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Predicting Decreased Health-Related Quality of Life (HRQL) in Adult Survivors of Childhood Cancer: A Report from the Childhood Cancer Survivor Study (CCSS)

Fiona Schulte, PhD¹; Yan Chen, MSc²; Yutaka Yasui, PhD³; Wendy Leisenring, ScD⁴; Todd M. Gibson, PhD⁵; Paul Nathan, MD⁶; Kevin C. Oeffinger, MD⁷; Melissa M. Hudson, MD^{3,8}; Gregory T. Armstrong, MD, MSCE³; Leslie L. Robison, PhD³; Kevin R. Krull, PhD^{3,9}; I-Chan Huang, PhD³

¹ Department of Oncology, University of Calgary, Calgary, Alberta, Canada

² Department of Public Health Sciences, University of Alberta, Edmonton, Alberta, Canada

³ Department of Epidemiology & Cancer Control, St. Jude Children's Research Hospital, Memphis, Tennessee, U.S.A.

⁴ Clinical Research Division, Fred Hutchinson Cancer Research Center, Seattle, Washington, U.S.A.

⁵ Division of Cancer Epidemiology & Genetics, National Cancer Institute, Rockville, Maryland, U.S.A.

⁶ Division of Haematology/Oncology, The Hospital for Sick Children, Toronto, Ontario, Canada

⁷ Department of Medicine, Duke University, Durham, North Carolina, U.S.A.

⁸ Department of Oncology, St. Jude Children's Research Hospital, Memphis, Tennessee, U.S.A.

⁹ Department of Psychology, St. Jude Children's Research Hospital, Memphis, Tennessee, U.S.A.

Background:

This study examines temporal patterns in HRQL among adult survivors of childhood cancer, and socio-demographic, lifestyle and health status predictors of decline in HRQL.

Methods:

Adult survivors of childhood cancer (4755, 55.2% female, 86.9% non-Hispanic white) completed baseline (T0) and follow-up (T1 in 2003, T2 in 2014) surveys (median[SD] age 32.4[7.5] at T1, time since diagnosis to T1 23.0[4.5], T1-T2 interval 11.7[0.6] years). Socio-demographic (e.g., age, sex, educational attainment, annual family income), lifestyle (physical inactivity, smoking) and health status predictors were collected at T0 and T1. Chronic conditions graded ≥ 2 by CTCAE defined as presence, and mental and cognitive status with ≥ 1 SD from norms defined as poor. SF-36 Physical and Mental Component Summary (PCS/MCS; mean 50/SD 10) at T1 and T2 classified HRQL as optimal (≥ 40) or suboptimal (< 40). Multivariable logistic regression identified risk factors (T0, T1 or status change T0-T1) of decreased HRQL (i.e., optimal to suboptimal) using a backward selection method ($p < 0.1$), adjusting for sex, race, age at T1 and years between T1-T2. The sample was randomly split into training (80%) and test (20%) datasets to develop and validate prediction models; Area Under the ROC Curve (AUC) evaluated model performance.

Results:

From T1-T2, 8.1% and 8.3% of survivors reported decreased PCS and MCS. AUCs of training/test models were 0.75/0.74 for decreased PCS and 0.72/0.68 for decreased MCS. Risk factors at T0 or T1 predicting decreased PCS included female sex (OR 1.67, 95%CI 1.25-2.24), younger age (OR

1.04, 95%CI 1.02-1.06), <college/vocational education (OR 1.59, 95%CI 1.02-2.46), family income <\$20,000 (OR 2.00, 95%CI 1.21-3.30), obesity (OR 1.97, 95%CI 1.32-2.92), chronic health conditions (neurologic OR 2.47, 95%CI 1.69-3.60; musculoskeletal OR 2.27, 95%CI 1.42-3.64; endocrinological OR 2.25, 95%CI 1.44-3.52; gastrointestinal OR 1.89, 95%CI 1.32-2.69; pulmonary OR 1.66, 95%CI 1.06-2.59; cardiovascular OR 1.53, 95%CI 1.14-2.06) and depression (OR 1.79, 95%CI 1.20-2.67). Risk factors at T0 or T1 predicting decreased MCS included unemployment (OR 1.68, 95%CI 1.19-2.38), smoking (OR 2.03, 95%CI 1.37-3.00), physical inactivity (OR 1.48, 95%CI 1.05-2.09), poor mental health (depression OR 4.29, 95%CI 2.44-7.55; somatization OR 1.63, 95%CI 1.05-2.53) and poor cognitive status (task efficiency OR 1.90, 95%CI 1.34-2.68; organization OR 1.67, 95%CI 1.12-2.48).

Conclusions:

Nearly 10% of childhood cancer survivors have significant late-onset decline in HRQL. Chronic health conditions predict decreased physical HRQL, whereas smoking, physical inactivity and poor mental health predict decreased mental HRQL. Interventions targeting modifiable lifestyle and health conditions should be considered to prevent decreased HRQL for childhood cancer survivors.