

Research Article

Cervical cancer prevention program in Nepal: a 'training of trainers' approach

Samantha Batman¹, Madan Piya², Sandhya Chapagain³, Poonam Lama⁴, Pabitra Maharjan⁴, Binod Aryal⁴, Maya Neupane², Shashwat Pariyar², Natacha Phoolcharoen⁵, Vanessa Eaton⁶, Vanessa Sarchet⁶, Megan Kremzier⁶, Jenny Carns⁷, Rebecca Richards-Kortum⁷, Ellen Baker¹, Melissa Lopez Varon¹, Mila Pontremoli Salcedo¹, Jessica Milan¹, Kathleen Schmeler¹, Jitendra Pariyar²

¹ The University of Texas MD Anderson Cancer Center, ² Cancer Care Nepal, ³ Cancer Care Nepal; National Academy of Medical Sciences, ⁴ Civil Service Hospital, ⁵ King Chulalongkorn Memorial Hospital, ⁶ The American Society of Clinical Oncology (ASCO), ⁷ Rice University

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Background

Cervical cancer remains the leading cause of cancer-related death among Nepalese women. To this effect, Cancer Care Nepal established an international collaboration to implement a 'training of trainers' (TOT) program to expand the reach of cervical cancer prevention techniques.

Methods

The Nepal cervical cancer prevention program began with an in-person TOT session in Kathmandu in November 2019. Due to the COVID-19 pandemic, two additional TOT courses were held in October and November 2021 with virtual support, didactic lectures from international faculty, and a hands-on component by Nepalese faculty. The Nepalese providers underwent training in these courses and then held further training in five collaborating centers across Nepal. Participants completed pre- and post-course knowledge assessments. The trainings were supplemented by the creation of a new Project ECHO® (Extension for Community Healthcare Outcomes) telementoring hub at Cancer Care Nepal. A capstone refresher course was held in November 2022.

Results

42 participants attended the initial TOT course in 2019. The two follow-up TOT courses held in October/November 2021 were two days long and included providers from five participating regions in Nepal. The courses included virtual didactic sessions followed by hands-on stations led by the Nepalese faculty who had participated in the 2019 TOT course. The stations included: visual inspection with acetic acid (VIA), colposcopy, thermal ablation, and loop electrosurgical excision procedure (LEEP). There were 41 participants in the October/November TOT courses. The trainers who received the TOT education then conducted local courses of similar content in each of the five regions for 152 local providers. Participants had improved mean knowledge scores after the training (0.70, 95% CI=0.67-0.72) in comparison to prior to training (0.50, 95% CI=0.47-0.53), $p < 0.001$. The program concluded with a capstone course in November 2022 attended by 26 participants. To date, 11 Project ECHO sessions have been held, with an average of 20 participants per session.

Conclusions

Nepal's cervical cancer prevention program has increased the number of providers trained in cervical cancer prevention techniques. By increasing provider capacity, individuals will have increased access to cervical cancer screening and treatment of pre-invasive disease, hopefully decreasing the burden of cervical cancer in Nepal.

Despite being both a preventable and potentially curable disease, cervical cancer is the fourth most common cause of cancer among women globally, with approximately 604,000

cases of cervical cancer and 342,000 related deaths diagnosed in 2020.^{1,2} Highlighting great disparities in health-care delivery, 90% of cervical cancer-related deaths occur in

low- and middle-income countries (LMICs).¹ Globally, the most affected regions are Southeast Asia, the Caribbean, sub-Saharan Africa, Latin America, Micronesia, and Melanesia.³ The higher incidence and mortality rates of cervical cancer in LMICs are often attributable to inadequate screening programs, lack of public awareness and education, and a shortage of trained medical providers skilled in diagnosing and treating pre-cancerous lesions of the cervix.

In May 2018, the Director-General of the World Health Organization (WHO) issued a global call to action to eliminate cervical cancer. The initiative incorporates scaling up interventions to achieve the following goals by 2030: (i) 90% of girls fully vaccinated for human papillomavirus (HPV) by the age of 15; (ii) 70% of women screened by the age of 35 and again by the age of 45; and (iii) 90% of women with pre-cancer treated and 90% of women with invasive cancer managed.¹

Nepal is a South Asian country that faces a disproportionate burden of cervical cancer, highlighting the disparities in this disease. Cervical cancer remains the most commonly diagnosed cancer and cause of cancer-related deaths among Nepalese women, with an age-standardized incidence rate of 16.4 cases per 100,000 women in 2020, with 2,244 new cases and 1,493 deaths.⁴ Most patients diagnosed with cervical cancer in Nepal are diagnosed at a late stage (80.9%),⁵ contributing to the higher mortality rate (i.e. stage IIB or greater). The national guidelines in Nepal recommend screening with visual inspection with acetic acid (VIA) every five years for women aged 30–60 years. However, lack of a coordinated national screening program has led to cervical cancer screening utilization (16%) which is four times lower than the national target (70%).^{6,7} Previous studies examining barriers to increased screening utilization have found issues with patient embarrassment related to the gynecologic exam, lack of knowledge on cervical cancer, limited trained health care personnel, inaccessibility of clinics, and cost of screening, among reasons for why utilization remains low.⁷

To continue the work to further the WHO goals in Nepal, a multi-institution, international collaboration was started to increase patient knowledge and the number of providers skilled in cervical cancer screening, diagnosis, and treatment techniques. We describe the details and outcomes of this program.

METHODS

The Nepal cervical cancer prevention program began with an in-person training course in Kathmandu in November 2019. The course was facilitated by the American Society of Clinical Oncology (ASCO) and included experts from the Department of Gynecologic Oncology at The University of Texas MD Anderson Cancer Center (MD Anderson) and the Department of Bioengineering at Rice University from the United States working in collaboration with Cancer Care Nepal, the National Academy of Medical Sciences (NAMS) Bir Hospital, Civil Service Hospital, and Bhaktapur Cancer Hospital in Nepal. The initial course included a didactic

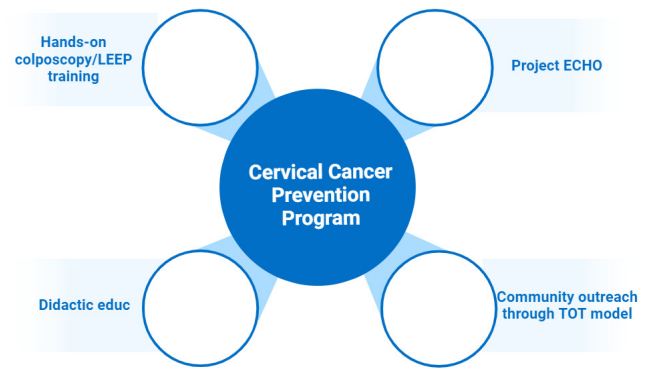


Figure 1. Components of the Cervical Cancer Prevention Trainings

component and a hands-on training workshop similar to the 'training of trainers' (TOT) workshops as described below. Further details of the course and results are in a prior paper.^{6,8}

The initial training in 2019 was followed by two additional TOT courses in October and November 2021. Due to the COVID-19 pandemic, these were held using a hybrid model consisting of virtual support and didactic lectures from international faculty and hands-on training by Nepalese faculty who had participated in the initial 2019 course. Both courses were two days long and were free to participants. The participants for these TOT courses were recruited via invitation letter to centers that were previously identified as those offering cervical cancer screening services including cancer hospitals, university-affiliated hospitals, and non-governmental organizations. The didactic lectures, which were given by American and Brazilian faculty from MD Anderson and Thai faculty from King Chulalongkorn Hospital, included topics such as the epidemiology of cervical cancer, screening recommendations, colposcopy and management of dysplasia, and an overview of cervical cancer treatment. The hands-on TOT stations using the LUCIA simulation models developed by Rice University⁹ included: (1) VIA; (2) colposcopy with cervical biopsies and endocervical curettage; (3) thermal ablation; and (4) loop electrosurgical excision procedure (LEEP). This schema is shown in [Figure 1](#). The blended TOT courses participants were from five institutions throughout Nepal: National Hospital and Cancer Center, Civil Service Hospital, Sushil Koirala Prakhara Cancer Hospital, Karnali Academy of Health Sciences, and Armed Police Force Hospital.

Following the hybrid TOT courses in October and November of 2021, the trainers from each of the five participating institutions held their local courses for providers (nurses and physicians) in their respective regions. The participants for these local courses were selected by the new trainers in coordination with local government and local health authorities based on each individual location's need for cervical cancer screening services. The structure of these courses was similar to the TOT courses described above. Lastly, a final capstone refresher TOT course was held in November 2022 to reinforce the skills that had been learned throughout the prior three years ([Figure 2](#)).

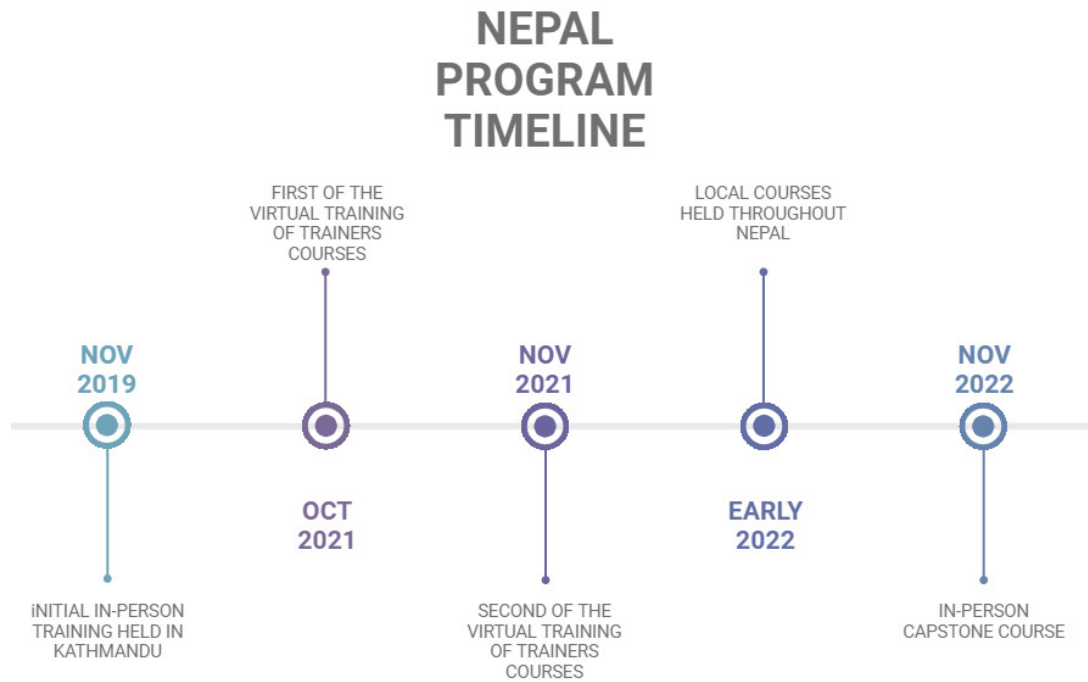


Figure 2. Timeline of the Nepal Cervical Cancer Prevention Course

In order to keep the retrospective on-site evaluation consistent, it was performed through a survey utilized in the previous initial course and described in a prior paper.⁶ In terms of survey assessments, participants in the initial course were given an immediate pre- and post- course self-assessment to map changes from their baseline knowledge to their post-course knowledge. They were then issued a follow-up survey at six months to determine if they had incorporated the skills learned in the course into their clinical practice. For the TOT courses, a pre- and post-course knowledge assessment consisting of 35 clinical scenarios was given to participants immediately before and immediately after the course. The capstone course participants were given an immediate post-course self-evaluation similar in structure to the survey done at the time of the initial course.

The training program was supplemented by creating a new Project ECHO® (Extension for Community Healthcare Outcomes) hub based at Cancer Care Nepal with Project ECHO telementoring videoconferences held monthly to continue supporting providers across all participating regions. These monthly sessions are attended and supported by faculty from the United States and Thailand and faculty from Cancer Care Nepal.

Descriptive statistics were used to report the specialty of the participants and were also used to describe the evaluation results across individual educational objectives. These data were then reported using summary statistics including mean and standard deviation for categorical variables.

RESULTS

A complete description of the results from the initial November 2019 course have been described elsewhere.⁶ In

brief, it was attended by 42 participants, 84% of whom were gynecologists or gynecologic oncologists. A follow-up survey sent to participants six months after the initial course was completed showed that, of the respondents, 88.9%, 88.9%, 50.0%, and 72.2% were still using their skills on VIA, colposcopy, thermal ablation, and LEEP, respectively. Those not using any of the skills learned during the initial course reported that this was due to unavailable or nonfunctional instruments, preference to perform a different procedure, no eligible patients in the following six-months, or shifting focus on the COVID-19 pandemic.⁶

The follow-up TOT courses in October and November 2021 were each two days long and included 41 providers from the five participating regions, with 23 participants in the first session and 18 participants in the second session. Due to the COVID-19 pandemic, the TOT courses were hybrid, and six participants in the first course and six in the second course attended virtually. In both courses, most participants (61%) were physicians. A total of 39 participants (73%) completed both the pre- and post-course evaluation surveys. Eighty-six percent of respondents from the first course and 100% of respondents from the second course reported that they intended to change their practice due to knowledge learned from the TOT course ([Table 1](#)).

Following completion of the two TOT courses, five additional local trainings were held in the following centers: National Hospital and Cancer Center, Civil Service Hospital, Sushil Koirala Prakhara Cancer Hospital, Karnali Academy of Health Sciences, and Armed Police Force Hospital. These courses were led by providers who had been trained in the earlier TOT courses and were delivered under the supervision of the Cancer Care Nepal faculty. These local service provider trainings were all held in-person, and there were 152 attendees in total, with an average of 30 attendees

Table 1. Respondents' plans for changes in practice patterns based on three TOT courses (n=39)

Practice Area	Planning Practice Change, n (%)
Vaccination Recommendations	18 (58.0%)
Screening Guidelines	18 (58.0%)
Colposcopy Recommendations	20 (64.5%)
Treatment Recommendations	17 (54.8%)
Referral Recommendations for Suspicion of Cancer	10 (32.3%)

Table 2. Specialty of Course Participants across all TOT and capstone courses

Reported Specialty	TOT and capstone courses n (%)
General Gynecologist	34 (50.7%)
Gynecologic Oncologist	12 (17.9%)
Medical Oncologist	1 (1.5%)
General Practitioner	2 (3.0%)
Registered Nurse	14 (20.9%)
Gynecologic Oncology trainee	4 (6.0%)
Total Participants	67

(range 21–43) per session. Most attendees at each of these local trainings were nurses or paramedics. The mean knowledge score, as assessed by a standardized questionnaire given before and after the local training courses, was improved following the training ($p < 0.001$), from 0.50 (95% CI=0.47–0.53) pre-course to 0.70 (95% CI=0.67–0.72) post-course.

The Nepal training program concluded with a capstone refresher course in November 2022. This three-day event was attended by 28 participants on the first day and 26 on the second and third days from four provinces. Topics reviewed included screening, HPV vaccination update in Nepal, thermal ablation and LEEP technique, and review of colposcopy images via didactic lectures as well as a refresher hands-on sessions for the previously-learned skills. This was also in collaboration with ASCO, MD Anderson, and Cancer Care Nepal. [Table 2](#) describes the overall breakdown of specialties of attendees across all four TOT courses (November 2019, October/November 2021, and November 2022). Across all courses, greater than 80% of participants reported improved understanding and skills across four objectives following the TOT courses ([Tables 3 and 4](#)).

To supplement the skills and knowledge gleaned at the courses, the Project ECHO telementoring program for cervical cancer prevention in Nepal launched with its inaugural session on January 18, 2022, by specialists at Cancer Care Nepal under the mentorship of the MD Anderson Project ECHO superhub and MD Anderson faculty. This is a monthly videoconferencing session and to date, there have been 11 sessions with an average of 20 participants per session across all collaborating sites. These sessions represent an opportunity for participants to continue their medical education through didactic lectures and discuss complex

patient cases in a group setting with ongoing mentorship from Cancer Care Nepal.

DISCUSSION

The burden of cervical cancer in Nepal continues to be disproportionately increased, with higher incidence and mortality rates and later stage at presentation compared to higher-income countries. Despite the 2010 National Guideline for Cervical Cancer Screening in Nepal, cervical cancer screening has remained low and increased from 2.4% of women aged 18–69 years in 2003 to only 8.2% of women aged 30–49 years in 2019.¹⁰

One factor contributing to the lack of cervical cancer screening uptake is a shortage of healthcare workers trained in cervical cancer prevention, screening, and treatment and a lack of access to these workers. This is particularly true given that Nepal is a mountainous, landlocked country with 81% of people living in a rural area as of 2015.¹¹ In 2013, there were only 0.67 doctors and nurses per 1000 population, which is well below the minimum standard set by the WHO of 2.28 doctors, nurses, and midwives per 1000 population.¹¹ Previous work examining cancer care disparities in Nepal has called for the investment in training programs for health professionals as one of the top strategic priorities to strengthen Nepal's cancer care system.¹² Thus, the cervical cancer prevention program described in this manuscript is a part of the ASCO International Affairs Committee's effort to address the needs of the international oncology community by building local capacity.¹³

Our work in Nepal has shown the feasibility of creating a targeted cancer prevention program that can educate and train providers of various backgrounds. Our course eval-

Table 3. Pooled Evaluation Results for Each Educational Objective across two TOT courses (n=31 respondents)

Objective	Mean (SD) Before	Mean (SD) After	Mean (SD) Change	Percent Reporting an Increase
Understanding cervical cancer screening guidelines	2.5 (0.91)	4.0 (0.57)	1.4 (0.79)	93.5%
Ability to perform colposcopy	1.9 (1.18)	3.4 (0.88)	1.3 (0.88)	80.6%
Ability to identify cervical lesions in colposcopy images	1.9 (1.12)	3.6 (0.75)	1.5 (0.82)	83.9%
Ability to perform LEEP	2.0 (1.24)	3.7 (0.99)	1.6 (1.01)	83.9%

*LEEP = loop electrosurgical excision procedure

Table 4. Pooled Evaluation Results for Each Educational Objective at the Final Capstone Course (n=23 respondents)

Objective	Mean (SD) Before	Mean (SD) After	Mean (SD) Change	Percent Reporting an Increase
Understanding cervical cancer screening guidelines	2.7 (0.81)	4.1 (0.81)	1.4 (0.50)	100%
Perform VIA	2.8 (0.89)	4.2 (0.80)	1.4 (0.66)	96%
Ability to perform colposcopy	2.6 (0.84)	4.1 (0.79)	1.5 (0.59)	100%
Ability to perform thermal ablation	2.8 (0.95)	4.1 (0.87)	1.3 (0.65)	96%
Ability to perform LEEP	2.5 (0.99)	4.1 (0.92)	1.6 (0.66)	100%

*LEEP = loop electrosurgical excision procedure

uations demonstrate that the cervical cancer prevention course increased participants' confidence and ability to perform across each prepared educational objective. Follow-up surveys demonstrate that most participants planned to change their practice patterns due to knowledge learned from the course, except for pre-existing referral patterns for suspected cases of cancer. These results demonstrate that a hybrid TOT model can effectively build local capacity for cervical cancer screening, diagnosis, prevention, and treatment.

The restraints of the COVID-19 pandemic required training to move from in-person to a hybrid model with a virtual component. Thus, a strength of our program is to demonstrate that hybrid models can continue to be a useful tool for building local capacity. Our team has previously shown that using a virtual platform can widen the reach of a training program and be a useful tool to engage a larger number of participants,¹⁴ and this was the case in Nepal.

Nevertheless, the evaluation of the program has some limitations. Our team developed the knowledge assessment used to determine the effectiveness of the didactic portion of the training, but it was not a standardized tool. Furthermore, the knowledge assessments were performed immediately following the training and may not reflect the knowledge retained. As such, we were also limited by the short follow-up time between the course and the surveys. However, the six-month follow-up survey provided at the end of the initial course showed that most providers continued to retain and practice the skills learned in the course.

The TOT model of the course lends itself to increasing its scale to reach a larger proportion of providers and more rural areas. These trainings continue to be supplemented

by Project ECHO, and further work will be done to increase active participation and individual patient presentations in the Project ECHO platform.

CONCLUSIONS

In conclusion, the cervical cancer prevention course improved participants' knowledge of cervical cancer screening, diagnosis, and treatment modalities and allowed scalability to more isolated regions of Nepal. Ongoing efforts will continue to require long-term partnerships and mentoring, and our efforts have demonstrated that this can be done using a hybrid model with a virtual component and telementoring support.

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AUTHORSHIP CONTRIBUTIONS

MN, SP, VE, VS, MK, RRK, EB, MLV, MPS, KS, and JP were involved in the conception and design of the project. MKP, SC, PL, PM, BA, MN, JC, RRK, and SP were involved in the provision of study materials or patients. VE, VS, MK, SB, JM, KS, JP were involved in the collection and assembly of

data. SB, NP, MLV, MPS, JM, KS, JP were involved in data analysis and interpretation. All authors were involved in the process of writing the manuscript.

DISCLOSURE OF INTEREST

The authors completed the ICMJE Disclosure of Interest Form (available upon request from the corresponding author) and disclose no relevant interests.

CORRESPONDENCE TO:

Kathleen M. Schmeler, M.D.

Mailing Address: Department of Gynecologic Oncology and Reproductive Medicine, Unit 1362, The University of Texas MD Anderson Cancer Center, 1515 Holcombe Boulevard, Houston, TX 77030.

Phone (713) 745-3518, e-mail: kschmele@mdanderson.org

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