

# Multidisciplinary care of breast cancer patients: a scoping review of multidisciplinary styles, processes, and outcomes

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## ABSTRACT

**Background** Clinical practice guidelines recommend a multidisciplinary approach to cancer care that brings together all relevant disciplines to discuss optimal disease management. However, the literature is characterized by heterogeneous definitions and few reviews about the processes and outcomes of multidisciplinary care. The objective of this scoping review was to identify and classify the definitions and characteristics of multidisciplinary care, as well as outcomes and interventions for patients with breast cancer.

**Methods** A systematic search for quantitative and qualitative studies about multidisciplinary care for patients with breast cancer was conducted for January 2001 to December 2017 in the following electronic databases: MEDLINE, EMBASE, PsycInfo, and CINAHL. Two reviewers independently applied our eligibility criteria at level 1 (title/abstract) and level 2 (full-text) screening. Data were extracted and synthesized descriptively.

**Results** The search yielded 9537 unique results, of which 191 were included in the final analysis. Two main types of multidisciplinary care were identified: conferences and clinics. Most studies focused on outcomes of multidisciplinary care that could be variously grouped at the patient, provider, and system levels. Research into processes tended to focus on processes that facilitate implementation: teamworking, meeting logistics, infrastructure, quality audit, and barriers and facilitators.

**Summary** Approaches to multidisciplinary care using conferences and clinics are well described. However, studies vary by design, clinical context, patient population, and study outcome. The heterogeneity of the literature, including the patient populations studied, warrants further specification of multidisciplinary care practice and systematic reviews of the processes or contexts that make the implementation and operation of multidisciplinary care effective.

**Key Words** Breast neoplasms, breast cancer, multidisciplinary management, teamwork, interdisciplinary teams, tumour boards, conferencing, clinics

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## BACKGROUND

Modern breast cancer management has become increasingly complex and specialized; the clinical treatment for breast cancer patients is a multimodal pathway that requires input from diverse health care practitioners<sup>1</sup>. A multidisciplinary approach to cancer care that brings together all relevant disciplines to discuss optimal care is

intuitively attractive and is promoted in many cancer care guidelines and policies<sup>2,3</sup>.

Fundamentally, multidisciplinary care involves the collaborative efforts of a wide variety of health care practitioners in the personalized treatment of cancer patients<sup>4,5</sup>. Many countries have formally established multidisciplinary care as a fundamental practice in breast cancer management and have used multidisciplinary care as a

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benchmark for accreditation and funding<sup>6-8</sup>. However, the effect of multidisciplinary care on patient care, survival, and satisfaction is unclear<sup>9</sup>. Because of heterogeneous definitions and research methods, the overall effectiveness of multidisciplinary care and the elements that contribute to its effectiveness cannot be firmly established<sup>10</sup>. Additionally, the literature is characterized by heterogeneous patient populations and measures of effectiveness that further hamper meaningful understanding of multidisciplinary care practices and outcomes.

In the present study, we aimed to take stock of the diverse literature about multidisciplinary care, to review what has been studied and how it has been studied, and to use a scoping review method to identify areas for future research. A scoping review is a form of knowledge synthesis that aims to clarify key concepts, evidence, and gaps for exploratory research questions<sup>11</sup>. The scoping review method was chosen because it allows for rapid mapping of concepts in an area of research by incorporating a range of study designs.

These questions guided the review:

- What in the literature characterizes current multidisciplinary care interventions for patients with breast cancer?
- What are the types of multidisciplinary care, settings, patient populations, and team compositions?
- What are the processes for conducting and auditing multidisciplinary care?
- Which outcomes of multidisciplinary care are explored in the studies?

## METHODS

### Study Design

This scoping review used the framework proposed by Arksey and O'Malley<sup>12</sup>. Rather than focus on a specific research question and one or more study designs (as in a systematic review), a scoping review focuses on identifying all relevant literature regardless of study design. For that reason, the process is not linear, but iterative, and it requires reflexive engagement to ensure comprehensive coverage of the literature.

### Literature Search Strategies

A systematic search for January 2001 to December 2017 was conducted in these electronic databases: MEDLINE, EMBASE, PsycInfo, and CINAHL. A search strategy was devised for the MEDLINE database and later converted by an information specialist (Bridget Morant) for each subsequent database. Searches included these terms and synonyms: clinical conference, tumour board, multidisciplinary, interdisciplinary, interprofessional, and collaborative (supplemental Table 1). Searches included all types of study designs, with restriction to articles in English. The search strategy was broad, given that the study aim was to characterize multidisciplinary care in the broadest sense.

### Study Selection

Study selection was an iterative process of screening abstracts and revising the inclusion and exclusion

**TABLE I** Characteristics of the included studies

Characteristic	Value	
	(n)	(%)
Country		
United States	55	28.8
United Kingdom	43	22.5
Australia	25	13.1
Canada	11	5.8
Hong Kong	5	2.6
Netherlands	4	2.1
Belgium	3	1.6
Other	45	23.6
Study design		
Survey	30	16
Interview	9	5
Prospective		
Before and after	25	13
Cohort	18	9
Retrospective		
Before and after	22	12
Cohort	33	17
Clinical audit	8	4
Cross-sectional	6	3
Randomized controlled trial	5	3
Descriptive		
Prospective	19	10
Retrospective	16	8

criteria. In level 1A screening, two reviewers (JS, MR) guided by preliminary inclusion and exclusion criteria (supplemental Table 2) independently screened abstracts. After the initial screening, the inclusion and exclusion criteria were revised to generate the final screening criteria. Empirical studies and clinical audits evaluating the implementation of multidisciplinary care were included. Because of the sheer volume of studies, the inclusion criteria were revised to limit results to studies of patients with breast cancer. Many studies included mixed patient populations, and because we aimed to take stock of the existing research, we included all studies of patients with breast cancer regardless of disease stage. That set of criteria was used to guide level 1B abstract screening and, subsequently, level 2 full-text screening. Disagreement between the reviewers was resolved by discussion until consensus was reached, or by arbitration involving a third reviewer, if needed.

### Data Abstraction and Synthesis

Information about the study aim, intervention name and description, study population, methods, and outcomes were collected using a data extraction table. Data were extracted by one author and subsequently cross-checked by

another. The table was reviewed, and descriptive themes related to the study characteristics, inputs, processes, and outcomes were generated in an iterative process. Findings were summarized using a descriptive approach. Given the goals of our scoping review, quality appraisal was not conducted<sup>12</sup>.

## RESULTS

The literature search yielded 9357 articles, which were screened at level 1 (title and abstract). Of those 9357 articles, 500 were screened at level 2 (full text). The 191 articles that remained after the level 2 screening were included in the scoping review (Figure 1). Studies were reviewed based on their characteristics and their multidisciplinary care inputs, processes, and outcomes (Figure 2).

### Study Characteristics

Table 1 presents the characteristics of the studies, including country of origin and methods. Most studies were conducted in the United States ( $n = 55$ , 28.8%), followed by the United Kingdom ( $n = 43$ , 22.5%), Australia ( $n = 25$ , 13.1%), and Canada ( $n = 11$ , 5.8%).

Study methods were heterogeneous and included 22 retrospective before-and-after studies, 33 retrospective cohort studies, 25 prospective before-and-after studies, 18 prospective cohort studies, 30 surveys, and 8 clinical audits. The remaining publications were interview, cross-sectional,

prospective descriptive, retrospective descriptive, and randomized controlled studies.

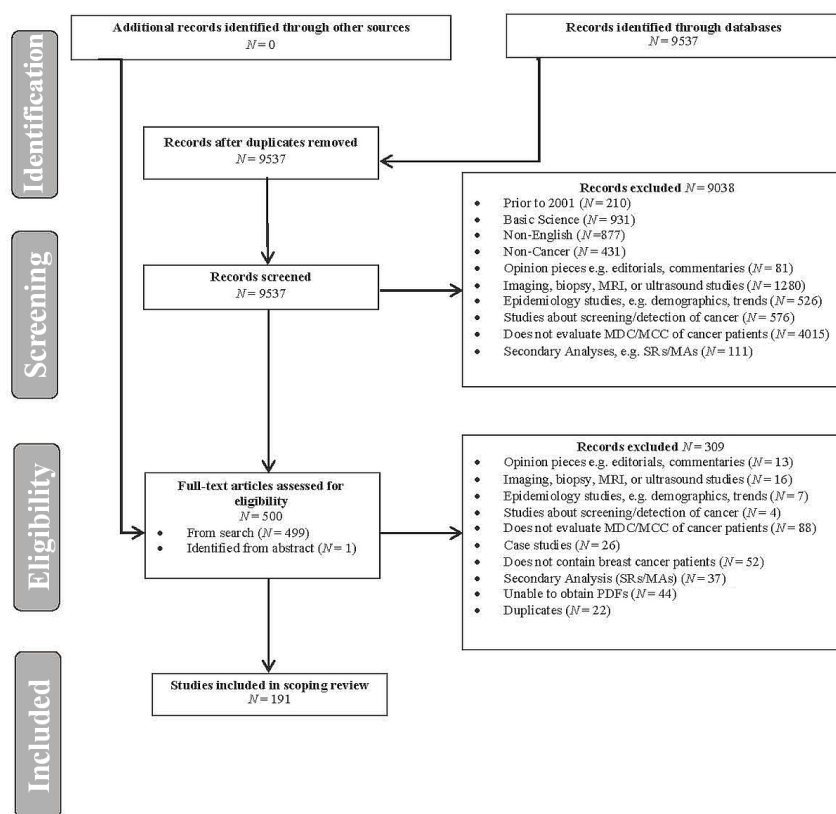
## Inputs

### Types of Multidisciplinary Care

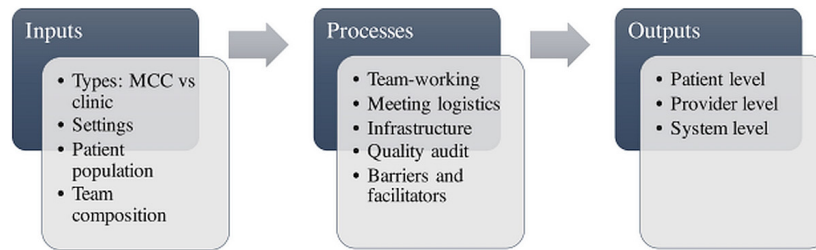
Two broad models of multidisciplinary care interventions were investigated in the studies: multidisciplinary cancer conferences (MCCs) and multidisciplinary clinics. The main difference between the models is that clinics occur during care provision and MCCs do not.

The MCC is also known as a multidisciplinary team meeting, multidisciplinary case management meeting, or tumour board. In our sample, 141 articles (74%) described MCCs as a team of health care practitioners, including surgeons, radiologists, pathologists, medical oncologists, radiation oncologists, and breast care nurses, who meet physically or virtually to evaluate and plan patient care at any stage of the diagnostic and treatment process. Two articles described molecular MCCs, in which the teams comprised clinical geneticists, basic science researchers, bioinformatics specialists, and pathologists in molecular genetics, in addition to the typical tumour board membership<sup>13,14</sup>.

The multidisciplinary clinic is also known as a multidisciplinary team, rounds, a one-stop clinic, and a multidisciplinary committee. Of the 191 articles, 51 (27%) described clinics or teams as meetings of health care practitioners who work together on site to provide streamlined and



**FIGURE 1** PRISMA diagram. MRI = magnetic resonance imaging; MDC = multidisciplinary clinic; MCC = multidisciplinary cancer conference; SR = systematic review; MA = meta-analysis; PDF = portable document format.



**FIGURE 2** Input, process, and output model of multidisciplinary care. MCC = multidisciplinary cancer conference.

coordinated patient care at an institution. The focus is on providing patients with a comprehensive multidisciplinary evaluation and consensus recommendations during a single visit. Of the fifty-one publications, five described specialized clinics serving a subset of cancer patients with multifaceted needs, such as adolescents and young adults with cancer<sup>15</sup> and patients with secondary bone metastasis<sup>16,17</sup> or treatment-related cardiotoxicity<sup>18,19</sup>.

### Multidisciplinary Care Settings

Studies varied in practice location, with most being undertaken in urban settings ( $n = 117$ , 61%), followed by rural ( $n = 13$ , 7%), mixed ( $n = 20$ , 10%), and unknown settings or setting not applicable ( $n = 41$ , 21%). The most common practice types were academic ( $n = 90$ , 47%) and community ( $n = 28$ , 15%), with the rest being mixed ( $n = 22$ , 12%) or unknown ( $n = 51$ , 27%).

### Patient Population

In general, the patient population represented in our dataset was heterogeneous. Of the 191 articles, 76% ( $n = 146$ ) focused exclusively on patients with breast cancer rather than on mixed patient populations. Of the studies that focused exclusively on patients with breast cancer, more than half did not specify a patient subpopulation on the disease continuum from early to late stage. Prevalence and access to multidisciplinary care in patients with breast cancer was reported in seven articles<sup>20–26</sup>. Of those seven studies, six described patient and institutional factors influencing the use of multidisciplinary care<sup>21–26</sup> such as race, age, geographic variation<sup>21</sup>, and tumour factors<sup>26</sup>.

### Team Composition

Composition of the multidisciplinary team was reported in 119 studies (62%). Frequently cited members included breast surgeons, radiologists, pathologists, medical oncologists, radiation oncologists, and breast care nurses. Team members less frequently cited included reconstructive surgeons, nurse navigators, physiotherapists, psychologists, genetic counsellors, social workers, pharmacists, clinical trial coordinators, and trainees.

### Processes

Our review identified multidisciplinary care processes including teamworking, meeting logistics (attendance, meeting duration, meeting frequency, timing of meetings, meeting topics, case presentation), infrastructure (venue and equipment, clinical decision-support decisions, and prognostic tools), quality audit, and barriers to and

facilitators of multidisciplinary care implementation. No studies compared processes for the two models of multidisciplinary care. Table II summarizes those findings.

### Outcome Types

Identified outcomes of multidisciplinary care are grouped into 3 broad levels: patient, provider, and system. No studies compared outcomes for the two models of multidisciplinary care.

#### Patient Level

**Clinical Outcomes:** Thirty-two articles examined the association between multidisciplinary care for breast cancer and clinical outcomes. Nine examined MCCs<sup>9,81–88</sup>, twenty-two examined multidisciplinary clinics<sup>18,19,89–108</sup>, and one did not specify care type<sup>109</sup>. Twenty-two articles reported on patient survival<sup>18,81,82,84,86–89,91,93–100,102,104–106,109</sup>, five, on recurrence<sup>85,87,96,104,107</sup>; five, on complication rates<sup>19,90,92,102,103</sup>; and four, on patient anxiety<sup>9,83,101,108</sup>.

**Patient Satisfaction:** Twelve articles (five about MCCs<sup>9,29,41,83,110</sup> and seven about multidisciplinary clinics<sup>17,80,111–115</sup>) evaluated patient satisfaction with multiple aspects of their multidisciplinary care. Most were program evaluations or audits that lacked comparison or control interventions. According to one study, measures of patient satisfaction included quality of care; comfort level with the care plan; and perception of experience, continuity of care, and discrepancy between desired information and actual information received<sup>83</sup>.

#### Provider Level

**Provider Satisfaction:** Ten articles assessed the effect of multidisciplinary care on the well-being and satisfaction of clinicians. Six examined MCCs<sup>30,31,43,69,70,116</sup>, three examined multidisciplinary clinics<sup>111,113,117</sup>, and one did not specify care type<sup>27</sup>. Results from one study suggested that multidisciplinary care leads to better provider satisfaction with treatment recommendations, improved efficiency and coordination between staff, and improved staff mental health<sup>27</sup>.

**Clinical Decision-Making:** Forty-three studies (forty-one about MCCs<sup>31,40,43,44,50,51,53–64,71,87,118–138</sup> and two about clinics<sup>139,140</sup>) found that multidisciplinary care resulted in changes in diagnosis or treatment suggestions. A major limitation of those studies was a lack of follow-up information to determine whether the multidisciplinary care recommendations were implemented and were effective.

**TABLE II** Processes for conducting and auditing multidisciplinary care

Process	Studies (n)	Study findings
Teamworking	2	<p>Seven elements identified<sup>27</sup>:</p> <ul style="list-style-type: none"> <li>■ Participation</li> <li>■ Clarity of and commitment to team objectives</li> <li>■ Emphasis on quality</li> <li>■ Support for innovation</li> <li>■ Reflexivity</li> <li>■ Innovation</li> <li>■ Leadership</li> </ul> <p>U.K. national survey showed that multidisciplinary team members from different tumour types are in significant agreement about what constitutes effective teamworking<sup>28</sup>.</p>
Meeting logistics	122	<p><i>Attendance</i></p> <ul style="list-style-type: none"> <li>■ Eight studies catalogued attendance rate at MCCs<sup>14,29–35</sup>. Of those studies, four examined the attendance rate of various members of the multidisciplinary team in MCCs<sup>14,30,32,34</sup>.</li> </ul> <p><i>Meeting duration</i></p> <ul style="list-style-type: none"> <li>■ Four studies reported duration of meetings and reasons for lengthier case discussions in some patient cases. Average duration of discussion per patient ranged from 2 to 8 minutes<sup>36–39</sup>.</li> </ul> <p><i>Meeting frequency</i></p> <ul style="list-style-type: none"> <li>■ Two studies reported the frequency of MCC meetings, with weekly meetings being the most common<sup>30</sup>. Variations in frequency were identified in different practice settings, including public compared with private and metropolitan compared with rural<sup>32</sup>.</li> </ul> <p><i>Timing of meetings</i></p> <ul style="list-style-type: none"> <li>■ One hundred four studies reported timing of meetings, of which seventy-three reported occurrence before treatment (after diagnosis, before surgery, before chemotherapy, before radiation therapy); nineteen, after treatment; and twelve, mixed.</li> </ul> <p><i>Meeting topics</i></p> <ul style="list-style-type: none"> <li>■ Two studies recorded topics of discussion during MCCs<sup>36</sup>. Pathology results and psychosocial issues were the most and least frequently discussed topics<sup>30</sup>.</li> </ul> <p><i>Case presentation</i></p> <ul style="list-style-type: none"> <li>■ Two studies reported on case selection for MCCs, with contrasting conclusions. One reviewed all patient cases<sup>35</sup>, and another discussed a group of patients with select demographic traits<sup>40</sup>.</li> </ul>
Infrastructure	35	<p><i>Venue and equipment</i></p> <ul style="list-style-type: none"> <li>■ Two studies reported the necessary venue and equipment for MCCs<sup>28</sup> and variations in use of technology for viewing electronic records and radiologic and pathologic findings<sup>41</sup>.</li> </ul> <p><i>Clinical decision support systems and prognostic tools<sup>a</sup></i></p> <ul style="list-style-type: none"> <li>■ Twenty-six studies investigated whether the use of such tools at the MCC led to changes in treatment and management decisions or guideline adherence (Table III).</li> </ul> <p><i>Teleconference</i></p> <ul style="list-style-type: none"> <li>■ Also known as telemedicine or a virtual tumour board. Seven articles described virtual teleconferences between sites (mostly between academic and rural satellite sites) to discuss cases, share expertise, and support clinical care<sup>31,33,69–73</sup>.</li> </ul>
Quality audit	4	<p>Two tools have been developed for the purpose of quality audit and evaluation of multidisciplinary care:</p> <ul style="list-style-type: none"> <li>■ The Community Cancer Centers Program self-assessment tool from the U.S. National Cancer Institute<sup>74</sup></li> <li>■ MTB-MODE (Multidisciplinary Tumor Board Metric for the Observation of Decision-Making) specifically assess the quality of MCCs<sup>36,75,76</sup></li> </ul>
Barriers and facilitators	19	<p>Seven studies reported barriers to multidisciplinary care implementation:</p> <ul style="list-style-type: none"> <li>■ Lack of time and resources<sup>37,41,48,77</sup></li> <li>■ Staff resistance to change<sup>41,77</sup></li> <li>■ Covering large geographic areas<sup>78</sup></li> </ul> <p>Twelve studies reported facilitators of multidisciplinary care implementation:</p> <ul style="list-style-type: none"> <li>■ Funding<sup>77,79</sup></li> <li>■ Team coordinators<sup>78</sup></li> <li>■ Adequate infrastructure<sup>28,33,63,70</sup></li> <li>■ Buy-in from team members<sup>48,76</sup></li> <li>■ Local champions, such as clinician leaders and breast care nurses<sup>36,41,76,79,80</sup></li> </ul>

MCC = multidisciplinary cancer conference.

<sup>a</sup> Clinical decision support systems, including prognostic tools, can be used during MCCs to reduce variation and to standardize clinical decision-making processes. Such systems match patient characteristics to a computerized clinical knowledge base that presents clinical care recommendations<sup>42</sup>.

### System Level

**Time to Intervention:** Nineteen studies (nine about MCCs<sup>13,14,26,128,129,141-144</sup>, nine about clinics<sup>15,23,24,89,92,106,114,145,146</sup>, and one that did not specify the care type<sup>20</sup>) examined the effect of multidisciplinary care on the efficiency of the cancer care pathway, particularly time to diagnosis or treatment, or both. However, most were retrospective cohort studies or clinical audits that reported the time to intervention at one point in time, without a control group for comparison. Of the nine studies that reported before-and-after findings, only one found that the MCC led to a longer waiting time to biopsy<sup>141</sup>. The rest found that MCCs<sup>128,142-144</sup> or clinics<sup>23,24,92,146</sup> led to a shorter time to diagnosis or treatment.

**Enrolment in Clinical Trials:** Six studies (four about MCCs<sup>75,147-149</sup> and two about clinics<sup>145,150</sup>) reported on the relationship between multidisciplinary care and access to and enrolment in clinical trials, yielding conflicting results.

**Guideline Adherence and Implementation:** Eighteen studies (thirteen about MCCs<sup>13,46,68,134,135,142,151-157</sup> and five about clinics<sup>93,145,158-160</sup>) examined whether multidisciplinary care resulted in better adherence to evidence-based clinical guidelines and in the implementation of consensus recommendations. One clinical audit investigated the factors influencing adherence to recommendations<sup>152</sup>. Twenty-six studies investigated whether the use of clinical decision-support systems and prognostic tools at MCCs led to changes in treatment and management decisions or guideline adherence (Table III).

## DISCUSSION

There is growing emphasis on the application of multidisciplinary approaches to breast cancer care. However, because of heterogeneous definitions and contexts, the effectiveness of multidisciplinary care and the processes that contribute to its effectiveness cannot be firmly determined. Our scoping review identified literature about multidisciplinary breast cancer care that was variable in terms of study characteristics and multidisciplinary inputs, processes, and outcomes. Furthermore, few studies linked specific multidisciplinary care processes with patient outcomes.

Across the literature, two models of multidisciplinary care were described: MCCs and multidisciplinary clinics. Despite adequate establishment, no systematic data compared processes and outcomes for the two models. Additionally, little research has examined multidisciplinary care in rural compared with urban, and private compared with public settings. However, there was an indication that rural and private sites were less likely to have formal processes in place for multidisciplinary care<sup>32</sup>.

Studies examining multidisciplinary care processes generally focused on teamworking, meeting logistics, infrastructure, quality audit, and barriers and facilitators. Although sufficient evidence has been generated about the benefit of technology supports such as teleconference and clinical decision-support systems for the functioning of multidisciplinary care<sup>31,63,72,73</sup>, research into other processes and their effects on outcomes are still in the

preliminary stages. For example, of the two studies that examined teamworking, only the leadership element was examined, and findings were conflicting<sup>27,36</sup>. Similarly, although studies have reported dimensions of MCC logistics, none have empirically evaluated the effects on outcomes. Tools have been developed to assess the quality of multidisciplinary care processes<sup>74,161</sup>. Future studies might consider integrating those tools into assessments of the effects of multidisciplinary care on outcomes.

There is ample evidence about the barriers to multidisciplinary care practice, but more research into interventions to overcome those barriers is needed. For example, a reported lack of clinician time to attend MCCs could be ameliorated by an intervention targeting the way in which cases are selected and presented. Guidelines from the American College of Surgeons<sup>8</sup> recommend that a minimum of 15% of the annual caseload be presented at MCCs held at a frequency of at least once each quarter. Despite those and other guidelines recommending implementation of institution-specific patient selection criteria for case presentations<sup>6</sup>, most programs lack a local protocol. Instead, variation in the patients that are brought forward for discussion is evident. Although most programs present only complex cases, some present all new patients, thereby prolonging the meeting duration<sup>32</sup>. Future studies should examine whether and how patient selection affects multidisciplinary care processes such as meeting duration, because understanding that aspect could potentially address meeting duration as a barrier to multidisciplinary care implementation and improved patient-centred care.

Outcomes of multidisciplinary care were variably measured at patient, practitioner, and systems levels and included clinical outcomes, patient and provider satisfaction, time to intervention, enrolment in clinical trials, guideline adherence, and clinical decision-making. Patient survival was the most widely studied outcome. However, most studies were retrospective in design and limited in their ability to attribute change in outcomes to multidisciplinary processes. Prospective studies are needed to reliably assess patient-, practitioner-, and system-level benefits. Additionally, examination of other important outcomes such as continuity or coordination of care is warranted, as is study about the cost-effectiveness of multidisciplinary care.

### Limitations

In line with the guidelines for scoping reviews, the quality of the included studies was not assessed. Furthermore, the evolving landscape and context in which the research studies occurred were not considered. It might be that evaluations of multidisciplinary care interventions are confounded by concurrent changes in clinical care such as increased subspecialization in the medical and nursing professions<sup>84</sup> and improvements in diagnostic staging and medical treatments. Critical appraisal through a systematic review of the literature with those issues in mind is warranted.

In addition, our scoping review was limited to English-language studies, and it might be that additional multidisciplinary care inputs, processes, and outcomes relevant to non-English-speaking countries were missed.

**TABLE III** Studies examining adjunct tools for the support of multidisciplinary cancer conferences (MCCs)

Reference	Tool name	Description
Epstein <i>et al.</i> , 2006; Nowak <i>et al.</i> , 2009; and Bishop <i>et al.</i> , 2011 <sup>43–45</sup>	Adjuvant Online	Web-based program that supports adjuvant decision-making at a multidisciplinary tumour board
Seroussi <i>et al.</i> , 2013; Bouaud <i>et al.</i> , 2015 <sup>46,47</sup>	OncoDoc2	Knowledge-based clinical decision support system embedding CancerEST clinical practice guidelines that provides patient-specific guideline-based care plans
Patkar <i>et al.</i> , 2012; Patkar <i>et al.</i> , 2010 <sup>48,49</sup>	MATE	Advanced computerized clinical decision support system that captures patient data, suggests evidence-based treatment recommendations, and identifies eligible candidates for clinical trials
Lin <i>et al.</i> , 2016; Somashekhar <i>et al.</i> , 2017; Ramarajan <i>et al.</i> , 2017 <sup>50–52</sup>	Artificial intelligence	Machine learning to structure experiential knowledge relevant for decision-making and to predict treatment decisions that experts are likely to recommend—for example, Experience Engine, IBM Watson for Oncology
Down <i>et al.</i> , 2014 <sup>53</sup>	PREDICT	Web-based breast cancer prognostication and treatment benefit tool that can aid decision-making for adjuvant chemotherapy and trastuzumab in HER2-positive early-stage breast cancer
Yeo <i>et al.</i> , 2015 <sup>54</sup>	IHC4+C score	Prognostic tool that estimates the residual risk of distant recurrence at 10 years in postmenopausal women with estrogen receptor-positive breast cancer who have received 5 years of endocrine therapy
Ozmen <i>et al.</i> , 2016; Cheung <i>et al.</i> , 2014; McVeigh <i>et al.</i> , 2014; De Boer <i>et al.</i> , 2013; De Boer <i>et al.</i> , 2011; Pestalozzi <i>et al.</i> , 2017; Keay <i>et al.</i> , 2016; Loncaster <i>et al.</i> , 2017 <sup>55–62</sup>	Oncotype DX	Clinically validated 21-gene genomic assay that can quantify the risk of breast cancer recurrence in patients with estrogen receptor-positive, HER2-negative, and lymph node-negative tumours
Exner <i>et al.</i> , 2014; Cusumano <i>et al.</i> , 2014 <sup>63,64</sup>	MammaPrint	A 70-gene tumour expression profile initially established as a predictor of disease outcome in premenopausal breast cancer; can be used to more accurately select breast cancer patients who can forgo adjuvant chemotherapy without compromising outcome
Armeanu-Ebinger <i>et al.</i> , 2016 <sup>65</sup>	CeGaT	Molecular report of somatic tumour panel
Devitt <i>et al.</i> , 2015 <sup>66</sup>	Geriatric screening tool	Patients 70 years of age or older with a new cancer diagnosis completed geriatric assessment that was incorporated into MCC treatment planning
Stanicki <i>et al.</i> , 2015 <sup>67</sup>	Virtual oncological networks template	Prototype of a continuous, cross-institutional health care management platform that offers information technology services to all professionals to support collaborative treatment processes and individualized care
Farrugia <i>et al.</i> , 2015 <sup>68</sup>	Documentation template	Standardized tumour board documentation template that provides accurate and efficient documentation of evidence-based practice

HER2 = human epidermal growth factor receptor 2.

Finally, although our review allowed for comprehensive coverage and mapping of all studies relevant to multidisciplinary care in breast cancer, the studies themselves made it difficult to define and capture the various facets of care catering to the varied patient populations studied. Along the breast cancer care continuum, a patient's multidisciplinary care needs vary: from access to treatment and support before and during early curative treatment, to practical and end-of-life supports in advanced disease. More research is needed to better understand multidisciplinary care for various patient populations across the disease spectrum.

Despite its limitations, the present review conducted a comprehensive search and rapid mapping of all English-language peer-reviewed studies of multidisciplinary

care in breast cancer. No secondary review study to date has attempted this breadth of coverage, encompassing all types of multidisciplinary care characteristics, processes, and outcomes.

## CONCLUSIONS AND FUTURE DIRECTIONS

Research into multidisciplinary breast cancer care varies by design, clinical context, and study outcomes. Although there is evidence connecting improvements in clinical outcomes to the implementation of multidisciplinary care, research into specific multidisciplinary care characteristics, inputs, or processes that contribute to those outcomes is lacking.

Further research into the changes in clinical management that result from multidisciplinary care is needed. For example, patchy multidisciplinary care attendance is documented as one barrier to practice. Does professional attendance ultimately affect changes in clinical management and patient outcomes? Do interventions focused on team communication improve collaboration and decision-making processes in the multidisciplinary care setting? Once identified, interventions to support practice and inclusion of critical elements of multidisciplinary care could be implemented. For example, policies for remunerating staff time or providing protected time to attend multidisciplinary care might improve attendance and willingness with respect to interdisciplinary work.

Research into the comparative effectiveness of various multidisciplinary care models is also needed. For example, are self- and other-reported outcomes better for patients who have been treated in multidisciplinary clinics than for patients who have been discussed at mccs? Further attention to the interaction between context and multidisciplinary care is also needed. Better understanding of the models of practice operating in various settings might support implementation efforts and provide insights into the “goodness of fit” between the multidisciplinary care model and the practice setting.

Numerous studies have examined and shown positive effects of multidisciplinary care on patient-, practice-, and system-level outcomes. However, further research is needed concerning the critical elements of multidisciplinary care and how such an intensive care practice could be streamlined to target not only improved patient outcomes but also healthy system functioning.

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#### CONFLICT OF INTEREST DISCLOSURES

We have read and understood *Current Oncology's* policy on disclosing conflicts of interest, and we declare that we have none.

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