MEDINFO 2015: eHealth-enabled Health
I.N. Sarkar et al. (Eds.)

doi:10.3233/978-1-61499-564-7-372

Online Continuing Medical Education for the Latin American Nephrology Community

Alvaro Margolis[a,b], Francisco Gonzalez-Martinez[c], Oscar Noboa[c], Mario Abbud-Filho[d], Leticia Lorier[a], Marcelo Nin[c], Ricardo Silvariño[c], Sofía García[a], Jacqueline Pefaur[e], Gustavo C. Greloni[f], Irene L. Noronha[g], Antonio Lopez[a,b], María A. Ribeiro-Alves[h], Roberto Tanús[i], Juan Fernández-Cean[j]

[a] *EviMed Corp, Uruguay.* [b] *School of Engineering, Universidad de la República, Uruguay.* [c] *Nephrology Department, Universidad de la República, Uruguay.* [d] *Faculdade de Medicina de São José do Rio Preto, Brazil.* [e] *Facultad de Medicina, Universidad de Chile.* [f] *Nephrology Department, Hospital Italiano de Buenos Aires, Argentina.* [g] *Nephrology Department, Universidade de Sao Paulo, Brazil.* [h] *Nephrology Department, Universidade Estadual de Campinas, Brazil.* [i] *President, STALYC.* [j] *President, SLANH.*

Abstract

A continuing medical education (CME) course was implemented for Latin American nephrologists in 2013. The topic was Immunopathology in native and transplanted kidneys. The course was given in Spanish and Portuguese. The activities included a distance education seven-week asynchronous online modality with multiple educational strategies. Thirty hours of study workload were estimated to complete the course.

Four hundred and ninety-eight physicians coming from 18 countries registered for the course; 442 of them participated in it. Of those who participated, 51% received a certificate of completion and 29% a certificate of participation. Sixty-five percent of registrants participated in the case discussions. Eighty-six percent were very satisfied and 13% were satisfied. Lack of time to devote to the course was the main limitation expressed (62%), while Internet access or difficulties in the use of technology were considered by only 12 and 6% of participants, respectively. There was a significant increase in knowledge between before and after the course; the average grade increased from 64 to 83%.

In conclusion, technology-enabled education demonstrated potential to become an instrument for Latin American nephrologists.

Keywords:

Internet; Continuing Medical Education; MOOC; Nephrology; Latin America.

Introduction

Latin America is a large and diverse region, where the predominant languages are Spanish and Portuguese, comprising more than 600 million inhabitants in over 20 countries, from Mexico in the North to Argentina and Chile in the South.

The number of nephrologists in the region is approximately 8,000, with a widespread variation across countries (1.77 to 53.9 per million population (13.2±14.0)) [1], and also within each of the countries.

SLANH (Latin American Society of Nephrology and Hypertension) is a scientific regional society with over 40 years of existence, integrates 24 Latin American National nephrology associations (www.slanh.net). STALYC (Latin American and Caribbean Transplantation Society) is the transplantation regional federation, with over 30 years of existence (www.stalyc.net). Both joined efforts in this educational initiative.

The use of information and communication technologies (ICT) is evolving constantly, with innovations and the potential for more interactive and engaging strategies to be incorporated into educational programming [2-5], still allowing for massive participation of physicians, some of them from more remote locations of the countries [6]. Therefore, in 2013, EviMed was invited by SLANH and STALYC to implement the integration of ICT into their more traditional formats, based on its record of blended multifaceted programs in Latin America [7-11].

This paper describes the design, implementation and results of a multi-country bi-lingual CME program for Latin American nephrologists.

Methods

The course was implemented in the months of September and October 2013. The topic, Immunology in native and transplanted kidneys, focused on diagnosis, categorization and therapy for these conditions, currently undergoing major discoveries. The target population was Spanish- and Portuguese-speaking nephrologists and other physicians caring for these patients working across the Latin American region. EviMed provided a multidisciplinary team of communication and educational experts, clinicians, system engineers, medical information specialists and translators to design and implement the course, together with regional and international domain experts provided by SLANH and STALYC. There were 33 lecturers, including 25 from Latin America (20 clinical nephrologists and five immunologists), as well as six European and two North American experts. Including the tutoring roles, 59 domain experts participated in the design and implementation of this course.

A multifaceted approach was used, in order to maximize opportunities for physician and health care professional participation and ensure that participants could interact and reflect on the material. Accordingly, the activities began with an on-site and online synchronous launching event, followed

by a distance education seven-week online modality with multiple educational strategies, and ended with a closing lecture. Reading resources, videos and voice-over-presentations were published, together with pre- and post-tests, patient aids, and electronic rounds (e-rounds) on clinical cases. Additionally, a clinical simulation using a custom tool developed with the School of Engineering, Universidad de la República, Uruguay [12], was used to provide applied learning through knowledge discovery and automatic feedback. It was implemented in module 6, almost the end of the course, and it had multiple possible pathways, some better than others, not only right or wrong paths, as in real settings (Figure 1).

The e-rounds were asynchronous discussion groups in either Spanish or Portuguese, coordinated by experts and tutors. This modality allowed physicians to participate whenever they could and wished to, lacking a fixed schedule to access the e-round.

A total of 30 hours of study workload along two months was estimated, in order to complete the course.

Course evaluation, participation, satisfaction and knowledge gain were quantified through pre- and post-tests.

The requirements for the certificate of completion were:

- Access to at least 70% of the study materials.
- Grading of at least 70% of tests in each module.
- Completion of the clinical simulation.
- Participation in at least 50% of discussion forums.

The requirements for the certificate of participation were:

- Access to the virtual campus.
- Access to at least 10 study materials, and/or active participation in clinical discussions.

Wilcoxon signed-rank test was used to compare pre- and post-test results.

Results

Registration

There were 498 physicians coming from 18 Latin American countries who registered for the course (Table 1), along with 59 experts and tutors and 55 observers (total=612 participants).

Table 1 - Distribution of participants by country of origin.

Country	Number	Percentage
Mexico	62	12
Brazil	59	12
Uruguay	53	11
Argentina	48	10
Peru	40	8
Ecuador	32	6
Chile	31	6
Bolivia	27	5
Costa Rica	24	5
Cuba	24	5
Guatemala	23	5
Venezuela	23	5
Colombia	13	3
Dominican Republic	12	2
Paraguay	11	2
El Salvador	8	2
Honduras	4	2
Panama	2	0
Europe	2	0
Total	*498*	*100%*

Regarding the characteristics of the audience, 49% were women and 51% men. Eighty-five percent were nephrologists and 11% were nephrology residents, while the rest were internists, pediatricians, or pathologists, among other. Seventy-seven percent were 34 years or older.

Figure 1 - Example of a graph with multiple intermediate states and paths, in a clinical simulation developed with the mentioned tool.

Participation

Ninety-six percent of registrants (n=479) accessed the online campus, and 92% of them (n=442) participated in the course. Of those who participated, 51% received a certificate of completion (n=226) and 29% a certificate of participation (n=128).

There was a slight decline in participation along the course, as is usually seen in CME courses that occur over a period of time (Figure 2).

The devices used by participants to watch the video-lectures are shown in Table 2. Thirteen percent of accesses were from tablets or smartphones.

Sixty-five percent of registrants participated in the case discussions with peers, tutors and experts, with an average of five participations per registrant out of six forums. Regarding the clinical simulation, 58% of registrants went through it, with an average of 15 pathways explored, out of 33 pathways available.

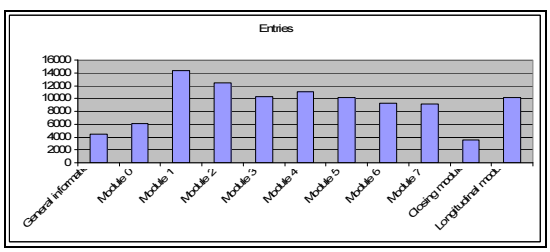

Figure 2 - Number of entries by module.

Satisfaction

This survey was responded to by 174 participants. In a Likert scale of 1-5, 86% were very satisfied, 13% were satisfied, 1% were neutral, and none were dissatisfied or very dissatisfied. Regarding the components of the course that were judged most useful, the video lectures, reading materials, discussion forums and case simulations (in this order) were selected.

Lack of time to devote to the course was the main limitation expressed (62% of participants who answered this question), while Internet access or difficulties in the use of technology were considered by 12 and 6% of participants, respectively.

Regarding perception of commercial bias, less than 1% (1/157) considered there was a commercial bias.

Table 2 - Type of devices used to watch video-lectures

Type of device	Reproductions of video lectures *Number of accesses (%)*	Mean duration (in minutes)
Computer	16,081 (86.2%)	12:03
Tablet	1,951 (10.5%)	11:09
Mobile phone	529 (2.8%)	07:52
Smart TV	57 (0.3%)	07:35
Unknown	46 (0.2%)	05:17

Knowledge acquisition

There was a significant increase in knowledge between before and after the course. Of 200 participants who took both tests, the grade increased from 64 to 83% ($p<0.001$) (Figure 3).

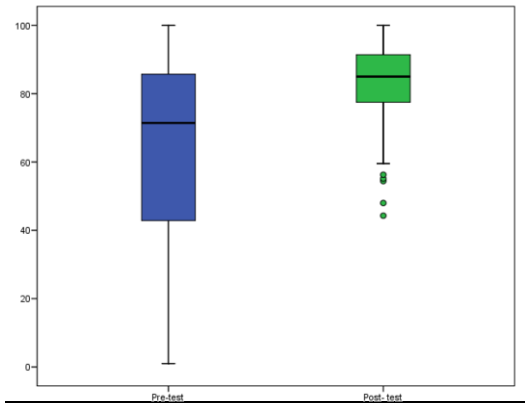

Figure 3 - Knowledge gain.

Discussion

The results of participation and retention shown are aligned with what could be expected in a voluntary online sequential CME program. In particular, the fact that 58% of participants went through the clinical simulation in module 6 is a good indicator of retention. There also was a high level of satisfaction, shown by participants relating to the study materials and experts involved in producing them, the existence of interaction among participants, and the use of innovative educational methods, such as the clinical simulations. The learning gain obtained was significant, as usually occurs with CME based on several features used in this course [13]. The fact that the program was bilingual, and both audiences were integrated in the online platform, received no mentions or criticisms; this is the best possible scenario, where translation was invisible to the user.

This educational activity reached about 7% of nephrologists in Latin America, including faculty and students. In a region as large as Latin America, this kind of program can facilitate participation, no matter the location of the professional.

This initial pioneer program has prompted both SLANH and STALYC to continue using this educational strategy in 2014, with new topics (peritoneal dialysis and solid organ transplantation, respectively). In the case of peritoneal dialysis, the online program for physicians and nurses working in dialysis centers was further integrated with an effort to provide practical support to participants who wish to implement such a dialysis method after the course, from a network of nephrology excellence centers within the region. This kind of strategy increases the chances of implementation of new knowledge and skills learned into clinical practice [14,15].

The cost structure of online education is different from live education [16]. Latin America, a geographically extensive region, but with good internet connectivity and only two main languages, allows for cost savings by avoiding costly transportation and hotel expenses necessary for live events, while engaging participants and experts in a more horizontal and prolonged exchange of experiences.

The two international associations improved their professional networks after the course; in the case of SLANH, its direct membership increased by 50%. This seems to be the result of new communication spaces being created through an online course [17].

The main limitations are related to the fact of having a one-group pre-post test study design, with no control group. Nevertheless, it would not be feasible for these associations to withdraw access to an educational program to a control group. The results regarding enrollment, participation, satisfaction and knowledge gain are useful in themselves, for this given context. Moreover, long-term knowledge retention was not measured, this would be a useful variable to consider in future research. Additionally, there was no formal attempt to measure satisfaction in those who did not answer the survey, who may differ in their perspective related to the course. Finally, no clinical outcomes were measured after this educational intervention; however, this is the norm and not the exception in CME, due to the difficulties related to measuring physician performance or patient outcomes in relation to a course.

A challenge for future courses in Nephrology and for other specialties is the possibility of massive participation of professionals, in the number of thousands, not hundreds, since Latin America has approximately one million physicians. This course had tutors who moderated group discussions, and if the same model is applied with very large audiences, the number of tutors may become difficult to manage. The models used by Massive Open Online Courses (MOOCs) [6] could then be applied here, where either more automatic interaction (e.g., with more use of clinical simulations), and/or more horizontal exchange (e.g., with more peer-to-peer discussions) would lessen the number of faculty required to moderate the discussions.

Conclusion

Technology-enabled education demonstrated good potential to become an instrument for nephrologists as well as other groups of physicians and healthcare professionals working in Latin America. It could help reduce heterogeneity in access to human resources training across regions in the countries.

Acknowledgements

The authors wish to thank the Boards of SLANH and STALYC for their support of this project, as well as the faculty involved in the implementation of the program. We also wish to thank Dr. Alejandro Ferreiro for the statistical analysis.

References

[1] González-Martínez F; Cortés Sanabria L; Di Bernardo JJ; Di Rienzo P; García García G; Cerdas Calderón M; Correa Rotter R; Fernández Cean J. Población y distribución de nefrólogos en Latinoamérica. VII Congreso Iberoamericano de Nefrología y XLII Congreso Nacional de la Sociedad Española de Nefrología. Gran Canaria. October 2012.

[2] Cook D et al. Internet-based learning in the health professions: a metaanalysis. JAMA. 2008;300:1181–1196.

[3] Lam-Antoniades M, Ratnapalan S, Tait G. Electronic continuing education in the health professions: an update on evidence from RCTs. J Contin Educ Health Prof. 2009;29:44–51.

[4] Cook DA, Levinson AJ, Garside S, Dupras D, Erwin PJ, Montori V. Instructional design variations in internet-based learning for health professions education: a systematic review and meta-analysis. Academic Medicine. 2010;85:909–922.

[5] Harris, J. M., Sklar, B. M., Amend, R. W. and Novalis-Marine, C. (2010), The growth, characteristics, and future of online CME. J. Contin. Educ. Health Prof., 30: 3–10.

[6] Liyanagunawardena TR, Williams SA. Massive Open Online Courses on Health and Medicine: Review. J Med Internet Res 2014;16(8):e191.

[7] Llambí L, Margolis A, Toews J, Dapueto J, Esteves E, Martínez E, Forster T, López Arredondo A, Lockyer J. Distance education for physicians: adaptation of a Canadian experience to Uruguay. J Contin Educ Health Prof. 2008 Spring; 28 (2):79-85.

[8] Llambí L, Esteves E, Martinez E, Forster T, García S, Miranda N, Lopez Arredondo A, Margolis A. Teaching tobacco cessation skills to Uruguayan physicians using information and communication technologies. J Contin Educ Health Prof. 2011 Winter; 31(1):43-48.

[9] Martínez E, Margolis A, Joglar F, Alonso D, López Arredondo A, García S. From Uruguay to Puerto Rico: similarities and differences in CME and the context of health care. CME Congress, Vancouver, Canada, May 2008.

[10] Margolis A, Santiago B, Martínez E, Dapueto J, Lorier L, Fernández Z, Forster T, Miranda N, Muñoz C y López A. Four-year Collaboration in CME Among Latin American Institutions. CME Congress, Toronto, Canada, May 2012.

[11]Cohen H, Margolis A, González N, Martínez E, Sanguinetti A, García S, López A. Implementation and evaluation of a blended learning course on gastroesophageal reflux disease for physicians in Latin America. Gastroenterol Hepatol. 2014 Aug-Sep;37(7):402-7.

[12] Medeiros N, Pérez G, Sniadover N, López A. Generador de casos interactivos. Presented at MoodleMoot Uruguay 2011, available at: http://www.moodlemoot.org.uy/moodlemoot_2011/moodlemoot/moodlemootuy2011_submission_26.pdf

[13] Mansouri M, Lockyer J. A meta-analysis of continuing medical education effectiveness. J Contin Educ Health Prof. 2007 Winter;27(1):6-15.

[14] Olson, C. A. (2012), Twenty predictions for the future of CPD: Implications of the shift from the update model to improving clinical practice. J. Contin. Educ. Health Prof., 32: 151–152.

[15] Fletcher SW. Chairman's Summary of the Conference. In: Hager M, editor. Continuing Education in the Health Professions: Improving Healthcare through Lifelong Learning; 2007 Nov 28 – Dec 1; Bermuda. New York: Josiah Macy, Jr. Foundation; 2008.).

[16] Maloney S, Haas R, Keating JL, Molloy E, Jolly B, Sims J, Morgan P, Haines T. Breakeven, cost benefit, cost effectiveness, and willingness to pay for web-based versus face-to-face education delivery for health professionals. J Med Internet Res. 2012 Apr 2;14(2):e47.

[17] Margolis A, Parboosingh JT. Networked learning and network science: potential applications to health professionals' continuing education and development. Accepted for publication at J Contin Educ Health Prof.

Address for correspondence

Alvaro Margolis, MD MS

Email: alvaro.margolis@evimed.net