

# The Cervical Cancer Care Line in Amazonas State: an Analysis from Prevention to Treatment of Precursor Lesions

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*Linha de Cuidado do Câncer do Colo do Útero no Amazonas: uma Análise da Prevenção ao Tratamento de Lesões Precursoras*  
Línea de Atención del Cáncer de Cuello Uterino en el Amazonas: un Análisis de la Prevención al Tratamiento de las Lesiones Precursoras

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## ABSTRACT

**Introduction:** Cervical cancer has high morbidity and mortality in Amazonas State, which shows the importance of consolidating a care line that seeks the best use of resources in actions of promotion, prevention, early detection and treatment. **Objective:** Draw a panorama of this care line in Amazonas State, evaluate the indicators of screening and diagnosis of cervical cancer and compare the total number of performed procedures with the recommendations for cancer care line effectiveness from 2016 to 2019. **Method:** Descriptive quantitative approach study analyzing the performance of procedures of the cervical cancer care line in Amazonas State, based on secondary data of the National Immunization Program Information System, of the Outpatient and Hospital Information Systems of the SUS – National Health System, of the National Supplementary Health Agency and of the Brazilian Institute of Geography and Statistics. **Results:** The analyses demonstrated that the vaccination goals (80%) were not achieved in the period investigated. The number of procedures performed did not reach the recommended parameters, even in the years when the best results were obtained: cytopathological exams (-47.20%) in 2017, colposcopies (-83.14%) in 2016 and biopsies (-63.60%) in 2019. **Conclusion:** The results obtained reveal flaws in the strategy throughout the entire trajectory of the care line, none of the parameters analyzed reached its goal, reinforcing the need to invest in more efficient prevention strategies to make the care line more organized.

**Key words:** Uterine Cervical Neoplasms/prevention & control; Uterine Cervical Neoplasms/diagnosis; Comprehensive Health Care; Women's Health; Brazil.

## RESUMO

**Introdução:** O câncer do colo do útero tem alta morbimortalidade no Amazonas, demonstrando a importância da consolidação de uma linha de cuidado que busque a melhor utilização dos recursos em ações de promoção, prevenção, detecção precoce e tratamento. **Objetivo:** Traçar o panorama dessa linha de cuidado no Amazonas, avaliar os indicadores de rastreio e diagnóstico do câncer do colo do útero e comparar o total de procedimentos realizados com o preconizado para a efetividade da linha de cuidado no período de 2016 a 2019. **Método:** Estudo descritivo, de abordagem quantitativa, que analisou a realização de procedimentos da linha de cuidado do câncer do colo do útero no Amazonas a partir de dados secundários do Sistema de Informação do Programa Nacional de Imunizações; do Sistema de Informações Ambulatoriais do Sistema Único de Saúde, da Agência Nacional de Saúde Suplementar e do Instituto Brasileiro de Geografia e Estatística. **Resultados:** As análises demonstraram que a cobertura vacinal preconizada (80%) não foi atingida em nenhum ano no período analisado. A quantidade de procedimentos realizados não alcançou os parâmetros preconizados, mesmo nos anos em que se obteve melhores resultados: exames citopatológicos (-47,20%) em 2017, colposcopias (-83,14%) em 2016 e biópsias (-63,60%) em 2019. **Conclusão:** Os resultados obtidos demonstram falhas na estratégia ao longo de toda a trajetória da linha de cuidado e nenhuma variável analisada atingiu seu objetivo, reforçando a necessidade de investimento em estratégias mais eficientes de prevenção e que tornem a linha de cuidado mais organizada.

**Palavras-chave:** Neoplasias do Colo do Útero/prevenção & controle; Neoplasias do Colo do Útero/diagnóstico; Assistência Integral à Saúde; Saúde da Mulher; Brasil.

## RESUMEN

**Introducción:** El cáncer de cuello uterino tiene una alta morbilidad y mortalidad en el Amazonas, lo que demuestra la importancia de consolidar una línea de atención que busque el mejor uso de los recursos en acciones de promoción, prevención, detección temprana y tratamiento. **Objetivo:** Trazar el panorama de esta línea de atención en el Amazonas, evaluar los indicadores de detección y diagnóstico del cáncer de cuello uterino y comparar el número total de procedimientos realizados con el recomendado para la efectividad de la línea de atención, desde 2016 hasta 2019. **Método:** Estudio descriptivo con un enfoque cuantitativo que analizó la producción de procedimientos de la línea de atención del cáncer de cuello uterino en el Amazonas, con base en datos secundarios del Sistema de Información del Programa Nacional de Inmunizaciones; el Sistema de Información Ambulatoria del Sistema Único de Salud, Organismo nacional de Salud Suplementaria y el Instituto Brasileño de Geografía y Estadística. **Resultados:** Los análisis mostraron que la cobertura de vacunación recomendada (80%) no se alcanzó en ningún año del período analizado. El número de procedimientos realizados no alcanzó los parámetros recomendados, incluso en los años en que se obtuvieron los mejores resultados: exámenes citopatológicos (-47,20%) en 2017, colposcopias (-83,14%) en 2016 y biopsias (-63,60%) en 2019. **Conclusión:** Los resultados obtenidos muestran fallas en la estrategia a lo largo de toda la trayectoria de la línea de cuidados, en ninguna variable analizada se lograron las metas, reforzando la necesidad de invertir en estrategias de prevención más eficientes que hagan más organizada la línea de cuidados.

**Palabras clave:** Neoplasias del Cuello Uterino/prevenición & control; Neoplasias del Cuello Uterino/diagnóstico; Atención Integral de Salud; Salud de la Mujer; Brasil.

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## INTRODUCTION

Uterine cervical neoplasm is a disease with great impact in the woman's health worldwide. In Brazil, morbimortality is still high with the worst indicators for the North and Northern regions. The most alarming data of the whole region are found in the States of Pará and Amazonas. From 2012 to 2018, the Mortality Information System (SIM) registered 1,926 deaths by cervical cancer in the State of Amazonas. In 2019 alone, 194 deaths by cervical cancer were registered in the reference hospital of "Fundação Centro de Controle do Câncer do Amazonas"<sup>1,2</sup>. (Foundation of Cancer Control of Amazonas).

Because of the high burden of the disease, the necessity of implementing a line of care for cervical cancer in Amazonas is clear for better utilization of the resources in actions of promotion, prevention, early detection, and treatment. Eventually, the line of care pursues "the establishment of the trajectory of the care, organizing the flow of patients according to their necessities", whose main objective is the full healthcare<sup>3</sup>.

Today, in Brazil, the line of care for cervical cancer starts in primary prevention through the vaccination against the human papilloma virus (HPV) for boys and girls, followed by secondary prevention as screening with cytopathological exam of the cervix (Papanicolaou). The results of this exam lead to new stages of diagnostic investigation and treatment of the precursor lesions. If malignancy is detected, the patient is referred for high complexity treatment and eventually to palliative care<sup>4</sup>.

Literature proves that the consolidation of the line of care through organized networks of attention per territory, although still a challenge in Brazil, is the best strategy of structuring the public policies for full care of the population. The information systems of the National Health System (SUS) can be important tools to analyze the efficacy of the lines of care because they allow to design the current scenario of healthcare<sup>5-7</sup>.

This study aims to analyze the registers of the procedures conducted in the line of care of cervical cancer in the State of Amazonas from the prevention to the treatment of precursor lesions from 2016 to 2019 in order to compare the necessity and the actual procedures of this line of care per year.

## METHOD

Descriptive, quantitative study from data registry bases without identification of the subjects of the System of Information of the National Program of Immunizations ("Sistema de Informação do Programa Nacional de

*Imunizações*) (SI-PNI)<sup>5</sup>", of the System of Outpatient Information of the National Health System ("Sistema de Informações Ambulatoriais do Sistema Único de Saúde") (SIA/SUS)<sup>8</sup>", of the Brazilian Institute of Geography and Statistics (IBGE) and of the National Agency for Supplementary Health (ANS).

The study population consisted of girls from 9 to 14 years of age, boys from 10 to 14 years of age and women from 25 to 64 years of age in 2016 with data extracted from the site of IBGE<sup>9</sup>. The data on HPV vaccination were collected in SI-PNI<sup>5</sup>. The data of screening, diagnostic investigation and treatment of precursor lesions were collected from SIA/SUS<sup>8</sup>. The analyzes of the age-ranges followed the current guidelines for HPV vaccination in age-ranges in each period: in 2016, 9-13 years for girls and 10-13 for boys; from 2017 to 2019, 9-14 for girls and 11-14 for boys. To analyze the other procedures of the line of care, the age range were 25-29, 30-34, 35-39, 40-49, 50-59, 60-64<sup>5,9,10</sup>.

The indicators of primary prevention described in SI-PNI (2016 to 2019) were: 1. Data of the quadrivalent HPV for females from 9 to 13 years of age (codes from 067 to 071) and quadrivalent HPV for males from 10 to 13 years of age (codes from 108 to 111/codes from 081 to 086) in the years 2016 and 2017; 2. Data of the quadrivalent HPV for females from 9 to 14 years of age (codes from 067 to 071) and quadrivalent HPV for males from 11 to 14 years of age (codes from 108 to 111/codes from 081 to 086) in 2018 and 2019.

The screening indicators described in SIA/SUS (2016 to 2019) were: (1) cervicovaginal/microflora cytopathological exam – screening (code 0203010086); and (2) cervicovaginal/microflora cytopathological exam – microflora (code 0203010019).

The indicators of diagnostic investigation described in SIA/SUS (2016 to 2019) were: (1) colposcopy (code 021104002-9); and (2) biopsy of the cervix (code 0201010666).

The indicators of the treatment of precursor lesions described in SIA/SUS (2016 to 2019) were: (1) excision type 1 of cervix (code 0409060089); (2) excision type 2 of the cervix (code 0409060305); and (3) excision type 3 of the cervix (code 0409060038).

Initially, for the analysis of the data, they were described and organized in the electronic spreadsheet in the software Excel<sup>®</sup>, and the IBM Statistical Package for the Social Science (SPSS), version 22.0.

To calculate the primary prevention, the descriptive analysis (mean and frequency) of the HPV vaccine coverage per dose and sex was performed, considering the goal of 80% of the coverage for the age-ranges established in the National Immunization Program<sup>4,10</sup>.

The female population of the State of Amazonas from 25 to 64 years of age was utilized as reference following the recommendations of the Brazilian Guidelines for Cervical Cancer Screening according to the population forecast of IBGE for each year analyzed. However, in order to not overestimate the consultations at the public health units or in those associated to SUS, an estimate of the women consulted at SUS was calculated, subtracting the proportion of women covered by private health-insurance from the total population of the target age-range (25 to 64 years of age) according to data of ANS in the State of Amazonas<sup>11,12</sup>.

In addition, technical parameters for cervical cancer screening which estimate the number of required procedures were utilized according to the population investigated to screen and follow-up 100% of the women of the target population, mimicking a fictitious scenario with organized screening, allowing the comparison with the actual scenario of the country whose screening is opportunistic and with different challenges to continue providing care<sup>13</sup>.

The percent of deficit or excess of screening, diagnostic investigation, and treatment of precursor lesions of cervical cancer was calculated with the following formula:

$$\frac{\text{number of procedures performed} - \text{number of procedures required}}{\text{number of procedures required}} \times 100$$

The formula estimated still the annual coverage of cervical cytopathological exams of women of the target population. Additionally, the annual coverage of cervical cytopathological exams of women of the target population from 25 to 64 years of age was calculated. The result of this calculation is an indicator of the process described in the technical card of actions of cancer control of cervical cancer of the National Cancer Institute José Alencar Gomes da Silva (INCA)<sup>14</sup>.

The indicator of process is defined by the public power and evaluates the extent to which the target-population is being reached in a certain region and year by actions of cervical prevention control through screening by the division of the number of cervical cytopathological exams and number of women in the target age range in the respective year and region<sup>14</sup>.

This study was not submitted to the Institutional Review Board because it utilized public data in compliance with Article I, Item III of Resolution 510/2016 of the National Health Council<sup>15</sup>, which addresses guidelines and rules involving human subjects.

## RESULTS

The most expressive coverage for HPV vaccination for girls and boys, respectively, 19.6% and 39.2%, was

reached in Dose 1 in 2017. However, the ideal coverage recommended (80%) was not reached in any dose considering both sexes in the period analyzed (Figure 1).

In the State of Amazonas between 2016 and 2019, in average, 83% of the female population in the age-range from 25 to 64 years depended on SUS as shown in Figure 2.

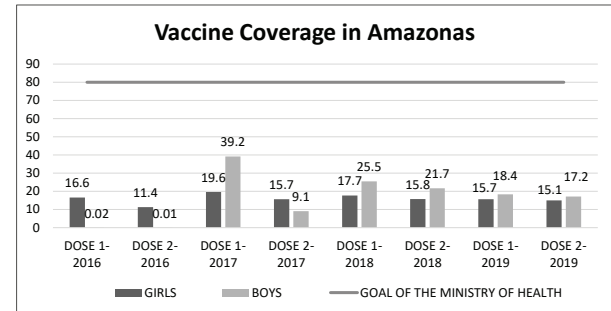


Figure 1. Vaccine coverage in the State of Amazonas between 2016 and 2019

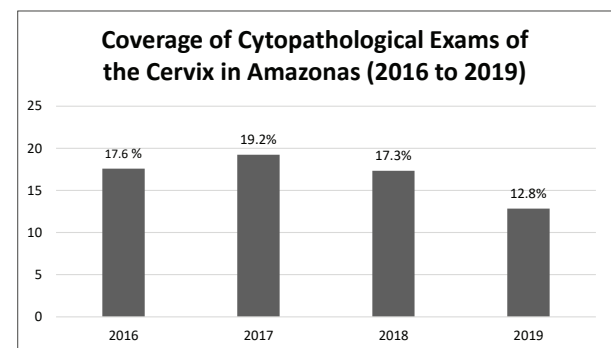


Figure 2. Female population consulted by SUS

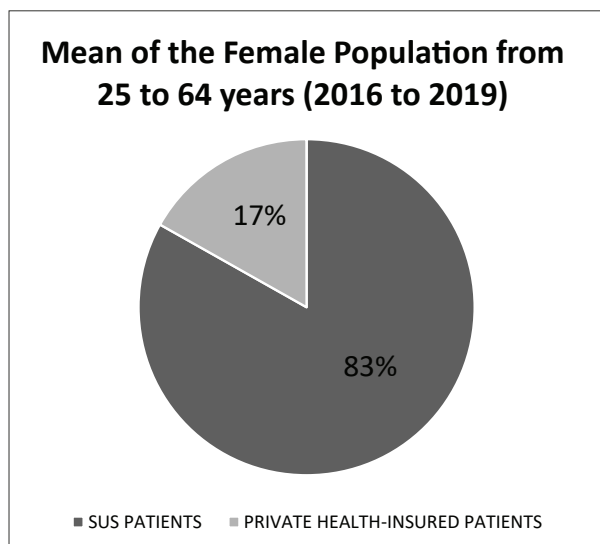
Based in the technical parameters for cervical cancer screening, the number of procedures that would be applied in an ideal scenario is represented in absolute values (Table 1). Within this perspective, 100% of the women in the age-range would be screened and followed-up when needed. The number of exams in absolute values performed in the period investigated was described too, in addition to the percent of deficit of the procedures analyzed obtained by the formula presented in the item Methods<sup>13</sup>.

The highest deficit (-65.36%) of the cytopathological exams completed compared with required occurred in 2019. For all the years analyzed, the number of colposcopies performed were less than the required. This scenario repeats for cervical biopsies with values particularly low in 2016 whose deficit reached 81%.

The annual coverage of cytopathological exams in the State of Amazonas during the period investigated was not reached; 2017 was the best year for the State, however, it meant less than 20% of the target-population (Figure 3).

**Table 1.** Comparison between the annual necessity estimated and offer of cytopathological exams, colposcopy, and biopsies between 2016 and 2019

| CYTOPATHOLOGICAL EXAMS |            |                             |
|------------------------|------------|-----------------------------|
|                        | Required   | Performed (difference in %) |
| 2016                   | 325,605.74 | 157,754.00 (-51.55)         |
| 2017                   | 336,164.60 | 177,500.00 (-47.20)         |
| 2018                   | 350,126.22 | 164,352.00 (-53.06)         |
| 2019                   | 360,866.33 | 125,018.00 (-65.36)         |
| COLPOSCOPIES           |            |                             |
|                        | Required   | Performed difference in %   |
| 2016                   | 14,028.37  | 2,365.00 (-83.14)           |
| 2017                   | 14,483.28  | 2,090.00 (-85.57)           |
| 2018                   | 15,084.80  | 2,209.00 (-85.36)           |
| 2019                   | 15,547.53  | 2,211.00 (-85.78)           |
| BIOPSIES OF THE CERVIX |            |                             |
|                        | Required   | Performed (difference in %) |
| 2016                   | 2,067.34   | 384.00 (-81.43)             |
| 2017                   | 2,134.38   | 674.00 (-68.42)             |
| 2018                   | 2,223.02   | 661.00 (-70.27)             |
| 2019                   | 2,291.21   | 834.00 (-63.60)             |

**Figure 3.** Coverage of cervical cytopathological exams in the State of Amazonas between 2016 and 2019.

## DISCUSSION

A line of care should comprehend actions and health services grounded in epidemiological criteria and regionalization able to ensure access to services and full care, in addition to establishing a trajectory to organize the flow of patients according to their necessities, promoting the prevention, access to screening, early diagnosis and proper treatment<sup>16</sup>.

Currently the flow of this disease encompass primary prevention through vaccination and screening per the Brazilian Guidelines for Cervical Screening<sup>11</sup>. The immunization against HPV starts in pre-adolescence for boys and girls. Next, in a certain moment, the opportunistic screening of all the eligible women through cytopathological exam of the cervicovaginal material. Of these, a small portion whose exams are altered is followed up according to the lesion detected. Further, the diagnostic exams of colposcopy and biopsy are utilized to define conducts. Finally, for women with invasive lesions, the last part of the line of care will be the proper treatment, possibly surgery, chemotherapy, radiotherapy, or a combination of all<sup>11</sup>.

The State of Amazonas was the first in the country to offer the vaccine against HPV by SUS from 2013. For the rest of the country, it was implemented as primary prevention in 2014; however, this process was gradual. Along the years, there were changes in the specific age-range, in the quantity and interval of the doses. In the first moment, it was offered for girls between 11 and 13 years of age in three doses (zero, six and 60 months). In 2015 and 2016, the age range was extended to 9 and 13 years of age and modification of the regimen for two doses only (0 and 6 months), respectively. From 2017, the vaccination was expanded for girls from 9 to 14 years, and it was officially offered to boys from 11 to 14 years of age<sup>17,18</sup>.

These adjustments were necessary and based in scientific studies to ensure efficacy of the prophylaxis since the vaccine is an effective method with excellent cost-benefit to diminish the severe outcome, which is cervical cancer. However, to secure these benefits and make the vaccination effective, the vaccine coverage must reach at least 80% of the target population<sup>19,20</sup>.

The State of Amazonas failed to reach the guidelines according to dose and sex in any year from 2016 to 2019. The highest rates were detected in 2017, the only year where the coverage percent was bigger in females. It is remarkable that in the other years analyzed, the coverage was larger for boys, a data also reported in other studies which can be attributed to the recent inclusion of this population in SUS HPV vaccine calendar<sup>17</sup>.

It is noticeable that the rates continued below the guidelines for both sexes, which emphasizes the necessity of strategies to stimulate the adherence to HPV vaccination. Unfortunately, this reality is not exclusive of Amazonas and because of this worrying scenario, several studies attempted to identify the encumbering factors for the adherence and the motives typically reported are lack of information about safety and efficacy of the vaccine for adolescents and their legal guardians, difficulty of access to vaccination and adverse events post-vaccination<sup>21,22</sup>.



The main method currently utilized for cervical cancer screening and its precursor lesions is the periodical cervical cytopathological exam, a test capable of detecting cellular alterations in this area. The exam should be performed in women in the age-range between 25 and 64 years, the first two exams made annually and if no alterations are detected, the next ones must occur at every three years<sup>11,16</sup>.

In order to meet what was recommended in Amazonas to actually screen the population, it would have been necessary to conduct nearly 343 thousand cytopathological exams of the cervix per year between 2016 and 2019, considering the target population. However, even in the year when the best ratio of exams was reached, a little more than 177 thousand exams were completed. Studies describe that the efficacy of screening may be associated with the strategy adopted. Despite some Brazilian regions show a slow decreasing trend of the rates of cervical cancer, the opportunist screening conducted in the country and consequently in Amazonas has limitations. The non-opportunistic screening strategy, ensuring an enrollment mechanism of the target-population has been indicated as an excellent alternative to change this reality leading to a better cost-benefit relation with high coverage of the population<sup>23,24</sup>.

The low coverage of cytopathological exams encountered in the State of Amazonas has been already reported in other studies and is worrying because to reach the levels recommended it is indispensable to significantly reduce the incidence and mortality. In countries with over 70% coverage, the mortality rates were lower or equal to two deaths per 100 thousand women per year<sup>11,25</sup>.

A great deficit was observed too in the indicators of diagnostic investigation, colposcopy, and biopsy whose values estimated were higher than the practice based in the total population of the State within the targeted age-range. The gap reinforces the difficulty of organizing the care network and can be closely related to high rates of incidence and mortality by cervical cancer in Amazonas<sup>26</sup>.

In relation to the procedures of treatment of precursor lesions, the excisions of types 1, 2 and 3 of the uterine cervix were considered; however, in the SIA/SUS<sup>8</sup> bases there were no records of data that allowed a robust analysis of these variables. This limitation can be associated with the accounting logics inherited by the predecessor system, which was based in the previous Form of Authorization of Payment (GAP). Along the years, improvements to ensure more trustworthy information about the outpatient consultations took place; SIA/SUS is a reliable tool to evaluate, control and planning, most of all of medical care provided by SUS<sup>8,27,28</sup>.

Despite the limitations in utilizing secondary data, this study presented results which reinforce the worrying

scenario and the necessity of investing in more effective prevention strategies that can result in reduction of the morbimortality of this disease in the State of Amazonas.

## CONCLUSION

The goals of vaccination and annual coverages of cytopathological exams of the cervix were not met in the State of Amazonas at any dose, sex or age-range in the period investigated. There was deficit of all parameters investigated while comparing the necessity of screening procedures and follow-up 100% of the women of the target-population with the number of procedures currently performed. These results reinforce the flaws along the entire line of care of this disease. The challenges to implement this line of care need to be reviewed and revised for better results in screening, diagnostic investigation, and treatment of precursor lesions of cervical cancer in Amazonas.

## CONTRIBUTIONS

Gabriela Amaral de Sousa, Juliana Nascimento Viana and Rosana Pimentel Correia Moysés contributed for the study conception and design, collection, analysis and interpretation of the data, wording and critical. Celsa da Silva Moura Souza contributed for the wording and critical review. All the authors approved the final version to be published.

## DECLARATION OF CONFLICT OF INTERESTS

There is no conflict of interests to declare.

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