CANCER SCREENING IN THE DEVELOPING WORLD

Edited by Madelon Finkel, PhD

CASE STUDIES AND STRATEGIES FROM THE FIELD
Cancer Screening in the Developing World
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Challenges in Screening for Cervical Cancer

Sharing Experiences from India

The difference between what we do, and what we are capable of doing, would suffice to solve most of the world’s problems.—Mohandas Gandhi

Life has an uncanny knack of redirecting one’s destiny. Like most people, I had plans and dreams laid out for myself, but what came to me instead—an opportunity to fight cervical cancer—turned out to be a better path than I ever could have planned for myself. This journey began in the summer of 2008 with the publication of my book, The HPV Vaccine Controversy: Sex, Cancer, God, and Politics. During a vacation I took in Kutch, a remote area in the northwest part of Gujarat, India, a woman who was struggling with disease said, “I just heard you say that India has the highest number of cervical cancer deaths in the world and that one young woman is dying from this disease every 7 to 8 minutes in this country. What are you going to do about it?” Her plea, her challenge, galvanized me to “do something about it.”

I established a nongovernmental organization (NGO) called Global Initiative Against HPV and Cervical Cancer (GIAHC), with the mission to try to save lives from cervical cancer, one woman at a time, one day at a time. Our goals are to build relationships to develop, strengthen, and support HPV and cervical cancer prevention, screening, and treatment programs; develop culturally sensitive and linguistically appropriate health education materials to promote healthy living; co-host screening training workshops on a periodic basis to train local community health workers (physicians, nurses, and other qualified health personnel); and identify barriers to help
communities implement creative, medically sound, economically sustainable, and practical solutions for effective management of screening an early treatment. We focused on India because of the great unmet need there to address screening for this disease.

The objective of this chapter is to describe how a grassroots organization with a specific purpose can make a difference in people’s lives. The discussion highlights the barriers we faced and the impact we have had on women’s lives.

**HPV Background**

Nearly all cases of cervical cancer can be attributed to human papillomavirus (HPV) infection. As chapter 2 discussed, HPV plays a major role in the development of cervical cancer. There are more than one hundred types of HPV, of which at least thirteen are cancer causing (also known as high-risk type). These types of HPV can cause oral, penile, and anal cancers in men and cervical, vaginal, vulvar, oral, and anal cancers in women. The low-risk types cause genital warts, which are highly contagious. Identifying specific HPV types that are strongly associated with cervical cancer was an important step in the fight against cervical cancer. In 2008 the Nobel Prize for Medicine was awarded to three virologists, one of whom, Dr. Harald zur Hausen from Germany, won for the detection and isolation of HPV types 16 and 18. These are the major precursors of almost all cervical cancers, as they are detected in approximately 70 percent of cervical cancers. (1)

The HPV virus spreads both nonsexually (through genital-to-genital or hand-to-genital contact) and sexually (through vaginal or anal intercourse with sexual activity comprising the most common form of transmission. (2) The peak time for acquiring infection for both women and men is shortly after becoming sexually active. Most sexually active women and men will be infected at some point in their lives, and some may be repeatedly infected. (3) Risk factors for HPV infection include early first sexual intercourse, multiple sexual partners, tobacco use, and immune suppression. HIV-infected individuals are at higher risk of HPV infection and are infected by a broader range of HPV types. It takes on average fifteen to twenty years for cervical cancer to develop in women with normal immune systems, but for women with weakened immune systems, the time period can be much shorter. (3)

Although most HPV infections clear up on their own, and most precancerous lesions resolve spontaneously, there is a risk that HPV infection ma
become chronic and that precancerous lesions could progress to invasive cervical cancer. Having an HPV infection, however, does not mean that a person will automatically develop disease or even cancer. HPV is a silent infection, and most people who become infected do not know that they have been infected. HPV infection also runs a very unpredictable course. It can be contracted through a partner without any symptoms, remain dormant, and then unknowingly be transmitted to the next partner.

One of the “best” ways to prevent the development of advanced cervical cancer is to screen for the disease. Cervical cancer is easily detected by various screening modalities; if it is identified at an early stage, the prognosis is excellent. Screening is most effective for women between the ages of thirty and forty-nine, when it has the potential for the greatest impact. Cervical cancer is not common among women younger than thirty years of age, and therefore screening is not recommended for them. The World Health Organization (WHO) recommends targeting screening to women who are between thirty and forty-nine years old because of their higher risk for developing cervical cancer. (4)

Screening Methods Most Suited for Rural India

In rural areas of developing countries, it is next to impossible to conduct a cervical cancer screening using the Pap smear, the gold standard test in the developed world. Many developing countries such as India lack high-quality cytology labs and trained technicians to read the slides. The cost of the test is usually more than a woman can afford. In addition, in India the overwhelming majority of the population live in villages, some at great distances from health centers or hospitals. Hence trying to develop and maintain a screening program using the Pap smear is just not feasible in these areas. We therefore had to be creative and innovative in our approach to designing a cervical cancer screening program in rural India. We had to find a sensitive, specific, cost-effective test that could be administered in rural areas. Fortunately such a test exists and has been used successfully in many developing countries.

Visual inspection with acetic acid (VIA) has been shown repeatedly to be an excellent alternative to cytology-based screening programs in developing countries. (5–7) Essentially, VIA relies on vinegar, a product that is readily available even in rural areas. In this procedure, the cervix is painted with vinegar (3–5% acetic acid). Normal cervical tissue remains unaffected by the
acetic acid, but the excess DNA protein found in abnormal tissue coagulate in the presence of vinegar and turns white. Women with the telltale white areas need to undergo additional testing to rule out or diagnosis cervical cancer. In many instances the woman can be treated at the time of screening by cryotherapy (freezing the cells with a probe using liquid nitrogen or carbon dioxide). This method of using VIA followed by cryotherapy was pioneered in the 1990s by physicians working in Africa and India and was later endorsed by the WHO.

The WHO endorsement specifically came from a demonstration project that was conducted in six African countries (Madagascar, Malawi, Nigeria, Uganda, United Republic of Tanzania, and Zambia) between 2005 and 2009. (8) It showed that VIA is a viable alternative to cytology-based screening in low-resource settings; the sensitivity of the VIA test is comparable to that of the Pap smear, although with a slightly lower specificity. The WHO concluded that VIA was simple, safe, feasible, and acceptable to women and providers in low-resource settings. (9) For those who test positive, cryotherapy is the treatment of choice, assuming that providers of care know how to treat using this therapy.

Visual inspection with acetic acid is a cheap and quick procedure that does not require lab processing or electricity, making it ideally suited for low- and middle-income countries, especially rural areas. In addition, VIA is well-suited for task shifting, as it can be effectively taught to nurses and community health workers. It does not have to be performed by a physician. Workshops lasting between two days and two weeks can effectively train allied health personnel to perform VIA. Our NGO has participated in training sessions, in which trainees pore over slides and flash cards showin cervixes with diagnosable problems, then practice cryotherapy on slice sausages inserted inside plastic tubes. “It is a simple test that nurses an trained community health care providers can administer,” one nurse said “The patient lies down to be examined, the cervix is washed with vinegar if it turns white, it means it is a positive test and I freeze it. There are minimal side effects. If I am in doubt, I refer her to the doctor.”

In our screening program we, like other NGOs, have found that there is a learning curve after the VIA training session. New trainees have approximately twice the number of positive VIAs (around 30%) as veteran (around 15%). (10,11) In their desire not to miss any potentially positive case new trainees have a tendency to identify benign cellular changes such as squamous metaplasia as positive, which probably accounts for the high
numbers of positive cases among the new trainees. However, we have found that within six to twelve months, with a trained eye, the new trainees become more confident and accurate in their interpretation of positive and negative cases.

The “screen and treat” protocol using VIA allows women to get their test results immediately, thus obviating the need to have an individual return to the clinic days or weeks later or to have the clinic staff travel into the villages to find her. Those who test positive can have cryotherapy on the spot. These “one-stop” or “single-visit” programs are based on the fundamental principle that fewer women will be lost to follow-up care if they can receive treatment during the same visit in which they are screened.

While low-tech screening options such as the VIA have many advantages, there are some limitations, which can lead to overtreatment of women who screen positive. For example, there is subjectivity in differentiating benign from malignant test results; the results may vary depending on how well the screener was trained. There is an issue of low specificity and reduced reliability in women fifty years of age or older because the squamo-columnar junction recedes into the endocervical canal in menopausal women, making it more difficult to detect cancer. (12)

The strong association between cervical cancer and HPV makes testing for the genetic material of HPV a valuable screening tool. A new test (the HPV DNA test), designed to detect the genetic material of the virus, has been developed. It is accurate, objective, and easy to administer. The test has a comparatively higher sensitivity (94.6–96.1%) and specificity (90.7–94.1%) than cytology or VIA. (13) In addition, women do not need to undergo frequent screening. (14) The test can be performed on cervical or vaginal samples. The advantage of vaginal samples is that a woman can take her own vaginal swab in the privacy of her home. Many studies have shown that self-testing is well accepted by women and can improve compliance. (15) In addition, self-collected samples have been shown to produce comparable performance to clinician-collected HPV samples. (16–19) This strategy may reduce the infrastructure requirements inherent in other screening options.

Probably the biggest limitation of the HPV DNA test, however, is that it requires a sophisticated laboratory and trained technicians, and it takes four to seven hours to process the specimen. In comparison to the VIA, with its immediate results, this could be an issue in some areas. It also is a comparatively expensive test. To make the HPV DNA test simpler, more affordable, faster, and more feasible for low-resource settings, a rapid molecular test for
HPV (careHPV) has been developed. (20) The rapid HPV DNA test is portable, is simpler to perform, and allows for field interpretation of the result within two and one-half hours, without any requirement for electricity or running water. It has proven to be a feasible test for use in rural areas. (21)

Our organization is currently working with partners in rural India who are performing the VIA test followed by cryotherapy. Yet there is considerable enthusiasm to introduce the rapid molecular HPV DNA test. The price of the test, the cost of the machine needed to process the samples, and the design of its packaging, with ninety-six test wells to a tray, make it suitable for use in camp settings, where many women can be screened at one arranged time. However, if this were to be used as a part of one-stop screening and treatment program, the logistical challenges of having ninety-six women waiting at the screening site for more than two hours while the tests were being processed, then treating the positive cases on the same day, would require considerable human resources and time. Hence we are currently at the crossroads of introducing this new technology and weighing the feasibility and sustainability of doing so.

Denny et al. (22) conducted a randomized screening trial using the hybrid capture 2 HPV DNA test and VIA to evaluate the safety, acceptability and efficacy of these two screen and treat approaches through thirty-six months of follow-up. The study sample consisted of 6,555 South African women thirty-five to sixty-five years old who were tested for the presence of high-risk HPV DNA in cervical samples. The women underwent visual inspection of the cervix using acetic acid staining and HIV serotesting. They were randomly assigned to three study arms: (1) HPV-and-treat, in which a woman with a positive HPV DNA test result underwent cryotherapy; (2) visual inspection-and-treat, in which all women with a positive visual inspection test result underwent cryotherapy; and (3) control, in which further evaluation or treatment was delayed for six months. All the women underwent colposcopy with biopsy at six months. The findings show that after thirty-six months, there was a sustained, statistically significant decrease in the cumulative detection of cervical intraepithelial neoplasia grade 2 (CIN2+) in the HPV-and-treat arm compared with the control arm (1.5% vs 5.6%, 95% confidence interval 2.8% to 5.3%). The HPV screen and treat arm was associated with a 3.7-fold reduction in the cumulative detection of CIN2+ over a thirty-six-month period of follow-up. The VIA treatment arm showed a 1.5-fold reduction. The researchers concluded that this screen an
treat approach using HPV DNA testing identified and treated prevalent cases of CIN2+ and appeared to reduce the number of incident cases of CIN2+ that developed more than twelve months after cryotherapy.

Despite their many advantages, HPV screening tests (both standard and the rapid molecular tests) have a low positive predictive value for cervical cancer. They only indicate the presence of current HPV infection in a woman and cannot differentiate between women who simply have HPV infection (which might spontaneously clear) and those who have started to develop abnormal changes that might proceed to precancer and then cancer. Therefore, further follow-up testing would be warranted.

**HPV Vaccine**

Several HPV vaccines have been brought to market since 2006. Each is a preventive vaccine that works best before an individual is exposed to HPV (before the onset of sexual activity). The vaccine is considered to be the single most effective way to prevent cervical cancer. Three vaccines are approved by the FDA to prevent HPV infection: the quadrivalent HPV vaccine (Gardasil), which protects against four HPV types (6, 11, 16, and 18; HPV 6 and 11 cause 90 percent of genital warts); the bivalent HPV vaccine (Cervarix), which protects against two high-risk HPVs (16 and 18); and the nonavalent HPV vaccine (Gardasil 9), which prevents infection with the same four HPV types plus five additional high-risk HPV types (31, 33, 45, 52, and 58). (23–26) The vaccines are recommended for eleven- to twelve-year-old girls and boys, the age during which the immune response is high and exposure to the virus is low. The vaccine may be administered as young as age nine and until age twenty-six. Common side effects include pain and swelling at the site of injection.

Studies have shown that the HPV vaccine can prevent up to 66 to 96.6 percent of cervical cancers, depending on which HPV vaccine is used: bivalent, quadrivalent, or nonavalent. (27,28) Vaccines are given through a series of injections into muscle tissue over a six-month period. In 2016 the US Centers for Disease Control (CDC) changed its recommendation about the number of doses needed. The Advisory Committee on Immunization Practices for the CDC recommends that nine- to fourteen-year-olds need only two doses of the HPV vaccine, instead of the three doses that have traditionally been administered. The CDC determined that two doses within that age group
are just as effective as three doses in older teens and young adults. (29) Since the HPV vaccine does not cover all the high-risk HPV types that cause cervical cancer, screening will be necessary even among those who receive the vaccine.

Recently the local Delhi government in India introduced an HPV vaccination program in public schools to include all nine- to thirteen-year-old girls. The Indian government received aid from the Global Alliance for Vaccines and Immunization (GAVI) to procure vaccines at a subsidize rate, which will make the HPV vaccine available for less than $5 a dose. The government also plans to expand the public-private partnership for cancer screening under the National Program for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPDCCS), to include cervical cancer screening. The NPDCCS program focuses on promoting healthy lifestyles, early diagnosis and management of diabetes, hypertension, cardiovascular diseases, and common cancers (including cervical breast, and oral). (30)

The development of safe and effective vaccines against HPV is acknowledged to be one of the more important breakthroughs in the fields of medicine and public health in the twenty-first century. The vaccine could have a major impact in India and other developing nations, given the high rate of undetected cervical cancer and the paucity of cervical cancer screening programs in those countries.

**Program Challenges, Opportunities, and Possible Solutions:**
**Education and Building Awareness**

There is no doubt that globally we have attained significant milestones in detecting and treating early cervical changes by safe, simple, and inexpensive methods. However, implementing screening programs has not been easy. Finding the appropriate NGOs or institutions to partner with, recruiting the right staff to train, identifying appropriate training sites, and finding sufficient funding sources to ensure some degree of sustainability have individually and collectively been challenging. In addition, country partners have other competing needs, including managing public health programs such as sanitation, family planning, and chronic and acute disease prevention, which makes cervical cancer prevention less of a priority—no by will, but by necessity, mostly because of lack of awareness, funding, infrastructure, and human resources.
We often hear our partners state, “One of our main challenges is to find ways to motivate providers to offer cervical cancer preventive services, and to mobilize women to accept these services.” It is well documented that education and information are basic factors that contribute to the success of an early diagnosis and treatment program. While many programs have created innovative materials that are culturally sensitive and linguistically appropriate, the ones that have the greatest impact, in our experience, are messages that are both inspirational and aspirational. That is, they motivate women to come forward on their own to get tested. The epic journey of Michele Baldwin (Lady Ganga) on the Ganges River is one such story.

Baldwin, a forty-three-year-old single mother of three, was told by her doctors that they could do nothing more to treat her cervical cancer. Baldwin decided to devote what time she had left to one extraordinary feat and disseminate a lifesaving message. She decided to take a trip to one of her favorite countries, India, and paddleboard 700 miles down the Ganges River to spread her message about the importance of cervical cancer screening. Her epic journey has been made into a short film and is in the process of being translated into several languages so that women around the world can be motivated and inspired to get screened for cervical cancer. We found that her film, Lady Ganga, Nilza’s Story, puts to rest the questions, concerns, and excuses that so many women have: “Why should I get tested when I am feeling well?” “I do not want to show my pelvic area if I don’t have to.” “I have no one to take care of my young children.” “I don’t have transportation.” “I cannot take time off from work.” “I have to ask my husband first.” We have found that women are receptive to inspirational educational messages, especially those presented in a manner that resonates personally. Stories like Baldwin’s can have a tremendous impact on women of all ages.

More than 50 percent of India’s population is below the age of forty. Harnessing the energy and enthusiasm of this cohort and providing these people with knowledge about cervical cancer could have a tremendous impact on reducing the burden of this disease. Our organization, in collaboration with one of our US partners, has developed a short, simple, and interactive presentation for middle and high school students. In this presentation the younger generation is encouraged to take a proactive role in getting vaccinated and to encourage their mothers, aunts, and older sisters to get screened. As Baldwin’s eleven-year-old daughter eloquently said, “Doesn’t matter if you don’t know what a Pap is. Just ask your Mom if she got it.”

While it is essential to provide education before screening, we have found
that it is just as important to continue education after screening. Wome
who test negative should be told that while the negative test result is won-
derful news, it is important to go for periodic screening. The absence (i
disease is not a guarantee that there is no disease, just as a positive test do
not automatically mean that there is cancer. Educational campaigns shoul
reinforce the message that women need to be screened periodically.

Screening and Treatment

“There are clinics that are offering cervical cancer screening without an
clear pathway for follow-up and treatment,” a program officer once sai
to me. Our belief is that there should be no screening unless a program
able to provide some accepted form of appropriate early treatment and
referral pathway for advanced cases wherever feasible. At one of our NGO
where there were no doctors on-site and the community health worker
were only trained in VIA and not in cryotherapy, the program coordinate
carried out the camp every four to six weeks and brought in doctors to tre:
the VIA positive cases.

The closer we get to one-stop screen and treat programs, the closer we ar
to reducing the number of late-stage cancers. Also, screening and treating:
the same time has the potential to reduce the number of women lost to fo
low-up. It has also been our experience that when lunch and transportatio
are provided, attendance at screening camps improves, especially if wome
have to travel long distances.

Local community physicians and nurses would like to receive more sup-
port from the OB-GYN doctors. “Without their support, it is very difficult t
scale up the VIA program,” a community physician said. We at GIAHC ar
in complete agreement with this statement and believe that leadership fro
the OB-GYNs in the community plays an important and pivotal role in suc
cessful screening programs. These doctors can and should play a significan
role in providing oversight and expertise.

In India the overwhelming majority of the population lives in rural se
tings, while the overwhelming majority of the physicians are located i
urban centers. Most screening programs using VIA and cryotherapy ar
currently administered by OB-GYNs. By reorganizing the workforce, tas
hifting presents a viable solution for improving health care coverage, in
creasing capacity and making more efficient use of the human resource
already available in areas where there is an acute shortage of doctors. W
have worked with NGOs in very remote areas where there are no OB-GYN
We have trained the local midwives and Ayush doctors (doctors trained in Ayurvedic medicine, one of the oldest holistic healing systems) to screen for cervical cancer and provide the necessary education and information to the local community. If it were not for them, we would not have been able to carry out our work in such remote areas.

We have also found that partnering with medical institutions that have outreach programs is helpful. Some local community NGOs may not have the support of a network of physicians within their system. One NGO in a rural area of India stated the problem very eloquently: “We are trained in cryotherapy but have problems securing the tanks. Since we have no affiliation with the community OBGYNs or a nearby hospital where oxygen tanks and cryo tanks are supplied on a regular basis, we have no access to them. Besides, if we do not have affiliations, the OBGYNs and staff in the hospital double guess our work and compromise our image in our community.”

In an effort to resolve the challenges of procuring cryotherapy tanks, we are now in the process of exploring newer devices that have been introduced in the market: CryoPens (using cold to freeze cells) and ThermoCoagulators (using heat to destroy abnormal tissue). Both devices are well suited for low resource settings, as they are inexpensive, portable, battery operated, and lightweight. A full charge is good for twenty-five to thirty treatments. The no-gas treatment options will substantially expand access to treatment through rural and mobile services.

One of our goals is to have the primary care staff in the rural areas be trained in VIA and cryotherapy and be able to refer advanced cases to local clinics where loop electrosurgical excision procedures (LEEP) can be performed. Some of our partners also have access to larger, tertiary centers with personnel who can manage the more advanced cases, including invasive cervical cancer.

“We are so glad that you asked us to present a clear pathway for treatment, referrals, budget, etc. as it forced us to review our capabilities and explore the facilities available in the neighboring areas to support our program. We just found out that there is an OB-GYN in the community who is very interested in cervical cancer prevention and has offered to help us with our referrals,” one program manager told us.

Follow-up for Positive Cases

How a program handles the cases that are lost to follow-up is a crucial issue in the success of any cervical cancer screening program. A social worker
told me, “Ma’am, when there is a V1A positive case, we do everything possible to make sure that the woman follows up for treatment. However, even knowing something could be wrong, many women refuse to come forward because they do not understand the disease process and its consequence. They talk to their friends and families, who discourage them to go for follow-up as they have no symptoms. So our program started a counseling service where women who tested positive attended the program and felt grateful that they did as they are now cured of the disease.” Counseling sessions and words of encouragement from doctors, nurses, and community advocates go a long way to help women make important decisions about their health.

*Training*

After our first foray in raising awareness and educating women about cervical cancer, we realized that there were very few programs offering cervical cancer education, screening, and early treatment training courses to physicians and nonphysicians in rural areas. When available, the programs were invariably in a different state where a different dialect was spoken, meaning that trainees would have to travel great distances, be away from home and work for several days, and face language barriers during training. This posed extra challenges to the learning process. In addition, we realized that many obstetrics residents were not trained in cryotherapy, and some were not familiar with LEEP. Discussions about offering a comprehensive cervical cancer prevention elective program to final year medical students ensued, as did holding periodic certification workshops for community doctors.

Our experience also taught us that practitioners who attended the training sessions had difficulty establishing cervical cancer screening programs. They had no idea where to begin or how to proceed. We also found that after providers are trained and return to their communities, there is very little ongoing support for them to initiate and sustain their programs. Somewhat feeling isolated and unsure of their skills, give up on the project.

In 2016 giahc accepted an invitation to participate in a partner workshop, Improving Data for Decision-Making in Global Cervical Cancer Programs (IDCCP), a project being led by the CDC, CDC Foundation, George V Bush Institute, and WHO. Its objective is to develop a globally endorsed standardized toolkit that can be adapted at the country level to support the collection of high-quality data for cervical cancer programs. The toolkit
would also include a costing tool template that we believe would be a good starting point for programs that are interested in cervical cancer prevention.

*Support Network for Community Health Centers*

We have been exploring the feasibility of building capacity among community-based clinicians. One program that helps to foster such a relationship is Project ECHO (Extension for Community Healthcare Outcomes). Project ECHO links primary care clinicians with specialist care teams based at university medical centers to manage patients who have chronic conditions requiring complex care. It is transforming the way medical knowledge is shared and translated into everyday practice and, in the process, enabling thousands of people in remote and medically underserved communities to get care they couldn’t easily get before, if at all. Project ECHO has over ninety hubs worldwide—including more than fifty-five in the United States and more than thirty in sixteen additional countries—covering more than forty-five complex conditions. There are plans underway to develop an estimated fifty ECHO hubs or programs throughout India over the next four years to include management for various complex medical conditions, including cervical cancer.

Another challenge many cervical cancer screening programs face is personnel turnover, particularly among program coordinators. I once received a letter from a program coordinator stating, “Dear Dr. Krishnan. Thank you for giving me the opportunity to coordinate the cervical cancer prevention program. I have gained invaluable knowledge from this program. Based upon my experience, I have been offered a better job with better pay and benefits at a much bigger organization. I’m sorry that I have to leave, but as you will understand, I believe this is good for my career and future.” While we are very happy for our staff to better their prospects, either through better jobs or receiving scholarships for higher education, it takes a long time to find adequate replacements, particularly in remote areas. Many programs are in danger of being completely derailed because of high turnover of trained staff. Other challenges that we continually encounter are in the area of financing. Fund-raising with matching programs and establishing corporate social responsibility (CSR)—a business approach that contributes to sustainable development by delivering economic, social, and environmental benefits for all stakeholders—have met with varying degrees of success. Often overlooked is the importance of maintaining a
good database to monitor progress. Data are essential for many reason including program evaluation and presenting a rationale for funding.

Conclusion

Cervical cancer can have devastating effects on a woman and her family. This cancer in particular affects women in their prime. One out of every four cases of cervical cancer occurs in India, with a woman dying every seven to eight minutes from this disease. This situation can be explained by lack of access to effective screening and to services that facilitate early detection and treatment. As chapters in this book have shown, low-tech and inexpensive screening tools exist and could significantly reduce the burden of cervical cancer deaths, especially in less-developed countries. The sad thing is that cervical cancer is a disease that is almost completely preventable by vaccine and screening.

Our experience has shown that implementing a cervical cancer prevention program in India is challenging. There is a general lack of awareness among rural women, and finding appropriate partners can be difficult. In addition, insufficient funding from the government at the national level, lack of insurance coverage, lack of universal access to the HPV vaccine, affordable prices, and a fragmented health system make cervical cancer screening more challenging than it should be.

In spite of all these realities, there are many excellent cervical cancer prevention programs run by dedicated providers throughout the country. We are optimistic that with greater awareness of the need for screening, cervical cancer prevention will become routine and help substantially reduce the number of women who die from this disease. Michele Baldwin’s quest and her dying wish, was to spread the word about the importance of cervical cancer screening. We, and other organizations, are striving to ensure that women, especially poor, rural women, need not die of this preventable, treatable disease.

References


and codirects the online master in family medicine, the MSc in global health non-communicable diseases, and the MSc in global eHealth. Dr. Grant also leads the international palliative care and spiritual and palliative care strands within the Primary Palliative Care Research Group in the Centre for Population Health Sciences.

**Rita Isaac, MD, MPH**  
Dr. Isaac is professor of community medicine and head of the RUHSA (Rural Unit for Health and Social Affairs) Department, Christian Medical College, Vellore, India. Since 2007 she has been working on an innovative, feasible model of the "Educate, Screen, Treat" Cervical Cancer preventive program using low-tech methods for rural women in India and more recently, an oral cancer prevention program for rural India. Her other research areas include nutritional issues in adults and children in collaboration with the University of Aberdeen; HIV disease, intestinal dysfunction, and inflammation, supported by the US National Institute of Health; and Empower ASHAs to provide mobile, multiplex, antenatal screening at point of care in collaboration with McGill University, Montreal. She is also currently serving as deputy director (promotion and publicity) at Christian Medical College, Vellore.

**Linda S. Kennedy, MEd**  
Ms. Kennedy is associate director for community affairs at Dartmouth-Hitchcock Medical Center. She is a facilitator and planner who connects people with opportunities and communicates about science to audiences, including the general public, investigators, and poor people who live in low-income countries. For more than twelve years she has been dedicated to community building in a small region of rural Honduras and to developing a research infrastructure there and in urban Honduras. She facilitates research in cancer prevention that yields immediate benefits for local people; improves local care; and makes substantive translational contributions to cancer control with initiatives that are feasible, acceptable, and effective.

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Dr. Kerr received his DDS from McGill University and his MSD and certificate in oral medicine at the University of Washington. He is a clinical professor in the Department of Oral and Maxillofacial Pathology, Radiology and Medicine at New York University College of Dentistry. He is a diplomate of the American Board of Oral Medicine and past president of the American Academy of Oral Medicine. He is chair of the Global Oral Cancer Forum and a member of the scientific advisory board for the Oral Cancer Foundation. His interests include the early detection of oral cancer and the diagnosis and management of oral, potentially malignant disorders.

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Dr. Krishnan is a board-certified family physician and gynecologist. She has been involved in the area of women’s health for over thirty years. She is founder and president of Global Initiative Against HPV and Cervical Cancer. Dr. Krishnan is a
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**Grace Tillyard**
Ms. Tillyard is currently pursuing a doctoral degree in the Media and Communications Department at Goldsmiths College, London, where she is a Stuart Hall Foundation scholar. For the past four years she has worked in women's health and international development in Haiti, London, and Italy. She holds the position of director of outreach and communication for Innovating Health International, a nonprofit based in Port-au-Prince. Her research interests include feminist cultural approaches to science and technology, women’s health, and the Internet and media cultures of use.