

HPV-associated cancers in men: Epidemiological and economic burden in Costa Rica

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Background and rationale

HPV is mainly a sexually transmitted disease affecting both men and women. Recently, an increase in head and neck cancers associated with human papillomavirus (HPV) infection, especially oropharyngeal cancer, has been observed mainly in high-income countries (HIC), such as the United States, as well as penial and anal cancers, which are diagnosed at late stages since there is no standardized screening test.¹

Approximately 45,000 HPV-associated cancers are diagnosed annually in the US, with approximately 60% detected in women and 40% in men. In 2017, the overall incidence of cancer associated with HPV infection in men was 11 per 100,000. Of these cancers, 80.1% were in the oropharynx.²

The significant increase in HPV-related cancer/disease has an economic burden for the health care system. In 2010 in the United States, the oropharyngeal cancer, anal cancer, penile cancer, and genital warts associated with VPH represent a baseline annual cost of \$306, \$155, \$7, and \$288 million of US dollars, respectively.³

Costa Rica has a national health care database that contains data of a considerable proportion of the population, with data related to diagnosis, treatment, and resources used in HPV-associated cancers and related diseases in men, and it represents a great opportunity to study these diseases. Worldwide, HPV is likely to be responsible for a substantial burden of disease in men, but no studies have investigated the economic burden associated with HPV-related cancers (penile, anal, and head and neck) and HPV-related diseases in men in Costa Rica.^{4,5}

Objectives

To describe the epidemiological characteristics, health resource utilization, and medical costs of care of patients with HPV-associated cancers and diseases in males by age group and type of cancer (penile, anal, and head and neck)/disease (genital warts) in Costa Rica.

Methodology

This was a hybrid study involving primary data collection (Delphi Panel) and retrospective review of structured data (Costa Rican Social Security Fund database) to describe epidemiological measures in patients with male cancer and HPV-associated diseases in Costa Rica.

This study used real-world data to describe epidemiological measures and examine the Health Care Resource Utilization (HCRU) and economic burden potentially linked to male cancer and HPV-associated diseases in Costa Rica. Health care claims were obtained from national databases.

To evaluate HCRU, a Delphi panel was developed with the participation of 5 experts from the Costa Rican public health system.

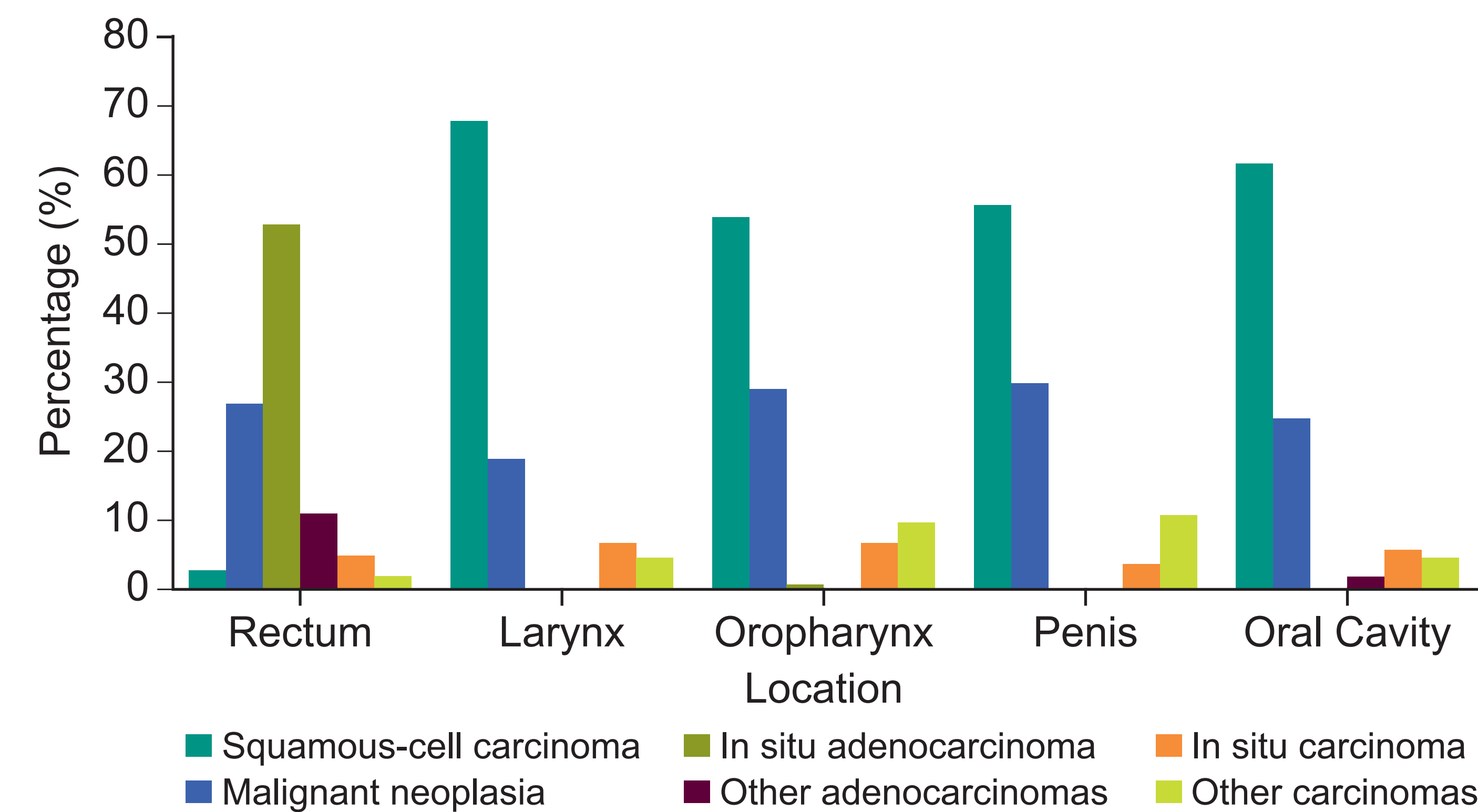
The annual cost of illness was estimated from the HCRU identified through the Delphi panel. The cost was expressed in local currency.

Results

A total of 1340 participants were included. Mean age was 63.6 (SD: 14.15), with 9% (131) of them younger than 45, 27% (361) between 45 and 60, 52% (693) between 60 and 80, and 12% (155) older than 80 years of age.

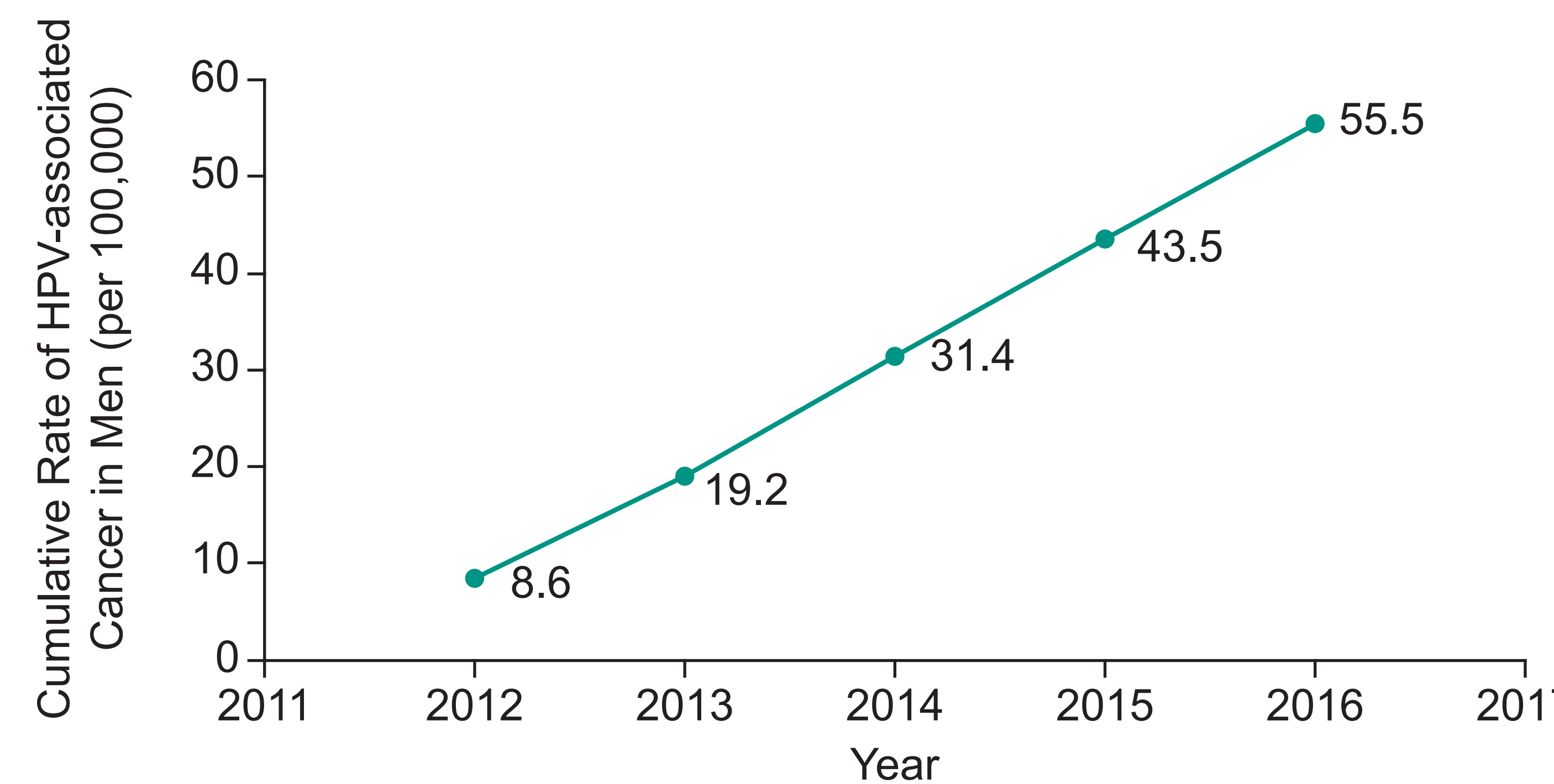
Related to the anatomical distribution, the most cases were diagnosed in the rectum (48.4%) followed by larynx (20.4%), oropharynx (10.7%), penis (10.6%), and oral cavity (9.9%). **Figure 1** describes the histological distribution by anatomical location, which in all cases, except in the rectum, corresponds to squamous-cell carcinoma and in the rectum to adenocarcinoma.

Figure 1. Distribution by histologic diagnosis



Based on the estimate of the male population of Costa Rica, according to the Central American Population Center, the cumulative rate of HPV-associated cancer in men per 100,000 inhabitants increased significantly in the period studied, rising from 8.6% in 2012 to 55.5% in 2016 (**Figure 2**).

Figure 2. Cumulative rate of HPV-associated cancer in men per 100,000 inhabitants



In relation to the use of health resources, 4 out of 5 physicians participating in the Delphi Panel mentioned that never/anytime (80%) routine diagnostic tests for HPV were performed in the practice. Diagnostic tests included: biopsy, PCR for HPV, cervical cytology, ELISA for HPV, VDRL for syphilis, anoscopy, peniscopy, and other procedures (fulguration, serology, and endoscopy).

Biopsy was ranked as the most common diagnostic procedure; other procedures (fulguration, serology, and endoscopy) were ranked second; and simple observation was ranked third. Eighty percent of physicians indicated that they did not routinely test sexual partners of HPV-positive patients. Eighty percent also indicated that they did not have sufficient resources to intervene with HPV patients.

All physicians mentioned that HPV patients regularly/always receive a specific treatment. Regarding treatments, 80% described commonly implementing cryotherapy, with a median frequency of 2.5 (0-4). Laser surgery was the least implemented among 4 out of 5 physicians, with a median frequency of 0.5 (0-2).

Eighty percent of physicians said they never/sometimes had an HPV patient hospitalized for more than 24 hours. The median days of hospitalization was 7 (0-7). Eighty percent of physicians mentioned that their HPV patients regularly/always suffered side effects.

A median of 4 (3-50) of follow-up consultations were given to HPV patients per year, and a median of 15 (4-50) patients had recurrences. Patients who have recurrences are given radiotherapy as described by 80% (4/5) of physicians. Eighty percent of physicians referred HPV patients with recurrences to otorhinolaryngology and urology specialists. The associated costs in local currency are shown in **Table 1**.

Table 1. Total annual costs of HPV

Total annual costs of HPV	Cost (CRC)*
HPV patient within their institution	300 - 20,000,000
HPV patient treated at external consultation	30 - 10,000,000
HPV patient treated at internal consultation	0 - 5,000,000
Treatment costs of an HPV patient	300 - 15,000,000

Panelists agreed that close to 0.6-40,000 USD (300-20.010.125 CRC) are expended in HPV patients within their institutions, 0.1-20,000 USD (50 - 10.005.062 CRC) in HPV treated at external consultations, 0-10,000 (0 - 5.002.531CRC) USD in HPV-treated patients at internal consultations, and close to 0.6-30,000 (300 - 15.007.593 CRC) USD in HPV-related treatment costs.

Conclusions

HPV remains an emerging issue of unmet need in public policy debates. The prevalence of associated diseases in men has been increasing, despite efforts in some countries around the world, and consequently the clinical and economic burden of the disease has an impact on populations. Strategies to prevent HPV infections and associated diseases in men should be promoted.

References

- Szymonowicz KA, et al. *Cancer Biol Med*. 2020;17(4):864-878.
- Liao C-I, et al. *JAMA Netw Open*. 2022;5(3):e222530.
- Chesson HW, et al. *Vaccine*. 2012;30(42):6016-6019.
- Pan American Health Organization. Human papillomavirus (HPV) vaccine. 2021. Accessed April 8, 2024. <https://www.paho.org/en/human-papillomavirus-hpv-vaccine>
- HPV Information Centre. *Human Papillomavirus and Related Diseases Report*. October 22, 2021. Accessed April 8, 2024. <https://hpvcentre.net/statistics/reports/zXWX.pdf>

Disclosures

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