Early-Onset Cancer as an Emerging Public Health Challenge

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Câncer de Início Precoce como Desafio Emergente de Saúde Pública

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INTRODUCTION

The consistent increase of cancers incidence diagnosed in individuals under the age of 50, known as early-onset cancers, EOCs, has emerged as a global epidemiological phenomenon in the last decades[1-3]. Initially recognized in colorectal tumors, now EOCs in breast, stomach, pancreas, liver, thyroid and lymphomas have been detected, affecting populations in low, middle and high income countries. In despite of screening advances justifying part of the increase of certain tumors as in breast and thyroid, the magnitude and reach of the trends observed indicate that it is not just a detection bias, but a structural shift of the epidemiologic profile of cancer[1,4].

Similar trends have been recorded in Brazil already. Recent analyzes of hospital-based cancer registries indicate an expressive increase of cases in 19 and 44 years young adults, especially breast, cervix, thyroid and colorectal cancers[4]. This is not only a clinical threatening scenario, but a challenge to public health and to the sustainability of the National Health System (SUS) as individuals in productive age are being affected entailing wide social, economic and psychosocial implications.

DEVELOPMENT

EXPOSOME IN TRANSFORMATION FOR GENERATIONS

Etiologic explanations for the growth of EOCs indicate intertwined multiple factors. Emerging hypothesis point out that the phenomenon reflects deep changes in global exposome encompassing the totality of an individual's environmental, dietary, behavioral and social exposures throughout their lifetime[2,3]. Among them, stand out high intake of ultra-processed food and sugary drinks, reduction of physical activity, disorders of circadian cycles, abuse of antibiotics, early obesity in addition to chronic infections and human papilloma virus (HPV), the virus of hepatitis B (HBV), and environmental polution[1,5]. Added to this, there are epigenetic and immunologic alterations, most of the times initiated perinatally and gene-environment interactions which increase the susceptibility to cancer in young adults[3,6]. These cumulative and intergenerational factors justify the necessity of understanding EOCs from a syndemic model which integrates biological, social and environmental dimensions.

The impacts of early-onset cancers go beyond clinical repercussions. Frequently, young adults are diagnosed late at advanced stages due to low clinical suspicion in age-ranges historically little associated with cancer[4,7]. In addition, evidences point out that many EOCs are more aggressive and present least favorable responses to the available therapies, which aggravates the burden of intensive treatments and associated costs with modest survival gains[5]. Mostly formed by adolescents and young adults, these patients remain invisible within the context of pediatric and adult care models, which compromises the integrality of the oncologic attention[8].

IMPLICATIONS FOR HEALTH POLICY

In this context, the National Policy of Cancer Prevention and Control (PNPCC), updated in 2023, emerges as an important landmark for the organization of oncologic prevention and attention actions in Brazil[9]. However, a critical analysis reveals that, regardless of its contributions, the PNPCC still does not address clearly the epidemiologic emergency of EOCs. This strategic gap compromises the country's capacity to respond accordingly to a phenomenon that tends to intensify in the upcoming decades. To tackle this challenge, it is recommended that the national policy incorporates specific guidelines for early-onset cancer, strengthening epidemiologic surveillance, age stratification in cancer registries, creation of specific lines of care for adolescents and young adults and revision of screening protocols for high risk populational groups. Additionally, it is essential to promote intersectoral public health policies that address determinant factors as diet, environment, working conditions and health literacy[2,6].

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Future strategies should include investments in national longitudinal cohorts with biobanks able to investigate early and intergenerational exposures. The use of artificial intelligence and big data can stimulate the integration of clinical, genomic and environmental data for early identification of risk patterns and implementation of predictive medicine actions[3,10]. From the perspective of assistance, it is essential that primary health attention is strengthened as gateway for early detection in young adults, integrating screening, diagnosis and fast referral. Concomitantly, cross-sectional health promotion programs should be implemented including schools and working environments targeted to healthy lifestyles and intergenerational prevention.

Early-onset cancers represent not only a new epidemiologic pattern, but an alert to the necessity of rethinking oncologic public health in Brazil. Ignore this phenomenon means to fragilize SUS in face of a rising generation of young adults in productive age affected by chronic diseases[11,12]. The incorporation of this emerging problem in PNPCC through strategic surveillance strategies, prevention and care is an essential step to reduce health disparities and ensure sustainability of the Brazilian oncologic system. The response to this challenge needs to be immediate, structured and inter-sectoral to spare not only the health of future generations but also the resilience of the Brazilian health system.

CONCLUSION

The rising incidence of early-onset cancers can be just the tip of the iceberg of a wider and deeper wave of chronic diseases that begin even earlier in life. The biological, environmental and social consequences of accelerated modernization accumulated for generations reflect a delayed, but intense impact of decades of exposures connected to dietary systems, urban environments, occupational conditions and digital lifestyles.

This context in expansion configures a public health crisis demanding urgent and articulated responses. An actual shift paradigm encompassing cancer not only as a condition associated with ageing but as a result of cumulative and intergenerational exposures that begin well before of what it is traditionally recognized is necessary. The complexity of this phenomenon demands interdisciplinary collaboration among investigators of pediatric and adult oncology, molecular epidemiologists, data scientists, health economists and policy formulators to decipher mechanisms, identify risk patterns and propose scalable solutions.

The challenge is generational. Without consistent investments in health promotion since the early days of life, longitudinal surveillance, equalitarian prevention strategies and integrated research infrastructure, the risk of perpetuating health disparities and overload the already fragile system with potentially avoidable diseases is a concrete issue. On the other hand, a timely action opens the opportunity of re-writing this trajectory: anticipate risks, intervene earlier and protect health and the potential of future generations in health systems in the whole world both in high-income countries and low and-middle-income countries as Brazil.

CONTRIBUTION

The author contributed substantially in every step of the manuscript and approved the final version to be published.

DECLARATION OF CONFLICT OF INTERESRS

There is no conflict of interests to declare.

DATA AVAILABILITY STATEMENT

All the content underlying the text is contained in the manuscript.

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REFERENCES

1. Ugai T, Sasamoto N, Lee HY, et al. Is early-onset cancer an emerging global epidemic? Current evidence and future implications. Nat Rev Clin Oncol. 2022;19(10):656-73. doi: https://doi.org/10.1038/s41571-022-00672-8
2. Zhao J, Xu L, Sun J, et al. Global trends in incidence, death, burden and risk factors of early-onset cancer from 1990 to 2019. BMJ Oncol. 2023;2(1):e000049. doi: https://doi.org/10.1136/bmjonc-2023-000049
3. Ogino S, Ugai T. The global epidemic of early-onset cancer: nature, nurture, or both? Ann Oncol. 2024;35(12):1070-4. doi: https://doi.org/10.1016/j.annonc.2024.08.2336
4. Grippa WR, Vasconcellos VF, Pessanha R, et al. Early-onset (EO) cancer trends in Brazil: a comprehensive analysis of hospital-based cancer registry data (2000–2019). J Clin Oncol. 2025;43(Suppl 16):10552. doi: https://doi.org/10.1200/JCO.2025.43.16_suppl.10552
5. Sung H, Siegel RL, Rosenberg PS, et al. Emerging cancer trends among young adults in the USA: analysis of a population-based cancer registry. Lancet Public Health.

2019;4(3):e137-47. doi: https://doi.org/10.1016/s2468-2667(18)30267-6

6. Mauri G, Patelli G, Sartore-Bianchi A, et al. Early-onset cancers: biological bases and clinical implications. Cell Rep Med. 2024;5(9):101737. doi: https://doi.org/10.1016/j.xcrm.2024.101737
7. Bray F, Laversanne M, Sung H, et al. Global cancer statistics 2022: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin. 2024;74(3):229-63. doi: https://doi.org/10.3322/caac.21834
8. Ferrari A, Stark D, Peccatori FA, et al. E. Adolescents and young adults (AYA) with cancer: a position paper from the AYA Working Group of the European Society for Medical Oncology (ESMO) and the European Society for Paediatric Oncology (SIOPE). ESMO Open. 2021;6(2):100096. doi: https://doi.org/10.1016/j.esmoop.2021.100096
9. Presidência da República (BR). Lei nº 14.758, de 19 de dezembro de 2023. Institui a Política Nacional de Prevenção e Controle do Câncer no âmbito do Sistema Único de Saúde (SUS) e o Programa Nacional de Navegação da Pessoa com Diagnóstico de Câncer; e altera a Lei nº 8.080, de 19 de setembro de 1990 (Lei Orgânica da Saúde) [Internet]. Diário Oficial da União, Brasília DF. 2023 dez 20 [acesso 2025 ago 29]; Edição 241; Seção 1:1. Disponível em: https://www.in.gov.br/en/web/dou/-/lei-n-14.758-de-19-de-dezembro-de-2023-532172581
10. Archambault AN, Su YR, Jeon J, et al. Cumulative burden of colorectal cancer-associated genetic variants is more strongly associated with early-onset vs late-onset cancer. Gastroenterology. 2020;158(5):1274-86.e12. doi: https://doi.org/10.1053/j.gastro.2019.12.012
11. Lopes-Júnior LC, Lima RAG. Cancer care and interdisciplinary practice. Cad Saude Publica. 2019;35(1):e00193218. doi: https://doi.org/10.1590/0102-311x00193218
12. Lopes-Júnior LC. The emerging epidemic of early-onset cancer: global patterns, biological complexity, and urgent calls for action. Cancer Control. 2025;32. [A ser publicado em 2025]. doi: https://www.doi.org/10.1177/10732748251386505

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