JOURNAL OF INTERNATIONAL CRISIS AND RISK COMMUNICATION RESEARCH
ISSN: 2576-0017
2024, VOL 7, NO S10

# Empowering Nurses in Cardiovascular Risk in Cancer Patients: Stratification and Survivorship Care

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**Abstract**

The increasing prevalence of cancer and cardiovascular disease (CVD) has led to the emergence of cardio-oncology, a specialty focused on addressing the cardiovascular complications associated with cancer therapies. This paper outlines the cardiotoxic effects of cancer treatments, explores the role of oncology nurses in performing cardiovascular assessments, and discusses the integration of evidence-based risk stratification tools into clinical practice. Cancer and CVD share common risk factors, and cancer patients face an increased risk of acute cardiovascular complications during and after treatment. Advancements in cancer therapies have improved survival rates but are accompanied by an increased risk of both acute and chronic cardiovascular toxicities. Oncology nurses play a critical role in preparing patients for treatment, educating them about potential side effects, and integrating cardiovascular risk assessments into their practice. Baseline cardiovascular assessment is recommended for all patients undergoing cancer treatment, and risk stratification tools, such as the Heart Failure Association-Cardio-Oncology cardiovascular risk assessment tool, enable healthcare professionals to tailor management plans accordingly. Patients with pre-existing CVD or those identified as high-risk require periodic evaluation and ongoing surveillance beyond the conclusion of cancer therapy. Oncology nurses are uniquely positioned to address and educate on lifestyle-related risk factors as part of survivorship care. Shared decision-making is crucial when addressing

cancer treatment in the presence of an acute cardiovascular event, and patients must be informed about the risks of continuing versus halting therapy. Adequate training and education for oncology nurses in cardiovascular assessment are essential to fulfill these additional responsibilities effectively. The development of a core curriculum for nurses in cardio-oncology is underway, aiming to provide the necessary guidance, support, and education to excel in this evolving field.
**Keywords:** nurses, cancer, CVD, cardiovascular disease

## Introduction

The global population is experiencing increased longevity, which has led to higher incidences of both cancer diagnoses and cardiovascular diseases (CVD). A significant proportion of individuals undergoing cancer treatment will either have pre-existing cardiovascular conditions, such as hypertension or hyperlipidemia, or may face an elevated risk of cardiovascular events, including acute coronary syndromes or heart failure, as a direct consequence of their cancer therapies. Cancer patients with coexisting cardiovascular conditions often require specialized care from both oncology and cardiology services, creating a demand for more integrated healthcare approaches. This necessity has given rise to the field of cardio-oncology, a specialty focused on addressing the cardiovascular complications associated with cancer treatments.

Cardio-oncology aims to mitigate the increased risk of cardiotoxicity linked to various cancer therapies, and the publication of the first European Society of Cardiology (ESC) guidelines in 2022 underscored the complexity of care in this field. These guidelines emphasize the need for improved coordination between oncology and cardiology specialists to optimize patient outcomes (Lyon et al., 2022). Health care professionals (HCPs) involved in cardio-oncology require interdisciplinary knowledge and skills that encompass both specialties. Despite its importance, this emerging field faces several challenges. Surveys conducted among cardiology specialists have highlighted the critical need for closer collaboration with oncology services (Asteggiano et al., 2020). Furthermore, these studies reveal gaps in cardio-oncology education for all HCPs and stress the necessity of a multidisciplinary approach to patient care. They also call for greater emphasis on understanding cardiotoxicity, including its assessment and management (Boriani et al., 2021).

Long-term cancer survivors represent a growing population, and there is accumulating evidence that they are at a higher risk of dying from CVD compared to the general population. Consequently, risk stratification for CVD, coupled with the management and surveillance of cancer patients and survivors who have or develop CVD, is essential for improving outcomes (Cleary et al., 2023; Sverdlov et al., 2024). From a nursing perspective, cardio-oncology nurses play a pivotal role in the detection and management of cardiotoxicity associated with cancer therapies. These professionals often transition into cardio-oncology roles from prior experience in cardiology or oncology and require advanced knowledge and skills in both domains. Their responsibilities include assessing patients for signs of cardiotoxicity during and after cancer treatments and implementing appropriate management strategies (Fadol, 2021). Therefore, the purpose of this paper is to outline the cardiotoxic effects of cancer therapies, explore the role of oncology nurses in performing cardiovascular assessments, and discuss how evidence-based risk stratification tools can be integrated into clinical practice.

To achieve this objective, an extensive review of the literature was conducted to examine the cardiotoxic effects of cancer therapies and their associated cardiovascular complications. Relevant clinical guidelines were also reviewed to provide an evidence-based perspective, identify knowledge gaps, and synthesize available evidence. This approach aims to inform clinical practice, enhance oncology nursing education, and highlight areas where further research is needed.

**Cancer and Cardiovascular Disease**

Cancer and CVD share several common risk factors, including aging, smoking, and obesity. Evidence suggests that modifiable lifestyle-related factors account for approximately 30% of cancer cases. Smoking and obesity, along with other modifiable risks such as poor diet (characterized by high intake of saturated fats and processed foods and low consumption of fruits and vegetables), excessive alcohol use, and physical inactivity, are strongly associated with both cancer and CVD. These shared risk factors underscore the interplay between the two conditions. Studies have demonstrated the detrimental impact of CVD in cancer populations. For example, one U.S. study highlighted that traditional cardiovascular risk factors, such as hypertension, diabetes, and dyslipidemia, are more prevalent among cancer patients than in individuals without cancer. Importantly, this study revealed an 8-year survival rate of 81% in patients without CVD, compared to only 60% in those with CVD (Sturgeon et al., 2019).

In addition to shared risk factors, cancer patients face an increased risk of acute cardiovascular complications, including heart failure (HF) and acute coronary syndromes (ACS), which can occur during or after cancer treatment. A U.K. study involving 108,215 cancer survivors found heightened risks of developing HF, cardiomyopathy, arrhythmias, pericarditis, coronary heart disease, venous thromboembolism, and valvular heart disease (Strongman et al., 2022). Given these elevated risks, early assessment of cardiovascular risk factors and baseline cardiac function is crucial for optimizing patient care. Oncology nurses are well positioned to conduct these assessments but must be equipped with appropriate training and education. While some countries have established dedicated cardio-oncology centers that provide a structured and integrated approach to care, this practice is not yet universal.

As populations continue to age, the number of cancer survivors is expected to rise significantly. For instance, projections indicate that the U.S. will have 22 million cancer survivors by 2032, with the majority (67%) being over the age of 65. This anticipated increase further underscores the need for comprehensive cardiovascular risk assessment, effective management strategies, and robust surveillance protocols to ensure optimal outcomes for cancer survivors.

**Cancer Treatment and Cardiotoxicities**

Advancements in cancer treatment have introduced new therapeutic options, significantly improving survival rates. However, these advancements are accompanied by an increased risk of both acute and chronic cardiovascular toxicities associated with cancer treatment (CTR-CVT). Therapeutic modalities such as cytotoxic drugs, radiation therapy, targeted therapies, and immune-modulating agents are known to induce acute cardiovascular events, with registry data suggesting that nearly 40% of cancer patients experience such complications (López-Sendón et al., 2020).

Therapies associated with cardiovascular complications, including acute coronary syndromes (ACS), heart failure (HF), and atrial fibrillation, are classified as cardiotoxic therapies. When cardiotoxicity is detected, it is often necessary to interrupt cancer treatment until the acute cardiovascular event has been managed and resolved (Gevaert et al., 2022). Importantly, the risk of CTR-CVT persists not only during active treatment but also after its completion, necessitating close monitoring during therapy and long-term surveillance of cancer survivors. Oncology nurses play a pivotal role in these monitoring and surveillance activities (Lyon et al., 2020).

Cytotoxic agents, widely used in cancer treatment, can induce cardiotoxicity, necessitating thorough patient evaluations before initiating therapy. Anthracyclines, alkylating agents, platinum-based drugs, and fluoropyrimidines have been associated with various cardiovascular complications. For patients undergoing radiation therapy, there is a risk of acute pericarditis during or shortly after treatment. Additionally, long-term effects of radiation include conduction abnormalities, coronary artery disease, and valvular disorders. Targeted therapies

have also been implicated in cardiotoxicity; for example, anti-estrogen therapies and all-trans retinoic acid have been associated with acute cardiovascular events. Similarly, monoclonal antibodies and small molecule tyrosine kinase inhibitors (such as gefitinib, erlotinib, sorafenib, sunitinib, and dasatinib) have been linked to CTR-CVT. Hypertension is a common adverse effect observed with vascular endothelial growth factor (VEGF) inhibitors, highlighting the importance of understanding the cellular targets of specific therapies to anticipate potential cardiovascular complications. Given the diversity and complexity of available cancer treatments, each patient requires an individualized assessment conducted by a multidisciplinary team (MDT) to balance the benefits and risks of the proposed treatment plan (Alexandre et al., 2020).

For patients experiencing CTR-CVT, timely and accurate diagnosis is critical to ensure prompt and effective treatment. An individualized, multidisciplinary approach is essential, and oncology nurses are integral to this process. Before resuming cancer therapy, a comprehensive risk-benefit analysis should be performed, focusing on whether to restart the original therapy or switch to an alternative treatment. Acute cardiovascular complications frequently observed in cancer patients include ACS, HF, arrhythmias, venous thromboembolism, and pericardial diseases. The European Society of Cardiology (ESC) has developed two consensus documents to guide the assessment and management of CTR-CVT complications.

**The Nurse's Role**

Oncology nurses hold a critical position in preparing patients for cancer treatment and educating them about potential side effects. However, in light of the increasing recognition of cardiovascular risks associated with cancer therapies, these nurses must now integrate cardiovascular risk assessments into their practice. In settings with established cardio-oncology services, the involvement of a dedicated cardio-oncology nurse facilitates this process. Conversely, in institutions lacking such specialists, oncology nurses may need to independently undertake cardiovascular assessments.

Cardiovascular assessment begins with familiar measurements such as blood pressure, pulse, height, and weight, enabling the calculation of body mass index (BMI). However, these basic parameters represent only a fraction of the comprehensive cardiovascular evaluation required. Patients undergoing cancer treatment should also have a 12-lead electrocardiogram (ECG) to detect potential arrhythmias, as well as a transthoracic echocardiogram to assess left ventricular function—commonly measured as ejection fraction—heart valve integrity (to identify regurgitation or stenosis), and wall motion abnormalities. Additionally, a detailed medical history should be obtained, including records of prior cardiac events, family history of cardiovascular disease, modifiable risk factors, and results of blood tests such as lipid profiles and biomarkers.

Baseline cardiovascular assessment is recommended for all patients undergoing cancer treatment, regardless of the planned therapy. This assessment should include the following components:

1. **Comprehensive Clinical Evaluation:** A detailed examination of the cardiovascular and respiratory systems, including resting heart rate, blood pressure, and oxygen saturation levels.
2. **Medical History:** Documentation of prior cardiovascular diseases (such as hypertension and hypercholesterolemia), as well as comorbid conditions like diabetes and obesity, with BMI measurement.
3. **Assessment of Modifiable Risk Factors:** Evaluation of physical activity levels, dietary habits, smoking status, and alcohol consumption.
4. **Diagnostic Testing:** Laboratory analysis of lipid profiles, a 12-lead ECG, echocardiographic imaging, and relevant biomarkers.

Following the history-taking and cardiovascular assessment, oncology nurses must determine the patient's cardiovascular risk in relation to their planned cancer therapy. Risk stratification is crucial for early identification of patients at moderate to high risk, facilitating the development of individualized treatment plans with well-documented recommendations for monitoring and surveillance. By incorporating these practices, oncology nurses contribute significantly to optimizing patient outcomes and mitigating the cardiovascular risks associated with cancer therapies.

**Risk Stratification**

Following the comprehensive clinical assessment, medical history review, and evaluation of identified risk factors alongside diagnostic blood test results, these findings must be carefully analyzed. If the oncology nurse feels uncertain about interpreting this data, it is essential to collaborate with a cardio-oncology specialist or a cardiologist, who may be a physician or a specialized nurse. Several tools exist for cardiovascular risk assessment in oncology patients, with the Heart Failure Association (HFA)-Cardio-Oncology cardiovascular risk assessment tool being highly recommended. Developed in 2020, this tool provides a personalized framework to evaluate baseline risk prior to initiating cardiotoxic cancer therapies. It stratifies patients into categories of low, moderate, high, or very high risk based on the planned cancer treatment. This stratification enables healthcare professionals to tailor management plans accordingly.

For patients classified as low risk, cancer treatment can typically proceed as planned. In contrast, those at high or very high risk require personalized management plans developed in multidisciplinary team (MDT) meetings. These plans often include interventions such as initiating medications to address hypertension or hypercholesterolemia to mitigate cardiovascular risks. The MDT's collective expertise ensures timely initiation or continuation of cancer therapy, minimizing delays while addressing cardiovascular concerns. For patients presenting with new cardiovascular complications, cancer therapy may proceed without interruption under a strategy known as "permissive cardiotoxicity," which is employed when the potential benefits of treatment outweigh the cardiovascular risks. In such scenarios, cardio-oncology clinical nurse specialists (CNS) play a vital role in monitoring these high-risk patients, adhering to established guidelines for managing and surveilling this vulnerable population.

The MDT's role is crucial in evaluating the overall risk-to-benefit ratio, ensuring all cardiovascular risk factors are meticulously documented for accurate risk stratification. Oncology nurses, equipped with knowledge about monitoring protocols, focus on recognizing signs and symptoms of cardiotoxicity, conducting appropriate tests, and incorporating routine cardiac biomarkers such as NTproBNP and Troponin I. Surveillance forms a cornerstone of the HFA-Cardio-Oncology assessment tool, offering guidance on assessments to perform at baseline, during treatment, and after therapy completion. This evidence-based approach aids the clinical team in managing risk factors effectively and provides a clear framework for explaining the surveillance process to patients and their families.

Surveillance encompasses monitoring parameters such as blood pressure, 12-lead ECG, serum Troponin and BNP levels, and transthoracic echocardiography. Oncology nurses are often responsible for coordinating these tests and ensuring effective communication with patients and their families. Timely scheduling of these evaluations is critical, as is ensuring that patients are not lost to follow-up after completing cancer treatment. Collaboration between cardio-oncology and oncology teams is vital for comprehensive patient care. Additionally, the American Heart Association has provided a guide summarizing U.S. and European guidelines for clinical practice, detailing monitoring strategies for high-risk patients and offering insights on managing cardiotoxicity.

**Long-Term Management**

Patients with pre-existing cardiovascular disease (CVD) or those identified as high-risk for CRT-CVT require periodic evaluation and ongoing surveillance beyond the conclusion of cancer therapy. The European Society of Cardiology (ESC) 2022 cardio-oncology guidelines outline a structured approach to end-of-therapy risk assessment and follow-up, based on the level of cardiovascular risk and CRT-CVT complications. While these guidelines emphasize the timing of assessments and surveillance, they provide limited direction on the long-term management of modifiable cardiovascular risk factors. Oncology nurses, due to their sustained therapeutic relationships with patients, are uniquely positioned to address and educate on lifestyle-related risk factors as part of survivorship care.

Evidence highlights the significant impact of risk factor modification, particularly dietary improvements and increased physical activity, in reducing the likelihood of cancer recurrence. The emerging field of cardio-oncology rehabilitation underscores the importance of integrating long-term risk factor management into survivorship care. Such programs adopt a holistic, multidisciplinary approach to address cardiovascular and oncological needs concurrently (Pituskin et al., 2023).

One notable study evaluating an 8-week rehabilitation program demonstrated substantial cardiovascular benefits in participants who received the intervention compared to those receiving standard care. These benefits included improved blood pressure control, reductions in BMI, and increased physical activity levels. Moreover, participants in the intervention group reported enhanced quality of life, better health literacy, and improved cost-effectiveness. These findings underscore the value of structured, long-term education and guidance in risk factor management (Viamonte et al., 2024).

In the absence of dedicated cardio-oncology services, oncology nurses, in collaboration with local cardiology services, can play a central role in addressing the long-term cardiovascular needs of cancer survivors. By integrating education on lifestyle modifications and risk factor management into routine follow-up care, oncology nurses contribute significantly to improving patient outcomes and quality of life.

**Shared Decision-Making**

Patient-centered care is a cornerstone of cancer management, and shared decision-making is crucial, particularly when addressing cancer treatment in the presence of an acute cardiovascular (CV) event. Such discussions must be transparent, ensuring that the patient and their family are fully informed about the situation (Hendriks & Lee, 2020).

When considering the continuation or cessation of cancer therapy, an evaluation of risks and benefits must be conducted, involving all relevant parties. These deliberations may be time-sensitive but should ideally include a multidisciplinary team (MDT) discussion with the patient—and their family, when appropriate—at the center of the process. The MDT may encompass oncologists, cardiologists, hematologists, radiologists, oncology nurses, pharmacists, dietitians, physiotherapists, and psychologists, among others. From the patient's perspective, the potential disruption to their cancer treatment can be a source of significant concern. Therefore, they need comprehensive information on the risks of continuing versus halting therapy, alongside an explanation of the necessary treatment for their CV condition. This collaborative approach ensures that patients and families are active participants in the decision-making process.

**Educating the Patient and Their Family**

Given the potential risk of cancer treatment-related cardiovascular toxicity (CTR-CVT), it is essential to educate patients and their families on recognizing signs and symptoms and understanding the appropriate course of action if new symptoms arise. Early identification of CTR-CVT and other CV complications is critical, particularly as these events may occur when patients are at home. Patients must be informed about which healthcare professionals (HCPs)

or services—whether cardiology, oncology, or emergency care—they should contact in case of acute symptoms.

Acute CV complications can manifest as chest pain, shortness of breath, or palpitations. Patients should be advised to seek immediate medical attention by visiting their local emergency department without delay. Additionally, patients need to understand their stratified risk level—low, moderate, or high—and the specific symptoms associated with their treatment. For instance, chest pain could indicate acute coronary syndrome (ACS), pericarditis, heart failure, or an arrhythmia. Regardless of the underlying cause, timely medical advice and a thorough cardiovascular assessment are essential to establish a diagnosis and initiate appropriate treatment. As with any acute cardiac event, prompt intervention is crucial, irrespective of the patient's medical history.

Planning for follow-up is equally important. Patients must be aware of the timing of their CV assessments, including post-treatment evaluations, one-year follow-ups, and long-term surveillance if indicated. They should be informed about the specific tests required—such as echocardiograms, blood tests, or other diagnostic procedures—and whether these will be conducted by their primary care provider or a specialized hospital service. This ensures patients and families are actively involved in their care and can promptly alert their oncology nurse if follow-up appointments or tests are missed.

An often-overlooked aspect is how information is communicated to patients. In addition to verbal discussions about monitoring and follow-up plans, patients should receive written documentation they can refer to and share with their families or primary care team. A lay summary document on cardio-oncology treatment and follow-up, available from the European Society of Cardiology, could be incorporated into standard practice by oncology nurses (Lee, 2022).

However, for oncology nurses to fulfill these additional responsibilities effectively, they require adequate training and education in cardiovascular assessment. Currently, no dedicated curriculum exists for nurses; only a core curriculum for physicians is available (López-Fernández et al., 2024). A recent gap analysis among nurses highlighted the pressing need for enhanced education in both oncology and cardiology. Efforts are underway to develop a core curriculum for nurses, expected to be available online by 2025. This initiative aims to provide nurses with the necessary guidance, support, and education to excel in this evolving field.

**Patient Experiences**

A qualitative study conducted in Australia explored patient experiences through thematic analysis of interviews with 15 participants, highlighting the benefits of dedicated cardio-oncology clinics. Patients emphasized that these clinics promoted information and understanding, demonstrated integrated care, and effectively managed both existing and emerging CV risk factors (White et al., 2022). However, patients also identified gaps in education and support, expressing the need for more information on lifestyle changes to reduce their cardiovascular risk. Participants valued clear explanations of their treatment and discussions of CV symptoms conducted in a calm and reassuring manner.

These findings underscore the importance of effective communication skills and the use of shared decision-making by oncology nurses. The study also pointed to the lack of quality-of-life indicators in cardio-oncology evaluations, emphasizing the need to include more patient-reported outcomes in research.

There is a growing demand for nurse-led cardio-oncology care, which would encompass CV risk stratification, management, and education, with a focus on addressing CV risk factors and providing lifestyle-related advice. Such an approach aligns with the broader objective of improving patient outcomes through integrated, comprehensive care (Fadol et al., 2024).

## Conclusion

As cancer therapies advance, so do the complexities associated with managing their cardiovascular implications. The growing prevalence of cancer treatment-related cardiovascular toxicity (CTR-CVT) necessitates a multidisciplinary approach, integrating expertise from oncology, cardiology, and allied health professionals. Oncology nurses, at the forefront of patient care, play a critical role in cardiovascular assessment, risk stratification, education, and long-term management. Their involvement ensures timely surveillance, early diagnosis, and effective intervention, which are essential to minimizing the impact of CTR-CVT on cancer treatment outcomes.

Shared decision-making forms the foundation of patient-centered care, empowering patients and their families to make informed choices about their treatment. Transparent communication about risks, benefits, and follow-up strategies fosters trust and facilitates a collaborative approach to care. Education on recognizing acute cardiovascular complications and understanding long-term surveillance plans further equips patients to actively participate in their health management.

The establishment of cardio-oncology services and the development of dedicated curricula for oncology nurses are critical to bridging the knowledge gaps in this emerging specialty. As the field continues to evolve, nurse-led initiatives in cardiovascular risk management and survivorship care hold promise for improving quality of life and long-term outcomes for cancer patients. Future research must prioritize patient-reported outcomes and quality-of-life measures, ensuring that care delivery aligns with the holistic needs of patients navigating both cancer and cardiovascular challenges.

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