Protocol

Implications of Agile Values in Software Engineering for Agility in Breast Cancer Treatment: Protocol for a Comparative Study

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Abstract

Background: Breast cancer treatment has been described as a dynamic and patient-centered approach that emphasizes adaptability and flexibility throughout the treatment process. Breast cancer is complex, with varying subtypes and stages, making it important to tailor treatment plans to each patient's unique circumstances. Breast cancer treatment delivery relies on a multidisciplinary team of health care professionals who collaborate to provide personalized care and quick adaptation to changing conditions to optimize outcomes while minimizing side effects and maintaining the patient's quality of life. However, agility in breast cancer treatment has not been defined according to common agile values and described in language comprehensible to breast cancer professionals. In the rapidly evolving landscape of breast cancer treatment, the incorporation of agile values from software engineering promises to enhance patient care.

Objective: Our objective is to propose agile values for breast cancer treatment adopted and adapted from software engineering. We also aim to validate how these values conform to the concept of agility in the breast cancer context through referencing past work.

Methods: We applied a structured research methodology to identify and validate 4 agile values for breast cancer treatment. In the elicitation phase, through 2 interviews, we identified 4 agile values and described them in language that resonates with breast cancer treatment professionals. The values were then validated by a domain expert and discussed in the context of supporting work from the literature. Final validation entailed a domain expert conducting a walkthrough of the 4 identified agile values to adjust them as per the reported literature.

Results: Four agile values were identified for breast cancer treatment, and among them, we validated 3 that conformed to the concept of agility. The fourth value, documentation and the quality of documentation, is vital for breast cancer treatment planning and management. This does not conform to agility. However, its nonagility is vital for the agility of the other values. None of the identified agile values were validated as partially conforming to the concept of agility.

Conclusions: This work makes a novel contribution to knowledge in identifying the first set of agile values in breast cancer treatment through multidisciplinary research. Three of these values were evaluated as conforming to the concept of agility, and although 1 value did not meet the concept of agility, it enhanced the agility of the other values. It is anticipated that these 4 agile values can drive oncology practice, strategies, policies, protocols, and procedures to enhance delivery of care. Moreover, the identified values contribute to identifying quality assurance and control practices to assess the concept of agility in oncology practice and breast cancer treatment and adjust corresponding actions. We conclude that breast cancer treatment agile values are not limited to 4.

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KEYWORDS

agile breast cancer treatment; breast cancer; breast cancer treatment; agile; software engineering; agile software engineering; oncology; agile values; multidisciplinary research; agility in health care; agile oncology practice

Introduction

Background

Breast cancer is the most frequent cancer diagnosis and the main cause of cancer mortality in women globally [1]. Through the 2 past decades, traditional breast cancer treatment (BCT) has been the standard of care and has led to significant improvements in patient outcomes [2]. However, the lack of consideration of the unique characteristics of each patient's cancer can lead to ineffective and nontargeted therapy with adverse and toxic side effects, reduced quality of life, and, in some cases, a resulting delay in detecting progression [2-4]. Thus, today, BCT is shifting toward more personalized approaches that enhance the patient experience while considering their diverse characteristics and evolving conditions [3,5-7].

Different treatment strategies may be required for each subtype of breast cancer, and genetic variation within tumors may complicate aspects of treatment. Developing tailored medicines that target certain genetic alterations or molecular subtypes is one of the main challenges in BCT [8]. Treatment planning has become more difficult as a result of the increased emphasis on personalized medicine, which calls for adjusting plans depending on a patient's genetic profile [8]. Optimizing therapeutic results and reducing the risk of treatment resistance require customizing therapies to fit the genetic features of each patient's tumor [9]. A patient's values and preferences must be taken into account in addition to clinical factors while deciding on the best course of action [10].

Further complication arises from managing treatment side effects and maintaining a patient's quality of life, particularly with regard to the level of depression both before and after treatment, as highlighted in the work of Salibasic and Delibegovic [11] and Breidenbach et al [12]. It can be difficult to strike a balance between a treatment's effectiveness and possible effects on the patient's well-being. Additionally, there are obstacles associated with the timing and order of various treatment modalities, including radiation therapy, hormone therapy, immunotherapy, chemotherapy, and surgery. A multidisciplinary approach to care is necessary to determine the most effective sequence and combination of therapies, which necessitates a comprehensive evaluation of the tumor characteristics, patient's overall health, and adverse side effects [13].

In the literature, all these reported treatment challenges, efforts, and strategies lack consideration and identification of their respective agility values. According to the *Oxford Dictionary*, the word *agility* means "the ability to move quickly and easily" [14]. *Value* means "the quality of being useful or important" or "beliefs about what is right and wrong and what is important in life" as a meaning related to *principle* or *standard* [15]. Thus, to improve BCT approaches and strategies and to overcome these challenges, it should be assessed whether they meet agility values and to what extent. This calls for identifying standards for the ability to move quickly, easily, and effectively in this complex disease, that is, defining *agility values* for BCT. Although the literature emphasizes addressing some agility values, such as patient-centric processes, personalization, and a multidisciplinary approach to decision-making and treatment plan design, there is still no validated definition of agility values for BCT. The complexity of BCT, shaped by factors ranging from tumor characteristics to patient preferences, highlights the need to identify common agile values to help in overcoming the above challenges. By identifying and promoting these values, health care organizations can create an agile culture of interactions, continuous learning, and improvement.

Multidisciplinary research has inspired individuals and communities, offered knowledge returns to individuals, and improved environment outcomes. In order to improve BCT and research, the different domains of software engineering and BCT may complement each other in a number of ways. Recent software development projects are adopting the agile approach to produce high-quality, useful software, in contrast to the traditional approach, which has limited flexibility, low user involvement, a long and delayed time-to-market cycle, late detection of errors, and high cost [16,17]

The concept of agility has been successfully described in the software engineering field over decades [17]. In software engineering, agility is a mindset, and its 4 values are not solid rules to follow [18]. In this context, it is possible to use the 4 agile values of software engineering for providing a shared framework for BCT teams to work together effectively and deliver value to their stakeholders while adapting to changing circumstances in complex environments and improving collaboration for better decision-making through a human-centric approach. Agile values emphasize the importance of individuals and interactions. This human-centered approach helps in building collaborative and motivated teams. The 4 agile values in software engineering are "individuals and interactions over processes and tools," "working software over comprehensive documentation," "customer collaboration over contract negotiation," and "responding to change over following a plan" [18]. The agile approach has enhanced value delivery to customers when user-centered experience and design are considered in the work of agile teams [19-21]. The agile approach has been used in the health care sector to translate the delivery of care from traditional methods into personalized ones, making care patient-centric, involving the patient in decision-making, enhancing continuous improvement and learning, and encouraging collaboration [22-26].

The creators of the agile values and principles have placed collaboration and people front and center, as the success or failure of a software project is highly dependent on them and not on the processes, tools, or the technology invested in it. Similarly, in the BCT process, the patient can be placed at the center of care by developing a personalized treatment plan considering the patient's preferences, values, and circumstances

and engaging their families to develop accurate and well-conceived plans [18].

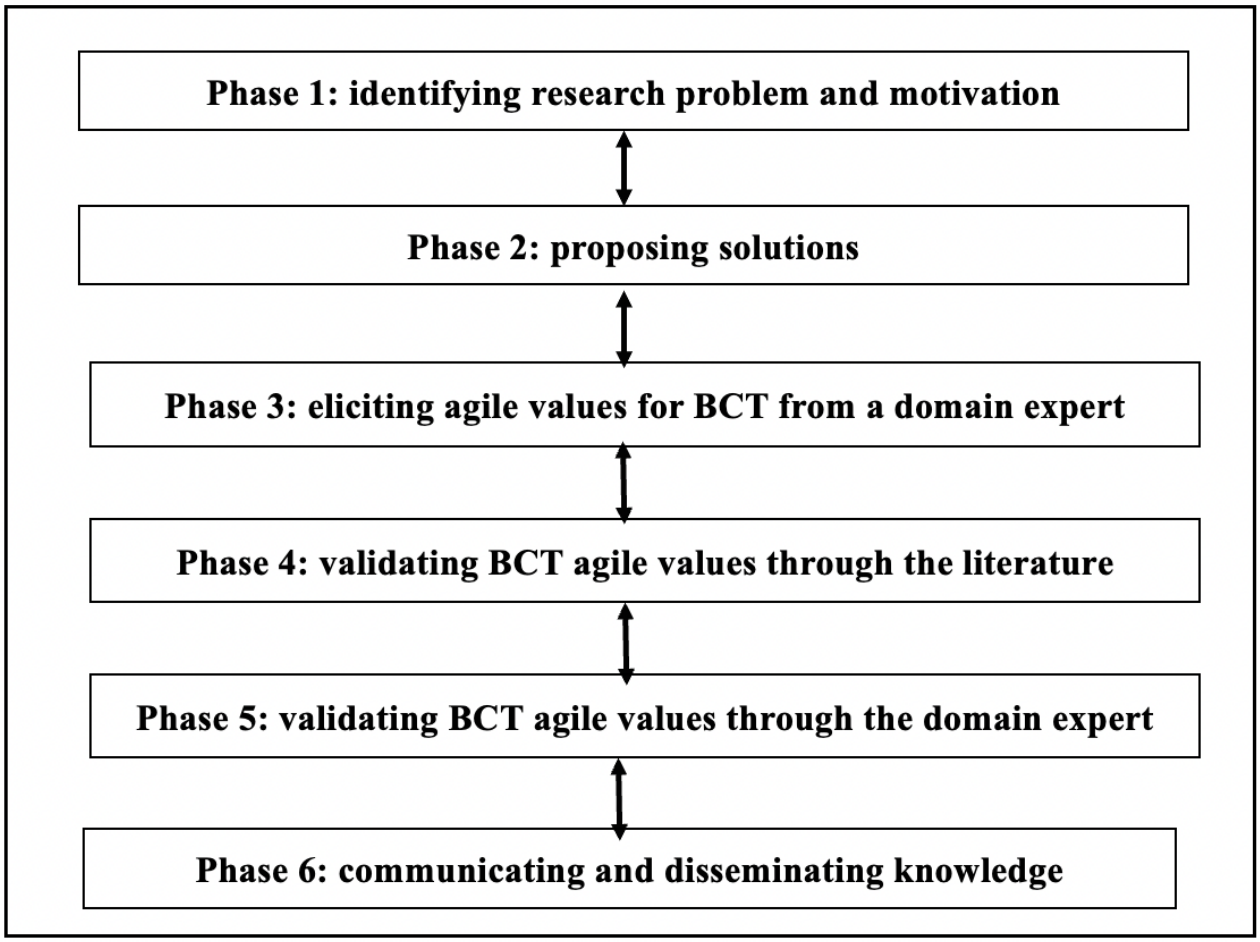
Aim of the Study

In this paper, we aim at identifying agility values in BCT to drive the BCT journey and ensure that patients receive appropriate and responsive care that considers their unique needs and preferences, ultimately leading to improving the effectiveness and efficiency of BCT strategies and approaches. The 4 identified agile values are adopted and adapted for BCT from the software engineering field. Also, we aim to investigate and validate how these values conform to the concept of agility in the breast cancer context through work reported in the literature. This should allow us to assess how they conform to the concept of agility in comparison with agile values in the field of software engineering. The reason behind adopting and adapting agility values from software engineering is that this discipline was founded to engineer effective solutions for complex problems while considering different aspects of continuous change. According to a domain expert, this is a noted similarity to the BCT discipline.

Methods

Here, the applied research methodology has 6 overlapping phases (Figure 1). This encourages researchers to actively engage with the problem-solving process, resulting in outcomes that align with the identified and validated agile values for BCT; this is anticipated to have a direct impact on BCT, health care, and society. As the methodology is described as a problem-solving process, it starts by identifying the research problem and the associated motivation. This leads to identifying the desired solution, which allows identifying the corresponding BCT agile values. Then, an elicitation phase is conducted to elicit the agile values for BCT from the domain expert after reviewing and amending the software engineering agile values into language that is reasonable for BCT professionals. In the fourth phase, we review the literature to provide references with the aim of validating these values. In the fifth phase, the domain expert conducts a walkthrough of the 4 BCT agile values as a final validation before communicating them to the research community in phase 6.

Figure 1. Research methodology.



Phase 1: Identifying Research Problem and Motivation

According to a literature review, there is a gap in promoting the agility of BCT with respect to well-identified values, although the literature reports huge efforts in patient-centered and personalized BCT. It is essential for patients to have open, transparent, and personalized communication with their care team professionals and health providers about their treatment approach and whether it is agile or not. Patients are empowered when they are aware of how BCT is delivered, particularly if agile mindsets are leading the journey. This encourages them to take an active role in making decisions about their care, ask

pertinent questions, and advocate for the appropriate treatment options that meet their individual needs and circumstances. Having initial BCT agile values would pave the way to more flexible and personalized protocols, polices, and procedures to move closer to deliver patient-centric care. This also motivates policymakers to specify quality assurance processes that measure and indicate the extent of compliance to agility. Overall, this motivates health care providers to improve their care outcomes and increases patient satisfaction.

Phase 2: Proposing Solutions

To our knowledge, there is a lack of a validated definition of agile values for BCT, although BCT professionals strive to adhere to agility, as reported in the literature. The authors seek to propose and identify BCT agile values that are adopted and adapted from the software engineering field.

Phase 3: Eliciting Agile Values for BCT From a Domain Expert

The 4 agile values of software engineering were reviewed and rearticulated into language that is tailored to BCT professionals through 2 interview elicitation sessions conducted with a BC oncologist. The outcome here was the 4 identified BCT agile values, which are discussed below in phase 4 through work referenced from the literature. The outcomes of this phase are the following:

- Value 1: Individuals and interactions over processes and tools
- Value 2: Documentation and quality of documentation is as high priority as delivering an appropriate patient-centered treatment plan
- Value 3: Patient collaboration over treatment plan design agreement
- Value 4: Responding to change over following a plan

Phase 4: Validating Breast Cancer Treatment Agile Values Through the Literature

In this phase, we aim to reference work from literature that supports the articulation of the BCT agile values, as defined in phase 3. Below, each of the 4 BCT agile values is supported with work reported in the literature to enhance the validation.

Value 1: Individuals and Interactions Over Processes and Tools

In software engineering, this agile value highlights the fact that people and the communication behind developed processes and tools for achieving software development success are more important than these processes and tools themselves. Even if the team has the best, most appropriate tools, having the right people along with effective communication is still of greater importance. Regarding language for BCT professionals, this value is maintained as it is, without changing any of its wording [18,20].

In the BCT context, “working together is much more than policies, strategies, structures and processes” [27]. This can be seen in the shared decision-making (SDM) process for BCT, where the patient and everyone else is involved in delivering valuable information and reducing any mismatch between information that is delivered and the information that is needed in the complex treatment process [28]. When a patient is involved in SDM, it permits consideration of the patient’s preferences in the treatment, increasing their satisfaction and transforming the treatment process into a patient-centered one [29]. Improving patients’ engagement skills, using elicitation, performing clarification exercises for their preferences, and using formal and informal coaching are recommended to increase patients’ engagement in SDM in the BCT lifecycle. However, lack of time and resources are the biggest barriers mentioned regarding SDM [29]. This would prioritize individuals and their interactions over the tools [26,28,29]. Patient-centered communication and education, as well as coordination of care, are vital components for achieving the triple aims defined by the Institute for Healthcare Improvement that aim to improve the care experience for patient and family, improve the population’s overall health, and reduce health care capital costs [30]. According to research findings, the effectiveness of communication changes depending on the stage of the disease, and, for it to be effective, it must be adapted to the changing requirements and preferences of breast cancer patients [31,32]. Even after cancer treatment, regardless of the channel used, communications and interactions are still necessary. For example, a storytelling support group was run over the internet to break the social isolation that follows cancer [33,34].

In cancer care, the multidisciplinary team is a core central point of communication and collaboration. The National Health Service in the United Kingdom defines the multidisciplinary team (MDT) as “a group of health and care staff who are members of different organizations and professions (e.g. GPs, social workers, nurses, anesthesiologist, radiologist, pathologist, etc.,) that work together to make treatment and related services decisions of individual patients. MDTs are used in both health and care settings” [35]. In BCT planning, individuals in the MDT and their interventions can optimize care planning. For example, a nurse can stimulate interdisciplinary strategic planning that satisfies the clinical setting and improves outcomes through playing a key role in assessing the patient’s holistic needs [36]. A breast radiologist plays a vital role in the assessment and management of pain while leveraging patient communication and education, can add significant value to the care delivery process and patient care, and can improve outcomes [37]. Breast cancer patients who participated in a well-organized MDT contributed to facilitating a clear definition of their needs related to diagnosis, treatment, surveillance, and monitoring. This significantly enhanced breast cancer care planning, clarifying SDM in terms of booking appointments, referring procedures, and allocating respective roles and their responsibilities for patient care [38-40]. As a result, this MDT communication approach with the patient enhances survival rates and improves quality of life [40-44]. Although the research community reports that the MDT and patient interaction are prioritized over processes, some barriers may still hinder the effectiveness of these interactions; these are reported to include absence of leadership, individual personalities, cultural and belief systems, the need for regular clinical meetings, health care workers with double positions, availability of the workforce, specific goals of care, implementation in national

health insurance, hospital bureaucracy, issues with hospital infrastructure, patients themselves, and high turnover [44-46]. In the BCT context, collaborative decision-making constitutes far more than relying on factual information, as patient communication may generate a decision that contradicts the evidence; the evidence may suggest a different plan. This highlights the reality that communication between the MDT and patient allows for the consideration of all factors [47].

Effective tools and processes, such as value-based breast cancer care, cannot be effectively addressed without interactions [48]. This does not neglect the role of tools and processes in the BCT context. Tools and processes should be used to improve the provision of patient-centered BCT planning and interactions [18]. The National Coalition for Cancer Survivorship (NCCS) provides the Cancer Survival Toolbox, a tool that aids cancer patients to learn how to communicate, obtain information, make decisions, negotiate, and speak up for their patient rights as they manage their cancer treatment [49].

When a person is diagnosed with breast cancer, it not only affects the individual but also has a significant impact on their family members. According to some studies, it is viable and beneficial to shift care delivery toward person- and family-centered care to clarify and address patient preferences, legitimize care-partner contributions, and grant appropriate access to information for family members and other care partners who are key players in enacting high-quality cancer care [50]. Research indicates that involving family members as care partners in communication intervention at the point of care increases patient understanding of illness, patient access to and use of the patient portal, and viewing of clinician visit notes among patients with more actively engaged care partners [50].

In conclusion, the agility of this BCT value fully conforms to the corresponding software engineering value. This leads us to classify this BCT value as achieving agility.

Value 2: Documentation and Quality of Documentation is as High Priority as Delivering an Appropriate Patient-Centered Treatment Plan

This software engineering agile value places "working software over comprehensive documentation." This indicates that it is a higher priority to rapidly deliver functioning software than to spend great attention and effort on documentation tasks [18]. This does not neglect the importance of documentation. The aim is to improve future software releases through obtaining feedback quickly [18]. This value is translated into BCT language as follows: "Documentation and quality of documentation is as high priority as delivering an appropriate patient-centered treatment plan."

Documentation is vital for medical records and legal purposes in parallel to the patient's health and immediate needs. Patient-centered treatment planning's main objective is to involve patients and their families in meaningful and in-depth conversations with their medical professionals to develop an accurate, well-thought-out treatment plan that appropriately uses all available medical information while also taking the medical, social, and cultural needs and preferences of the patient and family into account [26]. The treatment plan is designed, developed, communicated, and executed based on the patient's individual characteristics, preferences, and responses to treatment in collaboration with an MDT that includes members with different specialties, thus ensuring that their best interests are considered and the best benefits are delivered. Therefore, all this necessary information should be documented as required by the MDT [26].

The documentation of a breast cancer patient may require up to 20 distinct professional groups. Across these different professions, most of this paperwork is normally completed by resident doctors [51]. Across different medical specialties, most of the documentation is carried out by gynecologists or gynecological staff. Most of the time dedicated to paperwork is required for therapy [51]. All this necessary information from different resources is required to be documented for organization, doctor-patient communication, quality assurance and management, managing future changes (as changes are inevitable during BCT), and, mostly, for diagnostic needs and follow-up after each therapy [51].

In a study carried out by the American Society of Clinical Oncology (ASCO), a treatment plan and summary template increased communication between patients and their health care providers among almost 90% of assessed patients and health care professionals [52]. This highlights the importance of documentation for communication and demonstrates not only the need to prioritize documentation but also the need to prioritize documentation quality requirements [51].

Thus, the agility of this BCT value does not conform with the corresponding agile value in software engineering.

Value 3: Patient Collaboration Over Treatment Plan Design Agreement

In software engineering, this agile value places "customer collaboration over contract negotiation." It highlights that contracts do not clearly detail customer needs; rather, customers themselves do. Thus, continuous feedback loops are a priority in this agile value to ensure that the developed product is effective and useful as per the customer's needs. This indicates that agile development is customer-centric. However, this does not neglect the role of contracts. This value can be translated into BCT language as follows: "patient collaboration over treatment plan design agreement."

BCT professionals interpret patients' collaboration based on continuous feedback from them. This is observed in patient collaboration and in visits that begin early in the BCT process and should happen frequently. This close collaboration culture with patients has been reported to lead to significant benefits for them, particularly when they are unable to make decisions [44]. Close collaboration helps oncologists and their teams ensure they are delivering an effective, useful treatment solution to patients. When they talk to patients and their families, they build feedback into the treatment cycle and reduce risks [28,29,41].

Encouraging patient collaboration can be achieved through providing them the care and information they need according to their stage of breast cancer, as each stage varies in the aspects of information and associated delivery of care [31,32]. What

was effective at one stage may not produce similar effectiveness in another stage. Therefore, it is highly recommended to look for communication alternatives that meet needs and preferences at each stage [53]. Sharing a treatment plan and summary template enhances patients' and their families' collaboration [52].

In conclusion, this leads us to classify this BCT value as achieving agility.

Value 4: Responding to Change Over Following a Plan

The world is not static. Therefore, a workable plan should never be static. This software engineering agile value highlights that changes in software development happen due to changes in the market, customer preferences, priorities, project management conditions, and business needs [18]. Thus, the agile mindset encourages reviewing and readjusting the plan based on new, emerging information. Regarding the BCT context, this value can be maintained as it is without changing any of its wording.

Changes in a BCT plan are inevitable and can occur for several reasons. Changes involve but are not limited to diagnosis results, follow-up assessments, surgical outcomes, health conditions, tumor characteristics, treatment response, side effects and tolerance, structural changes, resources, policies, disease recurrence, drug resistance, monitoring assessments, new research, and others. All these alert us to the need for a personalized response to the changes as a priority over following a static plan. For example, changing the sequence of treatment, in terms of radiotherapy and surgery, could improve outcomes and reduce side effects in terms of treatment complications and address safety and technical feasibility [54]. Lifestyle changes that involve exercise, diet, smoking, and alcohol have empowered patients psychologically and reduced the risk of recurrence and death [55-57].

Breast cancer is a complex disease in which not all patients can benefit from the same treatment. Thus, it is essential to go beyond conventional BCTs [58]. Changes in BCT may require developing a novel treatment that could be described as personalized [58]. Changes to the treatment plan could happen if the aim has changed. Aims could include preventing cancer recurrence, slowing growth of cancer, and managing symptoms of incurable cancer [59]. Accordingly, changes entail allocating roles that are put into place to address the aim of BCT and provide referral to clinical trials that are regulated to effectively address the desired treatment aim with minimum side effects [60]. Furthermore, a change may require halting the treatment to recover from adverse side effects [60].

Managing BCT entails evaluating the patient's response to treatment from the perspectives of surgery, imaging, and medical oncology. Adjuvant treatment is guided by an appropriate surgical and pathological assessment and follow-up care that concentrates on identifying recurring illness with the goal of enhancing long-term survival [61]. Whatever the change that requires a response, the BCT team will strive to improve the patient's quality of life.

Magnetic resonance imaging (MRI) is used to accurately identify stages of breast cancer by assessing the size and extent of the tumor within the breast and evaluating if it has spread to nearby lymph nodes or other structures [62]. This information is essential in determining an appropriate treatment approach that is ready to respond to changes. A major change in the treatment plan may involve the need for surgery and additional treatment [62-64].

In BCT, personalized treatment is a means of responding to a change and delivering patient-centric medicine. Knowing the molecular characteristics of breast cancer subtypes is necessary to create a tailored therapy and diagnosis [65]. It is necessary to establish molecular profiles and metrics for tailoring the appropriate treatment and evaluating its benefits and risks. Dose ratios and regimens are likely to change according to an identified combination therapy [66]. BCT decisions are based not only on the assessment of prognostic factors but also on the assessment of pathological and clinical findings. A multitopic-based integrated data approach to address many breast cancer risk variables can bring tremendous insight and promises to change treatment for the better [67].

In conclusion, this BCT agile value shows how change is necessary for the benefit of the patient.

Phase 5: Validating Breast Cancer Treatment Agile Values Through the Domain Expert

In this phase, the domain expert conducted a walkthrough of the output generated from the previous phase as a form of final validation. This was to ensure that the BCT agile values identified in phase 3 are consistent with the respective reported literature as shown in phase 4.

Phase 6: Communicating and Disseminating Knowledge

The research knowledge obtained from this paper is disseminated in this open access journal to increase its availability and accessibility to the scientific community, policymakers, practitioners, and the public. In addition, the article is published to enhance collaboration between multidisciplinary fields for better BCT strategies. The authors also aim to deliver a public seminar about the ideas delivered in this article to increase community awareness of promoting agility in BCT for better care values, strategies, and delivery.

Ethical Considerations

No ethical considerations are required for this study, as it does not involve human subjects. The statements for human subject research ethics review, exemptions, and approvals, as well as descriptions of informed consent (for the institutional review board), privacy and confidentiality protection, and compensation type and amount are not applicable. The study does not include any clinical setting for recruitment, not even recruitment procedures.

Results

In this study, we have identified BCT agility values and showed how they conform to the concept of agility in the field of software engineering. Our validation was conducted through a comprehensive review of the existing literature and interviews

with a breast cancer oncologist. This work has resulted in 4 BCT agility values, which are specified below:

1. Individuals and interactions over processes and tools (conforms)
2. Documentation and quality of documentation is as high priority as delivering an appropriate patient-centered treatment plan (does not conform)
3. Patient collaboration over treatment plan design agreement (conforms)
4. Responding to change over following a plan (conforms)

In summary, our analysis indicates that BCT has made significant strides in aligning with the concept of agility through the identification of the 4 values that were reconfigured from the software engineering field. These values focus on how individuals interact, collaborate, and welcome changes. However, the quality of documentation is as high priority as delivering a patient-centered treatment plan. These values have been integrated into various aspects of breast cancer care, from treatment planning and delivery to ongoing support and survivorship care. However, there is still room for improvement, and ongoing efforts to enhance these values in BCT will continue to benefit patients, families, BCT professionals, and health care providers.

Discussion

The work has delivered a novel contribution to knowledge in identifying the first set of agile values in the BCT context adopted from the software engineering field. We conclude that only 3 of the 4 identified agile values in BCT conform, in terms of agility, with the 4 agile values in software engineering. The 3 BCT agility values are "individuals and interactions over processes and tools," "patient collaboration over treatment plan design agreement," and "responding to change over following a plan." However, the second BCT agile value did not conform to agility, as it is vital that documentation not only be comprehensive but also have high quality and have high priority for delivering an appropriate patient-centered plan. None of the agile values were recorded as partially conforming to agility; this addresses the aim of this paper to identify BCT agile values and compare their conformance to agile values in the software engineering field.

In the first BCT agility value, the priority of collaboration has emerged as a fundamental aspect of BCT that is interpreted in the SDM and MDT approaches. MDTs consisting of oncologists, radiologists, surgeons, nurses, and other health care professionals work closely together to ensure comprehensive patient care. Furthermore, the involvement of patients in SDM has promoted collaboration between health care providers, patients, and those managing the treatment. Collaboration and ongoing interactions appear early in the BCT lifecycle and continue even after survival, emphasizing the significance of these interactions and implying that quality of life requirements are increasing and leading to more patient-centric processes. For the second BCT agility value, the design of BCT plans respects the personalized characteristics of each patient. All kinds of collaborations and interactions between the patient and the MDT to discuss and design an effective and safe BCT plan should be based on high-quality documentation. Therefore, it is a priority to allocate enough time to facilitate documentation work to attain agility in the remaining values. In the third agile value, patient collaboration is a higher priority than following a rigid treatment plan; this leads to better treatment decisions via continuous feedback throughout the BCT lifecycle. Regarding the fourth agile value, effective and safe changes are always welcomed to interrupt a BCT plan for the patient's benefit, with or without minimizing impacts on quality of life, thereby leading to closer, patient-centric, and better treatment outcomes, as well as minimized side effects.

Attempts to address BCT agile values are limited and constrained by cultural mindsets, the availability of resources for implementation, the availability of quality standards that support agility, and interoperability of health care systems. Patients' efficient participation is constrained by the quality of their education and their health literacy in terms of understanding risks, benefits, overall quality of life, and adherence to their treatment plans and medication regimens.

The authors do not claim that these are the only BCT agile values, as they are not limited to 4. Instead, the values proposed here constitute the first version of a BCT agile values manifesto. The implication of having BCT agile values shared among administration and BCT professionals is broader than the specific interpretation behind each identified BCT agile value. The identified agile values focus on effective and efficient collaboration between the patient and MDT in SDM, with consideration to continuous response to change, which will contribute to increasing the patient's activity level and forming a more personalized BCT process that drives patient-centric therapy decisions. Moreover, this contributes to eliminating waste, in other words, unneeded activities or tasks that may involve tests, procedures, and treatments. Hence, this contributes to more cost-effective, time-saving, and efficient care. Rather than just following strict protocols, BCT agile values increase the flexibility of these protocols, allowing for more personalized care with respect to patients' characteristics, preferences, and needs. The identified BCT agile values highlight the necessity of specifying quality assurance processes that aim at investigating the extent to which they conform to the concept of BCT agility. Health care systems are anticipated to become more flexible, patient-focused, and efficient by adopting agile values in BCT and care. This will eventually enhance patient outcomes and experiences and promote a change from inflexible, one-size-fits-all methods of care to ones that are tailored to the specific requirements of each patient and the rapidly advancing fields of medicine and technology. Finally, this holds the potential to revolutionize the way we approach oncological care. This endeavor reflects a commitment to embracing innovation, collaboration, and patient-centeredness, mirroring the very essence of the agile philosophy.

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Data Availability

Data sharing is not applicable to this article as no data sets were generated or analyzed during this study.

Authors' Contributions

The first author (YO) contributed to research conceptualization, methodology, formal analysis, investigation, resources, data curation, writing—original draft preparation, writing—review and editing, visualization, and supervision. The second author (MAB) contributed to research validation, investigation, resources, data curation, and writing—review and editing.

Conflicts of Interest

None declared.

References

1. Breast cancer. World Health Organization. 2023. URL: https://www.who.int/news-room/fact-sheets/detail/breast-cancer [accessed 2023-07-23]
2. Wang J, Xu B. Targeted therapeutic options and future perspectives for HER2-positive breast cancer. Signal Transduct Target Ther. 2019;4(1):34 [FREE Full text] [doi: 10.1038/s41392-019-0069-2] [Medline: 31637013]
3. Sarhangi N, Hajjari S, Heydari SF, Ganjizadeh M, Rouhollah F, Hasanzad M. Breast cancer in the era of precision medicine. Mol Biol Rep. 2022 Oct;49(10):10023-10037 [doi: 10.1007/s11033-022-07571-2] [Medline: 35733061]
4. Komatsu H, Yagasaki K, Komatsu Y, Yamauchi H, Yamauchi T, Shimokawa T, et al. Falls and functional impairments in breast cancer patients with chemotherapy-induced peripheral neuropathy. Asia Pac J Oncol Nurs. 2019;6(3):253-260 [FREE Full text] [doi: 10.4103/apjon.apjon_7_19] [Medline: 31259221]
5. Gambardella V, Tarazona N, Cejalvo JM, Lombardi P, Huerta M, Roselló S, et al. Personalized medicine: recent progress in cancer therapy. Cancers (Basel). 2020 Apr 19;12(4):1009 [FREE Full text] [doi: 10.3390/cancers12041009] [Medline: 32325878]
6. Khoury T. The evolving approach to breast cancer: moving toward de-escalating treatment and personalized medicine. Cancers (Basel). 2023 Jul 05;15(13):3502 [FREE Full text] [doi: 10.3390/cancers15133502] [Medline: 37444611]
7. Güler EN. Gene expression profiling in breast cancer and its effect on therapy selection in early-stage breast cancer. Eur J Breast Health. 2017 Oct;13(4):168-174 [FREE Full text] [doi: 10.5152/ejbh.2017.3636] [Medline: 29082373]
8. Rodrigues R, Duarte D, Vale N. Drug repurposing in cancer therapy: influence of patient's genetic background in breast cancer treatment. Int J Mol Sci. 2022 Apr 14;23(8):4280 [FREE Full text] [doi: 10.3390/ijms23084280] [Medline: 35457144]
9. Andre F, Filleron T, Kamal M, Mosele F, Arnedos M, Dalenc F, et al. Genomics to select treatment for patients with metastatic breast cancer. Nature. 2022 Oct;610(7931):343-348 [doi: 10.1038/s41586-022-05068-3] [Medline: 36071165]
10. Seghers P, Wiersma A, Festen S, Stegmann ME, Soubeyran P, Rostoft S, et al. Patient preferences for treatment outcomes in oncology with a focus on the older patient-a systematic review. Cancers (Basel). 2022 Feb 23;14(5):1147 [FREE Full text] [doi: 10.3390/cancers14051147] [Medline: 35267455]
11. Salibasic M, Delibegovic S. The quality of life and degree of depression of patients suffering from breast cancer. Med Arch. 2018 Jun;72(3):202-205 [FREE Full text] [doi: 10.5455/medarh.2018.72.202-205] [Medline: 30061767]
12. Breidenbach C, Heidkamp P, Hiltrop K, Pfaff H, Enders A, Ernstmann N, et al. Prevalence and determinants of anxiety and depression in long-term breast cancer survivors. BMC Psychiatry. 2022 Feb 09;22(1):101 [FREE Full text] [doi: 10.1186/s12888-022-03735-3] [Medline: 35139815]
13. Cutolo C, Dell'Aversana F, Fusco R, Grazzini G, Chiti G, Simonetti I, et al. Combined hepatocellular-cholangiocarcinoma: what the multidisciplinary team should know. Diagnostics (Basel). 2022 Apr 02;12(4):890 [FREE Full text] [doi: 10.3390/diagnostics12040890] [Medline: 35453938]
14. Definition of agile. Oxford Dictionary. URL: https://www.oxfordlearnersdictionaries.com/definition/english/agile?q=agile [accessed 2023-10-23]
15. Definition of value. Oxford Dictionary. URL: https://www.oxfordlearnersdictionaries.com/definition/english/value_1?q=value [accessed 2023-10-23]
16. Sommerville I. Software Engineering, 10th edition. London, UK. Pearson; 2017.
17. Tokdemir G, Uğuz S. Research trends in agile software development. 2022 Presented at: International Conference on Emerging Trends in Computing and Engineering Applications (ETCEA); November 23-24, 2022; Karak, Jordan [doi: 10.1109/etcea57049.2022.10009873]
18. Beck K, Beedle M, van BA, Cockburn A, Cunningham W, Fowler M, et al. Agile manifesto. Agile Alliance. URL: https://www.agilealliance.org/agile101/the-agile-manifesto/ [accessed 2023-07-19]

19. Highsmith J, Cockburn A. Agile software development: the business of innovation. Computer. 2001 Sep;34(9):120-127 [doi: 10.1109/2.947100]
20. The agile manifesto: where it came from and where it may go. Martin Fowler. 2002. URL: https://martinfowler.com/articles/agileStory.html [accessed 2023-07-15]
21. Zaina LA, Sharp H, Barroca L. UX information in the daily work of an agile team: A distributed cognition analysis. Int J Hum Comput Stud. 2021 Mar;147:102574 [doi: 10.1016/j.ijhcs.2020.102574]
22. Sindhwani R, Singh P, Prajapati K, Iqbal A, Phanden RK, Malhotra V. Agile system in health care: literature review. In: Shanker K, Shankar R, Sindhwani R, editors. Advances in Industrial and Production Engineering. Lecture Notes in Mechanical Engineering. Singapore. Springer; 2019.
23. Kokol P, Blažun Vošner H, Kokol M, Završnik J. Role of agile in digital public health transformation. Front Public Health. 2022;10:899874 [doi: 10.3389/fpubh.2022.899874] [Medline: 35646754]
24. Ivanova D, Kadurin V. A new proposed software development methodology for healthcare industry. 2020 Presented at: 46th International Conference Applications of Mathematics in Engineering and Economics; June 7-13, 2020; Sofia, Bulgaria [doi: 10.1063/5.0042261]
25. Goodison R, Borycki E, Kushniruk AW. Use of agile project methodology in health care IT implementations: a scoping review. Stud Health Technol Inform. 2019;257:140-145 [FREE Full text] [doi: 10.3233/978-1-61499-951-5-140] [Medline: 30741186]
26. Balogh E, Ganz P, Murphy S, Nass S, Ferrell B, Stovall E. Patient-centered cancer treatment planning: improving the quality of oncology care. Summary of an institute of medicine workshop. Oncologist. 2011;16(12):1800-1805 [FREE Full text] [doi: 10.1634/theoncologist.2011-0252] [Medline: 22128118]
27. Schot E, Tummers L, Noordegraaf M. Working on working together. A systematic review on how healthcare professionals contribute to interprofessional collaboration. J Interprof Care. 2020;34(3):332-342 [FREE Full text] [doi: 10.1080/13561820.2019.1636007] [Medline: 31329469]
28. Katz SJ, Belkora J, Elwyn G. Shared decision making for treatment of cancer: challenges and opportunities. J Oncol Pract. 2014 May;10(3):206-208 [FREE Full text] [doi: 10.1200/JOP.2014.001434] [Medline: 24839284]
29. Maes-Carballo M, Martín-Díaz M, Mignini L, Khan KS, Trigueros R, Bueno-Cavanillas A. Evaluation of the use of shared decision making in breast cancer: international survey. Int J Environ Res Public Health. 2021 Feb 22;18(4):2128 [FREE Full text] [doi: 10.3390/ijerph18042128] [Medline: 33671649]
30. The IHI triple aim. Institute for Healthcare Improvement (IHI). 2012. URL: https://www.ihi.org/engage/initiatives/tripleaim/Pages/default.aspx [accessed 2023-06-06]
31. Shim E, Park JE, Yi M, Jung D, Lee K, Hahm B. Tailoring communications to the evolving needs of patients throughout the cancer care trajectory: a qualitative exploration with breast cancer patients. BMC Womens Health. 2016 Oct 18;16(1):65 [FREE Full text] [doi: 10.1186/s12905-016-0347-x] [Medline: 27756287]
32. Wuensch P, Hahne A, Haidinger R, Meißler K, Tenter B, Stoll C, et al. Discontinuation and non-adherence to endocrine therapy in breast cancer patients: is lack of communication the decisive factor? J Cancer Res Clin Oncol. 2015 Jan;141(1):55-60 [doi: 10.1007/s00432-014-1779-z] [Medline: 25085010]
33. Høybye MT, Johansen C, Tjørnhøj-Thomsen T. Online interaction. Effects of storytelling in an internet breast cancer support group. Psychooncology. 2005 Mar;14(3):211-220 [doi: 10.1002/pon.837] [Medline: 15386774]
34. Orgad S. Storytelling Online: Talking Breast Cancer on the Internet. New York, NY. Peter Lang Publishing; 2005.
35. Information sharing in multidisciplinary teams (MDTs). National Health Service. URL: https://transform.england.nhs.uk/information-governance/guidance/information-governance-guidance-support-multidisciplinary-teams-mdts/ [accessed 2023-07-18]
36. Miller R. Implementing a survivorship care plan for patients with breast cancer. Clin J Oncol Nurs. 2008 Jun;12(3):479-487 [doi: 10.1188/08.CJON.479-487] [Medline: 18515246]
37. Houserková D, Zlámalová N, Spáčilová K, Vomáčková K, Donociková B, Kolečková M, et al. Role of the radiologist during neoadjuvant systemic therapy for breast cancer. Rozhl Chir. 2021;100(6):285-294 [doi: 10.33699/PIS.2021.100.6.285-294] [Medline: 34465118]
38. Carroll-Johnson RM. Redefining interdisciplinary practice. Oncol Nurs Forum. 2001 May;28(4):619 [Medline: 11383177]
39. Hewitt M, Greenfield S, Stovall E. From Cancer Patient To Cancer Survivor: Lost In Transition. Washingon, DC. National Academies Press; 2006.
40. Taylor C, Shewbridge A, Harris J, Green JS. Benefits of multidisciplinary teamwork in the management of breast cancer. Breast Cancer (Dove Med Press). 2013;5:79-85 [FREE Full text] [doi: 10.2147/BCTT.S35581] [Medline: 24648761]
41. Spalluto LB, Bonnet K, Sonubi C, Ernst LL, Wahab R, Reid SA, et al. Barriers to implementation of breast cancer risk assessment: the health care team perspective. J Am Coll Radiol. 2023 Mar;20(3):342-351 [doi: 10.1016/j.jacr.2022.12.019] [Medline: 36922108]
42. Kesson EM, Allardice GM, George WD, Burns HJG, Morrison DS. Effects of multidisciplinary team working on breast cancer survival: retrospective, comparative, interventional cohort study of 13 722 women. BMJ. 2012 Apr 26;344:e2718 [FREE Full text] [doi: 10.1136/bmj.e2718] [Medline: 22539013]

43. Pangarsa E, Rizky D, Tandarto K, Setiawan B, Santosa D, Hadiyanto J, et al. The effect of multidisciplinary team on survival rates of women with breast cancer: a systematic review and meta-analysis. Ann Med Surg (Lond). 2023 Jun;85(6):2940-2948 [FREE Full text] [doi: 10.1097/MS9.0000000000000914] [Medline: 37363480]
44. Kurniasih DAA, Setiawati EP, Pradipta IS, Subarnas A. Interprofessional collaboration in the breast cancer unit: how do healthcare workers see it? BMC Womens Health. 2022 Jun 13;22(1):227 [FREE Full text] [doi: 10.1186/s12905-022-01818-7] [Medline: 35698115]
45. Lee PY, Cheong AT, Ghazali SS, Rashid AA, Ong SC, Ong SY, et al. Barriers of and strategies for shared decision-making implementation in the care of metastatic breast cancer: A qualitative study among patients and healthcare professionals in an Asian country. Health Expect. 2022 Dec;25(6):2837-2850 [FREE Full text] [doi: 10.1111/hex.13590] [Medline: 36098241]
46. Gravel K, Légaré F, Graham ID. Barriers and facilitators to implementing shared decision-making in clinical practice: a systematic review of health professionals' perceptions. Implement Sci. 2006 Aug 09;1:16 [FREE Full text] [doi: 10.1186/1748-5908-1-16] [Medline: 16899124]
47. Freeman ALJ. How to communicate evidence to patients. Drug Ther Bull. 2019 Aug;57(8):119-124 [FREE Full text] [doi: 10.1136/dtb.2019.000008] [Medline: 31345957]
48. Fayanju OM, Mayo TL, Spinks TE, Lee S, Barcenas CH, Smith BD, et al. Value-based breast cancer care: a multidisciplinary approach for defining patient-centered outcomes. Ann Surg Oncol. 2016 Aug;23(8):2385-2390 [doi: 10.1245/s10434-016-5184-5] [Medline: 26979306]
49. Cancer survival toolbox. National Coalition for Cancer Survivorship. URL: https://canceradvocacy.org/resources/cancer-survival-toolbox/ [accessed 2023-11-23]
50. Wolff JL, Aufill J, Echavarria D, Blackford AL, Connolly RM, Fetting JH, et al. A randomized intervention involving family to improve communication in breast cancer care. NPJ Breast Cancer. 2021 Feb 12;7(1):14 [FREE Full text] [doi: 10.1038/s41523-021-00217-9] [Medline: 33579966]
51. Lux M, Sell C, Fasching P, Seidl-Ertel J, Bani M, Schrauder M, et al. Time and Resources needed to document patients with breast cancer from primary diagnosis to follow-up - results of a single-center study. Geburtshilfe Frauenheilkd. 2014 Aug;74(8):743-751 [FREE Full text] [doi: 10.1055/s-0034-1382980] [Medline: 25221342]
52. Partridge AH, Norris VW, Blinder VS, Cutter BA, Halpern MT, Malin J, et al. The ASCO Breast Cancer Registry pilot: implementation of a multisite community practice registry and treatment plan/summary program. J Clin Oncol. 2011 May 20;29(15_suppl):6101-6101 [doi: 10.1200/jco.2011.29.15_suppl.6101]
53. Thorne S, Hislop TG, Kim-Sing C, Oglov V, Oliffe JL, Stajduhar KI. Changing communication needs and preferences across the cancer care trajectory: insights from the patient perspective. Support Care Cancer. 2014 Apr;22(4):1009-1015 [doi: 10.1007/s00520-013-2056-4] [Medline: 24287506]
54. Myers M. Switching the order of breast cancer treatments may lead to better care. Imperial College London. URL: https://www.imperial.ac.uk/news/238612/switching-order-breast-cancer-treatments-lead/ [accessed 2023-07-21]
55. Hamer J, Warner E. Lifestyle modifications for patients with breast cancer to improve prognosis and optimize overall health. CMAJ. 2017 Feb 21;189(7):E268-E274 [FREE Full text] [doi: 10.1503/cmaj.160464] [Medline: 28246240]
56. Selvan P, Hriso C, Mitchell J, Newberg A. Systematic review of yoga for symptom management during conventional treatment of breast cancer patients. Complement Ther Clin Pract. 2022 Aug;48:101581 [doi: 10.1016/j.ctcp.2022.101581] [Medline: 35398542]
57. Buffart LM, Kalter J, Sweegers MG, Courneya KS, Newton RU, Aaronson NK, et al. Effects and moderators of exercise on quality of life and physical function in patients with cancer: an individual patient data meta-analysis of 34 RCTs. Cancer Treat Rev. 2017 Jan;52:91-104 [FREE Full text] [doi: 10.1016/j.ctrv.2016.11.010] [Medline: 28006694]
58. Burguin A, Diorio C, Durocher F. Breast cancer treatments: updates and new challenges. J Pers Med. 2021 Aug 19;11(8):808 [FREE Full text] [doi: 10.3390/jpm11080808] [Medline: 34442452]
59. Breast cancer treatment planning. Stanford Health Care. URL: https://stanfordhealthcare.org/medical-conditions/cancer/breast-cancer/patient-care-resources/treatment-planning.html#process [accessed 2023-07-21]
60. Secondary breast treatment. Breast Cancer Now. URL: https://breastcancernow.org/information-support/facing-breast-cancer/secondary-metastatic-breast-cancer/secondary-breast-cancer-treatment [accessed 2023-07-21]
61. Sannachi L, Gangeh M, Tadayyon H, Sadeghi-Naini A, Gandhi S, Wright FC, et al. Response monitoring of breast cancer patients receiving neoadjuvant chemotherapy using quantitative ultrasound, texture, and molecular features. PLoS One. 2018;13(1):e0189634 [FREE Full text] [doi: 10.1371/journal.pone.0189634] [Medline: 29298305]
62. McLaughlin R, Hylton N. MRI in breast cancer therapy monitoring. NMR Biomed. 2011 Jul;24(6):712-720 [FREE Full text] [doi: 10.1002/nbm.1739] [Medline: 21692116]
63. Duygulu G, Oktay A, Bilgen IG, Kapkaç M, Zekioğlu O. The role of breast MRI in planning the surgical treatment of breast cancer. Diagn Interv Radiol. 2012;18(5):460-467 [FREE Full text] [doi: 10.4261/1305-3825.DIR.5429-11.2] [Medline: 22581712]
64. Christensen D, Shehata M, Javid S, Rahbar H, Lam D. Preoperative breast MRI current evidence and patient selection. J Breast Imaging. 2023;5(2):112-124 [doi: 10.1093/JBI/WBAC088]
65. Sabatier R, Gonçalves A, Bertucci F. Personalized medicine: present and future of breast cancer management. Crit Rev Oncol Hematol. 2014 Sep;91(3):223-233 [doi: 10.1016/j.critrevonc.2014.03.002] [Medline: 24725667]

66. Zhang J, Xia Y, Zhou X, Yu H, Tan Y, Du Y, et al. Current landscape of personalized clinical treatments for triple-negative breast cancer. Front Pharmacol. 2022;13:977660 [FREE Full text] [doi: 10.3389/fphar.2022.977660] [Medline: 36188535]
67. Mehmood S, Faheem M, Ismail H, Farhat SM, Ali M, Younis S, et al. Breast cancer resistance likelihood and personalized treatment through integrated multiomics. Front Mol Biosci. 2022;9:783494 [FREE Full text] [doi: 10.3389/fmolb.2022.783494] [Medline: 35495618]

Abbreviations

ASCO: American Society of Clinical Oncology
BCT: breast cancer treatment
MDT: multidisciplinary team
MRI: magnetic resonance imaging
NCCS: National Coalition for Cancer Survivorship
SDM: shared decision-making

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