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Videoconferences of Infectious Diseases: An educational tool that transcends borders. A useful tool also for the current COVID-19 pandemic

Jose A. Gonzales-Zamora[1], Jorge Alave[2,3], Daniela F. De Lima-Corvino[1], Anmary Fernandez[1]

[1]Department of Medicine, Division of Infectious Diseases, University of Miami Miller School of Medicine, Miami, Florida, USA;
[2]Department of Internal Medicine, Clinica Good Hope, Lima, Peru;
[3]Universidad Peruana Union, Lima, Peru

Telecommunications have been increasingly used by healthcare professionals to provide medical services in distant places, which has contributed to improve the quality, availability and efficiency of healthcare in hard-to-reach areas [1]. Likewise, teaching techniques based on telemedicine, referred as "tele-education", have overcome the limitations of traditional face-to-face education. Through videoconferences and audioconferences, it is possible to bring expert educators closer to students of limited resource areas [2]. Furthermore, the new era of globalization has allowed building up international partnership programs, which enable students from developing countries to have access to world-class education. These educational strategies have been adopted by the Division of Infectious Diseases of University of Miami, Miller School of Medicine in November of 2018. In collaboration with Clinica Good Hope in Peru and Universidad Peruana Union (Lima, Peru), we developed a videoconferencing program that consisted of clinical case presentations once a month. These sessions have taken place uninterruptedly until the date of submission of this report. Initially, we had the participation of 2 sites (University of Miami, and Clinica Good Hope); later on, the following institutions joined this activity: Hospital 12 de Octubre in Madrid in Spain; Aventura Hospital and Medical Center in Florida, USA; Hospital Padre Hurtado in Santiago, Chile; and Instituto Nacional de Enfermedades Neoplasicas (INEN) in Lima, Peru.

The objective of this educational activity was to expand the knowledge about infections of low prevalence in the participating countries, focusing mainly in tropical medicine and immunocompromised hosts. The format consisted of sessions of 1-hour duration, in which 2 clinical cases were presented by 2 different institutions using PowerPoint. The presenting sites were chosen randomly. The event was advertised via an electronic brochure distributed among the participating sites one week before the presentation. The diagnosis of the cases was unknown by all the participants. After each presentation, an attending physician was invited to discuss the differential diagnosis and treatment of the clinical cases. Then, the presenter revealed the diagnosis and provided a brief review of the topic. Lastly, a few additional minutes were assigned for questions and comments. All the sessions were performed exclusively in English language. We used several videoconference platforms: Skype™, Facebook™ and Zoom™.

From November 2018 until January 2020, we have conducted 15 videoconferences, in which 30 cases were presented (Table 1). Most of the cases were presented by University of Miami and Cl-

Corresponding author
Jose A. Gonzales Zamora
E-mail: jxg1416@med.miami.edu

inica Good Hope, with 46.7% and 33.3% of cases respectively. Regarding the videoconference platforms, Zoom™ was used in the majority of sessions (60%). Skype™ and Facebook™ were used in 33.3% and 6.7% respectively. Given its user-friendliness, good image resolution, and high quality of the audio, Zoom™ was the most commonly used platform. Additionally, Zoom™ allowed complete recording of videoconferences, which was distributed among participating sites after each session. These recordings were also posted in the Facebook™ page of the Infectious Disease Division of University of Miami, in such manner, they were put within reach of the general public. Regarding the difficulties experienced with this system, the most common problem was poor audio connectivity, which occurred in 5 (33.3%) sessions. These issues were resolved by making direct phone calls between the participating sites. Other problems were delay in the start time and poor image quality, which occurred in 2 occasions each one.

Telecommunications have emerged as important educational tools that allow to connect developing countries with first-world countries to obtain a mutual benefit. At one hand, they enable physicians from high-income countries to learn about pathologies of low prevalence in their settings (*i.e.*, tropical diseases, tuberculosis, parasite infections, etc.), and on the other hand, they

Table 1 - Clinical cases presented in Videoconferences

Date	*Platform*	*Participating Sites*	*Case #1*	*Case #2*
November 8th, 2018	Skype™	UM, CGH	Disseminated TB presenting as Parkinson syndrome	Whipple disease endocarditis
December 13th, 2018	Skype™	UM, CGH	Pathologic fracture secondary to *Echinococcus*	Meningoencephalitis secondary *Aspergillus versicolor*
January 10th, 2019	Skype™	UM, CGH	Opsoclonus myoclonus secondary to *Paramyxovirus*	Meningitis secondary to *Strongyloides* hyperinfection
February 14th, 2019	Skype™	UM, CGH	Intestinal histoplasmosis	Brain abscess secondary to *Curvularia*
March 14th, 2019	Skype™	UM, CGH	Leptospirosis complicated by pancreatitis and cholecystitis	Gastrointestinal CMV and Kaposi sarcoma in an HIV patient
April 11th, 2019	Facebook™	UM, CGH	Severe anemia and hypereosinophilia due to helminths	Dialysis associated peritonitis caused by *Mycobacterium abscessus*
May 9th, 2019	Zoom™	UM, CGH, 12 de Oct.	*Mycobacterium marinum* skin and soft tissue infection	Septic shock and splenic abscess secondary to *Salmonella enterica*
June 13th, 2019	Zoom™	UM, CGH, 12 de Oct.	*Lawsonella clevelandensis* hepatic abscess	Cardiogenic shock and myocarditis associated with Influenza
July 11th, 2019	Zoom™	UM, CGH, AH	*Aspergillus flavus* osteomyelitis	A case of Guillian Barre/AMAN
August 8th, 2019	Zoom™	UM, CGH, AH, INEN	OM caused by VIM producing PSA	Necrotizing infection secondary to *Aeromonas hydrophila*
September 12th, 2019	Zoom™	UM, CGH, AH, 12 de Oct, HPH	Infectious mononucleosis in an elderly patient	Neurobrucellosis presenting as a solitary brain mass
October 10th, 2019	Zoom™	UM, CGH, AH, HPH	Disseminated fusariosis with endogenous endophthalmitis	Septic shock by NDM producing *Enterobacter cloacae*
November 7th, 2019	Zoom™	UM, CGH, AH, HPH	Meningoencephalitis caused by Aspergillus versicolor	Liver abscess secondary to *Fasciola hepatica*
December 12th, 2019	Zoom™	UM, CGH, AH, HPH	HIV nephropathy	Leptospirosis with acute liver injury
January 9th, 2020	Zoom™	UM, CGH, AH, HPH	Bacteremia and diarrhea caused by *Edwardsiella*	OM caused by Nocardia and *Mycobacterium abscessus*

UM=University of Miami, CGH=Clinica Good Hope, 12 de Oct= Hospital 12 de Octubre, AH=Aventura Hospital and Medical Center, INEN= Instituto Nacional de Enfermedades Neoplasicas, HPH=Hospital Padre Hurtado, TB=tuberculosis, OM=osteomyelitis, CMV=cytomegalovirus, AMAN=acute motor axonal neuropathy, PSA=*Pseudomonas aeruginosa.*

expose providers from low-income countries to sophisticated diagnostic and therapeutic techniques not available in their hospital centers. This educational strategy has been applied by several teaching sites in a successful manner. A clear example was the collaboration between Massachusetts General Hospital in Boston, USA, and Mbarara Regional Referral Hospital in Mbarara, Uganda. Through this partnership, a videoconference program was elaborated to train Gynecology resident physicians [3]. From June 2012 through January 2015, thirty teleconferenced lectures were given. The structure of these lectures was similar to ours; they started with a case report, followed by a didactic lecture, and finished with a 15-minute discussion period. It was mainly oriented to residents in-training, but also had the participation of medical students and faculty. Their biggest challenge was internet connectivity, which led to cancellation of six out of thirty lectures [3]. Although connectivity problems were also experienced in our academic activity, these were only minor technical issues fully resolved during the sessions that never led to conference cancellation.

The partnership between Massachusetts General Hospital and Mbarara Regional Referral Hospital also allowed the development of a videoconference program for Anesthesiology residents. Through this program, the residents attended lectures and took a quiz before and after each session. The significant improvement of post-lecture scores demonstrated the high effectiveness of this educational tool [4]. In this regard, the systematic review conducted by the New South Wales Ministry of Health from Australia has shown that these models of tele-education not only achieve learning outcomes comparable to traditional methods, but also have high acceptance by healthcare professionals [5].

Similar experiences have been reported in Canada, where tele-education has been used in residency programs of Urology and Gynecology [6, 7]. In the surgical field, videoconferencing has been used extensively all over the world [8,9]. In Asia, one of the most notable examples was the seminar series conducted by Shanghai University Hospital (China), Kyushu Hospital (Japan), and Tokai University Hospital (Japan). These sessions were focused in laparoscopic surgery for digestive system malignancies. An important finding provided by post-seminar questionnaires was the high satisfaction level reported by attendees [10].

Videoconferencing has also been used increasingly in clinical specialties [11, 12]. One of the numerous examples was the program instituted by Alberta University (Alberta, Canada), which consisted in grand rounds of Geriatric Medicine delivered to 9 urban and 14 rural sites in Canada [13]. Another important experience was reported by Stokes et al. who described a collaboration between University of Calgary (Alberta, Canada) and University of Guyana [14]. Through this partnership, Internal Medicine residents from Calgary presented teaching sessions to Guyanese residents via videoconference in real time. An evaluation performed by surveys revealed that 92% of Guyana and Calgary residents agreed that these sessions enhanced their learning and 88% of Calgary residents felt the lectures improved their teaching skills [14]. In the field of Infectious Diseases, there is a very limited experience on the use of this technology. There is only one report published by Rodriguez et al., who conducted a series of videoconferences between the Universidad Peruana Cayetano Heredia in Peru, and University of Alabama in USA [15]. Our report is the first documentation of a successful Infectious Disease videoconference program that incorporates more than 2 institutions from different countries in real time. It is also one of the few tele-education programs that include teaching sites from Latin America.

Telecommunications have also been very valuable during disasters and public health emergencies. In the current COVID-19 pandemic, telemedicine emerges as an excellent alternative for evaluating patients with chronic conditions, and in such manner, we can limit patient attendance to healthcare facilities, which could serve as potential sources of contagion [16, 17]. Given the high transmissibility of COVID-19, this technique has also helped to follow-up stable patients with this infection, decreasing the exposure of healthcare personnel to this pathogen. In the setting of rapid spread of COVID-19 worldwide, videoconferencing has allowed physicians to learn from the clinical experience of countries with high incidence for this infection, and to be prepared for a similar situation by adopting prevention and control measures used in these affected countries.

Besides the obvious benefits in the education of

in-training physicians, these activities promote the exchange of information and clinical discussion between physicians of different realities, which leads to continuous learning and ultimately to a better patient care. In Latin America, tele-education is still on the process of development; however, we believe that implementation of more videoconference programs could contribute to improve the quality of education and medical services in this part of the world. Nonetheless, further studies are needed to evaluate the acceptance, effectiveness and impact of these educational tools in Latin American countries. We also highlight in this report the applicability of these techniques in public health emergencies like the current COVID-19 pandemic.

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