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Applying Appropriateness Methods to Address Overuse While Ensuring the Delivery of Appropriate Care: The Example of Cardiac Revascularization

By David J. Ballard, MD, MSPH, PhD

The National Priorities Partnership (NPP) identified "eliminating overuse while ensuring the delivery of appropriate care" as 1 of its 6 Priorities and Goals. Within this goal, one area of concentration is the reduction of unwarranted procedures, including coronary revascularization procedures such as coronary artery bypass grafting (CABG) and percutaneous coronary intervention (PCI).[1] These goals are laudable; currently, CABG is the most common type of open-heart surgery in the United States, with 500,000 surgeries performed per year at a total annual cost of $50 billion. Also common and costly, approximately 1.3 million PCI procedures are performed in the United States each year at a total cost of $60 billion.[2]

There is likely to be a larger opportunity to reduce overuse of PCI procedures than CABG procedures. Application of RAND methodology to determine appropriateness of cardiac revascularization procedures in 3960 Medicare beneficiaries in 1991 and 1992 demonstrated that 14% of PCI procedures were inappropriate.[3] The percentage of inappropriate PCI procedures varied from 4% to 24% across states, and half of all PCI procedures were rated as having uncertain appropriateness. For CABG, variation across states was less pronounced, with 10% of procedures rated as inappropriate (ranging from 0% to 14%), and only 15% of CABG surgeries rated as having uncertain appropriateness.[4]

Studies of cardiac revascularization in New York demonstrated lower rates of inappropriate use of PCI and CABG within that state. For patients who underwent PCI or CABG in 1990, the inappropriate rate of PCI use was 4% for men and 3% for women (with 34% and 40% of procedures having uncertain appropriateness for men and women, respectively); the rate of inappropriate use for CABG was 2% for men and 3% for women (with 7% of CABGs rated as having uncertain appropriateness).[5] Other studies of cardiac revascularization in New York have confirmed these rates[6, 7] and drawn attention to the larger proportion of uncertain appropriateness associated with PCI procedures.[7]

Cross-state studies have been more likely to examine CABG appropriateness than PCI appropriateness, and have found low rates of inappropriate and uncertain CABG use. In a study of patients who underwent CABG surgery in 1990 in 12 US Academic Medical Center Consortium hospitals, 2% of these procedures were rated as inappropriate and 7% were rated as having uncertain appropriateness.[8]

More recently, a study of 4684 CABG procedures performed in 2004 and 2005 in northern New England demonstrated an appropriateness rate of 99%.[9]

Despite general consensus among experts about when CABG is appropriate, questions have been raised about the effectiveness of the procedure, particularly for women.[10] Early studies suggested that women were more likely than men to experience in-hospital mortality and morbidity after CABG, although long-term survival and functional recovery were similar in women and men.[11, 12] More recent studies have suggested that this difference may be observed because women have a disadvantageous preoperative clinical profile (eg, older age, poorer left ventricle function, more comorbid conditions).[13, 14] Smaller coronary arteries in women may also contribute to a higher risk of in-hospital mortality and morbidity following CABG surgery.[15]

Other researchers have found that operative mortality is higher for women even after adjusting for comorbidities, and have suggested that this may be due to a referral bias that results in later referrals for women and treatment that occurs later in the course of the disease.[16] Overall,

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however, in-hospital mortality and morbidity and long-term survival appear to be related more to risk factors and patient characteristics than to gender.[10] As mentioned, rates of inappropriately used CABG surgery were found to be low and similar for men and women.[5]

There is scant evidence to date that the multiyear work of the cardiovascular physician community to produce appropriateness ratings for cardiac revascularization will have an impact on achieving the NPP Priorities and Goals.[17] Studies have not yet examined changes in appropriate CABG and PCI use after implementation of specific interventions to improve rates of appropriate use. The development of such interventions should form an important focus for future research efforts.

An additional area for future research is the development of concurrent data collection tools to support real-time clinical decision making regarding the appropriateness of PCI and CABG surgery.[18] Despite the availability of a data collection tool,[19] there has been no effort to connect the data collected to algorithms linked to American College of Cardiologists' appropriateness ratings that enable classification of a prospective candidate for PCI.

Examples of real-time decision-support tools include evidence-based guidelines that are integrated into practice through electronic or paper-based flow sheets and reminders, computer-assisted diagnosis tools, and mandatory solicitation of a second opinion for high-risk procedures such as CABG that are classified as inappropriate or as having uncertain appropriateness.[20, 21] Such tools can improve evidence-based clinical decision making and use of appropriate care.[22, 23]

Even with clinical decision-support tools, large reductions in the overuse of PCI are unlikely to occur without associated financial "carrots and sticks" that are yet to be defined. A variety of financial incentives have been used to contain costs associated with surgeries that may be overused. As health care costs accelerated in the 1970s, payers began to institute the first surgical second opinion programs (SSOPs) and precertification requirements.[21] Although overall surgery rates declined with SSOP use, the absence of controlled studies made it difficult to determine whether nonconfirmation accurately identified surgeries that should not be performed.[21]

Precertification requirements, designed to identify potentially unnecessary operations before they are performed, have also been used to contain costs associated with inappropriate surgeries. These requirements have been used both by public programs and commercial insurance carriers. For example, the Peer Review Organization (PRO) Program developed by Medicare in the 1980s required surgeons to obtain approval before patients could have certain surgeries. Screening criteria developed by individual PROs varied widely.[21] Consideration could not be given to severity of disease, comorbidity, possible alternative treatments, or outcome probabilities; thus, the denial rate for PROs nationwide was only 1.6% in 1990.[24]

More recently, pay-for-performance programs, which use financial incentives to encourage improvements in quality and efficiency, are increasingly used to contain health care costs and discourage overuse. In the Centers for Medicare and Medicaid Services Premier Hospital Quality Incentive Demonstration Project, small financial incentives (limited to 1% to 2% bonuses for selected Medicare populations) supported improvements in quality of care for CABG patients, including an average improvement in the CABG quality composite score from 84.8% to 97.4% during the first 3 years of the project.[25, 26]

With respect to eliminating overuse of cardiac revascularization, the NPP Priorities and Goals are commendable in light of the large number of these procedures that are performed in the United States and their high cost. A more significant opportunity exists to reduce inappropriate use of PCI because it is more likely to be performed despite uncertain appropriateness.

In order to eliminate the overuse of cardiac revascularization while ensuring the delivery of appropriate care, a variety of strategies will likely be needed. Although the literature lacks examples of specific interventions to improve rates of appropriate PCI and CABG use, real-time clinical decision-support tools can improve adherence to evidence-based care and may be useful to reduce overuse of cardiac revascularization procedures. Even with these tools, however, large reductions in the overuse of PCI are unlikely to occur without associated financial "carrots and sticks" that are yet to be defined. Future research should focus on identifying and measuring the impact of specific tactics to improve appropriate use of cardiac revascularization procedures

David J. Ballard, MD, MSPH, PhD, *is Senior Vice President and Chief Quality Officer for the Baylor Health Care System, Dallas-Fort Worth, Texas. He can be reached at: dj.ballard@baylorhealth.edu.*

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