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Structure and functioning of a multidisciplinary 'Heart Team' for patients with coronary artery disease: rationale and recommendations from a joint BCS/BCIS/SCTS working group

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Abstract

The decision-making process in the management of patients with ischaemic heart disease has historically been the responsibility of the cardiologist and encompasses medical management, percutaneous coronary intervention (PCI) or coronary artery bypass surgery (CABG). Currently, there is significant geographical variability in the PCI:CABG ratio. There are now emerging recommendations that this decision-making process should be carried out through a multidisciplinary approach, namely the Heart Team. This work was carried out on behalf of The British Cardiovascular Society (BCS), Society for Cardiothoracic Surgery in Great Britain and Ireland (SCTS) and British Cardiovascular Intervention Society (BCIS). This manuscript sets out the principles for the functioning of the Heart Team. This work has been approved by the Executive Committees of BCS/BCIS/SCTS.

Keywords: Ischaemic heart disease • Heart-team meeting • Guidelines

INTRODUCTION

The publication of the National Service Framework (NSF) for coronary artery disease (CAD) [1] enhanced the identification of patients with coronary disease, resulting in a commensurate increase in patients suitable for revascularization. This increase in activity was more pronounced with percutaneous coronary intervention (PCI) compared with coronary artery bypass surgery (CABG) [2]. At the same time the medical treatment of CAD was also better defined. Evidence-based medication with anti-platelet therapy, statins, beta-adrenergic antagonists and angiotensin-converting enzyme inhibitors was more consistently applied, thereby offering a wider choice of options for patients with CAD, namely optimal medical therapy, PCI or CABG [3, 4].

During this time there had also emerged a greater focus on surgical outcomes prompted by the Bristol enquiry [5] that led to the publication of individual surgeons' results [6]. The outcomes of individual PCI operators are also now in the public domain [7]. This has highlighted the need for transparency of decision-making not only in terms of risk assessment using established scores, but also with regard to appropriateness. An additional factor is the increasing involvement of patients, their family and carers in their management decision-making process. Furthermore, patient and carer expectations, and their ability to access information from the print media or the Internet, are greater than ever before.

Hence, an expansion in the choice of treatment options, together with a requirement for transparency in the process that defines appropriate treatment, has led to calls for a multidisciplinary team (MDT) approach to guide management of patients with CAD. The Heart Team is included in European and American guidelines on myocardial revascularization as a class 1C recommendation [3, 4, 8]. The 2014 European Society of Cardiology (ESC) and the European Association for Cardiothoracic Surgery (EACTS) Guidelines provide further clarification regarding which patient group needs a Heart-Team discussion and when an 'ad hoc' PCI option is justifiable [8].

The role of the MDT meeting is firmly established in oncology [9–12] where it underpins the decision-making process. This approach has, however, been inconsistently and variably implemented for coronary revascularization (Supplementary material, S1). While there is no randomized study demonstrating the benefits of the MDT meeting, a number of observational studies in cancer care do indicate that they facilitate a better, coordinated and uniform approach to providing optimum treatment.

The functioning of such a 'Heart Team' varies across the UK as does its composition, frequency and the type of cases discussed. It is the intention of this document to provide guidance as to the essential components of a Heart Team in terms of how it should be structured and how it should function.

SETTING

This Working Group was established acknowledging guidelines produced jointly by the ESC and EACTS. Their recommendation was that a multidisciplinary Heart Team should discuss a strategy for myocardial revascularization in patients with multivessel coronary disease [3, 8].

The call for wider adoption of an MDT approach has come from a number of sources, namely the National Confidential Enquiry into Patient Outcome and Death (NCEPOD) report that examined deaths following first time, isolated CABG [13] as well as from National Institute for Health and Care Excellence (NICE) recommendations for the management of stable angina [14] and the management of acute coronary syndromes [15]. A recent publication has also highlighted significant variation in the application of CABG or PCI when countries are compared with each other as well as within individual countries themselves [16].

In an attempt to assess the current status of the Heart Team in the UK, data have been drawn from a dedicated survey undertaken during 2012 (Supplementary material, S1) and presented at National Meeting [17], and from the National Cardiothoracic services Benchmarking Collaborative (NCBC). Both these sources have indicated variations in current practice. Where relevant, the guidance defined below in this document will refer to these data in order to reflect the degree of variation and so better justify the recommendations made in each of the specific areas covered.

PATIENT AND CARER INVOLVEMENT

The Heart Team should provide a consensus view as to which treatment strategy is superior based on the available evidence as well as the collective experience of individual specialists and their unit generally. By necessity the meeting is a technical one, involving explicit discussions about risk and prognosis. Most would agree that it would be impracticable for the patient or their carer to be present during those discussions. Nevertheless, patients' wishes need to be accommodated in any decision-making process. Thus, mechanisms should be in place for the patient to be informed of the MDT recommendation in a manner that allows their wishes to be taken into account. It is, therefore, recommended that a clinician who is familiar with the patient and their wishes, and who can thereby act on their behalf, should present their case to be discussed in the MDT. Once the MDT decision has been reached, it should be that clinician's responsibility to ensure that the patient is informed. While a letter or telephone call might accomplish this, it is probably more expedient to make arrangements for the clinician to see the patient and their carer or family in an outpatient setting. That would not only allow the MDT decision to be summarized in a way that can be understood by all parties, but would also provide the fundamentals of the consenting process that will be required to precede any revascularization procedure (Supplementary material, S1).

Patients referred for CABG are usually seen in an outpatient clinic by the consultant surgeon who will perform the operation. Likewise, those referred for PCI should see the interventional cardiologist in a similar setting. There will inevitably be cases in which the MDT discussion condenses into a position of equipoise. In such situations it is advised that the options be put to the patient and for the patient to choose his/her preferred management plan. Either the cardiac surgeon or the cardiologist could present these options to the patient. The paramount issue is that

any perception of indecision should be avoided. Indeed, such a position should be –and expressed–as advantageous in that more than one treatment option is available. The use of patient information leaflets based on the locally available expertise and outcomes as well as lay description of the various treatment options may prove beneficial.

CLINICAL COMPOSITION, ATTENDANCE AND FREQUENCY

The overarching principles of an MDT meeting are that (i) it is quorate and (ii) the frequency is sufficient to meet the demands of—but not so as to impede—the efficient running of a service. A robust MDT that seeks to discuss all the issues relevant to patients' management should comprise a minimum core group of individuals with the necessary range of expertise. Thus, in addition to cardiac surgeons and interventional cardiologists, there should also be a non-interventional cardiologist. The subspecialty interest of such individuals should not need to be specified, acknowledging that expertise in imaging, heart failure, device therapy or electrophysiology may all add value to discussion around individual patients. This varied expertise in attendance is in keeping with the results of a UK survey that indicated that the majority of current MDT meetings are attended predominantly by consultants in these disciplines (Supplementary material, S1). Although there may be some benefit in having members of other medical specialties (e.g. cardiac anaesthetists, geriatricians, diabetologists etc.) and allied health-care professionals (e.g. nurses) to be present at all the MDT meetings, it is recognized that this may not be practical. However, should the Chair identify such a need, then, in order to aid discussion of patients with complex disease, significant comorbidity or other medical conditions, a cardiac anaesthetist or a geriatrician may be asked to attend. Junior doctors should be encouraged to attend in order to become familiar with the process and derive benefit from its educational value. Other disciplines allied to medicine, e.g. nursing, pharmacy and audit staff, as well as research nurses, should be encouraged to attend given the multidisciplinary scope of the meeting and its potential educational value. Attendance by such colleagues would also enhance data collection for any proposed audit projects as well as recruitment into trials.

The meeting should be chaired by a consultant. The speciality of the Chair should be rotated between surgeons and interventional/non-interventional cardiologists. The function of the Chair is to ensure that sufficient time is allocated to discuss all cases presented, that all necessary data are available for each case and that discussion is directed towards producing a consensus view. The Chair should also ensure that the recommendations of the MDT are documented and that particular issues relevant to that decision are also recorded accurately (see below). It is not the function of the Chair to provide any form of 'casting vote' in situations of equipoise.

The frequency and duration of meetings will vary according to local needs and the number and type of cases discussed. Our survey (Supplementary material, S1) and NCBC data suggest that, in most centres, this is one or two times per week and in each case lasting 1–2 h.

FACILITIES AND TECHNICAL CONSIDERATIONS

A room dedicated to the MDT should be provided with adequate seating for all attendees and be sufficiently private in order to

allow confidential discussion to take place. Seating should be such as to allow all members to be able to see clearly any data presented on a display screen. Facilities should be available to display and view all cardiac imaging modalities such as coronary angiograms, computed tomography (CT) scan, magnetic resonance imaging (MRI) and nuclear scan results and echocardiograms in high quality and sufficient to meet diagnostic medical standards [18]. In addition to the results of current investigations, easy and rapid access to archived images will also be required.

Acknowledging that patients from remote centres may also be discussed, the ability to transfer and display their images will also be required and access to any electronic reports should also be available. These requirements will depend greatly on existing local Information Technology (IT) facilities and support. IT and audio-visual (AV) support should be readily available during MDT meetings in order to address particular issues as they occur and thereby avoid delaying or postponing meetings.

ADMINISTRATION AND MANAGERIAL SUPPORT

A dedicated MDT coordinator forms an essential component of these meetings and should be present to document the personnel attending, together with the outcome and recommendations reached after discussion for each patient. Issues resulting from detailed or complex discussion may require specific recording and more exact documentation, as directed by the Chair [19]. In order to cover periods of absence, leave or sickness, two dedicated coordinators will be required. The MDT coordinator should be notified prior to the meeting as to which patients are to be discussed. The coordinator will then ensure that all relevant investigations are available prior to the start of the meeting. Patient's information, including clinical details and the results of relevant investigations and other data such as risk scores (see below), should be documented on a dedicated MDT proforma made available to the MDT coordinator prior to the meeting. Once the proforma is completed to include the meeting's recommendation, it should then be signed by the Chair and incorporated into the patient's case notes. A copy should also be retained by the coordinator in order to enable later auditing of the MDT process. Documentation would be facilitated by the use of a computer database that would allow easier analysis of attendance, frequency, duration and outcome of meetings that would assist in audit, research and the production of annual reports. An electronic version of the MDT proforma will also facilitate the subsequent circulation of the MDT discussion and its outcome to all relevant stakeholders such as the patient, the referring cardiologist, the patient's general practitioner and the cardiac surgeon.

THE TYPE AND RANGE OF CASES TO BE DISCUSSED

Defining which cases should come to a formal MDT meeting is notoriously difficult. An ideal might be that all cases in which the possibility of any form of revascularization is considered should be discussed in an MDT forum. This policy might be seen as impractical and in some circumstances might even delay or jeopardize ideal patient care. Some centres are currently working with systems that routinely incorporate *ad hoc* or follow-on PCI in elective cases undergoing diagnostic angiography. Such an approach has both

advantages (e.g. a single patient admission, one arterial puncture and one invasive radiographic procedure), as well as disadvantages (e.g. issues with the validity of the consenting process prior to the procedure when the exact nature of any intervention is unknown).

The ESC/EACTS guidelines for myocardial revascularization refer to cases that should undergo Heart-Team discussion and provide a basis for any recommendations. When reviewing these criteria, it is clear that they highlight particularly the presence of obstruction of the left main stem (LMS) or the proximal segment of its left anterior descending (LAD) branch, particularly if this is a component of triple-vessel disease. Anatomical patterns of disease in which CABG may confer prognostic advantage will form an important proportion of cases to be discussed [3, 4, 8].

Some patients undergoing investigation with coronary angiography may proceed directly to PCI without formal discussion, so-called *ad hoc* or 'follow-on' cases. This applies particularly to urgent or emergency situations and is therefore recommended in haemodynamically unstable patients. Examples include addressing the culprit lesion in patients presenting with acute ST-segment elevation myocardial infarction. An *ad hoc* approach may also be applied to elective cases with single- or double-vessel disease acknowledging the guidance above [8]. A decision to proceed to PCI in such cases should take into account the validity of the consenting process and consideration as to whether CABG in such circumstances might confer prognostic—as well as symptomatic—advantage [3, 4, 8]. An explanation for proceeding in such a situation should be documented in the case notes.

MINIMUM DATA DISCUSSED AND METHOD OF PRESENTATION

In addition to basic patient demographics, other data should comprise the clinical presentation and severity of symptoms, together with the source of referral. The results of any stress investigations, the coronary anatomy and an assessment of left ventricular performance are also essential elements [20]. Associated medical conditions, particularly if they are known to confer additional risk for either PCI or CABG, should be itemized in order to calculate a formal score for either approach. While a number of risk scores are available, individual centres should decide upon which ones they feel should be used for both revascularization modalities and document them during the MDT meeting. The most commonly used system for CABG in the UK is the logistic EuroSCORE (<http://bluebook.scts.org/>) or EuroSCORE II [21].

The SYNTAX score is also being increasingly incorporated into MDT discussion [22]. While this does not quantify procedural risk for PCI, it nevertheless represents an individual's burden of disease and therefore a surrogate for the procedural time, contrast volume and number of stents that might be anticipated if PCI were to be recommended. Indeed, high SYNTAX scores are seen as a valuable discriminator in cases in which PCI and CABG are both feasible, and may then sway the consensus view in favour of surgery [23].

MULTIDISCIPLINARY TEAM CONSIDERATIONS AND FUNCTIONING IN NON-SURGICAL CARDIOLOGY CENTRES

Multidisciplinary meetings should occur regularly in both the surgical centre and in each non-surgical cardiology centre within

any region. The demand for a regular forum in a non-surgical cardiology centre not only requires a surgeon to travel to that unit, which is time consuming, but also has the disadvantage of involving and, therefore, relying upon a single surgeon. These constraints can be overcome by teleconferencing facilities, provided the technology is robust, reliable and of high quality. Such facilities exist in the UK and can permit the Heart Team in a surgical centre to involve multiple non-surgical sites at the same time. In this way, the MDT can incorporate several members of the surgical centre team. It also allows for the Heart Team meeting to be 'attended' by high-volume PCI operators from other units, who will have experience in complex PCI cases, and thus make additional contributions to any case discussion.

Any teleconferencing facilities should support the viewing of multimodality imaging such as angiography, echocardiography and CT/MRI/nuclear scans and it is preferable if those involved can have 'face-to-face' contact.

Documentation of the decisions made by the Heart Team should be consistent with those made in the surgical centre and be available electronically both locally and in the surgical centre. An effective Chair is important at each end to ensure open and democratic engagement. Core membership should be agreed upon and attendance should be recorded. There should be a written policy of which cases should be discussed and this could be guided by the Guidelines [3, 4, 8].

TIMING AND INTEGRATION INTO JOB PLANNING

The MDT forum is a pivotal requirement in the management pathway and is therefore a component of the planned activity that reflects direct patient care. Nevertheless, data from a UK survey and from NCBC comparisons suggested that although MDT meetings were held within 'office hours' in the majority of units sampled, they were only incorporated into consultant job plans in 60% of respondents (Supplementary material, Appendix S1). Dedicated time should be committed and agreed upon by managers and Clinical Directors in order for consultant staff to attend a sufficient proportion of MDT meetings and thereby ensure consistency of decision-making. It is not inconceivable that in the near future the reimbursement bodies (specialized commissioners, clinical commissioning groups or even private health insurers) for cardiac procedures would demand that the management plan for patients with CAD to have been discussed and validated by a Heart-Team discussion before payment is issued.

It is recognized that some cases may present urgently or as an emergency and require a more rapid discussion that may involve both interventional and surgical input. Most centres can work flexibly and be responsive enough to allow this important process to occur, the nature and results of which should be documented into the case notes.

DOCUMENTATION, FEEDBACK AND AUDIT OF OUTCOMES

It is a fundamental requirement that the recommendations reached by consensus are documented and signed off by the Chair. This ensures transparency. This record should be filed into the case notes. There will be cases in which the decision-making

is not straightforward and in such circumstances the MDT documentation should attempt to capture the essential elements of that discussion in order to further justify any decision reached. The role of the Chair is also important here in guiding the MDT coordinator in documenting the outcome as accurately as is necessary.

In addition to making recommendations regarding the requirement and mode of revascularization, the MDT should also provide a view as to whether this should take place during the current hospital admission (if the patient has presented with an acute coronary syndrome), at an early juncture after discharge or as an elective case on a routine waiting list.

Feedback is important in order to demonstrate that the process is robust. Units should therefore ensure that a system is in place that follows up the cases discussed and correlates their eventual management with original MDT recommendation. Any aberration from the original outcome should be brought back to the MDT for discussion [24]. In addition, there should be a system in place that reviews those patients undergoing either PCI or CABG without MDT discussion in order to ensure that this was appropriate. Such processes can provide educational value as well as informing any future decisions in similar patients.

Some units have tested the reproducibility of the MDT using the re-presentation of cases already discussed to examine whether the Heart-Team outcome then differs from the original recommendations [20]. While this is an area of research interest, there are data to suggest that a proportion of outcomes are indeed different. This is to be expected given the dynamics of group discussion and the variability in attendance. This is usually in cases in which there is genuine equipoise and in which more than one management plan would be acceptable.

It is acknowledged that there may be instances where the clinician delivering the final decision of the MDT (e.g. PCI or CABG) may not have been part of the MDT discussion and does not share the MDT decision. In such instances, this should be documented in the patient's medical records and the patient rediscussed at the earliest convenient MDT meeting to avoid delays in treatment. Likewise, it may be that a patient may not wish to proceed with the MDT recommendation. In such cases, the reasons for aberration should be documented. Ideally, the MDT should be updated at the earliest appropriate opportunity of this change in decision.

It is acceptable that the MDT documentation processes (referral, MDT discussion, MDT decision and decision enactment) are done electronically if available at local Trust level.

Finally, this guidance has been generated by the UK-based Societies [The British Cardiovascular Society (BCS), Society for Cardiothoracic Surgery in Great Britain and Ireland (SCTS) and British Cardiovascular Intervention Society (BCIS)]. However, there is no reason why such guidance should not apply to the management of patients with CAD around the world, especially in countries where all treatment modalities are freely available.

SUMMARY OF RECOMMENDATIONS

- (i) The MDT should be chaired by a consultant and comprise a minimum of an interventional cardiologist, a cardiac surgeon and a non-interventional cardiologist in order to be quorate.
- (ii) A clinician should attend, who is familiar with the case and is able to represent the patient's best interests and any

declared wishes. Facilitated by the coordinator, it should be that clinician's responsibility to ensure that the patient is advised of the MDT's recommendations.

- (iii) In elective cases, that transfer of information should be undertaken in an outpatient setting which will also present an opportunity to initiate the consenting process. Patient's data, comorbidities and a recognized scoring system should be used in evaluating the procedural risk of either CABG or PCI. In addition, the SYNTAX score could also be calculated and used in order to inform the discussion as to the burden of disease.
- (iv) In cases of equipoise, when the evidence for one management strategy is balanced by that for another, this should be discussed with the patient in order to gauge their own preference. A clinician of any of the specialities represented at the MDT should undertake that discussion, emphasizing the positive aspects of having more than one treatment available, rather than giving the impression of clinical indecision.
- (v) MDT meetings should be held at least once per week and for a minimum of 1 h.
- (vi) MDT meetings should be held in a dedicated room that offers privacy and space for attendees. Patients' imaging should be displayed on screens offering diagnostic medical quality and visible to all attendees.
- (vii) IT support should ensure that images from remote centres can also be viewed and that, where necessary, two-way voice communication with referral units can be accomplished during the meeting. It should be available during the meeting if required in order to deal rapidly with any technical problems.
- (viii) A dedicated MDT coordinator should be present in order to
 - (i) assimilate patient information prior to the MDT meeting,
 - (ii) document attendance, (iii) record recommendations in each case and (iv) facilitate communication of that decision to all relevant parties.
- (ix) Cases undergoing diagnostic angiography, in which revascularization is considered and in which there is no clinical mandate to proceed directly to PCI, should be discussed in an MDT forum. This applies particularly to cases in which the coronary anatomy might have prognostic significance (i.e. LMS or multivessel disease in which proximal LAD obstruction is a component). Moreover, cases that present high risk or complexity for PCI, and in which there is no clinical mandate to proceed, should also be brought to an MDT forum.
- (x) There will be occasions when clinical circumstances do not allow time for discussion in a formal MDT setting. In such cases *ad hoc* discussions will take place, the essence and outcome of which should be documented into the case notes.
- (xi) The principles of MDT structure and functioning apply to non-surgical cardiology units to the same extent as they do to cardiac surgical centres.
- (xii) MDT meetings should be scheduled during working hours. Job planning for consultant staff should incorporate their attendance at MDT meetings.
- (xiii) Units should put in place a system in which cases discussed in an MDT are followed up to ascertain whether the recommendations made were carried out. If there is any aberration, then the reasons for this should be discussed and documented. In addition to recommending the need and mode of revascularization, the MDT should also indicate

the priority in each case. In instances where there is an aberration from the MDT decision (clinician or patient decision), this should be documented in the patient's medical records and the patient re-discussed at the MDT.

SUPPLEMENTARY MATERIAL

Supplementary material is available at *EJCTS* online.

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EDITORIAL COMMENT

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Structure and functioning of the Heart Team: primum non nocere

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Clinical discussion within multidisciplinary teams has been shown to improve the quality of patient care in many fields of medicine. A pivotal example is the 'tumour board', proposed in the 1960s. A multidisciplinary discussion strategy in the field of oncology was associated with improved survival and more consistent survival rates between different hospitals and with increased treatment conformity to clinical practice guidelines [1].

In the field of myocardial revascularization, the Heart Team concept was introduced through randomized trials during the last decade, with the aim of facilitating a balanced evidence-based decision process, minimizing specialty bias and preventing self-referral from interfering with optimal patient care [2]. Of note, the decision-making process in a Heart Team appears to be largely reproducible [3].

The need for a multidisciplinary strategy is underscored by evidence showing underuse of revascularization procedures in up to 40% of patients with coronary artery disease [4] as well as inappropriate use of revascularization strategies and lack of clinical case discussions [5]. In addition, the heterogeneity in percutaneous coronary interventions (PCIs) to coronary artery bypass grafting ratios between European countries with similar health care systems has raised concerns on the appropriate selection of revascularization strategies [6]. The recently released guidelines on myocardial revascularization of the European Society of Cardiology (ESC) and the

European Association for Cardio-Thoracic Surgery (EACTS) provide a Class I, level C recommendation to the Heart Team, recognizing its relevance in current clinical practice [7].

In this issue of the Journal, the Joint Working Group of the British Cardiovascular Society (BCS), Society for Cardiothoracic Surgery in Great Britain and Ireland (SCTS) and British Cardiovascular Intervention Society (BCIS) reports a document that aims to provide guidance on the structure and function of the Heart Team [8]. This high-quality document includes an extensive overview on needs for a Heart Team in clinical practice and elaborates detailed recommendations on its structure and organization. Several important aspects of the document should be mentioned. Firstly, the composition of the Heart Team recommended by the Joint Working Group of the BCS/BCIS/SCTS is in line with the guidelines on myocardial revascularization of the ESC/EACTS [7]. Specifically, a clinical/non-invasive cardiologist, an interventional cardiologist and a cardiac surgeon should be included. Extending, on a regular basis, the Heart Team to additional specialists—such as general practitioners, anaesthesiologists, diabetologists, geriatricians, nephrologists or intensivists—is impractical, but may be useful on a case-by-case basis depending on patients' comorbid conditions. Secondly, the Joint Working Group of the BCS/BCIS/SCTS recommends that Heart Team meeting frequency should suffice the demands of the local clinical service. Therefore, in line