Consideration of comorbidity in treatment decision making in multidisciplinary cancer team meetings: a systematic review

J. Stairmand1, L. Signal1*, D. Sarfati1, C. Jackson2, L. Batten3, M. Holdaway3 & C. Cunningham3

1Cancer Control and Screening Research Group, University of Otago, Wellington; 2Department of Medicine, University of Otago, Dunedin; 3Research Centre for Māori Health and Development, Massey University, Palmerston North, New Zealand

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Background: Comorbidity is very common among patients with cancer. Multidisciplinary team meetings (MDTs) are increasingly the context within which cancer treatment decisions are made internationally. Little is known about how comorbidity is considered, or impacts decisions, in MDTs.

Methods: A systematic literature review was conducted to evaluate previous evidence on consideration, and impact, of comorbidity in cancer MDT treatment decision making. Twenty-one original studies were included.

Results: Lack of information on comorbidity in MDTs impedes the ability of MDT members to make treatment recommendations, and for those recommendations to be implemented among patients with comorbidity. Where treatment is different from that recommended due to comorbidity, it is more conservative, despite evidence that such treatment may be tolerated and effective. MDT members are likely to be unaware of the extent to which issues such as comorbidity are ignored.

Conclusions: MDTs should systematically consider treatment of patients with comorbidity. Further research is needed to assist clinicians to undertake MDT decision making that appropriately addresses comorbidity. If this were to occur, it would likely contribute to improved outcomes for cancer patients with comorbidities.

Key words: cancer, comorbidity, decision making, multidisciplinary team meetings, systematic review

Introduction

Comorbidity is very common among patients with cancer and its consequences pose a major clinical challenge in the treatment of cancer. As comorbidities may adversely affect an individual’s access to, and the effectiveness of, major cancer treatments, it is also a significant prognostic factor for long-term survival from cancer [1–3]. Comorbidity acts on survival both through direct mechanisms related to the increased physiological burden of disease, and through indirect mechanisms related to the effects comorbidity has on treatment choice, timeliness and/or effectiveness. Cancer patients with comorbidity are considerably less likely to be offered active therapy [4–6]. However, there is growing evidence that such treatments can be both tolerated and effective by some patients with comorbidity [5, 7–10].

Internationally, multidisciplinary team meetings (MDTs) are increasingly the context within which cancer treatment decisions are made. In the literature, MDTs are referred to using a number of terms e.g. tumour boards, tumour meetings and multidisciplinary cancer team meetings. In this paper, we use the term MDT for consistency to refer to a ‘group of people of different healthcare disciplines, which meets together at a given time (whether physically in one place, or by video or teleconferencing) to discuss a given patient and who are each able to contribute independently to the diagnostic and treatment decisions about the patient’ [11]. MDTs are often highly pressurized, with high case-loads, little time to process highly technical information, and frequently have members absent [12–14]. Nevertheless, there is growing evidence that MDTs are associated with ‘improved clinical decision making, clinical outcomes, patient experience, and the working lives of team members’ [12]. Efforts are being made to find ways to strengthen MDT functioning [15].

Little is known about how comorbidity impacts decisions in cancer MDTs. The aim of this systematic review is to summarize and evaluate previous evidence on consideration, and impact, of comorbidity in cancer MDT treatment decision making and to make suggestions for future practice and research.

Materials and methods

Studies that reported the findings of original research which met the following criteria were included in this review: (i) published from January 2005 to May 2014 and in English in peer-reviewed journals, (ii) investigated MDT treatment decision making as a
primary or secondary objective, (iii) the MDT was focused on addressing a certain type, or types, of cancer, (iv) the studies addressed comorbidity.

The studies were identified using a systematic search of electronic databases, including Medline, CINAHL, Cochrane CENTRAL and Embase. The reference lists of retrieved articles included in the review were hand-searched and advice sought from experts in the field. Broad search terms were used to ensure all relevant articles were identified. The databases were searched with combinations of terms and variations of the following: ‘decision making’, ‘multidisciplinary team’, ‘neoplasm’ and ‘comorbidity’ (full details of the search strategy can be found in supplementary S1, available at Annals of Oncology online). The studies included were categorized and evaluated by three authors (JS, DS and LS). Methodological evaluation was based on previously established criteria [16]. Findings were synthesized using narrative summary.

results

A total of 659 articles were retrieved. Application of the inclusion criteria excluded 638 articles. Excluded articles did not consider comorbidity (see Figure 1 and supplementary S1, available at Annals of Oncology online, for details). The 21 articles reviewed were published between 2006 and 2014. The outcomes in the articles assessed were heterogeneous; thus, a meta-analytic approach was not possible. Of the 21 studies, 15 were quantitative [15, 17–30], and 6 were qualitative [14, 31–35]. Key characteristics of the papers are presented in Table 1.

The data sources were information obtained from medical records (n = 13) [17–22, 24–30], surveys (n = 2) [15, 23], routine data (n = 1) [24], observation (n = 2) [14, 15], semi-structured interviews (n = 5) [14, 31, 32, 34, 35], focus group [33] and ethnography [31]. Papers were from UK (n = 12) [14, 15, 17, 20, 21, 23, 29–32, 34, 35], Australia (n = 3) [18, 19, 33], China [22], USA [24], Germany [26], France (n = 2) [27, 28] and Sweden [25]. Eleven MDTs of specialty were represented in the original articles: gastrointestinal (n = 2) [17, 34], colorectal (n = 2) [20, 27], lung (n = 2) [18, 19], gynaecology (n = 2) [14, 31], breast (n = 4) [21, 22, 28, 30], head and neck [25], oesophageal [26], thoracic [24], prostate [29], urology (n = 2) [34, 35] and four unspecified [15, 23, 32, 33].

The MDT care studied was centred across UK cancer networks and hospitals (n = 10) [15, 17, 20, 21, 29–32, 34, 35], an Australian cancer therapy centre (n = 2) [18, 19] and hospital [33], hospitals in Hong Kong [22], France (n = 2) [27, 28], Sweden [25], Germany [26] and a Cancer Institute in Tennessee [24]. Fourteen studies looked at patient cases where MDT decisions had been made [15, 17–22, 24–30] and eight involved participants in MDTs [14, 15, 23, 31–35].

A summary of the findings is presented below for each of the thematic areas of interest.

is comorbidity considered in MDTs?

There were a number of studies that noted that comorbidity was not well considered in MDTs [14, 15, 23, 29, 32, 34, 35]. Kidger et al. [14] undertook observations of MDTs and interviews with MDT team members in the UK. They found that comorbidity was not routinely presented or discussed unless an MDT participant identified it as having the potential to influence treatment decisions, or when a patient was in particularly poor health. MDT participants had varying opinions about the presentation of comorbidity with some suggesting that it was included as necessary while others thought it needed more attention and could be systematically included [14]. Two other recent studies involving interviews with MDT members found that participants reported that insufficient information on comorbidity was a barrier to decision making [34, 35]. In the UK, Lamb et al. [15] observed MDT meetings and MDT members completed a self-assessment survey. The authors found that comorbidities were not well covered and that team members tended to overrate aspects of their performance, including their consideration of comorbidities. Two other studies noted that comorbidity was not always considered appropriately in MDTs [23, 32]. Kastner et al. [29] aimed to determine whether a particular measure of comorbidity (the Charlson Comorbidity Index) [36] would be a useful addition in the context of a prostate cancer MDT. Based on their finding that, a patient Charlson Comorbidity Index was associated with survival, they concluded that they should adopt this approach to explicitly considering comorbidity in their MDT.

impact of comorbidity on MDT decisions

There is evidence in the literature that information on comorbidity (or lack of it) has three implications for MDT decision making. First, MDT decisions are less likely to be made for patients with comorbidity. Three studies [25, 32, 33] found that lack of information on comorbidity was a barrier to reaching a clear treatment plan. Similarly, Kidger et al. [14] noted that, when treatment decisions were not made, this was due to the complexity of the case and the extent of agreement among team members. Clearly, comorbidity could be a reason for such complexity.

![Figure 1. Article inclusion flow diagram.](image-url)
<table>
<thead>
<tr>
<th>Study</th>
<th>Country</th>
<th>Study question</th>
<th>Main outcome</th>
<th>Sample</th>
<th>Design</th>
<th>Data collection</th>
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</thead>
<tbody>
<tr>
<td>Barthélémy et al. [28]</td>
<td>France</td>
<td>What is the impact of age, geriatric assessment and other variables on recommendations by tumour boards for adjuvant chemotherapy in elderly breast cancer patients?</td>
<td>Elderly patients were less likely to receive adjuvant chemotherapy even when deemed appropriate by guidelines ( (P &lt; 0.001) ).</td>
<td>( n = 192 ) decisions</td>
<td>Quantitative</td>
<td>Medical records</td>
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<tr>
<td>Blazeby et al. [17]</td>
<td>UK</td>
<td>Are upper GI MDT decisions implemented?</td>
<td>15.1% (95% CI 11.1% to 20%) of MDT decisions were not implemented. Reasons for discordance included comorbidity (43.9%). Non-implementation often resulted in more conservative treatment than originally planned.</td>
<td>( n = 271 ) decisions</td>
<td>Quantitative</td>
<td>Medical records</td>
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<tr>
<td>Bumm et al. [26]</td>
<td>Germany</td>
<td>What is the feasibility of a daily tumour MDT in a high-volume university hospital?</td>
<td>Comorbidities such as obesity (using BMI) for patients with oesophageal carcinoma (OC) and stress for patients with OC and gastric cancer (GC) are considered by the MDT when evaluating patients’ perioperative risk.</td>
<td>OC ( n = 1238 ) patients, GC ( n = 1212 ) patients</td>
<td>Quantitative</td>
<td>Medical records</td>
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<tr>
<td>Chan et al. [22]</td>
<td>China</td>
<td>What is the applicability of the multidisciplinary approach to the management of breast cancer?</td>
<td>Adjuvant treatment was not recommended by the multidisciplinary conference panel for 29 patients owing to old age or concomitant medical illness.</td>
<td>( n = 563 ) patients</td>
<td>Quantitative</td>
<td>Medical records</td>
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<tr>
<td>Devitt et al. [33]</td>
<td>Australia</td>
<td>What are the views of health professionals attending MDTs on decision making processes and meeting dynamics?</td>
<td>Psychosocial concerns of patients were often neglected and at times inadequate information on patients’ comorbid conditions constrained treatment recommendations.</td>
<td>( n = 4 ) focus groups, ( n = 23 ) participants</td>
<td>Qualitative</td>
<td>Focus group</td>
</tr>
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<td>English et al. [21]</td>
<td>UK</td>
<td>Are breast cancer MDT decisions implemented and what factors influence these processes?</td>
<td>6.9% (95% CI 4.3% to 10.5%) of MDT decisions were not implemented. Reasons for changes to MDT decision were patient preferences (65%), new clinical information (15%) and doctor’s view (20%).</td>
<td>( n = 289 ) decisions, ( n = 210 ) women</td>
<td>Quantitative</td>
<td>Medical records</td>
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<tr>
<td>Jalil et al. [34]</td>
<td>UK</td>
<td>What are the factors influencing decision making and decision implementation in cancer MDTs?</td>
<td>Barriers to clinical decision making included: inadequate clinical information; lack of investigation results; non-attendance of key members; teleconferencing failures. Barriers to implementation of MDT recommendations included: non-consideration of patients’ choices or comorbidities; disease progression at the time of implementation.</td>
<td>( n = 22 ) team members</td>
<td>Qualitative</td>
<td>Semi-structured interviews</td>
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<td>Kastner et al. [29]</td>
<td>UK</td>
<td>What is the feasibility of using the Charlson Comorbidity Index (CCI) in MDT planning of the treatment of patients with prostate cancer?</td>
<td>The CCI was a statistically significant predictor of survival, following radical treatment of localized prostate cancer ( (P = 0.005) ). The CCI was easy to calculate and therefore feasible to use in the MDT setting.</td>
<td>( n = 37 ) decisions</td>
<td>Quantitative</td>
<td>Medical records</td>
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<td>Study</td>
<td>Country</td>
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<td>Sample</td>
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<td>Kidger et al. [14]</td>
<td>UK</td>
<td>What factors influence treatment decision making in a gynaecological cancer MDT?</td>
<td>Patient-centred factors, such as comorbidity, were more peripheral and not routinely discussed. This was partly due to members’ type and level of participation: senior clinicians occupied the most dominant roles whereas nurses contributed less.</td>
<td>n = 1 MDT n = 16 team members</td>
<td>Qualitative</td>
<td>Meeting observation and semi-structured interviews</td>
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<td>Kurtz et al. [27]</td>
<td>France</td>
<td>Does age negatively impact on adjuvant chemotherapy in colorectal MDT decisions?</td>
<td>Disease stage was the major variable leading to adjuvant treatment recommendation, age and comorbidities were of lesser importance. Elderly colorectal cancer patients were not undertreated.</td>
<td>n = 193 decisions</td>
<td>Quantitative</td>
<td>Medical records</td>
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<tr>
<td>Lamb et al. [32]</td>
<td>UK</td>
<td>What are the attitudes of MDT members; what are the barriers and facilitators for effective teamwork; and what do MDT members consider best practice?</td>
<td>Ten respondents agreed that comorbidities (psychological and social problems) were adequately presented. Lack of information on comorbidities was identified by three respondents as a barrier to reaching a clear treatment plan at MDTs.</td>
<td>n = 19 MDT members</td>
<td>Qualitative</td>
<td>Semi-structured interviews</td>
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<td>Lamb et al. [23]</td>
<td>UK</td>
<td>What contribution do oncologists make to MDTs; what is their experience of leadership in MDTs and are they potential MDT leaders?</td>
<td>92% of respondents felt their MDT venue was fit for purpose. Information about patient comorbidities were less likely to be presented in MDTs when their venue was not fit for purpose ($P &lt; 0.05, \chi^2$).</td>
<td>n = 61 responses</td>
<td>Quantitative</td>
<td>Survey</td>
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<td>Lamb et al. [15]</td>
<td>UK</td>
<td>What quality of information is presented by MDT members and who contributes to decision making? Is there correlation between observational and self-reported metrics?</td>
<td>Quality of information presented: patient views and comorbidities/psychosocial issues rated lowest. A pronounced difference between expert observer rating and MDT member self-rating was found for the quality of patient-centred information (comorbidities, psychosocial issues, and patients’ views) presented to the team. Contribution to decision making: surgeons and oncologists rated highest and nurses and MDT coordinators lowest.</td>
<td>n = 164 cases n = 47 surveys n = 5 MDTs n = 67 team members</td>
<td>Quantitative</td>
<td>Observational tools and on-line self-assessment survey</td>
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<tr>
<td>Lanceley et al. [31]</td>
<td>UK</td>
<td>What influences clinical decisions made in a gynaecological cancer MDT?</td>
<td>There are three major influences: discussions are dominated by those with medical, surgical or diagnostic expertise; compliance with policy initiatives concerning diagnosis and treatment; and if the patient is known or not by members of the MDT. It was difficult for non-medical team members to contribute to the meeting even when patients had differing characteristics e.g. physical comorbidity.</td>
<td>n = 53 MDT participants</td>
<td>Qualitative</td>
<td>Ethnography, ethnographic field notes, semi-structured interviews</td>
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<tr>
<td>Study</td>
<td>Country</td>
<td>Title</td>
<td>Research Question</td>
<td>Findings</td>
<td>Study Design</td>
<td>Data Collection Methods</td>
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<td>Osarogiagbon et al. [24]</td>
<td>USA</td>
<td>What is the benefit of multidisciplinary thoracic oncology MDTs? When care deviates from that recommended what is the impact on patient outcomes?</td>
<td>235 patients received concordant care and 141 did not. Comorbidity in 14 of 104 instances was identified as a reason for clinician-induced discordance of care.</td>
<td>n = 376 patients</td>
<td>Quantitative</td>
<td>Medical records and Social Security Death Index</td>
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<td>Rajan et al. [30]</td>
<td>UK</td>
<td>To evaluate the implementation of MDT decisions for patients with breast cancer in a modern breast unit.</td>
<td>The vast majority of MDT decisions are implemented. Management alteration was most often due to patient choice or additional information available including that related to comorbidity after the MDT. A minority of management alterations were 'unjustifiable'.</td>
<td>n = 705 patients</td>
<td>Quantitative</td>
<td>Medical records</td>
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<tr>
<td>Sarkar et al. [35]</td>
<td>UK</td>
<td>To explore current practices in urology MDT meeting organization, case preparation and the potential for case selection from the perspective of team members.</td>
<td>Factors negatively influencing the MDTs included insufficient time to prepare cases so that enough information is available to make appropriate decisions: absence of the clinician in charge or not knowing the patient; and lack of a systematic approach to case discussion. Participants recommended improvements including protected time for case preparation and focusing on patient comorbidities.</td>
<td>n = 20 MDT participants</td>
<td>Qualitative</td>
<td>Semi-structured interviews</td>
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<tr>
<td>Stalfors et al. [25]</td>
<td>Sweden</td>
<td>What is the quality and efficacy of the head and neck oncology MDT?</td>
<td>Uncertainty regarding general cardiovascular status (6%) resulted in the inability to establish a diagnosis and treatment plans. 16% of these failures required complementary information.</td>
<td>n = 324 patients</td>
<td>Quantitative</td>
<td>Medical records</td>
</tr>
<tr>
<td>Vinod et al. [18]</td>
<td>Australia</td>
<td>Are MDT recommendations concordant with guidelines in the treatment of lung cancer?</td>
<td>Concordance with guidelines existed in 58% of surgical cases, 88% of radiotherapy cases and 77% of chemotherapy cases. Reasons for MDT not recommending guideline treatment included comorbidity (25%).</td>
<td>n = 335 patients</td>
<td>Quantitative</td>
<td>Medical records</td>
</tr>
<tr>
<td>Vinod et al. [19]</td>
<td>Australia</td>
<td>What are the reasons for lung cancer patients receiving no treatment?</td>
<td>Guidelines recommended no treatment in 4% of cases compared with 10% by MDT. Differences were due to comorbidities and clinician decision. 20% of patients actually received no treatment.</td>
<td>n = 335 patients</td>
<td>Quantitative</td>
<td>Medical records</td>
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<td>Wood et al. [20]</td>
<td>UK</td>
<td>Are colorectal MDT decisions implemented? And if not why?</td>
<td>The majority of decisions were implemented. 10% (95% CI 6.3–15.2) were not. Reasons for non-implementation included comorbidity (40%) resulting in more conservative treatment than planned.</td>
<td>n = 201 treatment decisions</td>
<td>Quantitative</td>
<td>Medical records</td>
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Second, decisions made for patients with comorbidity are less likely to be concordant with clinical guidelines. Vinod et al. [18, 19] found that 29% of lung cancer patients reviewed in MDTs received care outside of that recommended in the guidelines, and comorbidity was given as the reason for the disparity in a quarter of these [18]. Further, although the guideline recommended no treatment in 4% of patients, MDTs recommended no treatment in 10% [19]. Again, a key reason for the discrepancy was comorbidity (47%). Patients with at least one comorbid condition were more likely to have no treatment (24%) than those who did not have any such conditions (12%) \( (P = 0.005) \) [19]. Consistent with these findings, Kurtz et al. [27] assessed the extent to which treatment recommendations from MDTs within a single institute were consistent with guidelines. They found that both comorbidity and ‘old age’ were frequently cited causes for discordant treatment. Similarly, Chan et al. [22] found that comorbidity was cited as a reason for not recommending adjuvant treatment. In contrast, Barthélémy et al. [28] assessed whether recommendations for adjuvant chemotherapy for elderly patients with breast cancer were associated with categorization according to the Comprehensive Geriatric Assessment (which includes an assessment of comorbidity) and found little association. However, when patients did not receive recommended chemotherapy, age and comorbidity were still often cited as reasons.

Third, that even when treatment decisions are reached in MDTs, the actual treatment received is more likely to be discordant with that decision among patients with comorbidity. Several studies investigated reasons why MDT decisions were not implemented [17, 20–22, 24, 27, 28, 30, 34]. All but one [21] found comorbidity was an important reason for this discordance. Of the eight studies that found comorbidity was a reason for not implementing decisions [17, 20, 22, 24, 27, 28, 30, 34], seven were reviews of medical records [17, 20, 22, 24, 27, 28, 30] and one a report of MDT participants’ perspectives [34]. When decisions were changed post-MDT, as a result of new information about comorbidity, they resulted in more conservative treatment [17, 20].

discussion

To the best of our knowledge, this is the first review to assess consideration of comorbidity, and its impact, in cancer MDT decision making. We found a limited number of articles which examined comorbidity. The review results suggest that comorbidity is not well considered in MDTs [14, 15, 23, 29, 32, 34, 35]. MDTs are less likely to make treatment recommendations for patients with comorbidity [14, 25, 33] and, when recommendations are made, comorbidity appears to be a key reason for MDTs not making these in line with guidelines [18, 19, 22, 27, 28]. Further, when recommendations are made, comorbidity is a key reason for not implementing these [17, 20, 22, 24, 27, 28, 30, 34].

The evidence relating to the potential benefits and harms of cancer treatments among patients with comorbidity is scarce, not least of all because patients with comorbidity are often excluded from relevant randomized controlled trials [37, 38]. Consistent with the findings of this review, a number of vignette-based studies have found that surgeons and oncologists are less likely to refer or recommend treatment of cancer patients with comorbidity [39–41]. Clinicians may be concerned about potential toxicity or effectiveness of treatments among those with comorbidity, and/or may consider that some patients’ life expectancy is too short to justify the risks of treatment.

In fact, research relating to the risk of complications and effectiveness of cancer treatment in patients with comorbidity suggests that while there is evidence that some cancer patients with comorbidity may be at increased risk of post-therapeutic complications; this is not a consistent finding [42–46]. There is increasing evidence that much cancer treatment is tolerated and effective for some people with comorbidities [5, 7–10, 47]. It is likely that the large differences in treatment between those with comorbidity and those without may not always be justifiable from the point of view of treatment toxicity and complications [42].

There are two important implications of the findings of this review in relation to comorbidity. First, given the impact of lack of information on comorbidity both on the ability to make decisions in the MDT context, and for those decisions to be implemented, it seems reasonable to recommend that MDTs should systematically consider the comorbid status of patients. Other authors have made similar recommendations [17, 29, 34].

Second, very careful consideration should be given to the impact of comorbidity on treatment decisions. The inclusion of comorbidity in MDT decision making will only impact positively on care if it does not result in either under or over-treating such patients. This balance is a difficult one to achieve given the paucity of evidence to inform the issue.

Given that MDT members tend to overrate their performance, particularly in relation to patient-centred information [15], it is likely that members are not aware of the extent that issues, such as comorbidity, are ignored.

From a methodological viewpoint, this review reveals a number of shortcomings in the evidence base about consideration of comorbidity in MDT decision making. The studies were heterogeneous with diverse aims, samples and methodologies creating few opportunities for comparison between studies. The sample sizes in the quantitative studies were relatively small. All of the studies originated from developed countries and were published in English, and none assessed whether explicit consideration of comorbidity in MDTs actually positively impacted patient outcomes. However, these studies demonstrate that MDT decision making can be assessed for consideration of comorbidity using a range of methods including, review of patient records, surveys, meeting observation, semi-structured interviews with MDT participants and ethnography.

This review provides a very limited evidence base from which to draw conclusions about consideration of comorbidity in MDTs. However, the literature suggests that comorbidity is rarely considered in MDTs and, when it is, that it may result in more conservative treatment, despite evidence that such treatment may be well tolerated. MDT members are likely to be unaware of the extent to which issues such as comorbidity are ignored. Therefore, MDT members need to be informed of the evidence about the effectiveness of treatment of comorbid patients, standardized information about patient comorbidity should be gathered and provided to MDTs, and members should systematically consider treatment in light of this evidence of effectiveness for comorbid patients. If not, MDTs continue to be at risk of making
non-evidence-based recommendations that may adversely impact on patient outcomes.

Further research is needed to assist clinicians to undertake MDT decision making that appropriately addresses comorbidity. Lamb et al. [15] provide the basis for a toolkit for MDTs to use to evaluate decision making in their meetings. It would be good to see this, and other supports, developed in order to assist MDTs, including to appropriately address comorbidity. If this were to occur, it would likely contribute to improved outcomes for cancer patients with comorbidities.

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disclosure
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