Author's response to reviews

Title: An e-health driven laboratory information system to support HIV treatment in Peru: E-quity for laboratory personnel, health providers and people living with HIV/AIDS

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Author's response to reviews: see over
We would like to begin by thanking Dr. Talbot for her assistance and the two referees for their comments regarding this manuscript. They have motivated us to review all aspects of the paper, as detailed in this Memo. We greatly appreciate your time and energies, as well as the opportunity to re-submit this manuscript.

REFEREE 1:

This is an excellent paper. I had difficulty in finding any significant issues with its presentation. In reference to web-based systems in developing nations the authors do not refer to the OpenMRS development from Kenya which represents one of the largest web-based HIV/AIDS electronic management systems available. This does not distract from the value of this submission. The Fraser reference from 2004 probably pre-dates his work in OpenMRS. This project needs to be complimented for its successful integration from laboratories to patient and other health care and administrative sources.

Thank you very much for your compliments and your suggestion. We have expanded the discussion to include the model example of Kenya suggested and a recent review of 15 electronic medical record systems for antiretroviral therapy worldwide.

REFEREE 2:

This is an interesting paper and it is important to the scientific community to learn of the developments which have taken place in Peru. However, the paper should be more focused - it currently is a mixture of the the development of NETLAB and a description of the software. I would recommend the authors to focus their paper more on the development of the network rather than providing screen-shots of the software.

Thank you very much for your comments and suggestions.

Questions like:
1) what was the impetus of the development of the network in the first place. It is not HIV specific so was the original plan to provide broad-based laborarory results, whihc incorporated HIV, or did they start with HIV and expanded across other disease groups? Which other disease groups are covered?
NETLAB was developed to respond to the newly created demand to carry out periodic testing to monitor the effectiveness of the greatly expanded HAART program in Peru. Since no laboratory information system existed, and since HIV was the most pressing monitoring need, the NETLAB system focused on HIV (CD4 counts and viral loads) first. Then, NETLAB expanded to include a total of 100 diseases of public health importance, such as dengue, malaria, tuberculosis, yellow fever, measles, German measles, Bartonellosis and Chagas disease.

We have made changes in the document to better reflect this information.

The third paragraph of the Background, on page 3, now reads: The HAART program continued widespread implementation during 2005 and 2006. The Peruvian National Institute of Health (INS), which is the Head of the National Network of Public Health Laboratories, was named by the Ministry of Health (MOH) as the institution responsible for carrying out periodic testing to monitor the effectiveness of HAART, consisting of CD4 counts and viral loads. An essential complement to the provision of laboratory testing is a laboratory information system to track each step in the testing process, from the administration of tests to the receipt of test results, thus catalyzing timely decision-making and action around diagnosis, treatment and care. However, at the time that the INS was made responsible for testing, a national public health laboratory information system did not exist in Peru, making the rapid expansion in the quantity and geographic diversity of HAART program clients a sizeable challenge for the INS. Therefore, NETLAB was created with the political support of both the INS and MOH.

The second paragraph of the Method, on page 4, now reads: This paper focuses on the module related to HIV testing, which was developed and piloted as the first component of NETLAB to respond to the new, sizeable demand for monitoring the HAART program. Following the pilot experience with HIV, the NETLAB system expanded to include 100 diseases of public health importance for which the INS and the network of public health laboratories provide testing and results. This includes dengue, malaria, tuberculosis, yellow fever, measles, German measles, Bartonellosis and Chagas disease.

2) What were some of the political and logistical issues involved with the development of the network? Which were the main problems and how were they overcome.

We think that this is an important question. However, we think that a lengthy discussion falls outside the scope of this paper.

In order to develop such broad-reaching systems, it is always necessary to have political support. In this case, this support existed both at the level of the Instituto Nacional de Salud (at that time led by Dr. Patricia García) and at the Ministry of Health.

We have therefore slightly modified the text in the third paragraph of the Therefore, NETLAB was created with the political support of both the INS and
3) What is current status of the network. How many facilities and what type of facilities are currently linked? Future expansion plans?
NETLAB continues functioning. The 24 regional laboratories are connected, as well as the main hospitals in each of the regions. The future goal is to expand to smaller health centers and health posts and to have more users from the different user groups.

We have added this information to the last paragraph of the manuscript, on page 14:

*Initial sustainability is apparent in the current state of NETLAB: the 24 regional laboratories and the main regional hospitals are all connected to the system. The future goal is to expand to smaller health centers and health posts and to have more users from the different user groups.*

4) I see no reference what so ever about existence of local guidelines on protecting the confidentiality & security of HIV and other health information. Do they exist in Peru and if so are they implemented. If they don't exist is someone developing them? Authors may want to consult the recent UNAIDS/PEPFAR guidelines on this [http://data.unaids.org/pub/manual/2007/confidentiality_security_interim_guideline_15may2007](http://data.unaids.org/pub/manual/2007/confidentiality_security_interim_guideline_15may2007)

Thank you for this important suggestion. We have now added in information about Peruvian laws on the confidentiality of health and HIV-related information.

The final paragraph of the Design of the NETLAB laboratory information system sub-section within Methods, on page 5, now reads:

*Since the NETLAB system targeted different user groups who accessed the system from different locations, assuring confidentiality was a key focus. NETLAB complies with the Peruvian General Health Law, Article 120, which states that health information generated by public entities that could affect personal or family privacy or personal image is not subject to the Law that makes such information part of the public domain. The system also respects Law 26626, which specifies that HIV results are confidential. NETLAB complies with this legislation by encrypting users’ usernames and passwords in the system database and by including a digital certificate of the authenticity and integrity of the information transferred. Peruvian law specifies that digital certificates have the same legal validity as hand-written signatures.*

The format of the paper does not really lends itself to the background/methods/results/discussion format. Suggest use different headings.

We respectfully disagree with this suggestion.

**Specific points:**

Abstract: what is meant by: "received the mandate to carry out testing to monitor the effectiveness of HAART"
We have now modified this to make the point clearer.

The text is modified in both the Abstract and the Background and reads: 
*Access to highly active antiretroviral therapy (HAART) expanded between 2004-2006 and the Peruvian National Institute of Health was named by the Ministry of Health as the institution responsible for carrying out testing to monitor the effectiveness of HAART.*

The needs assessment is not of the ‘public health laboratory system’ but of the people who work in the laboratories and provide and use health services.

In the opinion of the authors, the public health laboratory system *is* made up of the people who work in laboratories and those who provide and use health services. Therefore, a needs assessment of the system consists of assessing the processes that involve these three types of system users. That is the type of assessment that was used to generate NETLAB, as described in the first paragraph of the Methods, on page 4.

Background: p3 - 0.5 percent [0.3%–0.6%]- what is between the []? 95%CIs or IQR?

This data is taken from the UNAIDS 2008 estimates. The percentages between the brackets refer to a range since estimates are not exact. We have now clarified this in the text:

*While overall adult HIV prevalence was estimated at 0.5 percent [ranging from 0.3%–0.6%]*

Stop using 'HIV/AIDS' - now referred to 'HIV' unless one specifically also wants to refer to AIDS. Also when referring to people living with HIV, abbreviation used is now PLHIV.

The authors think that it is best to follow the UNAIDS terminology guidelines. We thank the referee for advising us about the term PLHIV, which is in the guidelines and which we have now integrated throughout the document. We will, however, continue to use HIV/AIDS, which is also recognized as an appropriate term in the latest guidelines. We think that this is the more appropriate term for this document since monitoring of people with HIV to determine whether they should start HAART and monitoring of people who are already taking HAART includes people with HIV and AIDS, respectively. The link to the guidelines follows:


What is meant with: “to carry out periodic testing to monitor the effectiveness of HAART” - who is being tested for what?

We have further clarified this in the text, as seen in the third paragraph of the Background, on page 3:

*periodic testing to monitor the effectiveness of HAART, consisting of CD4 counts and viral loads*

Also, we would refer readers to the Achievements of the NETLAB system sub-section within the Results, on page 8, where further information is
provided:
In Peru, CD4 counts are monitored at baseline in recently-diagnosed patients and then periodically, at least once per year, both for PLHIV who are currently taking HAART and for those who do not yet take HAART

Methods:
p5 - What was the function of the surveys and how were informants selected and surveyed?
The function of the surveys was to evaluate the functioning and reach of NETLAB. This evaluation was applied with PLHIV and providers who were involved in the HAART program, but not necessarily in NETLAB (potential NETLAB users). This results in more useful information than an evaluation with only NETLAB users, which would not have allowed us to determine NETLAB's actual reach.

We have now put in more detailed information about how informants were selected and surveyed. The text in the Evaluation of the NETLAB system subsection within Methods, on pages 5-6, now reads:
Two evaluations of the system were carried out during the first year and a half of NETLAB’s operation. The first evaluation applied quantitative surveys in a one-on-one interview format with health providers who administer HAART, laboratory personnel and PLHIV in Lima/Callao and 22 of the 23 other regions of Peru five to six months following the initial implementation of NETLAB [7]. The second evaluation included a quantitative survey applied as an interview with the same populations and two focus groups with PLHIV in Lima/Callao and in 4 other regions (Arequipa, Ica, Lambayeque and Loreto) and was carried out 14 to 15 months post initial implementation of the system. The evaluations included all laboratory personnel, physicians, nurses and midwives from the HAART teams at each health establishment who were present at the establishment on the day of survey application. They also included all PLHIV who were on HAART or had at least 2 CD4 counts and viral loads and who were present during survey application at the respective sites. In the case of a high flow of PLHIV at a given establishment on the day of the visit, every third PLHIV was invited to participate. All PLHIV gave their verbal consent to participate in the evaluation.

Results:
p7 - how is access to the site and data regulated? See comments above on confidentiality and security of HIV information.
As noted in the response to Question 4, above, we have now included further information about confidentiality and security, in the first paragraph on page 5.

p8 Details of the screen too detailed for a more general paper.
We respectfully disagree with this suggestion. We think that the educational component of NETLAB is very important and unique and that description of its content is useful.

p11 Authors should familiarize themself with some of the work being done in Africa, through the development of Open MRS and other related projects in the same area of work.
We had focused our literature review solely on HIV-related information systems in Latin America since that is the topic of this article. We have expanded the discussion to include the model example of Kenya suggested by Referee 1 and a recent review of 15 electronic medical record systems for antiretroviral therapy worldwide.

Conculsion

p13: link on the page did not lead to a web-site.
We have followed the link indicated from different computers and it leads to a website.

Figures 2-5 should be dropped.
We respectfully disagree with this suggestion. We think that it is important for the reader to see the different components of NETLAB and how user-friendly it is, particularly considering that making the system user-friendly was one of the key goals.