Spotlight on

Cancer treatment and heart failure

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Executive summary

People who have received some cancer treatments may have a higher risk of developing heart failure (HF).[1-4] This link has led to the emergence of cardio-oncology, a multidisciplinary field that aims to balance appropriate cancer therapy with cardiovascular health.[5 6]

The burden of cardiovascular disease in people who have received cancer treatment is growing.[7] This can be attributed to the toxicity of some cancer treatments as well as other factors, such as improved survival for some cancers and population ageing. The people affected experience worse health outcomes and decreased quality of life, which has an impact on their physical, social and psychological wellbeing.[8-11]

Initial risk assessment can facilitate tailored care, prevention and early detection of HF, but cardiac monitoring is often inconsistent.[6 12-15] Before the start of cardiotoxic cancer treatment, people at high risk of HF should be identified so they can receive appropriate cardio-oncology care.[13] Those at low risk also need to be monitored so that HF can be detected and treated early.[15 16] However, cardiac monitoring is inconsistent across and within European countries owing to the lack of standardised, evidence-based protocols, while more evidence is needed on prevention strategies.[16-18]

Shared decision-making and patient education around cardiotoxicity are essential for people with cancer. People receiving cancer treatment should be aware of the cardiovascular risk and learn to detect possible signs and symptoms of heart damage, including HF.[19 20] Active patient involvement is also necessary in discussions about the treatment required to preserve cardiovascular health.[21]

Cardio-oncology services and working groups can promote multidisciplinary collaboration and optimise care. In recent years, multiple cardio-oncology services have been established to support the care of people with cancer, from active treatment to follow-up.[6 22] In addition, national and international cardio-oncology working groups can develop registries that help collect evidence to support best-practice care.[23 24]

Primary care physicians and specialist nurses can play an important role in the care of people with cancer. These professionals should receive education and training to facilitate the care pathway for people with cancer and HF risk.[21 25] Specialist nurses can monitor patients, coordinate cardio-oncology teams and provide person-centred care.

Limited resources and a lack of education on cardio-oncology among healthcare professionals are major barriers to improving care. Studies have found that cardiologists and oncologists often lack knowledge and confidence to manage cardiotoxicity in people who have received cancer treatment.[26 27] Limited funding and infrastructure are also reported as obstacles to the establishment of cardio-oncology services.[27 28]

Key actions to improve the management of HF risk in people treated for cancer

1. Increase awareness of and improve education on HF risk following cancer treatment	Healthcare professionals across settings should be well trained in monitoring cardiotoxicity in people who have received cancer treatment. This would also improve care and awareness among people with cancer, facilitating early detection and treatment of cardiotoxicity.
2. Increase and target resources for cardio-oncology services	Targeted resources are necessary to establish cardio-oncology services that can support people with cancer along the care pathway and minimise risk.
3. Promote the formation of cardio-oncology national working groups, along with collaboration at an international level	National and international cardio-oncology collaboration can aid the development of guidance and care protocols, defining and championing the responsibilities of healthcare professionals across settings.
4. Invest in research on prevention and monitoring strategies	Further research is needed on prevention and monitoring strategies, as well as HF risk prediction tools, to develop evidence-based guidelines.
5. Accredit and fund specialist nurses to facilitate person-centred care	Specialist nurses should be sufficiently resourced so they can monitor patients, coordinate multidisciplinary teams and facilitate integrated, person-centred care.

1 What is the relationship between cancer and heart failure?

Cancer treatments can damage the heart and cause HF

People who have received cancer treatment are two or three times more likely than the general population to develop cardiovascular diseases such as heart failure (HF) owing to the cardiotoxicity of some cancer treatments (*Box 1*).[1-4] Cardiotoxicity, although it can lead to any cardiovascular disease, is commonly understood as heart damage leading to a decrease in left ventricular ejection fraction, regardless of whether HF signs and symptoms are present.[13] However, there is no universal definition of cardiotoxicity, with variations across guidelines and clinical trials.[15 29] This lack of clarity has hampered efforts to improve our understanding, prevent heart damage and train healthcare professionals (*Box 2*).

Box 1. Cancer treatments and mechanisms underlying heart damage

Cancer treatments that can cause HF include anthracyclines, HER2 inhibitors, mitotic inhibitors and radiation, among others.[13] The mechanisms underlying the heart damage are not completely understood.[30] However, it has been suggested that they act by generating oxidative stress and impairing cellular mechanisms.[13 30]

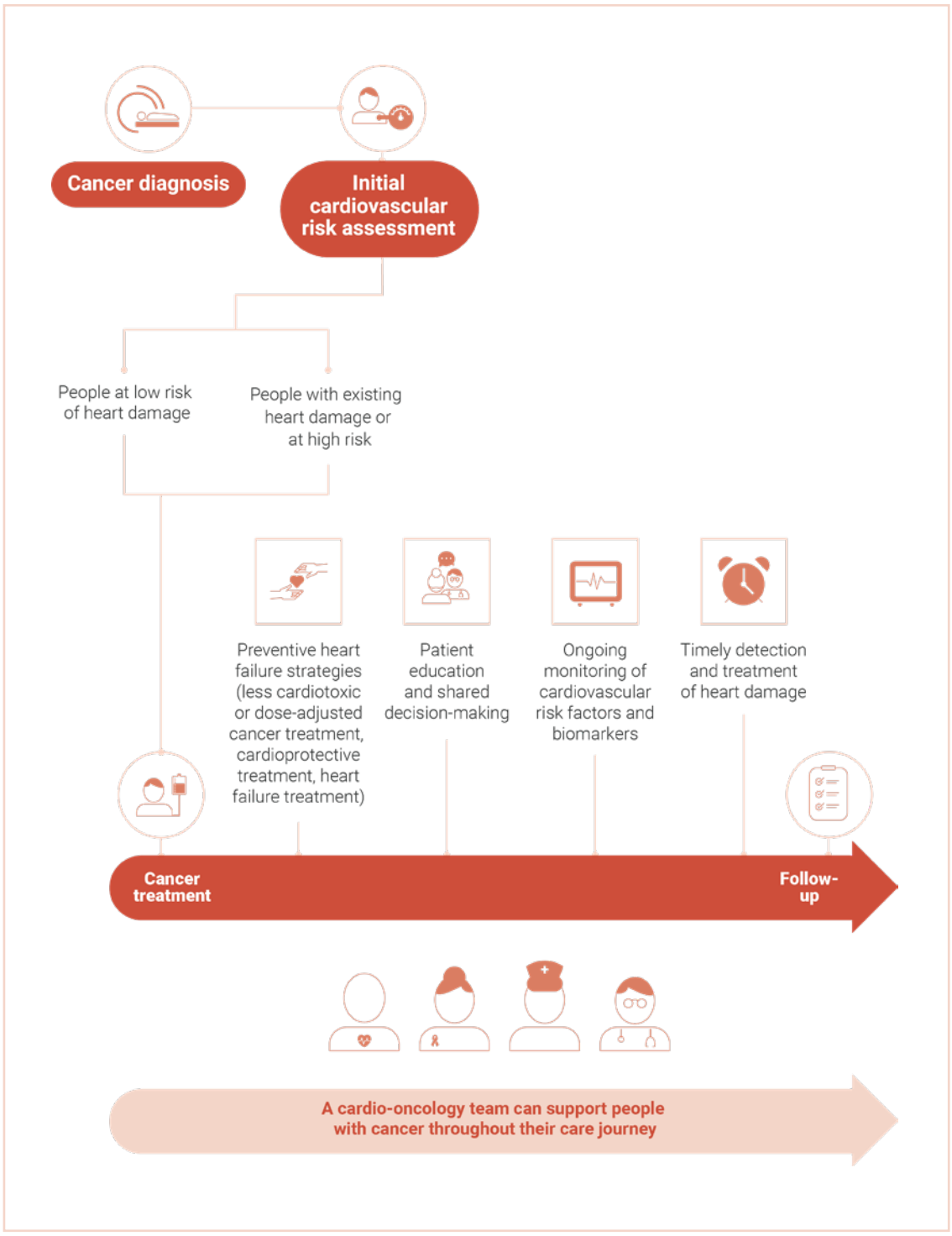
Box 2. The complicated relationship between HF and cancer

In the past decade, accumulating evidence has indicated the possibility that it is not just cancer treatment, but underlying biological mechanisms that can damage heart structure and function.[31] At the same time, studies showing an increased risk of cancer in people with HF have led some experts to propose that HF can cause cancer. It remains unclear whether HF and cancer have a causal relationship via the activation of biological mechanisms, or whether there are other factors at play, such as common risk factors and side effects of treatment.[1 31]

People who have received cancer treatment require tailored, multidisciplinary HF care

The link between cancer treatment and HF has led to the emergence of cardio-oncology – a new multidisciplinary field that focuses on providing the most appropriate cancer therapy while optimising cardiovascular health.[5 6] This requires integration of care, with improved collaboration between cardiologists, oncologists and other healthcare professionals along the care pathway.[32] From cancer treatment to follow-up, a cardio-oncology team can provide prevention strategies, patient education and ongoing monitoring to detect and treat cardiotoxicity as early as possible (*Figure 1*).

Figure 1. The role of a cardio-oncology team in preventing hospitalisations for HF in people treated for cancer



2 The burden of heart failure in people who have received cancer treatment

'Thirteen years after receiving chemotherapy, I developed severe heart failure. No one had ever told me that cancer treatment could hurt other organs, so I was very surprised when the physician informed me that my heart had been exposed during chemotherapy. I only had 30% of my heart capacity left and it was going down further. I needed a heart transplant.'

Penilla Gunther, cancer survivor and HF advocate

People who receive cancer therapy have a higher long-term risk of developing HF

People receiving certain types of cancer therapy have a two- to threefold higher risk of developing HF than the general population.[2-4] This increased risk can be highest shortly after receiving cancer therapy, but it can also lead to long-term heart damage.[33] Receiving cancer therapy in childhood increases the risk of developing HF in young adulthood,[34] and raises the lifetime risk of HF compared with other cardiovascular diseases.[35]

People who develop HF following cancer therapy have decreased quality of life and worse outcomes

The development of heart damage in people who have received cancer treatment has a serious impact on their physical, social and psychological wellbeing. A study in the Netherlands showed that most people experienced fatigue, which affected their daily and work life.[11] They also experienced anxiety, and their social life was affected due to the lack of understanding and connection they felt from their friends and family.

People with cancer and HF stay in hospital for longer and have worse health outcomes than the wider HF population, leading to increased healthcare costs.[8 9] They may also be more likely to require a heart transplant or the implantation of a left ventricular assist device.[10]

HF affects an increasing number of people who receive cancer treatment

The burden of cardiovascular disease in people who have been treated for cancer is growing.[7] This is not only due to the cardiotoxicity of cancer treatments, but also factors such as improved survival for some types of cancer, population ageing, and the overall increase in cardiovascular disease observed in the general population. In general, people with cancer who develop HF tend to be younger and have fewer comorbidities than the usual HF population.[10 36] People with cancer are at higher risk of hospitalisation as a result of HF, and this trend is particularly noticeable in women.[8]

> ***'In cardio-oncology, we see younger people who have survived cancer but have developed heart failure. They will stop seeing the oncologist, but they will continue to see the cardiologist for life.'***
>
> Ekaterini Lambrinou, HF nurse

3 Best practice in the care of people with cancer at risk of heart failure

Assessing HF risk early can facilitate tailored care

Initial assessment of cardiovascular risk factors is recommended for people with cancer before the start of cardiotoxic treatment.[6 12] At this stage, it not only serves as an initial assessment for cardiac monitoring during and after cancer treatment, but it can also help to identify people at high risk of cardiotoxicity. This means they can receive tailored care, preventing potential complications.[6 7 13-15]

It is important that people identified as being at a high risk of HF do not experience delays in cancer treatment.[13] They should receive cardio-oncology consultations, prevention strategies, and adequate monitoring during and after cancer therapy. Healthcare professionals have highlighted the need for monitoring protocols that can be tailored to each individual according to their level of risk.[15 26] Referral systems according to risk can also alleviate concerns for people with cancer who are at low risk of HF.[37]

Monitoring and early detection can allow for HF recovery and can be cost-effective

Current clinical guidance focuses on early detection of cardiotoxicity, before it becomes severe, rather than primary prevention.[38] The European Society of Cardiology has published several position papers on the use of biomarkers and cardiovascular imaging to allow early detection of heart damage.[6 7 15 39] For example, measuring biomarkers (including natriuretic peptide and cardiac troponin) and using echocardiography are recommended tools to monitor cardiac health in people with cancer.[7 15] The European Society of Medical Oncology recommends a similar approach, combining biomarker testing and echocardiography.[12]

Monitoring cardiovascular health during and after cancer treatment can help to detect subclinical cardiotoxicity, allowing HF treatment to be introduced early.[7 14 40] This can allow full or partial recovery and improved outcomes for most people.[18 41-43] Studies in the US suggest that long-term cardiac monitoring of people who had cancer as children is cost-effective.[44] Those at higher risk of HF benefit from ongoing monitoring, and the frequency of monitoring can be adjusted according to individual risk.[45] Further research is needed to assess the cost-effectiveness of monitoring for populations at lower risk.

Healthcare professionals should promote patient education and shared decision-making

Experts indicate that it is vital to make people with cancer aware of the long-term cardiovascular risk of cancer treatment, so they are able to detect HF signs and symptoms early and seek medical attention if necessary.[19 20] Individuals should also be educated on mitigation strategies, such as exercise and diet. Healthcare professionals can help reduce stress and uncertainty the person may be experiencing by explaining the measures taken for monitoring and early detection of cardiotoxicity to improve outcomes.[19]

Team discussions, including specialists and people with cancer, are needed to balance the risk of cardiotoxicity with the completion of cancer therapy and decide on complex cardiological procedures that could affect survival.[23] Active patient involvement is important to develop care plans with improved adherence, leading to better outcomes and quality of life.[36]

> ***'It is crucial that we build trust with our patients. Once the patient is well informed and able to participate in decisions about treatment, we must offer our support throughout, providing follow-up care to avoid complications and assuring them that, if complications appear, we will be able to detect them in time to avoid worse consequences.'***
>
> Pilar Mazón, cardiologist

Cardio-oncology services should be adapted to local resources to promote multidisciplinary collaboration and optimal treatment

The European Society of Cardiology and the European Society of Medical Oncology recommend multidisciplinary collaboration to avoid discontinuation of cancer treatment while protecting cardiovascular health.[12 15] A cardio-oncology service is a specialised multidisciplinary team that can support every step of the care journey of people with cancer to improve long-term outcomes.[22] During cancer treatment, its role is to ensure that people can complete treatment safely and without interruptions.[6 22] Following treatment, the service is involved in long-term monitoring of people who have received cancer treatment and can also educate and train healthcare professionals.[22 39] Telehealth tools may facilitate cardio-oncological care, allowing for virtual meetings with multiple specialists without the need to travel.[46]

Cardio-oncology services need rigorous, step-by-step protocols adapted to existing local strategies and resources.[19 23 37] While bigger centres that care for a large number of people with cancer require dedicated diagnostic pathways and access to cardiovascular specialties, smaller hospitals can receive support from advanced specialist services when needed.[22]

Cardio-oncology working groups and registries can help collect evidence and promote best practice

National cardio-oncology working groups can be a communication platform to initiate clinical trials and scientific studies as well as cardio-oncology registries.[23] Multicentre registries are essential to collect data on more people and across different care settings,[19] and electronic health records can allow the rapid development of cardio-oncology registries.[47] The evidence generated would improve the understanding of mechanisms underlying cardiotoxicity and be the basis for the development of effective strategies for managing it.[23]

Data-sharing across countries can also provide further information and improve understanding of best-practice care. The European Association of Cardiovascular Imaging and the Heart Failure Association have launched a multicentre registry of people with breast cancer and cardiotoxicity to assess current care practices for diagnosis and management across Europe.[24] This evidence will help improve knowledge among healthcare professionals and support the development of cardio-oncology strategies.

Primary care can play an important role in long-term management

Primary care physicians play a crucial role in the delivery of cardiovascular care among people with cancer. To fulfil this role, they must be educated on cardiotoxicity related to certain cancer treatments and have access to medical records that contain their patients' initial cardiovascular risk assessments.[6 14] During cancer treatment, primary care physicians can be involved in monitoring cardiovascular risk factors and promoting healthy behaviours.[25] Primary care is also responsible for the routine care of people who have had cancer treatment, assessing their risk factors for cardiotoxicity, monitoring for any signs and symptoms of HF, and educating people to recognise their own signs and symptoms.[25 37] There is evidence that people who have had cancer and are subsequently monitored in primary care are more likely to receive guideline-recommended care for HF than those who do not receive this follow-up.[48]

Specialist nurses can facilitate person-centred care

Caring for people with both HF and cancer is challenging, as it requires taking into account the complex needs of the individual, which will depend on their physical condition as well as their social and economic circumstances.[36] As well as playing a key role in coordinating cardio-oncology appointments and minimising interruptions or delays to cancer treatment,[19 36] specialist nurses are involved in patient monitoring, education and emotional support.[21] They can act as advocates for people with cancer, facilitating shared decision-making with their loved ones and healthcare professionals regarding treatment decisions, advance care planning and palliative care.[21 36]

Case study

Providing integrated cardiovascular care for people with cancer in Germany[49]

In 2016, the department of cardiology of the University of Heidelberg created the first German cardio-oncology unit (COUNT) to integrate and optimise care for cardiovascular conditions among people with cancer. The unit has developed a standardised protocol for initial assessment and monitoring of cardiotoxicity, along with a pathway to initiate treatment. Communication between cardiologists and oncologists has been improved by participating in cancer board meetings and cardio-oncology presentations, as well as the digital recording of cardiological findings and recommendations.
The unit is also involved in clinical studies, assessing the adverse cardiovascular effects of new treatments, and has introduced cardio-oncology into the student curriculum.

Case study

Optimising cardiovascular risk assessment for people undergoing cancer treatment in the UK[50]

The cardio-oncology unit at the Royal Brompton Hospital in London has optimised cardiovascular risk assessment of people with cancer, which has increased continuation of cancer treatment. The unit's multidisciplinary care team is composed of cardiologists, a cardio-oncologist and a specialist nurse, supported by specialists in cardiac imaging. When first established, the unit promoted the service via a dedicated website and disseminated referral documents. The team introduced a protocol for initial assessment of cardiovascular risk; it discusses each person with cancer and provides a clinical consensus-based decision that balances the severity of their cardiovascular disease and cancer. People at higher risk of cardiotoxicity are closely monitored during cancer treatment and receive long-term follow-up.

Case study

Improving cardio-oncology in primary care in Spain[51]

The Spanish Society of Cardiology has created a working group on cardio-oncology to ensure collaboration across care settings, with an emphasis on primary care. It has developed a report outlining communication lines between primary care and specialists and providing guidance on the monitoring and management of people with cancer at risk of HF and other cardiovascular diseases. It also promotes activities such as virtual and in-person meetings to facilitate interdisciplinary discussions and integrated care.

4 Challenges in the care of people with cancer at risk of heart failure

Lack of cardiac monitoring hampers early detection

Several biomarkers can help detect cardiotoxicity and assess risk before and during cancer treatment.[13] Although monitoring for cardiotoxicity is recommended,[15] it remains inconsistently implemented for most people with cancer. In the Netherlands, the prevalence of cardiac monitoring in people with cancer can range from 1% to 97% across different hospitals.[16] The lack of monitoring results in delayed detection of cardiotoxicity and diagnosis of HF. A study in Switzerland found that 75% of people who developed HF following cancer treatment had not received cardiac monitoring in the year before their diagnosis.[17]

Consistent monitoring of cardiotoxicity following cancer treatment could be supported with standardised, evidence-based protocols.[16] However, evidence is lacking for the best timing of, and protocols for, monitoring different population groups.[15] In the Netherlands, a study is underway to assess different monitoring methods for people treated for cancer as children who are at risk of HF,[52] and further research and evidence will be needed across Europe. Experts have indicated the urgent need for a validated risk prediction tool that allows care teams to tailor the timing and frequency of monitoring.[37 53] Further innovative developments in risk prediction could optimise treatment decisions and prevent cardiovascular complications.[54 55]

There is emerging evidence in favour of secondary prevention, but more research is needed

Prevention strategies include providing cardioprotective, less cardiotoxic or dose-adjusted cancer treatment, as well as introducing HF treatment (such as angiotensin-converting enzyme inhibitors and beta blockers) before the start of cancer therapy.[38 56] Among people without existing cardiovascular disease or cardiotoxicity, these strategies are considered primary prevention; secondary prevention means applying these strategies to individuals who already have cardiovascular disease or have previously experienced cardiotoxicity.[6 57] Secondary prevention strategies in people at high risk can prevent cardiotoxicity and reduce overmedication, as well as being cost-effective.[57] In Portugal, a study found that secondary prevention resulted in better outcomes and lower costs than primary prevention in all people with cancer.[58]

Current guidelines do not recommend primary prevention strategies, as the evidence of their benefit on long-term outcomes remains inconclusive.[38 56 59] Primary prevention requires more investment and exposure to potential side effects than secondary prevention. However, there are circumstances in which primary prevention may be a suitable option. A European study found this to be the case in children undergoing cancer treatment: in Italy and Spain, healthcare savings significantly exceeded the costs of administering cardioprotective treatment.[60] Further research is needed to understand the most appropriate prevention strategies for different populations.

Healthcare professionals do not receive enough education or training on cardiotoxicity

Despite recommendations from professional societies, the lack of awareness of cardiotoxicity and of strategies to address it has hampered their implementation. For example, cardiac monitoring is widely recommended during cancer treatment, but some healthcare professionals doubt its effectiveness.[26] In France, a study found that only 35% of oncologists managed cardiotoxicity according to guidelines, and none were aware of recommendations from expert cardiology societies.[27] Although all oncologists were aware of the cardiotoxic effects of some well-established cancer therapies, only half were aware of these effects from newer therapies.

The lack of education and training for healthcare professionals around cardiotoxicity leads to missed opportunities to improve outcomes for people with cancer at risk of heart damage. Many cardiologists agree that there is a need for more education on cardio-oncology in Europe.[61] In an international survey, fewer than half of cardiologists and only 2% of oncologists strongly agreed that they were knowledgeable about cardiotoxicity and confident in treating it.[28]

People undergoing cancer treatment often do not receive appropriate education or take part in decisions regarding their care

It is essential that healthcare professionals educate people who have been treated for cancer on cardiac symptoms, so they know when to seek medical attention.[14] However, some healthcare professionals avoid discussing treatment side effects and cardiovascular risk out of concern about overwhelming the person.[26] A study in the Netherlands found that none of the people with cancer interviewed had received information on cardiotoxicity either before or during their cancer therapy.[11]

Appropriate communication is important to facilitate cardio-oncology discussions between healthcare specialists, people with cancer and their loved ones. However, it has been reported that people with cancer may not have opportunities for shared decision-making regarding treatment options.[11]

> ***'I have discovered that there are more people like me, who had been really surprised to find out that there was a connection between their cancer treatment and heart failure. Patients need to be informed about the side effects of cancer treatment. We need to be aware of what can follow.'***
>
> Penilla Gunther, cancer survivor and HF advocate

Hospitals have limited resources to establish cardio-oncology care services

Providing cardiovascular care for people with cancer requires additional appointments, tests and treatments.[46] This demands a greater commitment from healthcare professionals as well as financial investment from the health system, often combining different departments and funding streams. Experts indicate that hospitals do not have enough resources to provide best-practice care for all people living with cancer.[19] Limited funding and infrastructure have been reported as major barriers to the development of cardio-oncology services;[28] in a French study, more than half of oncologists identified financial constraints as the main obstacle.[27]

5 The way forward

Multidisciplinary collaboration and integrated care can improve outcomes and quality of life of people with HF related to cancer therapy. The European Society of Cardiology and the European Society of Medical Oncology provide guidelines for monitoring cardiotoxicity to improve early detection of heart damage, and multidisciplinary care has emerged as the gold standard in these cases.[7 12 15]

Concerted action is required to improve the management of HF related to cancer therapy

We propose actions to improve the management of HF risk in people with cancer to promote early detection of heart damage, improve collaboration between healthcare professionals and increase the quality of life for people with cancer and HF.

1. Increase awareness of and improve education on HF risk following cancer treatment

Increased awareness among healthcare professionals and people treated for cancer could result in earlier detection of cardiotoxicity, allowing timely intervention and improved outcomes. Cardiologists and oncologists should be well educated and appropriately trained in monitoring and treating cardiotoxicity. Cardio-oncology should be included in student curricula and academic programmes to promote multidisciplinary collaboration. Primary care physicians should also be trained so they can promote prevention and self-care strategies for people with cancer at risk of HF. It is essential that healthcare professionals communicate the side effects of treatment to people with cancer, educating them on the signs and symptoms of HF.[19 20]

2. Increase and target resources for cardio-oncology services

Governments and health systems should include cardio-oncology in cancer strategies to ensure targeted funding streams for cardio-oncology services. With targeted resources, cardio-oncology services can support people with cancer at every step of the care pathway to prevent or manage the development of HF, and improve quality of care and outcomes.

3. Promote the formation of cardio-oncology national working groups, along with collaboration at an international level

In recent years, several countries across Europe have created national cardio-oncology working groups that unite cardiologists, oncologists and other specialists to implement best practice.[62-65] Comprehensive national cardio-oncology programmes – with clear guidance, protocols, healthcare professional responsibilities and outcome measurements – can help to improve the quality of care.[53] These working groups can also promote the establishment of cardio-oncology registries and the inclusion of cardio-oncology care in national and international plans, such as Europe's Beating Cancer Plan.[19]

4. Invest in research on prevention and monitoring strategies

Further research is needed on prevention and monitoring strategies, as well as risk prediction tools, before detailed evidence-based guidelines can be developed and implemented widely. Cost-effectiveness and cost–benefit studies will be vital to establish evidence-based policies on cardio-oncology.

5. Accredit and fund specialist nurses to facilitate person-centred care

Specialist nurses should be sufficiently resourced so they can be involved in patient monitoring, coordination of multidisciplinary teams, providing essential emotional support for patients and their loved ones, and facilitating integrated, person-centred care and shared decision-making.

It is time to recognise the risk of HF related to cancer therapy and improve its management

People who develop HF after receiving cancer treatment are in urgent need of best-practice care. Improving care for this population requires increased awareness and understanding of cardiotoxicity, close multidisciplinary collaboration and improved communication between individuals and healthcare professionals. These efforts must be backed up with government policies that target resources to multidisciplinary care. People who develop HF as a result of their cancer treatment have found themselves battling one serious disease after another. We should focus our efforts on improving the care they receive and their quality of life.

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About the Heart Failure Policy Network

The Heart Failure Policy Network (HFPN) is an independent, multidisciplinary group of healthcare professionals, patient advocacy groups, policymakers and other stakeholders from across Europe whose goal is to raise awareness of unmet needs surrounding heart failure and its care. All members provide their time for free. All Network content is non-promotional and non-commercial. The Secretariat is provided by The Health Policy Partnership Ltd, an independent health policy consultancy based in London.

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