

# Challenges in cervical cancer in the Amazon (Brazil)

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The state of Amazonas is located in the middle of the Brazilian Amazon Forest. It is the largest state in Brazil, which has continental dimensions. Approximately 52% of the Amazon population is concentrated in the capital, Manaus. The main path of transportation in the Amazon is the river, as it is cheaper and longer than air transportation.

According to INCA (National Cancer Institute of Brazil) 2020, the state of Amazonas leads the country with the highest rates of cervical cancer (even superior to breast cancer) among all other states in Brazil. These rates are comparable with the highest levels in Africa. In terms of mortality, it is also in the North region of the country where the highest mortality occurs—12 per 100 000 women. The challenge here lies in how to improve the training of health professionals in these regions with such low resources. More than half of the state's population is in the capital (Manaus), which has only two hospitals for the treatment of cancer by the public system (free healthcare for all), including diagnosis, staging, surgical treatment, radiotherapy, and chemotherapy.

In this context, we took advantage of an existing video conference structure at the Federal University of Amazonas (UFAM) and State University of Amazonas (UEA) because they have maintained a continuous program of education and dissemination of knowledge over the past 10 years. These strategies aim to bring together healthcare professionals who have contact with the indigenous and non-indigenous communities with limited resources. Many states of Brazil receive patients from the other states, as happens in African countries, in search of better treatment conditions.

The hospitals guarantee oncological support and trainees for patient care, even though the main city has only four radiotherapy centers and only one of these serving the public sector. Currently, there



**Figure 1** Staff and fellowships in the on site hospital training in oncology, in the capital of Amazonas.

are approximately 20 oncologic surgeons, 10 clinical oncologists, and 5 radio-oncologists for a population of approximately 4 million inhabitants (Figures 1 and 2).

This program aims to reach 8–10 cities distributed across the Amazonas, allowing for coverage of these indigenous communities and small cities through the help of trained health professionals. In this model, we noted that doctors can perform a diagnosis by cervical biopsies, self-collection programs, and vaccination campaigns (Figure 3).

Through the implementation of this program, there has been an increase in early diagnosis which leads to higher referral to gynecologic oncologists. However, hospital



**Figure 2** Hospital enabled for oncological surgery in the Amazon (HUGV), helping to cover more than 4 million inhabitants.



**Figure 3** Smaller cities without the oncology service, receiving guidance and training at a distance.

statistics in radiotherapy and outpatient services demonstrated a rate of approximately 75% of patients with advanced disease (higher than stage IIB) and a large increase in cases of cervical adenocarcinoma. In the future, among the parameters that we will use to evaluate the results will be preventive measures associated with vaccination, measuring mortality rates, and rates of advanced diagnoses with the aim of improving overall oncologic outcomes in the region of the Amazonas.

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**Contributors** Both authors worked together in the making and editing of the article. Both agree with the authorship and order of publication.

**Funding** The authors have not declared a specific grant for this research from any funding agency in the public, commercial, or not-for-profit sectors.

**Competing interests** None declared.

**Patient consent for publication** Not required.

**Provenance and peer review** Commissioned; internally peer reviewed.

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**To cite** Silva JdS, Leite PDÁ. *Int J Gynecol Cancer* Published Online First: [please include Day Month Year]. doi:10.1136/ijgc-2020-001474

Accepted 29 May 2020  
*Int J Gynecol Cancer* 2020;0:1.  
doi:10.1136/ijgc-2020-001474

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