Evaluating the Uptake, Acceptability, and Effectiveness of *Uliza!* Clinicians' HIV Hotline: A Telephone Consultation Service in Kenya

Charles Karari, B.Sc.,[1] Robin Tittle, M.G.H.,[2] Jeremy Penner, M.D.,[1,3] Jayne Kulzer, M.P.H.,[2] Elizabeth A. Bukusi, M.B.Ch.B., M.Med., M.P.H., Ph.D.,[1] Reson Marima, M.B.Ch.B.,[1] and Craig R. Cohen, M.D., M.P.H.[2]

[1]Centre for Microbiology Research, Kenya Medical Research Institute, Kisumu, Kenya.
[2]Department of Obstetrics, Gynecology, and Reproductive Sciences, University of California San Francisco, San Francisco, California.
[3]Department of Family Practice, University of British Columbia, Vancouver, Canada.

Abstract

Objective: *Many clinical sites that serve patients who are HIV positive face challenges of insufficient staffing levels and staff training and have limited access to consultation resources including specialists on site. Uliza! (Swahili for "ask") Clinicians' HIV Hotline was launched in April 2006 in Nyanza province in Kenya as a HIV telephone consultation service for healthcare providers. Hotline users called an Uliza! consultant who discussed the patients' problems and helped the caller work through a solution, as well as reinforced national guidelines. This objective of this study was to evaluate the uptake, acceptability, and effectiveness of Uliza!* ***Materials and Methods:*** *Consultants completed a form with details of each call, and healthcare workers completed satisfaction surveys during site visits. All available medical records were audited to determine whether the advice given by the consultant was implemented.* ***Results:*** *After a year of service, Uliza! responded to 296 calls. Clinical officers (64%) followed by nurses (21%) most frequently used the service. Most callers had questions regarding antiretroviral therapy (36%) or tuberculosis (18%). Thirty-six percent of all consults were pediatric questions. Ninety-four percent of users rated the service as useful. Advice given to providers was implemented and documented in the medical records in 72% of the charts audited.* ***Conclusion:*** *Healthcare providers in HIV clinics will use a telephone consultation service when easily accessible. Clinicians using Uliza! found it useful, and advice given was usually implemented. Uliza! increased access to current information for quality care in a rural and resource limited setting and has potential for scale-up to a national level.*

Key words: *HIV, sub-Saharan Africa, antiretroviral therapy, consultation; telemedicine*

Introduction

In 2003 Kenya initiated a massive scale-up of HIV care and treatment services, including decentralization of antiretroviral therapy (ART).[1] With concerted efforts to reduce the HIV burden in Kenya, the national HIV prevalence in Kenya dropped from 10% in 1997 to 7.4% in 2007.[2] Nyanza province continues to have the highest HIV prevalence in the country, at 15%.[2] Kenyan's life expectancy at birth declined from 60 years in the early 1980s to 45 years by 2002, before increasing to 55.3 years in 2007.[3] The fall in life expectancy has been attributed to the emergence of diseases such as HIV, malaria, and tuberculosis, among others.

Although the expansion of HIV care and treatment are making significant strides in sub-Saharan Africa, many of the most heavily burdened areas are also the most under-resourced.[4,5] Many clinical sites that serve patients who are HIV positive face challenges of insufficient staffing levels and staff training and limited access to consultation resources including books, Internet, and specialists on site. The doctor-patient ratio in Kenya is reported to be 14 per 100,000 patients.[6] Although the World Health Organization recommends a nurse-patient ratio of 200 per 100,000, Kenya's ratio stands at 50 per 100,000.[7] Few qualified specialists are willing to work in the under-resourced public health sector, particularly in rural areas.[4] To rapidly decentralize HIV services, training of healthcare workers has focused on standardized guidelines and protocols taught during short seminar-based courses.[8] Healthcare workers often have difficulty applying that knowledge when faced with complicated patients at their facilities, with little or no access to clinical decision-making support.[9] Patients often refuse referral to secondary- or tertiary-level facilities, even when quite ill, because of the distance, time away from livelihood, family responsibilities, poor transportation networks, the costs of traveling to the referral site, and paying hospital fees.[10]

Fortunately, the roll-out of HIV care and treatment in sub-Saharan Africa has coincided with the rapid expansion of cell phone coverage in the region.[11] In addition to improving communication between providers and patients, access to mobile phones has been used to facilitate provider-to-provider connections.[12] Several countries have developed consultation systems that allow healthcare providers to ask questions of experienced clinicians via direct phone calls and e-mail communication.[13–15] Consultation systems provide a support network that builds the confidence of newly trained providers and practitioners in HIV care. In the United States, for example, the National HIV/AIDS Clinicians' Consultation Center (NCCC) supports clinicians nationwide through a"warm-line."[16] In Uganda, the AIDS Treatment Information Centre hosts a call-in service that responds to providers' treatment questions.[17] Similarly, the Prince Leopold

 DOI: 10.1089/tmj.2010.0220

Institute of Tropical Medicine in Belgium has developed an Internet-based program using Telemedicine, to enable their experienced providers to respond via e-mail to inquiries made by clinicians in resource-limited settings.[18] Although these programs provide important services to their constituencies, published formal evaluation of these programs is lacking.

In April 2006, Family AIDS Care and Education Services (FACES), a collaboration between the University of California, San Francisco (UCSF), and the Kenya Medical Research Institute (KEMRI), initiated a telephone consultation service for HIV care providers in parts of Nyanza province in Kenya. The purpose of this study was to evaluate the uptake, acceptability, and effectiveness of this new service.

Materials and Methods

PROGRAM DESCRIPTION

Uliza!, the Swahili word for "ask," is a 24-h, 7-days-a-week telephone consultation service that offers expert toll-free consultation to HIV care providers in real time. This service utilizes widespread cellular phone coverage as a low-cost technology to expand the reach of HIV expertise leading to improved quality of care. Almost all healthcare providers in Kenya own a cellular phone. The provider uses their own phone, or that of a colleague, to call toll free with questions regarding clinical management of patients with HIV. Calls are answered by consultants employed by FACES who are expert HIV clinicians. The consultants have Internet access, additional resources, and are supported by a group of specialists who can be called to discuss particularly complicated cases.

Uliza! was launched in four districts in Nyanza province in April 2006. The sites were selected as a convenience sample in consultation with the Nyanza Provincial ART Officer. These included public and private health institutions of different levels including three district hospitals, two sub-district hospitals, seven health centers, two mission hospitals, one private hospital, and one youth clinic. An initial publicity meeting was held bringing together clinicians and nurses from the study sites. The services received calls from two additional sites, which learned about *Uliza!* from colleagues. Subsequent promotion of *Uliza!* to staff at the pilot sites was done by sending text messages from the *Uliza!* phone, word of mouth from colleagues, and promotion during continuous medical education sessions.

EVALUATION METHODS

Ethical approval was obtained from the KEMRI Ethical Review Committee and UCSF Committee on Human Research. The study was carried out in compliance with the Declaration of Helsinki. Verbal consent was obtained before conducting the healthcare provider interviews.

Uliza! consultants completed a form every time they responded to a call, capturing information about the facility, the provider, the patient, the nature of the questions being asked, and a summary of the consultant's response. It also captured information on any resources the consultant used to respond to the call. Consultation forms were analyzed for all consultations that took place within the first 12 months of program implementation. The consultation forms used by *Uliza!* did not contain patient identifiers such as name, date of birth, or other identifying features. Only the medical record number of the patient was used to link *Uliza!* forms with the medical records. Study forms were stored in a locked cabinet in a limited-access room at FACES headquarters in Kisumu, Kenya. The medical records reviewed are maintained in the medical records offices of the Ministry of Health facilities.

Site visits for program evaluation were conducted at months 3, 6, and 9 after implementation and consisted of user satisfaction surveys, nonuser surveys, patient chart audits, and informal feedback.

Table 1. Description of the Health Facilities, Cadre of Health Professional, and Primary Question Asked for *Uliza!* Clinician Hotline in Nyanza Province, Kenya

CALLS BY FACILITY TYPE	*N*=296 (%)
District hospital	108 (37)
Health center	94 (32)
Private hospital	37 (13)
Mission hospital	23 (8)
Sub-district hospital	18 (6)
Dispensary	1 (0.3)
Island mobile site	1 (0.3)
Other	12 (4)
Calls provider cadre	
Clinical officer (mid-level practitioner)	188 (64)
Nurse	66 (21)
Medical officer	23 (8)
Pharmacy technician	2 (1)
Other	17 (6)
Calls by topic[a]	
Antiretroviral therapy	102 (36)
Tuberculosis	51 (18)
Opportunistic infections	28 (10)
Gastrointestinal disease	13 (5)
Central nervous system	11 (4)
Postexposure prophylaxis	10 (4)
Genitourinary tract disease	5 (2)
Other	73 (27)
Calls by patient age	
Adult (>14 years old)	189 (64)
Pediatric (≤14 years old)	104 (36)

[a]More than one response may have been marked per patient encounter.

Table 2. Calls by Type of Facility and Cadre of User

CADRE	CLINICAL OFFICER (%)	MEDICAL OFFICER (%)	NURSE (%)	PHARMACY TECHNOLOGIST (%)	OTHERS (%)
District Hospital	79	10	7	0	4
Sub-District Hospital	56	0	33	11	0
Health Center	54	3	30	0	13
Health Dispensary	0	0	100	0	0
Mission Hospital	57	0	39	0	4

User satisfaction surveys sought to gain feedback on usefulness of the service, reliability, convenience of use, and consultant responsiveness. In addition, the survey sought to identify the resources used by healthcare providers while managing patients. Nonuser surveys were conducted at months 3 and 6 to identify barriers to hotline use. The tools were developed based on those used to evaluate the NCCC warm line at UCSF. The survey sample utilized a convenience sampling technique whereby the evaluator made site visits to each study site and distributed the user satisfaction surveys to all healthcare providers present at the clinic who had used the hotline. The nonuser surveys were similarly distributed to all healthcare providers present at the time of visit to the health facility who had never used the service. The survey tools were self administered and anonymous. The respondents completed the surveys immediately, ensuring all distributed surveys were completed and returned. Informal discussions were also used to elicit feedback from users.

Chart audits were conducted at each site to determine whether advice given over the phone was actually implemented. This occurred during the visits to the study sites and involved review of the medical records of all patients whose visit precipitated a call to *Uliza!*. The patient's management documented in the medical record was compared with the management recommended on the corresponding consult form.

Data were analyzed using SPSS 12.0 (SPSS, Inc., Chicago, IL) to perform descriptive analyses.

Results

After its first year of service, *Uliza!* responded to 296 calls from 79 different care providers (*Table 1*). Over two-thirds of the calls (69%) came from district hospitals and health centers. Clinical officers made the majority of calls from all facility levels (64%), except from dispensaries, which do not have clinical officers; nurses made 100% of the calls from dispensaries (*Table 2*). Over half of the callers (58.4%) made at least two calls, with a median number of calls per user of 2 (interquartile range (IQR) 1–4). Based on participation rates in the user/nonuser surveys, we estimate that of the staff on site at the time of site visits, 30.0% of staff at month 3 and 54.5% of staff at month 6 had used the service.

Most providers who called had questions regarding ART and tuberculosis (36% and 18%, respectively). Thirty-six percent of cases discussed were pediatric. Most questions were about specific patients; a few questions were about care and treatment logistics and general HIV-care questions (*Table 1*).

Among the callers who responded to the user surveys, almost all indicated that the service helped them improve the quality of care given to patients, met their consultation needs, and provided advice that helped them the next time they faced a similar situation in their clinical practice; results for these outcomes were relatively constant across the three evaluation periods (*Table 3*). In addition, nearly all of the respondents felt that the service was useful, convenient, responded in a timely manner, and gave reliable clinical information (*Table 3*). Most providers depended on Kenyan national guidelines and colleagues at their facilities as alternative sources of information and consultation. Less than 30% used text books or e-mail for clinical information or consultation. To improve clinical practice, most providers felt they needed additional clinical mentorship and training (*Table 3*).

From the user surveys, we identified two important barriers to use of *Uliza!*: (1) poor cellular phone network coverage at a few sites, and (2) slow response time of the *Uliza!* consultants. Some healthcare providers did not use the service, because they had access to alternative sources of information, including colleagues and the Kenyan national guidelines for care and treatment of persons infected with HIV (*Table 4*). Among respondents to the nonuser surveys, the most frequently cited reasons for not using the service were not knowing about the service, not having a question to ask, and using other resources to answer their questions (*Table 4*).

Of the 174 consultations made during the first 9 months of the service, we were able to retrieve 101 (58%) of the corresponding medical records during the site visits. Of these, the advice given by the consultation service was implemented and documented in 72 (71%) cases. This percentage increased from 52% (11 of 21 records) in the first quarter of the service to 84% (36 of 43 records) in the second, and 81% (30 of 37 records) in the third quarter. In those cases that the recommendations were not completely followed as documented in the medical records, most discrepancies resulted from waiting for laboratory tests that were not available immediately at the facility. In

Table 3. Description of the Acceptability and Utility of *Uliza!* Clinician Hotline Based on User Surveys in Nyanza Province, Kenya

	QUARTER 1 $N=12$ (%)[a]	QUARTER 2 $N=18$ (%)[a]	QUARTER 3 $N=15$ (%)[a]
Service useful Service is helpful for quality of care given to patients:	12 (100)	17 (94)	15 (100)
• Strongly agree	9 (75)	15 (83)	13 (87)
• Agree	3 (25)	3 (17)	2 (13)
• Uncertain	0	0	0
• Disagree	0	0	0
• Strongly disagree	0	0	0
Service meets my consultation needs:			
• Strongly agree	7 (58)	10 (56)	8 (53)
• Agree	5 (42)	8 (44)	7 (47)
• Uncertain	0	0	0
• Disagree	0	0	0
• Strongly disagree	0	0	0
The calls I made helped me next time I encountered a similar situation:			
• Strongly agree	7 (58)	9 (50)	9 (60)
• Agree	5 (42)	9 (50)	5 (33)
• Uncertain	0	0	0
• Disagree	0	0	0
• Strongly disagree	0	0	0
Service convenient to use:			
• Strongly agree	6 (50)	11 (61)	9 (60)
• Agree	6 (50)	7 (39)	6 (40)
• Uncertain	0	0	0
• Disagree	0	0	0
• Strongly disagree	0	0	0
Service answers question in a timely manner:			
• Strongly agree	5 (42)	10 (56)	8 (53)
• Agree	5 (42)	7 (38)	7 (47)
• Uncertain	0	0	0
• Disagree	0	0	0
• Strongly disagree	0	0	0
Service gives reliable and accurate information:			
• Strongly agree	6 (50)	9 (50)	9 (60)
• Agree	6 (50)	9 (50)	6 (40)
• Disagree	0	0	0
• Uncertain	0	0	0
• Strongly disagree	0	0	0

continued

Table 3. Description of the Acceptability and Utility of *Uliza!* Clinician Hotline Based on User Surveys in Nyanza Province, Kenya *continued*

	QUARTER 1 $N=12$ (%)[a]	QUARTER 2 $N=18$ (%)[a]	QUARTER 3 $N=15$ (%)[a]
I need additional support to improve my clinical practice:			
• Strongly agree	6 (50)	8 (44)	8 (53)
• Agree	4 (33)	10 (56)	5 (33)
• Disagree	2 (17)	0	1 (7)
• Uncertain	0	0	0
• Strongly disagree	0	0	0
I was able to implement advice given	10 (83)	18 (100)	15 (100)
What limits your use of the service?[b]			
• Time taken to make call	1 (8)	2 (11)	1 (7)
• Time taken to get response	3 (25)	4 (22)	3 (20)
• No cell phone access	2 (17)	3 (17)	1 (7)
• Unsure of quality of information given	0	0	0
• Other	2 (17)	5 (28)	4 (27)
In which type of information has the service been most useful for?[b]			
• Antiretroviral (ARVs)	7 (58)	11 (61)	8 (53)
• Drug Interaction	4 (33)	10 (56)	5 (33)
• Tuberculosis management	2 (17)	4 (22)	2 (14)
• Opportunistic infections management	4 (33)	9 (50)	8 (53)
• Postexposure prophylaxis	0	2 (11)	0
• Prevention of mother to child transmission (PMCT)	0	2 (11)	1 (7)
• Staging	2 (17)	2 (11)	1 (7)
• Other	3 (25)	4 (22)	1 (7)
Other resources used by providers:[b]			
• Kenya national HIV care and treatment guidelines	10 (83)	15 (83)	12 (80)
• Other providers on site	12 (100)	12 (67)	5 (33)
• Text books	4 (33)	6 (33)	4 (27)
• Phone call to colleague	4 (33)	11 (61)	1 (7)
• Internet/e-mail	0	3 (17)	3 (20)
• other	0	0	0
Do you have access to Kenya national HIV care and treatment guidelines?	11 (92)	16 (89)	15 (100)
What else would improve your clinical expertise?[b]			
• Clinical mentoring	8 (67)	8 (44)	10 (67)
• More training	10 (83)	15 (83)	11(73)
• Review materials	5 (42)	9 (50)	6 (40)
• Access to national guidelines	2 (17)	0	0
• other	1 (8)	2 (11)	1 (7)

[a]Some participants did not respond to every question, but the denominators remained the same to calculate the percentages.

[b]More than one response may have been marked per patient encounter.

Table 4. Reasons for Not Using *Uliza!* Clinician Hotline Based on Nonuser Surveys in Nyanza Province, Kenya

REASON	MONTH 3 ($N=28$)	MONTH 6 ($N=15$)
Do not know of *Uliza!* Service	25%	40%
No question to ask	36%	47%
Used other resources	36%	0%
No phone	4%	7%
No mobile phone network	14%	0%

those situations, the patient was often referred to a higher-level facility.

Discussion

The purpose of this study was to evaluate the uptake, acceptability, and effectiveness of a new HIV cell phone-based consultation service. We found that most healthcare providers in HIV clinics use a HIV telephone consultation service when it is easily accessible. Although only approximately 54.5% of healthcare staff surveyed at 6 months had used the service, this may reflect the natural chain of consultation that takes place within a facility. Junior staff will ask on-site colleagues or senior staff for assistance first. If together they are still uncertain, then it is the senior-most staff who generally call *Uliza!* In fact, most consultation calls came from clinical officers at sites that had clinical officers and from nurses in facilities which did not have clinical officers as staff.

The majority of calls came from high-volume health facilities, which were the sites that have been offering HIV services for longer (so more patients and more long-term complications) and often run their HIV clinic throughout the week (compared with low-volume sites that often have HIV clinics for 1 or 2 days per week).

This study found that the advice given through the service was usually implemented. The service increased access to current information on HIV prevention, care, and treatment, thereby improving access to quality of care for patients in this resource-limited and remote setting. Although providers had been trained on use of the Kenyan National Guidelines and most had access to the guidelines on site, this did not always lead to their proper use. The consultants, by referring to the Kenyan National Guidelines, strengthened their use by pointing the callers to specific pages to find information regarding the specific call. The guidelines were primarily algorithmic and provided guidance on typical patient care scenarios; however, they could not be continuously updated or include complex or unusual clinical presentations. The consultants had Internet access, additional references, and telephone access to HIV specialists, so they could provide the most up-to-date information tailored to each individual case.

Our study also demonstrated that first-time callers were likely to call *Uliza!* again. This repeated calling may indicate behavior change among healthcare providers toward adopting a culture of asking questions whenever in doubt. Historically, most clinicians working in resource-limited settings have had infrequent access to consultation as a result of the busy patient load, limited access to on-site medical expertise, and a poor telecommunication infrastructure.[13,18]

Most users of the service found it reliable and convenient to use, in part because of the real-time response by consultants while the patient was still in the examination room. Nevertheless, occasional slow responses were a barrier to use of Uliza*!*. During the first year of the service, slow responses were the result of the consultants having simultaneous clinical responsibilities while they responded to calls. With this feedback, we believe that a call center could be established in which the consultants could be relieved of other clinical responsibilities and take turns responding to calls.

A limitation of our study is that, although we demonstrated that advice given was usually implemented, we could not be certain that the advice led directly to improved patient outcomes. The direct measurement of patient outcome and its causality would be difficult to prove. Nevertheless, we believe that the methods used, including audit of patient records, abstraction of data, and correlation with the consultation form, are reasonable proxies for improved medical care affected by the service.

We believe our findings underscore the potential utility of a HIV telephone consultation service provided to healthcare providers in resource-limited settings. Moreover, the service provided a means to mentor clinical staff, especially those without many alternatives for continuing medical and nursing education. The widespread availability of cellular phones makes them an ideal tool for connecting providers to real-time consultation.[11,19] With the current cost of a cell-phone call in Kenya, only $0.04, this service has become even more cost effective than when it was first initiated in 2006. Finally, as countries throughout sub-Saharan Africa decentralize HIV care and treatment to more remote locations, *Uliza!* and similar consultation hotlines will play an important role in increasing access to current treatment information and management advice for complicated patients. Further evaluation of scale-up of phone consultation services should include the impact on healthcare worker long-term knowledge, quality of care, and cost effectiveness.

Acknowledgments

We acknowledge the following who contributed to the successful implementation of *Uliza!* Consultation service including the U.S. Centers for Disease Control and Prevention, the Kenyan Ministry of Health, and the National AIDS and STI Control Program (NASCOP). Lastly, we would like to acknowledge the support from the Director, KEMRI, to carry out this work.

This study was supported by a grant from the Mulago Foundation. The Mulago Foundation was not involved in the study design, analysis of the data, or the decision to publish these findings.

These data were presented at PEPFAR Implementers meeting, 16th–19th June 2007, Kigali, Rwanda

Disclosure Statement

No competing financial interests exist.

REFERENCES

1. Wools-Kaloustian K, Kimaiyo S, Musick B, et al. The impact of the President's Emergency Plan for AIDS Relief on expansion of HIV care services for adult patients in western Kenya. AIDS **2009;**23:195–201.
2. National AIDS and STI Control Programme MoH, Kenya: Kenya AIDS Indicator Survey 2007: Preliminary Report. Nairobi, Kenya. **2008**.
3. Kenya Economic Report 2009. Kenya Institute for Public Policy Research and Analysis. Available at www.kippra.org/KER%202009.pdf (last accessed November 2, 2010).
4. Barnighausen T, Bloom DE. "Conditional scholarships" for HIV/AIDS health workers: Educating and retaining the workforce to provide antiretroviral treatment in sub-Saharan Africa. Soc Sci Med **2009;**68:544–551.
5. Kirigia JM, Gbary AR, Muthuri LK, Nyoni J, Seddoh A. The cost of health professionals' brain drain in Kenya. BMC Health Serv Res **2006;**6:89.
6. Patient Ration in Africa, **2006.** Available at www.africapedia.com/wiki/index.php?page=Doctor (last accessed November 3, 2010).
7. Poor Kenyans often given wrong drugs, **2010**. Available at www.nation.co.ke/News/Poor%20Kenyans%20often%20given%20wrong%20drugs%20%20/-/1056/1014886/-/9h3r9u/-/index.html (last accessed November 3, 2010).
8. Barnighausen T, Bloom DE, Humair S. Human resources for treating HIV/AIDS: Needs, capacities, and gaps. AIDS Patient Care STDS **2007;**21:799–812.
9. Cohen J, Kimaiyo S, Nyandiko W, et al. Addressing the educational void during the antiretroviral therapy rollout. AIDS **2004;**18:2105–2106.
10. Wools-Kaloustian KK, Sidle JE, Selke HM, et al. A model for extending antiretroviral care beyond the rural health center. J Int AIDS Soc **2009;**12:22.
11. African Continent Fastest Mobile Growth Market. Cellular-News, **2009**. Available at http://www.cellular-news.com/story/15908.php (last accessed November 3, 2010).
12. Lester RT, Gelmon L, Plummer FA. Cell phones: Tightening the communication gap in resource-limited antiretroviral programmes? AIDS **2006;**20:2242–2244.
13. Clevenbergh P, Van der Borght SF, van Cranenburgh K, et al. Database-supported teleconferencing: An additional clinical mentoring tool to assist a multinational company HIV/AIDS treatment program in Africa. HIV Clin Trials **2006;**7:255–262.
14. Kiviat AD, Geary MC, Sunpath H, et al. HIV Online Provider Education (HOPE): the Internet as a tool for training in HIV medicine. J Infect Dis **2007;**196(Suppl 3):S512–S515.
15. Urquhart C, Turner J, Durbin J, Ryan J. Changes in information behavior in clinical teams after introduction of a clinical librarian service. J Med Libr Assoc **2007;**95:14–22.
16. Goldschmidt RH, Graves DW. The National HIV Telephone Consultation Service (Warmline): a clinical resource for physicians caring for African-Americans. J Natl Med Assoc **2003;**95(2 Suppl 2):8S–11S.
17. AIDS Treatment Information Centre (ATIC)–Uganda. **2009**. Available at http://idi.mak.ac.ug/?m=menu&i=170 (last accessed November 2, 2010).
18. Zolfo M, Arnould L, Huyst V, Lynen L. Telemedicine for HIV/AIDS care in low resource settings. Stud Health Technol Inform **2005;**114:18–22.
19. McGowan J, Hogg W, Campbell C, Rowan M. Just-in-time information improved decision-making in primary care: A randomized controlled trial. PLoS One **2008;**3:e3785.

Address correspondence to:
Craig R. Cohen, M.D., M.P.H.
Department of Obstetrics, Gynecology, and Reproductive Sciences
University of California San Francisco
50 Beale St., Suite 1200
San Francisco, CA 94105

E-mail: ccohen@globalhealth.ucsf.edu

Received: December 15, 2010
Revised: January 23, 2011
Accepted: January 25, 2011