



Implementation and consistency of Heart Team decision-making in complex coronary revascularisation☆



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ABSTRACT

Background: A multidisciplinary team (MDT) approach for decision-making in patients with complex coronary artery disease (CAD) is now a class IC recommendation in the European and American guidelines for myocardial revascularisation. The aim of this study was to evaluate the implementation and consistency of Heart Team HT decision-making in complex coronary revascularisation.

Methods: We prospectively evaluated the data of 399 patients derived from 51 consecutive MDT meetings held in a tertiary cardiac centre. A subset of cases was randomly selected and re-presented with the same clinical data to a panel blinded to the initial outcome, at least 6 months after the initial discussion, in order to evaluate the reproducibility of decision-making.

Results: The most common decisions included continued medical management (30%), coronary artery bypass grafting (CABG) (26%) and percutaneous coronary intervention (PCI) (17%). Other decisions, such as further assessment of symptoms or evaluation with further invasive or non-invasive tests were made in 25% of the cases. Decisions were implemented in 93% of the cases. On re-discussion of the same data ($n = 40$) within a median period of 9 months 80% of the initial HT recommendations were successfully reproduced.

Conclusions: The Heart Team is a robust process in the management of patient with complex CAD and decisions are largely reproducible. Although outcomes are successfully implemented in the majority of the cases, it is important that all clinical information is available during discussion and patient preference is taken into account.

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1. Introduction

A team-based approach to decision-making has been widely adopted in several medical fields; most notably in oncology and organ transplantation [1–4]. In cardiovascular medicine, the continuously evolving treatment options and strategies, along with the proliferating amount of scientific information from randomized control trials (RCTs) and large registries, and the need for input from various specialties or subspecialties make decision-making in complex cases difficult [5]. Furthermore, the effort to include patient preference in a shared decision process regarding their treatment requires moving away from the single physician-centric model to a multidisciplinary approach, where clinicians group themselves around the patient as a multidisciplinary team which can better disclose both the pros and cons of available

therapies [6]. Thus, Heart Teams (HTs) have been developed for the management of congenital heart disease, heart failure and more recently for the treatment of aortic and mitral valve disease [7–11]. In the management of patients with complex coronary artery disease (CAD), the significant variability in revascularisation decisions and delivery of care [12–14], the need for evidence based and up-to-date decision making and reports of inappropriate use [15–17], but also underuse of revascularisation indicate the need for a multidisciplinary team (MDT) approach [18–19]. The coronary HT concept was more widely adopted after the publication of the SYNTAX (SYnergy Between PCI [percutaneous coronary intervention] With TAXUS and Cardiac Surgery) trial. In the SYNTAX trial, the concept of multidisciplinary decision-making was emphasized and formally implemented. In order to enrol a patient in the study interventional cardiologists and cardiac surgeons should come together in consensus [20].

The most recent guidelines for myocardial revascularisation published by the European Society of Cardiology and the European Association for Cardio-Thoracic Surgery and also the guidelines for percutaneous coronary intervention (PCI), published by the American College of Cardiology Foundation, American Heart Association and the Society

☆ This author takes responsibility for all aspects of the reliability and freedom from bias of the data presented and their discussed interpretation

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for Cardiovascular Angiography and Interventions have embraced the HT approach and assigned a class IC recommendation for decision-making in complex CAD [21–22]. The British Cardiovascular Society (BCS), British Cardiovascular Intervention Society (BCIS) and the Society for Cardiothoracic Surgery in Great Britain and Ireland (SCTS) have recently published official recommendations for the structure and functioning of HTs in the United Kingdom [23]. Although the HT concept has now been widely accepted by the scientific community, data for its adoption and implementation in every day practise are scarce. Studies that evaluate its pros and cons and especially the reproducibility of its results are important in order to validate its concept [24–25]. The purpose of this study was to evaluate the implementation and consistency of coronary HT decisions in a tertiary cardiac centre.

2. Methods

St Thomas' Hospital is a tertiary referral centre for coronary interventions and cardiothoracic surgery in central London. HT meetings are held on a standard time and day on a weekly basis and at least one interventional cardiologist, one cardiac surgeon and one non-interventional cardiologist are present. A designated specialist nurse documents the minutes of the meeting. Patients' demographics, clinical details and meeting's outcome are documented and then kept in a dedicated electronic archive. HT meetings have a strong educational character and junior medical staff, medical students and cardiac laboratory physiologists and radiographers often attend them. Each case is presented in a structured manner with all available clinical information alongside with coronary angiography and other imaging modalities available (e.g. echocardiography, cardiac MRI etc.). Case are prepared and presented by the senior cardiology interventional fellow who is responsible for further communication with the referring clinician and the patient. Implementation of HT decisions relies on the referring clinician, who is either the cardiologist or the cardiac surgeon responsible for patient's treatment. There is no formal pre-specified selection process for the cases referred to the meeting. Referral is at the discretion of the responsible treating clinician. Almost half of the cases discussed are referrals from affiliated district general hospitals. In these cases, the referring physician is not present, but has passed the clinical information to the presenter who prepares the case and ensures that the performed investigations (coronary angiogram, echocardiogram etc.) are available for review.

We prospectively collected the data and analysed the implementation of the decisions from 51 HT meetings that were held between April 2012 and April 2013. A subset of cases ($n = 40$) was randomly selected and re-presented with the same clinical data at least 6 months after the initial decision, with the panel blinded to the outcome of the initial meeting, in order to evaluate the consistency of the decision making process. The 6-month period was considered an adequate time interval to minimize recollection of the cases by the panel members. In case that one of the panellists recognized the case and was aware of the final outcome, he was asked not to participate in the decision-making.

3. Results

Within a 12-month period, 399 patients were discussed at the HT meeting. An average of 8 patients was discussed in each weekly meeting. 198 cases (49.6%) involved elective patients and 201 cases (50.4%) involved inpatients that presented acutely. Among the inpatients, 109 (54.2%) were hospitalized in our centre and 92 (45.8%) were referrals from affiliated district general hospitals. The mean age was 69.1 years and 77% of the patients were males. The weekly HT meeting was attended by a median number of 3 interventional cardiologists, 1 non-interventional cardiologist and 3 cardiac surgeons.

The most common HT decisions were medical management (30%), coronary artery bypass grafting (CABG) (26%) and PCI (17%) (Fig. 1). A small number of patients (2%) were randomized to the EXCEL trial,

which compared PCI for unprotecting left main stem to CABG [26]. In 25% of the cases, the HT requested further information. That involved further clinical assessment of the patient (8%) or further non-invasive (9%) or invasive investigations (8%). Fifty five percent (55%) of this subgroup of patients were elective, while 45% were inpatients, with the significant majority of them (70%) being referrals from other hospitals. "Further clinical assessment" occasionally referred to review of symptoms, but most of the times referred to bedside clinical evaluation, when physical review was needed or when none of the HT members had physically met the patient. In a very small number of cases, input from non-cardiac specialties was requested. When further investigation was suggested, that involved ischaemia testing (non-invasively or invasively by fractional flow reserve or intravascular ultrasound), further delineation of coronary anatomy (repeat coronary angiogram) or further structural and functional myocardial assessment (transthoracic echocardiography or cardiac MRI).

HT decisions were implemented in 370 out of 399 of the cases. Only 7% ($n = 29$) of the patients had different management from the one suggested by HT. Fifty five percent (55%) ($n = 13$) of them were elective cases and 45% ($n = 16$) inpatients with the majority of them being inpatients in the tertiary centre (69%, $n = 11$). The reasons for non-implementation of decisions are shown in Fig. 2. The most common one (31%) was turndown due to co-morbidities: 7 cases referred for CABG were deemed too high risk when clinically reviewed by a cardiac surgeon and 2 cases planned for PCI did not take place due to worsening renal function and ongoing sepsis. Second reason was patient's preference (24%): 6 patients refused CABG and one preferred CABG over PCI. In 21% of the cases ($n = 6$), different management was guided by changes in symptoms. Resolution of symptoms after optimal medical therapy cancelled the proposed intervention in 3 cases; in 2 cases patients had revascularisation, as medication failed to control angina, and 1 patient had urgent PCI instead of elective CABG. Four patients referred by the HT for surgical treatment died before receiving the proposed treatment. Three of them were inpatients and in critical condition after being admitted acutely. Along with their other comorbidities, all of them had concomitant valve disease (2 severe mitral regurgitation and 1 severe aortic stenosis). One of them developed intractable cardiogenic shock, which made any intervention futile and the other two deteriorated and died acutely. The fourth patient that died prior to implementation of the HT decision was elective with symptoms of stable angina and was awaiting urgent outpatient surgical review with a view to CABG and aortic valve replacement. He also had significant comorbidities (age, severe aortic stenosis, peripheral vascular disease, chronic kidney disease and type II diabetes mellitus) and died few days after the HT decision. In only 2 occasions the treating physicians did not follow the HT suggestion and managed patients differently. In these two cases, medical management and CABG were preferred instead of PCI with the rational being the complexity of the PCI procedure. Finally, in one case new data (absence of viability in the LAD territory) changed the initially planned treatment. Table 1 shows the non-implemented Heart Team decisions and final management.

A subset of 40 cases was randomly selected and re-presented with the same clinical data within a median period of 9 months. These cases were presented in a random fashion during the meeting, with the participants being blinded to the date of the angiogram. Although the presenter was the same person as in the original meeting, members of the panel randomly varied, as it is not mandatory for all cardiologists and cardiac surgeons to attend every meeting. Only 8 out of 40 (20%) decisions differed from the original HT recommendation. After re-discussion we tried to risk stratify this particular cohort of patients by calculating the Syntax and Euroscore II scores for each one of them. The mean Syntax score was 25.6 showing coronary artery disease of intermediate complexity and the mean Euroscore II was 2.93% predicting a comparatively low risk surgical procedure. For the 8 cases with different outcome, Syntax and Euroscores were even lower: 22.75 and 1.31% respectively. The results, along with the original HT recommendations

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