

**Factors influencing cardiac surveillance for women with breast cancer at risk of cancer therapeutics-related cardiac dysfunction: healthcare professionals' views and expectations**

A qualitative study

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## Abstract

**Background** Due to increased breast cancer survival, awareness about cancer therapeutics-related cardiac dysfunction (CTRCD) is growing. CTRCD can negatively impact patients' quality of life and increase mortality risks. Early detection and treatment of CTRCD through cardiac surveillance improves patient outcomes. However, evidence-based guidelines for cardiac surveillance are lacking. Oncologists and cardiologist have been recommended to collaborate to develop shared knowledge and consensus-based guidelines. Yet insight in current collaborations and perceived factors influencing cardiac surveillance are missing.

**Aim** Views and expectations of healthcare professionals regarding influential factors for cardiac surveillance of women with breast cancer at risk of CTRCD were explored.

**Method** Through a generic qualitative research design, semi-structured interviews were conducted with twelve healthcare professionals (six oncologists, five nurse practitioners and one epidemiologist) working in Dutch hospitals. Interviews were audio-recorded and transcribed verbatim followed by thematical analysis.

**Results** Themes discovered were a *sense of urgency*: most professionals did not feel a need to increase cardiac surveillance and change current practice, *interprofessional collaboration*: in the few hospitals where an interprofessional collaboration existed professionals experienced structured cardiac surveillance and easy communication, *unburdening patients*: by limiting patient information and providing continuity of care and lastly *essential care*: determining what essential cardiac surveillance is through evidence and guidelines.

**Conclusion** The main theme influencing cardiac surveillance was the presence or lack of a *sense of urgency*. The presence of a sense of urgency is necessary to improve current practice leading to initiatives for interprofessional collaboration and increased cardiac surveillance.

**Recommendations** A sense of urgency for interprofessional collaboration and potential benefits of cardiac surveillance should be instilled on all involved healthcare professionals. Interprofessional collaborations to structure cardiac surveillance and initiate research initiatives need to be expanded. Further research should lead to the development of an evidence-based guideline for cardiac surveillance.

*Key words: breast neoplasms (MeSH), cardiac surveillance, cardio-oncology, influential factors*

## Samenvatting

**Achtergrond** Door de toename van borstkanker overleving stijgt de bewustwording aangaande kanker therapie-gerelateerde cardiale dysfunctie (Engelse afkorting: CTRCD). CTRCD heeft een negatieve impact op kwaliteit van leven en verhoogd het mortaliteitsrisico. Vroege opsporing en behandeling van CTRCD kan patiëntuitkomsten verbeteren. Er bestaan echter geen evidence-based richtlijnen voor cardiac surveillance. Recente studies raden aan dat oncologen en cardiologen samenwerken om gedeelde kennis en op consensus-gebaseerde richtlijnen te ontwikkelen. Er is echter geen inzicht in huidige samenwerkingsverbanden en percepties over beïnvloedende factoren voor cardiac surveillance.

**Doel** De opvattingen en verwachtingen van gezondheidsprofessionals ten aanzien van beïnvloedende factoren voor cardiac surveillance bij vrouwen met borstkanker die risico lopen op CTRCD werden geëxploreerd.

**Methode** Met een generiek kwalitatief onderzoeksdesign werden semigestructureerde interviews uitgevoerd met twaalf zorgprofessionals (zes oncologen, vijf nurse practitioners en één epidemioloog) werkzaam in Nederlandse ziekenhuizen. Interviews werden opgenomen en uitgeschreven, waarna een thematische analyse volgde.

**Resultaten** Thema's waren een *gevoel van urgentie*: de meeste professionals zagen geen noodzaak voor het uitbreiden van cardiac surveillance en het veranderen van de huidige praktijk, *interprofessionele samenwerking*: in de weinige ziekenhuizen waar interprofessioneel werd samengewerkt werd gestructureerde cardiac surveillance en laagdrempelige communicatie ervaren, *ontzorgen van patiënten*: patiënteninformatie beperken tot het hoognodige en continuïteit van zorg, en *essentiële zorg*: essentiële cardiac surveillance vaststellen door bewijslast en richtlijnen.

**Conclusie** Het belangrijkste gevonden thema wat cardiac surveillance beïnvloedde was de af- of aanwezigheid van een gevoel van urgentie. Een gevoel van urgentie is nodig voor verbetering van de huidige praktijk door initiatieven voor interprofessionele samenwerking en structurering van cardiac surveillance.

**Aanbevelingen** Een gevoel van urgentie voor interprofessionele samenwerking en potentiële voordelen van cardiac surveillance moet gecreëerd worden onder zorgprofessionals. Interprofessionele samenwerkingen die cardiac surveillance stroomlijnen en onderzoeksinitiatieven promoten moeten worden uitgebreid. Verder onderzoek moet gericht worden op de ontwikkeling van een evidence-based richtlijn voor cardiac surveillance.

*Trefwoorden: borstkanker, cardiac surveillance, cardio-oncologie, beïnvloedende factoren*

L.C. Dobbe (5872960), Master Thesis, Influencing factors for cardiac surveillance, June 29<sup>th</sup>, 201

## Introduction

Breast cancer is the most common type of cancer among women and will affect one in nine women in the Netherlands during her lifetime<sup>1</sup>. The risk of dying from breast cancer has decreased, due to advanced treatments and early diagnosis<sup>2-4</sup>. The ten-year survival rates are 94% for early stage breast cancer and 75% for locally advanced breast cancer<sup>5</sup>. Due to an increase of breast cancer survivors, awareness about long-term side effects, such as cardiac dysfunction caused by current treatment regimens is growing<sup>6-8</sup>. Cancer therapeutics-related cardiac dysfunction (CTRCD) is defined as a decrease in left ventricular ejection fraction (LVEF) of  $\geq 10\%$  compared to baseline, to a value  $< 53\%$ , confirmed by repeated cardiac imaging<sup>9</sup>. CTRCD, which can express itself in physical symptoms such as dyspnea and fatigue, is associated with lower physical and mental health-related quality of life (HRQoL) in breast cancer survivors<sup>10</sup>. More importantly, cardiovascular disease, caused by cancer treatment and risk factors, is an important cause of death among breast cancer survivors<sup>7</sup>.

Unfortunately, evidence-based guidelines for cardiac surveillance of breast cancer patients receiving treatment are lacking<sup>11,12</sup>. Cardiac surveillance entails cardiac function monitoring at the start, during and after cancer treatment. Surveillance plays an important role in early detection and treatment of cardiac dysfunction, resulting in better outcomes<sup>13,14</sup>. Existing recommendations for cardiac surveillance show much variety<sup>15</sup>. Furthermore, adherence of oncologists to recommended cardiac surveillance during treatment seems to be suboptimal, possibly due to implementation issues<sup>16</sup>. It is recommended for oncologists and cardiologists to collaborate closely while caring for women with breast cancer at risk of CTRCD in order to develop shared knowledge about (preventive) care and to create consensus-based guidelines<sup>11,15,17,18</sup>. Risks of inadequate collaboration include undermedicating patients<sup>19</sup> and patients with cancer and cardiovascular disease receiving different care, depending on whether they were first referred to the oncologist or cardiologist<sup>20</sup>. Studies on how oncologists and cardiologists collaborate in current practice could not be found.

This study focuses on healthcare professionals specialized in breast cancer care. Oncologists are the primary caregivers during cancer treatment. Therefore, oncologists' views on current and future cardiac surveillance are important to determine what current practice looks like and how it could be improved. The aim is discover influential factors that either facilitate or hinder oncologists from performing cardiac surveillance. This study also includes the views of nurse practitioners (NPs), who often perform similar tasks as oncologists (e.g. physical examinations, taking medical history and patient referrals)<sup>21</sup>. Furthermore, NPs play an important role in coordinating the care for their patients<sup>22</sup>. NPs are involved in advising, giving emotional support<sup>23</sup> and educating patients<sup>24</sup>, and will possibly provide a different perspective on cardiac

surveillance. In this study, a NP is defined as a registered nurse with a master's degree in advanced nursing practice specialized in breast cancer care.

To change current practice and provide patients with the best of care, a better understanding of influencing factors for cardiac surveillance is needed. To our knowledge, this will be the first study that explores influential factors for cardiac surveillance.

### **Objective**

This study aimed to explore views and expectations of healthcare professionals regarding influential factors for cardiac surveillance of women with breast cancer at risk of cancer therapeutics-related cardiac dysfunction.

### **Method**

With this qualitative study rich data was obtained about a subject of which little was known. A practical subject was explored, without philosophical assumptions, therefore a generic qualitative research design was the most fitting<sup>25</sup>. To ensure transparent reporting the consolidated criteria for reporting qualitative research (COREQ)<sup>26</sup> were incorporated into this paper.

This study was conducted according to the principles of the Declaration of Helsinki<sup>27</sup>, the guidelines for good clinical practice<sup>28</sup> and the Dutch law for protection of privacy<sup>29</sup>. A waiver stating this study is exempt from the Medical Research Human Subjects Act was obtained from the Dutch human research committee (CMO) of Arnhem-Nijmegen.

### Sampling

This study included a purposive sample of oncologists and NPs specialized in breast cancer care, employed by a department of oncology in a general, teaching or university hospital. Participants were selected based on work experience of minimally one year in their current function and the ability to understand and fluently speak Dutch. Maximum variation was obtained in gender, work experience and hospital type to improve generalizability. Different hospital types were selected, because collaborations and procedures may differ between hospitals.

Oncology department management in Dutch hospitals were asked for eligible participants to be approached for inclusion. Initial contact was made by the coordinating investigator. After participants had expressed interest, they were approached by the researcher conducting the interviews by email for an appointment. One epidemiologist was included. Though this deviated from the inclusion criteria, this participants' opinion was considered an asset to the

study due to her extensive experience with cardiac surveillance and cardiotoxicity in breast cancer survivors.

### Data collection

Interviews took place between January and May of 2019. Before the interview started, participants were reminded of the subject and aim of the interview. Written informed consent was obtained, after which baseline demographics were collected, including profession, gender, age, highest level of education, workplace and work experience.

All interviews were conducted at the workplace of the participant in a private room of their choice. Interviews were semi-structured through a topic list based on the seven domains of the TICD checklist (table 1). The TICD checklist is a synthesis of 12 existing checklists developed for identifying determinants of practice<sup>30</sup>. During interviewing, it was determined that all topics of interest were present in the interview guide, making adaptations unnecessary. Certain topics were explored further with follow-up questions in later interviews, based on emerging themes.

[insert table 1]

To improve trustworthiness, the researcher concluded every interview with a summary of the main points that were brought forward to check the interpretation. Field notes of notable observations were written down directly after the interview. On average, interviews lasted 36 minutes (range: 20-64 minutes). All interviews were audio-recorded and transcribed verbatim. The interviewing researcher (LD) was a registered nurse, who was not familiar with breast cancer patients through her profession and had no prior assumptions towards cardiac surveillance. Her experience with interviewing prior to this study was limited to professionally questioning patients and a masterclass in qualitative interviewing. The researcher received feedback on her interviewing technique from the coordinating investigator during data collection. The researcher had no prior relationship with the participants. Two participants were familiar to the researcher through her workplace. However, they had no working relationship. All participants knew the interviewing researcher was a master student and registered nurse.

### Data analysis

Analysis proceeded with a thematic analysis. The method of thematic analysis fits the purpose of this study, since it is a flexible method, independent of theory, that can result in rich and detailed data<sup>31</sup>.

All interviews were entered into ATLAS.ti (Scientific Software Development GmbH, v.8.3.20, 2018) software to support data analysis. Data were analyzed by the six steps of thematic

analysis<sup>32</sup> (table 2). A total of four researchers were involved in the process of data analysis, reducing the risk of bias.

[insert table 2]

Interviews were read and re-read by the researchers to familiarize themselves with the data. The first three interviews were coded by three researchers (LD, YK and NvZ). Thereafter, interviews were coded by two researchers (LD and NvZ). Coding was conducted independently to improve credibility of findings<sup>33,34</sup>. The initial codes were compared and differences were discussed until consensus was reached. If consensus could not be reached, the coordinating investigator (YK) was asked to code the interview as well, which occurred twice. Next, initial codes were clustered into categories. Initial codes found in interviews 1-3 were clustered into categories, after which the initial codes from interview 4-5 were added to the dataset and so on. The process of constant comparison was incorporated to improve the validity of the findings by comparing the new data to already existing categories to determine the fit<sup>34</sup>. Categories were reviewed by the research team (LD, YK and HV) for emerging themes. Defined themes were reached on basis of consensus. Data saturation, defined as the point where additional interviews did not lead to newly established themes, was reached after ten interviews. Two additional interviews were conducted to confirm data saturation.

## **Results**

A total of 12 professionals (six oncologists, five NPs and one epidemiologist) consented to study participation. Four professionals refused to participate, due to their busy working schedules. There was no dropout of included participants. Professionals from eight different hospitals were included, 83% of the participants were female. The mean age of participants was 50,2 years of age (table 3).

[insert table 3]

Although this could not be considered a theme, all participants were asked to describe the current practice of cardiac surveillance in their department. In six of the eight hospitals, the professionals described that cardiac surveillance was limited to LVEF monitoring before and during Trastuzumab treatment. No standardized LVEF monitoring existed for patients receiving other types of treatment. LVEF monitoring only occurred if professionals considered the patient at risk of developing CTRCD or if CTRCD symptoms manifested. Professionals from two hospitals mentioned the recent implementation of a cardio-oncology referral for all cancer

patients that were to receive treatments that were considered a risk for developing CTRCD. The cardio-oncology referral included screening and follow-up of cardiac functions, including LVEF, by a dedicated cardiologist before and during treatment. All professionals mentioned there were no guidelines for the monitoring of cardiac functions after cancer treatment completion.

Four themes influencing cardiac surveillance emerged from the data: *sense of urgency, interprofessional collaboration, unburdening patients and essential care*. The coding tree is provided in Appendix A.

**Sense of urgency.** The main factor influencing cardiac surveillance was a sense of urgency. While awareness about CTRCD is growing among professionals, most professionals did not feel a strong sense of urgency to change current cardiac surveillance practice. One reason for this could be found in frequency of events. Professionals indicated they rarely see breast cancer patients with CTRCD. LVEF reductions were considered reversible and the incidence of serious cardiac complications, such as heart failure, were perceived as rare.

*“...I can’t remember anybody from recent years that was referred to the cardiologist with a complaint and came back with heart failure. And that can mean two things: either those patients weren’t there or we haven’t searched properly.”*

P06, oncologist

The majority of professionals were not convinced that increased monitoring would lead to improved patient care in terms of quality of life and prevention of CTRCD.

Awareness and a lack of knowledge about CTRCD in other healthcare professionals was a perceived barrier. Professionals perceived that cardiologists did not always understand the reason for patient referral, which led to misunderstandings. Also, waiting-lists for patients having to be referred to a cardiologist were usually long, possibly leading to cancer treatment delay.

Some oncologists found themselves faced with cardiologists that misinterpreted the patients prognosis as more severe than it actually was.

*“When the word ‘cancer’ drops, the view that cardiologists have of the patients’ prognosis is not always correct. Cancer quickly sounds like: well, then we don’t need to proceed quickly with cardiac care either,*



*because this patients' prognosis is limited. But that is the question. Obviously this is sometimes true, but there are also situations in which we think that someone has many more years to go and, well, sometimes this stains the cardiologists' advices a bit too much."*

P10, oncologist

Professionals indicated that all disciplines involved, including themselves, could benefit from greater knowledge about CTRCD in breast cancer patients.

*"And then I had a patient with severe cardiac damage and she said: 'It was so not recognized, my troubles.' [...] She was in tears. Now I recognize how important it is to inquire more about this."*

P04, NP

***Interprofessional collaboration.*** The presence or absence of an established interprofessional collaboration between dedicated oncologists and cardiologists influenced the way cardiac surveillance was organized. The few professionals involved in interprofessional collaboration described this facilitated easy communication and structured cardiac surveillance for breast cancer patients that were to receive cardiotoxic medications. Professionals in these hospitals had cardio-oncology collaborations where patients were referred to cardiologists for screening and monitoring with echocardiography, if necessary. Established collaborations were based on a mutual interest in improving clinical outcomes with research. Research as a foundation for collaborations was supported by the epidemiologist.

*"I see that things are only achieved when a few people start collaborating. [...] That is the way it works. It often starts with doing research together."*

P08, epidemiologist

Hospital that lacked an established interprofessional collaboration resulted into two separate disciplines who occasionally collaborated when events occurred. Not all oncologists were unsatisfied with an occasional collaboration, mostly because in their view cardiac side effects of breast cancer treatment were rare.

Some of the included hospitals did not employ NPs for breast cancer care. However, where NPs were present, they were perceived as an asset in the team, both by themselves and oncologists, because they focus on the patient as a whole.

*“I am always very medically-technically involved and the nurse, in my view, sees the patients more in their system [...] and I, well, think that the nurse can offer a whole package more than I can.”*

P11, oncologist

**Unburdening patients.** Professionals considered quality of life as an important factor for breast cancer patients. Therefore professionals sought to unburden patients in different ways. Firstly, professionals described that patients received an abundance of information shortly after cancer diagnosis and treatment initiation. Several oncologists and NPs described limiting patient information regarding CTRCD to its most crucial content, to avoid overwhelming the patients.

*“I see it as our task to put people at ease about the long-term, instead of exaggerating this, because yes, of course there are long-term complaints, but these only apply to a minority of people and cardiotoxicity is really only a small piece.”*

P07, oncologist

Secondly, professionals perceived that patients were usually not very concerned about their cardiovascular health before and during cancer treatment. In their view, patients' emphasis was on survival. Therefore, professionals thought it important not to trigger concerns in patients that were already burdened with a possibly life-threatening disease.

*“When you start emphasizing the cardiac problems, while patients are occupied with: will this kill me or not... Patients will almost say: ‘I hope I get cardiac problems later, because that means I survived this.’ So we shouldn't take the balance out of this, because the ultimate goal is survival.”*

P06, oncologist

Thirdly, professionals felt it was important to improve continuity of care. Some patients reported seeing many different cardiologists throughout protocolized cardiac surveillance, lacking a familiar face. It was also considered burdensome, and not always necessary, for patients to visit many different professionals (e.g. surgeon, radiotherapist) during cancer treatment. NPs saw it as one of their qualities to provide continuity of care from start to finish. This also helped

to personalize care, as health changes were easily detected and health education could be tailored to the patients' situation and needs.

*“That is the advantage of knowing people, that you don't [...] check things off your list, but you go: okay, who do I have in front of me and to what degree does this need attention.”*

P05, NP

**Essential care.** Professionals felt cardiac surveillance should be limited to its essence to protect this patient group from unnecessary and burdensome procedures. Professionals considered it was important to determine efficacy of cardiac surveillance in relation to patient benefits and cost-effectiveness.

*“There is always a number-needed-to-harm, and the consideration of how many people are burdened by medical activities in vain versus the benefits, that is an important question.”*

P03, oncologist

Professionals experienced a gap in knowledge when it comes to what essential cardiac surveillance is. Most professionals expressed a need for guidelines regarding cardiac surveillance. It was perceived as important to be able to distinguish between high- and low-risk patients and adjust surveillance accordingly.

*“...it would be great if we knew for breast carcinoma, if you could identify, if someone within a treatment has a LVEF drop, or shows certain complaints, or has a risk profile, that you would know: this is a high-risk patient that I need to follow for the next 4,5 years.”*

P11, oncologist

Furthermore, most professionals perceived that evidence-based guidelines would structure cardiac surveillance in current practice.

*“...I really think that you need to make a guideline for this [cardiac surveillance]. Not everyone should go around doing things. [...] We need to prevent an overgrowth, where things are initiated, without proper support from a guideline.”*

Professionals considered an evidence-based change that improved patient care the most important trigger to change current practice. Change also required initiative from professionals and was considered easier to accomplish in a small hospital.

## **Discussion**

This was the first study to explore views and expectations of healthcare professionals regarding cardiac surveillance for women with breast cancer at risk of CTRCD. Perceptions towards cardiac surveillance were mainly influenced by the presence or lack of a sense of urgency that current practice could and needed to be improved. The presence of a sense of urgency led to the establishment of interprofessional collaborations between dedicated oncologists and cardiologists, resulting in structured cardiac surveillance and collaborative research initiatives. Furthermore, professionals expressed a need for evidence-based guidelines to provide patients with essential cardiac surveillance.

Professionals in this study considered CTRCD uncommon. However, many studies have reported the increased risks of developing CTRCD caused by breast cancer treatment<sup>35-39</sup>. Incidence rates of CTRCD have been reported to be around 30%<sup>40,41</sup>. A possible explanation for this contrast is that CTRCD could be underdiagnosed in current practice due to lacking cardiac surveillance. A study performed in 2019 showed that cardiac surveillance was only performed in a quarter of breast cancer patients receiving cancer treatment<sup>42</sup>. Moreover, CTRCD can manifest itself many years after cancer treatment completion<sup>43</sup>. Lastly, CTRCD can be difficult to recognize as symptoms may resemble expected chemotherapy side effects<sup>44</sup>.

A finding in this study was that patients were perceived to have their focus on cancer survival, leaving professionals feeling a need to limit patient information about cardiac risks to unburden patients. However, Armenian et al. state that patients' awareness of CTRCD symptoms is necessary to encourage early reporting<sup>45</sup>. Contrary to perceptions expressed by professionals in the current study, patients in a 2016 survey have expressed a need for information about cardiovascular side effects of cancer treatment<sup>46</sup>.

Most professionals in the current study wanted to improve their own and other disciplines' knowledge about CTRCD. A lack of knowledge about CTRCD was shown by Sulpher et al. who found discrepancies between oncologists and cardiologists treating CTRCD, which emphasized the need for a more effective collaboration<sup>47</sup>. Interprofessional collaboration in clinical practice is important to optimize healthcare for patients with complex diseases that

require more than one specialist<sup>48</sup>, such as the challenging field of cardio-oncology. Numerous studies report the need for implementing interprofessional collaborations in cardio-oncology<sup>43,49–53</sup>. Interprofessional collaboration would aid in developing shared knowledge about CTRCD and balances the interests of all involved professionals<sup>54</sup>. The end-goal of this collaboration is improved patient-care<sup>48</sup>, or in this case a decrease in cardiovascular side effects during and after breast cancer treatment<sup>55,56</sup>. Early detection of CTRCD through cardiac surveillance provides healthcare professionals with the opportunity to intervene early, possibly preventing further deterioration of cardiac functions<sup>43,45,57</sup>. The few professionals in this study who had an interprofessional collaboration declared this helped to structure cardiac surveillance and ease communication. However, the majority of professionals were not involved in an interprofessional collaboration and felt satisfied with occasional consultations with cardiologists. Therefore, the need to create a sense of urgency is evident and interprofessional collaborations should be expanded to improve current practice. Knowledge is the first step in creating a sense of urgency for innovation<sup>58</sup>. Professionals need to be made aware of the possible benefits of cardiac surveillance and interprofessional collaborations. This will create the foundation for the implementation of a lasting collaborations.

Lastly, professionals in this study expressed the importance of determining essential cardiac surveillance through evidence. Most professionals felt the need for an evidence-based guideline. Evidence of improved patient outcomes was considered the best incentive to change current practice. The need of healthcare professionals for evidence-based guidelines regarding cardiac surveillance has been corroborated by recent studies<sup>52,59</sup>.

This study has some limitations. Firstly, the sample consisted of Dutch healthcare professionals only, limiting generalizability to other cultures and countries. Nevertheless, maximum variation on education, work experience and variety of included professionals and hospitals was achieved within the sample. Secondly and perhaps most importantly, this study aimed to give the perspective of healthcare professionals towards cardiac surveillance. Views of oncologists, NPs and an epidemiologist were obtained, but the perspective of cardiologists was not included. It is possible that cardiologists would have shed a different light on the subject.

Future research should focus on developing an evidence-based guideline for cardiac surveillance, balancing patient benefits against patient burden. Meanwhile, current practice should focus on expanding interprofessional collaborations in an effort to develop consensus-based guidelines and shared knowledge about CTRCD. Before this can be achieved, a sense of urgency needs to be created in all involved professionals. Improving professionals'

knowledge of CTRCD and the possible benefits of interprofessional collaboration is vital in creating a foundation for change. The prevalence of cancer survivors is expected to rise by more than 31% by 2030<sup>60</sup>, therefore it is pivotal to optimize prevention and treatment of undesired side effects like CTRCD.

## **Conclusion**

The findings from this study provide an improved understanding of influential factors for cardiac surveillance described by professionals. The presence or lack of a sense of urgency to change current practice was the main influential factor for cardiac surveillance. A complex disease such as CTRCD calls for an interprofessional collaboration between all involved professionals, in order to improve shared knowledge and provide patients with the best of care, which should favorably be supported by an evidence-based guideline.

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**Table 1. Interview guide**

<b>Guideline factors</b>
<ul style="list-style-type: none"> <li>• Does the hospital you work in provide guidelines for cardiac surveillance of women undergoing breast cancer treatment?</li> <li><u>If yes:</u></li> <li>- What can you tell me about the accessibility and clarity of these guidelines?</li> <li><u>If no:</u></li> <li>- What is your understanding of current guidelines/recommendations existing in literature for women at risk of cardiac dysfunction due to breast cancer treatment?</li> <li>• What is your opinion about the feasibility of the guidelines in current practice?</li> </ul>
<b>Individual health professional factors</b>
<ul style="list-style-type: none"> <li>• Are you aware of the risk of cardiotoxicity in women with breast cancer under the current standard treatments?</li> <li>• Do you evaluate the cardiac function for your patients undergoing breast cancer treatment?</li> <li>- Why do you choose to do/not do this?</li> <li>• How often do you evaluate the cardiac function of women with breast cancer receiving treatment known to possibly be cardiotoxic?</li> <li>- Why do you choose this particular approach?</li> <li>• At what point would you choose to refer your patient to a cardiologist?</li> <li>• What should cardiac surveillance for women with breast cancer entail according to your opinion?</li> <li>- In your opinion, what is necessary to achieve this?</li> <li>• What are current processes that improve cardiac surveillance for this patient group?</li> <li>• What are current processes that undermine optimal cardiac surveillance for this patient group?</li> </ul>
<b>Patient factors</b>
<ul style="list-style-type: none"> <li>• What impact, in your experience, does cardiac dysfunction have on women who are undergoing or have undergone breast cancer treatment? (– physically, mentally, quality of life, social participation)</li> <li>• What do you think women with breast cancer who are at risk of developing cardiac dysfunction due to treatment need and expect in regard to cardiac surveillance?</li> <li>• How do patient needs influence your decision-making in regard to cardiac surveillance in current practice?</li> </ul>
<b>Professional interaction</b>
<ul style="list-style-type: none"> <li>• How would you describe the collaboration between oncology and cardiology in the care for women from cardiac damage due to breast cancer treatment?</li> <li>- What are facilitating factors of this collaboration?</li> <li>- What are barriers in this collaboration?</li> <li>• To what extent do influences of peers and managers facilitate or hinder you in performing cardiac surveillance for your patients?</li> </ul>
<b>Incentives and resources</b>
<ul style="list-style-type: none"> <li>• What could your organization do to help motivate you to change current cardiac surveillance for women with breast cancer?</li> <li>• Are there any environmental or resource factors that facilitate or hinder you in performing cardiac surveillance for women with breast cancer?</li> </ul>
<b>Capacity for organizational change</b>

<ul style="list-style-type: none"> <li>• How would you describe the capacity for organization change within your hospital?</li> <li>• How would you describe the capacity for organization change within your team?</li> </ul>
<b>Social, political and legal factors</b>
<ul style="list-style-type: none"> <li>• Can you think of any social, political and legal factors that would influence cardiac surveillance for women with breast cancer?</li> </ul>

**Table 2. Process of data analysis by thematic analysis<sup>32</sup>**

Step	Executed by
1. Familiarization with the data by transcribing, reading, re-reading and documenting initial ideas	LD, YK
2. Generating initial codes systematically from the dataset	LD, NVZ, YK
3. Searching for themes within the initial codes and clustering relevant data to the identified themes	LD, YK, HV
4. Reviewing and refining themes into a thematic map	LD, YK, HV
5. Defining and naming themes	LD, YK, HV
6. Producing the report, including the selection of illustrating quotes for the themes, relation to the research question and comparison to literature	LD, YK, HV

**Table 3. Descriptive statistics**

		n = (%)
Profession	Oncologist	6 (50)
	NP	5 (42)
	Epidemiologist	1 (8)
		mean (range)
Age (in years)		50,2 (36 - 62)
		n = (%)
Sex	Male	2 (17)
	Female	10 (83)
Highest level of education	Master's degree	7 (58)
	PhD	5 (42)
Work experience (in years)	1-5	2 (17)
	6-10	5 (41,5)
	>10	5 (41,5)
Work setting	General hospital	5 (42)
	University hospital	4 (33)
	Teaching hospital	3 (25)

Abbreviations: NP = nurse practitioner; Sd = standard deviation; PhD = philosophiae doctor.

**Appendix A: Coding tree**

