Feature Article

Development of the multidisciplinary team process in breast cancer

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Background

The breast multidisciplinary team (MDT) has evolved over the past decade. The breast MDT now has a central role in decision-making in the management of every patient with breast cancer in the UK and the model has been widely adopted elsewhere. The original drivers to the MDT process were to improve upon individual and idiosyncratic variation in clinical decision-making by the primary clinician (often the surgeon), with an informed, systematic and effective input from medical and radiation oncologists and allied health professionals. The intentions of the MDT process were thus clear. They were to standardise and harmonise decision-making in cancer management around perceived best practice, and to introduce all components of decision-making in advance of critical interventions. The logic of multidisciplinary teamwork in cancer care is persuasive [1,2], although the evidence base for a treatment benefit is as yet weak [3]. However, the evolution of the MDT as a clinical management tool is incomplete.

The MDT process is not without its immediate problems. It runs counter to the well established principles of individual consultant accountability to patients. It promotes a fundamental shift in responsibility for decision-making from the individual clinician to the group, thus diffusing the critical responsibility for events and outcomes. The observation that groups and committees feel empowered to take decisions that no single member would necessarily take individually is apposite here. The consequence is that the accountability of the individual consultant to the individual patient is sometimes in danger of being undermined by anonymised group decision-making. Group decisions are always subject to the vagaries of human nature, personalities and personal interactions. They are made in the absence of the patient under discussion, whose immediate contact remains the named and responsible consultant, who must in turn represent and 'humanise' the MDT decision to the patient.

The MDT process is nevertheless now well established. At its best, it allows for much greater standardisation in the management of breast cancer, albeit at considerable administrative and organisational cost. However, the breast MDT decision-making process remains severely handicapped by deficiencies in the available data systems to inform and optimise individual treatments.

The need for more informative data systems

The most important factor which currently impedes the clinical effectiveness of the MDT is the quality of decision-determining data which is available to the MDT members. The MDT process is designed and intended to discuss and determine interventions in every individual in the local population who presents with a relevant diagnosis. These individuals will come from all age groups; with all pathological variants of the particular cancer; in all disease stages; with a wide variety of co-morbidities and body mass indices, drug and treatment histories; and with the full range of social attitudes, backgrounds, economic circumstances and lifestyle choices. It is therefore essential that the MDT data reflect all of these variations and nuances.

The MDT decision-making process for individual patients is necessarily directed by the available evidence base. In an ideal world, objective measurements and indices derived from the past experience of treating all patients with breast cancer, and specifically those patients whose tumour, health and demographic characteristics most closely, if not identically, match the new patient, would be used to inform the MDT process. If the database of cases were large enough, the follow-up were long enough and the analytical algorithms were competent, it would be possible both to interrogate the system for the combination of multidisciplinary interventions which produced the best aggregate outcomes, and which best matched the new patient. A standard and capable breast cancer data system which could capture 'all comers' and which was focused upon clinical outcomes would accrue more than 500 cases per annum in a large specialist NHS centre; some 2–3000 cases in a health region, and some 30,000+ cases in the UK alone. With retrospective accrual of cases from earlier years, it would not take long to accumulate an extraordinarily powerful and informative case-matching system.

Such systems are not currently in use, although their capabilities are easy to define and the commercially available technology exists for their design and implementation. At present, the reality is that MDT decision-making is largely based on clinical trials, which in turn represent a highly selected group of patients who are treated by enthusiasts for the trials process. These data may be modified and refined by meta-analysis and by software tools such as Adjuvant!

On-Line. Unfortunately, the product is invariably an abstraction which cannot accurately represent 'ground truth', encompassing the full range of factors including age, disease and co-morbidity, which will determine the outcome in the individual patient in the immediate catchment population before the local MDT.

The design and implementation of informative data systems

The passage of time is a critical element in nature, life and disease. Timelines are descriptive devices both for recording and describing relationships in historical events; in personal lives from birth to death. They are also invaluable in displaying and understanding the progress of disease from diagnosis to final outcome.

Most present-generation breast cancer databases are simple registries: they record volumes and caseloads at the time of initial diagnosis, and they may record subsequent interventions, but they are not as yet configured to display and interpret the temporal relationships between events, treatments and interventions in large numbers of patients that would allow the comparison of combinatorial treatments, or in the temporal sequencing of combinatorial treatments between otherwise similarly matched groups of patients for demographics and diagnosis.

The critical challenge is thus to specify and implement computerised analysis systems which aid the collection of all treatment and clinical event data over time from registration on diagnosis to final outcome; which can be implemented in a cost-effective and user-friendly way; and which allow flexible user-generated analysis of the data to be conducted at will. Much conceptual and developmental work on such software systems has been in the Human Computer Interaction Laboratory of the University of Maryland, although not yet specifically in relation to cancer [4–14].

Fortunately, such systems are not difficult to conceive, although perhaps more challenging to design in detail. The management of any solvent commercial retail organisation with a large number of outlets and stock lines must be able to analyse, compare, contrast and predict the changes in sales with time and local circumstances based on historic and current data, using data warehousing and data-mining systems which are now commonplace.

Software systems in which the timeline is a central component can thus be specified which draw upon a wide range of data inputs from the existing computer systems which run most modern hospitals; and which can thus be implemented cost effectively and incrementally for breast and other cancers. Inputs which can be drawn from existing databases include demographic, pathological and all relevant contact and treatment data, thus building a timeline-orientated database focused upon clinical outcomes. These systems must have the analytical capacity to compare and contrast each and every individual patient's timeline from diagnosis to ultimate outcome, for which linkage to primary health care, regional cancer intelligence databases and death registration systems will also be most helpful.

Such systems would ultimately allow us to understand much better the true contribution of surgery, chemotherapy, radiotherapy and other interventions to each and every clinical outcome. They might also in time reveal insights which have a radical impact on the allocation of therapeutic resources for breast cancer, as the true contributions and morbidities of each component of therapy were clarified.

Closing the MDT data loop

The question thus arises as to how the breast MDT process can help us to learn more about the contributions of the component therapies to outcome for each and every cancer. The 'first generation' MDT has largely been focused upon the decision-making process at the outset of an individual treatment pathway. This will usually involve a surgical intervention followed by an adjuvant treatment package of radiotherapy and/or chemotherapy for treatable disease; sometimes there will be a clear indication for a primary chemotherapy and/or radiotherapy intervention. Not infrequently there will be a grey area in which either surgical or adjuvant intervention may take primacy, the final decision being determined by a number of factors, including the local skill and resource mix, and the influence of the protagonists for the various clinical strategies in the discussion on the strategy for each patient.

The computer-enabled and internally networked breast MDT meeting provides the ideal focal point for populating and updating such clinically informative data systems. The systematic collation and accumulation of information through the MDT, including registration data, all cancer treatments and their time-sequencing will allow very large data banks to be built up very rapidly. These will now be based upon the collective experience of treatment of 'all comers' rather than of distant, select and abstracted populations. Using standard software systems across multiple sites locally, regionally, nationally and internationally, it will soon become possible to optimise the treatment for individual patients by matching each patient most closely to all others in the historical treatment population with similar epidemiological and clinical characteristics. This in turn will provide far greater global utility on a daily basis than individual clinical trials and will substantially improve the objectivity of MDT decision-making.

Common-user software systems containing information collated and validated through the MDT process will allow the rapid accumulation of

knowledge based upon very large data sets across local and national health systems. The political and intellectual attractions of investment in an MDT-moderated breast cancer data system which would so clearly reveal the benefits and limitations of all components of treatment are considerable and compelling. An internationally standardised system between cooperating national subspecialty groups would allow even more rapid accumulation of data for analysis.

Further development of the breast MDT process

In order to fulfil the potential of MDT-moderated cancer outcome data, we will have to expand and extend the breast MDT process from initial treatment decision-making into a medium- and long-term post-treatment review of outcomes and complications. Natural review stages will occur when the initial adjuvant therapy cycle is concluded; at the time of recurrences and secondary adjuvant therapies; and on death. In this way, lessons are continuously learned, databases are updated, and decision-making on new cases is continuously refined by the growing knowledge base of existing patients and case matches. This will also rebalance the MDT, such that the contribution of medical and radiation oncology interventions becomes as clear and accountable as is that of the surgical strategy at the outset of treatment.

The expansion of the breast MDT process from a pre- and immediate treatment decision-making exercise into the realm of intermediate- and long-term post-treatment review and assessment will have considerable resource implications for local units and services. The introduction of a review element will add considerably to the workload, resource and time demands upon clinical and administrative members of the MDT. Weekly breast MDT sessions which currently take 60–120 minutes may well need to be extended into full sessions. In order to control this workload, MDTs will need to set specific review dates for individual cases, which might be at the one-year, five-year and ten-year points, or on notification of a major outcome event, such as proven recurrence or death. The latter data will in turn mandate networking to regional and national mortality registries.

The increased time needed to complete the enhanced MDT process will be justified over time by the substantial gain in insight into the effectiveness of treatment strategies for each and every patient, and by better individual treatment.

In conclusion, the need for evolution of the breast MDT process is inescapable. The immediate challenge is to design and roll out robust time-capable data systems which will provide advanced data capture and analytical capabilities to the breast MDT. This process will help us to understand the true costs, benefits and morbidities of the various cancer therapies and strategies which we currently have to debate and apply with incomplete knowledge and insight. It will also help us to move to a more objective assessment of the breast MDT process itself.

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