Short Communication

Prevention of cervical cancer in Sudan: perspective

Moawia Elsadig, MD MPH

Department of Obstetrics and Gynaecology, School of Medicine, Al Neelain University, Khartoum, Sudan and Center for Control and Research on Cervical Cancer

Abstract

Background

More than 600,000 new cases of cervical cancer are diagnosed annually worldwide. Eighty-five percent occurs in developing countries. Cytology screening can substantially reduce mortality from cervical carcinoma in developed countries. Such model of screening based on adequate resources is difficult to organize in developing countries. Objectives of this study are to discuss barriers and missed opportunities to cervical cancer prevention in Sudan, and emphasize the need for alternative screening tests and treatments.

Methodology

The study describes the current situation and investigates innovative screening approaches applicable in developing countries.

Findings

In Sudan, cervical cancer accounts for 16% of women’s cancer and ranks the 2nd most frequent cancer in the country. Eighty-five percent were presented in advanced stage. More than 990 new cases were diagnosed in 2011 and 600 died. Less than 0.10% has been screened in the last 5 years because access to Pap smear test is very limited or nonexistent. Considerable attention is being given to the development of alternative screening methods. Operational researches have shown that visual inspection with acetic acid (VIA) performed by primary health workers, can cut the death rate by 31% and can be implemented in...
low-income countries where it could prevent 72,000 number of deaths annually.

**Conclusion and recommendations**

There is no screening program in Sudan. VIA is considered the appropriate screening test. It is simple, acceptable, reproducible, and easily implemented without laboratory support and can save lives. Moreover, prevention program must include a package of health education, training, awareness, and good coverage. We have to face financial challenges, and culture acceptability which require community cooperation and partnership. We need to overcome prejudice towards simple screening techniques that can be performed by non-physicians, and increase health providers awareness towards cost effective novel procedures.

**Key words:** cervical cancer prevention, alternative screening tests human papillomavirus, developing world.

**Introduction**

Cervical cancer has a major impact on women’s lives worldwide, particularly in developing countries where it is the leading cause of cancer death. According to the latest global estimates, more than half a million new cases of cervical cancer are seen each year and more than 250,000 die of the disease annually\(^1\). Four out of five new cases and a similar proportion of death occur in developing countries where screening programs are not well established or non-existent. If prompt programs are not started, it is expected that the mortality will increase by 25% in the following 10 years \(^2\).

The hardest hit region is among the world’s poorest. Sub-Saharan Africa, Central and South America, the Caribbean and part of Oceania and Asia have the highest incidence rates- over 35 per 100,000 women, compared to no more than 10 per 100,000 women in North America and Europe\(^1\). Because the disease progresses over many years, an estimated 1.6 million women worldwide are living with cervical cancer, and up to 8 million may have pre-cancerous lesions that need to be identified and treated\(^3\).

According to WHO (2009), only 5% of women in developing countries had been screened for cervical cancer, compared to more than 40% in developed world. As a result, in Africa and other developing countries, the majority of women present with invasive disease at an advanced stage, where treatment is more expensive and seldom effective. An important reason for the markedly higher incidence of the disease is the relative lack of effective screening programs and treatment facilities for pre-cancerous conditions. There is also lack of awareness about the disease, its preventability, and the need for screening. These failures, account for the difference in disease rates between high and low resource countries. The disease represents a real example of health inequity.

Widespread Pap test screening has significantly reduced the incidence and subsequent death rate from cervical cancer by 80% in high-income countries. Screening based on the standard Pap smear test, remains beyond the economic resources of the developing world. If it is not detected and treated early, cervical cancer is nearly always fatal. The disease, which affects the poorest and most vulnerable women, sends a devastating effect through families and communities that rely heavily on women roles as providers and caregivers.

Unlike other cancers, cervical cancer can be successfully prevented by the timely identification and treatment of women who have pre-cancerous cervical lesions.

The natural history of the disease is well understood. A pre-cancerous lesion is a slow progressing condition that develops over 10-15 years providing ample opportunity to offer effective treatment before invasive cancer takes hold. Cost-effective studies show that prevention not only saves lives, but also saves money. Studies showed that screening women
with one or two-visit screening strategy involving VIA or DNA testing, reduces the lifetime risk of cancer by approximately 25 to 36% and costs less than $500 per year of life saved\(^4\).

**Study methodology**

The study was based on revision of relevant literature about recent innovative cervical cancer screening approaches applicable in developing countries using the key words: cervical cancer prevention, alternative screening tests human papillomavirus, developing world. The reviewed literature included relevant published articles, operational researches, WHO position statements and direct communications.

Due to the failure of establishing screening programs using cytology tests in many developing countries\(^5,6\), intensive work has been done worldwide since 1999 to assess and promote new prevention approaches that are inexpensive, safe, and widely acceptable. Two approaches are currently being evaluated: Visual inspection of the cervix with acetic acid (VIA), and Human papilloma virus (HPV/DNA) testing, have the potential to save more lives at lower cost than the traditional approach using Pap smear\(^4\).

Recently, the WHO/IARC conducted a large sampled, population based, randomized, controlled study in India\(^2\) and proved that with the availability of short-term training and effective quality control, VIA can be used as an effective cervical cancer screening method in developing countries.

Alliance for cervical cancer prevention (ACCP) projects in 17 countries\(^4,5,6\) has tested the feasibility of new screening and treatment approaches for low-resource settings. Their findings provide base of evidence upon which future programs can be built.

Visual screening methods involve swabbing the cervix with acetic acid (vinegar) or iodine solution and examining the cervix with the naked eye to spot abnormal tissue\(^7,8,9\). Visual screening has particular advantage in low-resource settings. It is relatively simple and inexpensive, relying on little infrastructure as all consumables are available locally. Non-physicians can perform the procedure, provided that they receive adequate training and supervision. Furthermore, results of the procedures are available immediately, making in principle, treatment and referral options possible during the same visit.

A recent randomized controlled study in 2103\(^10\), has shown that VIA conducted by non-medical personnel trained to deliver basic healthcare, can cut the death rate of cervical cancer by 31%. The strategy is effective and can be implemented on a broad scale in low-income countries. There is almost no over diagnosis, it doesn't require a laboratory, and it can be widely implemented. If taken globally to the lowest-resource countries, it could prevent around 72,000 numbers of deaths in the developing world\(^10\).

Another approach involves testing women for the presence of HPV on their cervixes using the hibred-2-capture test. Interest in HPV is growing worldwide. Since the discovery of HPV, as an etiological factor for cervical cancer in 2008, the pathogenesis of disease and the natural history of HPV infection have paved the way for the diagnosis of cervical cancer and pre-cancerous lesions, and for the development of HPV vaccines\(^10\). The latest HPV DNA testing technique, represented by the second generation of hybrid capture 2 (hc2), have improved the sensitivity and specificity of cervical cancer and pre-cancerous conditions detection to 95% and 85% respectively\(^4\). In 2005, the WHO announced that there was sufficient evidence that HPV DNA detection could be used for cervical cancer screening and follow-ups. Recent 8 years, Indian RCT showed that hc2 test was able to reduce mortality from invasive cervical cancer by 50%\(^6\). The recently developed rapid HPV DNA test, (the Care or Fast test) provides a simple, convenient and economical tool for cervical cancer screening and management\(^11\). The test
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is sensitive, reproducible, with almost 100% negative predictive value. Result is available within two hours, and new self-collection kits are now developed. Although it is not yet used as standalone test, it is expected to improve screening and follow-up combined with Cytology and VIA\(^7\).

**Situation in Sudan**

In the absence of proper cancer registry and limited statistical data, it would be extremely difficult to give a true picture of the situation in the Sudan, however, there are some studies that shed some light about the condition with regard to the epidemiology of cervical cancer, the availability of services, barriers and missed opportunities\(^2\).

Sudan, according to the last census, has a population of 14.04 million of women with the age of 15 years and older who are at risk of developing cervical cancer. Current estimates indicate that every year more than 990 women are diagnosed with cervical cancer and 612 died from the disease (Radiation and Isotopes center in Khartoum, 2009). The disease ranks the 2\(^{nd}\) most frequent women cancer in the country, and the second most frequent among women between 15 and 50 years of age\(^3\).

Over the last three decades all efforts failed to establish an effective national cancer control program and consequently, a proper cancer registry. There is no cervical cancer screening program in the country. The Radio Isotope and Nuclear Medicine Center in Khartoum (RICK) was the soul caregiver and source of information in the country. The only unit for cervical cancer prevention and treatment is at Khartoum Hospital, and Omdurman Friendship Hospital in Khartoum, and a center in Wad Madani Gezira state as part of the Gynecology Department.

It has been estimated that less than 0.10% of women in Sudan had been screened for cervical cancer in the past five years\(^3\). Cervical cancer screening services are not available to women at the primary health care level, where the majority (85%) live. Pap smear is theoretically the most commonly used method for cervical cancer screening, but its availability is limited at the urban areas and private clinics and hospitals. The average screening rate at the primary health care levels using pap smears is approximately less than 0.1 per month. Provincial and district hospitals combined, perform a total of about 150 pap smears a year\(^3\).

Treatments of cervical dysplasia in the public hospitals are limited mainly to cone biopsies. For the treatment of invasive cervical cancer, simple hysterectomy (effective only for early invasive disease) is available at district and referral hospitals, but extended hysterectomy and disease staging are available only at few tertiary facilities.

Radiotherapy facilities are very limited. Chemo-radiotherapy is available only in Khartoum and Gezira state. With only just two Cobalt machines, it means that there is one machine per 10 million people. Since most of cervical cancer is diagnosed late, the scope for successful treatment is limited and expensive. Consequently, the mortality rate is high among the affected. Palliative care services and drugs for pain management are available only at the RICK, with very limited access to them in other local facilities. There is no single hospice facility in the whole country. The care for all these cases is solely provided by the family!

Without access to viable programs, poor communities generally seek care only when they develop symptoms and the cancer is already advanced and difficult to treat. Health
Care providers often can do little to save their lives at this stage. Often barriers to prevention and treatment may include: lack of awareness, the health-seeking behavior, difficulty getting to clinic and hospitals, the need for multiple visits, and the high cost associated with travel and treatment.

Sudan National cancer control program, a dream that has never come true!
The new policies regarding the formation of national cancer control program, and the establishment of the new cancer registry, represent a true move against cancer control in the country. However, things are not moving forward. Still there is no clear policy regarding cancer control! The formation of the national cervical cancer management team, three years ago, and the newly drafted guidelines and prevention strategic plan for 2010-2014, marked an important milestone in the efforts to improve the health and the well-being of women in the country. It has evolved from growing recognition that death and illness due to cervical cancer are preventable. Research has demonstrated that cervical cancer prevention can be affordable, effective, and achievable in low-resource environment using visual inspection tests. The Ministry of Health is therefore obliged to make cervical cancer screening services available, affordable and accessible at the community level.

To avoid the downfall of the program and to secure continuity, we need to have the right people at the right place! This could be achieved by having full time leaders and well formed management team to plan, develop, supervise, implement, and evaluate programs and projects. Similar bodies could be formed at state level.

The goal of the program is to reduce morbidity and mortality from cervical cancer. Program objectives will focus on achieving wide coverage of women with high risk, using cost-effective screening and treatment approaches. Furthermore, they should mobilize resources required for program implementation, involve communities to build awareness and support, and assure appropriate management for cervical cancer patients within available resources.

Trained community physicians and family doctors can play an important role in cervical cancer prevention, not only in raising awareness, health education, training, and referrals, but also in screening and treatment of pre-cancerous conditions at local levels. Histopathology services are of paramount importance, and histopathologists are important partners in program development and implementation. Bearing in mind the limited resources within this sector, a realistic approach is mandatory for good and sustained programs. Allocation of funds should be considered. One way is the inclusion of services in the national insurance program.

The strategy also acknowledges the important role women themselves and their families can play in taking the right measures to prevent the debilitating disease. To accomplish these objectives, five outputs must be achieved in the initial period of the project: First, the development of strong and sustained communication and advocacy strategy, followed by improvement of infrastructures (facilities, equipments and supplies) at health centers, district hospitals and tertiary levels to enable them to carry out screening and treatment services, including repair and maintenance of equipments on which the success of the program depends. Training of health personnel at all levels of health care to provide continuous and sustained cervical cancer screening and treatment services. Providing facilitative supervision, refresher training and on-job certification by the training team to enable them to maintain and enhance their skills. Retain and schedule trained staff to ensure service availability.

Lastly, women of 30-49 years screened for cervical cancer, women with dysplasia treated,
those with invasive disease referred, and provision of palliative care for women with advanced disease.

Management approaches
The good test is the one that we can do!
Facts about etiology of cervical cancer, the development of new appropriate screening tests and treatment procedures, opened a new era for cervical cancer prevention and control in developing countries. In other words, multiple methods of control are available now that suit countries at various economical levels. WHO encourages prevention of cervical cancer worldwide, and considered that successful program depends not only on abundance of resources, but on proper health system, well defined heath policies and political will\(^{(11)}\).

Low cost treatment approaches
To be effective, cancer prevention programs must link testing with appropriate treatment, including low-cost outpatient procedures. Relatively, simple procedures can be used to either destroy or remove abnormal cervical tissue. Such two procedures are particularly appropriate in low-resource settings.

1. Cryotherapy uses extremely low temperature to destroy the abnormal tissue. The method is simple, cheap, needs no electricity, and is effective even where physician, health supplies, and infrastructure are severely limited\(^{(12)}\). Carbon Dioxide, the coolant agent is an out product gas, is cheap and available. The procedure is easy to learn and perform by almost all health providers, with almost 95% success rate in well selected cases\(^{(5,13)}\).

2. Loop excision of the transformation zone (LETZ) The procedure involves using a thin electric wire to remove the affected area. While LETZ requires more medical backup and equipment than cryotherapy, the procedure allows tissue to be extracted for diagnostic confirmation, reducing the possibility that advanced cancer will go unnoticed\(^{(13)}\).

For women with early cancer, programs need to make some surgical interventions available at referral centers for cone biopsy or hysterectomy. Patients with advanced conditions, radiotherapy and palliative home-based care to relieve pain and suffering may be the most realistic and compassionate option.

Discussion
Many developing countries have had cervical cancer prevention program using cytology, for some time! But have failed to replicate programs from developed countries and reduce death rates. Mainly, due to poor infrastructures and failure to sustain services\(^{(4)}\). Therefore, increased awareness of the feasibility of new preventive strategies had led to growing interest in addressing this preventable disease.

The great challenge is to encourage women with very limited awareness and knowledge about prevention of cervical cancer to seek care. To encourage community involvement in strengthening preventive efforts, and to maximize coverage, a state advocacy body from women groups, religious leaders, health workers, patients and NGOs should be established at the beginning of the program. Health clinics and traditional meeting and ceremonies and other appropriate events should be used. The important and integral part of the program is to focus on: creating cancer-awareness attitude among a community with very limited information and knowledge in this area of health. Issues about cancer stigma, hygiene, smoking, unsafe sex, multiple sexual partners, and the protective effect of male circumcision should be highlighted.

Information, education, and communication (IEC) materials should be widely used. Several radio and TV talks, posters, brochures, and stickers should be developed and distributed to reach wider target population. On-site education should be
carried out in all health centers and hospitals as well.

Operational researches have demonstrated that programs can safely and effectively screen and treat women in only one or two clinic visits, using low-cost techniques\(^{(14)}\).

In many resource-poor settings, prevention programs can be integrated into already existing health services, assuming adequate training and resources are available\(^{(6, 8, 5)}\).

To be effective, prevention programs must include a package of health education, training, screening, and treatment services that reach the majority of women at risk of the disease.

Cancer prevention activities or recently called preventive oncology, should be an integral part of community health programs in medical schools and other health institutions curricula.

Comprehensive prevention programs should have a number of key features. They should include the use of locally understood messages to increase awareness of the disease and motivate women to get tested at least once in a lifetime. Utilize an affordable, appropriate, simple, and reproducible test like VIA. Focus on screening a significant proportion of women in their 30’s and 40’s for cervical abnormalities. Furthermore, make outpatient treatment for pre-cancerous lesions widely available, track patients and arrange for appropriate follow-up and then monitor and evaluate program effectiveness.

To achieve these goals, task shifting and sharing should be employed. Programs may need to remove barriers that prevent service from expanding, such as those that do not allow trained non-physicians to provide services especially in remote rural areas. Experiences from developing countries\(^{(6)}\) have shown that non-physicians (medical assistants, midwives, nurses and other health workers) if well trained and supervised, can play an important role in many reproductive health activities including cancer prevention. There is a need for advocacy and awareness to overcome prejudice towards simple screening techniques that can be performed by non-physicians.

Providers at all level need training in cervical cancer prevention, including counseling skills. To be effective, services may need to be coordinated with other health programs that reach women in their 30’s and 40’s, and they should minimize the number of visits a woman must make to receive appropriate care.

The prophylactic vaccine has appropriately been recognized as a major advance in cancer research and a great achievement against cervical cancer. Since 2007, all WHO member’s states agreed that in efforts to reduce cervical cancer, every country should enhance cervical cancer prevention programs, improve strategies for treatments and monitoring and introduce human papilloma virus (HPV) vaccine in appropriate regions\(^{(14)}\).

However, the current price of the vaccine, at least for the near term, will remain too expensive to be widely implemented in the developing world.

The future goals will be to verify the long-term safety and efficacy of the vaccine, to reduce the current cost or make an effective vaccine that is more affordable to purchase and deliver, and also endow a vaccine with the ability to protect against an even larger proportion of HPV infections\(^{(15, 16)}\). Moreover, vaccines will not affect millions of women worldwide who are already infected with HPV. Therefore serious consideration needs to be given to reduce cervical cancer rate in women who are already infected, which will need to rely on screening intervention other than HPV vaccination.

To overcome major challenges and barriers to vaccination implementation, a strong political will and public acceptance are needed, as well as the presence of a strong multidisciplinary team. This can be achieved via strong internal advocacy for the introduction of vaccine in the public sector and collaboration and partnerships with bilateral donors like Global
Alliance for Vaccinations and Immunization initiative (GAVI), UNICEF and other local and international organizations. The initiative aims to make the vaccine available to developing countries at low cost\(^{(17,18)}\).

To apply and be GAVI - eligible country for prevention of cervical cancer, a demonstration project should be conducted with the objectives of studying the prevalence and magnitude of the disease, cost-effectiveness, available screening test and treatment, capacity building and established and clear health policy.

In conclusion and recommendations, due to the presence of very pressing health needs within the country, or other unforeseen factors, the reproductive health directorate at the ministry of health, the department of non-communicable diseases, and other related institutions or organizations, have previously not addressed seriously the problem of cervical cancer prevention! All measures and funds are directed towards treatment of advanced cases.

Recent advances and new screening tests are now available. Experiences from similar countries signify that, it's not only possible, but imperative that we stop neglecting the heavy burden of this disease. To make serious foreword steps, we have to face financial challenges, and culture acceptability which require community cooperation and partnership.

Furthermore, we need to overcome prejudice towards simple screening techniques that can be performed by non-physicians, increase health providers awareness toward cost effective novel procedures, and be prepared to face new opportunities and challenges. We believe that the time has come for the development and implementation of cost effective and comprehensive prevention program.

This can only be achieved through the establishment of strong national cancer control program involving all concerned stakeholders.

Realistic and contextual appropriate strategies compatible with available resources and infrastructure should be implemented. It should be designed and built on existing experience and capacity, and to be phased in measured way.

The goals and objectives are achievable if efforts are properly coordinated, multisectoral cooperation can be obtained, resources are allocated judiciously, and if political commitment is firm.

References


