

PROJECT REPORT

Findings and lessons learned from a multi-partner collaboration to increase cervical cancer prevention efforts in Bolivia

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ABSTRACT

Cervical cancer is a leading cause of cancer death among women in Bolivia, where cytology based screening has not performed well due to health-systems constraints. In response, the Centers for Disease Control and Prevention and the Pan American Health Organization partnered with the Bolivian Ministry of Health and the Peruvian Cancer Institute (INEN) to build capacity in Bolivia for the use of visual inspection of the cervix with acetic acid (VIA) and cryotherapy. Four 5-day courses on basic clinical skills to perform these procedures, provide related counseling, and manage side effects and infections were conducted from September 2010 to December 2012 for 61 Bolivian nurses and physicians. Of these courses, two were conducted by Bolivian trainers that were certified through a Training-of-Trainers course taught by the INEN. Classroom didactic sessions included lectures and practice with



anatomic models followed by clinical practice sessions to provide trainees with practical experience in VIA and cryotherapy. Pre- and post-training evaluations were administered to ascertain knowledge gained. Evaluation of competency was conducted during simulation exercises in the classroom and during supervised performances of procedures in clinical settings. This report summarizes findings and lessons learned that will be useful for planning the supervision and monitoring phase of this project as well as for future partnerships in the Latin American and the Caribbean region.

Key words: capacity building, cervical cancer, cryotherapy, global health, Latin America, visual inspection with acetic acid, women's health.

Introduction

Cervical cancer is the second leading cause of cancer death in Latin America and the Caribbean (LAC), yet prevention and control efforts have been largely unsuccessful¹. A growing body of evidence suggests that a single-visit screen-and-treat approach using visual inspection with acetic acid (VIA) and cryotherapy can be more effective and may be a more suitable option for resource-constrained settings than cytology-based strategies²⁻⁴. VIA has sensitivity equal to or higher than that of cytology⁵, and its results are immediately available, allowing for treatment of precancerous lesions with cryotherapy on the same visit. Even if referral to another facility is needed for women to receive cryotherapy, VIA increases women's chances of being treated by eliminating the need for an additional appointment to receive screening results. Finally, VIA and cryotherapy are inexpensive and can be performed by non-physicians^{4,6}.

The Pan American Health Organization (PAHO) Regional Strategy for Comprehensive Cervical Cancer Prevention and Control developed for the period 2008–2015 incorporates these alternative technologies as part of the overall goal of strengthening health services from primary and secondary prevention to treatment and palliative care⁷. In the context of a broader collaboration between PAHO and the Centers for Disease Control and Prevention (CDC), representatives from these organizations met with Ministry of Health (MOH) cancer staff from Bolivia, Barbados, Guatemala, and Trinidad & Tobago in Atlanta on April 2009 to learn about these

countries' programmatic needs. Bolivia was the first country that CDC supported in its collaboration with PAHO. Cervical cancer incidence and mortality rates in Bolivia are among the highest in the LAC region (36.4/100 000 and 16.7/100 000, respectively)¹. Bolivia has the commitment to address its high burden of cervical cancer and has a well-developed plan for cervical cancer prevention and control⁸. The plan incorporates VIA and cryotherapy and defines cytology as the primary screening strategy.

In September 2009, staff from the local PAHO office and several divisions within CDC conducted a site visit to Bolivia to assess needs for screening and precancer treatment services, education strategies, laboratories, information and monitoring systems, cancer registries, and potential for human papillomavirus (HPV) vaccine introduction. The needs assessment was conducted through informal interviews with public health officials, hospital directors, and community-based organizations. Key areas for potential collaboration with the MOH were identified:

- increased capacity to conduct colposcopy and loop electrosurgical excision procedure (LEEP), especially in areas where cytology-based screening is well-established and functioning well
- increased capacity to conduct VIA and cryotherapy, with a focus on areas where access to cytology-based services is low
- increased public awareness and community education



- technical assistance for the creation of a population-based cancer registry
- assistance with HPV vaccine introduction.

Because VIA and cryotherapy are particularly suited to constrained-resource settings, CDC, PAHO, and the Bolivian MOH decided to focus on capacity building for the use of these technologies. Some technical assistance to provide colposcopy and LEEP, which are still needed for lesions that are not suitable for cryotherapy, was also provided⁹. This report describes the activities undertaken to increase cervical cancer prevention efforts in Bolivia, with a focus on VIA and cryotherapy and lessons learned from such activities. Workshops conducted to increase capacity for community education and the use of colposcopy and LEEP are also briefly discussed.

VIA and cryotherapy

In an effort to promote south-to-south collaboration within the region, CDC and PAHO partnered with a regional training excellence center on VIA and cryotherapy that has been operating within the Peruvian National Cancer Institute (INEN) since 2005¹⁰. The center was established by PATH, Jhpiego, and the INEN and provides a comprehensive approach for the introduction of VIA and cryotherapy in LAC¹¹. The materials and framework utilized for capacity-building activities in Bolivia have been tested, evaluated, and validated over time through the joint work of Jhpiego, PAHO, and other organizations that have been part of the Alliance for Cervical Cancer Prevention¹².

Methodology utilized for training

The workshops utilized a teaching format that was competency-based: participants' performance was emphasized; the trainer acted as a facilitator and mentor rather than an instructor; and the participants' overall evaluation was based not only on knowledge acquisition, but also on the skills and abilities developed during both classroom simulation exercises and practice in clinical settings. The workshops also incorporated adult and

observational learning techniques. Lastly, anatomical models, audiovisual aids, and practice in clinical settings were used to allow trainees to gain a basic level of skill to make proper therapeutic decisions and perform procedures.

Capacity-building strategy

Peruvian trainers outlined a series of steps for capacity building: (1) the training of providers through a 5-day basic course on clinical skills to perform procedures and provide counseling, (2) the selection of no more than 10 providers to participate in a 4-day Training-of-Trainers (TOT) course, (3) the replication of basic courses by Bolivian trainers who achieved the highest level of skill and competency in the TOT course, and (4) the identification of 'master instructors' who would be in charge of providing guidance for scaling up and ensuring sustainability. Based on this framework, a basic course on VIA and cryotherapy was piloted for a small group of Bolivian physicians recruited by the MOH. This initial workshop was conducted in Peru to expose participants to the changes introduced within the Peruvian healthcare system to successfully adopt VIA and cryotherapy. Based on the expressed commitment of this prominent group of Bolivian trainees, a second basic course was conducted in La Paz, the capital city of Bolivia, targeting a separate group of providers. The participants who demonstrated the highest level of skill and knowledge in either workshop were selected for a TOT course. All participants recruited for the workshops were actively involved in the provision of reproductive health services for women in health posts, health centers, or hospitals.

Evaluation by content area: knowledge acquisition and competency

Knowledge acquisition was evaluated at pre-test and post-test in both the basic and TOT workshops. Evaluated core content areas varied by workshop. The basic course focused on influencing attitudes on the benefits and appropriate use of VIA and cryotherapy, counseling women prior to and after the procedures, developing competence to perform VIA and cryotherapy, managing side effects and preventing infections.



The TOT curriculum content areas included planning and implementing basic courses for VIA and cryotherapy that emphasize a competent, dynamic, and interactive approach to the learning process; providing engaging oral presentations; proper use of standardized survey tools to evaluate providers' competency; and tutoring participants prior to and during the provision of services in clinical settings.

The purpose of the pre-test was to establish a knowledge baseline and assess group strengths and weaknesses by content area. In line with the competency-based approach, a post-test was administered midway through each of the courses to assess gained knowledge and to match trainees who did not achieve a satisfactory score on a specific content area with a trainer that would provide individualized support and mentoring.

Competency of basic workshop trainees was evaluated in classroom activities and clinical settings using standardized step-by-step lists (Appendixes A–C). In the classroom, trainees performed pelvic exams with anatomical models, identified cervical pathology using visual aids, performed cryotherapy on inanimate objects, and provided patient counseling during role-playing exercises. After these skills were acquired, trainees counseled and performed procedures on pre-selected women under supervision.

A two-phase evaluation of participants' competency was used for the TOT course: (1) level of skill demonstrated in simulation exercises and oral presentations during the duration of the TOT workshop and (2) ability to properly plan and implement a basic course on VIA and cryotherapy with the tools and guidance provided by the Peruvian experts. TOT participants were divided into three groups based on their performance in planning and implementing the basic course: group A included participants who demonstrated the highest level of skill to independently plan and implement a basic course, group B included those who were prepared to replicate basic courses only under supervision, group C included participants who still needed more training and practice in classroom activities to become instructors. The INEN designed and administered all

evaluation materials. CDC received technical reports with de-identified data.

Outcomes

A total of 61 Bolivian health professionals were trained to perform VIA and cryotherapy and provide related counseling through the implementation of four basic courses (Table 1). Of these, one course was implemented by TOT Bolivian participants under the guidance of Peruvian trainers and another was implemented without supervision in the province of Beni by two Bolivian trainers who demonstrated the highest level of skill during the TOT course.

Most participants that attended basic courses received a satisfactory score at post-test (Table 1). For the two basic courses taught in La Paz, which included providers from selected provinces, the greatest improvements at post-test were in the areas of performing VIA and preventing infections (Table 2). In contrast, participants from the basic course implemented in Beni, which only included health professionals from this province, showed the most improvement in performing cryotherapy, and knowledge related to physiopathology, cancer risk factors, and HPV. Overall, familiarity with content areas was significantly lower among participants who attended the course in Beni, which included six family/general practitioners (FP/GPs) and six nurses, compared to those who attended the courses taught in La Paz which included mostly obstetricians and gynecologists. For the TOT workshop, content areas where participants were the least familiar at baseline included creating a positive learning environment (64%), implementing the clinical component of the course (65%), and using standardized tools to evaluate competency (67%) (Table 3). At post-test, however, these were some of the areas where participants showed the most improvement.

Participants from all courses provided feedback. When asked about ways to improve the basic workshop, many mentioned the need for more practice performing VIA in clinical settings. This, however, was not a problem reported in the workshop conducted in Beni, where recruitment efforts of eligible women were the



most successful. Given the difficulty recruiting a high number of women who met criteria for cryotherapy, it was challenging to ensure that all trainees received proper practice to perform this procedure in a clinical setting. When asked about the hardest aspect of the basic workshop, many cited using the cryotherapy equipment properly and identifying acetowhite lesions while performing VIA.

Most of the feedback received from participants who attended the TOT course related to the planning and implementation of the basic workshop. Many stated that it was difficult to work with other trainers to plan and implement the basic workshop and that they had the most difficulty teaching trainees how to provide individual and group counseling. This finding is not surprising given that counseling is rarely emphasized during medical training; however, it highlights the need to pay special attention to the counseling component of TOT workshops to ensure that future trainers are well equipped to teach their colleagues how to properly provide this service to women. Participants' beliefs regarding the role, effectiveness, and acceptability of VIA and cryotherapy in Bolivia have been published elsewhere¹³.

Colposcopy and LEEP

CDC and PAHO partnered with the American Society for Colposcopy and Cervical Pathology (ASCCP) to support the MOH capacity-building efforts for colposcopy and LEEP. Four physicians with expertise in colposcopy and medical education from ASCCP's Committee on International Education and Humanitarian Outreach were sent to La Paz to train Bolivian physicians to perform these procedures¹⁴.

The teaching format included lectures, case reviews, interactive case presentations, and simulations. The curricula included discussion of the strengths and limitations of cytology-based screening, a review of the cytology and histology of the normal and abnormal cervix, and detailed instruction in colposcopic technique. Emphasis was placed on recognition of the colposcopic appearance of the normal and abnormal cervix as well as on management protocols for

women with abnormal cytology and biopsy results. In simulations, participants practiced focusing the colposcope to conduct biopsies on inanimate objects¹⁵. LEEP was performed on chicken breasts through open-ended Styrofoam cups that simulated the cervix and vagina.

This structured training was followed by 2 days of mentored colposcopy examinations on preselected patients with abnormal cytology findings. The 2-day clinic experience at the Hospital de la Mujer in La Paz gave both trainers and learners the opportunity to work side-by-side caring for patients. Three exam rooms were set up for supervised patient exams. Each patient was examined by the ASCCP faculty mentor with two or three course participants. At each exam, technique was discussed, as were colposcopic findings and implications for management.

A total of 18 participants were trained in colposcopy and LEEP, 17 of whom indicated having performed cytology in the past and 10 of whom indicated having some prior colposcopy education. At the conclusion of the training, 94% indicated that they felt competent to perform and teach colposcopy. A total of 37 women received colposcopy examinations over 2 days. Most were biopsied, several underwent LEEP, and full spectrums of diseases were diagnosed, including cervical intraepithelial neoplasia 1, 2, and 3, as well as micro-invasive and invasive cancer. The clinic's physicians and staff arranged subsequent follow-up with the patients and management of disease identified in the clinical sessions.

Community education

Community health workers can play a pivotal role in increasing the demand for screening services and reducing cervical cancer disparities. To increase health promotion efforts a partnership with the Bolivian Cancer Foundation was formed to train lay health workers as *promotoras de salud* for cervical cancer prevention. The goal was to generate capacity among volunteers working in the Bolivian Cancer Foundation so that those who achieved the highest level of competency could replicate workshops in their communities.



Table 1: Participants in and outcomes of VIA and cryotherapy workshops

Type of workshop	Basic (n=7)	Basic (n=21)	Training-of-Trainers (n=12)	Basic (n=21)	Basic (n=12)
Date	Sept. 2010	Feb. 2011	Sept. 2011	Feb. 2012	Aug. 2012
Duration (days)	5	5	4	5	5
Location	Peru	La Paz, Bolivia	La Paz, Bolivia	La Paz, Bolivia	Beni, Bolivia
No. physicians trained	7	14	12	21	6
No. non-physicians trained	0	7	0	0	6
No. males	3	7	8	11	6
No. females	4	14	4	10	6
Department of origin					
La Paz	2	6	4	6	0
Pando	2	3	1	0	0
Oruro	0	3	1	2	0
Santa Cruz	0	0	1	3	0
Beni	1	0	1	2	12
Tarija	0	0	1	2	0
Chuquisaca	2	0	1	2	0
Cochabamba	0	0	0	2	0
Sucre	0	6	1	0	0
Potosí	0	3	1	2	0
Specialty (for physicians only)					
Obstetrics, gynecology	4	8	9	17	1
Family physician/GP	3	5	1	4	11
Other	0	1	2	0	0
No. participants that passed	6	19	10	21	12
No. that performed procedure prior to training [†]					
VIA	1	7	3	12	0
Cryotherapy	1	3	0	1	0

[†] Includes those with and without formal training. GP, general practitioner. VIA, visual inspection of the cervix with acetic acid

Table 2: Mean pre-test and post-test scores on knowledge items evaluated during basic courses on VIA and cryotherapy, La Paz, Bolivia, 2010–2012 (N=61)

Knowledge item	Sept. 2010		Feb. 2011		Feb. 2012*		Aug. 2012 [†]	
	Pre-test	Post-test (%)	Pre-test (%)	Post-test (%)	Pre-test (%)	Post-test (%)	Pre-test (%)	Post-test (%)
Physiopathology, risk factors, and HPV	–	86	83	80	75	99	44	100
Counseling related to VIA and cryotherapy	–	70	58	57	19	85	50	86
Screening with VIA	–	91	53	82	60	99	54	91
Treatment with cryotherapy	–	89	70	91	81	96	33	93
Prevention of infections	–	93	56	98	64	100	54	100

Note: Participants' group pre-test scores for the first pilot project were not available. Only individual scores were reported. [†] Course implemented by Bolivian trainers. HPV, human papillomavirus. VIA, visual inspection of the cervix with acetic acid.



Table 3: Mean pre-test and post-test scores on knowledge items evaluated during the Training-of-Trainers course, La Paz, Bolivia, 2011 (N=12)

Knowledge item	Pre-test (%)	Post-test (%)
Components of a competency-based teaching format	69	88
Steps to planning a basic course	71	92
Create a positive environment in the classroom	64	96
Effective use of visual aids to evaluate clinical skills	79	94
Provide interactive and engaging oral presentations	71	96
Proper use of standardized survey tools to evaluate providers' competency	67	89
Teaching clinical skills	71	92
Implementation of the clinical component of a basic course	65	89
Requirements for the implementation of a successful basic course	83	72

Volunteers were exposed to two frameworks for community education: the *Con Amor Aprendemos!* program ('With Love We Learn'), which was developed by the Spirit Foundation in partnership with the American Cancer Society¹⁶, and a health education module developed by the Peruvian training excellence center. The curricula for both programs were developed to incorporate sociocultural values, language and literacy level issues, and communication styles specific to the Latina/Latino population. The *Con Amor Aprendemos* program prepares lay health workers to raise awareness about cervical cancer among both women and their male partners and has an important sexually transmitted infections component. The training excellence center health education course focuses specifically on training *promotoras* to provide education in their communities on VIA and cryotherapy to increase uptake of these procedures. The combination of these two complementary approaches provided the Bolivian Cancer Foundation with a wide range of tools and materials to plan and implement workshops that can be tailored to participants' needs. To date, the CDC-PAHO collaboration has supported the training of 33 *promotoras* affiliated with nine regional offices of the Bolivian Cancer Foundation. Plans to replicate courses are under way. More information is available at <http://www.fubolcancer.com>.

Discussion

The tools and evidence for the effectiveness and advantages of implementing VIA and cryotherapy in Bolivia and other LAC

countries are available, but efforts are still needed to increase the visibility of these technologies and allow for their implementation through a systematic approach that ensures sustainability. With the goal of beginning a discussion to promote sustainability in the long term, PAHO convened a regional meeting in June 2011 with program managers from the MOH of 11 countries in LAC that have introduced VIA and cryotherapy, including Bolivia¹⁷. This meeting allowed program managers to share their experiences and discuss strategies to implement quality assurance mechanisms to monitor and evaluate the delivery of these services.

The experiences working in Bolivia demonstrate that capacity-building efforts for cervical cancer prevention in countries of the LAC region with the most limited infrastructure and resources are challenging but feasible. International organizations are in a strategic position to stimulate south-to-south collaborations within countries in the region. These collaborations are not only an excellent mechanism to leverage existing resources in LAC but also to increase capacity in a culturally sensitive manner, transfer knowledge and skills more successfully, increase feasibility of proposed activities, and encourage long-lasting partnerships that can contribute to the fulfillment of the millennium development goals¹⁸. The work of this multi-partner collaboration has provided valuable lessons that will be useful for the planning of the supervision and monitoring phase of this project as well as for future partnerships in the LAC region.



1. Historical allegiance to cytology-based screening is an obstacle to VIA implementation and scale-up in LAC. Coordinated action through a multi-sector platform with all stakeholders may be needed to shift attitudes concerning cervical cancer screening in the region. LAC poses unique challenges for the introduction of VIA and cryotherapy because most countries in the region have adopted a cytology-based strategy that has been in place for several decades. Increasingly, however, international organizations are discouraging low- and middle-income countries from adopting a cytology-based model given its quality assurance requirements and the workup needed for women to receive treatment^{19,20}. Alternative technologies like VIA and cryotherapy may have an impact in Bolivia and other LAC countries if they are promoted through coordinated action and their acceptability is high, especially among physicians. Efforts are also needed to ensure that nurses receive training on VIA and cryotherapy, as these health professionals play a key role in increasing access among hard-to-reach populations. Recruiting nurses for this project was challenging due, in part, to a certain resistance within the MOH and the medical community. Historically, nurses in Bolivia and other countries in LAC have not played an active role in making therapeutic decisions or performing procedures²¹; however, the successful adoption and scale-up of alternative technologies for cervical cancer screening requires a shift in non-physicians' roles and responsibilities, especially in countries that need these technologies the most.

2. Countries' promotion of new technologies beyond their endorsement may play a key role in increasing acceptability of alternative technologies among physicians and allied health professionals. Bolivia's plan for cervical cancer prevention and control proposes ensuring that all facilities have the needed equipment and supplies to perform both cytology and VIA⁸. During the workshops, trainees often cited national norms prioritizing cytology as one of the reasons for their reluctance to perform VIA in their clinical practice. Confusion regarding the role and scope of introduction of these technologies was also common. Clear guidelines in countries' national norms about the role that alternative strategies may play if cytology remains the main

screening strategy not only increase their acceptability but also facilitate their proper use. The World Health Organization is in the process of updating its guidelines for comprehensive cervical cancer control²². These guidelines may increase the visibility of VIA and cryotherapy in the region and clarify issues related to their proper use¹¹.

3. VIA 'champions' among respected physicians may be an important step toward ensuring sustainability. Frequent changes in leadership within the MOH were a common challenge for the implementation of capacity-building activities. At different points in time, leadership at the MOH expressed different visions for this project. Some emphasized a broader scope and urgency to scale up and provide training for health professionals nationwide rather than focusing on a defined geographic location and group of trainees. Difficulty in limiting activities to a particular geographic area was also the experience of Colombia when VIA and cryotherapy were initially introduced²³. Experiences of the authors and those of Colombia highlight the need to emphasize the importance of phasing projects gradually in a specific area as prerequisites to scaling up and having the wider impact that countries want and need.

The Bolivian trainers identified as 'champions' for VIA and cryotherapy provided continuity to this project during changes in leadership at the MOH. The work and commitment of these trainers allowed a focus on a specific population and defined geographic area within the province of Beni, which included the cities of Trinidad and Rivalta. Other countries that have implemented VIA, such as Zambia, provide examples of the key role that champions play to ensure successful demonstration projects in a context of political instability²⁴.

4. 'Screen-and-treat approach' terminology may lead to confusion. Lack of capacity and resources to purchase cryotherapy equipment for primary care clinics may limit the ability of health centers and posts to perform VIA and cryotherapy during the same visit. For countries that have successfully adopted these technologies referral linkages from primary to secondary level healthcare facilities have been



used within a specific geographic area for women who meet the criteria for treatment with cryotherapy^{11,25}. Decisions on referral or a single-visit approach as the best strategy for a given area should be decided prior to the implementation of activities, to avoid confusion among stakeholders. Since many health professionals believe that VIA should only be considered as an alternative strategy if treatment with cryotherapy is provided on the same visit, emphasizing that referral to cryotherapy may be a more effective approach than adopting a cytology-based model is of equal importance. If a referral model is adopted, the optimal location of cryotherapy equipment within specific geographic areas as well as ensuring that women can access services for treatment of precancerous lesions may be important. Lastly, it should be highlighted that quality assurance mechanisms are a key requirement for VIA and cryotherapy to have an impact on cervical cancer control.

Next steps

For the third year of this project, which began on January 2013, the focus will be on supervision and follow-up in Beni. This province is working on a proposal document to conduct supervision of VIA related activities. The plan aims to achieve 60% screening coverage among a population of 21 338 women aged 30–50 years from the cities of Riveralta and Trinidad in a 3-year period. In line with the World Health Organization global monitoring framework²⁶, the Bolivian MOH has recently approved the inclusion of VIA-related performance indicators in its surveillance system: (1) number of women screened with VIA, (2) number of women with positive VIA results, and (3) number of women with positive VIA results that received cryotherapy. At the same time, the national health authorities are improving the overall organization and quality of the national cytology-based cervical cancer program, with the technical assistance of PAHO, the MOH of Argentina, and other partners (personal communication S. Luciani, 26 February 2013). Thus, the opportunities exist in Bolivia to really scale up access to screening and treatment across the country, in order to reach more women with life-saving technologies.

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References

1. Ferlay J, Shin HR, Bray F, Forman D, Mathers C, Parkin DM. GLOBOCAN 2008 v1.2, Cancer Incidence and Mortality Worldwide: IARC CancerBase No. 10 (Online) 2010. Available: <http://globocan.iarc.fr> (Accessed 11 January 2013).
2. Luciani S, Gonzales M, Munoz S, Jeronimo J, Robles S. Effectiveness of cryotherapy treatment for cervical intraepithelial neoplasia. *International Journal of Gynecology & Obstetrics* 2008; **101(2)**: 172-177.
3. Sankaranarayanan R, Esmey PO, Rajkumar R, Muwonge R, Swaminathan R, Shanthakumari S, et al. Effect of visual screening on cervical cancer incidence and mortality in Tamil Nadu, India: a cluster-randomised trial. *Lancet* 2007; **370(9585)**: 398-406.
4. Sherris J, Wittet S, Kleine A, Sellors J, Luciani S, Sankaranarayanan R, et al. Evidence-based, alternative cervical cancer screening approaches in low-resource settings. *International Perspectives on Sexual and Reproductive Health* 2009; **35(3)**: 147-154.
5. Sritipsukho P, Thaweekul Y. Accuracy of visual inspection with acetic acid (VIA) for cervical cancer screening: a systematic review. *Chotmaihet thangphaet [Journal of the Medical Association of Thailand]* 2010; **93(Suppl 7)**: S254-261.
6. Cervical Cancer Action. *Progress in cervical cancer prevention: the CCA report card*. (Online) 2011. Available: <http://www.avac.org/ht/a/GetDocumentAction/i/33333>. (Accessed 12 February 2012).



7. Pan American Health Organization (PAHO). *Regional strategy and plan of action for cervical cancer prevention and control*. (Online) 2007. Available: http://www.paho.org/hq/index.php?option=com_docman&task=doc_view&gid=15744&Itemid (Accessed 12 July 2010).
8. Ministerio de salud y deportes. *Plan nacional de prevención, control, y seguimiento de cancer de cuello uterino 2009–2015* [in Spanish]. (Online) 2009. Available: <http://es.scribd.com/doc/35745655/Plan-nacional-de-prevencion-control-y-seguimiento-de-cancer-de-cuello-uterino-2009-2015> (Accessed August 2010).
9. Santesso N, Schunemann H, Blumenthal P, De Vuyst H, Gage J, Garcia F, et al. World Health Organization Guidelines: use of cryotherapy for cervical intraepithelial neoplasia. *International Journal of Gynecology & Obstetrics* 2012, **118(2)**: 97-102.
10. Instituto Nacional de Enfermedades Neoplásicas. *Escuela Latinoamericana de cáncer de cervix* [in Spanish]. (Online) 2013. Available: <http://eslatcc-peru.jimdo.com> (Accessed 1 February 2013).
11. Cervical Cancer Action. Global advances in screening and treatment of cervical precancer. (Online) 2012. Available: http://www.cervicalcanceraction.org/multimedia/webinar11April2012/CCAwebinar_slides_11April2012.pdf. (Accessed 12 January 2013).
12. Jhpiego. *ReproLine Plus: the source for technical expertise in global health practice*. (Online) 2013. Available: <http://reprolineplus.org/resources/trainer-educator> (Accessed 10 February 2013).
13. Stormo AR, Altamirano VC, Perez-Castells M, Espey D, Padilla H, Panameno K, et al. Bolivian health providers' attitudes toward alternative technologies for cervical cancer prevention: a focus on visual inspection with acetic acid and cryotherapy. *Journal of Women's Health* 2012; **21(8)**: 801-808.
14. Waxman AG. ASCCP, moving forward. *Journal of Lower Genital Tract Disease* 2012; **16(3)**: 165-168.
15. Ferris DG, Waxman AG, Miller MD. Colposcopy and cervical biopsy educational training models. *Family Medicine* 1994; **26(1)**: 30-35.
16. Spirit Foundation, Inc. Fighting cervical cancer and other HPV diseases. (Online). Available: <http://www.spiritfoundationinc.org> (Accessed 20 February 2013).
17. Pan American Health Organization. *Strategies for cervical cancer prevention using visual inspection with acetic acid screening and cryotherapy treatment: report of the PAHO workshops for Latin America and the Caribbean*. (Online) 2011. Available: http://www2.paho.org/hq/index.php?option=com_content&view=category&layout=blog&id=3595&Itemid=3637&lang=en (Accessed 5 October 2012).
18. Pan American Health Organization. *Triangular cooperation experience between the government of the Argentine Republic and the Pan-American Health Organization*. (Online) 2009. Available: <http://new.paho.org/sscoop/?p=2362> (Accessed 23 November 2012).
19. World Health Organization. *WHO guidelines. Use of cryotherapy for cervical intraepithelial neoplasia*. (Online) 2011. Available: http://whqlibdoc.who.int/publications/2011/9789241502856_eng.pdf (Accessed 5 January 2013).
20. United Nations Population Fund (UNFPA). *Comprehensive cervical cancer and control: programme guidance for countries*. (Online) 2011. Available: <http://www.unfpa.org/public/op/preview/home/publications/pid/10413> (Accessed 12 May 2012).
21. Stormo AR, Cooper CP, Hawkins NA, Saraiya M. Physician characteristics and beliefs associated with use of pelvic examinations in asymptomatic women. *Preventive Medicine* 2012; **54(6)**: 415-421.
22. World Health Organization. *Comprehensive cervical cancer control: a guide to essential practice*. (Online) 2006. Available: http://whqlibdoc.who.int/publications/2006/9241547006_eng.pdf (Accessed 18 December 2012).



23. Murillo R. Approaches to cervical cancer screening in areas with unequal health services: the example of Colombia. In *HPV Today* 2012, **27**, 12. (Online) Available: http://www.g-o-c.org/uploads/12nov_hpvtoday.pdf (Accessed 24 January 2013).

24. Mwanahamuntu MH, Sahasrabuddhe VV, Kapambwe S, Pfaendler KS, Chibwesa C, Mkumba G, et al. Advancing cervical cancer prevention initiatives in resource-constrained settings: insights from the Cervical Cancer Prevention Program in Zambia. *PLoS Medicine* 2011; **8(5)**: e1001032.

25. World Health Organization. *Prevention of cervical cancer through screening using visual inspection with acetic acid (VIA) and treatment with cryotherapy: a demonstration project in six African countries: Malawi, Madagascar, Nigeria, Uganda, the United Republic of Tanzania, and Zambia*. (Online) Available: http://apps.who.int/iris/bitstream/10665/75250/1/9789241503860_eng.pdf (Accessed 8 February 2013).

26. World Health Organization. *Report of the formal meeting of member states to conclude the work on the comprehensive global monitoring framework, including indicators, and a set of voluntary global targets for the prevention and control of noncommunicable diseases*. (Online) 2012. Available: http://apps.who.int/gb/NCDs/pdf/A_NCD_2-en.pdf (Accessed 31 January 2013).



Appendix A: Learning guide for counseling skills in visual inspection of the cervix with acetic acid (VIA) and cryotherapy

Grade the performance of each observed task or step utilizing the following grading scale:					
1	Needs improvement: The task or step is not being performed correctly, is out of order/sequence (if applicable), or it was omitted.				
2	Performed with competency: The task or step is performed correctly and in proper order (if applicable) but the participant does not move from one task/step to the next in an efficient manner.				
3	Performed with superior competency/skill: The task or step is performed efficiently and with precision in the proper order/sequence (if applicable).				
LEARNING GUIDE FOR COUNSELING WOMEN PRIOR TO AND AFTER PERFORMING VIA AND CRYOTHERAPY					
					CASES
GENERAL COUNSELING					
Initial interview					
1.	Greet the patient with respect and in an amicable manner.				
2.	Determine the purpose of the patient's visit and answer any of her questions.				
3.	Provide general information about cancer prevention through early detection.				
4.	Provide information about the pelvic exam and its pros and cons for the early detection of cervical cancer. Explain how the pelvic exam is performed. Explain how VIA and Cryotherapy can prevent cervical cancer.				
5.	Explain what the patient should expect during the appointment to receive the procedures.				
COUNSELING (VIA)					
1.	Make sure that there is enough privacy for the patient to discuss her information.				
2.	Ask about the patient's name, address, and other contact information.				
3.	Ask about the patient's clinical history related to reproductive health (e.g., age of sexual initiation, sexually transmitted infections she may have had, etc.)				
4.	Provide the patient with additional information about VIA and Cryotherapy: Explain what cervical cancer is and its relation to HPV. Discuss risk factors for cervical cancer. Describe how VIA is performed and the possible findings based on the test. Explain treatment options if VIA results are abnormal. Explain the need for referral, if applicable.				
5.	Ask if religious beliefs or certain attitudes have an influence in the patient's decision to get screened with VIA.				
6.	Engage in conversation with the patient to discuss her needs, questions, and concerns in detail and in an amicable manner.				
7.	Show support for the patient's decision to get screened with VIA.				
If the patient chooses to get screened with VIA:					
8.	Ask her if she has any other questions about the procedure.				
9.	Describe the procedure and mention what she should expect during the pelvic exam and the actual VIA procedure.				
If VIA results are negative:					
1.	Share the VIA results with the patient and describe what they mean for her reproductive health.				S
2.	Indicate when the patient should return for future screening tests.				
3.	Reassure the patient that she can return to the health center any time if she needs further counseling and/or medical care.				
4.	Provide instructions for follow-up visits.				
COUNSELING (CRYOTHERAPY)					
If VIA results are positive:					
1.	After completing the pelvic exam, ask the patient if she prefers to discuss the results laying down or sitting.				
2.	Discuss with the patient the VIA findings.				
3.	Ask the patient if she is pregnant and how long she has been pregnant for.				
4.	Provide the patient with detail information about treatment options: Show her how the Cryotherapy equipment is used. Explain the required steps to perform Cryotherapy. Describe the benefits and efficacy of the procedure. Explain potential side effects and make sure the patient clearly understands them.				
5.	Encourage the patient to ask questions and discuss her status.				
6.	Give the patient time to make a decision about being treated with Cryotherapy.				
7.	Ask for her informed consent to perform the procedure.				
Counseling after performing Cryotherapy:					
1.	Provide the patient with home care instructions.				
2.	Inform the patient about any warning signs she could potentially experience.				
3.	Discuss what the patient should do if she experiences problems (e.g., heavy bleeding, pelvis or abdominal pain)				
4.	Provide instructions for the use of condoms and feminine pads/sanitary napkins (if available).				
5.	Ask the patient to repeat the instructions provided.				
6.	Answer any questions the patient may have.				
7.	Schedule a follow-up visit.				



Appendix B: Learning guide for clinical skills in visual inspection of the cervix with acetic acid (VIA)

LEARNING GUIDE FOR CLINICAL SKILLS IN VIA					
TASK/STEP	CASES				
PATIENT EVALUATION					
1. Welcome the patient in a respectful and kind manner.					
2. Explain why VIA is recommended and briefly describe the procedure.					
3. Describe potential VIA results and the type of treatment that could be needed.					
PRIOR TO PERFORMING VIA					
1. Verify that all required instruments and supplies are ready for use.					
2. Ensure that the source of lighting is available and ready for use.					
3. Verify that the patient has emptied her bladder and, if needed, that she has washed the genital area properly.					
4. Ask the patient to undress from the waist down.					
5. Help the patient to sit in the exam table and cover her from the waist down.					
6. Wash your hands well with water and soap and dry them with a clean and dry towel/paper or let them air dry.					
7. Put on surgical gloves that have been carefully and properly disinfected in both hands.					
8. Place the supplies and instruments in a well disinfected tray or container.					
PERFORMING VIA					
1. Examine the external genitalia and monitor the urethral orifice to identify any discharge.					
2. Palpate the Skene's and Bartholin glands.					
3. Insert a speculum and adjust it as needed to visualize the entire cervix.					
4. Stabilize the speculum in an open position to ensure it stays in place to allow for the visualization of the entire cervix.					
5. Adjust the source of lighting as needed to observe the cervix clearly.					
6. Examine the cervix to detect cervicitis, ectropion, tumors, Nabothian cysts, or ulcers.					
7. Use a clean cotton swab to remove blood, cervical mucus, or other secretions.					
8. Identify the external orifice of the cervix, the columnar squamous junction, and the transformation zone.					
9. Saturate a clean cotton swab in a 3–5% acetic acid solution and apply it on the cervix. Discard the cotton swab in a sealed container or a plastic bag.					
10. Observe the cervix and wait 1 minute to determine whether acetowhite lesions are present.					
11. Examine the squamous columnar junction carefully. Notice if the cervix bleeds easily. Look for elevated edematous plaques or acetowhite epithelium.					
12. If needed, re-apply acetic acid or clean the cervix with a cotton swab to remove cervical mucus, blood, or other materials. Discard the cotton swab in a sealed container or in a plastic bag.					
13. Once visual inspection is completed, use another cotton swab to remove any acetic acid leftover in the cervix or vagina. Discard the cotton swab in a sealed container or in a plastic bag.					
14. Remove the speculum.					
15. Perform a bimanual and rectovaginal exam, if appropriate or indicated.					
AFTER PERFORMING VIA					
1. Insert both gloved hands in a 0.5% chlorine solution. Remove the gloves in an inverted position. If you discard the gloves, place them in a sealed container or plastic bag. The gloves must be discarded if a rectovaginal exam is performed. If the gloves will be re-used, decontaminate the gloves properly by placing them in a 0.5% chlorine solution for 10 minutes.					
2. Wash your hands thoroughly with water and soap and dry them with a clean and dry towel/paper or let them air dry.					
3. If the VIA results are negative, ask the woman to get up from the exam table and proceed to get dressed.					
4. Record the VIA results and other findings and place them in the patient's record/folder. If acetowhite changes are observed, Draw the affected area in a map of the cervix.					
5. Discuss VIA results and findings from the pelvic exam with the patient and make sure to answer all questions. If VIA results are negative, inform the patient when she should repeat the procedure. If the VIA results are positive or cancer is suspected, discuss recommended next steps with the patient. After counseling the patient, provide treatment or referral to the appropriate provider or health facility, if applicable.					



Appendix C: Guide for clinical skills in cryotherapy

Grade the performance of each observed task or step utilizing the following grading scale:	
1	Needs improvement: The task or step is not being performed correctly, is out of order/sequence (if applicable), or it was omitted.
2	Performed with competency: The task or step is performed correctly and in proper order (if applicable) but the participant does not move from one task/step to the next in an efficient manner.
3	Performed with superior competency/skill: The task or step is performed efficiently and with precision in the proper order/sequence (if applicable).

GUIDE FOR CLINICAL SKILLS IN CRYOTHERAPY					
STEP/TASK	CASES				
PATIENT EVALUATION					
1. Explain why treatment with Cryotherapy is recommended and briefly describe the procedure.					
2. Ask if the woman is pregnant. Ensure that the length of gestation is less than 20 weeks.					
3. Discuss with the patient potential side effects.					
PREPARATION					
1. Verify that all required instruments and supplies are ready for use.					
2. Ensure that the source of lighting is available and ready for use.					
3. Make sure that the Cryotherapy unit is ready for use, and that the gas (CO ₂) is contained within the cylinder, and that the pressure be between 40–70 kg/cm ² . Adjust the chronometer to 0.					
4. Prepare the disinfected or sterilized cryoprobe tip. Remove the protective cover from the end of the cryotherapy probe.					
5. Ensure that the patient has emptied her bladder if more than 30 minutes have passed since VIA was performed.					
6. Help the patient sit on the exam table and cover her with a sheet.					
7. Wash your hands thoroughly with water and soap. Dry them with a clean towel or let them air dry.					
8. Put on surgical gloves that have been carefully and properly disinfected in both hands.					
9. Place and organize the supplies and instruments in a well disinfected tray or container, if this step is still needed.					
CRYOTHERAPY					
1. Insert and stabilize the speculum to visualize the entire cervix clearly. Remove the glove from your left hand in an inverted position/inside out. If you discard the glove, place them in a sealed container or plastic bag. The gloves must be discarded if a rectovaginal exam is performed. If the gloves will be re-used, decontaminate the gloves properly by placing them in a 0.5% chlorine solution for 10 minutes.					
2. Adjust the lighting source as needed to clearly observe the entire cervix.					
3. Use a clean cotton swab to remove blood, cervical mucus, or other secretions.					
4. Saturate a clean cotton swab in a 3–5% acetic acid solution and apply it on the cervix. Discard the cotton swab in a sealed container or a plastic bag.					
5. Identify the external orifice of the cervix, the squamous columnar junction, and the placement and size of the lesion. (If needed for visualization, apply a 3–5% acetic acid solution with a clean cotton swab to the lesion. Discard the cotton swab in a sealed container or plastic bag.					
6. Point the cryoprobe tip toward the ceiling. Press the handle halfway for 1 second to ensure that the Cryotherapy unit can freeze properly. Then press the handle fully for 1 second to ensure that the Cryotherapy unit can defreeze properly.					
7. Screw the cryoprobe tip to the other end of the Cryotherapy unit.					
8. Apply the cryoprobe tip to the cervix making sure that the tip is at a 90 degree angle with the opening of the cervix. Ensure that the probe tip does not touch the vaginal canal.					
9. Adjust the chronometer to 3 minutes. Press the handle halfway to begin freezing the lesion. Apply pressure in the cervix to allow the nitrogen to flow from the unit. Observe the formation of the 'ice ball'.					
10. After 3 minutes, press the handle fully to begin de-freezing. Stop pressing the handle when the cryoprobe tip no longer appears frosty. Wait until the cryoprobe tip is detached from the cervix. Remove the cryoprobe from the vagina and place it in a clean tray.					
11. Wait 5 minutes and repeat the procedure until the zone of frozen tissue is 3–4 mm larger than the border of the cryoprobe.					
12. Examine the cervix carefully to ensure the formation of a hard and white zone of frozen tissue.					
13. Close the valve.					
14. Examine the cervix to detect if bleeding is present in the cervix. If it is, apply pressure in the cryoprobe using a clean cotton swab. Discard the cotton swab in a sealed container or plastic bag.					
15. Remove the speculum and place it in a 0.5% chlorine solution for 10 minutes to disinfect it.					



Append C: cont'd

TASKS AFTER PERFORMING CRYOTHERAPY					
1. Clean the source of lighting with a 5% chlorine solution or alcohol.					
2. Insert both gloved hands in a 0.5% chlorine solution. Remove the gloves in an inverted position. If you discard the gloves, place them in a sealed container or plastic bag. The gloves must be discarded if a rectovaginal exam is performed. If the gloves will be re-used, decontaminate the gloves properly by placing them in a 0.5% chlorine solution for 10 minutes.					
3. Wash your hands thoroughly with water and soap and dry them with a clean and dry towel/paper or let them air dry.					
4. Ensure that the patient does not have excessive cramps before she sits to get up from the exam table and dress.					
5. Provide the patient with after care instructions, inform about potential warning signs, and provide follow-up instructions.					
6. Record the procedure and follow-up information in the patient's chart.					
7. Observe the patient for at least 15 minutes and ask her how she feels before dismissing her from your facility.					