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Presenting the Brazilian physical activity during cancer treatment guidelines: adaptations and challenges in a low- and middle-income context

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Abstract

Background The purpose of this article is to present the Brazilian Physical Activity (PA) During Cancer Treatment Guidelines (PA) during cancer treatment, and discuss the adaptations made to align the recommendations with the Brazilian context and its distinctive peculiarities.

Methods The development of Brazilian Guidelines for recommending PA during cancer treatment consisted of identifying international guidelines and positions and adapting their recommendations and statements for the Brazilian context. For this, an expert working group including scientists, exercise specialists, and oncologists revised the international guidelines, selected outcomes, and created recommendations based on PA safety and efficacy on the selected adverse effects of cancer treatment and the regional context.

Results After review of 14 PA oncology guidelines, two were selected. Drawing from the selected guidelines, the working group formulated the recommendations considering the scientific evidence extracted from the documents and the Brazilian contextualization. Although the guidelines were based on international recommendations, the expert working group introduced adaptations to better reflect the Brazilian context. These adaptations included translating the content into Portuguese and simplifying the language to improve accessibility for healthcare professionals. Safety information and contraindications were added, and recommendations were adjusted not only in terms of intensity, mode, and frequency but also to promote accessibility, motivation, and long-term adherence. Additionally, the guidelines took into consideration professional regulations, access to qualified staff, the structure of the health system, and regional sociocultural and economic disparities, particularly in underserved and rural areas.

Conclusion There is a clear need for context-specific exercise oncology research and policies that reflect the low and middle-income countries' social, economic, and cultural characteristics. This Brazilian guideline represents a first and essential step toward aligning Brazil with the international agenda for establishing PA standards in oncology.

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Keywords Exercise, Oncology, Adverse effects, Practice guidelines, Consensus

Background

Since the first clinical trial published in the late 1980s [1, 2], numerous studies have demonstrated that physical activity (PA) is crucial in preventing and controlling cancer. This research effort led to a substantial number of systematic reviews, which promoted the development of guidelines and recommendations by scientific associations in several countries [3–7]. In Brazil, a collaborative effort among researchers and some medical, governmental, and scientific organizations, including the Brazilian Society of Clinical Oncology (SBOC), the Brazilian National Cancer Institute (INCA), and the Brazilian Association of Physical Activity and Health (SBAFS) led to the development of a document entitled “Physical activity: recommendations for prevention and control cancer” [8]. Published in 2022, this document is the first produced in Portuguese and marks the very first comprehensive set of recommendations tailored to the Brazilian population. The Brazilian document demonstrated that PA prevents various types of cancer, reduces overall and cancer-specific mortality rates among adults and the elderly, and oriented Brazilian healthcare providers on how to recommend and promote PA to prevent and control cancer. While this document was a significant step toward incorporating PA to prevent and control cancer in Brazil, it primarily focused on cancer prevention and mortality control. It did not delve into specific guidance or considerations regarding PA during cancer treatment. In response to this gap, Brazilian researchers and institutional collaborators SBOC, INCA, and SBAFS reconvened to create a new document entitled “Brazilian guidelines for PA recommendations during cancer treatment,” published in 2023 [9].

Because the field of exercise oncology is still evolving, very few clinical trials have been conducted in Brazil. Therefore, our working group chose to develop a guideline document based on existing international guidelines and position statements, to generate evidence and support the development of local recommendations. As a result, the vast majority of exercise oncology clinical trials and guidelines have been developed in high-income countries, raising the question of whether these guidelines are appropriate for low- and middle-income countries. Therefore, this article aims to present the Brazilian Physical Activity During Cancer Treatment Guidelines, describe the development process, summarize the results, and discuss how the recommendations were adapted to the Brazilian context and its specific particularities.

Methods

General overview

The Brazilian Physical Activity During Oncology Treatment Guidelines were collaboratively developed by Brazilian researchers and oncologists, with the support of the SBOC, INCA, and SBAFS. The initiative began in August 2022 when a dedicated working group was formed, comprising researchers and representatives from the three organizing institutions cited above. The collective effort culminated in July 2023, when a preliminary version of the document was approved by the 3 supporting entities. Subsequently, the final version of the recommendations was unanimously approved by the working group and representatives of the supporting entities, and the Portuguese version was published in November 2023 [9].

Procedures and methods for document formulation

The Brazilian guideline for PA recommendation during cancer treatment was constructed following the GIN-McMaster Guideline Development Checklist [10]. In the first two months, the working group made critical decisions regarding the document's scope and objectives. First, the working group decided by consensus to focus on formulating PA recommendations for individuals aged 18 years and older who have undergone or are undergoing oncological treatment. We chose not to address preventive PA, as it had already been covered in the prior publication mentioned [8]. Additionally, we aimed to explore the effects of PA on the primary health conditions associated with cancer and its treatment. A study was conducted to select the most prevalent and relevant treatment-associated conditions and adverse events (see details below). It was decided not to restrict the search to any specific type of cancer. The group further recognized the significance of information about the intensity, frequency, and type of PA; this data was incorporated whenever available. Additionally, details about precautions, contraindications, and reasons to discontinue PA were included.

A noteworthy decision made during the process was to build this document based on existing published guidelines and recommendations from medical entities and scientific organizations. This decision was prompted by recent high-quality guidelines and positions published in the last few years. Whenever these guidelines and recommendations only partially covered the subject, recently published systematic reviews were additionally incorporated. Searches for clinical trials were not conducted.

Outcomes: key health conditions related to cancer and its treatment

The working group undertook a study to identify the most prevalent and critical health conditions associated with cancer and treatment. Firstly, the most common and critical health and social-related conditions, as well as adverse events related to cancer and treatment, were identified in the study of Ramsey et al. [11]. The Ramsey et al. [11] study, which forms part of the COMET (Core Outcomes Measures in Effectiveness Trials) initiative, aimed to pinpoint a core set of outcomes relevant to health professionals. Specifically, Ramsey et al. [11] ranked several health and social-related conditions and adverse events of cancer and treatment according. All cited health conditions associated with cancer and treatment were considered possible outcomes to be included in this recommendation. We then identified the relevant outcomes from the selected guidelines and recommendations. An outcome was included in the current guideline if it was mentioned in Ramsey et al. [11] and in at least one of the two selected guidelines [3, 4] (Table 1). All other symptoms mentioned by Ramsey et al. [11] that are not included in Table 1 were excluded. Two health conditions related to cancer and its treatment—cardiotoxicity and cardiovascular fitness, and chemotherapy completion rate—were not mentioned in Ramsey et al. [10] but were cited in the selected guidelines, so they were also included in this study (Table 1).

Main questions

The next step involved the formulation of guiding study questions. These questions were devised using the PI/ECO methodology, which stands for Population, Intervention/Exposure, Comparison, and Outcome. This methodology ensured that the questions aligned with the most recent international scientific evidence and

considered unique aspects of the Brazilian context. These guiding questions were instrumental in extracting pertinent information and constructing the text for this recommendation. PI/ECO question can be summarized as follows: What is the impact of PA compared to physical inactivity or lower levels of PA on psychosocial well-being, pain, overall quality of life, fatigue, cognitive issues, functional impairment, sleep disorders, sexual function, treatment completion rates, tolerance to treatment, cardiotoxicity, and nutritional disorders, in individuals during and beyond cancer treatment? In addressing this question, important aspects, such as safety, intensity, volume, frequency, dose-response relationship, and type of PA were considered significant factors.

Search for guidelines and recommendations

Database searching included Medline/PubMed, Embase, Lilacs, and SPORTDiscus. Documents published in English, Spanish, and Portuguese were considered with a date restriction from 1980 to June 2024 (See search strategy in Supplementary Table 1). The initial date was chosen considering the first clinical trials published in exercise oncology [1, 2]. The reference lists of identified documents were also reviewed to identify additional relevant sources. Two independent reviewers (RD and LR) were responsible for the selection process. Guidelines and recommendations were included if they met the following criteria: (1) followed a structured format characteristic of guidelines or recommendations. (2) The primary focus was on exploring the effects of PA on symptom management, complications, and adverse effects related to cancer and its treatment. Conversely, guidelines and recommendations were excluded if: (1) PA was a secondary focus or was merely mentioned without substantive discussion regarding its role in cancer and its treatment. (2) The target population was pediatric. (3) The document

Table 1 Selected outcomes and the decisions regarding their inclusion in the recommendation

Outcomes	% of individuals considered the outcome to be critical, according to Ramsey et al. [10]		Included in Selected Guidelines		
	Cancer survivors	Health and research professionals	ASCO [4]	ACSM [3]	Brazilian Consensus
Psychosocial well-being	100	100	Yes	Yes	Yes
Pain/ Peripheral neuropathy	92	93	No	No	Yes
Overall quality of life	92	86	Yes	Yes	Yes
Fatigue	72	76	Yes	Yes	Yes
Cognitive function	80	69	Yes	No	Yes
Physical fitness	68	79	Yes	Yes	Yes
Sleep Quality	60	52	Yes	Yes	Yes
Sexual Health	40	48	No	No	Yes
Body weight control	40	37	Yes	No	Yes
Muscle wasting and/or cachexia	36	38	No	No	Yes
Cardiotoxicity and cardiovascular fitness	--	--	Yes	Yes	Yes
Chemotherapy completion rate	--	--	Yes	Yes	Yes

primarily focused on preventive aspects of PA oncology. (4) The document was an opinion article, letter, or editorial. (5) Despite meeting the inclusion criteria, the guideline was excluded if a newer or revised version was available.

Recommendations and level of scientific evidence

Detailed, structured guiding questions were constructed collectively and provided to each author for data extraction. The data extracted was then reviewed by pairs and used for recommendation construction. The level of scientific evidence certainty for each recommendation was determined using the following criteria:

High Certainty of Evidence. The certainty of the evidence was considered high when at least one of the selected guidelines concluded that strong/high-quality evidence exists supporting the recommendation.

Moderate Certainty of Evidence: Moderate certainty was assigned when at least one selected guideline concluded that moderate-level evidence supported the recommendation.

Weak Certainty of Evidence: Weak certainty of the evidence was designated in cases where the selected guidelines did not evaluate the specific outcome/recommendation or both guidelines concurred that there was insufficient, low, or very low certainty of evidence regarding such a recommendation.

This approach ensured that the level of scientific evidence supporting each recommendation was carefully assessed and categorized based on the guidance provided by the selected guidelines.

The recommendations formulation considering the Brazilian context

Once the recommendations were generated and the level of evidence defined, the working group adapted the scientific results to a simple and easy-to-understand language. The text was also produced considering the context of the Brazilian healthcare system. The group also decided that the document would be drafted in the Portuguese language (the native language of Brazil). All these were provided so that the recommendations were accessible to Brazilian healthcare professionals, cancer survivors, their families, and any interested individuals.

Results

Guidelines selection

Our database search initially returned 5740 publications. After removing duplicates, abstracts, trial protocols, and reading titles and abstracts, 47 articles were selected for full-text screening and evaluated in detail

(see the PRISMA flow of guidelines selection in supplementary Fig. 1). Following full-text review, 14 identified guidelines or recommendations, 12 were excluded [5–7, 12–20] (see the reason for exclusion of each guideline in supplementary Table 2). Guidelines were excluded if they were opinion articles, letters, or editorials; did not follow a structured format characteristic of guidelines or recommendations; did not have physical activity as a primary outcome or focused only on the preventive effects of physical activity; or were older than an included guideline. As a result, two documents were selected to answer the PI/ECO research questions: the guidelines of the American Society of Clinical Oncology (ASCO) authored by Ligibel et al. [4] and the guidelines from the American College of Sports Medicine (ACSM) authored by Campbell et al. [3].

Key health issues related to cancer and its treatment

The working group included 12 outcomes in this review (Table 1). The decision considered factors such as the frequency of citations in the Ramsey et al. [11] study, whether the outcomes were included in the selected guidelines, and the expertise of medical oncologists and researchers, considering the Brazilian context (Table 1). It is important to note that we included outcomes such as peripheral neuropathy, muscle wasting and/or cachexia, body weight control, and chemotherapy completion rate, which were not reported in the study by Ramsey et al. [11] or in the selected guidelines [3, 4]. These outcomes were incorporated by the working group because they are particularly relevant in the Brazilian context. For instance, body weight control was included because it is estimated that 68.1% of the Brazilian population will be living with overweight by 2030 [21], and the prevalence among cancer patients is likely even higher.

Adaptations to the Brazilian context and recommendations, and evidence.

Although the guidelines were formulated based on international recommendations, the expert working group introduced adaptations to better reflect the Brazilian context. It is important to highlight that, despite these adaptations, some recommendations remain general and closely aligned with international guidelines. A major challenge in the adaptation process was the lack of region-specific data. The adaptations are detailed below.

- The working group translated the scientific evidence into simple language and published it in Portuguese to ensure accessibility for healthcare professionals, cancer survivors, and the general public.
- While PA is typically deemed safe, the working group has decided to provide safety information and contraindications. This choice was prompted by considerable uncertainties in this domain among

cancer survivors and some healthcare professionals in Brazil. Specific considerations regarding contraindications and safety information are presented in the Supplementary Table 3.

- Adaptation to the Brazilian context was considered not only in terms of the recommended intensity and frequency but also by emphasizing strategies that enhance accessibility, motivation, and long-term adherence. While international guidelines tend to evolve to individualized prescriptions, we tend to develop realistic approaches that favor the implementation of public policies.
- Exercise prescription in Brazil must be carried out by university-trained professionals, which ensures safety but may limit accessibility. Therefore, the recommendations emphasize that all healthcare providers can offer general PA guidance to cancer patients, while specific exercise prescriptions should be made by qualified exercise professionals. Additionally, we made a call for action on expanding specialized training in exercise oncology in Brazil.
- Despite the Brazilian health system offering universal access, approximately 25% of the population uses the private health care system. Brazilian regions are diverse, considering sociocultural, economic, and especially in underserved and rural areas. This provides a great disparity in oncology services and PA access, which was considered when the guidelines were formulated.

Drawing from the selected guidelines and considering the regional context, the working group developed overarching PA recommendations. The summarized Brazilian PA recommendations for cancer patients undergoing treatment are presented below. Table 2 outlines the level of evidence for the adverse effects outcomes. Although some levels of evidence are classified as moderate or low, these outcomes were included in the recommendations because they are considered highly relevant to the Brazilian population and do not indicate that PA is contraindicated or harmful.

Table 2 Summary of evidence for the effects of exercise on cancer and treatment-induced adverse effects

High certainty of evidence	Moderate certainty of evidence	Low certainty of evidence
Fatigue	Sleep Quality	Pain
Psychosocial well-being		Cognitive function
Overall QoL		Sexual function,
Physical fitness		Cardiotoxicity and cardiovascular fitness
		Body weight control
		Muscle wasting

- Healthcare providers should recommend physical activity during cancer treatment, as it is safe and well-tolerated, with a low risk of adverse events (high certainty of evidence) [3, 4].
- Healthcare providers should recommend 150 min of moderate-intensity activities per week, or 75 min of vigorous-intensity PA per week, or an equivalent combination of both, for individuals undergoing curative cancer treatment (high certainty of evidence) [3]. When the recommended PA levels cannot be achieved, healthcare providers should encourage any amount of PA and support gradual progression toward the recommended volume, as even activity below the suggested duration and intensity may still provide benefits [3, 4].
- Healthcare providers should recommend that cancer patients incorporate aerobic and resistance PA into their routine (high certainty of evidence). Activities that promote flexibility and balance should also be recommended (moderate certainty of the evidence) [3, 4].
- Recommend initiating a PA routine as early as possible after diagnosis to maximize the benefits (moderate certainty of evidence).
- Although cancer patients may benefit from self-directed PA, Healthcare providers should recommend that patients undergoing cancer treatment participate in PA supervised by an exercise professional. Supervision offers greater safety and is likely to improve adherence compared with unsupervised, self-managed PA (high certainty of evidence) [3, 4].
- Healthcare providers should recommend PA during active treatment to mitigate fatigue, improve psychosocial well-being, and increase overall quality of life, preserving physical function (high certainty of evidence). Furthermore, it helps maintain sleep quality, preventing sleep disorders (moderate certainty of evidence). PA during and after cancer treatment is also associated with reduced pain, improved cognitive and sexual function, reduced risk of cardiotoxicity, and preservation of cardiovascular health. It also helps control body weight and muscle mass, preventing problems such as excessive weight gain and muscle loss (low certainty of evidence) [3, 4].

Discussion

Given that the highest increases in cancer rates are projected in regions with fewer resources, Brazil is expected to experience a notable surge in the proportion of new cancer cases in the coming years since it is a low-middle-income country. Indeed, estimates indicate a substantial increase of 66% in new cases and an 81% rise in

cancer-related deaths in Brazil in the next 30 years [22]. Regarding economic impact, the federal cost allocated to hospital and outpatient procedures for cancer patients aged 30 and above in the Brazilian Unified Health System (SUS - acronym in Portuguese) was approximately US\$ 1.6 billion in 2018. Without intervention, this cost is projected to rise to US\$2.6 billion in 2040, signifying a 124% increase in expenditure compared to current figures [23].

PA is currently recognized as a low-cost, effective, and safe strategy for cancer prevention and control, as evidenced by numerous guidelines and recommendations published worldwide [3–7]. In fact, several governmental and non-profit initiatives have incorporated PA as a standard component of cancer care [24–26]. However, the exercise oncology field remains underdeveloped in Brazil. This statement is supported by: (1) the lack of national data on PA levels among individuals with cancer; (2) the very low number of Brazilian clinical trials and cohort studies included in published meta-analyses and international guidelines; and (3) the absence of data regarding the availability of professional training courses in exercise oncology and programs promoting PA among people with cancer in Brazil. In response, Brazilian researchers and medical oncologists joined Brazilian Medical and Scientific Societies to construct a national initiative to include PA as a standard in oncology practice in Brazil. The first step in this direction was to develop the “Brazilian Physical Activity During Cancer Treatment Guidelines”. The original document was produced in Portuguese, considering the specificities of Brazil, and has a simplified and practical approach. However, given the very limited number of exercise oncology studies conducted in Brazil, our research group opted to develop a guideline document based on a systematic literature review, which identified existing guidelines and position statements to generate evidence and support the formulation of recommendations. Notably, most exercise oncology clinical trials and guidelines have been developed in high-income countries (see review 26 for a comprehensive overview), which are typically characterized by greater availability of resources for health promotion, infrastructure, and public policies.

This reality imposes an undeniable urgency: Brazil can no longer depend exclusively on recommendations developed in external contexts. This imbalance highlights the need for context-specific research and policy development that considers the unique social, economic, and cultural conditions of the country. Thus, the publication of the Brazilian guideline for PA recommendations during and after cancer treatment represents a valuable advancement, as it aligns global recommendations with national realities. However, there is still a critical need for regionally representative scientific evidence capable of informing more equitable, feasible, and effective actions.

Brazil's vast geographic, socioeconomic, and cultural diversity significantly affects the population's access to oncology health care and PA engagement. Indeed, Brazil's Unified Health System (SUS) is internationally recognized for its universal and free access model, uniquely designed to serve a population of continental dimensions. However, despite its comprehensive structure, SUS faces challenges not typically observed in health systems of countries with more homogeneous socioeconomic conditions and greater resource availability. Brazil's significant regional and socioeconomic diversity directly affects access to healthcare services and opportunities for PA [27]. While economically developed regions tend to offer better infrastructure, more qualified professionals, and stronger public policies, rural areas and underserved urban communities often experience limited resources, transportation barriers, safety concerns, and a lack of appropriate spaces or programs for PA. Thus, although SUS embodies a democratic and inclusive health ideal, structural inequalities continue to limit equitable access and reduce the effectiveness of health promotion strategies, including PA.

Another key aspect to consider is the central role of exercise professionals in promoting PA in Brazil. Unlike in many other countries, exercise prescription and supervision must be carried out by qualified professionals holding an undergraduate university degree. While this regulatory framework contributes to greater safety and service quality, it may also limit access to supervised exercise programs due to the reduced availability and higher cost of qualified professionals. In this context, professional training becomes crucial for advancing the field of exercise oncology in Brazil. Expanding education and specialization opportunities in this area is essential to strengthen the healthcare system, promote equitable access to PA, and improve treatment outcomes for people with cancer.

Furthermore, socioeconomic inequalities, racial and gender disparities, and varying levels of health literacy influence how PA is perceived and practiced throughout the country. Although our guidelines have been developed with the Brazilian context in mind, it is still lack robust empirical support derived from diverse regions and populations, limiting their applicability and effectiveness.

Although we consider the construction and publication of the Brazilian guideline for PA recommendation during cancer care a relevant step to transform PA into a standard in cancer care in Brazil, we understand that translating scientific evidence into practice is a great challenge. Indeed, the Brazilian initiative still needs to include crucial actions to disseminate PA among cancer survivors and healthcare professionals. This publication is relevant since a recent study demonstrated that only 19.3% of

Brazilian cancer survivors (during and post-treatment) reach the recommendations for PA [28]. Indeed, the costs of cancer attributable to insufficient leisure-time PA are projected to rise from US\$ 43 million in 2018 to US\$ 64 million in 2030. Increasing the Brazilian general population's leisure-time PA could reduce this burden, potentially saving approximately US\$8.9 million in 2040 by lowering the prevalence of insufficient PA by 2030 [29]. Therefore, it is essential to create national initiatives to disseminate information, particularly to cancer survivors, their caregivers, and families. Initiatives and efforts would include exercise professionals' training programs, specifically PA cancer survivor programs nationally. All these together will include Brazil in the international agenda to include PA as a standard in cancer care.

Conclusion

Brazil can no longer depend only on guidelines created for external contexts. There is a clear need for context-specific research and policies that reflect the country's unique social, economic, and cultural conditions. Our recommendations intend to support Brazilian healthcare providers in promoting PA among cancer patients under treatment, reducing physical inactivity, and promoting their health and well-being. The Brazilian guideline is the first and essential step to include Brazil in the international agenda to make PA standards in oncology practice.

Abbreviations

PA	physical activity
SBOC	Brazilian Society of Clinical Oncology
INCA	Brazilian National Cancer Institute
SBAFS	Brazilian Association of Physical Activity and Health
COMET	Core Outcomes Measures in Effectiveness Trials
SUS	Brazilian Unified Health System
ASCO	American Society of Clinical Oncology
ACSM	American College of Sports Medicine

Supplementary Information

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Supplementary Material 1.

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Authors' contributions

All authors contributed equally to the study Conceptualization, Data curation, Formal analysis, Methodology, Validation, Writing – review & editing. The first draft of the manuscript was written by RD and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

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Data availability

Data are available from the corresponding author upon reasonable request.

Declarations

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Competing interests

The authors declare no competing interests.

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