Reviewer's report

Title: Volume-Based Referral for Cardiovascular Procedures in the United States: A Cross-sectional Regression Analysis

Version: 1 Date: 15 March 2005

Reviewer: Michael Mack

Reviewer's report:

General
This retrospective analysis of an administrative discharge database (NIS) by a well recognized group that concludes that establishment of procedure volume minimums for CABG and PCI in the U.S. would result in fewer deaths than previously estimated and that a policy requiring transfer of large numbers of patients to high volume institutions is questionable. I have a number of comments and questions for the authors that may improve the manuscript.

Major Compulsory Revisions (that the author must respond to before a decision on publication can be reached)

1. Included in the study population was CABG with valve procedures. Most outcomes analyses of CABG do not include concomitant valve procedures, which comprise 10.6% of the patients in this study. Since addition of valve repair or replacement at least triples or quadruples the operative mortality, this introduces a possibly unfair bias into the study. The overall CABG mortality in this study of 3.6% is higher than most all comer databases (STS 2.9%, HCA 2.7%) and may be accounted for by inclusion of CABG plus valve patients. It would also be my assessment that CABG plus valve repair probably carries a significantly higher mortality in low volume hospitals than in high volume hospitals and perhaps the mortality benefit in high volume institutions would not be as great if CABG plus valve were not included.

2. Similarly, inclusion of same admission CABG and PCI in the CABG volume probably unfairly biases the low volume hospitals. Since half of same admission CABG/PCIs are usually for emergent CABG for failed PCI, the higher percent of same admission PCI in low volume hospitals (3.3% versus 2.8%) may adversely effect the assessment of CABG outcomes in low volume hospitals. As more patients in the low volume hospitals present with an acute myocardial infarction than in high volume tertiary care centers this unfairly biases the low volume institution outcomes. Acute emergent PCI followed by emergent CABG as a salvage situation in these acute MI patients again may prevent an unbiased comparison between and high volume CABG hospitals.

3. The internal mammary artery graft percentages in Table 1 are clearly wrong. The overall internal mammary artery graft use of 16.8% is either an egregious error or I am interpreting the Table wrong. I assume that this number represents a percent and if so, according to the STS National Clinical Database as well as the HCA Casemix Database the percent of patients receiving an IMA should be approximately 80%. I assume this represents a coding error or an unclear labeling of the Table, which I am not understanding â€“ either way, this number needs to be clarified.

4. The same comments hold true for PCI. Low volume hospitals are more likely to have patients
undergoing PCI for acute myocardial infarction compared to high volume tertiary care centers. PCI at the time of acute MI is an independent variable associated with higher mortality and not necessarily hospital nor operator volume.

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Minor Essential Revisions (such as missing labels on figures, or the wrong use of a term, which the author can be trusted to correct):

7. Reference 26 is incomplete.

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Discretionary Revisions (which the author can choose to ignore):

Dependent. Patients undergoing emergent PCI for acute MI should be excluded.

5. A shortcoming of this study is the inability to assess operator specific volumes. As has been noted in the Discussion and multiple references, the best outcomes are obtained by high volume operators at high volume institutions. In analysis of New York state database by Hannan, 49% of the benefit of a high volume institution was solely due to the high volume operators. Any statements regarding institution volume is somewhat compromised by the inability to analyze by operator volume. Many low volume institutions have only 1 or 2 high volume operators while many high volume institutions have a number of low volume operators.

6. The Discussion of the manuscript is appropriately quite circumspect and does appropriately call into question implementation of policies based upon procedural volume. The authors state however on page 11 under Limitations that there is no comprehensive national representative registry of cardiovascular procedure use. In point of fact, such a registry does exist â€” the STS National Clinical Database, which is a registry of 70% of all CABG procedures in the United States is a general source of data at least for CABG volumes and can be analyzed on the basis of individual operator volume. This database has recently been adopted by the NQF as the standard clinical outcomes source.

8. An assumption also made in this analysis is that there is no adverse mortality outcome associated with pre-procedural transfer to a high volume hospital and the time delay associated in the procedure necessitated by such a transfer. Do the authors have any information regarding potential mortality associated with transfer from a low volume to a high volume institution that may further diminish the potential of beneficial effect of transfer?

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What next?: Accept after minor essential revisions

Level of interest: An article of outstanding merit and interest in its field

Quality of written English: Acceptable

Statistical review: No

Declaration of competing interests:

I declare that I have no competing interests