
The Royal Australian and New Zealand College of
Radiologists

QUALITY USE OF DIAGNOSTIC IMAGING PROGRAM - QUALITY CONSUMER SERVICES

PROJECT CS06:

*The Role of the Radiologist in the
Multidisciplinary Care Team (MDT)*

FINAL REPORT

Submitted by

Australia's Health Pty Ltd

5 NOVEMBER 2008



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NOTE:

The Project Team was commissioned to undertake this work by the QUDI Program, a program managed by RANZCR and funded by the Australian Government.

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PURPOSE

This Report is submitted as the key milestone for Stage 4 of the QUDI project: '*CS06: The role of the Radiologist in the Multidisciplinary Care Team [MDT]*'.

It presents the completed project activities defined in the Contract between RANZCR and Australia's Health P/L dated 8 May 2008. Project activities were formally commenced on 15 May and completed on 15 September 2008.

This Draft version of the Final Report is submitted to the QUDI Program Manager for distribution to the relevant RANZCR members of the Project Management Group and Technical Reference Group for review and feedback.

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- The members of the Project Management Group:

Dr Liz Kenny - Immediate Past President of RANZCR
Dr Catherine Mandel - National QUDI Liaison Radiologist
Ms Ann Revell - Consumer Representative, Breast Cancer Network of Australia
Dr Jane Phillips - Cancer Australia
Ms Jane Grimm - QUDI Program Manager

- The Multidisciplinary Care Teams who permitted our attendance and observation of representative team meetings, and the Team Leader and Team Coordinators who facilitated this access
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CONTENTS

EXECUTIVE SUMMARY.....	4
BACKGROUND.....	7
METHODOLOGY.....	10
Project Management.....	10
Environmental Scan.....	10
Literature review.....	12
Stakeholder Consultation.....	13
Analysis and interpretation.....	14
RESULTS.....	16
Environmental Scan.....	16
Literature Review.....	19
Conceptualising MDT.....	20
Implementing MDT for breast cancer.....	23
MDT processes.....	29
Benefits of MDT.....	33
Team Membership.....	38
Role of radiologists in MDT.....	41
Barriers and their resolution.....	47
Benefits of involving radiologists in MDT.....	53
Stakeholder consultation.....	56
DISCUSSION.....	60
CONCLUSION.....	70
RECOMMENDATIONS.....	73
GLOSSARY.....	76
REFERENCES.....	77
APPENDIX A: KEY STAKEHOLDER ORGANISATIONS CONSULTED.....	82
APPENDIX B: LITERATURE SUMMARIES.....	83

In May 2008 RANZCR commissioned Australia's Health P/L to conduct this project and report its outcomes in September 2008. Work Plan for the project included requirement for a systematic literature review, stakeholder consultations and critical evaluation of the models of MDT care to identify the value of radiologist participation in MDT, barriers and enablers to radiologist participation, and identify models of MDT that facilitate radiologist involvement in MDT. Breast cancer was to provide the context for the project.

The literature review systematically assessed publications using the NHMRC 'Levels of Evidence' guidelines and identified 60 publications meeting the inclusion criteria. The majority of these were assessed as either Level III or Level IV studies (mostly observational or descriptive studies conducted without intervention, or reports of expert committees).

There is almost no discussion in the literature about the roles any of the core disciplines contribute to team functioning, and little evidence of systematic evaluation of MDT outcomes at this time. Stakeholder consultations were completed as a part of an initial environmental scan, and during targeted interactions with radiologists who participated in MDT for breast and other cancer. Observational visits to three examples of MDTs were also conducted. The composite data from these activities showed that:

Use of MDT in breast cancer: The model of MDT implemented in Australia varies as does the definition of what constitutes an MDT, and this is reported to appropriately reflect the complexities of the Australian service environment, workforce limitations and funding models. It is noteworthy that the recommendations of the National Breast Cancer Centre [NBCC] outlined in Multidisciplinary Meetings for Cancer Care: A guide for Service Providers (NBCC, 2005) and the NHMRC Clinical Practice Guidelines for the Management of Early Breast Cancer (NHMRC 2001) both indicate the need for flexibility in implementation to respond to local service needs and workforce availability.

Two models of MDT in breast cancer were evident in Australia:

- a 'pre-intervention' model in which the diagnosis and disease staging is confirmed, and comprehensive treatment planning is undertaken by a team commonly comprising the six 'core disciplines' identified in the literature and the guidelines referred to above (breast surgeon, radiation oncologist, medical oncologist, pathologist, nurse and radiologist), and
- a 'post intervention' model in which the MDT is convened after the initial intervention has taken place and the primary focus

of the team is on review of the outcomes of the intervention and subsequent treatment planning including adjuvant therapy.

Current level of radiologist involvement: Radiologists are identified as one of the core disciplines for MDT, and participation rates in teams are reported to be high and reasonably consistent over time. The composition of the teams reported in the literature is however, largely based on retrospective self-reported data provided by disciplines *other* than radiologists. In our consultations, radiologists identified a number of benefits they attribute to MDT membership: contribution of specialist expertise to team decision-making and treatment planning; team and resource use efficiency; inter-professional collegial support; quality improvement activities; personal satisfaction; training and education; research outcomes. The literature reports a number of benefits attributable to radiologist input to team decision-making, including changing the initial diagnosis and initial therapy (>50% cases) and clarifying the diagnostic strategy or refining therapeutic decisions (>65% cases) of clinician members.

Barriers and enablers to radiologist participation:

Factors identified as barriers to radiologist participation included: attributes of practice and setting; workforce scarcity and geographic dispersion of services and population; workload, other service demands and lack of protected time; lack of information on effectiveness of working in MDT; and lack of adequate infrastructure and administrative support.

Factors enabling radiologist participation included: evidence-based guidelines and adherence to these; governance structures that promoted collaboration; leadership possessing well-developed facilitation skills; supporting infrastructure including venue, facilities and equipment to support timely access to information and information exchange; presence of a 'champion' to drive change.

Models of MDT that help facilitate radiologist participation: The 'pre-intervention' model of MDT (that is closest to the recommendations of NHMRC and NBCC) is reported to enable radiologists to contribute their specialist expertise and derive greater benefit in relation to educational and professional development. The 'post-intervention' model of MDT provides limited opportunities for radiologist participation, since at this stage the primary focus is on planning following intervention, and this is predominantly about adjuvant therapy. Radiologist presence at teams using this model is noted to be an inefficient use of their time given other service requirements.

Recommendations for encouraging participation:

These recommendations are structured around areas for action at a national and jurisdictional policy and program level; at an institution and service level; and at the level of research evidence.

- RANZCR engagement with MDT policy and program research and development at the national and jurisdictional level is important to ensure an appropriate focus on the role of the radiologist in MDT, and guide research and evaluation activities being undertaken.
- The establishment of an 'MDT interest group' within RANZCR membership could support information and best practice exchange, and facilitate radiologist representation and input to other groups' research and policy development.
- Standards for radiologist participation in MDT should be promoted to institutions and services using MDT, including advice on the resources necessary to support their contribution.
- The benefits of their participation in MDT also need to be promoted to radiologists, and this could be addressed through the education and professional development programs of RANZCR.
- RANZCR could promote research by radiologists into MDT solutions addressing geographic and workforce barriers; the contribution of radiologists' role to MDT functions, outcomes and quality assurance; and benefits to radiologists of involvement in different models of MDT.

BACKGROUND

The Royal Australian and New Zealand College of Radiologists (RANZCR) through the Quality Use of Diagnostic Imaging (QUDI) Program published a *Request for Proposal* to undertake consultancy services to conduct the project 'CS06: The Role of the Radiologist in Multidisciplinary Care Teams [MDT]' in April 2008. This project falls under the 'Quality Consumer Services' sub-program that aims to develop and improve consumer focussed, accessible and coordinated services that promote informed choice and meet consumer needs.

The Request for Proposal invited

"a suitably qualified consultant (individual or organisation) to undertake a project to focus on the role of the Radiologist in the Multidisciplinary Care Team (MDT). This project will inform future work of the QUDI Program in this area, and is an identified project under the Quality Consumer Services Sub-Program 2006-07 QUDI Annual Work Plan.

The purpose of this project is to:

- 1. Establish and promote the value of radiologist participation in MDT*
- 2. Identify the enablers and barriers to radiologist participation in MDT*
- 3. Identify/develop models of MDT that facilitate radiologist involvement in MDT".*

The scope of the project was defined in the Request for Proposal:

"The context of the project will be the management of early and advanced breast cancer" .

The Request for Proposal noted that:

- Evidence already exists from extensive research in Australia and overseas that MDT is best practice in the treatment and care of breast cancer¹, especially in relation to concordance with evidence-based guidelines², and is an accepted standard for the delivery of best practice in cancer care overseas³ and in Australian Guidelines⁴. In 2003, the National Breast Cancer*

¹ Senate Affairs Reference Committee (2005). The Cancer Journey: Informing Choice. Report on the inquiry into services and treatment options for persons with cancer. Commonwealth of Australia. Submission from the Department of Health & Ageing, Canberra.

² National Breast Cancer Centre (2003). Multidisciplinary Care in Australia: A National Demonstration Project in Breast Cancer. Summary Report, National Breast Cancer Centre.

³ Peter MacCallum Cancer Centre - cited in Senate Community Affairs References Committee (2005. *Op. cit*).

⁴ National Health Priority Action Council (NHPAC) (2006). National Service Improvement Framework for Cancer, Australian Government Department of Health & Ageing, Canberra

Centre (NBCC) supported by the Australian Government Department of Health and Ageing released its report 'MDC care in Australia: a National Demonstration Project in Breast Cancer' and reported that decisions made by MDT are more likely to be in accordance with evidence based guidelines than those made by individual clinicians.

- Support for MDT in cancer care is reflected in the recommendations of the 2005 Senate Inquiry into cancer treatment options⁵, especially the promotion of MDT within the medical and allied health professions, including within curricula and funding arrangements⁶. One focus of the Senate Inquiry was on the increasing burden of cancer in Australia and needing to ensure the best use of cancer resources, their recommendations included action by the Department of Health and Ageing to ease this burden at all levels.
- The premise of MDT - multidisciplinary, holistic care, delivered by an integrated team attentive to the patient's preferences - is strongly supported by consumers, the RANZCR and especially the Faculty of Radiation Oncology⁷. Breast cancer consumers recognise the importance of radiologists in their treatment and care and have strong views about how this treatment is delivered. Benefits to consumers include:
 - o treatment is more likely to be in accordance with evidence-based best practice;
 - o the professional with the most knowledge of the diagnostic and treatment options administered through radiology departments and practices has a direct role in patient care;
 - o Enhanced communication between all medical providers and the patient in the planning and provision of cancer treatment; and
 - o MDT delivers a holistic approach to the treatment of cancer that meets the needs of the patient and the requirements for treating the disease.
- The importance of communication and collaboration between core disciplines and the patient is critical for continuity and a greater effectiveness of care, especially for patients living in rural/remote areas, Aboriginal and Torres Strait Islanders and those for whom English is not their first language.

The Request for Proposal further noted that

⁵ Senate Community Affairs References Committee (2005). *Op.cit.*

⁶ Senate Community Affairs References Committee (2005). *Op. cit.*

⁷ RANZCR Faculty of Radiation Oncology (2005). Submission to the Senate Community Affairs References Committee (2005). *Op.cit.*

- RANZCR's Faculty of Radiation Oncology in its submission to the Senate Committee ¹quoted a report 'Optimising Cancer Care in Australia'(2003)⁸ that showed Australia was not delivering the type of coordinated care which consumers want and clinicians know would be valuable. It stated the Faculty endorsed the principles contained in the report and strongly recommended the Senate Committee give its recommendations full consideration.
- The RANZCR is promoting the role of the radiologist as a clinical specialist. It represents a profession that is crucial in the diagnosis and treatment of breast cancer. Frustration is expressed by many radiologists at their isolation from, and lack of direct input into, patient treatment decisions. Additionally, governments are seeking better ways to use existing resources, especially in the future when a greater number of patients will be requiring medical services provided by a smaller number of medical practitioners.
- The critical nature of the radiologist in the diagnosis and treatment of cancer is heightened by on-going rapid and complex technological advances that make it essential for the radiologist, who is the expert in this field, to be involved in treatment decisions.
- It is important that QUDI now identifies the extent to which radiologists are currently involved in MDT, the barriers and enablers to their involvement and to consider strategies that will assist radiologists to participate more effectively in MDT.
- It is vital that research is undertaken to identify the extent to which radiologists are involved, as clinicians, in MDTs and how this can be improved. Research into what models of MDT are being utilised and/or what would be conducive to a greater involvement in MDT by radiologists should also be undertaken.
- The QUDI Program needs evidential research, on which to base guidance to the profession, on what is, and will increasingly be, the preferred model of care. There are unique and specific issues for radiologists taking their place in MDTs, especially those in private practice.
- This project is intended to build on the evidence from the 2003 NBCC research that MDT is the best practice model of care for breast cancer, and the knowledge that MDT is recommended by a significant range of stakeholders as a preferred model of care for cancer patients.

⁸ McAvoy B (2003). Optimising Cancer Care in Australia. Australian Family Physician, 32(5):369-72.

The RANZCR required the Consultant to complete a comprehensive review of existing Australian and international literature, conduct structured interviews of MDT participants and critically evaluate MDT models of care to establish:

- *The current level of radiologist involvement in MDT and how widespread the use of MDT is in the treatment of breast cancer*
- *The barriers and enablers to radiologists participating in MDT*
- *What MDT models best facilitate radiologist involvement in MDT*
- *Recommendations for encouraging radiologist participation in MDT and informing other MDT members of the value of radiologist involvement in MDT*

Australia's Health P/L was commissioned by the RANZCR on 8 May 2008 to undertake the project, and the scope of project work was confirmed in the Consultants' Work Plan presented to the RANZCR on 17 May 2008.

METHODOLOGY

PROJECT MANAGEMENT

In support of this project, RANZCR made guidance in the design, development and implementation of the project available through the QUDI Program Manager, and facilitated the establishment of a specific Project Management Group comprising representation from RANZCR, a consumer representative, and the QUDI Program Manager to oversight the progress of the project in keeping with the agreed Work Plan.

Communication with the Project Management Group was mutually agreed to be conducted by telephone and email as required.

ENVIRONMENTAL SCAN

The Work Plan agreed to between RANZCR and the Consultants included a rapid environmental scan to assess the extent MDT use in Australia particularly for the management of early and advanced breast cancer, and identify key issues in relation to MDT, including the

participation and role of radiologists in teams. The scan was also intended to assist in the identification of potential participants for the consultation activities and to help guide relevant and informed content for the semi-structured interviews to be used in the consultation.

The information derived from the environmental scan was expected to provide a set of baseline assumptions about the role and contribution of radiologists to MDT that can then be tested and critically reviewed in the light of consultation and literature review data.

A preliminary scan of the literature was conducted prior to commencement of the project to identify some of the issues likely to be relevant to it. This preliminary understanding was used together with the issues identified by the RANZCR in the Request for Proposal and those discussed with key QUDI Program staff during the Project Initiation meeting, to commence the Environmental Scan.

The Environmental Scan was designed to 'snowball' so that as discussions took place with the Project Management Group and the stakeholders identified in the early stage of the project, the themes emerging from these would contribute to the scan. Interview feedback would also supplement the scan.

The Project Management Group, and each of the stakeholders contacted during this stage would be invited to:

- identify MDTs currently operating in Australia that they considered were good demonstrations of the MDT approach or particular aspects of it;
- nominate from their own perspective, any key issues relating to MDT and their operation;
- identify the role(s) they considered radiologists take currently within MDT, and any factors they considered acted as barriers or enablers to radiologist participation; and
- suggest key informants within MDT centres as possible candidates for the consultation interviews.

The Project Management Group would be provided with a summary of key points emerging from the Environmental Scan as part of the scheduled project updates for their consideration. Any feedback received from the Project Management Group about the summary would be incorporated as appropriate in the materials developed for the semi-structured interviews and the literature review.

Key informants were contacted by telephone and email to outline the project and invite their participation. Follow up interviews were completed by the Consultants at mutually convenient times and included in the project data set.

A brief project description and invitation to contribute views about MDT in relation to breast cancer was included in the RANZCR e-newsletter for distribution to College Fellows.

As part of the Environmental Scan, the Consultants made a brief presentation to the RANZCR Council outlining the issues and key questions identified to date, together with possible MDTs for inclusion in the consultation activities, for Councillors' consideration and advice.

LITERATURE REVIEW

The literature review was undertaken between May and September 2008, using a standardised approach:

- The scope and parameters for the review, including search terms, search strategy, inclusion and exclusion criteria, and years of publication were clearly defined prior to commencement of the review
- Search and retrieval was completed through the library services of the University of Queensland
- Literature meeting the specific search criteria was retrieved and assessed by the consultants using the current nationally recognised evaluation framework (the NHMRC 'Levels of Evidence' hierarchy described below)
- Reference lists and bibliographies of retrieved literature were also examined for additional literature of potential relevance to the project.
- Summaries derived from the retrieved and reviewed literature were incorporated into a database to facilitate analysis and interpretation, and subsequent inclusion in the draft and final reports.

Search terms included: Radiologist/Radiology; Radiotherapy; Imaging; Multidisciplinary Care/Team/Service; Breast/Cancer; Role; Standards; Quality/Best practice; Patient/Consumer; Outcomes.

Computerised literature searches were made of the following databases: EMBASE; MEDLINE (via OVID); Cochrane Library; CINAHL; ISI Web of Knowledge - current contents; Medical Journal of Australia; Journal of Medical Imaging and Radiation Oncology (formerly Australasian Radiology). Other information sources included relevant organisation publications and documents such as the Senate and NBCC reports, information from MDT services or groups and from other organisations addressing MDT services in Australia and identified during the consultation phase of the project.

Inclusion criteria: published full text, peer-reviewed articles and information in relevant published reports; English language only; published between 1998 and 2008; and where available, any systematic reviews and meta analyses of studies conducted in patient groups comprising only those with diagnosis of breast cancer.

Exclusion criteria: studies published only in abstract form; in languages other than English; and publication dates prior to 1998 were excluded from the search.

Levels of evidence: NHMRC notes that the Levels of Evidence focus primarily on assessing the clinical evidence for interventions and recognises that the levels have been found to be too restrictive, particularly where the areas of study do not lend themselves to research designs appropriate to intervention studies (i.e. randomised controlled trials) (NHMRC, 2008).

A new evidence hierarchy was subsequently developed by NHMRC in 2005, which assigned evidence according to the type of research question recognising the importance of appropriate research design to that question. The hierarchy included new levels for studies relevant for guidelines on diagnosis, prognosis, aetiology and screening. The feedback on its usability and applicability has led to a revised and expanded hierarchy that is now the subject of public consultation until mid 2009 (NHMRC 2008).

While the new criteria would be more appropriate for the literature selected for the current review, the consultation paper published by NHMRC makes it clear that finalisation of the criteria is subject to feedback through the public consultation process which extends until mid-2009, and further consideration by the Evidence Translation Section.

Accordingly, we chose to assess the quality of the literature included in this project applying the current guidelines as closely as possible, bearing in mind the new criteria which provide greater guidance on how the type of evidence captured by this project might be assessed. A framework for summarising each paper was developed (Appendix A) and populated as each paper was reviewed.

STAKEHOLDER CONSULTATION

Semi-structured interviews with key informants were conducted to collect information and understand their perspectives on MDT in general and in relation to breast cancer services and radiologist roles in MDT specifically. The interviews were intended to provide an additional environmental scanning opportunity where participants suggested additional publications or contacts relevant to the project, and to contribute to the critical appraisal stage by testing assumptions derived from the environmental scan and the literature review.

The following processes were used to complete this project activity:

- Informed by the themes emerging from the literature review, relevant reports, the environmental scan, and preliminary discussions with RANZCR, a semi-structured interview guide was developed for appropriate administration by telephone, email or face to face recognising the busy nature of radiology practice and cancer services, and the likely time constraints of any interview participant.

- Potential respondents were contacted to arrange mutually convenient times to brief them about the purpose of the interview, gain their agreement to participate, and invite their completion of the interview, either by phone or its return by email. In advance of the interview, informants were provided with the interview materials so they could reflect on the issues being canvassed.
- A non-representative selection of three services (1 public, 2 private, located in metropolitan Sydney) operating MDT services for breast cancer, and that involved radiologists as core members of the team, agreed to host visits to scheduled team meetings to meet team members, observe team processes and functioning, and consult directly with the Team Leader, Team Coordinator, Radiologist and other team members (as available) to gain their perspectives on MDT and the role of radiologists within teams.
- Data from the site visits and interviews was incorporated into the project database for subsequent analysis and interpretation. The anonymity of respondents was guaranteed, therefore individual responses have been aggregated. A list of the organisations consulted as part of this project is provided in Appendix A.

ANALYSIS AND INTERPRETATION

The following processes were completed in order to critically evaluate MDT models of care as required by the Request for Proposal.

- Triangulation of all data arising from the project activities facilitated testing and validation of preliminary conclusions, and enhanced the reliability and generalisation of findings. The multi-method approach enabled data collection activities to be cross-referenced.
- The outcomes of the Environmental Scan were reviewed in light of the literature, stakeholder and participant feedback to develop key project findings for further review and confirmation
- Stakeholder consultations were conducted successively so that as common themes were identified these could be tested iteratively and interpretations strengthened.
- One of the Consultants conducted the literature search through the library of the University of Queensland using the parameters described above. Individual studies included in this systematic review were assessed using the NHMRC dimensions of evidence and the reviewers followed the basic principles of systematic reviewing and assessing evidence (NHMRC 2001). Assessment of the quality of the evidence was completed by a second Consultant practiced in this process, and summaries of the key elements of each paper were entered into the matrix developed for this purpose.

Levels of evidence

The NHMRC dimensions of evidence comprise a hierarchical four-level rating system recommended by the Quality of Care and Health Outcomes Committee and adapted from the system developed by the US Preventive Services Task Force (NHMRC 2001).

Level I Evidence is obtained from a systematic review of all randomised controlled trials

Level II Evidence is obtained from at least one properly designed randomised controlled trial

Level III Evidence is obtained from well designed controlled trials without randomisation; OR from well designed cohort or case control analytic studies, preferably from more than one centre of research group; OR from multiple time series with or without intervention

Level IV This represents the opinions of respected authorities based on clinical experience, descriptive studies or reports of expert committees

- The draft report together with potential recommendations meeting the objectives of the project, and based on triangulation of all project information was presented to the Project Management Group for feedback.
- A work-in-progress presentation was made to the RANZCR Council on the issues and understanding emerging from the Environmental Scan, and Councillors' views were invited at the completion of that presentation.
- A progress report outlining the key issues identified to date was also provided to RANZCR to facilitate discussion and feedback on our interpretations, and to inform the development of the draft and final reports including the recommendations proposed in relation to MDT.

RESULTS

Our results are presented in the order in which project activities were conducted.

Environmental Scan

This scan provided an initial assessment of the current status and key issues in MDT; in Australia; and in breast cancer services in Australia. It assisted the identification of potential participants for the consultation and site visit activities of the project; helped guide relevant and informed content for semi-structured interviews with key informants; and additional guidance to literature for consideration in the review component. A set of baseline assumptions about the role and contribution of radiologists to MDT derived from the environmental scan were subsequently tested and critically reviewed in the light of the consultation and literature review data.

Key informants for the environmental scan were identified in collaboration with RANZCR and the Project Management Group, and contacted by telephone during May - August 2008. Their perspectives were sought on the issues identified in the Request for Proposal; those arising from our preliminary scan of the literature; and those identified during the Project Initiation meeting with RANZCR.

Key issues underpinning the environmental scan were:

1. the identification of MDT currently operating in Australia;
2. issues about MDT from each stakeholder group's perspective; and
3. stakeholder views on the role of radiologists within MDT, including any barriers and enablers to their participation.

As part of the environmental scan, we reviewed current publications, conducted a preliminary literature review and interviewed five key informants for their views on the project scope and potential information sources. The broad outcomes of the scan are described below, and detailed information based on this preliminary stage is described in later sections of this report.

Preliminary stakeholder views

Consumer perspectives: The integration of cancer care promised by MDT was welcomed by consumers who had previously experienced care

delivery that had been fragmented between multiple institutions. Our initial research suggested that while MDT is clearly established as the recommended standard for delivery of breast cancer treatment, the implementation of this varies widely across Australia, from informal arrangements supporting discussion between specialists, to formal, fully established and well coordinated MDT. Consumer experiences of MDT reflect this variation.

A consumer view expressed at this time was that access to an MDT was purely "the luck of the draw" as these were not systematically adopted by cancer services. MDT team members do not necessarily have easily identified team roles and in general terms the interaction between the consumer and the radiologist was 'buffered' by members of other disciplines. It was felt that radiologists possess well developed knowledge of and experience with the complex technology relevant to breast cancer, and radiologist involvement in the care planning process is essential to it. Consumer discussions with radiologists should not just relate to the cost of imaging, but also include discussions about access and time taken for imaging to be conducted and reported. Consumers remain under-represented as active participants in the decision-making of most MDTs, and attend sessions post MDT to discuss the recommendations made by the team.

Radiologist perspectives: Early indications were that while radiologist involvement in existing teams is not uncommon, GP and consumer involvement is much less common. Radiologists noted differences between MDT in metropolitan facilities and those in regional and rural areas; and between public and private sector settings. Process issues included funding arrangements, team coordination, team leadership, contribution to team decision making, infrastructure issues, and logistic and technical support.

The key informants contributing to this scan identified examples of MDT's in NSW, Victoria, Qld, SA and WA they considered to be good examples of MDTs in action, and these included sites located in metropolitan and regional locations, and within the public and private sector. These were suggested as possible sites for engagement in the consultation activities. Key contacts within each of the nominated sites were also identified. Informants at this stage considered that most of the MDTs convened formally for the first time after diagnosis and initial surgical treatment had commenced rather than as a mechanism for the multidisciplinary review of patient information to make diagnoses and recommend treatment plans.

Our request for comment through the QUDI e-newsletter received two responses from radiologists involved in MDT, one in northern NSW and the other in New Zealand. Our initial consultations have also identified a number of groups with relevant information on MDT in breast cancer including cancer monitoring and data agencies in NSW, Qld and Victoria.

Preliminary literature scan

The preliminary scan of literature identified a number of publications meeting the search criteria. These included refereed journal papers and major publications from Australian organisations and agencies, including the National Breast and Ovarian Cancer Centre (NBOCC). Much of the literature identified at this stage of the project comprised descriptive or observational studies of teams in Australia and elsewhere; reports based on self-reported retrospective data from team members, such as team composition and attendance at MDT meetings, or attributes of teams, settings, and support; and activities completed in preparation for and during team meetings. Empirical studies of the outcomes of MDT and the particular role and contribution of key disciplines to team functions and outcomes were rare.

Many of the reports identified key members of teams, and included radiologists in this group, however it was noteworthy that team composition data was commonly derived from retrospective recall from disciplines other than radiologists. Disciplines identified as 'core' to MDT were: breast surgeons, medical oncologists, radiation oncologist, radiologist, pathologist and breast care nurses.

Key points made in the literature indicated that:

- There is an increased demand for MDT especially in relation to coordinated best practice care over the whole of the care continuum. MDT is based on principles of multidisciplinary care: team approach, good communication, access to full range of therapies, maintenance of standards of care, and patient involvement in decision-making.
- MDT models are dynamic rather than fixed and invariable. Flexibility in the application of MDT allows for pragmatic responses to the differences between sites, such as public or private settings, metropolitan or regional locations. Team composition, working methods and workloads are reported to positively relate to team efficacy.
- Much of the MDT literature refers to 'core disciplines' necessary for teams, and includes radiation oncologists and radiologists in these. Reports over time indicate that these disciplines are fairly well represented in Australian MDTs, however rural teams are less likely than their metropolitan and regional counterparts to include radiation oncologists and pathologists (possibly reflecting workforce deficiencies in rural settings). As noted above, GPs and patients are significantly absent from MDT processes.
- The nature of the MDT approach is noted to impose additional demands for role clarity within teams - a factor noted to be important to the efficiency of team functioning - however there is limited discussion of the role any discipline might take within teams. Many reports allude to surgical leadership of the MDT.

- While radiologists and radiation oncologists are identified as experts occupying a key role in MDT in breast cancer, discussion on any differential roles within the MDT and the relative contribution the role makes to the overall outcome is not a priority in discussions in the literature. Generally it appears that there may be a lack of multidisciplinary awareness and unclear role boundaries.
- A limited number of publications discuss the diagnostic and therapeutic benefits of radiologist participation in MDT. In those publications identified so far, the benefits are reported to range from changing initial diagnosis and initial therapy (>50% cases) to clarifying diagnostic strategy or refining therapeutic decision (>65% cases) of clinician members.
- Success of MDTs is reported to hinge on leadership and coordination, and capacity building in these two key roles is noted as a prerequisite for effective team work. Training (of the other members) to work as a team is also recognised as necessary to both functioning and participation.
- MDT participation has a significant number of resource implications, including time management, meeting preparation and coordination, team membership, linkage across continuum of care, data exchange mechanisms, and shared professional liability for team decisions.

This initial scan of the literature was developed in the next stage of the project - a systematic review of the literature.

Literature Review

The methodology for conducting the systematic literature review was described earlier in this report. The review examined MDT in the context of breast cancer, to identify uptake in Australia, characteristics of MDT processes, radiologist participation and roles within teams, and exemplars that could be used for conveying MDT messages to radiologists, other MDT team members, and consumers.

The search strategy identified 60 publications that met the inclusion criteria defined in the Work Plan or from examination of the bibliographies of the retrieved papers. Each paper was considered for the insight it provided into the role radiologists take within teams.

In the majority of studies meeting the inclusion criteria for this review, there has been no reported intervention, nor have they been conducted under randomised controlled conditions. Rather, they tend

to be descriptive, observational, based on clinical experience, or reports of expert committees (Level IV). There are a smaller number of studies comprising case series or cohort studies mostly from more than one centre or research group, or time series without intervention (Level III). We have identified only one study that was based on a randomised controlled trial (Level II).

As noted in the review, there is little published discussion on the role that any team member takes other than general discussion about the contribution of team leadership and coordination to effective team functioning. Apart from nominating radiologists as core members of team, there is almost no discussion of the role they take within teams. Given this significant limitation, each retrieved paper was also considered for any insights it reported about team composition, processes and outcomes, to determine how these might be applied to understanding the present or future role of radiologists in MDT.

Our summary of the material reviewed is presented using the broad categories of:

- Conceptualising MDT
- Implementation of MDT for breast cancer
- MDT processes
- Team membership
- Role of radiologists in MDT
- Barriers and their resolution
- Benefits of MDT
- Benefits of involving radiologists in MDT

CONCEPTUALISING MDT

Defining multidisciplinary care and MDT is particularly relevant in the Australian context, given the mix of private and public service provision in Australia, and significant regional variations in delivery of and access to services.

Multidisciplinary care is defined as 'an integrated team approach to health care in which medical and allied health care professionals consider all relevant treatment options and develop collaboratively an individual treatment plan for each patient' (NBCC 2003).

Marsh, Boulton, Wang, Maddern, Roder & Kollas (2008) indicate the definition of multidisciplinary care remains fluid in the literature and among health professionals, with no one interpretation being a perfect fit for all situations (Zorbas, Barraclough, Rainbird, Luxford & Redman 2003; NBCC 2006; Whelan, Griffith & Archer 2006; Harrison, Choy, Spillane, Butow, Young & Evans 2008) and its delivery varies along the dimension of disease-focussed care to patient oriented disease management, for example in breast cancer ranging from providing same day, single point of access to appropriate specialists ("one-stop-shop"), to scheduled treatment planning meetings that include all relevant specialists plus the patient (Zorbas et al 2003; Choy, Chiu, Butow, Young & Spillane 2006). Other centres focus on providing information and support in a multidisciplinary setting in the first post-operative consultation and in the UK, designated Cancer Units provide specialist diagnostic and therapeutic expertise together with facilities for managing common cancers (Zorbas et al 2003).

The Clinical Oncological Society of Australia, The Cancer Council of Australia & The National Cancer Control Initiative (COSA, CCA & NCCI) Report indicates that there is some variability in opinions of what multidisciplinary care is, who needs to be involved and who needs it. The same Report notes that:

'some providers and consumers firmly believe that all or nearly all new cases of cancer should have the diagnosis and staging confirmed, and a treatment plan agreed, at a multidisciplinary team meeting. Others (providers more than consumers) feel a lesser model is appropriate, one that requires 'agreements' between clinicians that treatment is in accordance with institutional protocols (agreed by the team), with serious cases referred to the team meeting for discussion. Clinicians practising wholly or substantially in the private sector, however, often express a different view. They feel that the present system of patients seeing specialists serially works well. They argue it is cost-effective and is presently funded under the MBS, which integrated multidisciplinary team meetings are not. They can refer to their colleagues in other specialties quite readily: very quickly if the need arises. Multidisciplinary care can apply to both initial treatment and ongoing care' (COSA, CCA & NCCI 2003 p16).

The literature indicates that most appropriate way of providing this collaborative multidisciplinary approach is to bring together an integrated team comprising different professionals possessing a variety of skills necessary to produce safe and effective care to patients liaise and collaborate with one another and in consultation with the patient diagnose, treat and manage the condition to the best possible standards of care (CanNET National Support & Evaluation Service-Siggins Miller 2008; Zorbas et al 2003; Firth-Cozens 2001). Flessig, Jenkins, Catt & Fallowfield 2006 report that the UK Department of Health defines a MDT as

'a group of people of different health-care 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 able to contribute independently to the diagnostic and treatment decisions about the patient'.

This dedicated team of medical and allied health professionals thus provides the multidisciplinary care sought (Choy et al 2006) - offering treatment services, and a range of patient education programs, psychosocial support programs, and rehabilitative programs (CanNET NS&ES-Siggins Miller 2008; Zorbas et al 2006). The MDT members collaborate to reach consensus on diagnosis and treatment options (CanNET NS&ES-Siggins Miller 2008), and this means that decision-making and accountability is necessarily shared by members of different disciplines working within a team (Ponte, Gross, Winer, Connaughton & Hassinger 2007). The 2003 COSA, CCA & NCCI Report notes that while care can involve several disciplines, if this is not integrated, optimal care is not provided (COSA, CCA & NCCI 2003).

CanNET NS&ES-Siggins Miller (2008) notes MDTs 'generally deal with one type of specific illness or groups of illnesses/conditions', and in relation to cancer, MDTs deal specifically with one type of cancer or group of cancers. In this case, the cancer MDT comprises health professionals with specialised knowledge of diagnosis and treatment (Flessig et al 2006) who consider all treatment options and the preferences of the patient (Marsh et al 2008; Zorbas et al 2003; NBCC 2003) to arrive at an *'outcome [that] is a tailored treatment plan for each patient based on input from multiple disciplines'* (CanNET NS&ES-Siggins Miller 2008; Jobe, Enestvedt & Thomas 2006).

MDTs present the capacity to incorporate the necessary investigations in the diagnostic process and prevent unnecessary or repeated investigations being performed (Ruhstaller, Roe, Thürlimann & Nicoll, 2006). Care provided by MDT is considered to offer the most appropriate evidence-based care as management plans use a broad range of expert knowledge (Harrison et al 2008; NBCC 2005).

Current evidence indicates that multidisciplinary care has the potential to reduce mortality, improve quality of life and reduce healthcare costs (Zorbas et al 2003; Chang, Vines, Bertsch, Fraker, Czerniecki et al 2001; Sainsbury, Hayward, Johnston & Round, 1995; Choy et al 2006); and care via MDT results in better concordance between treatment and current guidelines, consistency of information delivery to patients, improved patient understanding and compliance, and greater capacity for informed consent (Choy et al 2006).

A multidisciplinary approach clearly has the objective of improving patient outcomes - and appears to deliver this. NHMRC (2001) indicated that:

'There is reasonable evidence that the survival of patients with breast and other cancers is better if they are treated by a

specialist who treats a significant number of similar patients, and who has access to the full range of treatment options in a multidisciplinary setting'.

IMPLEMENTING MDT FOR BREAST CANCER

It is clear that the contemporary management of breast cancer has increased in complexity, and combined multimodal therapy has become the standard of care (Newman, Guest, Helvie, Roubidoux, Change, Kleer, Diehl, Cimmino, Pierce, Hayes, Newman & Sabel, 2006). Treatment of breast cancer lends itself to multidisciplinary care because optimal care is frequently realised through multimodal therapy aimed at maximising the likelihood of long term survival while permitting a satisfactory cosmetic result (Shuster et al 2000). A number of authors, for example, Zorbas et al (2003); Shuster, Girschovich, Whitney & Hughes (2000) and Tripathy (2003) have also commented on the variety of models and frameworks for multidisciplinary care in the management of breast and other cancers.

The experience internationally

In the UK, MDT working has been endorsed as the principal way of managing cancer care (Flessig et al 2006) and MDTs are mandatory within the NHS for hospitals providing cancer services (Royal College of Radiologists, 2005). The Royal College of Radiologists (2005) notes the requirement to refer all patients with cancer or suspected cancer to a member of the relevant MDT and to be subsequently discussed at the MDT meeting.

Multidisciplinary care is incorporated in the UK Manual of Cancer Services Standards (2000) for audit of breast cancer services (NBCC 2003), as well as in the later UK Department of Health's National Quality Standards, and include standards such as the composition of teams for each tumour service, the time clinicians are expected to commit to MDT working, the frequency of MDT meetings, and the documentation of MDT decisions (Flessig et al 2006). Guidelines for the time of referral to diagnosis to treatment, and performance against these guidelines is audited and reported to the Department of Health (Royal College of Radiologists, 2005).

The Royal College of Surgeons of England (The Association of Breast Surgery) published guidelines for the MDC management of symptomatic breast cancer (Harrison et al 2008, citing RCSE (2005), and the UK Royal College of Radiologists has published Standards for Clinical Radiologists participating in Oncological MDTs. Each MDT is responsible for all cancers within its specialty, has to fulfill predetermined quality criteria and is subject to peer review on a regular basis (Royal College of Radiologists, 2005). Macaskill, Thrush, Walker & Dixon (2006) report that European guidelines for

breast cancer units require 'protected time' for surgeons, radiologists, pathologists and oncologists to allow their attendance at weekly team case management and audit meetings. Protected time in this case, refers to the recognition that the time required to participate in MDT meetings is a clinical commitment similar to clinics or operating sessions, and included in individual job plans.

Multidisciplinary care also features in the Canadian (NBCC 2003) and US strategies for cancer control (NBCC 2003), and feature in the US guidelines for breast cancer treatment (Harrison et al, 2008, citing NCCN & ACS, 2006). In other countries (for example Japan), multidisciplinary care approaches to the management of cancer are reported to be in their infancy (Kim & Toge, 2004).

In the UK, the NHS Cancer Plan stipulates that all patients either with a new diagnosis of cancer or patients with recurrent or metastatic disease should be discussed within a MDT meeting (Nouraei, Philpott, Nouraei, Maude, Sandhu, Sandison & Clarke (2007), and *'treatment cannot commence until a plan has been agreed upon, and a plan cannot be agreed upon until the MDT is in full possession of the necessary information'* (Nouraei et al 2007, p113-114). However published data suggests in practice, this has not been optimal.

A significant proportion of UK breast cancer units report the adoption of MDT in the management of their patients, and figures range from 70% of all units (Whelan et al 2006) to over 95% of all units (Flessig et al 2006). Both figures are a significant increase from the 20% of all cancer patients estimated to be managed this way a decade ago (Flessig et al 2006). Nevertheless, there remain some units that do not. Macaskill et al (2006) reported that 25% of the breast cancer units identified in their UK sample did not discuss patients before operation (which falls outside the current UK national recommendation) and in the majority of teams (94%) all patients were discussed following surgery.

The rise of MDT in Australia

Multidisciplinary care was recommended in Australia 13 years ago as a means of achieving best practice with a team of different specialists working cooperatively with each other and their patients. It has been identified in several prominent national policy documents as a priority for the delivery of best practice care for cancer patients in Australia (NHMRC 2001; NBCC 2002; Cancer Institute of NSW 2004; NBCC 2005; COSA et al 2003; House of Representatives Standing Committee on Community Affairs 1995; Senate Community Affairs Reference Committee, 2005; National Health Priority Action Council, 2004).

The process, impact, acceptability and costs associated with the implementation of strategies to improve the delivery of multidisciplinary care have been assessed (NBCC 2003). The literature indicates that the most advanced models of multidisciplinary care (in relation to common cancers) are in breast

cancer (COSA et al 2003). NBCC (2003) reported that there is evidence that the multidisciplinary care of breast cancer can reduce mortality and improve quality of life, and multidisciplinary care is now widely recommended as the preferred approach to managing breast cancer. Whelan et al (2006) reported that there is evidence that care for breast cancer patients delivered via MDT results in an improved survival rate 10 years following diagnosis compared to those cared for by a series of individual practitioners.

In 1995, NHMRC released evidence-based clinical practice guidelines for the management of breast cancer as part of the national program to improve the quality of health care and patient health outcomes. NHMRC indicated that the focus on breast cancer was based on *'concerns that knowledge of the treatment options was not well disseminated among health professionals, and that not all women with breast cancer were being presented with the range of appropriate treatment options* (NHMRC 2001, p3).

In 2001 NHMRC reported that the guidelines were well received by clinicians, many of whom believed their practice was already consistent with the guidelines, and a revision incorporating newly available evidence of the guidelines was published (NHMRC 2001). Based on the evidence available to it, NHMRC recommended that all patients with early breast cancer should have access to care from a range of disciplines (NHMRC 2001), and the National Breast Cancer Centre encouraged MDC as a new standard of cancer care (NBCC 2003), and formulation of guidelines on how to implement MDC (NBCC 2006).

Nevertheless, the diversity of service delivery settings and models of care in Australia present challenges to the implementation of these guidelines, and this is reflected in several surveys. As noted earlier, there are differing interpretations of what constitutes a MDT, when the MDT convenes in the care pathway, and the acceptability of it as a model of care. In relation to the latter, Zorbas et al (2003) reported that a survey of surgeons' opinions of the NHMRC guidelines indicated that 44% of rural and 10% urban surgeons did not agree with the NHMRC recommendation for treatment planning to be determined in a multidisciplinary setting, and 34% of rural and 11% of urban surgeons indicated that this would be difficult to implement in their practice.

In the National Profile Study (NBCC 2003) that surveyed 60 hospitals across Australia that treated high (•100 breast cancer cases/year) , medium (30-99/year) and low caseloads (•29 cases/year) of women with breast cancer, NBCC reported that most specialist cancer clinicians were aware of the NBCC Principles of Multidisciplinary Care and that compliance with the Principles was high. However while most clinicians recognised the desirability of MDC, study reported (p 2) that *'a large minority of services'* did not offer an MDT for treatment planning. Irrespective of caseload, most hospitals in the sample had implemented at least some aspects of multidisciplinary care: 55% had multidisciplinary meetings for treatment planning, either regularly or irregularly.

Zorbas, Rainbird, Redman, Luxford (unpublished study cited in Zorbas et al 2003) sought the view of clinicians from a representative sample of hospitals across Australia on the key components proposed in the Multidisciplinary Care Principles: '95% agreed that communication, full therapeutic range, standards of care and involvement of the woman were essential or preferable for the provision of multidisciplinary care'.

The National Profile Study highlighted a disparity between attitudes to and implementation of multidisciplinary care in Australia - while all respondents acknowledged having access to all relevant treatment and support services was either essential or preferable, 15% of hospitals lacked established referral links for reconstructive surgery or psychiatric care; 12% did not provide core supportive services; 27% had no protocols for the management of women with breast cancer. Tellingly, while 95% respondents agreed it was essential for clinicians involved in management of breast cancer to communicate with one another about the care, NBCC 2003 reported that 30% hospitals with high breast cancer caseloads do not have regular MDT and while 45% high caseload hospitals had written protocols based on best practice guidelines, only 50% high caseload hospitals had regular MDT meetings that considered all cases. Only 40% had processes to review data.

At the time of the report by Marsh et al (2008), it was unclear how rigorously MDT guidelines were followed by the medical community. These authors surveyed all currently practising full members of the Royal Australian College of Surgeons (Section of Breast Surgery) in late 2006 for their use of multidisciplinary care, the composition and functioning of MDT in public and private practice, and in metropolitan, regional and rural settings. The survey was constructed around the NBCC's Principles of Multidisciplinary Care, and resulted in a 91.2% response rate (n=239) of this entire group. Surgeons' responses were subjective, and indicated that

- more metropolitan surgeons were involved in MDT (89.2%) than those practising in regional (82.9%) or rural (61.1%) areas, and the rural MDT's were less developed than their metropolitan and regional counterparts
- fully operating MDT were more common, consistent and functional in public (85%) than private (64%) of surgeons' practices
- MDT meetings were typically held before adjuvant therapy rather than before surgery and this pattern was consistent across sectors and location
- weekly MDT meetings were significantly more common in public (58%) than in private (35%) locations, and significantly more common in metropolitan than regional or rural locations

- The six core disciplines recommended by NBCC were well represented in most teams (radiologists cited as included in around 75% public MDT and 78% in private MDT)
- Patients and their GPs were not considered to be part of the treatment team by surgeons

The variability in implementation of MDT that these responses indicate, points to the challenges of implementing the model in the Australian context. Barriers such as the private-public service mix and geographical dispersion of services and populations may limit access to specialists, diagnostic, supportive and therapeutic services, and significantly impact on the model of care available to women with breast cancer.

NBCC 2003 reviewed common factors in a number of overseas models and identified key elements of care that were informed by the Australian experience. These key elements are consistent with Principles of Multidisciplinary Care (Harrison et al 2008; Zorbas et al 2003; NBCC 2003); that is:

- **a team approach**, involving core disciplines integral to the provision of good care, with input from other specialties as required (where 'core' disciplines are surgery, radiology, medical and radiation oncology, pathology and supportive care) NBCC 2003. CanNET NS&ES-Siggins Miller (2008); Zorbas et al (2003); and Firth-Cozens (2001) note the team includes all relevant medical and health disciplines, possessing a variety of skills necessary to produce safe and effective care to patients. The patient and his/her GP should be part of the core team (Zorbas et al 2003). Expansion (as required) of the core should ensure the patient has access to a full range of treatment options and alternatives (Boyle, Robinson, Dunn & Heinrich 2005; Zorbas et al 2003). '*Patients should feel their treatment is coordinated, not fragmented*' (Zorbas et al 2003, p529).
- **good communication** among team members regarding treatment planning (NBCC 2003). CanNET NS&ES-Siggins Miller (2008, p 15) indicate team members are '*supposed to liaise and collaborate with one another and in consultation with the patient and debate the diagnosis and conclude the best course of care*'. A framework for communication that facilitates interaction and case conference meetings is considered a key element (Boyle et al 2005; Zorbas et al 2003). Communication with the patient should inform them of the '*comprehensive range of treatment alternatives. Specifically the benefits, risks, side effects and complications of all treatment choices should be clearly outlined*' (CanNET NS&ES-Siggins Miller 2008, p 23).

- **access to the full range of treatments available** for all women, regardless of geographical remoteness or size of institution (NBCC 2003). Teams offer a range of patient education programs, psychosocial support programs and rehabilitative programs in addition to treatment services (CanNET NS&ES-Siggins Miller 2008; Flessig et al 2006; Seek & Hogle 2007).
- **provision of care in accord with nationally agreed standards** (NBCC 2003). Teams '*diagnose, treat and manage the condition to the best possible standards of care*' (Zorbas et al 2003, p528) which means conformance with '*guidelines... and all clinicians should operate within these*' (CanNET NS&ES-Siggins Miller 2008, p 23).
- **involvement of the woman** in decisions about her care (NBCC 2003, CanNET NS&ES-Siggins Miller 2008; Zorbas et al 2003). Treatment plans should consider the individual circumstances of the patient and should be acceptable to the patient (Zorbas et al 2003). Patients should be encouraged to actively participate as part' [of the MDT] including '*having input into treatment planning* (CanNET NS&ES-Siggins Miller 2008; Ruhstaller et al 2006; Zorbas et al 2003). Flessig et al (2006) and Seek & Hogle (2007) take a different view of when patient involvement is appropriate - only once consensus has been reached in terms of diagnosis and treatment options to ensure the consistency of information provided [to the patient and their family].

Harrison et al (2008) note that while these principles allow the conceptualisation of multidisciplinary care, in Australia there is currently no standard definition of an optimal model to bring this about. These authors considered this situation probably reflects the diversity in geographic location of services as well as the mix of public-private settings. There may be other factors at play though (such as those highlighted below), and as recently as 2005, the Senate Community Affairs Reference Committee recommended that multidisciplinary care 'consisting of an integrated team approach in which medical and allied health care professionals develop collaboratively an individual patient treatment plan, *continue to be widely promoted within the medical and allied health professions*' (Senate, 2005, p xv).

In practice there are variations in when the MDT approach to breast cancer management is used. Some teams are convened to assess stage of illness, set treatment goals, develop treatment plans, share decision-making with patients, and mobilise relevant team members to implement the plan (Mileshkin & Zalcborg, 2006) and others convene the MDT after assessment and surgical intervention has taken place, and use the team processes to define the subsequent treatment plan.

The Australian models of MDT reflect these variants (NBCC, 2003) including the 'tumour board' approach in which the team discusses patient cases, recommends treatment, with referrals made as appropriate, and the treating clinician informs the patient of the recommendation; and a variation of this in which the patient attends a clinic after the team discussion and meets the members of the team who will be involved in ongoing care. NBCC (2003) indicates '*there is no one 'correct' model or formula. The aim of the Principles of Multidisciplinary Care is to allow flexibility in process while ensuring that key underlying principles are in place*'.

The 2006 study (Marsh et al 2008) showed most surgeons had an MDT established in their practice - whether private or public, but the teams operate differently in these settings, with private practice MDT more likely to take an informal approach to case discussions, less likely to discuss all their patients, on a less frequent basis. A small percentage (4.6%) of private practice surgeons considered personal communication between individuals from other disciplines a form of multidisciplinary care (Marsh et al 2008). These authors also speculate that the public/private differences reflect proximity of colleagues, availability of technology and resources, and financial cost related to establishing and managing MDT Marsh et al (2008).

MDT PROCESSES

There are several factors highlighted in the literature that have the potential to influence participation of core members, including radiologists, and a number of key components that are common to teams recognised as effective. These are each outlined below.

Organisational elements

These are defined in the literature as a 'centre-based approach', and 'economies of scale'. In relation to the former, CanNET NS&ES-Siggins Miller (2008); Tripathy (2003); and Strusowski (2006) note there are organisational logistics which indicate that a MDT requires a 'centre-based approach where patients can go to the one institution to receive all the different types of care they need and where information and patient records are shared between specialists and health professionals'. In recognition of the limits to this approach (i.e. due to geographic location and limited access to services), CanNET NS&ES-Siggins Miller (2008); Zorbas et al (2003); and Kunkler, Fielding, Brebner, Prescott et al (2005) suggest a variation to aggregating team members in a single location, is the adoption of a 'networked approach and preparedness to explore novel technologies' - i.e. using appropriate IT to link components of a team to its members who may be dispersed across multiple locations and institutions.

Economies of scale as indicated in the literature relates to the cost savings that can be achieved by utilising an MDT approach, such as sharing patient records and access to these (CanNET NS&ES-Siggins Miller 2008; Tripathy 2003; Strusowski 2006); sharing equipment and staff between MDTs - and having clear protocols for this (CanNET NS&ES-Siggins Miller 2008; Tripathy 2003; Penson, Kyriakou, Zuckerman, Chabner & Lynch, 2006); or remuneration based on a uniform multidisciplinary fee schedule (CanNET NS&ES-Siggins Miller 2008; Tripathy 2003)

Structure, leadership, governance

The literature is clear on the importance of MDT structure, leadership and governance to effective team functioning. Structure includes clarity on decision-making authority and accountability (Firth-Cozens 2001; Ponte et al 2007); and identification and documentation of team membership including the core disciplines integral to treatment planning and non-core disciplines which make significant contribution to the psychosocial well-being of the patient, and both should be based on evidence-based clinical practice guidelines (NBCC 2007). Structure also includes the presence of conflict resolution strategies (Penson et al 2006); and regularity of meetings (CanNET NS&ES-Siggins Miller 2008; Chang 1998; Ruhstaller et al 2006; Marsh et al 2008) that discuss diagnosis, review treatment outcomes and build on past learnings.

Team functioning and appropriate outcomes are also tied to the presence of a dedicated communication framework that enables members to communicate on a regular basis - most commonly via scheduled weekly meetings (Marsh et al 2008), and the existence of strong referral networks so that MDT is appropriately expanded as necessary to include other specialist services (CanNET NS&ES-Siggins Miller 2008; Boyle et al 2005; Zorbas et al 2003).

Team leadership is consistently noted in the literature to be a central issue for MDT teams. The presence of a single leader and the style of leadership are important to team effectiveness. Conflict over leadership and lack of clarity about leadership negatively affect team communication and effectiveness (Haward, Amir, Borrill, Dawson, Scully, West & Sainsbury, 2003). Good team leadership is considered to be essential for patient safety and quality of care (CanNET NS&ES-Siggins Miller 2008; Firth-Cozens 2001; Flessig et al 2006) to encourage full participation and feedback to team members (Connor, Pont & Conway 2002); and overall team effectiveness including use of resources and effective communication with patients (Haward et al 2003).

These reports indicate that leadership roles, team objectives and team protocols need clear definition and delineation of individual and shared accountabilities - and this would be consistent with a continuous quality improvement approach (Connor et al 2002; Ponte et al 2007; and NBCC 2007). CanNET NS&ES-Siggins Miller (2008); Flessig et al (2006) and Kim and Tige (2004) comment on the importance of clear shared objectives, and NBCC (2007) notes the

importance of having and following defined protocols for the conduct of MDT meetings.

Evidence based care

A significant outcome of the MDT approach is reported to be reduction in the variability of care through the use of standardised, evidence-based principles for care. The Senate Report (2005) recommended that the use of and adherence to clinical guidelines is an essential component of multidisciplinary care, and must be part of any system of accreditation of cancer services. Standardisation of team protocols and evidence-based treatment recommendations ensures the right work up is provided to each patient (CanNET NS&ES-Siggins Miller 2008; Chang 1998; Ruhstaller et al 2006).

NBCC (2007) advises that team protocols also include agreed criteria to decide which cases are discussed at the MDT; availability and presentation of all relevant and accurate patient information including medical history and diagnostic results; as well as protocols for documenting recommended treatment plans (and any dissensions). Timely access to relevant patient information on which team decisions are made requires appropriate clinical information management systems (CanNET NS&ES-Siggins Miller 2008; Tripathy 2003). Other authors include the necessity for protocols that enable clear and comprehensive information to be provided to patients and their families (CanNET NS&ES-Siggins Miller 2008; Penson et al 2006; Marsh et al 2008), and the discussion of the recommended treatment plan with the patient and communicated to the GP and other relevant treating clinicians after the MDT (NBCC 2007).

Decision-making should be consensus-based using evidence-based guidelines, and where these guidelines do not exist, MDTs should use clinical trials, qualified peer review and cross discipline training and awareness to develop these (CanNET NS&ES-Siggins Miller 2008; Tripathy 2003).

Indicators of team effectiveness, operational efficiency, clinical quality and safety, and outcomes are regarded as important to MDT and there should be ongoing evaluation of the team against these (CanNET NS&ES-Siggins Miller 2008 ; Firth-Cozens 2001). NBCC has developed key indicators or data items based on its Principles of *Multidisciplinary Care* that can be used at a team and service level to measure implementation of MDC (NBCC 2006).

Administration

It is reported that effective teams are facilitated by the allocation of specific team members to coordination and administration tasks (CanNET NS&ES-Siggins Miller 2008; Flessig et al 2006; Tripathy 2003) and that their role is expedited by the standardised protocols and clinical information management systems referred to earlier.

Team coordinators are reported to perform an invaluable role: the absence of a dedicated MDT coordinator organising and running MDT meetings is considered a problem in 25% UK breast cancer units (Whelan et al 2005). In the US, Strusowski (2006) reported the institution of a model of cancer care coordinators whose role was to support patients, and integrate all aspects of care provided through MDTs, resulted in improved patient satisfaction with the care process and staff views that the model was time and resource efficient. NBCC (2006) reported that gaining the support of hospital administration was important to the sustainability of teams.

Other administrative features noted in the literature include the value of pro formas for recording MDT attendance, documentation of patient consent, treatment plan, and communicating recommended treatment plans to patient's GPs or to other clinicians (NBCC 2007; NBCC 2006). The NBCC publication *Multidisciplinary meetings for cancer care: a guide for health professionals* contains a generic treatment plan that can be adapted for specific tumour types (NBCC 2005).

It is apparent that these critical attributes can take time to develop, but that the end result of carefully articulating guiding principles, specifying priorities for design and implementation and obtaining collaborative staff input, is ultimately better implementation and acceptance of the MDT by staff (Ponte et al 2007).

Frequency of MDT

Whelan et al (2005) report UK data indicating nearly all the respondent units held a weekly meeting as a sessional commitment in normal working hours. Marsh et al (2008) report Australian data indicating a weekly, fortnightly or monthly schedule of meetings is common for MDTs, however there is a statistically significant difference between public and private settings for weekly meetings (more common in public settings), and more 'as-needed, ad hoc or case-by-case' meetings in private settings. Frequency also differed between metropolitan, regional and rural MDTs - weekly meetings significantly more likely in metropolitan teams; monthly meetings significantly more likely in regional and rural settings; and rural MDT were more likely to hold unscheduled (ad hoc or case-by-case) meetings than their counterparts.

The number and frequency of meetings is clearly increasing. Harrison et al 2008 report weekly meeting frequency for 63%, fortnightly for 20%, monthly for 14% and as required for 1% of MDTs attended by their study sample. Other authors (e.g. Kane Luz, O'Briain & McDermott 2007) similarly report an increase both in the number of meetings and the amount of time spent at these, and predict the trend will continue, with more patients being managed through MDT in the future. NBCC (2005) indicates that meetings should be held at a mutually acceptable time, and the duration limited to 45-90 minutes. NBCC further suggests that '*any time not used for treatment planning*

may be used for education purposes or discussion of other relevant issues' (NBCC 2005). A key feature of sustainable MDTs is for the meetings to become habitual (NBCC 2005).

While adding dependability to patient management and diagnostic processes, MDT's clearly have an impact on the workflow of departments such as radiology. As noted earlier, radiologists frequently participate in multiple MDT's with consequent issues of time management, resources, scheduling, meeting preparation and impact on quality (Kane et al 2007). These authors analysed all work related to clinical meetings in a large university teaching hospital in Ireland, for its impact on radiology and pathology departments (Kane et al 2007) and reported that senior radiology staff spend almost 20% of their time either preparing for or participating in MDT meetings, many of which take place outside of the 'normal' working day, and that the increased workload is absorbed by an increase in the working hours of many staff.

In addition, it is reported that the rate of designated resources has not kept pace with the rate at which working by MDT has developed (Kane et al 2007). Kane et al (2007) reported that in some hospitals, up to 20% of the radiology images required for MDT meetings were missing when required.

Who gets discussed at MDT?

In Australia, NBCC recommends prospective treatment planning for all newly diagnosed cases (NBCC, 2005). In practice, as noted earlier, MDT meetings are often conducted after assessment and surgical intervention has taken place, and only then use the team processes to define the subsequent treatment plan (Mileshkin & Zalberg, 2006). In either case, NBCC recommends local protocols agreed by the MDT should guide the decision-making process (NBCC 2005).

Marsh et al (2008) report that private MDT teams significantly differ from public teams in choosing which patients to discuss in the team, with the majority of public MDTs discussing every case. In the UK, Whelan et al (2005) reported that 60% MDTs discuss every breast cancer patient, 36% discussed over 90% cases, and 4% discussed less than 90% cases. A majority of UK respondent units included private patients in the MDT discussion. Flessig et al (2006) noted that one study reported that a quarter of breast cancer teams did not discuss patients before operation - a practice that falls outside the current UK recommendations.

In either case, there is an obvious impact on the duration and frequency of MDT meetings. NBCC (2005) indicates that meeting duration will be determined by the size of the institution and the number of cases requiring discussion.

BENEFITS OF MDT

There is a view that 'the outcomes of MDT have not been rigorously evaluated and evidence from published empirical studies and reports on any benefit is limited' (Harrison et al 2008; Flessig et al 2006; Houssami & Sainsbury, 2006). Houssami & Sainsbury (2006) reported the existence of very few studies that formally evaluated MDC in relation to clinical outcomes, and none on the impact of MDC on survival, and conclude that research on clinical outcomes and survival effects of MDC remains a priority.

The paucity of publications addressing the evaluation of MDTs in cancer generally, and breast cancer specifically is also pointed out in the comprehensive literature review reported by CanNET NS&ES-Siggins Miller (2008). That review located 24 empirical research studies addressing MDT and care that used observational or comparative design, but could locate only one study (Gabel, Hilton & Nathanson 1997) that had a controlled design. *'Those studies that do not support using MDT have not reported any adverse outcomes from their use'* (CanNET NS&ES-Siggins Miller 2008, p26).

Nevertheless, the benefits of MDT in cancer care are noted in three areas: benefits to patients, benefits to healthcare practitioners and professional development; and improvements to systems, processes and protocols (CanNET NS&ES-Siggins Miller 2008 - citing Chang 1998; Carter et al 2005; Maleshkin & Zalberg 2006; Seek & Hogle 2007); Choy et al 2007).

Benefits to patients

In terms of benefits to patients, MDTs offer a range: from improved access to condition-specific specialists (Kane et al 2005; NBCC, 2003); patient collaboration in treatment decision making (NBCC 2003; Zorbas et al 2003; CanNET NS&ES-Siggins Miller 2008); consistency in treatment (NBCC 2005); better outcomes of care (Chang et al 2001; NHMRC 2001; Zorbas et al, 2003; Choy et al 2006); improved patient education (NBCC 2003) and improved patient satisfaction with the care experience (Haward, et al 2003; NBCC, 2006) to quality of clinical care (Haward et al 2003), treatment outcomes (Sainsbury et al 1995; Whelan et al 2006); and access to evidence-based care (NBCC 2003; Chang et al 2001; Zorbas et al 2003; CanNET NS&ES-Siggins Miller 2008).

The 1997 USA study by Gabel et al investigated the effectiveness of MDT in providing consultation and support for newly diagnosed patients referred to a multidisciplinary breast cancer clinic. This was a non-randomised controlled study conducted over 1 year comparing disease stage, treatment type, time from diagnosis to initiation of treatment, and patient satisfaction before ($n=162$) and after ($n=177$) the introduction of the multidisciplinary team. These authors reported that MDT statistically significantly ($p<0.001$) decreased time to treatment initiation; improved patient satisfaction; involvement of patients' supporters, and helped patient treatment decisions (Gabel et al 1997).

Benefits to clinicians

In relation to benefits to clinicians from participation in MDT, these are reported to include: shared and consensus decision-making (NBCC 2003; NBCC 2005; Haward et al 2003); reduction in error (Connor et al 2002); improvements to workload (Olver & Selva-Nayagam 2000; Dalla Palma, Stacul, Meduri & Geitung 2000; Tripathy 2003; Strusowski 2006; Davison et al 2004; CanNET NS&ES-Siggins Miller 2008); education and research development opportunities (Sickles et al 2002; Haward et al 2003; NBCC, 2003; Jobe et al 2006; Ruhstaller et al 2006; Jazieh et al 2008); professional development activities (NBCC, 2005; Kane et al 2007); improved mental well-being (as measured by the presence of minor psychiatric morbidity - feelings of strain, depression, inability to cope, anxiety based on insomnia, lack of confidence among other psychological problems - (Haward et al 2003); greater emotional and intellectual support, especially in relation to difficult treatment decisions (NBCC 2003); and improved understanding of the complexities of breast cancer (NBCC 2003).

Benefits to healthcare practitioners include reported benefits in team members' mental well-being - in the UK at least, where Haward et al (2003) report that the mental well being of team members appeared significantly better than in previous studies of cancer clinicians, the NHS and the general population. NBCC (2003) in the National Observational Study of MDT in Australia reported that clinicians felt that participation in MDT provided them with greater emotional and intellectual support (than in individual practice), and especially when there were difficult treatment decisions to make.

Benefits to systems

In relation to system improvements, MDT are reported to provide cost effective services (Marsh 1991 in Haward et al 2003; Tripathy 2003; Strusowski 2006; CanNET NS&ES-Siggins Miller 2008); efficiencies of care delivery (Kane et al 2007; Shuster et al 2000; NBCC, 2003; Gabel et al 1997); timeliness of appropriate consultation, and reduction of time from diagnosis to treatment (NBCC, 2005; Kinkler et al 2005; Nouraei et al 2007); conformance with evidence-based guidelines (Chang et al 2001; Zorbas et al 2003; NBCC, 2005; NHMRC 2001; Newman et al 2006; Kane et al 2007); development of local protocols and resolution of service delivery problems (NBCC, 2005).

At least one UK MDT study concluded that team composition predicted self reported effectiveness, with team size positively predicting accurate and timely diagnosis, and greater professional diversity in the team positively predicted effectiveness in respect to clinical audit and research (Haward et al 2003).

Consistency of approach

CanNET NS&ES-Siggins Miller 2008 (citing Archer et al 2005) note that while the discussion of cancer cases at MDT meetings made no difference to the clinical management in more than 98% cases (in that study), there is some potential to change the clinical

management based on case review of pathology or radiological reports. For example a US audit of the clinical records of 75 patients presenting at a tertiary cancer centre in 1998, noted that in 43% of the cases reviewed, the initial treatment recommendations received by women from single or sequential consultations with individual external physicians did not concord with the consensus recommendations made by a MDT subsequently reviewing those cases (Chang et al 2001).

This points to the benefits of MDTs in arriving at decisions more likely to accord with evidence-based guidelines (Zorbas et al 2003; CNES-Siggins Miller 2008). Elsewhere CanNET NS&ES-Siggins Miller (2008) notes that the MDT approach represents an efficient, cost effective way to care for women with breast cancer.

The National Institute of Clinical Excellence (NICE) considered that:

'Teamwork allows for all aspects of care to be given due weight, and enables decisions to be discussed and questioned from a broad base of expert knowledge .In addition, discussion of patient management at multidisciplinary team meetings should ensure that each patient receives consistent information and co-ordinated treatment from all those involved in her care. This will tend to reduce the variation in management and outcomes around the country and in particular, avoid individual "outliers" who may provide sub-optimal care. It will thus increase the chances that each patient will be offered the most effective treatments. Specialists in the management of breast cancer are likely to have higher levels of expertise and skills. Benefits associated with optimal provision of surgery, radiotherapy and chemotherapy are more likely to be realised by this form of organisation' (NICE 2002, p 80-1).

Case volume and outcome

MDTs are as noted earlier, more likely to exist in metropolitan, high caseload settings. The literature includes some discussion about an association between case volume and health outcomes. For example in 2002 the UK's NICE had reported that it considered the evidence linking higher case volume with better long term outcome was fairly strong. Observational studies such as that by Sainsbury & Haward (1995) indicated that surgeons who treat over thirty new breast cancer patients per year achieve lower 5-year mortality rates.

In a retrospective audit of a Yorkshire cancer registry of breast cancer cases between 1979-1988 Sainsbury & Haward (1995) found that variations in 5 year survival rate of 12,681 patients were not a function of treatment but of consultant caseload and variations in treatment. Better survival rates were associated with surgeons seeing more than 30 new cases per year and use of multimodal therapy. The authors noted that clinical organisation increases

volume treated and reflects ability to bring together all the disciplines and expertise across full therapeutic range and standardise treatment. This suggests that outcomes may be a function of multidisciplinary practice, but further investigation was needed.

Team size appears to be a significant factor for accuracy and timeliness of diagnosis (Haward et al 2003). Gillis & Hole (1996); also showed that higher caseload correlated with better clinical performance, pointing to a need for sufficient workload to make breast teams viable and effective.

Several lines of evidence suggest there is a threshold number of new cases per year (>100 per year) MDTs should consider to achieve these outcomes. NICE for example reported that observational studies show benefit from specialised multidisciplinary care and benefit from a case-load above 30 per surgeon. Professional consensus indicates that this level of workload is operationally cost-effective for the deployment of coordinated care via MDT given the time and resources required (NICE 2002).

Direct patient involvement

The review of the literature indicates there is little formal research to evaluate the impact of directly involving patients in MDT. Choy et al (2006) did investigate the feasibility and acceptability of directly involving breast cancer patients in MDT in an exploratory, controlled, non-randomised small sample (n=30) in an Australian specialist breast clinic located within a major teaching hospital. Patients were not usually involved in the MDT. These authors found that preference for information and decision-making control (active, passive or collaborative) determined participation in MDT; there was a reasonable trend (despite lack of statistical power) showing no demonstrated increase in patient anxiety scores from participating in MDT; MDT participation did not significantly change patient access to information, understanding of medical decision-making processes, ability to be involved in decision making or ease in making decisions (Choy et al, 2006).

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Sustainability of MDC

NBCC (2005) reported changes implemented in response to the introduction of MDC (the Demonstration Project) were for the most part sustainable, and transferable to other areas of care. Allocation of specific resources to funding and personnel to maintain, support and improve MDC; routinising MDC meetings; team members' recognition of personal and patient benefits of MDC; champions to drive MDC; and planning contingencies for staff and organisational change/turnover were considered important factors contributing to the sustainability of the changes implemented.

Other considerations

Teams do not necessarily develop automatically into a fully formed team at their first meeting, but develop through a series of stages that parallel those identified in the development of small groups (Tuckman 1965, cited in Boyle et al 2005) - forming (assembling and developing agenda); storming (conflict and challenges to leadership); norming (definition of functional roles); performing (effective and efficient delivery of outcomes); and reforming (dissolution and focus on new challenges).

This research indicates that teams require time to develop a team identity and enact the mechanisms that will support the interactive, multidisciplinary approach desired. Just as team size positively predicts accuracy and timeliness of diagnosis, team composition predicts team effectiveness including in communication, clinical audit and research, effectiveness of psychosocial support, and use of resources (Haward et al 2003).

TEAM MEMBERSHIP

The primary feature of MDT is the formation of a functioning team. The composition of MDTs described in the literature indicate there are 'core' teams comprising six core specialist disciplines (surgery, medical oncology, radiation oncology, pathology, radiology, supportive care (nursing), and 'expanded' teams that include disciplines focussed on patient quality of life and other issues secondary to the cancer - psychosocial care, allied health and rehabilitation, genetic/hereditary counselling, plastic and reconstructive surgery for example (NBCC 2003; NBCC 2006; Marsh et al 2008). NBCC (2003) indicates that team membership will vary according to cancer type, but should reflect both clinical and psychosocial aspects of care.

In Australia, the NBCC also recommended that GPs be included in the MDT discussions on all stages of the disease process, including diagnosis, referral, treatment, coordination and continuity of care, and to provide information and support to the patient and family

(NBCC 2003; NBCC 2006). A number of other reports also include GPs as members of MDT (e.g. CanNET NS&ES-Siggins Miller 2008; Flessig et al 2006; and Jobe et al 2006). It appears however from the National Profile Study (NBCC 2003) and the 2008 study by Marsh et al that GP participation in MDT remains low, although the 2005 follow up study by NBCC found that there was an increase in attendance by general practitioners (GPs) in the participating collaborations to the National Demonstration Project, where a staff member facilitated this by phoning and inviting the GPs of patients to attend (NBCC 2005).

While the NBCC guidelines recommend patient involvement in the treatment plan, the 2006 study (Marsh et al 2008) reported that the respondent surgeons did not include patients or their relatives in either core or expanded teams. This was not taken to mean that patients were excluded from decision-making, but rather a reflection of surgeons' attitudes towards the role of patients. Similarly, these authors postulate that the absence of GPs from the MDT may also reflect surgeons' attitudes to patients' GPs.

The membership of registered nurses is considered an 'essential part of MDT' (CanNET NS&ES-Siggins Miller 2008; Strusowski 2006), with a multifaceted role primarily focussed on support and care for the patient.

RANZCR is promoting the role of the radiologist as a clinical specialist⁹, and in its submission to the Senate Community Affairs References Committee Inquiry into services and treatment options for people with cancer, the Faculty of Radiation Oncology of the RANZCR (2005) articulated its strong support for the development and practice of multidisciplinary care and treatment for breast and ovarian cancer.

Reports over time indicate that the core disciplines are fairly well represented in Australian MDTs (e.g. Delaney, Jacob, Iedema, Winters & Barton 2004; NBCC 2005). In the National Profile Study, high breast cancer caseload hospitals reported that the following 'always/usually attend' MDT: Surgeon 100%; Pathologist 88%; Radiologist 76%; Medical oncologist 82%; Radiation oncologist 79%; Supportive care professional 79%; General practitioner 0% (NBCC 2003).

Three years later, Marsh and colleagues surveyed MDTs to determine team composition to compare differences between public and private settings, and published their findings in 2008. The study design focused on breast surgeons' recall of meeting participants and reported little difference in team composition between public and private settings. According to their sample, the six core disciplines well represented: surgeons 100% both public and private; radiation oncology 85% public, 80% private; medical oncology 95% public, 90% private; radiology 73% public, 75% private; pathology

⁹ RANZCR (2008). Request for Proposal, Project Brief No. CS06: The Role of the Radiologist in the Multidisciplinary Care Team (MDT).

72% public, 70% private; nursing (specialist breast care nurse) 85% public, 80% private (Marsh et al, 2008).

This study did note that rural teams were less likely than their metropolitan and regional counterparts to include radiation oncologists and pathologists, possibly reflecting workforce deficiencies in rural settings (Marsh et al 2008). Radiologists were better represented on rural MDTs (90%); general practitioners were under-represented on MDTs in both 3% public, and 5% private settings; and rural MDTs had the most involvement with GPs (10%). In those core teams reporting an expanded version, there was much smaller representation of all disciplines across all settings (Marsh et al 2008).

In 2008 Harrison and colleagues also asked MDTs about who attended meetings and how often. In their study sample there was a high regular attendance rate at MDT meetings by breast surgeons (96%), medical oncologists (92%), radiation oncologists (90%), pathologists (88%), breast care nurses (87%) and radiologists (78%); less frequent were social workers (28%), physiotherapists (24%), ward nurses (21%), psychologists (17%) and general practitioners (10%), with no statistical difference between the groups nor whether in public or private practice (Harrison et al 2008).

Of particular note to the QUDI project, the Harrison et al (2008) study showed that for the survey respondents reporting their attendance at MDT meetings, 78% considered 'radiologists' were regular attendees, and amongst the topics of discussion during the MDT, 66% considered 'relevant diagnostic radiology' was 'always discussed' and 19% 'often discussed' in meetings. The question is by whom?

In teams outside Australia, core disciplines represented in MDT in breast cancer are reported to be similar (Jenkins, Fallowfield & Poole, 2001; Haward et al 2003; Chang et al 2001; Catt, Fallowfield, Jenkins, Langridge & Cox 2005; Whelan et al 2006) and there is a low incidence of omission of radiologists as key team members..

Estimates of the presence and proportion of MDT meeting time actually attended by the various disciplines is largely based on self-report data, such as the 2006 study reported by Macaskill et al (2006). Their assessment of UK surgeons' commitments to MDT identified significant variation in the attendance of core disciplines for the whole time of the MDT, with similar attendance rates for surgeons, breast nurses, radiologists and pathologists (95% of the cases). In contrast medical oncologists were present for the whole meeting in 44% cases and did not attend in 41.2% (Macaskill et al 2006).

There may be a bias in the self-reporting of attendance however there are a number of studies that report this variable attendance at MDTs. It is suggested that the failure to attend might reflect the fact that team meetings may be conducted as 'unprotected sessions' (i.e. the time required to participate in MDT meetings is

not identified as a clinical commitment similar to clinics or operating sessions, and included in individual job plans) - although this is reported to be more problematic for disciplines such as medical oncologists and may account for their under-representation at MDTs (Flessig et al 2006; Macaskill et al 2006; Whelan et al 2006).

As noted earlier, radiologists are nominated as core members of MDTs for breast and other cancers. Despite the limitation of self-reported data, and the source of it (the majority of studies appear to target breast surgeons for their views on team composition and participation rates), in Australian MDTs, radiologist participation rates are reported to be fairly consistent over time. In 2003, the survey results from 'high caseload' (>100 cases/year) hospital teams indicated radiologists 'always or usually attended' 76% of the team meetings (NBCC 2003). In 2006, this figure was reported to be 73% (Marsh et al 2008) in public settings, and 75% in private settings. In 2008, radiologist attendance at MDT meetings was reported to be 78% in the teams sampled, with no difference between public and private settings (Harrison et al, 2008). Marsh et al (2008) reported the radiologist participation rate in rural teams was 90%.

ROLE OF RADIOLOGISTS IN MDT

As core members of the team, radiologists' role is regarded as crucial by the UK National Institute of Clinical Excellence (NICE) 2002; Whelan et al 2005; and, along with other members are critical to the success of a multidisciplinary team (Chang 1998). They are regarded as important contributors to MDT in the UK (Flessig et al 2006), and their presence at MDTs is regarded as 'beneficial' by Ruhstaller et al (2006), especially as the discussions can '*allow clinicians to learn about their abilities and limitations*' (Ruhstaller et al, 2006, p2461).

It is worth noting that in the UK there are prescribed standards for MDT membership including standards for radiologists as clinical members of the team: *The Royal College of Radiologists Cancer Multidisciplinary Team Meeting - Standards for Clinical Radiologists* (RCR, 2005) which it considers will be an aid to improving radiological participation in MDT and contribute to better care. In the Forward to *The Royal College of Radiologists Standards for Clinical Radiologists* the Dean and Vice-President of the Faculty of Clinical Radiology (Dr Gill Markham) noted

'The intent behind a team based approach is to bring to patient care an appropriate mix of knowledge, backgrounds, and expertise to ensure that it is conducted in a comprehensive, yet cost effective manner. It is a concept to which radiologists widely subscribe. ...It is also an essential part of the continuous and systematic audit of clinical services,

including radiology'. Royal College of Radiologists (2005, p 5).

The Royal College of Radiologists notes that MDTs have specific membership requirements for all relevant medical and non-medical groups, and in the case of radiology, a named lead radiologist (and deputy) is required, each of whom must be present for at least 50% of MDT meetings (Royal College of Radiologists, 2005).

Despite the absence of mandated participation in MDT by radiologists, the level of radiologist participation reported in Australian MDTs is noteworthy.

It is also noteworthy that despite their nomination as core members of the MDT, in the literature reviewed here there is little discussion about the role that radiologists take within the team. Indeed there is little discussion about the team roles of any of the core disciplines, other than reference to the role of team leader, typically taken by a breast surgeon. Inferences can nevertheless be drawn from discussions in the literature about team processes and outcomes to consider actual or potential team roles provided by radiologists.

Contribution of specialist expertise

Radiologists have particular expertise that can facilitate higher standards of reporting and improve diagnostic inputs to clinical decisions. This is recognised in the UK in the NHS Cancer Plan¹⁰ and a number of reports cited below. It is clear from a number of studies that the routine treatment of breast cancer requires access to radiological expertise (Chang et al 2001; Sickles, Wolverton & Dee, 2002), and with the adoption of a multidisciplinary approach to cancer management, the importance of specialist knowledge is emphasised.

For example the USA study by Newman et al (2006) retrospectively reviewed patient imaging records for those referred by an external specialist to the MDT for a second opinion. This review resulted in changes in interpretations in 45% of cases - most commonly the identification of additional lesions. These changed interpretations resulted in recommendations to undergo additional biopsy or alteration in follow up imagery in 29% of cases. Eight of the 24 patients (33%) who underwent additional studies in the MDT centre as a result of the review of imaging, demonstrated additional or residual cancer. Based on review of the breast imaging, 11% of the study sample (n=149) had a change in the surgical management. Reviewing the pathology studies also resulted in changed interpretations (29%) and consequent surgical management (9%). When the changes in recommendations based on review of the radiology,

¹⁰ UK Department of Health (2000) The NHS Cancer Plan, London: Department of Health

pathology and clinical review were combined, a total of 52% of the patients evaluated had at least one change in recommendation for surgical treatment (Newman et al 2006).

These results underscore the benefit the MDT perspective brings to decisions about intervention, as well as the necessity of having the relevant expertise in forming decisions about treatment.

Participation in decision making

Kane et al (2007) suggest that the role of radiologists (and pathologists) is different from other MDT participants in that they often belong to several groups and actively contribute to a range of MDTs. In this case, observations and experience of differing team performance might equip radiologists to bring a quality improvement perspective to other teams in which they participate.

In the UK, it is reported that a review of all information including radiology images, biological materials and all reports takes place prior to MDT discussion, and is important in quality management (Kane et al, 2007). This pre-MDT review confirms (and refines if necessary) the primary diagnosis and satisfies a training and education function for pathologists and radiologists, as well as a quality assurance role for the department (Kane et al, 2007). These authors note however, that for radiology, the review of a *'full image set [of external work - reported to be nearly 50% of all the images] is rarely available'*; in teams *'radiology films are regularly unavailable for discussion at meetings'*; and within hospitals *'as much as 20% of radiology images are missing when required'* (Kane et al 2007 citing Strickland 2000).

The Royal College of Radiologists (UK) Standards for Clinical Radiologists (RCR, 2005) are intended as a guide to improving radiological participation in MDTs and contribute to better patient care, and provide suggestions for performance targets and audit. There are five areas outlined: time requirements; quality control; record keeping; facilities; and job planning and appraisal. The areas all have implications for radiologist participation in MDT, and consequently radiologists need to be consulted in arriving at decisions about these areas.

The Standards provide a useful guide to the roles radiologist members of the team should take. These include: collaboration on decisions about the frequency, duration, and number of cases to be considered at meetings, and the necessary facilities (such as image project, display, information management systems); attendance at meetings and participation in decision making; review imaging results, and contribute to the "second opinion" function of MDT (where radiological images have not been previously seen) and appropriately report these; contribute to the quality assurance processes of the team; contribute to and utilise the education opportunities of MDT.

Quality assurance

Given that as part of good practice policy and quality management, all relevant patient reports including radiology images are reviewed for MDT discussions, radiologists must make a substantial contribution to the quality of the team outcomes. Reviewing material for an MDT contributes to quality assurance processes (Kane et al, 2007). A significant benefit derived from MDT participation relates to the evidence of improved conformity with guidelines as well as improved outcomes for patients. At least one group of co-factors - experience, training, and caseload - is reported to contribute to these outcomes.

Sickles et al (2002) conducted a large prospective comparative review of screening (of asymptomatic women) and diagnostic (evaluation of a palpable mass or other indication) mammographic examinations performed either by specialist breast imaging radiologists or generalist radiologists over a 3.5 year period in a US Breast Imaging Centre. The authors were evaluating interpretive performance parameters - that is detection rates for breast cancer, especially early-stage. They considered abnormal interpretation rates (i.e. recall rate) in screening, and abnormal interpretation rates (i.e. recommended biopsy) in diagnostic mammographic studies in radiologists who interpret a large series of consecutive screening and diagnostic studies.

Allowing for the non-significant underlying differences in the study population, the authors found that generalist radiologist abnormal interpretation rates for screening mammograms were significantly 30% higher than the rate for specialist radiologists; and conversely, biopsy recommendation rates for diagnostic mammography were significantly 60% higher for specialist radiologists than for generalist radiologists. Cancer detection rates including detection rates for early-stage cancer were significantly higher in specialist versus generalist for both screening and diagnostic mammography. These results suggest that the performance differences are likely to relate to differential training and education (including continuing education); caseload per year (rather than years of experience) in mammography (Sickles et al 2002).

Newman et al (2006) report there is known variability in radiologists' interpretation of mammograms, and specialists in breast imaging tend to detect more abnormalities compared with general radiologists. These authors suspect these results are likely due both to training and continuing specialty education in mammography, and the volume of mammographic interpretation (i.e. radiologist experience).

Inter-professional support

Supportive, well-functioning teams benefit from better mental health and increased team effectiveness (Catt et al 2005). Haward et al (2003) report a beneficial effect of team working on the mental health in breast care teams, where the prevalence for minor psychiatric morbidity (i.e. depression, loss of confidence, sleep disturbance) was significantly lower than that of the general

population - although radiologists report a greater rate of feeling low levels of personal accomplishment than other members in at least one breast care MDT, perhaps reflecting lower levels of engagement (Catt et al 2005).

Effective communication between professionals and patients is reported to be improved in well-functioning MDT - especially reducing the potential for contradictory information provided by different specialists (Catt et al 2005).

Training and education

The NBCC Demonstration Project (NBCC 2005) demonstrated that team members identify many benefits to themselves and their patients from participation in MDT including problem sharing, joint decision-making, education and peer interaction. In relation to educational benefits, case conference meetings improved communication across disciplines, fostered evidence-based discussions about treatment options and the consequent development of treatment plans.

Technological developments make the choice of radiological investigation and interpretation of results more complex and thus participation in MDT can also provide an opportunity for updating professional knowledge and continuing professional development (Kane et al 2007). MDTs present the opportunity for specialists to develop common reporting terminology and expression (Kane et al, 2007). Mentoring junior members and improving the education and research experience of everyone is cited as a benefit by Jazieh, Al Hadab & Howington (2008).

Participation in research activities

MDTs present opportunities for improving recruitment into clinical trials, provided team members are aware the importance of opportunistic discussion with their patients (Flessig et al 2006), and development of research protocols (Jobe et al 2006). Participation in a MDT presents members with the opportunity to identify areas of interest and needs and collaborate on research which can improve accrual to studies (Jazieh et al 2008). Ruhstaller et al (2006) reports that patients discussed at a MDT are more likely to be included in a clinical trial.

Informational role

Effective communication is an important factor to team functioning, team outcomes and patient education. Some research has already identified that the provision and consistency of information provided to MDT patients differs within teams. The study reported by Catt et al (2005) underscores the importance to teams of consistency within and across disciplines regarding the provision of accurate and consistent information to patients to minimise misunderstandings. This study was based on earlier reports which suggested that the potential for providing contradictory information to patients about tests and treatments is heightened when team members are not clear about what their colleagues are covering.

Jenkins et al (2001) reported a lack of interdisciplinary awareness of team members roles in information giving (i.e. providing information about treatment and care to patients). Their study (and that by Catt et al 2005) reported that some of the information roles colleagues *assumed* radiologists provide (such as information on radiotherapy, chemotherapy, family history), did not accord with radiologists' actual experience, and some of the information that radiologists reported they provided to patients (such as information relating to prognosis, clinical trials, physical and functional well-being, and emotional well-being) was unrecognised by their fellow team members. It is worth noting that in the Catt et al study, while multiple professional groups were shown to regularly discuss these issues with patients, the only information giving role that over 75% of the radiologists agreed they *regularly* provided to patients was related to explaining tests (Catt et al, 2005).

Leader/facilitator

Team leadership is identified in the literature as a key contributor to effective and sustainable MDT (NBCC 2003; NBCC 2004; Haward et al 2003). However the literature is scant on whom, other than breast surgeons fulfils the role of leader in MDT meetings. Macaskill et al (2006) reported that in 14% of the breast MDTs they surveyed, radiologists chaired the meetings.

The essential attributes of MDT team leaders include championing the MDT process, drive change, gain peer support, and promulgate the inclusive, cross-discipline contribution to team discussion and decision-making that supports the MDT process and leads to its outcomes. Team leaders may also act as Chair of the MDT meeting and in this role act as facilitators of team discussion. Haward et al (2003) reported the most effective UK breast cancer MDT were those that had 'plural, democratic or distributed leadership' (i.e. greater number of different occupational groups reported as team members leading discussion, which ensures a broader range of perspectives and input to decision-making). This supports team members to '*feel their work is essential to the team, their roles meaningful and rewarding, and their contributions identifiable*' (Haward et al, 2003, p 16), and positively predicted team processes and team effectiveness.

It is clear that team members have to be willing to consider and implement changes to usual processes and practices in order to implement or improve MDT (NBCC 2005), and this may require the acquisition of new skills. The team leader needs to have the skills to bring this change about - requiring an understanding of the task and of the group processes to guide a team through broadly based clinical assessment and decision-making in order to provide the best possible care for patients (Mental Health Commission, 2006).

This suggests that any team member who can facilitate this participation, have effective interpersonal communication skills and manage group dynamics is just as able to assume the leadership role.

There are a number of factors that have the potential to act as barriers to MDT implementation and participation, however as Tripathy (2003) observed evidence-based outcomes can shed light on how these can be overcome. The literature specifically reports on practical barriers to the successful establishment implementation of multidisciplinary care for cancer - including attributes of practice and the setting; availability of health professionals and resources; professional and institutional resistance; workforce and logistical difficulties; discipline-specific knowledge and focus; and scarcity of research on the effectiveness of working in MDT.

The NBCC Forum series (NBCC 2006) identified a number of factors participants indicated are potential barriers to both the establishment of and participation in MDT for cancer services: geography, workforce and caseload, funding, time, resources, medico-legal issues, public-private interface, sustainability, resistance to change, communication, role definition, culture. These are not insurmountable barriers as the same participants agreed, but require recognition and effort to address.

Geography

Population and resources are considerably dispersed outside metropolitan areas in this country. This geographical spread presents a particular challenge for regional and rural areas that do not have access to core members in establishing and conducting MDT, as well as providing equity of access to it (CanNET NS&ES-Siggins Miller 2008; Zorbas et al 2003). There are difficulties in involving visiting consultants in regional and rural areas (NBCC, 2006) as well as other human and technological infrastructure and resource challenges to effectively link and manage collaboration between regional and metropolitan sites (NBCC 2006), and communication with rural and regional specialists (NBCC 2003).

In Australia, the hugely dispersed population and variability in physical location of core team members present significant challenges to the formation and utilisation of MDT. Developments in information technology have clearly assisted MDT functioning, impacted on service structures, and extended MDTs geographically.

For example, telemedicine is noted as a potential device to overcome the geographical barriers, and enabling 'virtual' MDTs to operate between distant locations (CanNET NS&ES-Siggins Miller 2008; Zorbas et al 2003; Kunkler et al 2005). This enables consultations through MDT, tailoring of patient care pathways, and coordinating treatment through case discussions (Kane et al 2007).

In Australia, Olver & Selva-Nayagam (2000) reported the evaluation of a videoconference link between an Adelaide tertiary referral

centre's MDT oncology meetings and clinicians in Darwin to resolve communication and access problems. Despite the perception that this mode of interaction was impersonal, these meetings actually achieved a high level of clinician and patient satisfaction, and had little intrusion on the routine practice of the clinicians. Olver & Selva-Nayagam (2000) reported that participation also gave the remote area clinicians more experience in the role of radiotherapy and how that fits with other treatment modalities.

As Kunkler et al (2005) report, telemedicine provides the prospect of addressing 'delivery of cancer services [in Scotland] in areas remote from teaching centres which have low population densities'. An Australian study on improving access to breast cancer MDT via videoconferencing (Delaney, Jacob, Iedema, Winters & Barton 2004 cited in CanNET NS&ES-Siggins Miller 2008) compared 12 consecutive weeks of face-to-face MDT meetings with 12 consecutive weeks of videoconference MDT meetings. Respondents favoured the format of face-to-face MDT over videoconferencing, (including shared negotiation of uncertainty - uncertainty was not acknowledged in the videoconference MDTs) however videoconference MDTs were noted to result in 'more use of formal scientific evidence' and improve MDT meeting access for those motivated to attend.

Delaney et al (2004) reported that a videoconferenced Australian breast cancer MDT conducted over three sites, inhibited the exchange of information and interpersonal interaction, however a later study reported by Davison, Eraut, Haque, Doffman, Tanqueray, Trask, Lamont, Uppal & Sharma (2004) found the use of videoconferencing was not an impediment to the relationships between MDT clinicians, and that subsequent improvements in the technology, changes to the seating format of meetings, and training to improve familiarity with the videoconferencing equipment had overcome these limitations. Delaney et al (2004, p 492) reported that a subsequent revision of the layout for the videoconference also improved its acceptability: *'telemedicine/videoconferencing... led to improved patient outcomes...[and] was useful in improving access to those that do normally attend [MDT meetings]'*.

This approach to overcoming distance and workforce limitations means services can comply with management guidelines (Davison et al 2004), as well as benefit clinicians as Olver & Selva-Nayagam reported in 2000. The RANZCR Faculty of Radiation Oncology (2005) notes that the necessity for physical clinical examination may limit the usefulness of remote electronic teleconferencing for some members of MDTs. It is reported that there is however, no internationally agreed, comprehensive methodology to assess the clinical, technical and economic effectiveness of telemedicine led breast MDT (Kunkler et al, 2005). This group reported the development of such a methodology and testing across eight Scottish hospitals, but outcome data is not similarly reported by them.

Nouraei et al (2007) reported that the formidable challenges of coordinating multiple specialties and resources required for the head and neck MDT at Charing Cross Hospital London, were addressed

by introduction of an intranet-based data management system registering and tracking patients and automated work lists for pathology and radiology. The database significantly improved cross-specialty coordination, reduced the number of patients whose treatment planning was delayed due to the unavailability of adjunctive investigations, leading to an improvement in the overall efficiency of the MDT by 60%.

Caseload

A particular barrier noted by the NBCC 2006 Forum related to workforce and case load. When service sites have low patient case loads and many of the core team members are visiting specialists (such as in regional areas), there are challenges in establishing regular prospective multidisciplinary meetings that can access both core and non-core team members, as well as managing referrals arising from a limited workforce MDT to other necessary specialists such as those providing psychosocial support (NBCC, 2006).

MDTs impose a financial or opportunity cost, on all participants and institutions (NBCC 2003) and given funding and other constraints, MDT members have been reported to be reluctant to assume an added workload in the absence of added remuneration (NBCC 2003) or funding for administrative positions to support the implementation of MDT (NBCC 2006). The introduction of specific MBS Items in late 2006 may help address this (NBCC 2006).

Governance

Other authors have reported the value of initiating an interdisciplinary governance structure as a means of securing better collaboration, ownership, and implementation and overcoming some of these barriers (Ponte et al 2007). Ponte et al (2007) suggest the governance model adopted should be shaped by a multidisciplinary group with firsthand knowledge of the organisation and broad experience with clinical work, and thus the model for change becomes more compelling. Ponte et al (2007) also point to the importance of allowing time for large organisational changes to be realised.

Incentives

The literature on MDT indicates that there are a number of 'minimum conditions' required for effective MDT meetings, especially as these are commonly held outside normal working hours, for example during breakfast or lunchtimes (NBCC 2005; NBCC 2003). Included in the minimum conditions are incentives for participants to attend meetings, such as education, evidence of benefits, refreshments and food.

Other examples include incentives for cross-discipline collaboration (such as financial models for care that include evidence-based support, policy and legislative initiatives); efficiencies gained from pooled resources (such as common patient charts, shared space) or where it can be demonstrated based on evidence that additional

expenditure of resources is justified (such as higher rates of breast conservation, increased quality of life and patient satisfaction); well-conceived and unbiased educational venues (where non-partisan information can be shared, free of conflict of interest (Tripathy 2003).

Remuneration for team participants is an issue for non-salaried members, and in late 2006 two new MBS item numbers were introduced to support specialists in attending and participating in MDT for cancer patients. One Item is to support clinicians participating in MDT; the other for clinicians leading MDT. In an information guide to practitioners about the items (NBCC 2007) noted:

'Item 871 can be claimed by a medical practitioner from any area of medical practice (defined in the item descriptor as a specialist, consultant physician or general practitioner) who is leading and coordinating a multidisciplinary case conference to develop a multidisciplinary treatment plan for a patient with cancer.

Item 872 can be claimed by a medical practitioner from any area of medical practice (defined in the item descriptor as a specialist, consultant physician or general practitioner) who is participating in a multidisciplinary case conference to develop a multidisciplinary treatment plan for a patient with cancer. Only treating medical practitioners can claim the items - that is those who have treated or provided a formal diagnosis of the patient's cancer in the past 12 months or expect to do so within the next 12 months.

Under this definition, a 'treating medical practitioner' would include the pathologist or radiologist who provided a formal diagnosis of the patient's cancer prior to the meeting, or a radiation oncologist who will prescribe radiotherapy for the patient but does not expect to have contact with the patient until some months after the meeting' (NBCC 2007, p1).

Time

The time required to organise meetings, manage the competing priorities of attendees who already have a heavy workload or requirement to attend multiple meetings was noted by the Forum to be a barrier to participation (NBCC, 2006). Other authors noted the absence of champions and leaders (NBCC 2003); time and or travel to attend the meetings (Whelan et al 2005); prevailing attitudes including entrenched resistance to change; and dominance of decision making by some disciplines, were all barriers (NBCC 2006).

Resources

Adequacy of resources can be a barrier. These are reported to include: lack of dedicated meeting venues with adequate facilities (such as digital imaging, pathology viewer, video- or teleconference facilities; and the cost of technology to support remote links (NBCC, 2006). NBCC (2003, p3) reported that *'inadequate logistic*

and telecommunications support for meetings coupled with the reluctance to assume added workload without added remuneration combine to make the achievement of MDC a major enterprise dependent upon the efforts and personal skills of a few committed individuals'.

Resources such as allocation of sufficient space in which to hold MDT meetings and that can facilitate participant interaction; availability of adequate equipment to facilitate the types of materials and information required at the meeting; video- or teleconferencing facilities as needed; refreshments, have been identified as necessary for effective MDT functioning (NBCC, 2003). Whelan et al (2006, p121) note '*most [UK breast cancer] units find the MDT coordinator an essential part of organising and running the MDT meeting, and for 34 units not to have access to such a person is an area that could be improved'.*

Medico-legal issues

In the NBCC 2006 forum series, a number of medicolegal issues raised by participation in MDTs were raised, and subsequently followed up in a specific purpose workshop and reported in the 2007 report of that workshop. In 2006, these issues included:

- informed patient consent - including financial consent. This requires documented patient consent prior to discussion at MDT, ensuring distinction between consent to case discussion and consent for a particular treatment or procedure (NBCC 2007)
- professional liability for health professionals participating in a multidisciplinary team, and duty of care even in the case of no direct patient contact.
- documentation of dissenting views in a multidisciplinary team meeting
- involvement of the patient and how to incorporate patient views in treatment planning.

Among the issues identified as potential barriers to MDT, some related to privacy issues for meetings that are cross-institutional, cross-practice or cross public-private interface (NBCC 2006). Others related to decisions made by a team rather than an individual, however the subsequent workshop revealed that participants felt that in reality, shared decision making actually carried a low level of medicolegal risk to them (NBCC 2007). Health professionals participating in MDT were considered to carry responsibility for their actions within that team akin to other clinical

responsibilities, and share responsibility for treatment recommendations made within their area of expertise (NBCC 2007).

Role delineation

Poor definition of team roles and lack of multidisciplinary awareness are cited in studies as a barrier to MDT. For example, Jenkins et al (2001. P72) note '*some MDT members are unsure of their roles, and there is a discrepancy between members expectations of the roles of others compared with individuals perceptions of their own role*'. Professional and institutional resistance (Haward 2003 in Flessig et al 2006; Tripathy 2003; Carter, Garside & Black, 2003); differences in team members' understanding of consensus decision-making (Tripathy 2003); focus on medical aspects of treatment planning with limited consideration of allied health and psychosocial needs; and limited understanding of specific cultural issues such as those relating to Aboriginal and Torres Strait Islander communities (NBCC 2006), have also been reported in the literature as barriers to MDT. The scarcity of research on the effectiveness of working in MDT (Carter et al 2003; Houssami & Sainsbury 2006) also acts as a barrier.

These barriers are not insurmountable, and their resolution sheds light on factors that facilitate MDT implementation. Possible solutions to some of the barriers were suggested by the NBCC Forum participants who proposed them (NBCC 2006). These suggestions included: setting realistic and achievable steps to bring about change; documenting processes to assess change; ensuring the model of MDT was congruent to the service adopting it; securing a local champion to drive change; and recognition of the holistic nature of multidisciplinary care, thus avoiding medical specialty dominance (NBCC 2006).

Key enablers to participation in MDT

Many of the enablers are discussed in the earlier section of this review dealing with characteristics of effective MDTs. An Observational Study examining best practice in establishing MDT in breast cancer accompanied the NBCC National Demonstration Project (NBCC 2003). The Observational Study identified a set of minimum conditions for effective MDT:

- Respected peer leader with strong leadership and facilitation skills to enable full participation of all disciplines
- Supporting infrastructure (e.g. meeting room venue, facilities, equipment)
- Preparation of all relevant materials and information in advance of meetings
- Inclusion of all disciplines and mutual respect between participants leading to productive group dynamics

- Incentives for participants to attend meetings (e.g. education, evidence of benefits, food)
- Timely communication of the outcomes of case discussions to the patient, and to his/her general practitioner (NBCC, 2003).

There clearly have to be dedicated resources to support MDT functioning, including funding, administrative support, and adequate infrastructure such as venue and equipment (NBCC, 2003).

NBCC 2003 notes the success of MDC is ultimately dependent on champions and individuals with leadership qualities, who drive change and gain the support of their peers (NBCC, 2003). Harrison et al 2008 note the NBCC Demonstration Project found the most sustainable approach to improving MDT was the formation of regular MDT planning meetings, dedicated to treatment planning. A key to sustainability of MDT meetings is the need for them to become habitual - thus meetings should be held at the same time and place to maintain routine and avoid confusion, be time-limited, and held at a mutually convenient time for all attendees (NBCC, 2003).

BENEFITS OF INVOLVING RADIOLOGISTS IN MDT

Dalla Palma et al (2000) analysed the effects of individual clinician-radiologist interactions (not undertaken as part of a MDT) in a single hospital in Italy. Descriptive analysis was based on three separate self-report surveys of staff radiologists and staff clinicians. Staff radiologists (n=20) were asked to collect data concerning their relationships with staff clinicians over a 10 day period, and data about interactions promoted by staff clinicians to solve clinic-radiological problems together with the impact of this consultation on diagnosis and therapy; all staff clinicians (n=174) were asked for their opinions about their relationships with staff radiologists.

These authors concluded that there are a large number of time-consuming daily contacts between radiologists and clinicians that were initiated by clinicians. These consultations were reported by the clinicians to have significant effect - helping to refine diagnosis (6% often, 58% sometimes); reduce number of investigations (23% often, 46% sometimes); correct the diagnostic strategy (13% often, 71% sometimes) and alter therapeutic decisions (10% often, 57% sometimes). Clinician-initiated contacts in urgent/complicate cases resulted in changes to initial clinical diagnosis (50% cases) and therapy substantially changed in 60% cases (Dalla Palma et al 2000).

Dalla Palma et al (2000) note these data are consistent with that reported in earlier papers suggesting that conferences between

clinicians and radiologists bestow considerable benefit to patients whose diagnosis and management is discussed and refined.

Ruhstaller et al (2006) report that the US study by Chang et al (2001) concluded that the initial treatment recommendation for women with breast cancer was changed following a second opinion of a MDT in 43% of the cases - underscoring the reduction in variation in decisions made by practitioners acting independently, and the importance of radiological review.

When team members in a UK breast cancer MDT study were asked their views on the effectiveness of MDT, radiologists (and histopathologists) had consistently more negative perception of team effectiveness than surgeons and nurses - possibly reflecting radiologists' more limited degree of involvement given they were members of multiple MDT and also had obligations in relation to running of their departments (Haward et al 2003).

There are other benefits for being involved in MDT:

- provision of evidence-based patient care - with implications for clinical outcomes and cost effectiveness (NBCC, 2003; Chang et al 2001;)
- Benefits of prospective treatment planning that includes consideration of all treatment options and individualised treatment plans (NBCC 2005; NBCC 2003);
- streamlining referral pathways (NBCC 2003; Gabel et al 1997);
- enhanced professional development and collegial activities (NBCC 2003);
- development of local protocols (NBCC 2005); and
- discussion of other relevant issues such as resolving service delivery problems (NBCC, 2005)
- Team clinicians enjoy lower psychiatric morbidity than general health workforce (Haward et al 2003).

The evidence from the literature indicates that while MDT have the potential to maximise efficiencies in both organisational terms and outcomes for professionals, this does not just occur as a result of bringing the relevant disciplines together. Team members need to have shared goals and values, and understanding and respect for other members' roles and competencies. Teams also need effective quality assurance programs to implement, monitor and evaluate service against standards/guidelines.

The principles of multidisciplinary care (team approach, good communication, access to full range of therapies, maintenance of standards of care, patient involvement in decision-making) aim to provide some flexibility for services in implementing MDT to

Australian women with breast cancer, and make this relevant to local context (Zorbas et al 2003; Choy et al 2006). Several Australian studies have shown that aspects of best practice involving multidisciplinary care are attainable for women with breast cancer irrespective of location or practice setting (Olver & Selva-Nayagam, 2000 - cited in Zorbas et al 2003), including consulting city colleagues on a case-by-case basis. Wider geographic spread of MDT is also facilitated by developments in teleconferencing (Kane et al, 2007) and telemedicine (Ovler & Nayagam 2008), but these technologies do not resolve staff shortages, shortage of time, or inconvenient meeting times (Flessig et al 2006).

Stakeholder consultation

Semi-structured interviews with key informants were conducted in order to collect information and understand stakeholder perspectives on MDT in general, and in relation to breast cancer services and radiologist roles in MDT specifically. The interviews provided an additional environmental scanning opportunity where participants suggested additional publications or contacts relevant to the project; and contributed to the critical appraisal stage by testing assumptions derived from the environmental scan and the literature review. The semi structured interviews were conducted either by telephone, during face-to-face meetings held at the time of MDT site visits, or by email response, as convenient to the respondent. We talked in detail to ten radiologists who are current members of MDT, and consulted with the organisational representatives of nine agencies either directly involved in the provision of MDT breast cancer services, or that provide advocacy, clinical and policy guidance to such services and their users. A condition of their participation was the assurance of their anonymity. In addition we reviewed the publicly available web-based information about MDT from a further eight service provider organisations.

MDT site visits were conducted as part of the consultation activities. The purpose of site visits was to understand the context within which MDTs and radiologist members of teams functioned. Visits provided an opportunity to observe teams in action and talk to key team members (leader, coordinator, radiologist) about radiologist role and involvement, barriers and enablers to radiologist involvement, and ways of promoting this in future. The Contractual requirements for this project required the selection of two sites for this purpose.

As noted earlier in this report, during the environment scan stage of the project, key informants suggested MDTs with which they were familiar and which could offer examples of teams addressing location-specific application of MDT. Their suggestions encompassed a range of metropolitan and regional teams that were considered to be examples of well-established functional MDTs. These teams were also suggested as examples that addressed location specific issues such as cross-border or geographic factors; cross-institution and cross-sector collaborations; and public-private differences. The key contacts nominated within each suggested site were followed up by telephone and email to help determine practicalities of visiting within the timeframe of this project.

The Team Leader for each MDT was approached directly by one of the Principals of Australia's Health P/L, and was provided written materials outlining the project and its purpose together with an invitation to participate in the QUDI project. The extent of their

involvement was limited to permitting observation of a meeting in progress and providing the opportunity to meet with team members and radiologists in particular. Team Leaders sought the cooperation of their team members and hospital administration prior to advising their response to us.

The selection of sites for the observational visits was based on a convenience sample reflecting consent to participate, the practicalities of location, access to key informant members of the team, and the timeframe stipulated in the contractual agreement between RANZCR and Australia's Health P/L. MDTs in three locations permitted our attendance at their regularly scheduled treatment planning meetings - all were located in metropolitan Sydney: one operating in a private inner-west hospital; one in a major public teaching hospital with a reported high breast cancer caseload; and one operating in a private inner north hospital. The two private sector teams comprised specialists in private practice who attended each scheduled MDT meeting. The public sector team comprised salaried staff from various departments within the hospital. A fourth service located in metropolitan Melbourne required formal consent to be obtained from each member of the multiple MDT teams and the hospital administration, and this required a timeframe that was not practicable for the purposes of this project.

Two of the MDTs convened after the diagnosis and initial surgical intervention had been completed - usually about 2 weeks following surgery. One team convened pre intervention to discuss the presentation, confirm diagnosis and plan treatment. It also performed a routine follow up post surgery.

Overview MDT 1

One of the 'post-intervention' teams had a dedicated Team Leader (Breast surgeon) and (team-funded) Team Coordinator. The Team Leader role was not rotated among members. Patients were not present in the team meeting, but were met by one of the team members immediately following the meeting to discuss the MDT recommendations. The venue was set up in 'theatre-style' with rows of seats facing the projection screens. Meetings were of 90 minutes duration - 1 hour for the case presentation and discussions, and 30 minutes at its conclusion for the journal club. On average 8-10 patients were discussed at each meeting. Refreshments were provided for all participants.

This MDT adopted a funding model that pooled MBS payments from multiple teams ("private referred non-inpatient") to fund the Coordinator and previously an IT support person.

This MDT made considerable use of IT to view relevant patient information including history, psychosocial factors, histopathology and radiology imaging, and decision-support software to ensure treatment decisions (including adjuvant therapy) conformed to clinical guidelines. Relevant case material was compiled by the respective discipline prior to the meeting and presented either by

the principal treating surgeon, or in the case of the pathology and radiology materials, presented by the appropriate discipline specialist. All of the radiology imaging was presented electronically.

Discussions were predominantly centred around the three disciplines - surgery, pathology and radiology. The meeting agenda included a standing 'journal club' item at the conclusion of the clinical agenda. For each meeting, one member of each discipline took the lead in presenting relevant information and leading the discussion. The Team Leader subsequently advised us that this was an invaluable mechanism assisting regular attendance. It was noted that the presence of a highly committed and enthusiastic radiologist had been key to the team's continuation and performance. The Team Leader also commented that member contribution to team discussions was variable, and that the seating arrangement limited interaction .

The Radiologist noted that preparation of relevant imaging for the team discussion was completed by the specialist prior to the meeting, and this was a time-consuming task, given the other clinical requirements on the Radiology Department. Some of the imaging performed outside the institution was not available for inclusion as needed. It was hoped that improvements in the rate of digital storing of imaging would improve this.

Overview MDT 2

The other 'post-intervention' MDT had an institution-funded Team Coordinator and an Administrative Assistant. The Team Leader was a Breast Surgeon, and leadership was not rotated amongst members. All new presentations were discussed at the MDT, but the list is compiled based on the surgeon's referral to it. Relevant case background was compiled in a PowerPoint presentation prior to the team meeting; pathology results were presented via an overhead project connected to a microscope that the pathologist brought to the meeting; radiology results were presented from images pre-loaded into the PC used for the meeting. Not all patient imaging was available at the time of meeting, and this was noted to be an impediment to the team considerations. Meetings were limited to 1 hour, and were scheduled at 7.00am once a week. On average 8-10 patients were discussed per meeting. Refreshments were provided.

The institution funded the MDT Coordinator and provided the Administrative Assistant. Remuneration for non-salaried specialists' participation depends on their MBS Item claim. The Institution has a mandatory requirement for completion of a patient consent to MDT discussion before it will process these claims.

Case discussion included contribution from all disciplines, including allied health. The face-to-face seating arrangement

appeared to assist interaction and member contributions. This MDT did not have a regularly scheduled educational session.

Overview MDT 3

The third MDT visited for this project convened to assess the diagnostic information, confirm diagnosis, plan intervention and again, post surgery to follow up patient outcomes, and as a quality assurance activity. This team discussed all new cases, and was convened at 7.00am once a week. On average 8-10 patients were discussed per meeting. The Team Leader role was taken by a Breast Surgeon who had been the founding member of the MDT, and was regarded by the other members as an advocate and champion of MDT. The Team Leader reported that this team does not pool MBS funds to support its operation, since there is a risk that this could excuse the institution from appropriately funding the MDT.

The meeting had two discrete parts - a dedicated radiology session at which the Radiologist and radiology registrars presented and discussed patient imaging followed by a histopathology session conducted similarly; and a subsequent treatment planning session. Core disciplines were described as 'usually in attendance', and their input was actively encouraged by the Team Leader. The role of the Breast Care Nurses was especially valued.

Radiology imaging was presented using light boxes and film; histopathology results presented using microscope and overhead projector. Team discussions were focused on holistic care.

The meeting time and regularity was described as important to the success of the MDT, since it encouraged planning for attendance, and enabled members to attend prior to starting their usual work day. The time of the meeting was however considered to considerably extend the working day for the radiologist, given other service requirements that also needed to be met. The Radiologist member of this team reported that the educational value of this meeting was high, not the least because it provided insight into the approach being considered by surgeons. The interaction that took place in the MDT *before* intervention meant the radiologist did not have to pre-empt the key questions being posed by the surgeon, but rather respond in a more focussed way. This was considered to add value to the radiologist's own work as well as enhancing team efficiency.

Attendance at the meetings and discussions with key team members provided additional insights into the process and utility of MDT.

DISCUSSION

The scope of this project was defined by RANZCR, and was to establish:

- The current level of radiologist involvement in MDT and how widespread the use of MDT is the treatment of breast cancer;
- The barriers and enablers to radiologist participation in MDT;
- What MDT models best facilitate radiologist involvement in MDT; and
- Recommendations for encouraging radiologist participation in MDT and informing other MDT members of the value of radiologist involvement in MDT

An integrated suite of methods was developed to collect information relating to these parameters within the timeframe specified by the contractual agreement between RANZCR and Australia's Health P/L (May to September 2008). The choice of methods was intended to strengthen the data in the face of collection constraints, and the interpretations to be derived from it. The multiple methods comprised:

- a preliminary literature review;
- an environmental scan;
- a systematic literature review; and
- stakeholder consultations including observational visits to a convenience sample of MDT.

In addition, interim and draft reports for this project were presented to RANZCR, its Council, members of the QUDI Program, and the Project Management Group for their review and feedback.

Stakeholders were identified through the advice of RANZCR, members of the Project Management Group, and suggestions provided by key informants as discussions progressed. There were several constraints to the scope of stakeholder consultation: the practicalities inherent in seeking the cooperation of busy clinical staff including radiologists; informants' availability within the project timeframe; and the contractual requirements for the consultancy.

We have identified a number of key issues that address the questions posed by the project aims. These are discussed in the following section of the Report under the broad categories of MDT use; the extent of radiologist involvement; service and workforce constraints and MDT leadership; and the value of radiologist involvement in MDT. Enablers and barriers as these have been identified are discussed in each of these broad categories. Our recommendations for encouraging

radiologist participation in MDT and promoting the role to other MDT members are presented in the section of the Report following the Conclusions section.

Our research suggests that while MDT is clearly established as the recommended standard for breast cancer treatment, the implementation of MDT models varies widely across Australia, from informal arrangements supporting discussion between specialists, to formal, fully established and coordinated MDT teams. Several key stakeholders noted that there is currently no readily accessible repository of information about the utilisation of MDT in Australia. The literature also indicates that there remain a significant percentage of Australian services that do not have multidisciplinary teams for all cancer types, despite the evidence-based recommendations for this.

Use of MDT

There is variation across jurisdictions in MDT use in breast cancer, and most jurisdictions, while recommending MDT, are reluctant to mandate it as a requirement of service given workforce and service constraints. Many of the stakeholders considered that adherence to strict MDT protocols and guidelines can lead to a rigid approach and reduced flexibility, and that the advantage of the 'Principles of MDT Care' is the inclusion of this flexibility so that services can in fact develop a model that suits their local circumstances, and can reflect workforce issues.

It was apparent that there are different models of MDT for breast cancer. One application is the multidisciplinary tumour board - which engages clinicians, registrars and house officers. In this model patients are typically presented, but do not attend. It was suggested that in practice, this approach often lacked a radiologist and relevant imaging, leading to rework and delays in initiating treatment. Another model was a more holistic team, encompassing all aspects of patient care, and all parties contribute to the treatment planning and monitoring. A significant advantage of including radiologists in the model was thought to be evident in the coordination of care, saving time, cost, patient exposure to radiation and minimizing the number of appointments patients needed to attend.

Many MDTs appear to only meet post-intervention and then only to discuss selected cases. Selection of patients for discussion appears somewhat ad hoc, and MDT's do not necessarily have team-developed criteria to decide which cases should be discussed. It was reported that in some instances the selection was made by an individual clinician, and the treatment decisions made by the leading doctor. This does not appear to be consistent with the *Principles of Multidisciplinary Care* which include an emphasis on 'provision of care in accordance with nationally agreed standards' - nor the national policy documents that include the recommendation to

review all patients as a priority for the delivery of best practice in cancer care. The current MDT guidelines do recommend that all patients with newly diagnosed cancer should be discussed by the multidisciplinary team, and this is central to the planning of treatment. The National Service Improvement Framework for Cancer¹¹ - a joint initiative of the Australian Government and States and Territories - identifies that ' a more coordinated approach to cancer is required which enables networked integrated services to be provided within a patient centred and multidisciplinary framework'.

However it is recognised that the Australian context does require flexibility in the implementation of MDT. Some stakeholders considered that despite the recommendation to discuss all patients in a MDT, this was not realistic on a number of grounds: in some cancer groups the volume of cases presenting would overwhelm team capacity, whereas in some regions the small number of cases would not support the establishment of a local team; teams may see the merit in discussing uncomplicated cases; and workforce issues limited access to some specialists..

The literature reveals that overseas there is a different requirement as to when in the care process a patient is discussed by an MDT: for example in the UK 'treatment cannot commence until a plan has been agreed upon, and a plan cannot be agreed upon until the MDT is in full possession of the necessary information' (Nouraei et al 2007, p113). Despite this requirement, it is reported that 25% of the UK breast cancer units do not discuss patients treatment at an MDT prior to surgical intervention.

It appeared that at this time few Australian teams were systematically assessing their team functioning and outcomes, although it was recognised that this is an important quality improvement activity. Some stakeholders suggested that this was in part due to a lack of agreement on process measures as much as outcome measures, and well-established cancer centres would need to take the lead to demonstrate how to do this. Some jurisdictions are now conducting evaluations and these are expected to be completed later in 2008. Less than optimal conformance with Australian MDT guidelines is likely to increase the difficulty in evaluating team performance and health outcomes as a quality improvement mechanism.

MDTs clearly require significant organisation, cooperation and input from core members, service and administrative staff, and patients. Stakeholders commented that this level of intensity was necessary for teams to be truly functional, but that the workload burden was not recognised by the institution in which the team operated. Lack of administrative support, and dedicated technical support for team equipment was a barrier to team efficacy. Several stakeholders noted the dependence of the team on the contribution of a few highly dedicated individuals, including managing the MDT IT requirements.

¹¹ National Health Priority Action Council, *National Service Improvement Framework for Cancer*. 2004

It was evident that collating all relevant patient information including radiology results was a challenge, and especially when many have been completed 'off-site'. Some MDT discussions were limited by the availability of relevant information, and relied on specialists' recall of salient points for discussion, rather than referring to the clinical records. This was reported to be problematic in relation to accessing mammograms, and it was considered that there should be a requirement for these to be digitised for transmission to the MDT meeting. One radiologist noted that there was some benefit in not having all imaging at the meeting, as this helps to limit discussion given the other time requirements on them.

IT resources available to MDT are variable despite the key role they have in providing timely access to clinical information needed to inform decision-making. Some teams have very limited access to contemporary equipment (such as adequate computerization, links to digitised data repositories, broadcast facilities for videoconferencing, and data projection facilities) to ensure that case discussions are efficiently informed by results. Hospital Picture Archive and Communications System (PACS) - which comprise hardware and software that enables digital communication, archiving, processing and viewing of images and image-related information - are not uniformly available, and in some cases are described by MDT leaders as unreliable or inadequate. Teams have attempted to circumvent this limitation by relying on the personal laptop computers of individual members to store and retrieve the relevant records.

Participation in MDT was considered to provide an invaluable educational opportunity for team members - modeling collaborative relationships and improving knowledge and skills. As noted above, one MDT structured education around a standing agenda item. Presentations were rotated among all the disciplines and this was reported to be a successful strategy that added value to members' attendance. One radiologist noted that while the meetings can contribute to CME, it would be useful if the process for accrediting MDT as CME providers was clear, and claiming points was simplified for participants.

The extent of radiologist involvement in MDT

Radiologists are considered core members of MDT teams, and this is consistent with the discussion of team membership in the literature. In long standing teams well supported by the Radiology Department, the radiologist is likely to be a founding member, but this reflects individual personality and commitment. Radiologists are frequently members of multiple MDT's - and this adds to their workload burden, challenges time management and imposes additional demands on departmental time. In the public sector, radiologists report they may not be provided protected time to attend all MDT meetings.

Much of the work relating to breast cancer was considered to take place in the private sector; however the public-private divide was

exacerbated by current funding mechanisms. Radiologist stakeholders indicated that private radiology providers attending public sector MDTs do so in a voluntary basis, (notwithstanding the availability of MBS MDT-specific Items) and this represents an opportunity cost to them. In the private sector, the time required to travel to MDT meetings, as well as the time spent in the meeting at which only a few cases were presented and limited radiology input was sought, was noted to be an inefficient use of time. It was considered that better use of 'virtual' meetings using teleconferencing or preferably videoconferencing would improve this, and this would be expected once PACS systems are uniformly operational.

Many of the radiologists consulted in this project noted their attendance at MDT meetings was not driven by the remuneration, rather their participation reflected the need to develop and maintain good referral relations, and offered educational benefits. This was particularly the case for salaried radiologists.

It appeared that there was little use of the MBS MDT Items by radiologist team members: some commented that the process to claim was a disincentive to do so, and outweighed the payment received; however some comments implied that eligibility for making a claim may not be widely understood. In MDT that had adopted a funding model that aggregated income and used this to fund its operation, including purchase technical support, it is a useful contribution to costs of attendance. However there were tax implications if MBS payments were included.

In the teams visited for this project, members advised that radiologist expert opinion was sought in relation to the patient imaging discussed, and radiologists actively participated in team discussions and specific treatment planning. The exception was noted by radiologists in one of the 'post-intervention' teams, where it was felt the radiologist was not usually asked for diagnostic clarification. One unanticipated benefit reported here though, was the usefulness of seeing the outcomes from procedures that had been performed. Preparation and attendance at MDT was considered by the radiologists to be a necessary part of team participation, and was recognised by them as facilitating collegial interactions as well as benefitting practice referral mechanisms.

Radiologist team members reported that their attendance at meetings was frequently an additional demand on their time, and in public sector settings, attendance was not formally recognised as constituting part of their routine workload. The exception occurred in private practice where it was reported by one radiologist that team meetings were included as part of the workload. A benefit of participation in scheduled meetings was that it also scheduled the clinic-radiological interaction. One radiologist reported the common experience of being persistently interrupted in other work (such as performance of angiography) by clinicians seeking an 'on-the-spot' opinion or clarification of a radiological report.

It was noted that the time taken for participation in MDT was a potent factor in extending the radiologist workload, since in the one hour duration of a meeting, during which a small number of cases would be discussed, it would otherwise be possible to review about 30 images for reports. Given that in most cases participation is not protected time, MDT workload must be completed between usual reporting cases, and given workforce constraints, radiology workload accumulates. Consideration needs to be given to how to best manage a multidisciplinary approach to planning patient treatment.

Some radiologists report that protected time, including time for MDT preparation, is also essential because once documented, the MDT decision constitutes a medico-legal record. If there is insufficient time to properly review images, the medico-legal risk is increased.

Assessing the extent of radiologist involvement in MDT is assisted by the recent Royal Australian College of Surgeons' study. This paper summarises the percentage of radiologists engaged in multidisciplinary breast cancer teams, by public and private practice and by metropolitan, regional and rural practice settings. As noted in the literature review, the reliance on self-report data has well-acknowledged limitations, and in the case of much of the literature about MDT, team composition has largely been reported by disciplines other than radiology.

While radiologist involvement in existing teams is not uncommon, GP and consumer involvement is much less commonly reported in the RACS and other studies and confirmed in our consultations.

Service and workforce constraints

Radiologists and indeed team members of other disciplines reported that service and workforce constraints limit the available time for radiologists to participate in MDT. These constraints mean that the highest priority is given to image reading and reporting rather than to any other call on their time. This is a factor affecting radiologist involvement across all geographic and practice settings.

One radiologist noted that attendance and participation in the breast MDT required time out of other duties, and this had significant consequences for completing routine imaging and other reporting requirements. Given the tendency for MDT meetings to be held early morning, prior to the commencement of 'normal' work hours, this added considerably to the length of time required to complete a day's work. In this case it was reported that attendance at the weekly MDT resulted in completing the rest of that day's work around midnight. Where there was limited access to consultant staff, service demands cannot be readily met in conjunction with MDT workload requirements.

It was also noted by another radiologist that attendance at the breast MDT meeting required juggling attendance at other similar meetings, and this effectively limited the amount of time that could be spent in a meeting. The approach in this case was to restrict the radiologist input to only discussing the relevant patient imaging,

and limiting radiologist contribution to any team discussion and treatment planning, or participation in any team educational activity.

Many MDTs involving private practitioners occur outside business hours while those within daily or weekly institutional schedules represent an additional rather than alternative commitment. Even allowing for very long working periods, workloads for many radiologists are high. As noted earlier, in many instances MDT participation is additional to expected daily service functions. Some radiologists considered that this was not adequately recognised at an institutional or departmental level. The radiologist contribution for either pre-meeting review of patient imaging or attendance at the MDT meeting is not afforded 'protected time' status - i.e. recognition that the time required to participate in MDT meetings requires a clinical commitment just as clinics or operating sessions do, and is thus time that is included in individual job plans. This is reported to lead to prioritising such as only attending meetings for a brief period for discussion of specific cases. In regional and rural settings, radiologists may not be able to attend MDTs at all, in the face of other workload demands.

Workload demands are compounded where the radiologist has insufficient administrative and technical support. In settings where budgets are constrained, administrative staff support may be reduced even for necessary MDT functions. MDT functions where this support is regarded as instrumental to team efficacy include organising and recording team meetings, location and retrieval of radiology records, IT support for meeting technology such as teleconferencing or video conferencing equipment and operation, and image transfer (especially between collaborating sites) necessary to ensure team members have all the relevant information on which to base their discussions and decisions.

Our research suggests that in settings where these administrative supports are not present or inadequate, highly qualified radiologists spend time and effort carrying out these functions, which is a false economy.

Some radiologists reported spending significant pre-meeting time personally locating and organising relevant patient records for meeting presentation. The literature has reported that coordination and exchange of relevant patient information is a particular time-consuming problem where some of it resides 'off site' or has been performed by an external service. This was the radiologist experience in a number of MDTs. Images were reported to often be presented (by external services) on CD requiring additional work to import into PACS prior to meeting review. This is a time-consuming additional step that should be provided by an administrative person, not the radiologist. Sometimes the computing facilities available at the MDT were not adequate to manage the successful reading of CDs. It was noted that improved access to, and utilisation of digitised records will help counter this.

In several of the MDTs visited for this project, the effective operation of equipment such as data projectors, cameras and computers critical to linking remote members to the discussion as well as for presentation of patient information locally, relied on the IT skill and knowledge of local team members. This is clearly a distraction from the contribution of their specialist expertise to the MDT tasks. IT facilities are clearly central to the efficiency of MDT meetings, and contribute to the quality and safety of its decisions.

MDTs require adequate display, computing and projection facilities. Since treatment decisions are based on adequate review of patient information, including high quality monitors and projection equipment, adequate computer capacity and appropriate software are paramount. MDT teams require an appropriate strategy to ensure standards for equipment are met. Radiologist members may be in a sound position to refer to the new RANZCR standard for 'Portable Data Imaging' (RANZCR Standards of Practice for Diagnostic and Interventional Radiology Version 9.0) that is expected to address reading issues between different CD readers.

Team leadership

Our consultations indicate that the MDT leader role is commonly assumed by a breast surgeon who is also recognised as the 'champion' of MDT. While team members recognised the importance of team leadership to the effective functioning of their team, this role appeared to have defaulted to the surgeon. In some teams, the leadership was identified as exemplary, however there were some concerns expressed about the quality and style of leadership, particularly the extent of 'inclusiveness' of other disciplines' perspectives, and the reliance on a single individual to fulfill this role. The literature similarly identifies team leadership as a central feature of teams, critical to their efficacy, and points to the value of formalising leadership training as well as sharing leadership across team members. Our consultations however, did not identify any instances of formal leadership training and development, and this suggests that the capacity of other team members to assume this role will remain limited until this is addressed.

Teams appear particularly reliant on one or two "champions" to maintain the impetus for the team's continuation, and a number of stakeholders expressed concerns about the future of the team should the champion move on. The contribution of the champion was reported to be especially important where institutional and administrative support was considered to be insufficient or reducing. This also underscores the central role that the team leader provides when this individual is also the prominent champion of the MDT.

The value of radiologist involvement in MDT

Our consultations indicated that the contribution of radiologists to team function is valued - by radiologists and members of other

disciplines. This is consistent with the value ascribed to radiologist participation that is reported directly in the literature, or can be inferred from discussions about team composition and outcome. The value of MDT meetings as a quality assurance mechanism was noted by some radiologists. There were reported instances where the meeting discussion prompted a second review of radiology imaging and identified earlier omissions.

The recognition of their role was important to radiologists. Some radiologists considered their MDT input was not especially recognised or valued by the hospital administration, and there was no consideration of the amount of extra time or workload involved in preparing for or participating in MDTs. This was especially the case when team meetings took place early in the morning, prior to commencing 'normal' working hours. The early start for meetings was recognised for its value in falling outside working hours, but may serve as a disincentive to some radiologists. As noted earlier, participation in MDTs significantly extended the work day given the other service demands placed on radiologists as well as workforce shortages. This clearly has the potential to negatively impact on the quality of work being performed.

Similarly, some radiologists reported they considered that they were not necessarily respected as specialists, in some cases were told by other specialists "how to do imaging studies", and in others, being expected to conduct imaging and make a report available (to other specialists) in unreasonably short time period.

In our consultations, radiologists themselves as well as members from other disciplines indicated that radiologist participation in MDT contributed to:

- **Providing specialist expertise.** Multidisciplinary perspectives underpin MDTs decision-making and treatment planning
- **Team decision making.** Imaging results should be reviewed by the most proficient experts - radiologists - in order to assure quality of diagnosis and treatment planning.
- **Quality improvement.** Radiologist review of patient imaging contributes to quality assurance processes through improving conformity with guidelines; guides accurate intervention, and avoids rework and outcomes for patients. Experience, training, and caseload contribute to this.
- **Team efficiency.** Radiologist participation in MDT enables discussion between specialists and other staff when all are present, reducing the need for ad hoc discussions during other radiologist work commitments.
- **Inter-professional support.** Collegial support is cited as a benefit of participation in MDT

- **Job satisfaction** . Participation in an effective, functional MDT is reported to enhance professional satisfaction, in turn supporting staff retention
- **Training and education**. MDT participation provides a valuable teaching opportunity for all students and registrars and contributes to CME for existing specialists.
- **Research outcomes**. Team participation enhances opportunities to collaborate on research and improve accrual to research studies

CONCLUSION

There is a growing body of Level III and Level IV evidence that MDT's in cancer confer benefits to patients, clinicians and systems. The literature and the stakeholder consultations confirm that MDT is intended to bring patient-focused, comprehensive, contemporary and cost effective care to patients with breast and other cancer. The contribution of individual core disciplines to the outcomes of teams is neither well described in the literature, nor serves as a focus for the evaluation of team functioning.

MDT's rely on the contribution of a range of disciplines in their decision making - both for patient management and quality improvement. There is no doubt that multidisciplinary input improves team conformity to current service and treatment guidelines, and this is recognised as bringing a significant benefit to patients, clinicians and services. The presence of the broad range of disciplines both described in the literature and evident in the consultation activities completed for this project is regarded as essential to the success of teams, including clinical and service efficiency, and delivery of evidence-based outcomes for patients.

The literature and the consultations together confirm that radiologists are regarded as core members of teams, and participate in many teams operating in Australia today. It is apparent that radiologists subscribe to the principles underpinning MDT, and radiologists are recognised as core members of teams, and clearly contribute to overall team functioning. The role of radiologists within MDT is not well described in the Australian literature, although there is some discussion of this in overseas settings.

Training and education are noted as particular outcomes for participation in MDT, and foster the adoption of the evidence-based discussion within teams as well as contribute to individual and group professional development. Radiologist participation is identified as a factor important to updating cross-discipline professional knowledge and improving the quality of team outcomes. Participation in MDT is noted to improve radiologist's own interpretative skills and cancer detection rates in both screening and diagnostic mammography.

There is some recognition that radiologist input can and does contribute to higher standards of reporting as well as improve diagnostic input to team discussions, although this is noted to reflect a number of factors, such as expertise, training and caseload. The literature records examples where the radiologist review of imaging within MDT resulted in changes to interpretations, interventions and patient management compared to decisions about these taken outside of team environments.

Member contribution to inter-professional support is reported to reduce the potential for contradictory information to patients, as

well as improve inter-professional communication and team efficacy. Some literature points to the under-recognition of some of the less obvious roles radiologists perform within teams - such as provision of information to patients.

MDTs present opportunities for improving participation in research activities, including of team processes, functioning and outcomes as well as health outcomes or patients managed through MDT. In light of the scarcity of literature reporting the formal evaluation of team outcomes, there remain many opportunities for the investigation of individual and collective discipline contributions.

Team leadership is reported to be a key contributor to effective and sustainable MDT, however leadership is typically attributed to surgeons, and radiologist leadership is not common. MDT efficacy is apparently improved through plural, democratic and distributed leadership, and this minimises any discipline-bias in decision-making - something valued by consumers particularly. Interdisciplinary governance structures though are noted to not just materialise, but require some encouragement and training in MDT team functioning.

Notwithstanding challenges to the implementation of MDT, such as workforce, caseload, resources, time and service complexities, well-established MDT's for breast cancer operate in public and private sector settings in Australia. Teams are effective, case consultation mechanisms for tailoring patient care pathways and coordinating treatment, and are well regarded by clinicians and patients alike.

MDTs impose financial and opportunity costs, and clearly increase workload for a few dedicated individuals, however the majority of respondents in this project have emphasised that their participation provides education and collegial advantages that encourage and sustain their participation. The advent of MDT's challenges all disciplines to reconsider what is considered to be core business and likewise impact on services. Technological advances and new approaches to the delivery of care require the constant review and redefinition of roles, which in turn opens the way for role redesign. It is unrealistic to think that the way in which care was delivered in the late 20th century will continue to meet consumer, professional and community needs in the 21st.

MDT is one change that has to be addressed. There is no doubt that implementing an MDT requires dedicated resourcing to support member participation and team functioning. These resources include funding, administrative support and adequate infrastructure such as team venue and the equipment necessary for the team to carry out its business.

A key feature of sustained participation by radiologists, and adoption of a role that properly reflects their expertise, is when the MDT is convened to assess the diagnostic information, confirm diagnosis, and plan intervention, rather than teams that only meet after intervention to discuss and confirm adjuvant therapy.

Radiologists in the consultation activities conducted for this project report that in the latter, there is a limited role for them, which does not afford an especially efficient use of their time and skills, and participation is experienced as a particular burden and distraction from other pressing service requirements.

Shared decision-making is considered by team members to carry a relatively low level of medicolegal risk to the team, a risk level consistent with individual practitioner recommendations being made within their area of expertise.

There is growing evidence relating to team outcomes, but this remains a significantly under-researched area at this time. Radiologists are in a good position to help redress this. Teams require the contribution of the specialist expertise and technical knowledge of radiologists, especially since the diagnosis and treatment of cancer is heightened by on-going rapid and complex technological advances that make it essential for the radiologist, who is the expert in this field, to be involved in treatment decisions. The inclusion of radiology expertise should assist teams to set performance targets and clinical audit activities, and provide a salient contribution to decisions about MDT, team processes and facilities.

Both professional and institutional resistance can be challenged by compelling evidence for the MDT approach, and teams need to document their processes used to assess change wrought by their activity. MDT's are reported to provide improvements in cost effectiveness and efficacy of service as well as development of local protocols that help resolve local service delivery issues. Data on health outcomes including quality of life and patient satisfaction is needed. The evidence-base also needs to extend to the financial models that support MDT.

Multidisciplinary teams bring benefits to patients, healthcare practitioners and improvements to systems. While MDT participation does carry a workload, there are reports that overall, teams bring about efficiencies in cross-discipline cooperation that reduces workload elsewhere. The inter-disciplinary cooperation and collegial support ascribed to team membership is reported to advantage the mental health of its members. Incorporating a standing item for education (such as a journal club) in teams was noted to be an invaluable mechanism to encourage team attendance as well as serve a knowledge growth function. Meeting time and its regularity is described as important to the success of MDT, encouraging planned attendance that fits in with other working day commitments.

RECOMMENDATIONS

Based on the findings from this project, there are three broad levels at which interventions through RANZCR could promote the role of radiologists in MDT: at a national and jurisdictional policy and program level; at an institutional and service level; and at the level of research evidence. We have framed recommendations for potential next steps around these levels for action.

National/jurisdictional policy/program level

MDT in cancer care is the subject of ongoing policy and program research and development in national and state institutes, networks and agencies, as well as in overseas jurisdictions. This effort covers both 'generic' multidisciplinary cancer teams, and teams specific to breast cancer. RANZCR needs to be connected to these activities in order to ensure appropriate focus on the role of the radiologist with MDT and provide guidance on the research and evaluation activities being undertaken in respect of the roles and contributions of radiologists to successful MDT in cancer care.

Recommendation 1

RANZCR should seek to identify specific national and jurisdictional level activities focused on MDT policy and program research, and ensure the College secures formal organisational links with these activities.

Recommendation 2

RANZCR should ensure that it maintains appropriate representation on national and jurisdictional policy and program networks to strengthen the networks' focus on the role radiologists play in MDT, and to guide an appropriate radiologist focus to the research and evaluation activities being undertaken.

Recommendation 3

Where there is no clearly identifiable research and evaluation activity addressing MDT, RANZCR should take a lead role in driving this.

Recommendation 4

RANZCR should establish an 'MDT Interest Group' within its own membership to support the exchange of information, sharing of best practice examples and solutions to challenges faced by teams. This MDT Interest Group should be used to facilitate radiologist input to the national and jurisdictional level MDT policy and program

networks, and to guide the education and continuing professional development programs of the College.

Institutional/service level

This project shows that radiologists undertake significant personal and professional commitment to supporting MDT in breast and other cancer care. This effort is frequently undertaken in addition to normal workloads and sometimes with limited practical administrative and technical support to the radiologist and the MDT. In relation to information technologies, there is a need to ensure the integration and compatibility of system requirements to provide radiologists with timely access to radiological and patient information.

There is a need to promote the appropriate, effective and efficient use of specialist radiologists in MDTs to institutions and services using or intending to use MDT. This includes information on the function and role of radiologists in MDT, together with the resources needed for them to effectively and efficiently contribute to MDT processes and outcomes. The establishment of an MDT Interest Group (Recommendation 4) should provide expert guidance in the development of standards for radiologist participation in MDT.

Recommendation 5

RANZCR should develop standards for radiologist participation in MDT and promote these standards to all services and settings using MDT as a model of management for breast and other cancers. These standards should include guidance to radiologists and others involved in MDT in accordance with best practice, resources, support, infrastructure, information technology standards, and requirements necessary to ensure effective radiologist input to team decision-making.

There is also a need to promote the benefits of radiologist participation in MDT to services and to radiologists, including peer and collegial support; the acquisition of new knowledge and skills, team management; and efficiencies such as aggregation of multiple specialists; care planning pathways and referral links; limitations to rework; and opportunities for participation in research.

Additional information that may assist radiologists in MDT include eligibility and application of the MBS MDT Items, processes for accrediting teams for the purposes of continuing professional development, and processes for radiologists to claim CME points through MDT activities. These promotional goals could be addressed through the educational and professional development programs of the College; and the networks and peer MDT Interest Group described above.

Recommendation 6

RANZCR should ensure the educational and professional development programs of the College address MDT, including promoting to radiologists the benefits of MDT to patients, clinicians and services. The CPD programs should address the acquisition of skills in relation to team management and team participation; recommended minimum standards for radiologist participation in MDT; guidance on processes for accrediting teams and awarding of points for CPD purposes and information on radiologist eligibility for MBS Items for participation in MDT.

Evidence level

This project shows that there are a number of issues in radiologist involvement in MDT that require active promotion of further research and development. Particularly prominent is the need to identify MDT models and solutions intended to overcome geographic and workforce barriers; skills development for radiologists to actively participate in teams, team leadership, MDT outcomes and quality assurance; and adequacy of current MBS reimbursement for radiologist participation in MDT.

Recommendation 7

RANZCR should use the formal organisational links (Recommendation 1) and the MDT Interest Group (Recommendation 4) to promote MDT research by radiologists including the areas indicated above.

GLOSSARY

CanNET NS&ES	CanNet National Support & Evaluation Service
MDC	Multidisciplinary care
MDT	Multidisciplinary Care Team
NBCC	National Breast Cancer Centre
NHMRC	National Health & Medical Research Council
NICE	National Institute of Clinical Excellence
QUDI	Quality Use of Diagnostic Imaging Program
RANZCR Radiologists	The Royal Australian and New Zealand College of

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National Institute for Clinical Studies
Peter MacCallum Cancer Centre
Royal Adelaide Hospital
Royal Women's and Children Hospital Brisbane
Sydney Cancer Centre
Sydney Breast Clinic

APPENDIX B: LITERATURE SUMMARIES

Reference	Objective	Study focus	Design	Conduct	Results	Conclusions	LOE *
Ahern V, Bull C, Harris J, Matthews K & Willis D, (2006). Subspecialisation of radiation therapists in Australia and New Zealand. <i>Australasian Radiology</i> , 51(2): 104-105	Review radiation therapy workforce	Radiation oncology subspecialisation	Review of RT workforce	Review of workforce data; and outcomes of a one-day special interest RT group of 28 RT. Descriptive	Workforce has improved since 2000, but lack of retention data and career opportunities are limited.	Subspecialisation within RT (as exists in UK) requires role definition, training, mentorship and funding	
Boyle FM, Robinson E, Dunn SM, Heinrich PC (2005). Multidisciplinary care in cancer: the fellowship of the ring. <i>Journal of Clinical Oncology</i> , 23: 916-920	Using movie analogy (Lord of the Rings) to reflect on setting's team approach to cancer care	Advanced breast cancer – team approach in RNS Sydney	Descriptive reflection on team functioning using movie analogy and literature review	Extrapolation of movie themes and application to team development and its communication framework. Descriptive only. Limited literature review; LOE not specified	MDT development reflects discrete developmental stages described in psychological literature for small groups (forming, norming, storming, performing and reforming); team challenges (including leadership, membership, language, interprofessional, patient-centredness, turnover of members, performance)	Teams reflection on their effectiveness and patient support is valuable insight-producing mechanism that could improve outcomes for patients and providers	
CanNet National Support and	Comprehensive literature	MCN & MDC in cancer	describing previous	Data from studied	Defines MDT and	Points to limit of	III

Reference	Objective	Study focus	Design	Conduct	Results	Conclusions	LOE *
Evaluation Service-Siggins Miller (2008). Managed Clinical Networks – a literature review. Cancer Australia, Canberra, ACT.	review		work including 24 empirical research studies, only one of which was RCT (Gabel, Hilton & Nathanson 1977)- the rest were observational or comparative in design	reviewed have been summarised by extracting data into tables. Systematic literature review, Levels of Evidence of included papers mostly observational or descriptive.	theoretical and conceptual literature relating to MDT and a review of critical components of an effective MDT	empirical research on MDT	
Carter S, Garside P & Black A (2005). Multidisciplinary team working, clinical networks and chambers: opportunities to work differently in the NHS. <i>Quality and Safety in Health Care</i> , 4. – in Ref 5	Description of one cross-organisational network approach to service provision to NHS	UK – NHS - urological services in “chambers” (ie cooperatives) as alternate model of service delivery. Focus on surgeons’ practice organisations	Descriptive study of one example of ‘chambers’ to identify limitations and impact	Descriptive only plus 1 case study.	New NHS developments include structure that guide prices for designated services similar to DRGs used in US and elsewhere. Specialist teams may seek greater autonomy (from institutions) to improve service quality. “Chambers” (autonomous groups of clinicians) are an alternative organisational and transactional structure for clinicians outside institutional boundaries, selling services back to NHS.	Clinical networks (chambers) represent one approach to overcome challenges of building effective cross-organisational teams within the structure and culture of NHS	

Reference	Objective	Study focus	Design	Conduct	Results	Conclusions	LOE *
					Chambers optimise efficiency by changing referral practice and surgical activity from site to site; standardising protocols; centralisation of complex care for particular procedures; and enhance management of emergency care		
Catt S, Fallowfield L, Jenkins V, Langridge C & Cox A (2005). The informational roles and psychological health of members of 10 oncology multidisciplinary teams in the UK. <i>British Journal of Cancer</i> , 93: 1092-1097.	Roles in information giving across MDT members	Oncology MDT communication	Questionnaire on perception of own and other MDT member's roles in giving information, and 2 measures of psychological well being (GHQ and Maslach Burnout Inventory)	5 breast, 3 colorectal and 2 gynaecological MDT (8-21 members) in England, Scotland & Wales. 23 Radiologists included in study. Descriptive results only, unsuited to statistical analysis due to small cohort.	Surgeon, oncologist, radiologist and clinical nurse information roles well recognised by their colleagues; other team members' roles more ambiguous and less well understood. Information about clinical trials not regularly provided by any team member. High levels of emotional exhaustion evident in team leaders; feelings of	Benefits of team working may not be realised without investment in team training. Radiologists have low personal accomplishment scores in MDT	IV

Reference	Objective	Study focus	Design	Conduct	Results	Conclusions	LOE *
					low level of personal accomplishment prevalent in histopathologists and radiologists		
Chang AE (1998). Multidisciplinary cancer clinics: their time has come. <i>Journal of Surgical Oncology</i> , <u>69</u> : 203-205.	Editorial on multidisciplinary cancer clinics	Cancer Clinics – USA – model is ‘one stop shop’ where patients seen by various disciplines in the same clinic on the same day. Assumption that patients with higher informational expectations are attracted to MD clinics to seek information and care	Observations based on own hospital multidisciplinary clinics.	Descriptive only.	Critical elements to success of MD clinic includes: physician-director, nurse coordinator, administrator, support staff, membership of clinical disciplines including pathology and radiology, and a tumour board.	Patient satisfaction high measured by growth in patient activity. Since surgery remains primary mode of therapy for solid malignancies, surgeons need to take a prominent role in leadership of these clinics	
Chang JH, Vines E, Bertsch H, Fraker DL, Czerniecki BJ, Rosato EF, Lawton T, Conant EF, Orel SG, Schuchter L, Fox KR, Zieber N, Glick JH & Solin LJ (2001). The impact of a multidisciplinary breast cancer center on recommendations for patient management. <i>Cancer</i> , 2001, <u>91</u> (7): 1231-1237	Evaluation of a cohort of breast cancer patients	Breast cancer patients of US multidisciplinary panel comprising surgical, medical and radiation oncologists, radiologist, pathologist, and plastic surgeon where indicated	Retrospective audit of clinical records of 75 patients spanning 6 mths in 1998, and comparison of consensus recommendations for optimal treatment with treatment recommendations made by external physician prior to review	Patient demography and disease stage data recorded; radiographic and pathology results scored; outside treatment recommendations received by patient recorded and compared with panel consensus recommendation. Descriptive analysis	MDT panel disagreed with the treatment recommendations from outside physicians in 43% cases and agreed in 55% cases. Panel recommendations included changes to treatment, need for further work up, change in diagnosis	Multidisciplinary panel provided an integrated program and changed the treatment recommendation for 43% of patients examined	III

Reference	Objective	Study focus	Design	Conduct	Results	Conclusions	LOE *
				(frequencies and percentages). Standard not defined	based on review of pathology, or addition of adjuvant therapy		
Choy ET, Chiu A, Butow P, Young J & Spillane A (2006). A pilot study to evaluate the impact of involving breast cancer patients in the multidisciplinary discussion of their disease and treatment plan. <i>Breast</i> , <u>16</u> :178-179.	Test feasibility and acceptability of directly involving patients in MDT	Breast cancer – effect on patient anxiety of direct involvement in MDT and acceptability to professionals	Exploratory, pilot study using a convenience sample, non-random allocation to group; Intervention and control group. Pre-post test (included STAI-anxiety, preference for information and decisional conflict and satisfaction with level of involvement; and post MDT survey of specialist members.	30 consecutive presenting patients invited to attend MDT post surgery; 22 participated; 7 controls; 17 clinicians in MDT participated. Non-parametric; t-test and Chi-square and Wilcoxon; $p \leq 0.05$	Direct involvement of patient in MDT acceptable to patient and professionals; STAI scores not affected by participation	Despite lack of power, reasonable trend showing no demonstrated increase in anxiety scores from participating in MDT. Direct involvement highly valued by most patients and acceptable and welcomed by most MDT team members, but was regarded as resource-intensive. No MDT member thought patients more overwhelmed /confused as result of participating in MDT.	III
Clinical Oncological Society of Australia (COSA), The Cancer Council Australia (CCA) and the National Cancer Control	Outline key recommendations for improvement in cancer care	Cancer care	Stakeholder consultation to identify key themes; then used	Descriptive; literature review but LOE not specified	Four broad areas illustrated: models of cancer care; Improving the quality	Primary recommendation is investigation of the	IV

Reference	Objective	Study focus	Design	Conduct	Results	Conclusions	LOE *
Initiative (NCCI) (2002). Optimising Cancer Care in Australia. National Cancer Control Initiative, Melbourne, 1–122	in Australia		workshop, steering committee, consultative committee, cancer care organisations' input and literature review to derive key issues from the themes.		of cancer care; Resource issues in cancer care (including workforce and skills, physical infrastructure (for example, radiotherapy), drugs; and access issues.	incentives required to foster, maintain and evaluate integrated multidisciplinary cancer care in both the public and private sectors be undertaken, with a view to widening availability of multidisciplinary cancer care in all settings.	
Connor M, Ponte PR & Conway J (2002). Multidisciplinary approaches to reducing error and risk in a patient care setting. <i>Critical Care Nursing Clinics of North America</i> , <u>14</u> : 359-367.	Discussion of a framework addressing team collaboration and communication	Team collaboration to patient safety	Discussion incorporating key tenets of continuous quality improvement to identify key components required in multidisciplinary teams	Descriptive based on observation	Describes a framework for identification and resolution of systemic error. Key components of effective teams include non-punitive reporting, strong interdisciplinary collaborative practice, systems improvements and patient centredness.	Team approaches can help address realities of practice, care and brings about systems improvements.	
Dalla Palma L, Stacul F, Meduri	Analysis of reasons for,	Staff radiologists and	Three separate self-	10 consecutive days;	During study period	Large number of	

Reference	Objective	Study focus	Design	Conduct	Results	Conclusions	LOE *
S & Geitung TE. (2000). Relationships between radiologists and clinicians: results from three surveys. <i>Clinical Radiology</i> , <u>55</u> : 602-605.	nature and clinical impact of contact between radiologists and clinicians	staff clinicians in 1 university hospital	report questionnaires: objective radiologist data on contacts over 10 days; staff clinicians' opinions on frequency and nature of contact with radiologists; radiologist data on staff clinician-initiated contacts relating to more urgent/complicated cases. Impact of this consultation on diagnosis and therapy analysed by review of clinical charts	n=20 radiologists; n=174 staff clinicians. Descriptive analysis (percentage)	radiologists had mean 3.95 contacts/day (82% initiated by clinicians, 19% by radiologists) to help refine diagnosis (6% often, 58% sometimes); reduce number of investigations (23% often, 46% sometimes); correct the diagnostic strategy (13% often, 71% sometimes) and alter therapeutic decisions (10% often, 57% sometimes). Clinician-initiated contacts in urgent/complicate cases resulted in changes to initial clinical diagnosis (50% cases) and therapy substantially changed in 60% cases	time-consuming daily contacts between radiologists and clinicians. Clinicians highlighted the beneficial effect of their consultations with radiologists relating to diagnostic strategy and therapeutic decisions. Radiologist role is discussed in relation to individual interaction not within MDT	
Davison AR, Eraut CD, Haque AS, Doffmann S, Tanqueray A,	Retrospective review of use of telemedicine MDT	Lung cancer MDT using videoconferencing	12 month study of 28 telemedicine MDT	Retrospective review of outcomes of	CCD video camera images were of	Telemedicine allowed services to	III

Reference	Objective	Study focus	Design	Conduct	Results	Conclusions	LOE *
Trask CW, Lamont A, Uppal R & Sharma A (2004). Telemedicine for multidisciplinary lung cancer meetings. <i>Journal of Telemedicine and Telecare</i> , <u>10</u> : 140-143.		between London and Southend	meetings	telemedicine MDTs after one year. Post hoc comparison of number of cases presented, comparison of initial and revised MDT diagnosis; mean time from first assessment to surgery; time requirement for participation in MDT. Non-parametric; t-test; p=0.05	sufficient quality for diagnostic and management decisions. Telemedicine was user-friendly; close professional relationships were maintained; technical assistance with the camera, sound and changing radiographs was necessary to allow clinical staff to concentrate on the clinical issues; proforma recording forms ensured concise and complete presentations.	comply with UK guidelines on management of cancer despite distance and workforce limitations.	
Delaney G, Jacob S, Iedema R, Winters M & Barton M (2004). Comparison of face-to-face and videoconferenced multidisciplinary clinical meetings. <i>Australasian Radiology</i> , <u>48</u> : 487-492.	Test feasibility of improving access to breast cancer MDT through use of videoconferencing	Breast cancer; technical, organisational and interpersonal interaction factors that may impact from use of videoconference MDT between 3 regional hospitals	Comparison of 12 weeks face-to-face (F2F) MDT with 12 weeks videoconference (VC) MDT; convenience sample, no allocation to groups; pre-post trial questionnaire.	External bridge facility used to link the three sites simultaneously; videotaped 3 MDT for analysis of differences in interpersonal interactions between F2F and VC; pre-post questionnaire of satisfaction and case	Respondents favoured the format of F2F over VC MDT. F2F allowed shared negotiation of uncertainty (not acknowledged in VC) and more satisfying interpersonal communication. VC	Number of issues need to be addressed so that VC does not obstruct MDT (such as seating so participants face one another not the camera; and prior training to reduce	III

Reference	Objective	Study focus	Design	Conduct	Results	Conclusions	LOE *
				management assistance. Non-parametric; t-test; $p \leq 0.05$	more use of formal scientific evidence. VC did not increase attendance. Subsequent improvements in technology, training and seating format have overcome these limitations.	inhibition). VC improved MDT meeting access for those motivated to attend. One limitation to attendance cited was lack of Medicare rebate.	
Elmore JG, Wells CK, Lee CH, Howard DH & Feinstein AR (1994). Variability in radiologists' interpretations of mammograms. <i>New England Journal of Medicine</i> , 331(22), 1493-1499.	Examination of variability in radiologist interpretation of screening mammography	Extent and possible sources of variability in diagnostic accuracy and subsequent recommendations for mammograms at Yale-New Haven Hospital, in 1987.	Stratified random sampling of eligible cases; 10 radiologists (7 private, 3 F/T academic) blind to diagnoses; independent and paired comparisons of interpretation and recommendations made.	Cases selected from 606 eligible cases; each radiologist independently interpreted each mammogram and the same films 5 months later using checklists to indicate observations, interpretations and recommendations. Agreement and disagreements analysed within pairs of radiologists and for the total sample. Descriptive analysis; pairwise comparisons (frequencies and some percentages)	150 cases included: confirmed breast cancer (n=27) and no evidence of breast cancer at 3 years of follow up (n=123). Only 7% of cases were agreed by all 10 radiologists. Diagnostic interpretations were moderately consistent – 78% agreement; recommendations for immediate workup ranged from 74-96% for the cancer cases, and from 11-65% for non-cancer cases. In 25% of comparisons	Reduction in variability may require more consistent criteria for interpreting, and specialised education.	II

Reference	Objective	Study focus	Design	Conduct	Results	Conclusions	LOE *
					for the 150 women, there was substantial clinical disagreement on management; in 9% cases, there was substantial disagreement in the stated location of the lesion.		
Firth-Cozens J (2001). Multidisciplinary teamwork: the good, bad, and everything in between. <i>Quality in Health Care</i> , <u>10</u> : 65-66.	Comment on multidisciplinary teamwork	MDT – no condition defined - UK	Review of limited published articles on MDT	Descriptive; observations based on experience and limited literature review.	Attributes of MDT (such as diversity, professional allegiances, quality of leadership etc) are not insurmountable challenges but do require attention and adjustment. Membership can confer advantages such as lower stress levels, opportunities for learning	Training and support for team leadership is needed	
Flessig LM, Jenkins V, Catt S & Fallowfield L (2006). Multidisciplinary teams in cancer care: are they effective in the UK? <i>Lancet Oncology</i> , <u>7</u> : 935-943.	Review of putative benefits of MDT, potential barriers to good practice and evidence of efficacy of cancer MDT in UK	UK cancer services	Descriptive report	Descriptive, based on literature review. LOE not assigned	Effective MDT functioning in UK requires good leadership, positive team dynamics, adequate	MDT frequently not fully staffed (especially in workforce shortage areas including radiology).	IV

Reference	Objective	Study focus	Design	Conduct	Results	Conclusions	LOE *
					administrative support, good quality complete information, sufficient staff time and funding. Evidence for effectiveness of MDT including clinical outcomes is sparse, but some improved (survival) outcomes are reported in lung, oesophageal, rectal, head and neck cancer.	Evidence on effectiveness is sparse and conclusions might apply only to the specific time studied.	
Gabel M, Hilton NE & Nathanson SD (1997). Multidisciplinary breast cancer clinics: do they work. <i>Cancer</i> , 79: 2380-2384.	Assess effectiveness of MDT in providing consultation and support for newly diagnosed patients	USA -breast cancer – newly diagnosed patients, comparing pre MDT treatment with post MDT implementation	Controlled study over 1 year (not randomised). Pre-MDT (Control n=162) versus post MDT (treatment n=177). Treatment timelines assess using retrospective chart review; patient satisfaction using anonymous questionnaire	Groups evaluated by disease stage, treatment type, time from diagnosis to initiation of treatment , and patient satisfaction. Non-parametric (Wilcoxon and Chi-square); p=0.02 between groups; p<0.001 pre-post satisfaction	MDT significantly decreased time to treatment initiation; improved patient satisfaction; involvement of patients' supporters, and helped patient treatment decisions	MDT model provided more timely care and significantly increased patient satisfaction	III
Harrison JD, Choy ET, Spillane A, Butow P, Young JM & Evans A (2008). Australian breast cancer specialists' involvement	Survey of participation and outcomes of MDT	Australian breast cancer specialists	Cross-sectional survey of self-reported attendances at MDT of	Pilot tested, literature-based survey of oncology specialists	n=229 reported they attended MDT (74% BS, 85% BN, 74%	MDT regarded by >90% as effective for treatment	III

Reference	Objective	Study focus	Design	Conduct	Results	Conclusions	LOE *
<p>in multidisciplinary treatment planning meetings. <i>The Breast</i>, doi 10.1016/j.breast.2008.03.001</p>			<p>breast surgeon (BS), medical oncologist (MO), radiation oncologist (RO) and breast cancer nurse (BN)</p>	<p>(192 BS, 117 MO, 42 RO, 66 BN) reached via their peak organisations. Descriptive, non-parametric (t-test and Chi square) and univariate (regression) analysis of MDT attendance and format. Predictors of MDT attendance via regression modelling. P<0.05</p>	<p>RO, 56% MO – n.s.); no diff. public/private practice setting, but sig. more likely to attend if based in major city and >50 new cases/year. Attendance dominated by medical specialists. MDT mostly weekly, and spent >75% time available to MDT discussing cases. 16% reported <50% available time spent in case discussion. 78% respondents reported radiologists were regular MDT attendees; allied health 17-28%, GPs 10% . While pathology results, extent of disease, surgery performed and treatment plan were almost always topics during planned MDT meeting (83-91%), relevant</p>	<p>planning and improved outcomes for patients (>80%). This study shows that a third of the MDT spend less than 75% available time discussing cases, suggesting other functions possibly including education. MDT and could be improved by ensuring RO and MO (+allied staff) always present; better meeting facilitation; better GP and data manager involvement; improved video/telephone conferencing. Authors suggest time limits probably prioritise key medical decisions (“including review of radiology...”). Despite citing</p>	

Reference	Objective	Study focus	Design	Conduct	Results	Conclusions	LOE *
					diagnostic radiology only discussed in 66% of those meetings and in 13% cases treatment plan discussion did not always happen	NBOCC principles for MDT, no report of patients attending or discussion of their absence.	
Haward R, Amir Z, Borrill C, Dawson J, Scully J, West M, Sainsbury R (2003). Breast cancer teams: the impact of constitution, new cancer workload, and methods of operation on their effectiveness. <i>British Journal of Cancer</i> , <u>89</u> : 15-22	Systematically evaluate the effectiveness of MDT in cancer	Breast cancer – 72 MDT with similar composition in UK	Observational study over 1 year –team composition, processes, effectiveness, clinical performance, members' well-being; number of presentations to achieve diagnosis; proportions assigned different therapies; clinical innovation	Initial random selection of 119 breast cancer teams – of whom 72 participated but only 61 were able to provide the clinical data sought. Questionnaire on team composition, team functioning and self-reported effectiveness and clinical performance. Data collected over 1 year of MDT operation (1999-2000). Variables – diagnosis and treatment. Used multivariate regression analysis; p=0.04 and p=0.01	Team workload and proportion of breast care nurses positively predicted overall clinical performance; significant positive correlations between individual inputs, team composition, high workload and clinical performance; most effective MDT shared leadership of clinical decision-making. Radiologists (and histopathologists) had consistently more negative perception of team effectiveness than surgeons and nurses - possibly reflects degree of involvement as in	Team composition, working methods and workloads are related to measures of effectiveness including quality of care. Team working was beneficial to the mental health of members (reduced burnout)	III

Reference	Objective	Study focus	Design	Conduct	Results	Conclusions	LOE *
					multiple teams and obligations to running of their departments).		
Houssami N & Sainsbury R, (2006). Breast cancer: multidisciplinary care and clinical outcomes. <i>European Journal of Cancer</i> , <u>42</u> : 2480-2491	Examine evidence for MDC contribution to clinical outcomes and influence on survival	Published evidence for clinical outcomes of MDC in breast cancer	Systematic review of MDC breast cancer literature on survival or clinically significant outcomes	Descriptive; quality of evidence assessed for external validity (study design and population; description of MD care) and internal validity (comparator and adjustment for confounding or significant variables)	Very few studies formally evaluate MDC in relation to clinical outcomes, and none on impact of MDC on survival. 14 papers and 1 abstract examined MDC and provided data on clinical outcomes. All were observational; none were RCT. 2 case series studies provided weak evidence that MDC affects/alters treatment recommendations; remainder provided higher level evidence for caseload and survival	Paucity of evidence to support association of MDC with better survival. Weak evidence that MDC may alter treatment. Research on clinical outcomes and survival effects of MDC should be a priority.	III
Jazieh A-R, Al Hadab A & Howington J (2008). Thoracic oncology multidisciplinary teams: between the promises and challenges. <i>Annals of</i>	Facilitate better understanding of functions, roles, benefits and challenges of team	Thoracic oncology MDT	Description of MDT	Descriptive only	Radiologists and pathologists participation is crucial in the team discussion	Potential to improve patient care and health care system	

Reference	Objective	Study focus	Design	Conduct	Results	Conclusions	LOE *
Thoracic Medicine, <u>3</u> (1), 34-37.	members and leadership				of diagnostic procedures, staging work-up and test/intervention sequence. Team will be able to detect any systemic error such as delay in acting. Consensus decision enables conveying a unified approach to the patient.		
Jenkins VA, Fallowfield LJ & Poole K (2001). Are members in multidisciplinary teams in breast cancer aware of each other's informational roles? <i>Quality in Health Care</i> , <u>10</u> : 70-75.	Determine MDT members' expectations of their own and other team members' role in providing different kinds of information to women with breast cancer	Breast cancer – 5 MDT in Sussex health authority (UK); size of MDT ranged from 6-19	Questionnaire based survey – interdisciplinary awareness of MDT members' informational roles	Two part survey – perceptions of individual's own roles and expectations of others' roles in relation to information giving. Descriptive only (percentages); no p value; multiple centres	Perceived and expected roles differ; roles in discussion of results, staging interventions and prognosis underestimated for breast nurses in 3/5 MDT; informational roles claimed by radiologists and radiographers unrecognised by MDT	Most MDT members fulfilled the roles expected of them by the team, but team unaware of extent of other members' involvement in discussions. Suggests lack of clear role boundaries leading to burnout or feeling undervalued. Radiologists nominate patient information provision as part of	IV

Reference	Objective	Study focus	Design	Conduct	Results	Conclusions	LOE *
						their team role.	
Jobe BA, Enestvedt CK & Thomas CR Jr (2006). Disease-specific multidisciplinary care: a natural progression in the management of oesophageal cancer. <i>Disease of the Esophagus</i> , <u>19</u> : 417-148.	Editorial comment on positive impact of MDT care reported by two studies	Management of oesophageal cancer	Review and comment on two studies reporting impact of MDT on management of oesophageal cancer, USA	Descriptive only	Benefits of MDT seen in improvements in communication, streamlined testing, patient satisfaction, increased enrolments into research protocols, hypothesis generation, problem solving, and provider satisfaction	Editors conclude that the two studies reported provide good evidence to support a MDT approach in esophageal cancer	
Kane B, Luzi S, O'Brian DS, McDermott R. 2007. Multidisciplinary team meetings and their impact on workflow in radiology and pathology departments. <i>BMC Medicine</i> , <u>5</u> (15): doi:10.1186/1741-7015-5-15	Examine work processes and time demands on radiologists and pathologists in MDT	MDT in a single large teaching hospital, UK, not specific to cancer	Participant observation of work practices; semi-structured interviews; literature review and analysis of organisational records including meeting agenda, notes, radiological images and pathology samples used at meetings, and self-reported meeting preparation. Quantitative data.	Over 22 months, observed more than 240 hours MDT. Interviews with consultant and non consultant medical staff, nurses, technical and support staff. Meeting frequency and type, patients discussed, and patient referral patterns noted. Descriptive analysis based on observation. No p value set.	MDT schedules (to suit other members) and demand for increased MDTs pose increased workload and 'out of hours' contribution by radiologists; participation facilitates interdisciplinary communication; common terminology and formal reporting ; changed trends in diagnostic pathways (eg external imaging) challenges	Participation in multiple teams poses time, coordination and resourcing issue for radiologists (and pathologists) but adds quality to diagnosis, disease staging and patient management decisions. Radiologists specifically identified as team members.	

Reference	Objective	Study focus	Design	Conduct	Results	Conclusions	LOE *
					coordination and exchange of information		
Kenny LM & Lau LS. (2008). Clinical Teleradiology – the purpose of principles. <i>Medical Journal of Australia</i> , 188(4):197-198.	Editorial comment		Descriptive account of Teleradiology – secure transfer of images to radiologist at geographically remote site for assessment	Descriptive only.	67% Australian radiologists use Teleradiology in their daily work (92% within own state; 22% between states; 1.7% internationally. Can exacerbate 'distancing' of radiologist from patient; reduce the clinical or contextual patient information; increase potential for error (language, image quality, indemnity), and reduce teleradiology to a purely technical commercially-leveraged service	Teleradiology beneficial but requires uniform standards to guide quality care while ensuring patient safety	
Kim R & Toge T (2004). Multidisciplinary approach to cancer treatment: a model for breast cancer treatment at the MD Anderson Cancer Centre. <i>International Journal of Clinical</i>	Comparison of MDC approach in one large US cancer institute with the Japanese traditional, individual approach	Model of multidisciplinary care for breast cancer presented as attempt to address some of the barriers	Descriptive account of the background to the MDC approach, including the policy, review, conferencing,	Descriptive; based on observation	Presentation of model of MDC that may have utility in Japan	MDT may help overcome traditional barriers in Japan where MDC is in its infancy	

Reference	Objective	Study focus	Design	Conduct	Results	Conclusions	LOE *
<i>Oncology</i> , <u>9</u> : 356-363.		(such as intra-department resistance, nature of specialist practice, and limited responsibility of medical and support staff) prevalent in Japan	team management, clinical trials, and future directions for the approach				
Kunkler IH, Fielding RG, Brebner J, Prescott R, Maclean JR, Cairns J, Chetty U, Neades G, Walls A, Bowman A, Dixon JM, Gardner T, Smith M, MacCoubrey J, Lee AJ, Swann S, McNab M, Wilson J & Nawroz IA (2005). A comprehensive approach for evaluating telemedicine-delivered multidisciplinary breast cancer meetings in Southern Scotland. <i>Journal of Telemedicine and Telecare</i> , <u>11</u> (Suppl.1): 71-73.	Proposed comprehensive methodology for assessing the clinical, technical and economic effectiveness of telemedicine MDT in breast cancer	Breast cancer using videoconferencing, Teleradiology and telepathology in a network of 8 Scottish hospitals	Testing of the proposed methodology in a cluster, randomised controlled trial in breast MDT, intended to produce qualitative and quantitative data with validated inter-rater reliability of rating scales used	Currently in trial. Standardised proforma designed to record technical performance of equipment, compliance with best practice guidelines; pre-post questionnaire and structured interviews with MDT staff on attitudes and expectations of telemedicine MDT, MDT functioning, and satisfaction with MDT; views of telemedicine vs F2F MDT; objective measures of interaction and group dynamics extracted from video and audio recording samples of MDT. Descriptive only	Pre trial data have been collected. Trial underway, but no outcome data reported in this paper	Methodology for evaluating F2F vs telemedicine-led MDT is complex. Radiologists identified as team members	

Reference	Objective	Study focus	Design	Conduct	Results	Conclusions	LOE *
<p>Macaskill EJ, Thrush S, Walker EM, Dixon JM. Surgeons' views on multi-disciplinary breast meetings. Eur. J. Cancer, 2006; 42: 905-908</p>	<p>Assess surgeons' views and their current commitments to breast MDT meetings.</p>	<p>Breast surgeons participating in breast cancer MDT</p>	<p>Anonymous survey of all registered members of the British Association of Surgical Oncology. Survey addressed frequency and timing of meetings, discipline attendance, patients covered in discussion, organisation and communication</p>	<p>250 questionnaires distributed. Descriptive (percentages)</p>	<p>Response rate of 61.2% gave 136 included in analysis. All were involved in MDT, 80.9% held weekly; radiologists reported present for whole MDT in 90-95% cases. Variability in which patients discussed and 25% did not discuss patients prior to surgery; variability in attendance of clinical and medical oncologists. Surgeons suggested MDT improvements could include: more time on protected sessions (ie MDT time identified as a clinical commitment and included in individual job plans); meeting preparation time; allocation of designated coordinator;</p>	<p>Study highlights the need to improve provision for MDT and produce guidelines for these meetings. Radiologist rate of attendance reported by surgeon respondents</p>	

Reference	Objective	Study focus	Design	Conduct	Results	Conclusions	LOE *
					attendance of oncologists for whole of meeting.		
Marsh CJ, Boulton M, Wang JX, Maddern GJ, Roder DM & Kollas J (2008). National Breast Cancer Audit: the use of multidisciplinary care teams by breast surgeons in Australian and New Zealand. <i>Medical Journal of Australia</i> , <u>188</u> : 385-388.	Explore involvement of RACS Breast surgeons in MDC	Australian & New Zealand breast surgeons	Convenience sample; no allocation to group subjective view on items; questionnaire not described	questionnaire to all full members, Dec 2006. Descriptive analysis (percentages); p value used but no statistical test reported	91.2% response rate; Rates MDT sig dif public vs private (p<0.001); public: 85% report MDT; 7% MDT in process; 8% no MDT at all. Private: public MDT more consistent and functional vs private; rural less developed than metro & regional; NBCC core disciplines well represented most teams; patients and GP not included	MDC supported by most; deficits in rural and private relative to public	IV
McAvoy B (2003). Optimising Cancer Care in Australia. A General Practice Perspective. <i>Aust. Fam. Physician</i> , <u>32</u> (5) 369-372.	GP perspective on the report 'Optimising Cancer Care In Australia' by the Clinical Oncological Society of Australia, the Cancer Council of Australia, & National Cancer Control Initiative	Synopsis of the report from a GP perspective		Descriptive only	Identifies recommendations in the Report of greatest relevance to GPs	Endorses the Report and encourages GPs to read the Exec Sum, Recommendations and Action Items	

Reference	Objective	Study focus	Design	Conduct	Results	Conclusions	LOE *
Mental Health Commission (2006). Multidisciplinary Team Working: From Theory to Practice. MHC, Ireland.	Discussion paper for implementation of MDT for mental health service development	Develop definitive statement on MDT for mental health services in Ireland; examples of Australian MDT	Second consultation paper on MDT; review of literature and expert opinion	Descriptive;	Promote discussion on MDT; core competencies for team working; models of MDT working; and issues for MDT	Highlights issues for discussion relating to MDT in mental health	
Mileshkin I & Zachberg J (2006). The multidisciplinary management of patients with cancer. <i>Annals of Oncology</i> , 17: 1337-1338.	Commentary of best practice approach to overcome reported failure to implement MDT treatment decisions in 15% of that study cases (Balzeby et al, 2006, UK)	Aust – Peter MacCallum Cancer Centre – comment on processes supporting best practice MDT.	Subjective commentary on functioning of MDTs in 1 Australian cancer centre	Commentary	Centre's MDT's adopt best practice approach to collaboration with patient; use MDT to assess stage, set treatment goals, and develop treatment plan in collaboration with patient; and mobilises relevant members to implement plan	Application of this approach should fulfil promise of improving patient and clinician satisfaction, reduce mortality and improve QOL.	
National Breast Cancer Centre (2003) <i>National Multidisciplinary Care Demonstration Project, National Profile Study of Multidisciplinary Care and Observational Study of Multidisciplinary Care</i> . National Breast Cancer Centre 2003	Demonstration project to provide information about the critical intervention point of treatment planning after diagnosis; provide principles of MDC, and profiling MDC.	Breast Cancer	Pre-post design using time series analysis, multiple data sources, intervention and evaluation. Principles derived from review of overseas models of MDC and local expert	3 year Demonstration project in 2 parts – provision of information about MDC; and assess usefulness of MDC in practice(consumer and clinician survey, clinical audit, activity log).	Most breast cancer clinicians aware of evidence-based guidelines, and their compliance is high; although recognised by most clinicians as desirable, large	Barriers to MDC relate to communication with rural/regional specialists and GPs; inadequacy of infrastructure resources; medical	II

Reference	Objective	Study focus	Design	Conduct	Results	Conclusions	LOE *
			knowledge and experience; Profile study used representative sample of hospitals from low, medium and high caseload categories (20/category) and telephone interview.	Principles of MDC derived from literature and expert opinion. Profile study surveyed 73 hospitals across Australia, with participation rate of 82% (n=60). Non parametric analyses; p<0.05, and descriptive (measures of central tendency) analyses	minority of services do not provide MDC; implementation of MDC strategies results in improvements in support and information about treatment options	funding needs to recognise cost/benefits of MDC; need for adequate logistic support, champions and leaders	
National Breast Cancer Centre (2005). Sustainability of Multidisciplinary Cancer Care. A follow up study of the National Multidisciplinary Care Demonstration Project. Camperdown: NBCC	Explore the sustainability, further developments and flow on effects of the changes resulting from strategies implemented during the Demonstration Project	Breast cancer	Structured telephone interviews with at least 2 key members from 3 multi-site collaborations, to explore the sustainability and transferability of the strategies implemented during the Demonstration project	Follow up 19 months after data collected. Qualitative interview questions tailored to each participant – all included sustainability and contributing factors, and transferability to other areas of care. Thematic analysis of data only	Majority of changes sustained including MDC meetings (established/improved); psychosocial care (improved). Links between urban/rural not sustained in one collaboration. Transfer of MDC into other cancers/chronic diseases in 2/3 collaborations; cultural changes (improved interdisciplinary communication; acceptance of shared	Factors contributed to sustainability included allocation of resources (\$ and personnel) to maintain, support and improve MDC; routine MDC meetings became habitual; team recognition of self- and patient benefits of MDC; champions to drive MDC; contingencies for staff and organisational change/turnover	IV

Reference	Objective	Study focus	Design	Conduct	Results	Conclusions	LOE *
					decision-making		
National Breast Cancer Centre (2005). Multidisciplinary meetings for cancer care: a guide for health service providers. NSW, Australia, NBCC website: www.nbcc.org.au/bestpractice/resources/MDM_mdcmeetingguide.pdf (accessed 04/06/08)	Guidelines for health service providers implementing MDT for cancer	Implementation of MDT for cancer in Australia	Expert and evidence-based implementation guidelines; based on national demonstration project and observation study; multiple centres	Evidence-based guidelines; multiple centres; expert opinion; literature review			III
National Breast Cancer Centre (2006). <i>Making multidisciplinary cancer care a reality, a National Breast Cancer Centre forum series. Report and recommendations.</i> National Breast Cancer Centre, Camperdown, NSW.	National workshop series report and recommendations for implementing MDC in cancer	Promote local discussion of barriers and solutions to the implementation of multidisciplinary care (MDC).	Using lessons learned from its previous Demonstration Project, Sustainability Study & guide to running MDT in cancer care, forum series designed to provide practical advice and promote discussion about the implementation of new MDC teams and strategies to improve existing teams.	Forums represented collaboration between the NBCC and State/Territory Governments and Cancer Councils. In New South Wales (NSW), the Cancer Institute NSW provided funding to allow broader roll-out of the program across the State. Descriptive, conclusions based on expert consensus	14 forums (776 participants) Recommendations and local implementation strategies provided		
National Breast Cancer Centre (2007). <i>Multidisciplinary Cancer</i>	Information to assist MDT in implementing the new MBS	Medical practitioners participating in MDT	Information developed by NBCC	Descriptive only	Provides advice on the application and	Treating medical practitioners	

Reference	Objective	Study focus	Design	Conduct	Results	Conclusions	LOE *
<i>Care in Australia. Information about the new MBS items for multidisciplinary cancer care, National Breast Cancer Centre 2007</i>	items	planning meetings for cancer patients			use of MBS items for medical practitioners involved in MDT planning meetings for cancer patients	includes radiologist or pathologist providing a formal diagnosis of the cancer prior to the meeting, or radiation oncologist prescribing radiotherapy for the patient but not expecting to have contact with the patient until some months after the meeting	
National Breast Cancer Centre (2007). <i>Multidisciplinary care – What are the medicolegal implications? Workshop report and recommendations.</i> National Breast Cancer Centre, Camperdown, NSW, 2007.	Workshop report and recommendations for MDT	Medicolegal issues arising as outcome of the national forum series (Ref 4)	Workshop format	Descriptive – conclusions based on expert consensus	MDT considered to carry a low level of medicolegal risk for health professionals. Consensus recommendations to guide health services and MDT	Medicolegal issues not viewed as barrier to MDC	
NHMRC (1999). How to review the evidence: systematic identification and review of the scientific literature. NHMRC, Canberra	Ways of assessing methodological quality of scientific evidence, to develop health care questions appropriate for intended guidelines; and	Systematic identification of scientific literature; selection and review of highest quality studies (strength; size and effect; relevance);	Examination of types of clinical and public health questions; ideal study types and major appraisal issues.	Evidence-based guidelines; multidisciplinary expert consensus	General information on methods relevant to all systematic reviews and issues specific to six different types: effects of		II

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	identify systematic reviews of the scientific literature relating to those health care questions	summarise results for consideration by clinical practice guideline development committee			intervention; frequency/rate of condition/disease; diagnostic accuracy; aetiology and risk factors; prediction and prognosis; economics		
National Health & Medical Research Council (2000). How to use the evidence: assessment and application of scientific evidence. Handbook series on preparing clinical practice guidelines. NHMRC, Canberra	How to evaluate and use the evidence from a systematic literature review to inform the development of evidence-based clinical guidelines	Assessment of evidence against dimensions of real effect, clinical importance of size of effect, and relevance of evidence to practice	Examination of types of evidence (dimensions): strength – level, quality, statistical precision; size of effect – distance from 'null' value, CI; relevance – usefulness in clinical practice and appropriateness of outcome measures	Evidence-based guidelines; multidisciplinary expert consensus	Assessment of evidence for strength, size of effect and relevance; application of evidence to clinical healthcare situation to determine benefits/harms		II
National Health & Medical Research Council (2001). Clinical Practice Guidelines for the management of early breast cancer. Sydney, NMHRC (2001).	Review of 1995 guidelines providing information on which decisions can be made	Revision and update of 1995 Clinical Practice Guidelines for the management of early breast cancer (NHMRC 1995)	Review using currently available evidence	Review of accuracy, evidence and levels of evidence of 1995 version; inclusion of evidence on psychosocial aspects of care; incorporation of feedback on 1995 version. Evidence-based and expert consensus review	Update of guidelines based on reviews of available evidence and recommendations of expert groups. Summarise knowledge and areas where knowledge is inadequate to guide research	On going evaluation of utility and effect on patient outcomes	III

Reference	Objective	Study focus	Design	Conduct	Results	Conclusions	LOE *
NHMRC (2008). NHMRC additional levels of evidence and grades for recommendations for developers of guidelines. Stage 2 Consultation, early 2008 – end June 2009.	Consultation draft for re-classifying levels of evidence and grading evidence recommendations	Public consultation of revision of levels of evidence hierarchy	Consultation framework for expanded levels of evidence	Revision of existing levels of evidence hierarchy based on submissions on useability and applicability. Guidelines based on expert consensus and evidence-base	Hierarchy includes strength of evidence; size of effect; relevance of evidence; according to type of research question	Expanded hierarchy more applicable to studies that do not lend themselves to research designs appropriate to intervention studies (i.e. RCT)	III
National Institute for Clinical Excellence (2002). Improving outcomes. <i>Breast Cancer</i> , <u>76</u> .	Update of manual for cancer services	UK NICE guide for planning, commissioning and organising breast cancer services	NICE Editorial Board review of guidelines for implementing services to complement clinical practice guidelines	Evidence-based review team	MDT involving radiologist as core member; weekly meeting to discuss all new patients; designated leader and coordinator; preparation time and attendance recognised as clinical commitment; annual review of MDT functioning	Guidelines include anticipated benefits and resource implications of implementation of key recommendations.	III
Newman EA, Guest AB, Helvie MA, Roubidoux MA, Chang AE, Kler CG, Diehl KM, Cimmino VM, Pierce L, Hayes D, Newman LA & Sabel MS. (2006). Changes in surgical management resulting from case review at a breast cancer	Effect on surgical recommendations of patient case reviews at MDT compared to surgical recommendations prior to review by MDT	Breast cancer patients presenting for second opinion	Comparative study using retrospective review of medical records over one year of consecutive referrals to MDC clinic;	149 cases reviewed; outcomes were alterations in interpretations of radiologic, pathologic, surgical and medical	Review of imaging studies resulted in changed interpretations in 45% which resulted in changed surgical	In over half cases reviewed reinterpretation resulted in changed recommendations. Multimodal	IV

Reference	Objective	Study focus	Design	Conduct	Results	Conclusions	LOE *
multidisciplinary tumour board. <i>Cancer</i> , <u>107</u> : 2346-2351.			comparison of surgical recommendations made pre MDT review and post MDT review.	data following case review and effects on surgical management. Descriptive analysis (percentage); pre-post	management in 11%. Review of pathology resulted in changed interpretations for 29%, and consequent changes in surgical management for 9% cases. Changes in recommended surgical management based on MDT discussion not reinterpretation of radiologic or pathology data in 34% cases. Overall, second evaluation by MDT led to changes in recommendations for surgical management of 52% cases; at least 7% had previously undetected or residual cancers.	approach provides important additional information, allowing expert opinion and evidence-based recommendation for patient management.	
Nouraei SA, Philpott J, Nouraei SM, Maude DC, Sandhu GS, Sandison A & Clarke PM (2007). Reducing referral-to-treatment waiting times in cancer patients using a	Improvement in efficiency of MDT and reduce delays in treatment	Head and neck cancer; registering and tracking patients and automated work lists for pathology and radiology	Systematic(pre-post) analysis of effect on MDT processes of introduction of intranet based data	MDT audited for 11 weeks prior and 10 weeks after introduction of database system for 'incomplete episodes'	Overall efficiency of MDT (cross discipline coordination, delays in availability of adjuvant	Effective ongoing coordination between MDT members improved by database with	III

Reference	Objective	Study focus	Design	Conduct	Results	Conclusions	LOE *
multidisciplinary database. <i>Annals of the Royal College of Surgeons England</i> , <u>89</u> : 113-117			management system. Direct observation and survey of stakeholders	(recurring and potential decision-making delays). Non-parametric statistical analysis; Mann-Whitney U test; $p < 0.001$ and $p < 0.05$	investigations) significantly improved (by 60%) by introduction of database ($p < 0.001$)	minimal resource implications. Potential for generalisability outside study area of focus.	
Olver IN & Selva-Nayagam S (2000). Evaluation of a telemedicine link between Darwin and Adelaide to facilitate cancer management. <i>Telemedicine</i> , <u>6</u> : 213-281	Evaluation of a telemedicine link between Adelaide and Darwin to allow Darwin clinicians to discuss cases in a MDT	Telemedicine lead breast cancer MDT for remote and regional location	Retrospective survey of healthcare professionals and patients after 2 years of operation. Opportunistic sample of those attending MDT at the time of survey	Questionnaires to 20 HCP and 8 patients with breast cancer. Digitally transmitted pathology and radiology not good quality so films and slides mailed to Adelaide prior to MDT videoconference (VC). Descriptive (frequencies)	High level of clinician and patient satisfaction with VC MDT. Key success factors: Use of VC was clinician-initiated to resolve communication and access problems; purpose-specific facilities were created; clinician 'champion' at each site helped problem solve and recruit other users; use of strategies to minimise impact of VC on clinician practice – majority reported little intrusion into usual practice.	Prior to VC MDT the Darwin clinicians had limited experience in the role of radiotherapy and how that discipline fits with other treatment modalities. A cross-border issue relates to jurisdictional registration and fee structures. Radiologist role discussed in relation to imaging review or discussion with colleagues prior to VC MDT	
Penson RT, Kyriakou H,	Description of how teams			Descriptive review of	Suggestions for ways	Teams provide the	

Reference	Objective	Study focus	Design	Conduct	Results	Conclusions	LOE *
Zuckerman D, Chabner BA & Lynch TJ Jr (2006). Teams: communication in multidisciplinary care. <i>Oncologist</i> , <u>11</u> : 520-526.	handle uncertainty and bad news, and how patients and families can be better supported in MDC			patient-healthcare provider communication and brief exploration of ways to overcome barriers to communication. Descriptive only	to overcome communication barriers within teams and between team members and patients	capacity to coordinate information and support through multifaceted care.	
Ponte PR, Gross AH, Winer E, Connaughton MJ & Hassinger J (2007). Implementing an interdisciplinary governance model in a comprehensive cancer center. <i>Oncology Nursing Forum</i> , <u>34</u> : 611-616.	Model of interdisciplinary governance for MDT in large Institute in US.	12 disease specific oncology centres, including breast, that had a physician leader for research, teaching and clinical activities and supervision of some staff including nurse practitioners, and new patient encounters, and a parallel reporting structure for other nursing and patient care service staff that created separate allegiances, unilateral decisions, omission of members from decision-making, and resistance to change clinical systems and processes	Model assessed by qualitative evaluation of patient and staff satisfaction, quantitative assessment of operational efficiency and productivity, and clinical quality and safety	In collaboration with team members a Task force developed a principle-based, interdisciplinary governance model for MDT, with leadership roles and shared accountabilities for the outcomes of care delivery clearly defined. Multiple co-located teams share coordinated operations and shared systems. Behaviours and attributes that contribute to MD collaboration were identified. Descriptive; multiple centres	Some turnover in leadership teams accompanied increased individual understanding of roles and match with interests/skills. Sustained improvements in completeness of financial data; shared online medical records system; ready accomplishment of change. Active involvement of the Institute's Executive Team (CEO, Chief Operating Officer and Chief Medical Officer) was important to successful implementation of the	Leadership and governance should feature in interdisciplinary collaboration, but time needed to articulate guiding principles and change priorities and gain staff input. A data-driven approach to drive decisions kept staff focussed on performance improvement .	IV

Reference	Objective	Study focus	Design	Conduct	Results	Conclusions	LOE *
					model.		
Royal Australian and New Zealand College of Radiologists – Faculty of Radiation Oncology, (2005). Submission to the Senate Community Affairs References Committee.	Articulate FRO position on services and treatment options for people with cancer			Descriptive submission based on expert opinion	Supports development and practice of MDC model and treatment		
The Royal College of Radiologists, Board of the Faculty of Clinical Radiology. (2005). Cancer Multidisciplinary Team Meeting – Standards for Clinical Radiologists. <i>RCR, London.</i>	Standards to define aspects of radiological services and care in MDT	Clinical Radiologists	Expert consensus; evidence-based	Standards underpinned by broad consensus obtained through consultation and published evidence (where available) reviewed each 4 years.	Six standards addressing time requirements; quality control; record keeping; facilities; job planning and appraisal; and education. Each standard has suggestions for performance targets and audit. Apply to radiologists and radiology departments engaged in MDT	The standards attempt to define the aspects of radiological services and care which promote the provision of high quality services for patients.	III
Ruhstaller T, Roe H, Thürlimann B & Nicoll JJ (2006). The multidisciplinary meeting: an indispensable aid to communication between different specialties. <i>European Journal of Cancer</i> , <u>42</u> : 2459-2462.	Opinion piece on use of MDT in oncology settings	Lung cancer	Limited review of relevant literature	Descriptive; limited literature review; LOE not specified; analysis not specified	MDT form regular part of most cancer care in hospitals – and degree of organisation and communication impact directly on	MDT offers consistency in standard of patient management, teaching forum for junior doctors, and improved	

Reference	Objective	Study focus	Design	Conduct	Results	Conclusions	LOE *
					quality of care provided.	interdisciplinary communication	
Sainsbury R, Hayward B, Johnston C & Round C (1995). Influence of clinician workload and patterns of treatment on survival from breast cancer. <i>Lancet</i> , <u>345</u> : 1265-1270.	Investigate whether survival rates were attributable to variations in treatment and surgeon caseload	Yorkshire cancer database 1979-1988 – breast cancer variations in survival rate after intervention	Retrospective audit for variations in 5 year survival rate and variations in input. Population based cohort.	12,681 patients with breast cancer – linear regression used to look at age of patient; stage of disease and presentation; treatment regime; caseload; socioeconomic deprivation. Adjusted for age, socioeconomic status, cancer stage & treatment. Parametric analysis (linear regression), 95% CI	Differences in survival as not a function of treatment but of consultant caseload (<30 new cases/year; individual consultant; use of surgery alone had poorer survival rate at 5 years; >30 cases/year; ?MDT; multimodal therapy had significantly better survival). Clinical organisation increases volume treated and reflects ability to coalesce all the disciplines and expertise across full therapeutic range.	Outcomes may be a function of multidisciplinary practice, but further investigation is warranted	III
Seek AJ & Hogle WP (2007). Modelling a better way: Navigating the healthcare system with patients with lung cancer. <i>Clinical Journal of Oncology Nursing</i> , <u>11</u> : 81-85.	Description of MDC processes	Newly diagnosed lung cancer		Prospective initiation of MDC clinic and retrospective audit of times from diagnosis to treatment. Descriptive only, based on	MDC clinic allows patients convenience of seeing multiple specialists consecutively during a single visit to the	Coordination of services for patients with lung cancer optimises outcomes;	

Reference	Objective	Study focus	Design	Conduct	Results	Conclusions	LOE *
				observation	hospital, and decreases time from diagnosis to treatment		
The Senate Community Affairs References Committee, 2005. The cancer journey: informing choice. Report on the inquiry into services and treatment options for persons with cancer. June 2005. Commonwealth of Australia, Canberra.	Examine key areas of multidisciplinary care and integrated service delivery, and the use of complementary and alternative treatments	Cancer – MDC, service delivery and outcomes	Senate Committee processes	Public and confidential submissions; public hearings. Descriptive, expert consensus based recommendations	Recommendations include those to improve: availability of information at diagnosis and referral; coordination of services; support for patients; access; research; and promote MDC	Report outlines ways to optimise choice and improve outcomes for cancer patients	IV
Shuster TD, Girschovich L, Whitney TM & Hughes KS (2000). Multidisciplinary care for patients with breast cancer. <i>Surgical Clinics of North America</i> , <u>80</u> : 505-533.	Describes the MDC approach for breast cancer at a Massachusetts Medical Centre, and general guidelines for patient care	Breast cancer in a US medical centre – focus on clinical approach	Clinical literature review	Reviews clinical literature on preoperative workup; surgical axillary staging; breast irradiation and conservation; selection of chemotherapy or hormonal therapy in BC. Evidence-based; multi-centre	Treatment of breast cancer lends itself to MDC because optimal care is frequently realised through multimodal therapy aimed at maximising the likelihood of long term survival while permitting a satisfactory cosmetic result	Multidisciplinary clinic approach justified to achieve optimal treatment of breast cancer	III
Sickles EA, Wolverson DE, Dee KE (2002). Performance parameters for screening and diagnostic mammography:	Evaluate radiologist mammographic performance parameters	Breast specialist practice radiologists versus general	Comparative non-randomised prospective review of screening and	Studies from Jan 1997 to Aug 2001 (3.5years) (n=47,798	<u>Screening</u> : Recall rates were significantly higher for	Specialist radiologists detect more cancers and	III

Reference	Objective	Study focus	Design	Conduct	Results	Conclusions	LOE *
specialist and general radiologists. <i>Radiology</i> , <u>224</u> :861-869.		diagnostic radiologists in USA setting.	diagnostic mammographic studies; single centre	screening, 13,286 diagnostic mammograms). Abnormal interpretation rates for screening (ie recall rate) and diagnostic (recommended biopsy rate). Non-parametric (t-test and Chi square); p = 0.01 and p<0.001	generalists <i>c.f.</i> specialists. Cancer detection rates significantly higher specialists <i>c.f.</i> generalists. <u>Diagnostic:</u> Recommended biopsy rates were significantly higher for specialists <i>c.f.</i> generalists; cancer detection rates significantly higher specialists <i>c.f.</i> generalists	more early-stage cancers, recommend more biopsies (which results in more true-positive <i>and</i> false-positive results), and have lower recall rates than general radiologists. The higher false and true positive rates for specialists reflect a preferable pevep of performance because the principal goal of mammography is cancer detection rather than reduction of benign biopsy results.	
Strusowski P (2006). A multidisciplinary model for cancer care management. <i>Oncology Nursing Forum</i> , <u>33</u> : 697-700.	Describe implementation of care management process for coordinating care provided via MDTs, using a Cancer Care Management Department and care coordinators.	Trial of coordinators of care for 14 MDC teams in US private facility from 2001 meeting monthly ("sometimes weekly"). Average active caseload per	Survey of patient satisfaction of coordinated MDC; staff reported (undefined) perceptions of new approach	Not specified; descriptive only; multiple centres	30% response rate from patients, reporting high level of satisfaction with approach; staff consider coordinated approach is time and		

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		team is 100-125,			resource efficient 'standard order sets' for timelines for carrying out routine care, lab and diagnostic tests, and scheduling of OR time reduced mean time from appointment to procedure from 21 to 7-10 days. Coordination model Increased numbers in clinical trials by 10%		
Tripathy D (2003). Multidisciplinary care for breast cancer: barriers and solutions. <i>The Breast Journal</i> , 9: 60-63.	Summary of barriers and possible resolutions to MDC in breast cancer	Breast cancer - US	Statement of barriers and possible solutions	No review of literature. Identifies barriers to MDC – categorised as logistical – decentralised/fractured nature of medicine means true multimodality care rarely given under one roof; administrative or economic - given additional costs and inefficiencies with multidisciplinary care; or educational – where primary discipline	Evidence-based outcomes can shed light on how to overcome these barriers. Examples include incentives for cross-discipline collaboration; efficiencies gained from pooled resources ; increased quality of life and patient satisfaction; well-conceived and unbiased educational venues.	Coordinated multimodal care in breast cancer may result in better outcomes and less invasive treatments but requires careful imaging, treatment planning and needs more detailed pathologic assessment	

Reference	Objective	Study focus	Design	Conduct	Results	Conclusions	LOE *
				knowledge/focus (eg surgery, chemotherapy, radiotherapy) is challenged by need to find common ground in MDT. Descriptive only			
Tulloh BR, Goldsworthy ME (1997). Breast cancer management: a rural perspective. <i>MJA</i> , 1997,166:26-29	Descriptive report of outcomes for breast cancer treated in small volume isolated rural practice	Breast cancer MDT in general surgical ward in rural Victoria. The MDT comprised oncologist and specialist breast surgeon	Descriptive retrospective review of all records of breast cancer patients attending a single surgeon's practice between 1992 and 1995	Sample comprised 25 patients diagnosed with breast cancer. 16 patients seen F2F by "team" to formulate a management plan; 10 more discussed by phone then plans devised. Descriptive (frequencies)	Multidisciplinary management and breast conservation rates were high (26 of 28 patients) despite this being an isolated small volume practice	Audit showed rural setting not an impediment to MDT approach – but MDT of very limited construction and quality assurance was limited	
Whelan JM, Griffith CDM & Archer T (2006). Breast cancer multi-disciplinary teams in England:much achieved but still more to be done. <i>The Breast</i> , 15: 119–122	Review coverage and composition of MDT in breast cancer	UK Breast cancer units	Non-probability (convenience) sample, self-report questionnaire (not described); outcome variables: attendance of core members at MDT; proportion patients discussed with treatment plan; private patients discussed; reconstructive surgery	All breast units in England sent questionnaire. Descriptive analysis (frequencies)	Responses from lead surgeons of 134 units (70% UK units).98.5% hold weekly meetings; 75% hold meeting as sessional commitment in normal working hours. Majority of core members attend weekly meetings; 60% discuss MDC of all patients; 36% discuss >90%	Most breast cancer patients in UK cared for by MDT; treatment widely discussed to formulate treatment plan; MDT coordinator essential to organising and running MDT; regular radiology input (and	IV

Reference	Objective	Study focus	Design	Conduct	Results	Conclusions	LOE *
					patients; medical oncologists and reconstructive breast surgeons have limited attendance; no radiologist and no pathologist present in 3 MDT; most MDT have coordinator;	pathology) crucial to MDT. Radiologists team members in all but 3 of sample teams	
Zorbas H, Barraclough B, Rainbird K, Luxford K and Redman S (2003). Multidisciplinary care for women with early breast cancer in the Australian context: what does it mean? <i>Medical Journal of Australia</i> , 179: 528-531	Discussion of Principles of MDC	Early Breast Cancer		Descriptive, based on limited literature review (no LOE assigned)		Principle-based approach to MDC unique; generalisable to other healthcare systems and other conditions	

*LOE= Level of Evidence hierarchy, as indicated in the NHMRC Handbook series on preparing clinical practice guidelines:

NHMRC (2000). *How to review the evidence: systematic identification and review of the scientific literature*. NHMRC, Commonwealth of Australia.

NHMRC (2000). *How to use the evidence: assessment and application of scientific evidence*. NHMRC, Commonwealth of Australia.

¹ RANZCR Faculty of Radiation Oncology (2005). Submission to the Senate Community Affairs References Committee (2005).