HEALTHCARE RESOURCE UTILIZATION OF CERVICAL CANCER IN THE BRAZILIAN PUBLIC HEALTHCARE SYSTEM: A CLAIM DATABASE

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BACKGROUND

- Cervical Cancer (CC) is strongly related to socio-economic disparities around the world, up to 80% of the CC related deaths occurs in low- and middle-income countries, such as Brazil[1]. At country level, there are estimated over 16,590 new cases per year, with a crude mortality rate of 6.17/100,000[2].
- Furthermore, despite the current efforts to increase vaccination against human papillomavirus and improve CC screening rates, the diagnosis is made at locally advanced or advanced stage in 60% of the cases, resulting in worst disease prognosis impairing the odds of cure[3].
- In Brazil, CC is a public health and social challenge: disparities have been associated with lower rates of CC screening[4] and higher rates of mortality[5]. Most of CC cases are diagnosed in non-white women with low educational level, that relies upon public health care (SUS, *Sistema Único de Saúde*)[6].
- It is known that care for patients with CC is associated with a high economic burden, especially in advanced stages of the disease[7,8], but data from the Brazilian public health system perspective is still scarce.

OBJECTIVE

- To evaluate the healthcare resource utilization (HCRU) of patients with CC treated at SUS.

METHODS

- This was a retrospective database study in Brazil, using SUS administrative databases: inpatient (SIH) and outpatient (SIA).
- Database covers procedure done within SUS, which is universal and available for the entire population, though ~75% are exclusively dependent.
- Women aged ≥18 years and with claims of CC-related procedures (ICD-10 C53.*) from January/2014 to December/2020 were included.
- The extracted data included information on patient's characteristics, CC treatment, disease staging, outpatient and hospital procedures performed, among others. Treatment was classified as surgical procedure (biopsy, conization, trachelectomy, hysterectomy and lymphadenectomy), RT, and CT. Domains of HCRU includes hospitalization, CT, RT, and other outpatient procedures.
- Patient's follow-up comprised the time from index date (first claim of ICD-10 C53.*) to last information available.
- Non-advanced (stage 1 and 2) and advanced (stage 3 and 4) disease were evaluated for those patients with claims for radiotherapy (RT) and/or chemotherapy (CT), as this information was only available for this population.
- Data were analyzed using Python 3.6.9. Categorical variables were described by simple and cross contingency tabulation, with absolute frequencies and percentages; and continuous variable as median and interquartile range (IQR). HCRU was summarized as median procedures performed per patient per month (PPPM [95% confidence interval]).

RESULTS

- A total of 206,861 women were included in this study (**Figure 1**), with a median follow-up of 1.1 years (IQR 0.17-2.84). Median age at index was 49.5 years (interquartile range [IQR] 38-61), and most included patients were white (44%) and brown (43%) color, residing in the southeast (41%) and northeast (29%) regions (**Table 1**).
- The treatment patterns analysis showed that, as expected, in the non-advanced stages the use of surgery and radiotherapy are more common than in the advanced stages, in which chemotherapy with or without radiation are more frequent (**Figure 2A**)
  - Proportion of patients submitted to CT increased with staging, reaching 85% in stage 4, with a median number of visits for chemotherapy PPPM of 1.20 (IC95% 1.20-1.20) (**Figure 2B**).
  - About 90% stage 1 *vs* 67% stage 4 patients were submitted to RT (Table 1), both with a median PPPM of 1.50 (IC95% 1.50-1.50) (**Figure 2B**).
  - Cisplatin was the main CT prescribed for stage 2 and 3 patients. For stage 4, paclitaxel-based regimens were more prescribed (**Figure 3**).
- Most patients (70%) started treatment within 2 months after first claim of CC (**Figure 4**).
- The HCRU of CC treatment increases with the disease advanced stages, mainly due to increased hospitalization rates and outpatient procedures (**Figure 5**).

Figure 1. Patient flowchart

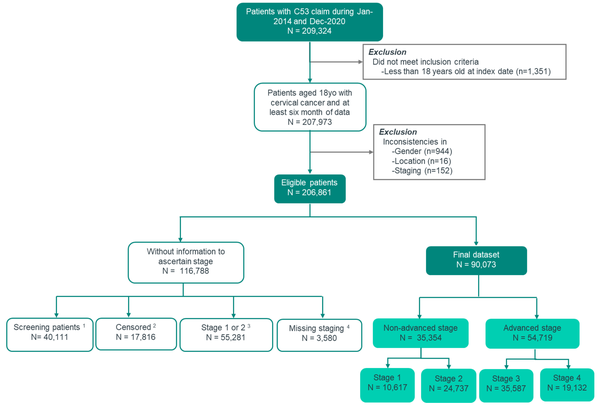


Table 1. Demographic characteristics of cervical cancer patients per Brazilian region

	North	Northeast	Midwest	Southeast	South
N	16211 (8)	58937 (29.2)	15854 (7.9)	83005 (41.2)	32854 (16.3)
Age* (years)					
Mean (SD)	51.48 (13.89)	50.13 (15.38)	49.31 (14.74)	49.75 (15.99)	49.44 (15.23)
Median (IQR)	50.77 (40.85 - 61.07)	49.52 (38.28 - 61.04)	48.39 (38.0 - 59.44)	49.54 (37.13 - 61.44)	48.95 (37.49 - 60.2)
Age* n (%)					
18 to 30 years	940 (5.8)	6438 (10.9)	1678 (10.6)	11369 (13.7)	3873 (11.8)
31 to 50 years	7270 (44.8)	25147 (42.7)	7294 (46.0)	32810 (39.5)	14181 (43.2)
51 to 70 years	6525 (40.3)	21372 (36.3)	5521 (34.8)	30348 (36.6)	11790 (35.9)
> 70 years	1476 (9.1)	5980 (10.1)	1361 (8.6)	8478 (10.2)	3010 (9.2)
Ethnicity n (%)					
White	1026 (7.6)	7052 (14.3)	4282 (33.6)	41631 (56.1)	24813 (86.1)
Black	258 (1.9)	3234 (6.6)	706 (5.5)	5768 (7.8)	1167 (4.0)
Mixed	10658 (78.7)	32568 (66.1)	6341 (49.7)	24086 (32.5)	2202 (7.6)
Indigenous	72 (0.5)	50 (0.1)	159 (1.2)	19 (0.0)	41 (0.1)
Asian	1525 (11.3)	6364 (12.9)	1261 (9.9)	2688 (3.6)	611 (2.1)

*Age at index date

Figure 2. Cervical cancer treatment patterns in the Brazilian public health system

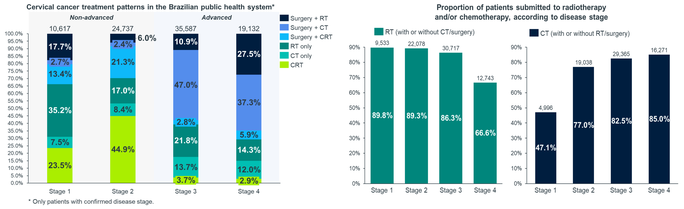


Figure 3. Chemotherapy used, by disease stage and line of therapy (LOT)

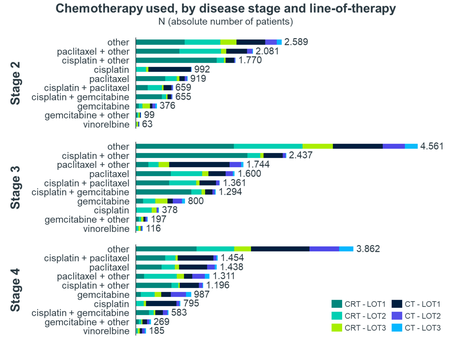


Figure 4. Time to treatment initiation in advanced and non-advanced cervical cancer

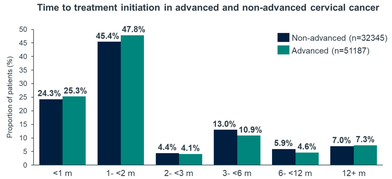
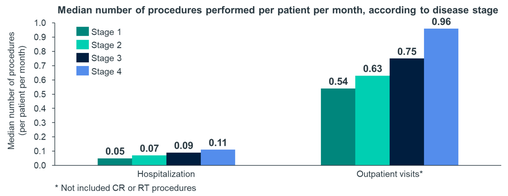


Figure 5. Healthcare resource utilization of cervical treatment in SUS, per disease stage



KEY MESSAGES

- To our knowledge this study reports the largest evaluation of HCRU for CC treatment in Brazil, showing an overall increase in HCRU with staging, what corroborates with previously reported data[7–9].
- As only a minority of CC cases have early diagnosis in Brazil [3,10,11], this study highlights the high economic burden of CC for the public health sector , especially considering delays in CC diagnosis[12,13]. Therefore, reinforcing the urgent need to drive more efforts into CC prevention and screening, as we move towards CC elimination goals[14] .
- In Brazil, although a local regulation requires treatment to initiate within 60 days from the diagnosis, this study showed that 1 in every 3 patients did not start CC therapy within this timeline, impacting survival[11], quality of life and pushing patients to advanced treatments and higher HCRU.
- Regarding systemic therapy, cisplatin is generally recommended as a first-line option for the treatment of CC[15]. However, in patients with recurrent disease, there may be reduced sensitivity to cisplatin from previous use, in addition to cumulative toxicity from prolonged use[16,17]. For this reason, paclitaxel regimens may be a good alternative in patients with advancing/recurrent disease[16,18].
- The economic and social burden of CC in Brazil is significant [8], this study reiterates the urgent call for assertive public policies to mitigate disparities amplifying the anti-HPV immunization and the screening coverage. With early detection the overall HCRU will decrease and allow optimized resources allocation to provide Brazilian patients with the best cancer care.

LIMITATIONS

- The databases used in this study are administrative, reimbursement-oriented, and therefore lack clinical data. As usual in retrospective database studies, the missing or incomplete data impacts the interpretation of the data. In this study, this was a limitation especially for staging classification, as the information was available only for patients undergoing CT and/or RT, but not for those submitted solely to surgery or no treatment.

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