GARDASIL 9 AS A STRATEGY FOR ONCOLOGICAL PREVENTIVE MEDICINE: INTEGRATION BETWEEN IMMUNIZATION, SCREENING, AND REDUCTION OF THE GLOBAL BURDEN OF CERVICAL CANCER

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Abstract

This chapter aims to analyze the role of the nine-valent human papillomavirus (HPV) vaccine, commercially known as Gardasil 9, as an oncological preventive medicine strategy, emphasizing its integration with screening programs and public health policies designed to reduce the global burden of cervical cancer. This study consists of a narrative review of national and international scientific literature, adopting a qualitative approach and examining institutional guidelines. The findings indicate that expanding vaccination coverage combined with cytological and molecular screening significantly reduces the incidence of high-grade intraepithelial lesions and mortality associated with cervical cancer. Integrated strategies based on equitable access and health education further enhance immunization outcomes, particularly among vulnerable populations. It is concluded that the systematic incorporation of the nine-valent vaccine into national immunization schedules, aligned with organized screening programs, represents a cost-effective and essential measure to achieve global targets for the elimination of cervical cancer as a public health problem.

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INTRODUCTION

Cervical cancer remains a major global public health problem, especially in low- and middle-income countries. According to the World Health Organization (WHO, 2020), it is one of the most incident neoplasms among women and is largely preventable through effective vaccination and screening strategies. Persistent infection with oncogenic types of human papillomavirus (HPV) constitutes the main etiological factor of the disease, with particular emphasis on subtypes 16 and 18, which are responsible for most cases (WHO, 2020; Brazil, 2022).

In this context, the nine-valent HPV vaccine, commercially known as Gardasil 9, broadens protective coverage by including nine viral types associated with high-grade intraepithelial lesions and anogenital cancers (Joura et al., 2015). Clinical evidence demonstrates high immunogenic efficacy and a favorable safety profile, consolidating its role as a primary prevention strategy (Schiller; Lowy, 2018).

The research problem guiding this chapter is to analyze how integration between immunization and organized screening can enhance the reduction of the global burden of cervical cancer, considering that vaccination alone does not replace cytopathological or molecular screening (WHO, 2020).

The general objective is to discuss the nine-valent vaccine as an integrated oncological preventive medicine strategy. As specific objectives, this chapter proposes to: (a) examine the epidemiological basis for cervical cancer prevention; (b) analyze scientific evidence regarding vaccine efficacy and population-level impact; (c) evaluate the complementarity between immunization and screening; and (d) reflect on implications for public policies.

The justification is grounded in the global strategy for eliminating cervical cancer proposed by the World Health Organization, which establishes targets of 90% vaccination coverage, 70% screening, and 90% adequate treatment by 2030 (WHO, 2020).

The theoretical review is based on epidemiological studies and clinical trials showing that integrated vaccination and screening programs have greater potential to sustainably reduce cervical cancer incidence and mortality (Joura et al., 2015; Schiller; Lowy, 2018), consolidating oncological preventive medicine as a structuring axis of contemporary women's health policies.

METHODOLOGY

STUDY DESIGN

This is a qualitative study with a narrative literature review design, grounded in the critical analysis of scientific evidence concerning the nine-valent HPV vaccine, commercially known as Gardasil 9, as an oncological preventive medicine strategy integrated with cervical cancer screening. The choice of a narrative review is justified by its capacity to integrate different types of evidence—clinical trials, epidemiological studies, institutional guidelines, and cost-effectiveness analyses—allowing a comprehensive and contextualized approach to the topic (Greenhalgh, 2019).

SEARCH STRATEGY AND DATA SOURCES

The bibliographic search was conducted in national and international databases, including PubMed/MEDLINE, Scopus, Web of Science, and the Virtual Health Library (BVS). Technical documents and guidelines published by the World Health Organization and the Brazilian Ministry of Health were also analyzed.

Controlled descriptors and keywords combined with Boolean operators were used, such as: "HPV vaccination," "Gardasil 9," "cervical cancer prevention," "screening integration," and "public health strategy."

INCLUSION AND EXCLUSION CRITERIA

Studies published between 2010 and 2025, in Portuguese or English, were included if they addressed:

a) efficacy, immunogenicity, and safety of the nine-valent vaccine;

b) the epidemiological impact of HPV vaccination;

c) integration between immunization and cytopathological or molecular screening;

d) cost-effectiveness analyses and public policies related to cervical cancer control.

Studies with incomplete data, isolated case reports, and publications without peer review were excluded, except for official documents from recognized international organizations.

ANALYTICAL PROCEDURES

Data analysis was performed through exploratory, selective, and interpretive reading, with thematic categorization based on the content analysis technique proposed by Laurence Bardin (2011). The analytical categories defined were: (1) clinical efficacy and immunogenicity; (2) population-level impact and incidence reduction; (3) integration with screening; (4) implications for public policies and health equity.

METHODOLOGICAL RATIONALE

The methodological discussion is based on the understanding that narrative reviews, although they do not follow a rigid systematic protocol, are suitable for the critical synthesis and contextualization of evidence in fields with extensive scientific production and public health relevance (Greenhalgh, 2019). In addition, global strategic guidelines for eliminating cervical cancer proposed by the World Health Organization guided the interpretation of findings, enabling analysis aligned with international public health targets.

Thus, the adopted methodology makes it possible to examine, in an integrated and evidence-based manner, the role of the nine-valent vaccine in the context of contemporary oncological preventive medicine.

RESULTS AND DISCUSSION

EFFICACY AND EPIDEMIOLOGICAL IMPACT OF THE NINE-VALENT VACCINE

The analyzed studies demonstrate that the nine-valent HPV vaccine, commercially known as Gardasil 9, has high efficacy in preventing high-grade cervical intraepithelial lesions associated with types 16, 18, 31, 33, 45, 52, and 58 (Joura et al., 2015). Randomized clinical trials indicate efficacy greater than 90% against lesions related to the types included in the formulation.

From an epidemiological perspective, observational data from countries with broad vaccination coverage indicate a consistent reduction in HPV infection prevalence and a decline in precursor lesion rates among adolescents and young women (Bruni et al., 2019).

TABLE 1 – MAIN SCIENTIFIC EVIDENCE ON THE NINE-VALENT VACCINE

Study / Guideline	Type of study	Main findings	Implications for health
JOURA et al., 2015	Randomized clinical trial	\>90% efficacy against high-grade lesions related to the types included in the vaccine	Strong evidence for expanded primary prevention
BRUNI et al., 2019	Systematic review and meta-analysis	Significant reduction in the prevalence of HPV and cervical lesions in countries with high vaccination coverage	Confirms population-level impact
WHO, 2020	Global guideline	90-70-90 target for the elimination of cervical cancer	Integrates vaccination, screening, and

INTEGRATION BETWEEN IMMUNIZATION AND SCREENING

The strategy proposed by the World Health Organization (WHO, 2020) establishes integrated targets of 90% vaccination coverage, 70% screening with a high-precision test, and 90% adequate treatment. Epidemiological models indicate that combining large-scale vaccination with molecular screening accelerates reductions in incidence and mortality when compared with isolated interventions.

Vaccination reduces viral circulation and the incidence of precursor lesions, while screening enables the identification and treatment of residual cases, especially among unvaccinated women or those previously exposed.

TABLE 2 – COMPARISON BETWEEN ISOLATED AND INTEGRATED STRATEGIES

Strategy	Advantages	Limitations	Estimated impact
Vaccination alone	Effective primary prevention; reduction in viral infection	Does not protect women already exposed; depends on high coverage	Progressive long-term reduction
Screening alone	Early identification of lesions	Does not prevent infection; requires periodic adherence	Reduction in mortality
Integrated strategy	Prevention + early detection	Requires systemic organization and financing	Greater sustained reduction in incidence and mortality

DISCUSSION

The analysis demonstrates that the systematic incorporation of the nine-valent vaccine into national immunization programs, combined with organized screening, constitutes a cost-effective approach aligned with global targets for eliminating cervical cancer.

The results reinforce that oncological preventive medicine requires coordination among public policies, health education, and equity in access to services. The literature converges in indicating that combined interventions have greater potential for sustainable epidemiological impact, especially in contexts of social vulnerability.

CONCLUSION

This chapter aimed to analyze the nine-valent HPV vaccine, commercially known as Gardasil 9, as a strategy for oncological preventive medicine, emphasizing its integration with organized screening programs to reduce the global burden of cervical cancer. The chapter sought to discuss the epidemiological basis of the disease, examine evidence on vaccine efficacy and population-level impact, and reflect on implications for public policies.

The main results show that the nine-valent vaccine has high efficacy in preventing high-grade intraepithelial lesions associated with the oncogenic HPV types included in the formulation. In addition, the data indicate that expanded vaccination coverage, when articulated with cytopathological screening and, above all, with molecular HPV detection testing, promotes a faster and more sustained reduction in cervical cancer incidence and mortality. The integrated strategy, aligned with the targets proposed by the World Health Organization, proves more effective than isolated interventions.

As a contribution, the study reinforces the need for a systemic approach in oncological preventive medicine, highlighting the importance of coordination among immunization, screening, health education, and the organization of care systems. It also underscores the relevance of public policies grounded in scientific evidence and guided by equity.

For future research, longitudinal studies in low- and middle-income settings are suggested, along with updated cost-effectiveness analyses considering different vaccination coverage scenarios, and investigations into strategies to expand population adherence, especially among socially vulnerable groups.

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