

INTERNATIONAL PERSPECTIVE

Cardio-Oncology in Chile

The Future of an Emerging Discipline



Stefanie Mundnich, MD, Michelle M. Saba, PT

Cancer and cardiovascular disease (CVD), including cardiac disease and stroke, are the first and second leading causes of death in Chile, respectively, as in other developed countries, according to the Vital Statistics Report published in December 2021.¹ According to this report, death from neoplasms has displaced CVD as the main cause of death in Chile. In 2019, the main cause of death in Chile was cancer, accounting for a total of 28,492 deaths (26%), whereas CVD was the cause of 28,079 (25%) deaths. Together, cancer and CVD account for more than 50% of all deaths in the country.¹

With more than 19 million inhabitants, Chile has an age-standardized cancer incidence rate (excluding all nonmelanoma cancers) of 271.5 per 100,000 per year,² and the 5-year prevalence for all cancers in our country is 148,303 cases.³ In 2020, the 3 most common cancers in Chile were prostate cancer, with an incidence of 8,157 new cases and 2,296 deaths; followed by breast cancer, with an incidence of 5,331 new cases and 1,674 deaths; and colon cancer, with an incidence of 4,261 new cases and 2,279 deaths.²

Ongoing advancements in cancer therapies have increased the survival rates of cancer patients. However, this has resulted in an increased risk of developing adverse effects related to these treatments, for example, cardiac dysfunction and heart failure, myocarditis, arrhythmias, hypertension, and vascular toxicities.⁴ The role of cardiologists and oncologists are both crucial “to establishing a collaborative effort to achieve the best possible cancer outcomes and the longest possible survival without cardiovascular complications”.⁵ Accordingly, cardio-oncology has emerged as an evolving medical discipline, with the

recognition that ensuring the survival of cancer patients also requires a focus on preventing, minimizing, and optimally treating cardiotoxicity. Cardiotoxicity can develop at any time during, or even several years or decades after, therapy, as is seen, for example, with the development of valvulopathy after radiation of the left breast.⁶ In addition to managing cardiotoxicity, the cardio-oncology subspecialty also includes assessment of comorbid CVD and cancer, as well as the prevention, diagnosis, and management of cardiovascular risk factors.

Although cardiologists and oncologists have collaborated in caring for oncology patients since the mid-1980s, the first cardio-oncology unit in Chile, named the Cardio-Onco Foundation, was established recently, in 2020. We developed this unit in the middle of the SARS-COV-2 pandemic, when the public and private health systems for treatment of diseases other than COVID-19 were partially shut down. Prevention and treatment of cardiotoxicity in oncology patients was not a priority at that time. Our first mission was to create awareness of the problem in our country. We did this by building a social media community to teach oncology patients and health care providers about cardiotoxicity. In June 2020, we started performing online patient visits. This was very difficult because telemedicine visits were not a usual way of attending to patients in Chile. Patients were very reticent at first because they did not know how to use the technology, and many did not have internet access. Finally, although online platforms for patient visits were being developed, not all of them complied with Chilean laws regarding privacy. In November 2020, as COVID-19 cases started to diminish in Chile and the promise of a vaccine

From the Fundación Cardio-Onco, Santiago, Chile.

The authors attest they are in compliance with human studies committees and animal welfare regulations of the authors' institutions and Food and Drug Administration guidelines, including patient consent where appropriate. For more information, visit the [Author Center](#).

Manuscript received March 16, 2022; accepted July 5, 2022.

sounded real, we began in-person services. Chile has public and private health systems, and we were able to associate with both, allowing us to care for cancer patients from all over the country.

The Cardio-Onco Foundation's work team started with 1 cardio-oncologist, 1 cardiologist, 1 physical therapist, 2 nurses, 1 nutritionist, 1 psychologist, and 1 speech therapist. The main goal of the cardio-oncology unit is to use a collaborative, interdisciplinary, and patient-centered approach to enhance the safety and efficacy of care for cancer patients who are either at risk of cardiotoxicity or who have developed cardiotoxicity, with the goal of enabling patients to return to their lives before their cancer diagnosis and diminishing the cardiovascular impact of cancer treatment on their health. To date, more than 500 patients have been evaluated and treated as outpatients, and more than 100 patients have completed our cardio-oncology rehabilitation (CORE) program.

Cancer patients with high or very high risk of cardiotoxicity⁷ are referred to our CORE program, which starts with a cardio-oncology consultation. In this consultation, the patient's cardiovascular risk factors, treatment, and type of cancer are evaluated, and a specific follow-up protocol is assigned. If necessary, treatment is started for his/her cardiovascular pathologies, and the patient is referred to nutrition, psychology, and CORE (Figure 1).

Regarding rehabilitation, we do *prehabilitation*, which involves training the patient from the beginning of their diagnosis and continuing through all stages of treatment, including neoadjuvant therapies, surgery, and adjuvant treatments. We require hemograms, and we use the safety check from the American Heart Association Scientific Statement for exercise training in CORE.⁸

It is very important to us to contribute to medical education and to the development of this new, emerging, and important cardiology discipline. During our first year, we did an online 4-month course to teach major topics in cardio-oncology: diagnosis, treatment, prevention, and CORE. More than 200 health professionals participated, including cardiologists, internal medicine physicians, physical therapists, nutritionists, oncology nurses, cardiology nurses, and fellows in training from all over Latin America. This course was sponsored by the Chilean Society of Oncological Physical Therapy and Cardiological Physical Therapy, as well

as the Costa Rican Association of Oncological Rehabilitation.

In April 2022, we held our first Latin American Congress, with the help of our Peruvian partners in cardio-oncology, sponsored by the International Cardio-Oncology Society and the Ibero-Latin American Cardio-Oncology Society, with knowledgeable speakers from around the world.

The close relationships that we have built throughout these years with the International Cardio-Oncology Society, the Ibero-Latin American Cardio-Oncology Society, the Cuban chapter of Cardio-Oncology, and Costa Rican Association of Oncological Rehabilitation, have improved our CORE program, leading to early and better exercise prescriptions, use of new pharmacologic therapies, and enhanced our skills in communicating with oncology teams in our country.

Despite the many advances that have taken place in the past few years, there are still several areas in the cardio-oncology subspecialty that need to be addressed in our country, including⁵:

- Continuing to raise awareness of cardiotoxicities secondary to cancer treatments and the role of preventive cardio-oncology.
- Strengthening the collaboration between amongst oncologists, hematologists, cardiologists, cardio-oncologists, and other health professionals, with the aim of offering the best possible trans-disciplinary care for the oncologic patient.
- Incorporating cardio-oncology as a subspecialty of cardiology.

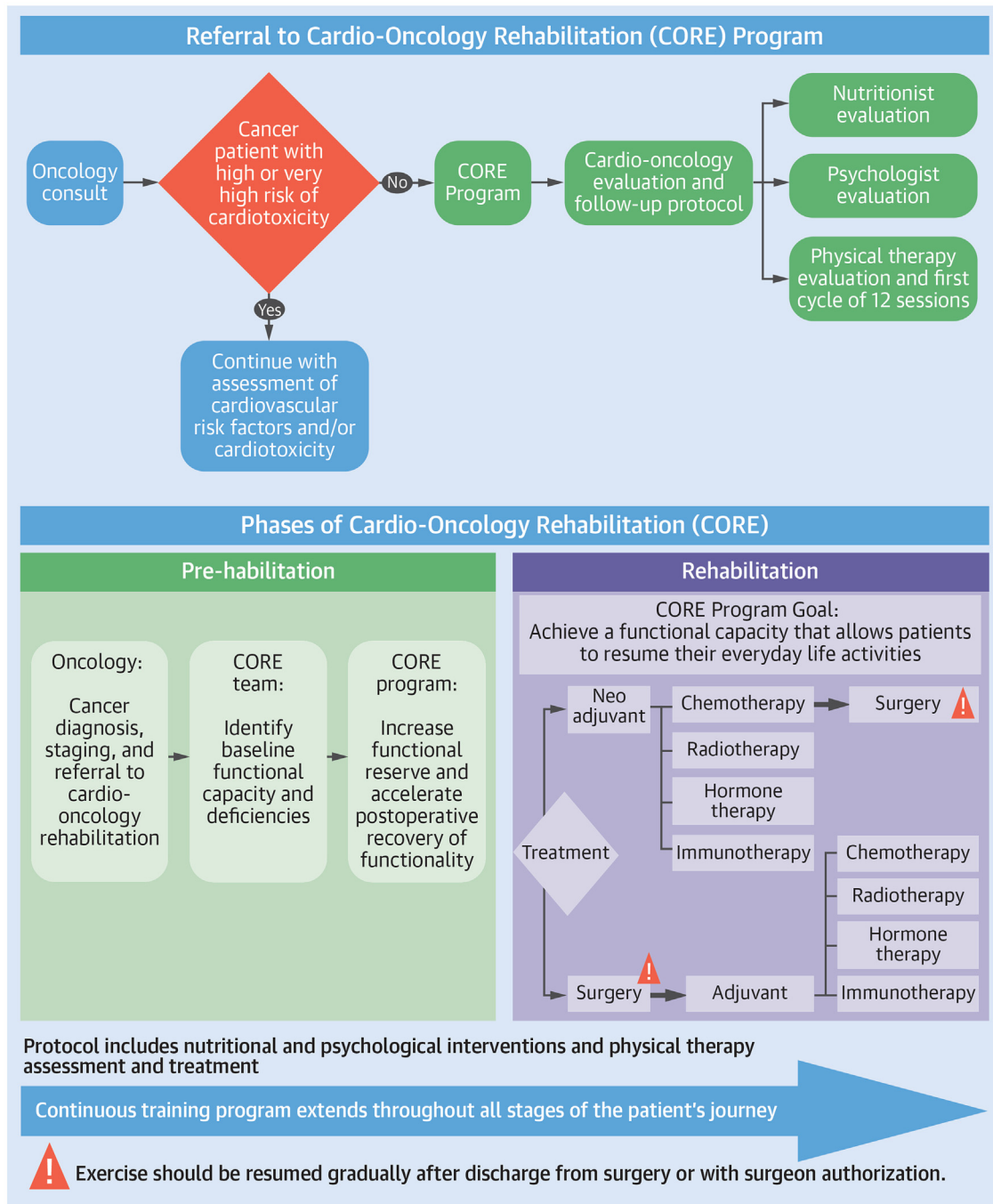
These challenging areas can be addressed by making the good results of our program visible to health care providers and helping build public policies that incorporate CORE into cancer patients' treatment protocols. We will continue to use our social media channels and partnerships to raise awareness of cardio-oncology and prevention of cardiotoxicity.

FUNDING SUPPORT AND AUTHOR DISCLOSURES

The authors have reported that they have no relationships relevant to the contents of this paper to disclose.

ADDRESS FOR CORRESPONDENCE: Dr Stefanie Mundnich Batic, Fundación Cardio-Onco, Antonio Varas 303, Oficina 1103, Providencia, Santiago, Chile. E-mail: stefanie@cardioonco.cl.

FIGURE 1 Referral and Phases of Cardio-Oncology Rehabilitation



In an active cardio-oncology rehabilitation (CORE) program for patients at a very high risk of cardiotoxicity and referred by the oncologist, the CORE team, led by a cardio-oncologist, first identifies the patient's baseline functional capacity and deficiencies. In some patients, the CORE program starts before the oncologic treatment in order to achieve better functional capacity through prehabilitation. In other patients, the CORE program extends along with the oncologic treatment and through all stages of the patient's' journey. The CORE program's goal is to achieve a functional capacity that allows the patient to resume their everyday life activities. The protocol includes nutritional and psychological interventions along with the physical therapy assessment and treatment.

REFERENCES

1. INE. Vitals statistics 2019. Accessed July 28, 2022. <https://www.ine.cl/estadisticas/sociales/demografia-y-vitales/nacimientos-matrimonios-y-defunciones>
2. International Agency for Research on Cancer. Estimated number of new cases in 2020, Chile, both sexes, all ages (excl. NMSC). *Cancer Today*. Accessed July 28, 2022. https://gco.iarc.fr/today/online-analysis-table?v=2020&mode=cancer&mode_population=continents&population=900&populations=152&key=asr&sex=0&cancer=39&type=0&statistic=5&prevalence=0&population_group=0&ages_group%5B%5D=0&ages_group%5B%5D=17&group_cancer=1&include_nmssc=0&include_nmssc_other=1#collapse-group-0-1
3. International Agency for Research on Cancer. *Cancer Tomorrow*. Accessed July 28, 2022. https://gco.iarc.fr/tomorrow/graphicisotype?type%25bc0%3Bpopulation%25bc900%3Bmode%25bcpopulation%3Bsex%25bc0%3Bcancer%25bc39%3Bage_group%25bcvalue%3Bapc_male%25bc0%3Bapc_female%25bc0
4. Herrman J, Lenihan D, Armenian S, et al. Defining cardiovascular toxicities of cancer therapies: an International Cardio-Oncology Society (IC-OS) consensus statement. *Eur Heart J*. 2022;43(4):280-299.
5. Bazan M, Mestre BF, Peix A. Cardio-oncology in Cuba: the present and the future. *J Am Coll Cardiol CardioOnc*. 2021 16;3(1):162-164.
6. Mitchell JD, Cehic DA, Morgia M, et al. Cardiovascular manifestations from therapeutic radiation. *J Am Coll Cardiol CardioOnc*. 2021;3:360-380.
7. Herrman J, Lerman A, Sandhu NP, Villarraga HR, Mulvagh SL, Kohli M. Evaluation and management of patients with heart disease and cancer: cardio-oncology. *Mayo Clin Proc*. 2014;89(9):1287-1306.
8. Gilchrist SC, Barac A, Ades P, et al. American Heart Association Exercise, Cardiac Rehabilitation, and Secondary Prevention Committee of the Council on Clinical Cardiology; Council on Cardiovascular and Stroke Nursing; and Council on Peripheral Vascular Disease. Cardio-oncology rehabilitation to manage cardiovascular outcomes in cancer patients and survivors. *Circulation*. 2019;139(21):e997-e1012.

KEY WORDS cardiotoxicity, cardiovascular disease, Chile