



CHOC Children's Hospital
Best Evidence and Recommendations

Physical Activity and Exercise for Pediatric Hematology & Oncology Patients

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PICO: For pediatric hematology/oncology patients, what are best practices for physical activity and exercise education and implementation to decrease treatment complications?

P (Population/problem): Pediatric hematology/oncology patients

I (Intervention/issue): best practices for physical activity and exercise education

C (Comparison): current practice

O (Outcome): decrease treatment complications

Background:

Advancements in pediatric cancer care have resulted in higher numbers of childhood cancer survivors than ever before. Today, there is an estimated 500,000 survivors of childhood cancer in the US (Robison & Hudson, 2014). However, long term follow-up of childhood cancer survivors indicates that 95.5% of survivors have at least one chronic health condition and 80.5% have a serious/disabling or life-threatening health condition by age 45 (Hudson et al., 2013). Identified health conditions in childhood cancer survivors include pulmonary, cardiac, endocrine, neurocognitive, auditory, endocrine/reproductive abnormalities and secondary malignancies (Hudson et al., 2013; Robison & Hudson, 2014). Moreover, childhood cancer survivors have lower quality of life, lower physical functioning and higher rates of fatigue and pain compared to their healthy peers (Badr et al., 2013). Additionally, childhood cancer survivors have been identified as having higher rates of exercise intolerance and much lower participation in physical activity or fitness than their healthy counterparts (Antwi et al., 2019; Ness et al., 2019). Exercise intolerance has been significantly associated with mortality in this population, underscoring the need to address this emerging issue (Ness et al., 2019).

Research into adult cancer survivors and physical activity has led the American College of Sports Medicine (ACSM) to release a roundtable report on the importance of being active throughout cancer, from diagnosis to survivorship (2019). In fact, the ACSM reports "There is consistent, compelling evidence that physical activity plays a role in preventing many types of cancer and for improving longevity among cancer survivors" (2019, p. 2391).

In pediatrics, the body of evidence is still growing, but preliminary research has illustrated similar evidence to that of adult cancer survivors. Lemay et al., (2019) found that "good cardiorespiratory fitness induced a preventative action for most health outcomes studied and was associated with lower late adverse effects prevalence in ALL (acute lymphocytic leukemia) survivors" (p. e456). Furthermore, even just "a slight increase in cardiorespiratory fitness gave ALL survivors better preventative action on health outcomes" (Lemay et al., 2019, p.e456).



Similarly, Tonorezos et al. (2019) found that vigorous exercise in childhood cancer survivors was associated with lower depression, lower somatization, less impairment in physical functioning and overall health/vitality, and higher cognitive functioning. Again, they found that “even small amounts of vigorous exercise may ameliorate these outcomes” (p. 3063).

Given the background evidence discussed and the implications it has for survivorship, this evidence-based practice project was undertaken. The purpose of this evidence-based practice project is to review the literature and consult leading authorities to determine the best evidence for physical activity and exercise recommendations for pediatric hematology and oncology patients, specifically to decrease treatment complications.

Search Strategies and Databases Reviewed:

- Databases searched for this review: CINAHL, PubMed, Google Scholar, Ovid Full Text Search and JAMA Network Search. Key search words: childhood cancer exercise, cancer exercise, kids cancer exercise, pediatric oncology physical activity, pediatric cancer exercise, pediatric oncology exercise, pediatric oncology exercise program. This search yielded 86 articles of which 14 were critically reviewed.
- Professional organization’s websites reviewed: American College of Sports Medicine, American Academy of Pediatrics, Association of Pediatric Hematology/Oncology Nurses (APHON), Children’s Oncology Group, Maple Tree Cancer Alliance, Sunflower Wellness, University of Calgary POEM, Nationwide Children’s Hospital Play Strong Program, Alberta Children’s Hospital.
- A listserv survey was sent via the APHON open forum to gather responses from members working in children’s hospitals across the nation. This survey yielded 2 responses. A similar listserv survey was sent through Society of Pediatric Nurses (SPN) via the general and hot topic forum, yielding 0 responses.
- Communication with personnel at other facilities including Children’s Hospital of Los Angeles, Miller Children’s Hospital, Rady Children’s Hospital, Seattle Children’s Hospital, St. Jude’s Children’s Research Hospital, Nationwide Children’s Hospital, City of Hope, Joe DiMaggio Children’s Hospital, Children’s Minnesota, University of Alabama at Birmingham, University of Calgary, UCSF Benioff Children’s Hospital, The James at Ohio State University and Anschutz Health and Wellness Center at the University of Colorado.

Synthesis of Evidence:

Overall, there is wide variability between study designs, interventions and outcome measurements in research on physical activity and exercise in childhood cancer survivors. This variability makes it impossible to draw specific conclusions about ideal physical activities or exercise practices (Zucchetti et al., 2018). Despite this, the consensus is that childhood cancer survivors can and should be more physically active. Spreafico et al. (2018) championed the need to integrate physical activity into routine cancer care and outlined the need for individualized physical activity and exercise programs for childhood cancer survivors. Further, the authors synthesized available evidence into recommendations for current practice and emphasized the need for further research to provide specific, prescriptive recommendations.



Additionally, the following was found:

- Single modality interventions were not shown to be effective enough to motivate this population to be physically active.
 - Motivational coaching at regular clinic appointments did not result in an increase in physical activity. However, inactivity did not progress which is encouraging. Authors suggested a more comprehensive and dose-intensive intervention to increase physical activity levels in this population (Hooke et al., 2019).
 - A 2016 study exploring the use of Fitbits to motivate childhood cancer survivors to be more active found that participants did not significantly increase their physical activity or VO2 max. This study concluded that Fitbits are feasible for use but “this population may require more interaction on a regular basis to achieve benefit” (Le et al., 2016, p. 393).
- Web Based interventions featuring online coaching and motivation in addition to activity monitors (Fitbit or accelerometers) were among the most promising studies for improving patient outcomes.
 - Two pilot studies concluded this multipronged intervention type is both feasible and acceptable for this population. Although neither study found a significant difference in time spent in physical activity, both found a moderate increase in motivation for physical activity, quality of life, neurocognitive function and measured physical performance (Howell et al., 2018; Mendoza et al., 2017).
- Small scale studies exploring in-person classes were also found to have promising patient outcomes.
 - In-person, weekly physical activity programs for childhood cancer survivors were found to be both feasible and effective. Both studies found participants to have improved health-related quality of life and motor performance (Beulertz et al., 2016; Kim & Park, 2018). Further, the researchers found increased overall level of activity, increased emotional well-being and participant’s motor performance was improved to the level of their healthy peers.
 - Worth noting, both studies mentioned the observed potential importance of initiating physical activity interventions earlier on after acute treatment, though neither measured this (Beulertz et al., 2016; Kim & Park, 2018).
- Of 15 leading pediatric oncology facilities interviewed, two were found to have specific programs they referred patients to:
 - The PlayStrong Program at Nationwide Children’s Hospital is an exercise class funded by the Sports Medicine Department and ran by athletic trainers. It is a 12 week-long, two times a week class for any specialty patients that have a referral. This program has both educational and exercise components each week with a goal of fostering positive lifelong physical activity and wellness habits. The classes are split into 2 age groups and patients participate in age appropriate play and exercise. No data has been published from this program, although anecdotal evidence has been positive.
 - The PEER Program at Alberta Children’s Hospital is an evidence-based program that synthesized available evidence into a practice very similar to the PlayStrong program. The PEER program features additional research and specifications for the pediatric oncology population not included in PlayStrong. Furthermore, the



PEER Program has worked closely with a multitude of facilities and researchers to develop a handbook for exercise for pediatric oncology patients for dissemination to other programs. Again, no data has been published from this program, although anecdotal evidence has been positive.

Practice Recommendations:

- Implement a multidisciplinary program to provide comprehensive health and wellness promotion, including physical activity/exercise education, information and programming.
- Incorporate accessible physical activity interventions and education into currently available patient care systems within the facility- television channel, clinic appointments, child life activities, etc.
- Collaborate with the interdisciplinary care team to address acute patient issues with the goal of having each patient be able to participate in health promoting physical activities.
- Review current education provided to patients on physical activity and exercise for most current information.
- Develop staff education regarding importance of physical activity, ways to encourage physical activity and resources they can refer patients/families to.
- Conduct or participate in research to continue to build the body of evidence on physical activity and exercise in pediatric oncology patients.

Acknowledgments:

- The Evidence-Based Scholars Program was supported by a grant from the Walden W. and Jean Young Shaw Foundation
- Jennifer Hayakawa, DNP, CNS, CNRN, CCRN-K, Nurse Scientist, CHOC Children's.
- Vicky R. Bowden, DNSc, RN, Azusa Pacific University, CHOC Children's Hospital EBP Scholars Mentor.

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