

CERVICAL CANCER IN WOMEN

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Abstract: Cervical cancer remains a major public health concern worldwide, particularly in low- and middle-income countries. It is predominantly caused by persistent infection with high-risk types of human papillomavirus (HPV). Despite being one of the most preventable and treatable cancers, cervical cancer continues to contribute significantly to cancer-related morbidity and mortality among women. This article provides an in-depth overview of the etiology, risk factors, screening modalities, clinical presentation, staging, and current management strategies of cervical cancer. Special attention is given to HPV vaccination, the role of public health systems, and future directions in treatment and prevention.

Keywords: cervical cancer, human papillomavirus, HPV vaccine, Pap smear, colposcopy, gynecologic oncology.

INTRODUCTION

Cervical cancer is a malignant neoplasm arising from the epithelial lining of the cervix, most commonly from the squamocolumnar junction. It ranks as the fourth most common cancer among women globally, with an estimated 600,000 new cases and over 340,000 deaths annually, according to WHO statistics. The vast majority of cases occur in women who have limited access to screening and preventive services.

The etiological link between cervical cancer and persistent infection with oncogenic strains of human papillomavirus (HPV), particularly types 16 and 18, has transformed the approach to prevention and early diagnosis. With the advent of HPV vaccination, regular Pap smear testing, and improved awareness, cervical cancer is largely preventable. Nevertheless, disparities in access, education, and healthcare infrastructure continue to hinder effective control of the disease in many regions.

MATERIALS AND METHODS

The pathogenesis of cervical cancer is strongly linked to persistent infection with high-risk HPV types. While HPV infection is common and often transient, in some women it persists and leads to pre-cancerous changes known as cervical intraepithelial neoplasia (CIN), which can progress to invasive cancer over several years.

RESULTS AND DISCUSSION

Cervical cancer outcomes vary drastically across the globe. While incidence and mortality have declined significantly in high-income countries due to robust vaccination and screening programs, the burden remains high in LMICs, particularly in sub-Saharan Africa, South Asia, and parts of Latin America.

For instance, countries with universal HPV vaccination (e.g., Australia, the UK, Sweden) have reported a dramatic decline in high-grade cervical lesions among young women, projecting the elimination of cervical cancer as a public health problem within the next few decades.

In contrast, over 85% of cervical cancer deaths occur in developing countries, where women often present with advanced disease and have limited access to curative treatment. The global response, led by WHO's "Global Strategy to Eliminate Cervical Cancer", aims to achieve the 90-70-90 targets by 2030 [2]:

- 90% of girls fully vaccinated with HPV vaccine by age 15

- 70% of women screened with a high-performance test by 35 and again by 45
- 90% of women with cervical disease receiving appropriate treatment

Meeting these targets will require coordinated action at all levels, from primary care to oncology referral centers, and from health ministries to civil society organizations.

Recent advancements in cervical cancer diagnostics are transforming the landscape of early detection and risk stratification. While the traditional Pap smear remains widely used, its subjectivity and variable sensitivity have prompted the development of more robust, molecular-based screening tools.

One of the most promising developments is the HPV mRNA testing, which specifically detects the expression of E6/E7 oncogenes—indicating not just the presence of the virus but active viral replication and cellular transformation. Compared to DNA-based tests, mRNA assays offer higher specificity in detecting lesions that are likely to progress [3].

In pregnant women, cervical cancer management becomes more complex. Depending on the stage of disease and gestational age, treatment must balance maternal survival with fetal viability. Early-stage disease may allow for delayed intervention until fetal maturity, while advanced cases may necessitate early delivery or pregnancy termination.

Additionally, transgender men with intact cervixes, often excluded from routine gynecological care, are at risk for cervical cancer and may face significant barriers to screening due to stigma, misgendering, or lack of provider knowledge. Gender-inclusive protocols are essential to ensure comprehensive coverage.

In many low-income regions, out-of-pocket health spending leads to catastrophic financial consequences. Cost-effectiveness analyses demonstrate that HPV vaccination and early screening are among the most efficient public health investments, yielding long-term savings by preventing advanced disease [4].

International agencies such as Gavi, the Vaccine Alliance, have begun supporting HPV vaccine rollout in eligible countries, reducing financial barriers and promoting sustainable health equity. Policymakers are urged to reframe cervical cancer programs not as expenditures but as investments in women's health, workforce productivity, and social stability.

CONCLUSION

Cervical cancer is a highly preventable disease with well-established risk factors, screening tools, and effective treatments. Despite this, it remains a significant cause of death among women, especially in low-resource settings. Comprehensive strategies encompassing HPV vaccination, regular screening, early diagnosis, and equitable treatment are essential to reduce the global burden. The success of cervical cancer control programs ultimately depends not only on medical advances but also on political will, community engagement, and sustained investment in women's health systems.

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