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New Models for Medical Education: Web-Based Conferencing to Support HIV Training in Sub-Saharan Africa

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Abstract

Background: Healthcare workers in Africa managing human immunodeficiency virus (HIV)-infected patients often receive inadequate HIV-specific medical education. The acceptability and feasibility of Web-based distance learning tools to enhance HIV training in Africa have not been extensively evaluated.

Materials and Methods: In this prospective observational study, we assessed the feasibility of Web-conferencing to deliver HIV-specific medical training to clinicians supporting HIV care and treatment across 12 Sub-Saharan African countries over a 10-month period. Webinar attendance, technical quality, and participant satisfaction were measured for each Webinar. Demographic details about participants were recorded.

Results: Attendance increased from 40 participants in Month 1 to over 160 in Month 10. Thirty-six percent of participants were physicians, and 21% were in allied health professions. A mean of 95% of respondents found the content to be relevant. Participants reported that the opportunity to interact with HIV clinicians from other countries and expert teaching from leading scientists were major reasons for attendance. Audio quality was variable across countries and over time. Barriers to attendance included lack of information technology (IT) literacy and Internet connectivity.

Conclusions: This analysis demonstrates that Webinars are feasible and acceptable to support HIV training. Significant impediments to scale up in use of Web-conferencing for HIV education in resource-limited settings include lack of IT hardware and limited IT literacy. Strengthening IT capacity and Internet infrastructure is necessary to support expanded use of Webinars as a tool for continuing HIV education.

Keywords

Africa, human immunodeficiency virus, HIV, web-conferencing, webinar, IT

Disciplines

Health and Medical Administration | Health Information Technology | Medical Education | Medicine and Health Sciences

New Models for Medical Education: Web-Based Conferencing to Support HIV Training in Sub-Saharan Africa

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Abstract

Background: *Healthcare workers in Africa managing human immunodeficiency virus (HIV)-infected patients often receive inadequate HIV-specific medical education. The acceptability and feasibility of Web-based distance learning tools to enhance HIV training in Africa have not been extensively evaluated.* ***Materials and Methods:*** *In this prospective observational study, we assessed the feasibility of Web-conferencing to deliver HIV-specific medical training to clinicians supporting HIV care and treatment across 12 Sub-Saharan African countries over a 10-month period. Webinar attendance, technical quality, and participant satisfaction were measured for each Webinar. Demographic details about participants were recorded.* ***Results:*** *Attendance increased from 40 participants in Month 1 to over 160 in Month 10. Thirty-six percent of participants were physicians, and 21% were in allied health professions. A mean of 95% of respondents found the content to be relevant. Participants reported that the opportunity to interact with HIV clinicians from other countries and expert teaching from leading scientists were major reasons for attendance. Audio quality was variable across countries and over time. Barriers to attendance included lack of information technology (IT) literacy and Internet connectivity.* ***Conclusions:*** *This analysis demonstrates that Webinars are feasible and acceptable to support HIV training. Significant impediments to scale up in use of Web-conferencing for HIV education in resource-limited settings include lack of IT hardware and limited IT literacy. Strengthening IT capacity and Internet infrastructure is necessary to support expanded use of Webinars as a tool for continuing HIV education.*

Key words: *distance learning, e-health, extreme environments, telemedicine*

Introduction

The human immunodeficiency virus (HIV) pandemic has placed an enormous burden on the delivery of healthcare services in Sub-Saharan Africa (SSA).[1] The humanitarian imperative to scale up HIV treatment to millions of people in Africa has further highlighted the gaps in both numbers of personnel and their preparation for delivering high-quality care.[2] It is therefore no surprise that healthcare workers caring for people living with HIV in many places in SSA receive insufficient education to manage complex HIV-infected patients and lack time or means to access research.[3]

There is increasing evidence that information and communications technology has an important role in improving health outcomes in resource-limited settings. The Réseau en Afrique Francophone pour la Télémédecine network has clearly demonstrated the feasibility of information and communications technology, even in low bandwidth settings, to support medical education across 15 countries in West Africa.[4] Other projects in Africa have also confirmed the potential of Web-based training to enhance medical training for front-line clinicians.[5–9] Internet connectivity in Africa is increasing at a faster pace than in any other region worldwide.[10] However, despite increasing access and uptake of online tools in SSA,[11–13] information technology (IT) literacy and Internet access are often limited.[14,15]

ICAP-Columbia University (previously referred to as the International Care and Treatment Program, Columbia University) in New York, NY, supports capacity-building initiatives to enhance the delivery of HIV prevention, care, and treatment programs in SSA. This includes providing HIV-specific training to clinical personnel, public health specialists, and HIV epidemiologists. After an initial pilot in Tanzania (performed in 2009)[16] demonstrated the technical feasibility of Webinars to support distance learning, ICAP established a curriculum for HIV training offered monthly by Webinar to provide clinicians in supported programs with HIV-specific continuing medical education. Adobe (San Jose, CA) Connect® was used for Webinar hosting given its user-friendly interface and its successful application in the pilot. The feasibility and acceptability of Web-based training to support HIV education across multiple SSA countries were evaluated in this analysis.

Materials and Methods

A prospective, observational design was adopted to determine the acceptability of a Web-based platform to enhance HIV-specific training. The study population included clinicians and public health specialists working in HIV programs supported by ICAP. Web-based training was hosted using Adobe Connect software, which enabled participants to listen to live lectures and, for those logged on synchronously, to communicate directly with the presenter by typing questions and comments. Each Webinar was recorded and could be viewed on-demand afterward. Computer requirements are outlined

Table 1. System Requirements

COMPONENT	REQUIREMENT
Operating system	Microsoft Windows XP or Windows 7 or Windows Vista
	Mac OS X version 10.4–10.6 (Intel); Mac OS X version 10.4 (PowerPC)
Browser	Internet Explorer 6, 7, or 8; Mozilla Firefox 2, 3, 4; Google Chrome; Safari
Software	Adobe Flash Player version 10.1
Network requirements	100 Megabits per second Ethernet (1 Gigabits per second recommended)

Table 2. Participant Demographics

DEGREE	%
B.A./B.S.	15.8%
M.D.	36.8%
Ph.D.	26.3%
Other medical/allied health degree	21.1%

in *Table 1*. Both before initiation of the curriculum and then between Webinars, IT support was available to all ICAP country offices to minimize technical barriers to participation.

Webinars were intended for HIV clinicians and public health practitioners working in HIV programs in 12 SSA countries (Ethiopia, Kenya, Lesotho, Mozambique, Nigeria, Rwanda, South Africa, Tanzania, Swaziland, Democratic Republic of Congo, Cote D'Ivoire, and Zambia) that received support from ICAP at Columbia University through funding from the U.S. Government's President's Emergency Plan for AIDS Relief initiative.[17] All Webinars were in English and were presented by leading clinical experts and scientists. Content was academically rigorous, HIV-specific, and clinically oriented, covering topics that addressed many of the clinical and programmatic issues faced by HIV healthcare providers across Africa. (Webinars were archived on the ICAP Website and can be accessed at www.columbia-icap.org/webinars/webinars.html).

Our primary objectives were to assess the acceptability and feasibility of Web-based training. In order to assess the acceptability of our intervention we measured Webinar attendance, recorded as the number of unique log-ins registered and audience feedback. The latter was assessed using a survey application embedded in the Webinar software. For 6 of the 10 Webinars, participants were asked to evaluate the audio quality and technical content of the Webinars. All polls were voluntary and anonymous. Demographic details about participants were also recorded. There was no financial incentive for participant attendance or feedback.

The feasibility of our intervention was assessed as in terms of IT capacity across the supported countries. We evaluated IT capacity qualitatively by describing the level of technical support required to ensure participants were able to attend Webinars and measured it quantitatively in terms of e-mail and phone support.

Results

Participants attended from the 12 supported countries. Thirty-six percent of participants were physicians, and 21% were in allied health professions (*Table 2*). The average attendance on live Webinars was 69.7 persons. Attendance increased from 40 participants in Month 1 to over 160 in Month 10 (*Table 3*). The majority of participants attended as part of a group, rather than logging on individually. A large proportion of participants (77.8% [$n = 697$]) attended the live Webinars, rather than accessing the recordings.

Real-time collaboration with other HIV clinicians from across SSA countries and expert teaching from leading researchers/scientists were reported as major reasons for attendance (*Table 4*). Participants reported that the greatest barriers to attendance were variable quality of Internet connection and lack of IT expertise.

Feedback on the audio quality of the Webinars was variable, both between countries and over time: overall, 41% of participants reported sound quality was excellent, 39% reported good audio quality, and 13% deemed it fair (*Table 5*). There was no change in the assessment of audio quality over the 10 months of the evaluation.

Across all supported countries, less technical support was required as time progressed. Participants reported that once they had learned how to use the software, they subsequently experienced minimal problems interfacing with the Web-based platform (*Table 4*). Furthermore, IT literacy of participants improved over the course of the intervention, as individuals gained basic competency using integrated voice over Internet protocol and teleconferencing software.

Discussion

Academically rigorous, interactive HIV-specific Webinars were increasingly popular across the varied countries in SSA that participated in the Webinars. The increase in the number of participants and the positive feedback received confirm the acceptability of Web-based conferencing to build local capacity for quality HIV care in SSA. Enthusiasm for the Webinars was also reflected by the fact that lectures were translated into Portuguese and French and disseminated by local HIV trainers in several countries. Webinars were initially intended for health professionals supporting ICAP facilities, but there was increasing participation from personnel from Ministries of Health and partner non-governmental organizations. Web-based training enabled health professionals from across Africa to receive expert teaching and ask questions of leading clinicians/scientists in other countries. It also gave participants opportunity to share experiences from across the continent.

Our analysis did not afford us opportunity to assess the quality of Webinar content or the effectiveness and impact of Web-based training to improve HIV-related knowledge, clinical competency, or

Table 3. Webinar Content

WEBINAR TITLE	NUMBER OF COUNTRIES	NUMBER OF "LIVE WEBINAR" PARTICIPANTS	TOTAL NUMBER OF WEBINAR VIEWS[a]	PRESENTER
1. HIV and hepatitis B co-infection	6	40	88	Dipo Alao, M.D., M.P.H.
2. Chronic complications of HIV	2	33	40	Molly McNairy, M.D., M.Sc.
3. Microbicides and HIV prevention	7	39	47	Jessica Justman, M.D.
4. HIV and mental health	4	38	46	Fran Cournos, M.D.
5. HIV and tuberculosis co-infection	10	72	103	Michael Reid, M.D., M.A.
6. Cervical cancer screening	10	50	60	Louise Kuhn, Ph.D., M.P.H.
7. Health system strengthening	8	56	64	Miriam Rabkin, M.D., M.P.H.
8. HIV laboratory update	7	82	93	Amilcar Tanuri, M.D., Ph.D.
9. Linkage and retention to care	11	127	139	Molly McNairy, M.D., M.Sc.
10. HIV treatment as prevention	11	160	175	Wafaa El Sadr, M.D., M.P.H., M.P.A.
Totals		697	895	

[a]Includes recorded Webinar viewings but may underestimate number of Webinar viewers.

HIV, human immunodeficiency virus.

Table 4. Selected Participant Feedback

Give reasons for why you attended Webinars
"To hear up to date research on HIV that is relevant to [the country I am working in]"
"To discuss HIV programs with doctors from other countries"
"To listen to experts"
"It is what my job involves and I want to participate in training relevant to my work."
"We do not get to hear much new research—the [Webinars] allow us to hear this kind of new [research]."
"I like to connect to the Internet and listen to the team in New York."
"To hear experiences from other countries and how they are dealing with HIV/AIDS."
"The Webinar is easy to use."
Give reasons for why you have not attended Webinars
"At first I did not know how to use the Webinar [software]."
"The lecture is not useful to my practice."
"Our Internet is not always reliable."
"We had meetings at the scheduled time."
"The Internet is sometimes weak and the sound comes and goes."

AIDS, acquired immunodeficiency syndrome; HIV, human immunodeficiency virus.

patient outcomes. However, it clearly demonstrated the acceptability of this training medium in SSA. This is supported by a breadth of literature from elsewhere in Africa, demonstrating that Internet-based training is a useful, feasible tool to support distance continuing medical education.[18–20]

Lack of IT hardware and IT literacy remain significant impediments to scaling up the Webinar training across much of Africa. We found that the audio quality of Webinars was also suboptimal in some countries. This was due in part to use of outdated computers, running older and slower operating systems, and limited bandwidth that was unable to accommodate real-time Internet streaming at the bit rates necessary to support the Adobe software. This latter limitation could have been overcome by using alternative low-bandwidth solutions or by accessing high-bandwidth National Research and Education Networks, such as the Ubuntu Net Alliance in Southern and Eastern Africa.[21] In rural locations where Internet penetration is low, use of cellular telephony to support Webinars is another feasible alternative that could have been used.

One important limitation of our analysis was that we were unable to determine how frequently sites or individuals were unable connect to the Webinars. However, we suspect that this happened relatively rarely, given the infrequency of reports that lack of connectivity precluded participation. Our study findings were also limited by the fact that we only included those regions of the 12 countries assessed where ICAP works and where robust Internet connectivity had already been established. Across the 12 countries included in our analysis, the bandwidth in ICAP's main offices varies between 256 kilobytes per second to 1 megabyte per second. We acknowledge that in many countries in SSA, especially in rural settings, bandwidth is

Table 5. Participant Feedback

	WEBINAR MONTH NUMBER						
	1	3	4	7	8	9	TOTAL
Number of respondents surveyed (% of total number of participants attending the Webinar)	25 (62.6)	30 (76.9)	20 (51.2)	40 (71.4)	52 (63.4)	84 (66.1)	25 (65.7)
Technical content [*n* (%)]							
Relevant/interesting	22 (87)	23 (77)	18 (90)	40 (100)	52 (100)	84 (100)	239 (95)
Audio content [*n* (%)]							
Excellent	15 (60)	21 (70)	9 (45)	10 (25)	9 (17.3)	40 (47.6)	104 (41.4)
Good	8 (32)	6 (20)	7 (35)	16 (40)	34 (65)	28 (33.3)	99 (39.4)
Fair	2 (8)	3 (10)	4 (20)	8 (20)	9 (17.3)	7 (8.3)	33 (13.2)
Poor	0 (0)	0 (0)	0 (0)	6 (15)	0 (0)	9 (10.7)	15 (6.0)

not comparable with this, and lack of Internet connectivity might prevent access to such online training resources.

The U.S. government intends to spend approximately $63 billion dollars on its global health programs between 2009 and 2014,[22] of which $48 billion is to support HIV-related activities. The provision of current, evidence-based medical education to accompany these programs is essential. Our analysis provides important insights into the emerging role of Internet-based educational training as a facet of continuing HIV education in resource-limited settings. Internet-based education provides unique opportunities to support dissemination of new research findings and guideline changes. Because such training can be provided close to the point of care, it also obviates potential disruptions to patient services: clinicians can participate in training without leaving clinics understaffed.

However, many additional questions need to be addressed. Operational research is needed to determine the cost-effectiveness and the impact of Web-based training on healthcare workers' clinical competency and patient outcomes in resource-limited settings. It is also crucial to understand the effect of improving IT literacy and infrastructure in concert with other health system–strengthening measures, to determine both direct and indirect effects.

Conclusions

Human resource shortages and comprehensive medical education are significant barriers to scaling up HIV care and treatment programs in SSA. Our analysis demonstrates that Web-based training is a feasible, acceptable tool to support clinical and programmatic education for personnel caring for people living with HIV in Africa.

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