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The identification and development of Canadian coronary artery bypass graft surgery quality indicators

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Objective: The study objective was to develop quality indicators for coronary artery bypass graft surgery that relate to quality of care, associate with preventable death, and could be reported on performance reports.

Methods: A comprehensive list of quality indicators was collected from quality improvement organizations including the Society For Thoracic Surgery, Northern New England Cardiovascular Disease Study Group, and Veteran's Affairs System. Indicators were collated from practice guidelines from the American College of Cardiology and the American Heart Association. A MEDLINE search using the keywords "quality indicators" and "coronary bypass" was completed. A 17-member multidisciplinary international expert panel was assembled, who voted using a 2-step Delphi process regarding association with quality of care, risk adjustment, association with preventable death, and inclusion on performance reports.

Results: A total of 149 quality indicators were examined. This list was distilled to 33 indicators related to quality of care, 10 indicators that could be adequately risk adjusted, 34 indicators related to preventable death, and 18 indicators to be included on performance reports. These selected indicators consisted of 19 outcome variables, 23 process of care variables, and 4 structure variables. The quality indicators believed to be useful on a Canadian institutional coronary artery bypass graft surgery report card included the following: 30-day mortality, in-hospital mortality, electrocardiographic myocardial infarction, red cell transfusion, allogeneic blood product transfusion, deep sternal wound infection, postoperative stroke, postoperative dialysis, intensive care unit readmission, intensive care unit length of stay, ventilation time, repeat cardiac operation, repeat surgery with cardiopulmonary bypass, repeat revascularization, waiting time to surgery, completion of surgery within a recommended waiting time, use of left internal thoracic artery graft, and institutional volume.

Conclusions: This set of consensus quality indicators can be used as a standard list to be monitored by providers of coronary artery bypass graft surgery in an effort to continuously evaluate and improve their performance.

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The monitoring of quality of care has been an essential part of ongoing quality of care efforts in cardiac surgery. Risk-adjusted mortality is used as the standard measure of quality of care to evaluate the institutional performance for coronary artery bypass graft (CABG) surgery, despite the fact it has an uncertain link to quality of care.[1] It has been suggested that the publication of hospital mortality may deliver the wrong message to the public about the relative performance of a hospital, because the public is not aware of the weak evidence to date that links mortality to quality of care.[2]

Quality of care as defined by the Institute of Medicine is the "degree to which health services for individuals increases the likelihood of desired health outcomes

Abbreviations and Acronyms
CABG = coronary artery bypass graft
ECG = electrocardiogram (electrocardiographic)
ICU = intensive care unit
NQF = National Quality Forum

and are consistent with current professional knowledge."[3] For many aspects of cardiac surgical practice the health services that increase the likelihood of desired health outcomes are not clear. It is also apparent that health outcomes themselves are not adequate to measure quality of care, because they can vary with patient factors and random chance, which cannot always be accounted in statistical modeling.

Report cards have focused on the outcomes portion of the Donabedian model of quality of care consisting of the dimensions of structure, process, and outcome. Structure includes variables related to the resources and systems within a hospital, such as staffing ratios. Process relates to recognized therapeutic management of a patient, for example, the use of internal thoracic artery grafts to bypass the left anterior descending artery. Outcomes represent adverse clinical events that occur after the completion of CABG surgery.

The argument for using outcomes despite scarce evidence of the link to quality performance is that the goal of clinical care is to provide a good outcome, and so the quality of care should be mirrored in the outcome.[4] Mortality is the most common outcome that has been analyzed because of its clear definition and the ease of availability. There has been a need to create more comprehensive outcomes report cards for CABG surgery that better reflect institutional quality of care.[5] Detailed report cards that include outcomes other than mortality have not been widely researched for CABG surgery.[6]

Surveys of cardiologists and cardiac surgeons have been completed to understand the impact of these reports on practice patterns.[7,8] In Pennsylvania, only 10% of cardiac surgeons and cardiologists in the state believed that mortality rates were "very important" in assessing surgeon performance, and 87% of cardiologists stated the guide had a minimal influence or none on their referral patterns.[7] A majority (78%) of cardiac surgeons and cardiologists believed the most important limitation of these reports was the absence of indicators of quality other than mortality.[7] In Pennsylvania the CABG surgery guide had limited credibility, and it was concluded that future reports should be collaborative and involve all stakeholders.[7] It is more likely that reports tailored and targeted to providers will be successful in influencing improvements in the quality of care.

In the United States, peer review organizations monitor hospital use and quality of care in many states with the goals of attempting to reduce patient morbidity and mortality through the identification of preventable mortality and morbidity by implicit chart reviews. These reviews identify outcomes that are related to quality of care and would be preventable if optimal care had been delivered.[9] This type of review is the most accurate estimate of the proportion of adverse outcomes related to quality of care; however, the use of this process is limited because it is costly and time consuming.

The National Quality Forum (NQF), a private, nonprofit, public benefit corporation whose mission is to improve American health care, recently released a report of voluntary consensus standards for cardiac surgery.[10] Previous to this there was no consensus set of quality measures or indicators that had been published for CABG surgery. The method of identifying quality indicators in health care through consensus paneling has been successfully applied in many situations including hospital admissions for congestive heart failure and acute myocardial infarction, as well as for emergency visits.[11-13] This project's goal was to develop a comprehensive set of consensus indicators for CABG surgery that was believed by an expert panel to measure quality of care, relate to preventable death, and be included as a minimum set on Canadian CABG performance reports.

Methods

Quality Indicators

An initial list of potential quality indicators was accumulated through a MEDLINE search, databases of established quality initiatives (eg, Northern New England Cardiovascular Disease Study Group, Society For Thoracic Surgeons), American College of Cardiology/American Heart Association guidelines, and expert opinion.[14-19] The literature search focused on randomized controlled trial evidence. Quality indicators included variables that were outcomes, surrogate outcomes related to processes of perioperative care, and structure variables. These variables were rated on 5-point Likert scales, and panel members were given an opportunity to suggest quality indicators that were not listed.

Rating Scales

Outcomes and surrogate outcomes (such as peak troponin level and lowest intraoperative hematocrit) were rated on 4 separate scales. The first scale evaluated the degree to which the implementation of best practice evidence and guidelines could help prevent the outcome (1 = extremely preventable, 2 = very preventable, 3 = somewhat preventable, 4 = minimally preventable, 5 = not at all preventable). The second scale evaluated the adequacy of risk adjustment for this outcome (1 = extremely adequate, 2 = very adequate, 3 = neutral, 4 = minimally adequate, 5 = not adequate). The third scale evaluated whether the outcome was related to preventable death (1 = strongly related, 2 = very related, 3 = somewhat related, 4 = minimally related, 5 = not at all related). The final scale evaluated the usefulness of the outcome to be used on a surgery report card for institutional quality assur-