Cardio-Oncology

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Nursing knowledge in cardio-oncology: results of an international learning needs-assessment survey

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Abstract

Background With early detection and improvements in systemic and local therapies, millions of people are surviving cancer, but for some at a high cost. In some cancer types, cardiovascular disease now competes with recurrent cancer as the cause of death. Traditional care models, in which the cardiologist or oncologist assess patients individually, do not address complex cancer and cardiovascular needs. Nursing disciplines should be an integral part of holistic assessment in cardio-oncology care. To learn what educational needs nurses perceive important for provision of competent cardio-oncology nursing care, we undertook an international survey, aiming to understand their learning needs and preferred learning modalities.

Methods A cross-sectional survey was developed by members of the International Cardio-Oncology Society (IC-OS) Nursing Research group. The survey was in English and consisted of 23 questions which include demographic information, clinical specialty (oncology, cardiology, or cardio-oncology), multiple-choice questions related to clinical topics that nurses might be interested in learning, and preferred methods of instruction.

Results Three hundred and twenty-nine responses were received. The majority expressed interest in learning more about cardio-oncology related topics, primarily via pre-recorded webinars ($n=206$, 67%) and live virtual meetings ($n=192$, 63%). Formal programs leading to certification were highly endorsed ($n=247$, 80%). In relation to specific cardio-oncology topics, there was a strong interest in learning more about specific cardiovascular toxicities, and their monitoring and management ($n=205$, 66%).

Conclusion Cardio-oncology is a new field of expertise requiring competent nurses with current knowledge incorporating both specialties. The survey we conducted described the sample's characteristics, identified cardio-oncology learning needs and preferred methods of delivery. A cardio-oncology core curriculum based on the survey responses can offer convenient, accessible and learner-directed education for nurses worldwide. Ultimately, development of cardio-oncology nursing expertise will benefit cancer patients and survivors worldwide.

Keywords Nursing, Cardio-oncology, Multidisciplinary team, Learning needs assessment, Survey, Education, Certification, Webinar, Cardiology, Oncology

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Background

Worldwide, cancer and cardiovascular diseases are leading causes of morbidity and mortality in middle and upper-income countries. With early detection, improvement in systemic and local therapies [1, 2], millions of people are surviving cancer, but for some at a high cost. In some cancer types, cardiovascular disease now competes with recurrent cancer as the cause of death [3, 4]. Moreover, cardiovascular disease represents multiple possible events inclusive of cardiovascular mortality, myocardial infarction, stroke, heart failure, and pulmonary embolism [5]. These events are highly prevalent regardless of cancer site with risk persisting 10 years beyond diagnosis [5].

Traditional care models, in which the cardiologist or oncologist assess patients individually, do not address intersecting cancer and cardiovascular needs [6]. This practice results in fragmented care, variability in assessment and management, and suboptimal outcomes for patients [6]. Figure 1 describes potential decision making and subsequent clinical outcomes of cancer patients at risk or presenting with cardiotoxicity [6]. Dual-specialty clinics or health professionals with dual-specialty training are essential to ensure optimal outcomes from both oncologic and cardiovascular perspectives [7].

In the last 15 years, the term 'cardio-oncology' was coined to describe multidisciplinary clinics aiming to manage complex cardiovascular problems experienced by cancer patients [8]. In oncology literature, multidisciplinary cancer conferences have a positive impact on patient outcomes with improvements in diagnosis and treatment planning, patient survival, as well as patient and clinician satisfaction [9–12]. Patient needs are often unmet by a physician-only approach as many patients require holistic care addressing education, lifestyle modification, polypharmacy review, social support, pain control and end of life care [10–14]. The American Heart Association endorses a similar multimodal cardiac rehabilitation-based approach to improve cardiovascular outcomes in cancer survivors [15]. This care model typically involves a comprehensive medical evaluation, exercise prescription, pharmaceutical and behavioral cardiovascular risk factor management, and education/counseling support [16].

The specific roles of nursing within cardio-oncology clinics are yet to be fully elucidated [17]. We previously conducted an integrative review of cardio-oncology clinics aiming to describe nursing roles [18]. The consensus amongst all studies was that cardio-oncology clinics should be composed of a multidisciplinary team [18]. While the majority of papers focused on physician disciplines, nursing was broadly considered an essential resource, but no specific roles nor responsibilities were discussed in any papers [18]. Nursing should be a part of the initial and ongoing assessment in cardio-oncology care [19–21]. However, cardio-oncology is a relatively new field of study and the nursing knowledge standard to provide holistic care has not been established. Moreover, nurses commonly have knowledge based in either cardiology or oncology but rarely both. For competent

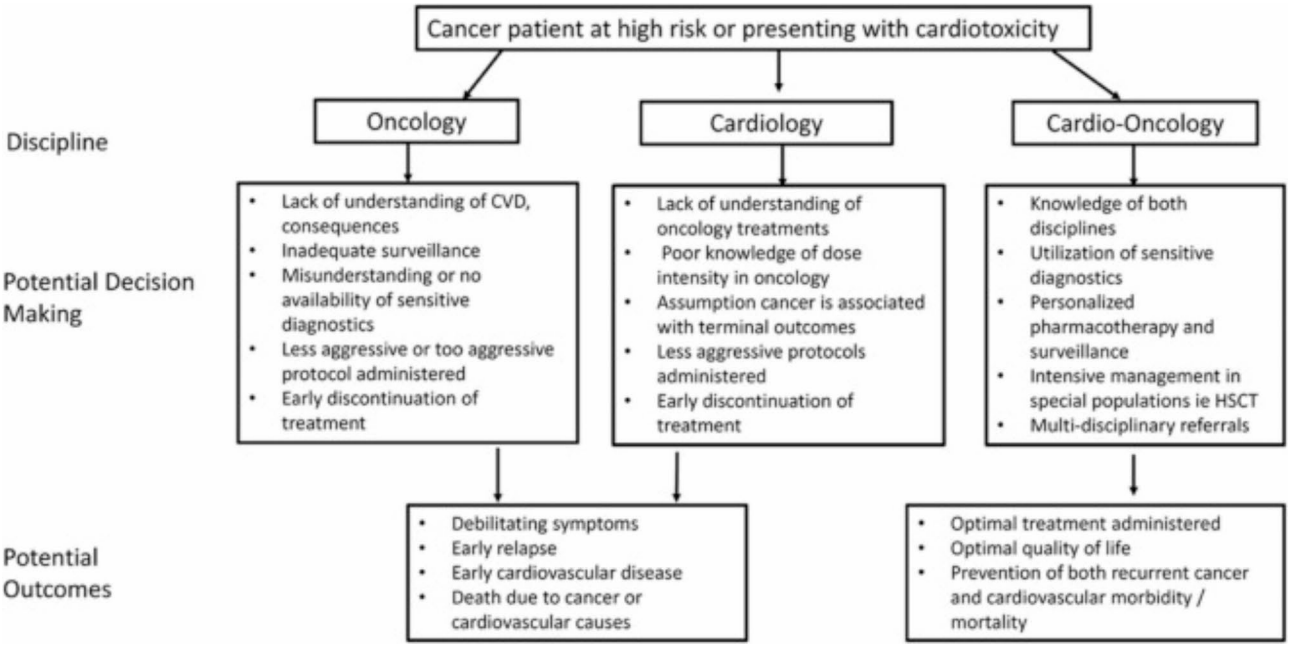

Fig. 1 Potential decision making and clinical outcomes of cancer patients at risk for cardiovascular disease depending on assessing discipline
Legend: Cardiovascular disease (CVD); Hematopoietic stem cell transplant (HSCT)

cardio-oncology nursing care to be fostered, accessible and acceptable educational opportunities must be readily available. Accordingly, we undertook an online survey to assess the learning needs of nurses in the competent care of cardiovascular issues in patients with cancer, aiming to understand their learning needs and preferred learning modalities.

Method

A cross-sectional survey was developed by members of the International Cardio-Oncology Society (IC-OS) Nursing Research group, with invitations distributed through IC-OS as well as national and international nursing societies and associations. The survey was in English and consisted of 23 questions which include demographic information, clinical specialty (oncology, cardiology, or cardio-oncology), multiple-choice questions related to clinical topics that nurses might be interested in learning, and preferred methods of instruction. No identifying information was requested thus participants remained anonymous. The survey qualified for exempt status by institutional board review and completion was considered implied consent of participation. The survey was conducted online via the IC-OS website with submissions accepted between the dates of December 1, 2023, to February 29, 2024. The secure Research Electronic Data Capture (REDCap) program was utilized to administer the survey which took approximately five minutes to complete [22]. Survey questions were purposefully developed to describe potential cardio-oncology events across the treatment and survivorship continuum. Depending on the format of the question, respondents could choose as many areas of interest as desired. Aiming for the broadest perspectives and representation of different health care systems, participants were recruited by convenience sampling in multiple countries and were currently working in cardiology, oncology or cardio-oncology programs.

Results

Three hundred and twenty-nine responses were received during the study time frame. The majority of respondents reported as residing in the United States ($n = 206$), Canada ($n = 45$), United Kingdom ($n = 14$) China ($n = 12$), Qatar ($n = 5$), Australia ($n = 1$), Ireland ($n = 2$), Poland ($n = 2$), Turkey ($n = 1$) and Italy ($n = 1$). The majority were female ($n = 290$, 93%) with 49% educated to Bachelor´s level ($n = 151$, 49%) and working in oncology ($n = 218$, 70%) in direct patient care roles ($n = 260$, 85%) (Table 1). A total of 201 (65%) nurses stated they had cardio-oncology experience.

In terms of previous education and training in cardio-oncology, the majority stated that they had no formal education ($n = 268$, 88%) and approximately one-third have formal cardio-oncology programs in their workplace ($n = 110$, 36%) (Table 2). The majority of respondents expressed an interest in learning more about cardio-oncology related topics, primarily via pre-recorded webinars ($n = 206$, 67%) and live virtual meetings ($n = 192$, 63%). Formal programs leading to certification were highly endorsed ($n = 247$, 80%).

Respondents were asked about training topics categorised into cardio-oncology, oncology and cardiology (Table 3). In relation to specific cardio-oncology topics, there was a strong interest in learning more about cardiovascular toxicities and their management ($n = 205$, 66%) along with interest in cardio-oncology programs and cancer therapeutics.

Discussion

Cardio-oncology is a new sub-specialty requiring competent health care providers with knowledge that incorporates both specialties. To learn what educational needs nurses perceive important for provision of competent cardio-oncology nursing care, we undertook an international survey. We report the sample's demographic and educational characteristics, clinical practice settings, cardio-oncology learning content and preferred methods of delivery. To our knowledge, this is the first survey of its kind.

Only 22% of respondents reported any formal education or training in cardio-oncology in their practice setting. Multiple choices for topics of interest were allowed with desire for education being high across all subtopics. These results highlight the complexities and potential knowledge gaps faced by nurses when assessing cancer patients with cardiology issues. 36% reported a formal cardio-oncology program in their workplace, suggesting there are few formal resources available to nurses and other multidisciplinary team members for referral and collaboration. This finding is similar to a survey of healthcare professionals exploring facilitators and barriers to injectable cardiovascular therapies where professional education was highlighted by respondents [23].

In terms of their current learning approaches, respondents modestly endorsed continuing education programs, journals, conferences or webinars. The majority expressed considerable interest in learning about cardio-oncology topics, primarily via pre-recorded webinars and live virtual meetings. A previous survey reported preferences for face-to-face training (44%) whereas online learning was less favored (26%). The COVID-19 pandemic restrictions necessitated online learning for health professionals, which has since been embraced with higher attendance of courses and greater flexibility of delivery [23, 24]. Formal programs leading to certification were highly endorsed. In many countries, specialty certification is desirable as a means of validation with formal examination of nurses' knowledge, skills, and

Table 1 Demographic and clinical characteristics of respondents ($n = 329$)

Characteristic		*N* (%)
Age (***n*** = **310**)	20–30 years old	32 (10%)
	31–40 years old	81 (26%)
	41–50 years old	91 (29%)
	51–60 years old	69 (22%)
	60 years or older	30 (10%)
	Prefer not to answer	7 (2%)
Gender (***n*** = **310**)	Female	290 (93%)
	Male	15 (5%)
	Nonbinary	2 (0.6%)
	Prefer not to answer	4 (1.3%)
Highest educational level (***n*** = **311**)	Bachelor's degree	151 (49%)
	Clinical Doctoral degree (DNP)	12 (4%)
	Diploma in Nursing	6 (2%)
	Master of Science in Nursing	118 (38%)
	Other	6 (2%)
	PhD	13 (4%)
	Associate Degree in Nursing	5(2%)
Primary Specialty (***n*** = **310**)	Cardiology	55 (18%)
	Oncology	218 (70%)
	Other	37 (12%)
Type of role (***n*** = **414**)	Direct patient care (direct interactions with patients, families and groups of patients to promote health or well-being and improve quality of life)	260 (85%)
	Indirect patient care (Activities other than direct care i.e.: developing evidence-based/evidence-informed guidelines or protocols for care, staff education & development activities)	32 (11%)
	None	108 (35%)
	Other	14 (5%)
Job title (***n*** = **329**)	Clinical Nurse Specialist (CNS)	21 (7%)
	Clinical Nurse	177 (57%)
	Nurse Consultant	6 (3%)
	Nurse Faculty in a school of nursing	5 (2%)
	Nurse Navigator	22 (7%)
	Nurse Practitioner (NP)	58 (19%)
	Nurse Scientist/Researcher	10 (3%)
	Other	27 (9%)
	Prefer not to answer	3 (1%)
Cardio-oncology experience (***n*** = **201**, **65%)**	1 year	32 (10%)
	1–5 years	75 (24%)
	6–10 years	42 (14%)
	11–15 years	21 (7%)
	16–20 years	14 (5%)
	20 years	17 (6%)
Current workplace (***n*** = **370**) **Can have more than 1 answer**	Academic Medical Center	136 (44%)
	Outpatient clinic	134 (43%)
	Community Hospital/Facility	59 (19%)
	Research	17 (5%)
	Other	12 (4%)
	Faculty/School of Nursing	9 (3%)
	Private Practice	3 (1%)
Number of beds in workplace (***N*** = **309**)	< 100 beds	31 (10%)
	> 500 beds	105 (34%)
	100–499 beds	113 (37%)
	Not applicable	60 (19%)

Table 2 Cardio-oncology education and training

Question	Answer	*N* (%)
I have received formal education/training in cardio-oncology ($n=305$)	Yes	37 (12%)
	No	268 (88%)
There is a formal cardio-oncology program in my place of work? ($n=306$)	Yes	110 (36%)
	No	196 (64%)
I update my Cardio-Oncology knowledge from? ($n=519$) Can select all that apply	Continuing education programs	170 (57%)
	Journals	133 (45%)
	Conferences	108 (36%)
	Webinars	108 (36%)
I am most interested in learning about Cardio-Oncology topics through ($n=674$) Can select all that apply	Pre-recorded webinars	206 (67%)
	Live virtual meeting	192 (63%)
	Attending onsite cardio-oncology nursing programs	168 (55%)
	Rotating with/Shadowing with established Cardio-Oncology providers	103 (34%)
	Others	5 (2%)
I would be interested to enroll in a formal Cardio-Oncology program that provides a certificate training in Cardio-Oncology at completion ($n=308$)	Yes	247 (80%)
	No	61 (20%)
I would be interested in becoming a member of the International Cardio-Oncology Society Nursing group ($n=302$)	Yes	148 (49%)
	No	154 (51%)
I have heard/known of the International Cardio-Oncology Society (IC-OS) ($n=308$)	Yes	89 (29%)
	No	219 (71%)

abilities specific to their specialty beyond entry-level education and licensing [25]. The anticipated results of such certifications are improved safety, quality of care, and health outcomes for care recipients [25]. Undoubtedly having an informed and educated nursing workforce who practice using an approved curriculum will improve patient care [26]. A key part of the nursing role is patient assessment and education regarding their treatment and how to self-manage. A previous survey of cardiovascular patients highlighted their need for ongoing education from healthcare professionals and this is usually undertaken by nurses [27].

Guided by the survey results, the IC-OS Nursing Research and Education committees are currently in the process of developing a Cardio-Oncology Nursing Education program core curriculum. The modules will be evidenced-based reflecting the latest research and will also incorporate the relevant guidelines and consensus documents as appropriate [28]. The didactic component of the learning program will be composed of modules inclusive of the multiple cardio-oncology topics identified in the survey [29]. Access to the educational presentation is anticipated to be offered via on-demand, learner-directed modules which can be accessed by participants globally at their own convenience. A cardio-oncology nursing certificate of completion will be available upon successful completion of the modular learnings.

Strengths and limitations

A strength of this email survey is the participants were primarily working in clinical roles. The delivery method was efficient, convenient, and inexpensive and resulted in over 300 responses. The survey was distributed through national and international societies and associations therefore we are confident that the responses reflect nurses working in oncology and cardiology specialties. Given the brevity and focused nature of the survey, we do not believe response fatigue was a major issue. The survey was in English therefore did not capture non-English speaking nurses. Nurses are busy professionals with scant time for professional activities thus the sample size may be limited by those who were unable complete the survey within the deadline. A limitation of surveys with pre-formatted responses is lack of open-ended questions which likely would have illuminated the meaning of survey responses or demonstrated areas of unknown need. Similarly, 65% of nurses reported having cardio-oncology experience, but the type and depth of knowledge is unknown, hence the potential for overestimating knowledge. Nevertheless, we believe this study provides insight into the current educational needs of nurses caring for a patient population with highly complex problems and provides essential information for the purpose of curricular development.

Conclusion

Cardio-oncology is a new field of expertise requiring competent nurses with current knowledge incorporating both specialties. The survey we conducted described the sample's demographic characteristics, identified cardio-oncology learning needs and preferred methods of delivery. A cardio-oncology core curriculum based on the survey responses can offer convenient, accessible and learner-directed modular education for nurses

Table 3 Respondents interest in specific cardiology and oncology topics

Statement	Topic	*N* (%)
I am most interested in learning about the following topics in Cardio-Oncology (*n* = 962) Can select all that apply	Cardiovascular Toxicities/Monitoring and Management	205 (66%)
	Cardio-Oncology Program	180 (58%)
	Cancer Therapeutics and Cardiotoxicity (Pharmacology CE hours)	171 (55%)
	Cancer Survivorship	155 (50%)
	Cardiology	117 (38%)
	Pediatric Cardio-Oncology	69 (22%)
	Other	65 (22%)
Interest in cardiology (*n* = 450) - Can select all that apply		
	Basic ECG	48 (57%)
	Advanced ECG (STEMI and NSTEMI)	51 (60%)
	Cardiac Arrhythmias	61 (72%)
	Atrial Fibrillation/Flutter	48 (57%)
	AV Blocks	45 (53%)
	Ventricular Arrythmias	41 (48%)
	Acute Coronary Syndrome	47 (55%)
	Cardiac Medications (ACE-I, Beta blockers, Antidysrhythmic, Statins)	57 (67%)
	Cardiovascular Risk Factor Management (HTN, Lipids)	52 (61%)
Interest in topic - Cancer Therapeutics Sub-topic (*n* = 763) -Can select all that apply		
	Cardioprotective agents	104 (77%)
	Anthracycline Cardiotoxicity	97 (71%)
	CAR-T Cell Therapies	84 (62%)
	Immune checkpoint inhibitors	94 (69%)
	EGFR Agents	67 (49%)
	Endocrine Agents	62 (46%)
	Radiation Therapy and late effects (Accelerated Atherosclerosis)	88 (65%)
	Targeted Therapy	93 (68%)
	VEGF inhibitors	74 (54%)
Interest in topic - Cardiovascular Toxicities Sub-topic (*n* = 770)		
	HTN management in cancer patients	117 (75%)
	Orthostatic hypotension	67 (43%)
	Endocarditis	73 (47%)
	Myocardial infarction	74 (47%)
	Oral anticoagulation in cancer patients	91 (58%)
	Thromboembolism	76 (48%)
	Cardiomyopathy	101 (64%)
	Heart Failure	111 (71%)
	Peripheral Vascular Disease	60 (38%)
Interest in topic - Pediatric Cardiology Sub-topic (*n* = 92)		
	Adolescent and young adults (AYA)	47 (89%)
	Adult survivors of childhood cancer	45 (85%)
Interest in topic - Cardiology-Oncology Program Sub-topic (*n* = 313)		
	Community-based	58 (40%)
	Hospital-based	85(59%)
	Nurse navigators	63 (44%)
	Patient Education Strategies	107 (74%)
Interest in topic - Cancer Survivorship Sub-topic		
	Cardiovascular risk factor assessment	111 (88%)
	Exercise Rehabilitation in cancer patients	94 (75%)
	Engaging caregivers in cancer survivorship care	79 (63%)
	Cardiometabolic Syndrome	76 (60%)
	Supportive Care/Palliative Care	73 (58%)
	Nutrition and Dietetics	71 (56%)

worldwide. Ultimately, development of cardio-oncology nursing expertise will benefit cancer patients and survivors worldwide.

Abbreviations

ICOS	International Cardio–Oncology Society
REDCap	Research Electronic Data Capture
COVID	19–Coronavirus disease

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Author contributions
A.F. made substantial contributions to the conception of the study, design the survey, led the manuscript writing, and provided critical manuscript revisions. V.S. made significant contributions in the acquisition of data, and collated survey responses. E.P., and G.L. made substantial contributions in survey dissemination, writing and revising the manuscript, and critical review for intellectual content. K.S, L.N., A.Y., and M.S. contributed to the writing of the manuscript. All authors engaged in the critical review, approved the version to be published, and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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Data availability
No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate
No identifying information was requested thus participants remained anonymous. The survey qualified for exempt status by institutional board review and completion was considered implied consent of participation.

Consent for publication
Consent for publication of Fig. 1 was approved by Elsevier.

Competing interests
The authors declare no competing interests.

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References

1. Causes of death statistics, Statistics Explained: Eurostat. 2020 [Available from: https://www.oecd-ilibrary.org/sites/82129230-en/1/3/2/1/4/index.html?itemId=/content/publication/82129230-en&_csp_=e7f5d56a7f4dd03271a59acda6e2be1b&itemIGO=oecd&itemContentType=book
2. National Center for Health Statistics, Leading Causes of Death: Center for Disease Control. 2024 [31 July 2024]. Available from: https://www.cdc.gov/nchs/fastats/leading-causes-of-death.htm
3. Patnaik JL, Byers T, DiGuiseppi C, Dabelea D, Denberg TD. Cardiovascular disease competes with breast cancer as the leading cause of death for older females diagnosed with breast cancer: a retrospective cohort study. Breast Cancer Res. 2011;13(3):R64.
4. Abdel-Qadir H, Austin PC, Lee DS, Amir E, Tu JV, Thavendiranathan P, et al. A Population-based study of Cardiovascular Mortality following early-stage breast Cancer. JAMA Cardiol. 2017;2(1):88–93.
5. Paterson DI, Wiebe N, Cheung WY, Mackey JR, Pituskin E, Reiman A, et al. Incident Cardiovascular Disease among adults with Cancer: a Population-based Cohort Study. JACC CardioOncol. 2022;4(1):85–94.
6. Pituskin E, Paterson I, Cox-Kennett N, Rothe D, Perri M, Becher H. The role of Cardio-Oncology in the Interprofessional Care of adult patients receiving Cancer Therapy. Semin Oncol Nurs. 2017;33(4):384–92.
7. Parent S, Pituskin E, Paterson DI. The Cardio-Oncology Program: a Multidisciplinary Approach to the care of Cancer patients with Cardiovascular Disease. Can J Cardiol. 2016;32(7):847–51.
8. Ewer MS, Yusuf SW, Asmis R, Abe J-i. Editorial: Case reports in cardio-oncology: 2022. Frontiers in Cardiovascular Medicine. 2023;10.
9. Wright FC, De Vito C, Langer B, Hunter A. Multidisciplinary cancer conferences: a systematic review and development of practice standards. Eur J Cancer. 2007;43(6):1002-10.
10. Alhumaid W, Small SD, Kirkham AA, Becher H, Pituskin E, Prado CM, et al. A contemporary review of the effects of Exercise Training on Cardiac structure and function and Cardiovascular Risk Profile: insights from imaging. Front Cardiovasc Med. 2022;9:753652.
11. Pituskin E, Fairchild A, Dutka J, Gagnon L, Driga A, Tachynski P, et al. Multidisciplinary team contributions within a dedicated outpatient palliative radiotherapy clinic: a prospective descriptive study. Int J Radiat Oncol Biol Phys. 2010;78(2):527–32.
12. Pituskin E, Sneath S, Rabel H, O'Rourke T, Duggleby W, Hunter K, et al. Addressing Pain Associated with Bone metastases: Oncology nursing roles in a Multidisciplinary Rapid-Access Palliative Radiotherapy Clinic. Semin Oncol Nurs. 2022;38(2):151279.
13. Pituskin E, Mackey JR, Koshman S, Jassal D, Pitz M, Haykowsky MJ, et al. Multidisciplinary Approach to Novel therapies in Cardio-Oncology Research (MANTICORE 101-Breast): a Randomized Trial for the Prevention of Trastuzumab-Associated Cardiotoxicity. J Clin Oncol. 2017;35(8):870–7.
14. Pituskin E, Perri M, Cox-Kennett N, Andrews E, Dimitry R, McNeely M, et al. Personalized care in the Prevention of Treatment-Related Cardiac Dysfunction in Female Cancer survivors. J Womens Health (Larchmt). 2019;28(10):1384–90.
15. Gilchrist SC, Barac A, Ades PA, Alfano CM, Franklin BA, Jones LW, et al. Cardio-Oncology Rehabilitation to Manage Cardiovascular outcomes in Cancer patients and survivors: A Scientific Statement from the American Heart Association. Circulation. 2019;139(21):e997–1012.
16. Pituskin E, Foulkes SJ, Cox-Kennett N, Driga A, Dimitry R, Thompson RB, et al. Cardio-oncology and Cancer Rehabilitation: is an Integrated Approach possible? Can J Cardiol. 2023;39(11S):S315–22.
17. Fadol A, Nodzon L, Lee G. The role of nursing in the delivery of Cardio-Oncology. Current Treatment Options in Oncology. 2024; 25(10):1268-1275
18. Reber T, Kucharski D, Wiles C, Hunter K, Pituskin E. An Integrative Review of Cardio-Oncology Interdisciplinary Clinics and the role for nursing. Edmonton: University of Alberta; 2022.
19. Brown S-A, Patel S, Rayan D, Zaharova S, Lin M, Nafee T, et al. A virtual-hybrid approach to launching a cardio-oncology clinic during a pandemic. Cardio-Oncology. 2021;7(1):2.
20. Gujral DM, Manisty C, Lloyd G, Bhattacharyya S. Organisation & models of cardio-oncology clinics. Int J Cardiol. 2016;214:381–2.
21. Kappel C, Rushton M, Johnson C, Aseyev O, Small G, Law A, et al. Clinical experience of patients referred to a multidisciplinary Cardio-Oncology Clinic: an Observational Cohort Study. Curr Oncol. 2019;26(3):322–7.
22. Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG. Research electronic data capture (REDCap)--a metadata-driven methodology and workflow process for providing translational research informatics support. J Biomed Inf. 2009;42(2):377–81.

23. Khatib R, Angus N, Hansen TB, Lambrinou E, Vellone E, Khan M, et al. Perceptions of injectable therapies with cardiovascular benefit: an ACNAP survey of healthcare professionals to explore facilitators and barriers. Eur J Cardiovasc Nurs. 2021;21(5):430–7.
24. Stoehr F, Müller L, Brady A, Trilla A, Mähringer-Kunz A, Hahn F, et al. How COVID-19 kick-started online learning in medical education—the DigiMed study. PLoS ONE. 2021;16(9):e0257394.
25. Dierkes AM, Schlak AE, French R, McHugh MD, Aiken L. Why some nurses obtain Specialty Certification and others do not. JONA: J Nurs Adm. 2021;51(5):249–56.
26. Lee GA, Aktaa S, Baker E, Gale CP, Yaseen IF, Gulati G, et al. European Society of Cardiology quality indicators for the prevention and management of cancer therapy-related cardiovascular toxicity in cancer treatment. Eur Heart J - Qual Care Clin Outcomes. 2022;9(1):1–7.
27. Lee GA, Durante A, Baker EE, Vellone E, Caggianelli G, Dellafiore F, et al. Patients' perceptions on the facilitators and barriers using injectable therapies in dyslipidaemia: an empirical qualitative descriptive international study. J Adv Nurs. 2023;79(12):4687–96.
28. Gevaert SA, Halvorsen S, Sinnaeve PR, Sambola A, Gulati G, Lancellotti P, et al. Evaluation and management of cancer patients presenting with acute cardiovascular disease: a clinical Consensus Statement of the Acute CardioVascular Care Association (ACVC) and the ESC council of Cardio-Oncology—part 2: acute heart failure, acute myocardial diseases, acute venous thromboembolic diseases, and acute arrhythmias. Eur Heart J Acute Cardiovasc Care. 2022;11(11):865–74.
29. López-Fernández T, Farmakis D, Ameri P, Asteggiano R, de Azambuja E, Aznar M, et al. European Society of Cardiology Core Curriculum for cardio-oncology. Eur J Heart Fail. 2024;26(4):754–71.

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