



# Public reporting on cardiac electrophysiology procedures and outcomes: where are we now and where are we headed?

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## Abstract

Over the years, public reporting of patient outcomes has been promoted as a means to improve healthcare quality. More recently, in response to dramatic rises in healthcare costs, the Medicare Access and CHIP Reauthorization Act (MACRA) of 2015 was implemented in an effort to link quality with reimbursement. As part of a value-based model, public reporting of procedural outcomes has been incorporated into this initiative. Outcomes measures that have been introduced in cardiology include heart failure readmission and post-myocardial infarction medication prescription. Public reporting of these data has led not only to positive changes but also to unintended negative consequences. The limited number of existing registries and lack of clear consensus on quality metrics have posed challenges for quality and value assessment in cardiac electrophysiology. After learning from the lessons of existing models of public reporting, physicians, professional societies, stakeholders, and patients will need to collaborate to develop a health care model that can improve outcomes and reduce waste.

**Keywords** Electrophysiology · Outcome and performance measures · Public reporting

## 1 Introduction

Public reporting of outcome measures has been an area of much debate and controversy. Proponents argue that by increasing transparency and accountability, public reporting can help guide choices of hospitals and providers for patients and identify gaps in performance which can lead to proper allocation of resources to improve outcomes [1]. Others have argued that some measures may be marred by limitations such as voluntary reporting and incomplete data that are unbeknownst to the public and can lead to unintended consequences [2]. Despite these concerns, it is clear that public reporting is currently an integral part of our healthcare care system and will remain so for the foreseeable future. In this review, we summarize the recent evolution of public reporting, its impact on cardiology and cardiac electrophysiology (EP), and its continued role in tracking outcomes.

## 2 Recent developments in public reporting

Health care spending has grown significantly over the last 20 years, reaching more than 3.3 trillion dollars in 2016 [3]. The federal government has attempted to control cost by finding new ways to reimburse physicians based on utilization and quality metrics. One of the central challenges has been the determination of a model that promotes efficient, effective, judicious, and safe care [4, 5]. In 1997, Congress supported the Medicare Sustainable Growth Rate (SGR) formula in an effort to curb the growth in volume and cost of services. Under SGR, Center for Medicare and Medicaid (CMS) unsuccessfully tried to set a yearly budget target for physician payment tagged to the growth in gross domestic product [5]. From 2006 to 2010, there was a greater emphasis for value-based payment over the current fee-for-service model with programs such as the Physician Quality Reporting System in 2006 and the Physician Value-Based Payment Modifier in 2010 [5]. In 2015, the Medicare Access and CHIP Reauthorization Act (MACRA), also known as the “Quality Payment Program,” passed with bipartisan majority support. Under these rules, there are two tracks that clinicians can choose: Merit-Based Incentive Payment System (MIPS) or Alternative Payment Model (APM) program [4, 5]. In the MIPS model,

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participating physicians will be scored from 1 to 100 based on different performance categories. Those who forego participation will have their reimbursement lowered. In the APM model, physicians are reimbursed based on incentivization of quality and value. Advanced APMs refer to programs that further necessitate the doctors to take financial risk for patient outcomes [4, 5].

As part of the new legislation, the CMS mandated not only assessment of performance and quality at the level of practice and institutions, but also at the level of individual physicians. Hospitals are required to publish quality metrics and to allow consumers access to these reports [5, 6]. Currently, the government reports public outcomes through the website Hospital Compare (<https://www.medicare.gov/hospitalcompare/search.html>). The CMS reports data on structural measures, patient experience evaluations, timeliness and effectiveness of care, 30-day complications/readmission rates/mortality rates for certain diagnoses, and payment data on those hospitals providing care for CMS patients. The CMS rank hospitals on 64 measures and assign a 1–5 score, with 5 as the best score [7, 8].

Despite bipartisan support for the legislation, opponents have argued that value in medicine is challenging to define and cannot be easily represented and reported in a manner such as a single sum score on a website [5]. Both outcome measurement and cost data are particularly challenging to obtain in the medical setting, especially with the heterogeneity in practice settings [9]. While most of the focus on outcomes have been on objective measures (e.g., readmission or complication rates), employer and consumer groups have also made a push to include more subjective data such as patient experience surveys and patient-reported outcomes, which further complicates outcome measures [10]. For any quality outcome reporting that affects reimbursement, there are three fundamental questions to answer: (1) Does it employ quality metrics that are accurate and valid? (2) Are the penalties or rewards based on these metrics administered in a manner that is fair and achieves meaningful quality improvement? (3) Can there be unintentional harm in the implementation of this process? A reliable quality metric also needs to be risk-adjusted for medical complexity, variations in coding, and socioeconomic status of patients [11, 12].

### 3 Public reporting in cardiology and cardiac electrophysiology

The field of cardiology has long been involved in public reporting of performance and outcome measures. Currently, the CMS has focused on eight process measures for acute myocardial infarction hospitalization, three process measures for congestive heart failure, ten process measures for stroke,

and five process measures for prevention and treatment of venous thromboembolism [7, 8]. Individual states like New York and Massachusetts have led the way for reporting more specific outcome data on cardiac surgery and percutaneous coronary intervention (PCI) based on timeliness, complications, patient satisfaction, 30-day readmission rates, and hospital-acquired infections [8, 13, 14].

Within cardiology, cardiac electrophysiology faces a unique set of challenges in defining proper metrics for value-based reimbursement and reporting. Although EP procedures make up less than 10% of total cardiovascular costs in the healthcare system, they nonetheless involve the use of expensive technology [15]. Benefits of some EP procedures may not be seen for many years, such as in the case of implantable cardioverter-defibrillator implantation for primary prevention of sudden cardiac death. Due to some of these challenges, the Heart Rhythm Society (HRS) has been actively developing unique quality measures to align with the goals of MACRA that go beyond the usual core measures shared with other cardiology practices such as peri-procedural antibiotics or anticoagulation for patients with high-risk atrial fibrillation, [9, 16].

The HRS Quality Improvement Subcommittee conducted literature review, focus groups, and pilot studies to develop appropriate EP-specific performance measures. The group proposed four unique heart rhythm care performance measures [17]: (1) *implantable cardioverter-defibrillator (ICD) complication rate*, which assesses the risk-adjusted rates of procedural complications after ICD implantation; (2) *in-person evaluation following implantation of a cardiovascular implantable electronic device (CIED)*, which assesses the proportion of adult patients who had an in-person evaluation within 2–12 weeks after procedure by the electrophysiologist or another physician; (3) *infection within 180 days of cardiac implantable electronic device implantation, replacement, or revision*, which assesses the rate of infection after device implantation or modification including pacemaker, ICD, CRT, or implantable loop recorder; and (4) *cardiac tamponade or pericardiocentesis following atrial fibrillation ablation*, which follows the rates of pericardial complications within 30 days of ablation.

In addition to these performance measures, specialty-specific advanced APMs for episodic payments for EP diagnoses and procedures were also proposed by HRS [17]. Two procedures in EP were proposed to CMS for assessment: (1) ICD implantation for the primary prevention of sudden cardiac death and (2) catheter ablation for paroxysmal AF. Unfortunately, the proposed APM models were ultimately rejected by CMS. The majority of costs associated with ICD implantation and catheter ablation was felt to be concentrated on the procedure itself, with relatively small variability in costs attributed to outpatient monitoring, which would result in limited cost savings [16, 17].

Registries, which involve the systematic collection of data for specific procedures, represent another critical component of outcomes data reporting in electrophysiology [14, 17]. Registries can reflect “real-world” practice patterns that, in contrast to controlled clinical trials, can avoid potential bias that favor outcomes from certain high-performing institutions. However, these databases, especially when completed voluntarily, can be challenging to monitor, and may be subject to lower participation [14]. While interventional cardiology has built extensive registries such as the Cath-PCI database [8], cardiac electrophysiology has had a limited number of specialty-specific registries. After the publication of the Sudden Cardiac Death in Heart Failure (SCD-HeFT) trial in 2005 [18], CMS issued a National Coverage Decision which expanded payment for primary prevention ICDs. This was accompanied by a coverage with evidence decision which mandated enrollment of patients receiving these ICDs in either a clinical trial or a national registry. This led to the creation of the National Cardiovascular Data Registry (NCDR) ICD Registry. More recently, two other EP-specific registries have recently been created: the Left Atrial Appendage Occlusion Registry (LAAO) and the Afib Ablation Registry. Started in 2015, the LAAO registry has been designed to follow 3000 participants over 2 years with a focus on outcomes such as complications, transient ischemic attack, stroke, major bleeding, or death [19]. The Afib Ablation Registry, launched in 2016, aims to develop a dataset to measure and report safety and efficacy of AF ablation procedures. Data to be collected by this registry include data on outcome metrics (e.g., mortality, complication rates, and proportion of patients free of Afib at discharge), process/utilization metrics (e.g., use of anticoagulation at discharge, median procedure duration, post procedure length of stay), and process comparisons (e.g., use of trans-esophageal echocardiogram prior to procedure) [20]. Similar initiatives have been launched in countries outside the USA with some success and may serve as potential models. The Spanish Catheter Ablation registry, which is comprised of about 90% of all practicing Spanish centers, has included both success and complication rates for ablations for various arrhythmias for the last 16 consecutive years. The registry has appeared to demonstrate a progressive increase in the number of performed ablations, coupled with higher success rates and lower complication rates [21].

#### 4 Lessons learned from public reporting thus far

Public reporting has led to mixed consequences within the field of cardiology (Table 1). Improvements in performance measures have been documented—for example there has been a significant increase in the number of patients who receive appropriate medications at discharge for

conditions such as acute myocardial infarction or heart failure over recent years [8]. Multiple publications have shown that patients who are discharged on appropriate medications are significantly more likely to continue these medications as outpatients [22]. In Minnesota, where use of aspirin for cardiovascular diseases is publicly reported, aspirin use was 95% among patients with vascular diseases compared to the 35–57% among vascular patients in other states in 2008 [23]. The cardiac surgery public reporting in New York in the 1980s was associated with lower mortality despite an increase in surgical case complexity [8]. Overall, public reporting can help realign organizational quality goals, develop a sense of accountability to both providers and consumers, and raise important questions regarding gaps in care.

Despite the benefits, there have also been concerns about unintended consequences of public reporting [24]. Heart failure is the number one cause of readmissions among Medicare recipients [25]. As part of the Hospital Readmission Reduction Program (HRRP) in 2010, public reporting on 30-day risk-adjusted heart failure readmission rates was initiated with penalties imposed on hospitals with higher readmission rates [26]. Using the American Heart Association Get with the Guidelines Heart Failure (GWTG-HF) registry, Gupta et al. analyzed risk-adjusted 30-day and 1-year all-cause readmission and mortality rates in Medicare beneficiaries before and during HRRP implementation. While the 30-day heart failure readmission rate declined from 20.0 to 18.4% after the institution of HRRP reporting and associated penalties, the risk-adjusted mortality rates increased from 7.2 to 8.6%. Similarly, 1-year readmission rate also declined but was associated with a troubling increase in mortality rates [26]. Whether or not this association between HRRP implementation and trend in increased heart failure mortality is causal remains to be seen. However, these data raise concerns that hospitals may be incentivized to use strategies such as delaying re-admission beyond 30 days or shifting inpatient care to emergency department which in turn leads to worse outcomes.

Risk adjustment of performance measures can also have unintended consequences. For example, in New York between 1989 and 1991, the reported incidence of chronic obstructive pulmonary disease among CABG patients jumped drastically from 6.9 to 17.4% and CHF increased from 1.7 to 7.6% with the introduction of public reporting [8, 27]. Physicians and hospitals may be incentivized to exaggerate co-morbidities in cases where publically reported outcomes are risk-adjusted. However, when outcomes are not adequately risk-adjusted, physicians may be decide not to perform procedures in high-risk patients who require them. In Massachusetts, with the implementation of public reporting, cardiologists performed fewer procedures in high-risk patients with acute myocardial infarction as PCI for cardiogenic shock declined from 2.28 to 1.29% in 2005 [28]. Public reporting of readmission rates can

**Table 1** Potential pros and cons of public reporting

Potential pros of public reporting	Potential cons of public reporting
Identifies areas for quality improvement with actionable data	Promotes avoidance of treatment of high-risk patients who can adversely impact quality metrics
Promotes transparency and maintains trust between public and healthcare system	Encourages exaggeration and coding of co-morbidities in order to alter risk-adjusted metrics
Promulgates standards across country in the form of benchmarks	Disengages physicians who become skeptical of inaccurate quality metrics
Allows patients to make informed choices about hospital and health care provider selection	Misleads public using metrics that are not truly representative of quality of care
Encourages data collection that permits opportunities for continued quality improvement	Discourages underperforming centers from voluntarily reporting data

affect safety-net hospitals and academic centers to a greater degree, which can negatively impact care for vulnerable and sick populations [29].

Given that public reporting within the field of cardiac electrophysiology is still in its nascent stages, its impact on quantifiable outcomes such as procedural complications and mortality remains to be determined. It is currently too soon to be able to study the effects of implementing MACRA-based EP performance measures on outcomes. However, well-established registries such as the NCDR ICD registry have yielded numerous studies that have highlighted areas for quality improvement in EP. For example, NCDR ICD registry studies have highlighted rates of under-utilization of ICDs for post-myocardial infarction patients [30], variations in single versus dual chamber ICD implantation practice patterns [31], and real-world assessments of outcomes with use of newer ICD technologies such as the subcutaneous ICD [32]. However, the direct impact of NCDR registry data collection and reporting on hospital practice patterns and outcomes are difficult to quantitate. It should be noted that public reporting through the NCDR registries is voluntary. This can introduce reporting bias as voluntary reporting may be more likely to occur from hospitals that are well-performing rather than from hospitals that are under-performing [33]. Furthermore, registry data may be misleading when medical records are missing critical elements and when there is an absence of an auditing process to ensure data integrity [34, 35]. In this regard, big data analytics may hold promise as an important tool for allowing identification of meaningful markers of quality by reducing the impact of inaccurate data from smaller registries. [36].

## 5 Conclusion

With the introduction of MACRA and the push towards APM value-based payment models, it is clear that public reporting is here to stay. Transparency and accountability are important goals for ensuring trust between the public and healthcare

providers. However, identification of metrics that are truly representative of quality remains a daunting challenge. In addition, public reporting can also have unintended consequences that may negatively impact care instead of improving it. It is clear that the creation and maintenance of public reporting must be a team effort that involves patients, providers, policy advisors, and other stakeholders in order to succeed. The cardiac electrophysiology community will have to play an integral part in developing and testing new outcome targets and educating the public and policymakers about the appropriate use and interpretation of outcome measures—only then, can the ultimate goal of public reporting to improve outcomes in a cost-effective manner be possible.

## Compliance with ethical standards

**Conflict of interest** Dr. Jim W. Cheung has received consulting fees from Biosense Webster, speaker honoraria from Zoll, research grant support from Biotronik, and fellowship grant support from Biotronik, Boston Scientific, Medtronic, and St. Jude Medical. Dr. Kim has no relevant disclosures.

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