# 2017 Versus 2012 Appropriate Use Criteria for Percutaneous Coronary Interventions

## Impact on Appropriateness Ratings

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## ABSTRACT

**OBJECTIVES** The purpose of this study is to revisit cases rated as "inappropriate" in the 2012 appropriate use criteria (AUC) using the 2017 AUC.

**BACKGROUND** AUC for coronary revascularization in patients with stable ischemic heart disease (SIHD) were released in January 2017. Earlier 2012 AUC identified a relatively high percentage of New York State patients for whom percutaneous coronary intervention (PCI) was rated as "inappropriate" versus optimal medical therapy alone.

**METHODS** New York State's PCI registry was used to rate inappropriateness of patients undergoing PCI in 2014 using the 2012 and 2017 AUC, and to examine patient characteristics for patients rated differently.

**RESULTS** A total of 911 of 9,261 (9.8%) patients who underwent PCI in New York State in 2014 with SIHD without prior coronary artery bypass grafting were rated as "inappropriate" using the 2012 AUC, but only 171 (1.8%) patients were rated as "rarely appropriate" ("inappropriate" in 2012 AUC terminology) using the 2017 AUC. A total of 26% of all 8,407 patients undergoing PCI in New York State with 1- to 2-vessel SIHD were without high-risk findings on noninvasive testing and were either asymptomatic or without antianginal therapy. No current or past randomized controlled trials have focused on these patients.

**CONCLUSIONS** The percentage of 2014 New York State PCI patients with SIHD who are rated "rarely appropriate" has decreased substantially using 2017 AUC in comparison with the older 2012 AUC. However, for many low-risk patients undergoing the procedure, the relative benefits of optimal medical therapy with and without PCI are unknown. Randomized controlled trials are needed to study these groups. (J Am Coll Cardiol Intv 2018;11:473–8) © 2018 by the American College of Cardiology Foundation.

I n 2009, the American College of Cardiology and the American Heart Association, in conjunction with the Society for Cardiovascular Angiography and Interventions, the Society of Thoracic Surgeons, the American Association for Thoracic Surgery, and the American Society of Nuclear Cardiology, released appropriate use criteria (AUC) for coronary revascularization to supplement earlier guideline documents

(1). These AUC were updated in 2012 (2), and new AUC were recently released in 2017 (3).

Following the publication of the 2009 AUC, 3 studies applied these criteria to examine the extent of inappropriateness of revascularization procedures during the 2009 to 2010 time period (3-5). The studies found percutaneous coronary intervention (PCI) inappropriateness rates for patients without acute conditions that ranged from 10% to 14% (3-5). Later, these studies tracked inappropriateness rates over time to examine the impact of feeding back appropriateness information to hospitals and physicians (6-9). All these studies found impressively large decreases in the percentage of PCI patients undergoing inappropriate procedures, and in the number and percentage of patients with stable ischemic heart disease (SIHD) undergoing PCI (6-9).

The newly published 2017 AUC for coronary revascularization differ from the 2012 AUC in many respects, including: 1) changing the terminology (from "inappropriate" to "rarely appropriate" and from "uncertain" to "may be appropriate"); 2) combining intermediate- and high-risk noninvasive findings; 3) including calcium score as a noninvasive finding; 4) combining Canadian Cardiovascular Society (CCS) class I to II with CCS class III to IV into a single "symptomatic" group; and 5) advocating for a shared decision making approach "whereby patients are provided with evidence-based information on treatment choices and encouraged to use the information in an informed dialogue with their provider to make decisions that not only use the scientific evidence, but also align with their values, preferences and lifestyle."

The purpose of this study is to examine in detail the impact of the 2017 AUC on inappropriateness (now "rarely appropriate") ratings for PCI procedures using the latest (2014) audited New York State data. The study also identifies patients who have changed AUC ratings between 2012 and 2017.

## METHODS

**DATA.** The database used in the study was New York State's PCI Reporting System, which was developed in 1991 to gather information on all New York State patients undergoing PCI in nonfederal hospitals in the state. The PCI Reporting System contains information on demographics, comorbidities, left ventricular function, hemodynamic state, vessels diseased,

hospital and operator identifiers, and in-hospital adverse outcomes. As of July 2009, it has also contained information on the extent of anti-ischemic medical therapy used by patients and noninvasive test findings, both of which are part of the scenarios used in the AUC. The noninvasive test information includes standard exercise stress tests, stress echocardiogram, stress testing with single photo emission computed tomography, and testing with cardiac magnetic resonance. Also, low-, intermediate-, and high-risk findings are defined and recorded. However, calcium scoring is not available in the database. Data are audited and cross-checked against the department's acute care hospital discharge database, the Statewide Planning and Research Cooperative System to ensure accuracy and completeness. There is also an intensive auditing process that involves medical record reviews in samples of hospitals each year.

**PATIENTS AND HOSPITALS.** Data from all 58 nonfederal New York State hospitals in which PCI was performed in 2014 were included in the study. Patients in the study included all patients who underwent PCI in these hospitals between January 1, 2014, and December 31, 2014, who had no acute coronary syndrome or prior coronary artery bypass grafting surgery.

**STATISTICAL ANALYSIS.** All analyses were descriptive in nature. Patients undergoing PCI in New York State in 2014 were classified by their appropriateness ratings in 2012 and 2017. Ratings in 2012 were "appropriate," "uncertain," "inappropriate," and "not rated," whereas in 2017, "inappropriate" was replaced by "rarely appropriate" and "uncertain" was replaced by "may be appropriate." Differences were noted in the rating of inappropriate (rarely appropriate) of patients by the 2 AUC. Scenarios (patient characteristics) for patients rated as inappropriate in 2012 who were no longer rated that way in 2017 were identified and examined with respect to existing evidence.

## RESULTS

A total of 911 of 9,261 (9.8%) patients who underwent PCI in New York State in 2014 with SIHD without acute coronary syndrome or prior coronary artery bypass grafting were rated as "inappropriate" using the 2012 AUC (**Table 1**, row 3). Of these patients, only 140 (15%) were rated as "rarely appropriate" in the 2017 AUC, although another 31 patients who were rated as "uncertain" in 2012 were also rated as "rarely appropriate" with the 2017 AUC. In total, only 1.8% (171 of 9,261) patients were rated as "rarely appropriate" with the 2017 AUC compared with 9.8% (911 of 9,261) with the 2012 AUC.