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Review

The Impact of Cervical Cancer on the Health of Elderly Women and the Relevance of HPV Vaccination: Challenges and Strategies for Public Health

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ABSTRACT

Uterine cancer represents a significant public health challenge, especially among older women. This article discusses the impact of this cancer on the physical and emotional health of patients, as well as the high costs associated with its treatment. The relationship between the Human Papilloma Virus (HPV) and uterine cancer, as well as other cancers, is addressed, highlighting the importance of prevention and early detection through Pap smears and HPV vaccination. Although vaccination has the potential to eradicate the disease, countries like Brazil face difficulties in implementing it effectively due to vaccine hesitancy and the spread of false information. This article emphasizes the need for a multidisciplinary approach to combat misinformation and improve vaccination uptake.

Keywords: HPV, misinformation, Pap smear, vaccine hesitancy, Uterine cancer

1. Introduction

Uterine cancer, also known as cervical cancer, is a global public health problem that ranks among the leading causes of female mortality. This type of cancer is especially devastating for older women, who often face greater challenges in accessing healthcare and undergoing preventive examinations. According to the World Health Organization (WHO), in 2020, around 604,000 new cases of cervical cancer were diagnosed worldwide, resulting in approximately 342,000 deaths, with the majority occurring in low- and middle-income countries¹. These alarming figures underline the urgent need for effective prevention and treatment strategies.

The early detection of cervical cancer through the Pap smear, developed by George Papanicolaou in the 1940s, revolutionized the ability to identify and treat precancerous lesions before they

became malignant². This simple, low-cost cytological test has drastically reduced the incidence of and mortality from cervical cancer in countries where it has been widely implemented. However, the effectiveness of this method depends on its regular performance, which is not always possible in areas with limited access to health services.

At the same time, vaccination against the Human Papilloma Virus (HPV) has emerged as a crucial tool in the prevention of cervical cancer. HPV is responsible for around 70% of cervical cancer cases and the introduction of the bivalent, quadrivalent and nonvalent vaccines has brought new hope for the eradication of this disease³. The vaccine has been shown to be highly effective in preventing infections by the most oncogenic types of HPV, including types 16 and 18, which are responsible for most cases of cervical cancer⁴.

Despite robust scientific evidence supporting the efficacy and safety of HPV vaccination, vaccine hesitancy remains a significant challenge. The spread of false information and conspiracy theories on social media has fueled public distrust and undermined vaccination efforts⁵. This phenomenon not only affects HPV vaccine acceptance, but also jeopardizes the implementation of other essential public health interventions.

This article aims to explore the multifaceted impact of uterine cancer on women's lives, with a special focus on older women and to examine the critical importance of HPV vaccination as a preventive strategy. In addition, it discusses the challenges faced in implementing effective prevention programs, highlighting the need for an integrated approach that includes education, access to health services and combating misinformation. By deepening the understanding of these aspects, it is hoped to contribute to the development of more effective policies and practices in the fight against cervical cancer.

2. The Impact of Uterine Cancer on the Lives of Older Women

2.1. Physical Health

Uterine cancer, particularly cervical cancer, has a devastating impact on the physical health of women, especially older women. This type of cancer is often detected in advanced stages, due to a combination of factors such as lack of access to health services, negligence in carrying out regular preventive examinations and the presence of comorbidities that mask the initial symptoms¹.

In advanced stages, treatment for cervical cancer can involve radical surgery, such as hysterectomy, as well as radiotherapy and chemotherapy. These procedures, although necessary, have significant side effects that can drastically reduce patients' quality of life. Among the most common adverse effects are extreme fatigue, nausea, damage to surrounding tissues and urinary and intestinal complications⁶. In addition, older women often have a slower recovery and a higher risk of postoperative complications, further exacerbating the physical impact of cancer and its treatment¹.

2.2. Emotional and Psychological Health

In addition to the devastating physical effects, the diagnosis and treatment of cervical cancer have profound emotional and psychological effects. Studies indicate that women diagnosed with cervical cancer often face high levels of anxiety, depression and post-traumatic stress⁷. These impacts are exacerbated in older women, who are often already dealing with other age-related health conditions, such as chronic diseases⁸ and who may have an inadequate social support network. Loss of independence, fear of death and altered body image due to surgical interventions are factors that contribute to psychological distress⁷. In addition, the feeling of social isolation, common among the elderly, can intensify these negative feelings. The combination of these factors can lead to a decline in mental health, negatively affecting adherence to treatment and patients' overall quality of life¹.

2.3. Impact on Public Health

Uterine cancer represents a significant challenge for public health systems. The costs associated with treatment are high and include spending on surgery, radiotherapy and chemotherapy treatments, as well as palliative care for advanced cases⁹. In

developing countries, where health resources are limited, these costs represent a substantial economic burden that can be mitigated by implementing effective prevention programs.

HPV vaccination and regular Pap smears are essential preventive measures that have been shown to significantly reduce cervical cancer incidence and mortality¹⁰. However, vaccine hesitancy and lack of adherence to screening programs remain major barriers. The World Health Organization points out that HPV vaccination is one of the most cost-effective strategies for preventing cervical cancer, recommending that it be administered to girls between the ages of 9 and 14¹. Studies show that expanding vaccination coverage and improving access to screening could significantly reduce the burden of cervical cancer on public health systems, freeing up resources for another essential areas¹¹⁻¹³.

3. The Link Between HPV and Uterine Cancer

3.1. History and Discoveries

The relationship between the Human Papilloma Virus (HPV) and uterine cancer, specifically cervical cancer, was established in the second half of the 20th century. From the 1970s onwards, research began to demonstrate the presence of HPV in cervical cancer samples, culminating in the identification of the virus as the main cause of the disease¹⁴. HPV is a common viral infection, transmitted mainly through sexual contact, which can cause precursor lesions to cervical cancer. There are more than 100 types of HPV, of which around 14 are considered to be at high risk of developing cancer¹⁵. These high-risk types, such as HPV-16 and HPV-18, are responsible for approximately 70% of cervical cancer cases¹⁶.

The pioneering studies of Harald zur Hausen, who won the Nobel Prize for Medicine in 2008, were crucial to understanding the role of HPV in the development of cervical cancer. His research demonstrated that HPV DNA was present in cancer cells, establishing a causal link between the virus and cancer¹⁷.

4. Other Types of Cancer Associated with HPV

In addition to uterine cancer, HPV is associated with several other types of cancer, including cancers of the mouth, throat, rectum, penis and vulva. It is estimated that HPV is responsible for around 5% of all cancers worldwide¹⁸. In the United States, for example, HPV is the cause of approximately 70% of oropharyngeal cancers (cancers of the mouth and throat)¹⁹. HPV infection is also a significant risk factor for anal cancer, accounting for around 90% of cases²⁰.

The diversity of cancer types associated with HPV highlights the importance of comprehensive prevention strategies. HPV vaccination is highly effective in preventing infections with high-risk HPV types. Studies show that the HPV vaccine can prevent up to 90% of cancers caused by the virus, including cervical and anogenital cancers²¹.

5. Prevention and Early Detection: The Pap Smear

5.1. Impact of the Pap Smear

The Pap smear, introduced in the 20th century by George Papanicolaou, revolutionized the early detection of cervical cancer. This cytological test allows the identification of abnormal cells in the cervix, enabling early interventions that can prevent the development of cancer². The impact of the Pap smear on

public health is substantial, as its implementation in population screening programs has resulted in a significant reduction in cervical cancer incidence and mortality in several countries²². In countries such as the United States, the widespread adoption of the Pap smear has reduced the incidence of cervical cancer by more than 70% since the 1950s²³.

5.2. Implementation Challenges

Despite the proven efficacy of the Pap smear, ensuring that all women undergo the test regularly remains a considerable challenge. Financial barriers, limited access to health services, lack of awareness, fear of the procedure and cultural stigmas are some of the obstacles that prevent universal performance of the test²⁴. In Brazil, for example, although the test is available through the Unified Health System (SUS), coverage is still insufficient to achieve effective prevention. Studies indicate that only around 80% of Brazilian women get tested regularly and coverage rates are even lower in rural areas and among low-income populations²⁵.

In addition, the inadequate health infrastructure in many regions prevents tests from being carried out efficiently and the necessary follow-up for cases with abnormal results²⁶. Another challenge is the variability in the quality of tests and the interpretation of results, which can compromise the effectiveness of screening²⁷.

To overcome these challenges, it is necessary to invest in educational campaigns that raise awareness about the importance of the Pap smear and demystify the procedure. In addition, public policies must be strengthened to guarantee universal and equitable access to health services, with special attention to vulnerable populations. The continuous training of health professionals to ensure the quality of the tests and the correct interpretation of the results is also crucial²⁸.

6. HPV Vaccination: Hopes and Realities

6.1. Vaccine development

The introduction of the HPV vaccine in the 21st century represented a significant milestone in the prevention of cervical cancer. The available vaccines, such as Gardasil and Cervarix, protect against the most common and dangerous HPV types, especially types 16 and 18, which are responsible for around 70% of cervical cancer cases^{4,29}. Clinical studies have demonstrated the high efficacy of these vaccines in reducing HPV infections and precursor lesions of cervical cancer. For example, a 4-year follow-up study showed a 90% reduction in infections caused by the HPV types covered by the vaccine³⁰.

6.2. Challenges in Vaccination Adherence

Despite the vaccine's revolutionary potential, the implementation of large-scale vaccination programs faces several challenges. One of the main obstacles is vaccine hesitancy, fueled by misinformation and conspiracy theories^{31,32}. For a portion of the population, the fear of many diseases that vaccines have controlled and eradicated has been lost and the lack of memory and information about what the world was like before immunizations leads to a lack of interest or commitment to this practice, which is so important for public health³¹. In Brazil, vaccination rates are worryingly low, with only around 50% of girls and an even lower percentage of boys completing the vaccination schedule³³.

Factors such as fear of side effects, the belief that the vaccine may encourage early sexual initiation and a lack of trust in health authorities contribute to this low uptake³⁴. In addition, the logistics of implementation, including distribution and access to the vaccine in rural and peripheral areas, also represents a significant challenge³⁵.

6.3. Fake News impact

The spread of fake news on social media exacerbates the challenges of vaccination uptake. False information about the risks of the vaccine, such as unfounded claims that vaccination can cause infertility or other serious conditions, have led many families to refuse vaccination for their children³⁶. This phenomenon is not exclusive to Brazil but has a particularly devastating impact in countries with limited health resources, where the capacity to combat misinformation is lower³⁷.

Fake news, amplified by social media platforms, creates an environment of mistrust and fear, hampering public health efforts to promote vaccination (Jolley & Douglas, 2014). Studies show that disinformation campaigns can significantly reduce vaccination rates, compromising the effectiveness of immunization programs³⁸.

7. The Challenge of Disinformation and the Role of Education

7.1. Misinformation and social media

Misinformation about the HPV vaccine is widely spread on social media, often by public figures and even some health professionals. The viral nature of these platforms allows false information to spread quickly, creating an environment of distrust and fear that hinders acceptance of the vaccine³⁹. The spread of fake news about the risks of the vaccine, such as unfounded claims that it can cause infertility or other serious conditions, has led many families to refuse vaccination for their children³⁶. This phenomenon is exacerbated by the architecture of social networks, by their algorithms, which often privilege sensationalist and polarizing content, thus increasing the reach of misinformation and forming bubbles that isolate users in misinformation⁴⁰.

7.2. Education and responsibility

To combat misinformation, it is crucial that all sectors of organized society, including the education sector, come together. Schools can play a vital role in disseminating correct information about the vaccine and promoting vaccination programs. Educational initiatives should be implemented to inform students about the benefits of vaccination and the risks associated with HPV infection, as well as debunking common myths⁴¹. Teachers and health professionals should be trained to convey this information effectively and in a way that is sensitive to cultural and individual concerns.

The traditional media, such as printed and televised newspapers, scientific journals or otherwise, must also be called upon to assume their informative and reliable role. Even if these means of disseminating knowledge are declining in use by the population⁴². In the face of the internet and social networks, they can play an important role in tackling the phenomenon of digital disinformation. But it is also important to pay attention to media outlets that do not ensure the reliability of the information they disseminate and that they can be held responsible for any form of spreading false or distorted news^{43,44}.

In addition, holding social media platforms accountable is an essential measure to tackle disinformation. Technology companies should be encouraged or even obliged, to implement strict fact-checking policies and to remove or flag false content about vaccines⁴⁵. Promoting evidence-based content and collaborating with health organizations to disseminate accurate information are important steps in this process⁴⁶.

7.3. Artificial Intelligence and New Technologies

Artificial intelligence (AI) and other new technologies can be powerful allies in the fight against disinformation. AI algorithms can be developed to identify and neutralize false information, promoting verified and educational content. Research shows that machine learning algorithms can detect patterns in fake news and help remove them before they go viral⁴⁷. However, the effective implementation of these technologies requires close collaboration between governments, technology companies and the scientific community to ensure that technological solutions are ethical and effective⁴⁸.

The creation of AI systems that can verify the authenticity of information in real time and provide immediate feedback to users is a promising area. In addition, blockchain technologies have the potential to guarantee the transparency and traceability of information, helping to build a more reliable information ecosystem⁴⁹.

8. Conclusion

The fight against uterine cancer and the promotion of HPV vaccination are multifaceted challenges that require an integrated and coordinated approach. Eradicating this cancer depends not only on the effectiveness of prevention and treatment tools, but also on the ability to overcome socio-cultural barriers and tackle the misinformation that undermines public health efforts.

The academic community, health professionals, educators and government authorities must collaborate to develop innovative and effective strategies that guarantee universal access to vaccination and early detection. The empowerment of social media platforms, public education and the use of advanced technologies are crucial steps in this journey.

The fight against uterine cancer reflects the larger battle against misinformation in the digital age. Science and technology have the potential to save lives, but their success depends on an informed society willing to embrace evidence-based knowledge. Only with a joint effort will it be possible to achieve the eradication of uterine cancer and build a healthier future for all women.

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