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Review Article

From Global Insights to National Impact: Advancing Cardio-Oncology in Iraq

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Introduction

Cancer remains a leading cause of mortality and morbidity worldwide. Advances in cancer therapies—including immunotherapies (e.g., checkpoint inhibitors, gene-targeted therapies), antibody-based cancer toxins, chemotherapy, radiotherapy, and surgery—have significantly improved survival rates (1, 2). However, this progress has led to a surge in the prevalence of cardiovascular disease (CVD) among cancer survivors, now recognized as a leading cause of mortality in this population (3, 4). These intersecting burdens highlight the growing need to prevent, detect, and manage cardiovascular complications in cancer care pathways and call for important initiatives in establishing Cardio-oncology services globally (5, 6).

Cardio-oncology (CO), a multidisciplinary specialty, focuses on optimising cardiovascular risk stratification, prevention, and treatment among cancer survivors (7). The field has addressed the cardiotoxicity associated with cancer treatments (see Table 1), such as heart failure, arrhythmias, and coronary artery disease. Baseline risk assessment and early identification of high-risk patients are central to mitigating treatment-related cardiac complications and ensuring uninterrupted cancer care in this population.

Table 1: Summary of cardiovascular effects of commonly used cancer therapies (8,9)

Drug	Cardiovascular effect
Anthracyclines (e.g., Doxorubicin)	Induces DNA damage in cardiomyocytes and vascular endothelium leading to cardiotoxicity, cardiomyopathy and heart failure.
HER2 Inhibitors (e.g., Trastuzumab)	Interferes with myocardial survival pathways, with enhanced cardiotoxicity when combined with anthracyclines.
VEGF Inhibitors (e.g., Bevacizumab)	Impairs vascular remodeling and increases vascular resistance.
Immune Checkpoint Inhibitors (e.g., Nivolumab)	Causes myocarditis, arrhythmias, vasculitis, and pericardial diseases.
Tyrosine Kinase Inhibitors (e.g., Imatinib)	Causes QT prolongation, ischemic heart disease, and pulmonary hypertension.
Anti-Microtubule Agents (e.g., Paclitaxel)	Enhances cardiotoxicity when combined with trastuzumab, but if used alone then it has low cardiac risk.
Platinum-based therapy (e.g., Cisplatin)	Increases risk of ischemic heart disease, myocarditis and arterial thrombosis.
Antimetabolites (e.g., 5-FU)	Causes coronary artery spasm, leading to angina and myocardial infarction.
Radiotherapy	Causes vascular damage and fibrosis resulting in long-term complications include coronary artery disease, valvular disease, and pericardial disease.

Recent advancements in the field, coupled with the development of specialist CO guidelines, have provided structured protocols to manage therapy-related cardiotoxicities and improve long-term outcomes for cancer survivors. The relevance of this subspeciality extends globally and locally, where the dual burden of cancer and CVD continues to pose significant challenges for healthcare systems.

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Global trends in cardio-oncology:

The Cardio-Oncology (CO) field emerged in the 1960s when anthracyclines were first used to treat cancers and saw its first dedicated service at MD Anderson, USA, in 2005. Over the last few years, numerous dedicated centers providing CO services were established in the USA, Europe, some Asian countries while low- and middle-income countries (LMICs) still lack such centers and services due to financial constraints and infrastructure constraints (5,7, 10).

In an important step to translate the accumulating science from the CO experiences into clinical application, the 2022 ESC clinical practice guidelines on CO emerged as an important tool to define the cardiotoxicities of anticancer therapies, and to minimize the potential cardiovascular complications of different cancer therapies in a huge effort to improve survival and quality of life of cancer survivors (10, 11). However, these guidelines highlighted the main knowledge gaps in the field of CO including but not limited to; the role of CO services, dedicated clinics and networks on the prognosis of patients with cancers and survivors, it also raised the importance of exploring the role of different healthcare providers and heart teams including clinical pharmacists in CO services and their impacts on prognosis (10). These knowledge gaps represent future opportunities for scientists and clinicians interested in the field of CO.

Now, CO represents more than only the field of preventing and managing cardiovascular effects of cancer therapies, but there is increasing evidences that both cancer and CVD have the same stems like smoking, dyslipidemia, obesity, diabetes and genetic backgrounds (12), thus, CO is now considered a novel platform for translational scientists, clinicians and researchers to answer many research questions and build new hypotheses in this innovative field.

The Role of Big Data in Cardio-Oncology Research

A significant challenge in global CO (CO) guidelines is the reliance on Level C evidence, which primarily based on expert opinion. This limitation is further compounded by the exclusion of cancer patients from cardiology trials and cardiovascular patients from oncology trials (13, 14), resulting in a significant lack of real-world evidence to inform clinical management. Big data from national administrative databases and registries can address these gaps, elevate evidence in CO to Level B, and ultimately improve clinical decision-making in this growing field.

In the United Kingdom (UK), the Keele Cardiovascular Research Group has led CO research using big data. By employing datasets obtained from the National Institute for Cardiovascular Outcomes Research (NICOR) in the UK, the group developed earlier this year the updated PRECISE-DAPT cancer score to enhance bleeding risk stratification for cancer survivors undergoing percutaneous coronary intervention (PCI), offering a tailored approach to managing the delicate balance between thrombotic and bleeding risks in this vulnerable population (15). Beyond this, the group has contributed to advancing the level of evidence in CO literature through a range of other impactful studies over the last several years (16–22).

National status of Cardio-Oncology field in Iraq:

In 2019, the Iraqi Cardio-Oncology Programme (ICOP) was founded by a senior consultant cardiologist and his mentee; the cardiology clinical pharmacist, they initiated the first CO services that were very crucial to provide during the very critical time of COVID-19 era (23). This service was founded first at Medical City hospitals (Al-Amal Oncology Centre and Baghdad Oncology Hospital), in Baghdad. Since then, data from this Iraqi CO Clinic started to be published (23–26), such model provides an example to facilitate establishing CO clinics in other LMICs saving many trials and errors. In Iraq, other CO clinics were established in Babylon and Basrah, while two other CO clinics are under planning in Al-Anbar and Salahuddin. To date, the primary challenges for CO service to be integrated into routine care of cancer patients in Iraq are the limited awareness of healthcare providers and decision-makers of this important initiative, and shortage of trained specialists in this field. Lack of proper training can deprive cancer survivors from the simple and vital initial cardiovascular risk stratification before proceeding with their chemotherapy protocol. Lack of multidisciplinary team approach and limited access for regular follow up are other barriers in the field of CO in Iraq, not to mention the lack of infrastructure including high-cost diagnostic tools like cardiac imaging and biomarkers. Finally, as in other subspecialities of cardiology, there is lack of uniform global guidelines tailored to low-resource settings which further exacerbates the issue.

Recommendations and Future Directions:

-Cardio-Oncology Clinics: Proper infrastructure is needed to establish CO clinics. Streamlining these services within already established oncology centers will be a pragmatic and feasible approach. Multidisciplinary team is the cornerstone for CO clinics, so, cardiologists, oncologists, hematologists, clinical pharmacists, nurses, dieticians and psychosocial workers can collaborate to make decisions regarding risk stratification and management of CO patients. When referring cancer patients for CO services, a structured and comprehensive approach is required to assess both their cardiovascular risk and the potential impact of cancer treatments on cardiovascular system. The standard of care should include baseline assessments before starting potentially cardiotoxic therapies, regular monitoring during therapy, and long-term follow-up care after completing the cancer therapies.

-Training in Cardio-Oncology: Training in CO needs to combine the expertise of both cardiology and oncology to address the cardiovascular needs of cancer survivors. CO training requires in-depth understanding of the impacts of cancer therapies on cardiovascular system as well as the ability to provide both preventive measures and therapeutic interventions. A structured postgraduate training program in CO should provide a comprehensive foundational education, hands-on

clinical experience, and advanced training and interdisciplinary collaboration (27). This ensures that the CO-trained providers are fully equipped to manage the complex cardiovascular needs of cancer survivors, both during treatment and in long-term survivorship. Collaboration with international societies like International Cardio-Oncology Society (ICOS) can also help in building a global network of specialists in this field.

Research infrastructure: Establishing proper research infrastructure is vital in CO to identify potential ways to prevent, diagnose, and treat cardiovascular complications of different cancer therapies. CO is still an emerging field in Iraq with many gaps in knowledge and evidence in the time that the cancer survivors keep increasing. Establishing electronic health records and data registries is essential to improve observational research output in this field to explore the long-term effects of cancer therapies, predictors of these effects and to investigate the potential preventive and therapeutic interventions.

Equally important is working on funding and establishing dedicated research groups within universities. These initiatives would expand knowledge, inform national policy decisions, and guide clinical practices in CO with evidence-based approaches, ultimately enhancing the quality of care for cancer survivors across the country, see Figure 1.

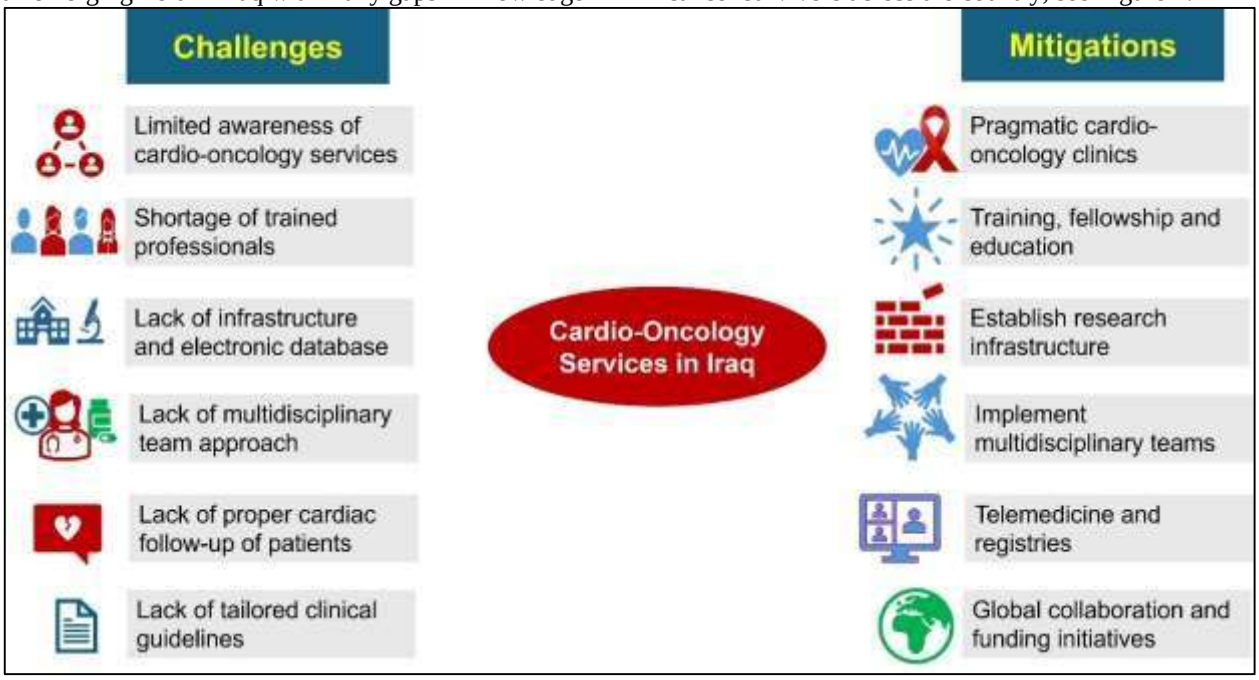

Figure 1: Main challenges for establishing cardio-oncology services in Iraq and suggested mitigations

Conclusion:

Developing cardio-oncology services in Iraq presents a unique opportunity to improve outcomes for cancer survivors with cardiovascular risks. While challenges such as limited awareness, inadequate infrastructure, and training gaps persist, prioritising the establishment of multidisciplinary clinics, bespoke training programmes, and research infrastructure can help overcome these barriers. This effort could also position Iraq as a regional leader in advancing cardio-oncology, ultimately improving survivorship and the quality of care for cancer population.

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