evaluate impact on participants, and compare experiences based on in-person versus virtual attendance.

*Design:* Cross-sectional survey-based evaluation.

*Setting:* International comprehensive cleft care workshop.

*Participants:* Total of 489 participants.

*Interventions:* Three-day simulation-based hybrid comprehensive cleft care workshop.

*Main Outcome Measures:* Participant demographic data, perceived barriers and interventions needed for global comprehensive cleft care delivery, participant workshop satisfaction, and perceived short-term impact on practice stratified by in-person versus virtual attendance.

*Results:* The workshop included 489 participants from 5 continents. The response rate was 39.9%. Participants perceived financial factors (30.3%) the most significant barrier and improvement in training (39.8%) as the most important intervention to overcome

[15] Instituto Sírio-Libanês de Ensino e Pesquisa, Hospital Sírio-Libanês and Departamento de Fissura Lábio Palatina, Hospital Municipal Infantil Menino Jesus, São Paulo, Brazil
[16] Children's Hospital, Melbourne, Australia
[17] Sahlgrenska University Hospital and Institute of Clinical Sciences at Sahlgrenska Academy, Gothenburg, Sweden
[18] Anadolu Medical Center, Kocaeli, Turkey
[19] Children's Hospital of Pittsburgh, University of Pittsburgh Medical Center, Pittsburgh, USA
[20] University of South Carolina, Charleston, USA
[21] The University of Arkansas for Medical Sciences, Little Rock, USA
[22] Plastic and Craniomaxillofacial Surgery Division, School of Medicine, Rio Grande do Sul Federal University, Porto Alegre, Brazil
[23] University of São Paulo, São Paulo, Brazil
[24] Taipei Medical University Hospital, Taipei, Taiwan
[25] University of Washington and Seattle Children's Hospital, Seattle, USA
[26] Division of Pediatric Plastic Surgery, Spectrum Health Medical Group, Michigan State College of Human Medicine, Grand Rapids, USA
[27] Hospital Infantil Universitario de San José, Bogotá, Colombia
[28] Kanagawa Children's Medical Center, Yokohama, Japan
[29] Division of Speech-Language Pathology, Cincinnati Children's Hospital Medical Center, Cincinnati, USA
[30] Centre for Outcomes and Experience Research in Children's Health, Illness and Disability (ORCHID), London, UK
[31] Division of Speech Therapy, Department of Otorhinolaryngology, Head & Neck Surgery, The Chinese University of Hong Kong, Hong Kong, China
[32] Division of Speech Pathology/Craniofacial, Connecticut Children's Medical Center, Hartford, USA
[33] State University, Baton Rouge, USA
[34] Faculty of Health Sciences, Kristianstad University, Kristianstad, Sweden
[35] European Cleft and Craniofacial Initiative for Equality in Care, European Cleft Organization, the Netherlands
[36] Critical Care and Pain Medicine, Boston Children's Hospital, Boston, USA
[37] University of Miami Miller School of Medicine, Miami, USA
[38] University Medical Centre Groningen, Groningen, the Netherlands
[39] School of Dental Medicine, Medical Faculty, University of Bern, Bern, Switzerland
[40] Faculty of Dentistry, Universitas Indonesia, Jakarta, Indonesia
[41] The Hansjörg Department of Plastic Surgery, New York University Langone Health, New York City, USA
[42] Cleft Competence Center, Strasbourg University Hospital, Strasbourg, France
[43] Orthodontics, Hospital for Rehabilitation of Craniofacial Anomalies, University of São Paulo (HRAC/USP), São Paulo, Brazil
[44] Smile House, San Paolo Hospital, University of Milan, Milan, Italy
[45] All India Institute of Medical Sciences, New Delhi, India
[46] Division of Plastic Surgery, Duke University, USA
[47] University Hospital Basel and University of Basel, Basel, Switzerland
[48] Manav Rachna Dental College, Faridabad, Haryana, India
[49] Smile Train, New York City, USA
[50] Deutsche Cleft, Freiburg, Germany
[51] Transforming Faces, Toronto, Canada
[52] Operation Smile, Virginia Beach and The G4 Alliance, Chicago, USA
[53] Faculty of Dentistry, Istanbul University, Istanbul, Turkey
[54] Faculty of Dental Medicine, Ankara University, Ankara, Turkey
[55] University of California, Irvine, Department of Plastic and Reconstructive Surgery, California, USA

**Corresponding Author:**
Rami S. Kantar, Global Smile Foundation, Norwood, USA; Department of Surgery, The University of Maryland Medical System/Shock Trauma, Baltimore, USA; and Department of Plastic and Reconstructive Surgery, Amsterdam University Medical Center, Amsterdam, 21201, the Netherlands.
Email: ramikantar@gmail.com

barriers facing cleft care delivery in low to middle-income countries. All participants reported a high level of satisfaction with the workshop and a strong positive perceived short-term impact on their practice. Importantly, while this was true for both in-person and virtual attendees, in-person attendees reported a significantly higher satisfaction with the workshop ($28.63 \pm 3.08$ vs $27.63 \pm 3.93$; $P = .04$) and perceived impact on their clinical practice ($22.37 \pm 3.42$ vs $21.02 \pm 3.45$ $P = .01$).

*Conclusion:* Hybrid simulation-based educational comprehensive cleft care workshops are overall well received by participants and have a positive perceived impact on their clinical practices. In-person attendance is associated with significantly higher satisfaction and perceived impact on practice. Considering that financial and health constraints may limit live meeting attendance, future efforts will focus on making in-person and virtual attendance more comparable.

**Keywords**

nonsyndromic clefting, craniofacial morphology, dental health, epidemiology, ethics/health policies, hard palate, lip form, lip function, oral health, nursing, nutrition, palatoplasty, pediatrics, soft palate, surgical technique

## Introduction

Clefts of the lip and/or palate (CLP) affect around one in every 500 to 700 live births.[1] If untreated, these congenital facial differences are associated with an increased risk of psychological distress, orofacial functional deficits, malnutrition, respiratory tract complications, and negative socioeconomic consequences.[2] As a result, guidelines recommend that clefts of the lip should be repaired within the first year of life, and when/if present, clefts of the palate should preferably be corrected before 18 months of age.[3] Nevertheless, a significant backlog of untreated patients persists around the world as a result of multiple barriers facing comprehensive cleft care delivery, including lack of access to high-quality cleft care education and training.[4]

We have previously described that international simulation-based educational comprehensive cleft care workshops can serve as a successful tool for building cleft care capacity in areas that need it the most through education and training.[5,6] We highlighted how these workshops can promote international cleft care collaborations by bringing international authorities in cleft care and learners together.[5,6] Confirming our predictions, participants reported that one of the major barriers facing comprehensive cleft care delivery in low to middle-income countries was lack of access to high-quality education and training.[5,6] We also showed that these workshops are overall well received by participants attending them.[5,6] More importantly, participants attending these workshops also reported a significant impact on their practice that is sustained over a prolonged period of time.[6]

The COVID-19 pandemic amplified existing barriers facing international comprehensive cleft care delivery.[7] Limited travel, mandated lockdowns, and quarantines have significantly hindered international cleft clinical care delivery, as well as major educational initiatives and national/international cleft care meetings. This was applicable to the third version of the comprehensive cleft care workshop organized by Global Smile Foundation (GSF), which was scheduled in India during the first year of the pandemic, but was ultimately held in virtual format to ensure the safety of learners, staff, and faculty members. With the peak of the pandemic behind us and anticipated recurrent waves of disease variants in sight, international cleft care initiatives must learn how to adapt to a new reality.[7] With these issues in mind, we held the Fourth International Educational Comprehensive Cleft Care Workshop in Istanbul, Turkey, in hybrid format. Participants had the opportunity to attend the workshop in person with heightened safety precautions, or attend virtually. In this study, we describe this First Hybrid International Educational Simulation-Based Comprehensive Cleft Care Workshop, analyze its impact on participants, and compare this impact between participants who attended in-person versus those who attended virtually.

## Methods

### *Hybrid Comprehensive Cleft Care Workshop Organization and Design*

GSF is a nonprofit organization based in Norwood, Massachusetts, USA. The vision of the foundation is a world where all children and individuals born with CLP can thrive and reach their full potential. The mission of the foundation is to provide high-quality, free, comprehensive clinical cleft care to individuals born with CLP. The clinical care provided by the foundation is supplemented with research and educational initiatives aimed at building cleft care capacity in areas around the world that need it the most. GSF volunteers and members have been providing the full spectrum of comprehensive cleft care for more than 3 decades in Latin America, Africa, Asia, and the Middle East. Since 2018, we have strengthened our educational efforts by organizing annual simulation-based comprehensive cleft care workshops around the world.[5,6]

The workshops have been reproduced successfully and have been well attended and received.[5,6] Participants in the workshops have consistently reported a high level of satisfaction, and have also reported improved procedural confidence as well as a sustained impact on their practice at the conclusion of the workshops.[5,6] The third version of the workshop had to be held in virtual format as a result of the

COVID-19 pandemic. With the peak of the pandemic behind us and with anticipated recurrent variant waves, we sought to organize the fourth workshop in hybrid format where participants could attend in person under heightened safety precautions or virtually.

In collaboration with Smile Train (New York City, USA), other key stakeholders in international cleft care delivery, and international authorities in cleft care, we held our Fourth Simulation-Based International Educational Comprehensive Cleft Care Workshop in Istanbul, Turkey from October 6 to 8, 2021 in hybrid format. All in-person participants were required to provide proof of vaccination against COVID-19 and a recent negative test. Heightened precautions against COVID-19 were also taken during the workshop including but not limited to masks, distancing, and appropriate hygiene measures. Similar to previous workshops, the educational program was of relevance to cleft care providers from all specialties (www.cleftworkshop.org).[5,6] The educational program included didactic lectures, discussion panels, as well as breakout sessions including hands-on simulations of cleft lip and palate surgery using high-fidelity simulators, facial nerve block sessions, speech and language pathology (SLP) hands-on sessions, and others (Figure 1). *Simulare Medical*, a division of Smile Train, sponsored the cleft lip and palate simulation sessions, donating a total of 60 simulator kits containing instruments, high-fidelity cleft surgery simulators, and headlamps. Each simulation session lasted around 2 h and was led by an expert cleft surgeon. Dr David Fisher, MD, led the cleft lip simulation session through live streaming from Toronto, Canada, and Dr Larry Hartzell, MD, led the cleft palate simulation session in-person in Istanbul. Both sessions included a live step-by-step demonstration of surgical technique, which participants followed with assistance by expert-level proctors who rotated in the room.

The full schedule of the workshop is listed on the following link: https://www.eventsquid.com/event.cfm?id=11534. Essentially, the virtual learners had access to the exact same content as in-person learners, except for the following: Augmented Reality Workshop, Cleft Lip Surgical Simulation Workshop, Cleft Palate Surgical Simulation Workshop, and Facial Nerve Block Workshop.

### Data Collection

Data collection was performed through surveys distributed electronically to the participants at the conclusion of the workshop. Collected data included participants' age, gender, specialty, country of origin, years in current position, professional position, in-person versus virtual attendance, as well as whether participants worked with a cleft team in their countries. Participants were also asked if they would participate again in a similar workshop. Participants were also asked what they considered the most significant barrier facing comprehensive cleft care delivery in their countries was, and what they considered was the most important intervention to overcome barriers facing comprehensive cleft care delivery in their countries.

Satisfaction of the participants with the workshop as an educational method for learning about cleft care was also evaluated using a modified version of the Student Evaluation of Educational Quality (SEEQ) survey, a validated tool for measuring higher education student satisfaction as previously described.[6,8] The SEEQ survey evaluates whether an educational tool is stimulating, increases participant interest, allows the participant to learn the subject matter, is clear, is an effective means of teaching, and whether participants would recommend it to others. Each of the parameters in the SEEQ survey has a maximum score of 5, for a total maximum score of 30.

We also evaluated participants' perceptions of the impact of the workshop on their clinical practice as previously described.[6] Participants were asked if they thought the workshop would improve their competence, performance, outcomes, clinical care, and whether it will change their practice. Each of these parameters was graded with a maximum score of 5. Overall impact on practice was graded as a total of over 25 by combining all of these parameters.

Participants' satisfaction with the workshop and their perceptions of the impact of the workshop on their practice were compared between participants attending the workshop in person and those attending virtually.

### Data Analysis

Descriptive statistics were generated for all collected data. We used parametric testing including independent sample *t*-test based on the central limit theorem and assumption of normal distribution for analyses involving a sample size of more than 30. Data analyses were performed using the Statistical Package for the Social Sciences (SPSS, V. 23.0, IBM Corp.).

## Results

The total No. of participants in the workshop was 489 with an average age of $40.1 \pm 7.2$ years. The majority of participants were female (51.1%). Workshop participants, faculty, and staff hailed from 70 countries from 5 continents (Figure 2).

The response rate to the questionnaire was 39.9% with 195 participants completing our workshop satisfaction survey, including 103 participants who attended in person (52.8%) and 92 participants who attended virtually (47.2). The majority of respondents were surgeons (50.8%) followed by dentists (21.0%), speech and language pathologists (20.5%), and other cleft care practitioners (7.7%). Most respondents were independent cleft care practitioners (64.1%) followed by trainees or students (19.0%), and the majority reported having been in their current positions for 5 years or more (53.8%) and working within a cleft team in their countries (83.1%) (Table 1). The majority also reported that they would participate again in a similar workshop (96.4%) (Table 1).


**Figure 1.** Workshop simulation sessions (*top*) and didactic lectures session (*bottom*).

When asked about the biggest barrier facing comprehensive cleft care delivery in their countries, the most frequent answer was financial challenges (30.3%), followed by the absence of multidisciplinary cleft teams (21.1%), patient travel distance (17.4%), poor training (15.6%), lack of awareness about cleft lip and/or palate (8.3%), and the absence of cleft centers (7.3%) (Figure 3). When asked about the most important intervention for comprehensive cleft care delivery in their countries, the most frequent answer was better training (39.8%), establishing multidisciplinary cleft teams (18.4%), followed by financial support (17.3%), establishing cleft centers (15.3%), and raising awareness about cleft lip and/or palate (9.2%) (Figure 3).

Participants demonstrated a high level of satisfaction with the workshop as an educational method for learning about cleft care ($28.16 \pm 3.53$), and reported that it was stimulating ($4.66 \pm 0.71$), increased interest in the subject matter ($4.70 \pm 0.70$), allowed for better learning ($4.67 \pm 0.70$), was clear

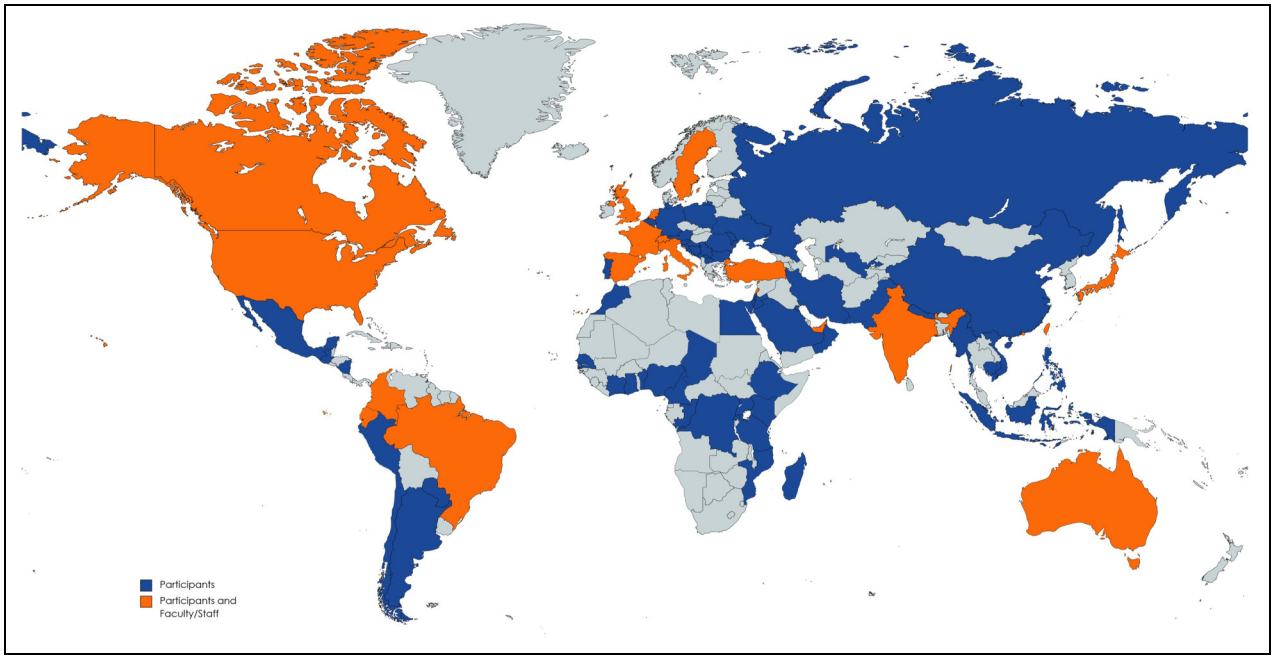


**Figure 2.** Workshop participants, faculty, and staff countries of origin.

(4.64 ± 0.72), was effective in teaching (4.70 ± 0.68), and they were likely to recommend it to others (4.78 ± 0.61) (Figure 4). In-person participants reported a significantly higher overall satisfaction with the workshop compared to virtual participants (28.63 ± 3.08 vs 27.63 ± 3.93; $P = .04$) (Figure 4). In-person participants also reported that the workshop allowed for significantly better learning (4.79 ± 0.55 vs 4.54 ± 0.82; $P = .02$) and was significantly clearer (4.77 ± 0.58 vs 4.50 ± 0.83; $P = .01$) compared to virtual participants (Figure 4).

Respondents also reported that they thought the workshop will positively impact their clinical practice at the end of the workshop, including competence (4.45 ± 0.81), performance (4.45 ± 0.81), outcomes (4.41 ± 0.80), and clinical care (4.42 ± 0.79), as well as that it will change their practice (4.01 ± 0.97) (Figure 5). In-person participants reported a significantly stronger perceived impact on their clinical practice compared to virtual participants (22.37 ± 3.42 vs 21.02 ± 3.45; $P = .01$). In-person participants also reported that the workshop had a significantly stronger impact on their clinical competence (4.58 ± 0.76 vs 4.29 ± 0.85; $P = .01$), performance (4.59 ± 0.76 vs 4.29 ± 0.85; $P = .01$), outcomes (4.57 ± 0.78 vs 4.23 ± 0.80; $P < .01$) and clinical care (4.55 ± 0.74 vs 4.27 ± 0.81; $P = .01$) compared to virtual participants (Figure 5).

## Discussion

Patients with CLP are at an increased risk for malnutrition, orofacial functional deficits, respiratory complications, psychological distress, and negative socioeconomic consequences if they are not treated surgically early in life.[1] Despite guidelines recommending repair of the cleft lip within the first year of life and correction of the cleft palate if present by 18 months of age, a significant global backlog of untreated patients persists, particularly in low to middle-income countries.[3,9] An important barrier to comprehensive cleft care delivery in these countries is the paucity of cleft care expertise and limited training, compounded by the limited resources to address these deficiencies.[5,6,9] GSF founders and volunteers have been providing comprehensive clinical cleft care around the globe for more than three decades.[5,6] To strengthen our educational initiatives and in line with our vision to build cleft care capacity in areas around the globe that need it, we launched our simulation-based comprehensive cleft care workshops in 2018 in collaboration with key international stakeholders in cleft care.[5,6] We have previously described how our workshops have had an overwhelmingly positive impact on participants including a high level of satisfaction with the workshop content, a significantly positive perceived impact on cleft surgery procedural confidence, as well as a strong positive impact on clinical practice that was sustained for a prolonged period of time following attendance of the workshops.[5,6]

The COVID-19 pandemic significantly affected cleft care provision around the world including clinical activities, as well as educational initiatives, local, national, and international cleft care meetings.[7] This included our third comprehensive cleft care workshop which was scheduled to be held in person in India in 2020, but was ultimately held in virtual format for the safety of our participants, speakers, and staff. Development of the COVID-19 vaccines and implementation of large-scale vaccination campaigns, have enabled some return to normalcy and have allowed less stringent travel restrictions.[7] However, with expected recurrent waves of disease variants in sight, international cleft care stakeholders must adapt to continue to provide comprehensive cleft care

**Table 1.** Comprehensive Cleft Care Workshop All Participants and Post Workshop Survey Respondents Demographic Data.

| | | |
|---|---|---|
| *All Participants Data (n = 489)* | | |
| Age in Years, mean ± SD | 40.1 ± 7.2 | |
| Gender, n (%) | Male | 155 (48.9) |
| | Female | 162 (51.1) |
| *Survey Respondents Data (n = 195)* | | |
| Attendance Format, n (%) | In Person | 103 (52.8) |
| | Virtual | 92 (47.2) |
| Specialty, n (%) | Surgery | 99 (50.8) |
| | Dentistry | 41 (21.0) |
| | Speech and Language Pathology (SLP) | 40 (20.5) |
| | Other | 15 (7.7) |
| Position, n (%) | Independent Practitioner | 125 (64.1) |
| | Trainee/Student | 37 (19.0) |
| | Other | 33 (16.9) |
| Years in Position, n (%) | < 5 | 90 (46.2) |
| | ≥ 5 | 105 (53.8) |
| Work With Cleft Team, n (%) | Yes | 162 (83.1) |
| | No | 33 (16.9) |
| Participate Again, n (%) | Yes | 188 (96.4) |
| | No | 7 (3.6) |

Abbreviation: SD, standard deviation. Percentages do not include missing data where applicable.

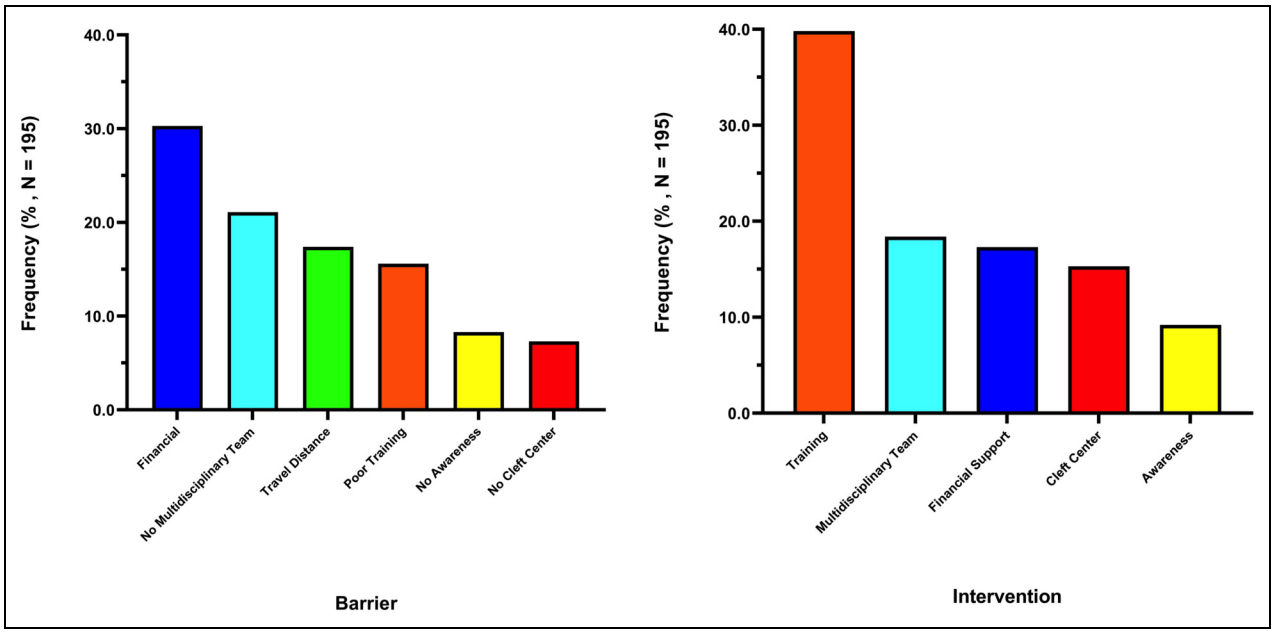


**Figure 3.** Greatest barrier to comprehensive cleft care delivery (*left*) and the most important intervention to improve comprehensive cleft care delivery (*right*) as perceived by workshop participants.

to areas of the world that need it the most.[7] All of these factors encouraged us to organize our Fourth International Educational Comprehensive Cleft Care Workshop in hybrid format in Istanbul, Turkey recently under heightened COVID-19 precautions. This allowed participants who were vaccinated against COVID-19 and can demonstrate a recent negative COVID-19 test to attend the workshop in person, while others who were not, or did not feel safe to attend in person had the option to attend the workshop virtually. In this study, we compared workshop satisfaction and perceived impact on clinical practice between participants who attended the workshop in person and those who attended virtually. While all participants reported a high degree of satisfaction with the workshop and a strong positive perceived impact on their clinical practice, participants who attended the workshop in person reported a significantly higher level of satisfaction with the

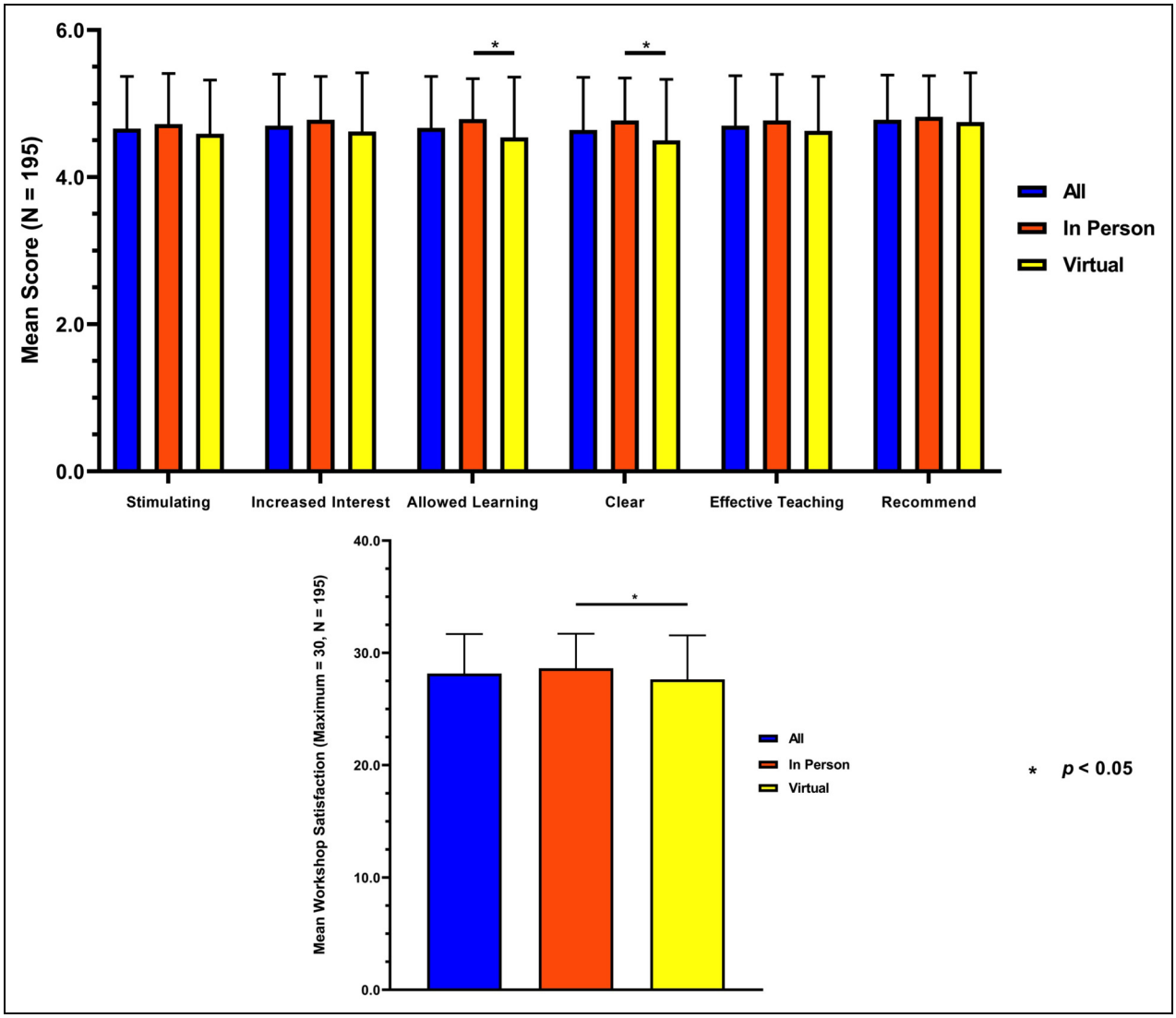


**Figure 4.** All participants, in-person participants, and virtual participant's workshop satisfaction based on Student Evaluation of Educational Quality (SEEQ) survey subitems (*top*) and total (*bottom*) scores.

workshop and a stronger perceived impact on their clinical practice compared to those who attended virtually. To our knowledge, the workshop described here constitutes the First Simulation-Based International Educational Comprehensive Cleft Care Workshop, and this study is the first to analyze educational differences between in-person and virtual cleft care learners.

Our study provides proof of concept that hybrid international educational comprehensive cleft care workshops can be carried out successfully in a safe fashion, and provide learners with high-quality educational content that positively meets their expectations and has a significant perceived impact on their clinical practice. However, we also identified significant differences in these outcomes between learners who attended the workshop in person and those who attended it virtually. We hypothesize that while virtual learners reported strong satisfaction with the workshop content and perceived impact on their practice, in-person learners had a significantly more positive experience due to the ability to participate in the simulation and hands-on sessions offered for the different specialties. While the results of this study are not completely unexpected findings, we believe that they are extremely significant as this is the first study that compares the effectiveness of in-person versus virtual cleft surgery education in an analytical and data-driver fashion. We also think our results are significant as they highlight a major current and anticipated future challenge that all key stakeholders in international cleft care delivery and education will have to face, adapt to, and overcome. We foresee that future cleft care and other educational workshops and meetings will predominantly be held in hybrid format, allowing learners who do not feel safe traveling long distances or internationally, to still benefit from the educational content that is being offered. The challenge for teams organizing these educational initiatives will be to find

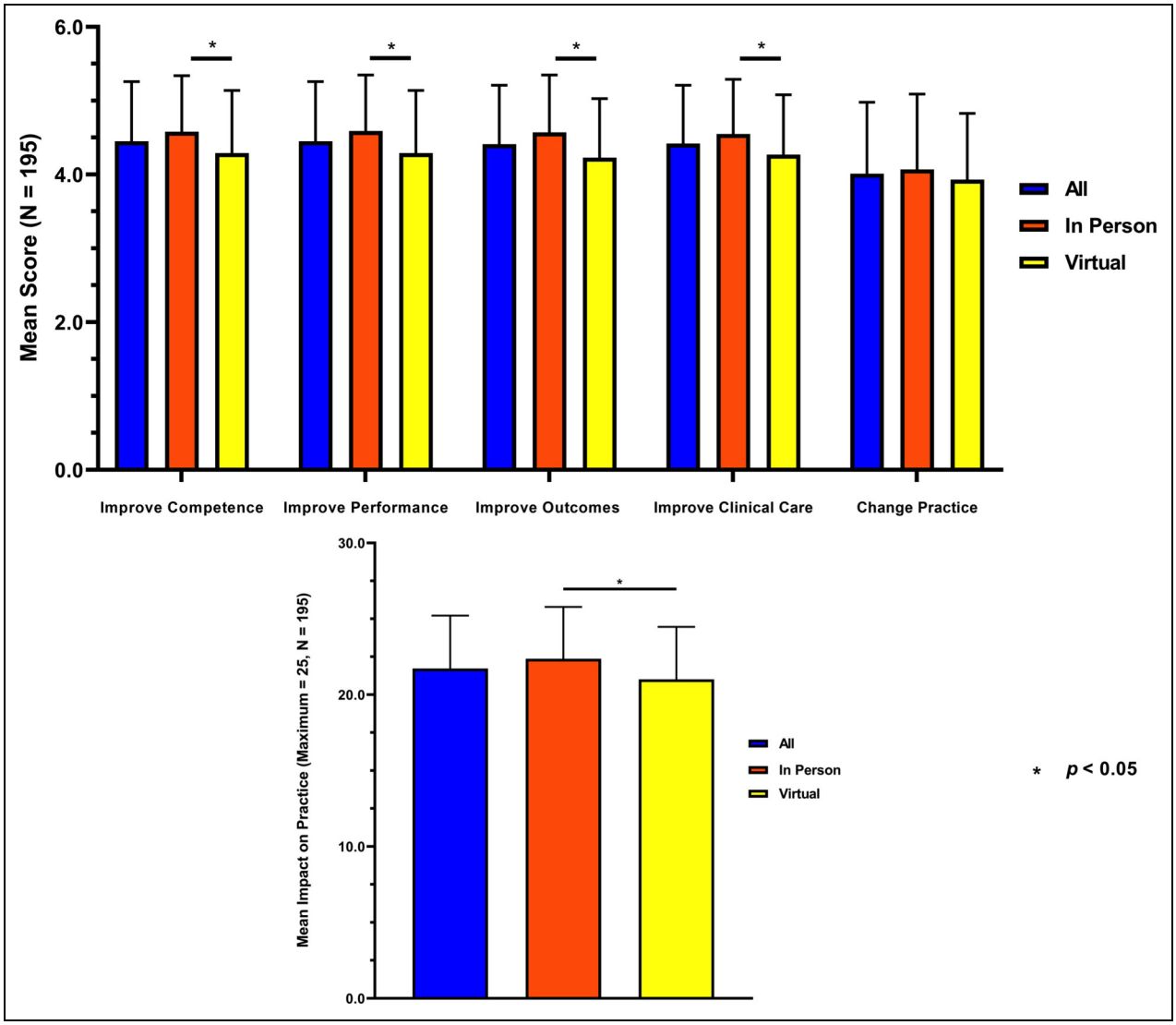


**Figure 5.** All participants, in-person participants, and virtual participants perceived impact on clinical practice based on survey subitems (*top*) and total (*bottom*) scores.

innovative methods to deliver all aspects of their educational content to in-person as well as virtual learners alike. The COVID-19 pandemic has significantly accelerated the widespread adoption of remote digital education, as well as the development of tools, technologies, and platforms that are required for its effective delivery.[10] Augmented reality has previously been shown to be successful and effective in transferring cleft surgery knowledge and procedural skills to overseas learners through an augmented reality-based, hands-on remote educational curriculum.[11] Harnessing these emerging technologies and tools will certainly be explored extensively for our future workshops, with the hope of delivering all of our educational content, including the simulation and hands-on sessions to virtual and in-person learners in a comparable fashion.

There are multiple limitations to this study as well as challenges facing the organization of future international, educational, simulation-based comprehensive cleft care workshops. The response to the survey was only around 40%, which is not uncommon for these types of studies, but it may have influenced the results. While we have demonstrated that our workshops are well received by learners, lead to significantly increased procedural confidence, and have a sustained strong perceived positive impact on their clinical practice, our future efforts should and will focus on analyzing how this is affecting patient clinical outcomes. We will also continue to collaborate with key international stakeholders in comprehensive cleft care provision and education to make our initiatives as widely available as possible for learners around the world. This is especially important in low to middle-income countries where financial resources and logistical challenges to widespread implementation and dissemination of these initiatives are particularly challenging. While hybrid meetings can theoretically be more financially viable given that they are associated with less travel expenses and have the potential for

increased attendance from virtual participants, there are added costs associated with the safety precautions, live streaming, and archiving associated with these meetings. We also recognize how demonstrating that providing a virtual option leads to improved access to learners from low-to-middle-income countries is extremely important and this is the topic of current research and data collection. We hope this data will supplement data from our previous workshops investigating the impact of geographic and demographic factors on perceived barriers to comprehensive cleft care delivery in low-to-middle-income countries.[12]

Expected recurrent waves of COVID-19 will challenge the organization and implementation of our future workshops, which we hope to mitigate by adopting a hybrid format for all of our future educational initiatives and focusing on leveraging new digital technologies to deliver our educational content effectively to virtual learners. A major challenge facing this will be the different time zones of our participants. While having the meeting recorded and made available to registrants to watch at their own convenience may partially address this, it does not address making the simulation and hands-on sessions available to all participants. With these considerations in mind, we hope to keep improving our workshops to make them as widely accessible by learners as possible, in order to help alleviate global cleft care disparities and contribute to building cleft care capacity in areas around the world that need it the most.

## Conclusion

We describe the First Simulation-Based International Educational Comprehensive Cleft Care Workshop held in hybrid format. Our results suggest that while the workshop was well received by all participants, in-person learners reported a significantly higher level of satisfaction with the workshop and a stronger perceived impact on their clinical practice. This highlights a significant challenge that all international cleft care educational initiatives will face moving forward. Future efforts will focus on leveraging emerging technologies, tools, and digital platforms to deliver our educational content to in-person and virtual learners in a comparable fashion

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### ORCID iDs

Rami S. Kantar https://orcid.org/0000-0002-2245-2054
Elçin Esenlik https://orcid.org/0000-0002-5647-4630
Omar S. Al Abyad https://orcid.org/0000-0002-6992-0193
Antonio Melhem https://orcid.org/0000-0001-8818-6978
Serena Kassam https://orcid.org/0000-0001-5418-3568
Charanya Vijayakumar https://orcid.org/0000-0003-1067-5506
Derek M. Steinbacher https://orcid.org/0000-0003-3165-5969
Hans Mark https://orcid.org/0000-0001-5472-175X
Valerie J. Pereira https://orcid.org/0000-0001-7527-053X
Anne Marie Kuijpers-Jagtman https://orcid.org/0000-0001-8172-0090
Maria Costanza Meazzini https://orcid.org/0000-0001-9596-570X
Om P. Kharbanda https://orcid.org/0000-0001-8908-4666
Prasad Nalabothu https://orcid.org/0000-0003-2442-7618
Puneet Batra https://orcid.org/0000-0003-4201-4235
Raj M. Vyas https://orcid.org/0000-0002-5442-0786
Roberto L Flores https://orcid.org/0000-0002-3817-313X
Corstiaan C. Breugem https://orcid.org/0000-0003-3587-7489

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