Original Article

Patient and Physician Perspectives on Public Reporting of Mortality Ratings for Percutaneous Coronary Intervention in New York State

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Background—Public reporting of physician-specific outcome data for procedures, such as percutaneous coronary intervention (PCI), can influence physicians to avoid high-risk patients who may benefit from treatment. Prior physician attitudes toward public scorecards in New York State (NYS) have been studied, but the exclusion criteria have evolved. Additionally, patient perceptions toward such reports remain poorly understood. This study evaluates (1) whether exclusion of certain high-risk patients from public reporting of PCI outcomes in NYS has influenced physician attitudes, (2) current patient awareness and use of publicly reported outcome data, and (3) differences in physician and patient attitudes toward public reporting.

Methods and Results—A questionnaire was administered to interventional cardiologists in NYS with specific emphasis on how modifications in publicly reported outcome data have influenced their practice. The results were compared with a 2003 survey administered by our group. A separate questionnaire regarding the publicly available NYS PCI Report was administered to patients referred to our center for possible PCI. The majority of interventional cardiologists indicated that the exclusion of patients with anoxic brain injury and refractory cardiogenic shock from public reporting has made them more likely to perform PCI for these subgroups. While patient awareness of the NYS PCI Report was low, patients were significantly more likely than physicians to think that publication of physician-specific mortality data can provide an accurate measure of physician quality, serve to improve patient care, and provide useful information in terms of physician selection.

Conclusions—The study provides further evidence that public reporting of physician-specific outcome data influences physician behavior and indicates that significant discrepancies exist in how scorecards are perceived by physicians versus patients. **(*Circ Cardiovasc Qual Outcomes*. 2017;10:e003511. DOI: 10.1161/CIRCOUTCOMES.116.003511.)**

Key Words: ethics and policy ■ mortality/survival ■ myocardial infarction ■ percutaneous coronary intervention ■ quality and outcomes ■ statements and guidelines

With the passage of the Patient Protection and Affordable Care Act in 2010, transparency and accountability through public reporting of outcomes is now an essential part of a national strategy to address quality and cost in this era of value-based health care.[1] The New York State (NYS) Department of Health (DOH) has long collected outcome data on all interventional cardiologists and cardiac surgeons practicing in the state, and this information is made publicly available. The most recent NYS percutaneous coronary intervention (PCI) report contains physician-specific and hospital-specific outcome data for all percutaneous coronary revascularization procedures performed in NYS from January 2009 to December 2011. The report also includes data on the number of interventions performed, as well as observed and risk-adjusted patient mortality rates for each physician. Proponents of the public reporting system in NYS have argued that coronary artery bypass graft outcomes and PCI outcomes have improved since its inception.[2] However, some studies have suggested a pattern of risk-aversion whereby physicians practicing in public-reporting states are less likely to perform PCI procedures on higher risk patients than those in nonpublic-reporting states.[3–5] Likewise, physicians have indicated that publication of their individual mortality statistics influences their decisions regarding whether to intervene in critically ill patients with high expected mortality rates, and patients who might benefit from PCI may not receive the procedure as a result of public reporting.[6,7] Responding to such concerns, in 2008, the NYS DOH excluded patients presenting in cardiogenic shock from public reporting. A subsequent study showed an increased rate of revascularization in such

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WHAT IS KNOWN

- Public reporting of mortality data leads to risk-aversive behavior among cardiologists, whereby they are less likely to perform percutaneous coronary intervention for patients at higher risk of adverse outcomes, even if the procedure is thought to convey benefit.
- In recent years, selected higher-risk patient subsets have been excluded by some public-reporting organizations.

WHAT THE STUDY ADDS

- Exclusion of higher-risk patient subgroups from the New York State Percutaneous Coronary Intervention Reporting System has made cardiologists more likely to perform percutaneous coronary intervention for these individuals.
- The majority of interventional cardiologists surveyed continue to think that physician scorecards do not accurately measure physician quality or serve to improve quality of care.
- While most patients surveyed were unaware of the existence of publicly available physician-specific mortality data, in contrast to physicians, most patients believed that such data would provide an accurate measure of physician quality, provide useful information for physician selection, and improve quality of care.

patients in NYS, although the rates were still lower than the rates seen in Michigan, California, or New Jersey.[8]

Despite the demonstrable influence that public reporting has on medical decision making by physicians, little is known regarding patient awareness and use of such reports. A study in the pre-internet era indicated that patients undergoing coronary artery bypass graft in Pennsylvania rarely were aware of that state's reporting system, but data from the current information age are lacking. Our aim was to survey physicians and patients to (1) determine whether the changes made to eliminate high-risk patients from public reporting influenced physician attitudes, (2) evaluate patients' knowledge, attitudes, and beliefs regarding public reporting of physician-specific outcome data, and (3) compare physician and patient attitudes about public reporting.

Methods

Physician Survey

The physician population consisted of interventional cardiologists in NYS included in the most recent publicly available PCI in NYS 2009 to 2011 report published in March 2014.[9] Current e-mail or physical addresses were obtained from medical society membership directories and internet-based directories. A primary aim was to determine how changes to the reporting system in 2008 and 2010 (when NYS decided to exclude patients presenting in cardiogenic shock or experiencing anoxic brain injury from public reporting) have affected physician attitudes and behavior. We assessed the number of physicians practicing for greater than 10 years and who, therefore, experienced the transition in reporting rules.

The study instrument consisted of an e-mail- or paper-based questionnaire designed to elicit opinions from cardiologists regarding the PCI in NYS report and its potential impact on their clinical practice. The survey asked each physician to provide demographic information and respond to 9 statements regarding the report and its changes over the last 10 years. Physicians were asked to indicate whether they strongly agreed, agreed, disagreed, or strongly disagreed with each statement. Several of the statements were worded identically to those from our group's 2003 questionnaire and served to compare attitudes between the 2003 and 2016 survey participants.

Patient Survey

A separate survey instrument was administered to patients with suspected or known coronary artery disease undergoing outpatient cardiac catheterization at our center between July 1, 2016, and November 22, 2016. Patients were approached and provided informed consent to participate in the survey prior to undergoing their elective cardiac catheterization, and the survey was administered the following day (either in-person for patients who were admitted to the hospital postprocedure or by phone for patients who were discharged on the day of the procedure). The questionnaire asked for demographic and medical information (level of education, type of insurance, number of years with coronary disease, number of coronary angiograms, self-reporting of their physical and mental health) included questions regarding knowledge of the PCI in NYS report and included 5 statements regarding views on the publication of physician-specific mortality rates in which patients were asked to indicate whether they strongly agreed, agreed, disagreed, or strongly disagreed with each statement. Several of the statements presented to the patient group were direct corollaries of those included on the questionnaire provided to the physician group and served to compare potential differences between the 2 groups.

Statistical Analysis

For the physician survey, demographics and survey responses were analyzed using frequency tables and descriptive statistics. Comparisons between the 2003 and 2016 surveys were analyzed using frequency tables and Pearson chi-squared tests. We assessed the impact of physician characteristics on survey responses using multivariable ordinal logistic regression. Patient demographics and survey responses were analyzed using frequency tables and descriptive statistics. Patient and physician survey responses were compared using frequency tables, Pearson chi-squared tests, and the Cochran–Armitage test for trend. Analyses were performed using SAS 9.4 (Cary, NC) and JMP 12 PRO (Cary, NC). The study was approved by the University of Rochester Research Subjects Review Board.

Results

Physician Response Rate and Physician Variables

Questionnaires were provided to 320 interventional cardiologists included in the PCI in NYS 2009 to 2011 report, of whom 162 (51%) responded. Of respondents, 83% were in practice for >10 years and were, therefore, practicing at the time of the reporting rules change in 2008. Self-reported demographic information of the respondents is presented in Table 1. There were several significant differences noted between physician characteristics between 2003 and 2016. Ninety-one percent of the respondents were board certified in interventional cardiology, with two thirds practicing outside of the New York City 5 boroughs. There was a wide distribution among physicians in terms of number of years since completing cardiology training, annual number of PCI procedures performed, and hospital type where physicians performed most of their PCI procedures. Among the responding physicians, 87% reported never having been asked by any patient about their mortality

Table 1. Self-Report Background Information, New York State Interventional Cardiologists

	2016 (n=162), % (n)	2003 (n=120), % (n)	*P* Value
Board-certified in interventional cardiology			
No	9 (15)	19 (23)	0.006
Yes	91 (147)	78 (94)	
Not reported	0 (0)	3 (3)	
Practice location			
NYC	28 (46)	Not Assessed	NA
Outside NYC	68 (110)		
Not reported	4 (6)		
Age, y			
35–44	20 (33)	34 (41)	<0.001
45–54	34 (55)	48 (57)	
55–64	37 (59)	12 (14)	
65–74	9 (15)	3 (3)	
Not reported	0 (0)	4 (5)	
Annual number of coronary interventions—average over past 2 y			
<50	5 (8)	1 (1)	0.025
51–100	21 (34)	14 (17)	
101–150	25 (41)	21 (25)	
151–200	21 (33)	14 (17)	
201–250	10 (16)	13 (15)	
251–300	7 (12)	15 (18)	
301–350	2 (3)	5 (6)	
≥351	9 (14)	17 (20)	
Not reported	1 (1)	1 (1)	
Number of years out of cardiology fellowship			
0–9	17 (27)	23 (28)	<0.001
10–19	35 (56)	45 (54)	
20–29	31 (50)	25 (30)	
30–39	17 (28)	2 (2)	
≥40	1 (1)	1 (1)	
Not reported	0 (0)	4 (5)	
Hospital type where most (>50%) interventions are performed			
University, teaching	53 (85)	44 (53)	0.16
Community, teaching	26 (41)	36 (43)	
Community, nonteaching	21 (36)	20 (24)	
Number of patients asking about personal mortality statistic in NYS DOH website			
None	87 (140)	Not Assessed	NA
1–5	13 (21)		
6–10	0 (0)		

DOH indicates Department of Health; NA, not applicable; and NYS, New York State.

statistics as reported on the NYS Cardiovascular Disease Data and Statistics public reporting website.

Physician Questionnaire Responses

Responses of the interventional cardiologists to the 9 specific queries related to the PCI in NYS 2009 to 2011 report are presented in Table 2. Six statements focused on the respondents' overall perception of the report. Specifically, the overwhelming majority disagreed or strongly disagreed that the report provided an accurate measure of physician quality (90%), provided useful information for the public (78%), served to improve patient care (75%), or that mortality statistics should determine physician and hospital reimbursements (94%). The majority (78%) believed that public reporting of specific physician mortality rates results in patients who might benefit from PCI not receiving the procedure. We compared responses to 4 identical statements used in both our 2003 and 2016 surveys, and no significant interval differences in physician responses were seen (P>0.2 for all comparisons; Figure 1). Multivariable ordinal logistic regression analysis revealed that physicians from major teaching hospitals were less likely to agree with the statements that the measures provided an accurate measure of quality, provide useful information, or served to improve patient care (P=0.01 for all). Physician age, location in New York City, board certification, years in practice, and case load were largely not associated with responses (Supplement 1 in the Data Supplement).

Three statements focused on changes made in the NYS reporting system over the last 10 years to exclude certain high-risk patients from publicly reported mortality statistics. Seventy percent of physicians agreed that the decision to exclude patients with anoxic brain injury from public reporting made them more likely to perform PCI in patients who presented with this condition. Seventy-five percent of physicians agreed that the 2008 decision to exclude refractory shock, defined as systolic blood pressure <80 mm Hg and cardiac index <2.0 L/min/m^2 despite inotropic, vasopressor, or mechanical support, made them more likely to perform PCI in patients with this condition. Sixty-one percent felt that the 2015 decision to still include hemodynamically unstable but not refractory shock patients, defined as systolic blood pressure <90 mm Hg and cardiac index <2.2 L/min/m^2 and the requirement of inotropic, vasopressor, or mechanical support to maintain blood pressure or cardiac index at the specified levels, in the report made them less likely to perform coronary angioplasty in this high-risk patient group. The majority of physicians also indicated that creation of a physician panel to review all post-PCI deaths and exclude those deaths deemed not to be procedurally related would improve the reporting system. Multivariable ordinal logistic regression did not identify any physician characteristics associated with responses.

Patient Questionnaire

A total of 247 patients agreed to participate in the survey, and 204 patients (83%) completed the survey. Patient demographics can be found in Table 3. Most patients (81%) had used the internet and a substantial number (37%) had used the internet to find out information about their physicians. Among respondents, the overwhelming majority (95%) had

Table 2. Responses by Interventional Cardiologists in 2016 (%)

	Strongly Disagree	Disagree	Agree	Strongly Agree
Mortality statistics provide an accurate measure of physician quality	40	50	9	1
Mortality statistics provide information that is useful for the public in terms of selecting a physician or hospital for angioplasty	37	41	21	1
Public reporting of physician-specific mortality rates may result in some patients who might benefit from the procedure not receiving the angioplasty	11	11	40	38
The New York State Angioplasty Report serves to improve patient care in New York State	33	42	23	2
NYS's decision in 2008 to exclude patients with cardiogenic shock (systolic BP <80 mm Hg or low cardiac index [<2.0 L/min/m^2]) from public reporting has made you more likely to perform angioplasty on patients with cardiogenic shock	5	20	41	34
Mortality statistics should be used to help determine individual physician and hospital reimbursement levels	62	32	6	0
Creation of a physician panel to review all post-PCI deaths and exclude those deemed not to be procedure-related from public reporting would improve the quality of the reporting system	6	3	34	57
NYS's decision to exclude deaths related to anoxic encephalopathy from public reporting has made you more likely to perform angioplasty on patients after prolonged resuscitation	4	26	39	31
Do you feel that NYS's 2015 new definitions for cardiogenic shock where cardiogenic shock is still included in public reporting analyses will make you less likely to perform angioplasty	3	36	40	21

Cardiogenic/unstable shock (included): hemodynamically unstable but not refractory cardiogenic shock, defined as systolic blood pressure <90 mm Hg and cardiac index <2.2 L/min/m^2 and the requirement of inotropic, vasopressor, or mechanical support. Refractory shock (excluded): hypotension with systolic BP <80 mm Hg and cardiac index (<2.0 L/min/m^2) despite inotropic, vasopressor, or mechanical support. NYS indicates New York State; and PCI, percutaneous coronary intervention.

never heard of the NYS DOH public report on coronary angioplasty, either from their cardiologist, or from their hospital, or from a friend. Only 2.4% of patients had actually viewed the report, and only 1.5% of patients who had viewed the report stated that the report had influenced where their procedure was performed or which physician did their procedure. When asked if they would want to discuss the NYS DOH information with their general cardiologist, more than half (52%) said they would. Additionally, the majority (66%) said they were either somewhat interested or very interested in using the public report to obtain information about their interventional cardiologist.

Comparing Patient and Physician Perspectives

Five specific queries sought to compare patient and physician opinions regarding the public reporting of physician-specific data (Table 4). Patient and physician perspectives regarding the accuracy and potential utility of public reporting differed significantly (Figure 2). Contrary to physicians, the majority of patients felt that knowing a physician's procedural

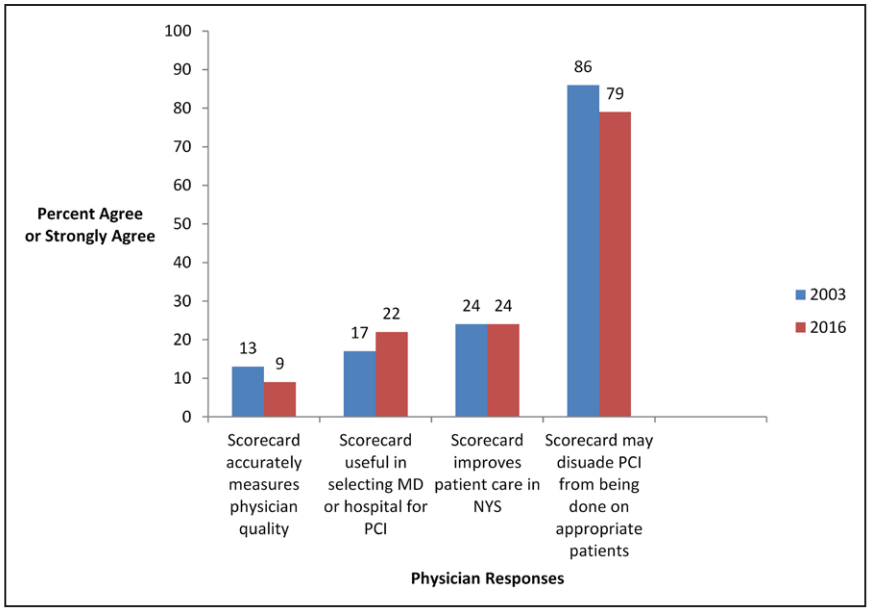

Figure 1. Physician responses in 2003 vs 2016. MD indicates medical doctor; NYS, New York State; and PCI, percutaneous coronary intervention.

Table 3. Background Information on 204 Patient Respondents

Background Information	Number	Patients, %
Age, y		
<45	5	3
45–54	16	8
55–64	68	33
65–74	83	41
>75	32	16
Sex		
Female	49	24
Male	155	76
Level of education		
High school	76	37
Some college	60	29
College	33	16
Graduate school	35	17
Average length of heart disease, y		
No prior heart disease	29	14
<1	19	10
1–5	29	14
>5	127	62
Number of coronary catheterizations		
One	59	29
Two	58	28
Three	31	15
Four	19	9
Five or more	37	18
How often do you use the internet?		
Never	39	19
Less than once a week	24	12
Several times a week	34	17
Daily	107	53
Have you ever used the internet to find out information about your doctor?		
Yes	75	37
No	129	63
Have you ever heard of the New York State Department of Health public report on coronary angioplasty procedures by New York cardiologists?		
Yes	11	5
No	193	95
Would you want to discuss the New York State Department of Health information with your cardiologist?		
Yes	106	52
No	96	48
In the future, would you consider using New York State Department of Health report to obtain information about your interventional cardiologist?		
Not at all interested	45	22
Not very interested	24	12
Somewhat interested	90	44
Very interested	45	22

mortality rate would provide an accurate measure of the quality of the physician (60%), would provide useful information for the public in terms of selecting a physician or hospital for PCI (78%), and would serve to improve patient care (77%). Despite these potential benefits to public health, the majority of patients (62%) also felt that cardiologist-specific public reporting might make physicians less likely to perform procedures on sicker patients, even if patients might benefit from the procedure. A majority of patients (59%) felt that mortality rates should not be used to determine hospital or physician compensation. The differences between physician and patient responses for all 5 queries were statistically significant ($P<0.001$).

Discussion

Our results provide further evidence that public reporting of physician-specific outcome data influences clinical behavior. The majority of cardiologists responding to our survey indicated that the exclusion of high-risk patient subgroups from public reporting has made them more likely to perform angioplasty on these patients. However, despite the modifications to the reporting system, a large majority of interventional cardiologists continue to think that physician scorecards do not accurately measure physician quality nor serve to improve quality of care. Although patient awareness of the NYS PCI report was low, our study demonstrated significant disparities in how scorecards are perceived by patients and physicians. In contrast to physicians, most patients believed that publication of physician-specific mortality data would provide an accurate measure of physician quality, serve to improve patient care, and provide useful information in terms of physician selection.

The Society for Cardiac Angiography and Interventions recently updated its position on public reporting,[10] indicating that it continues to support the use of public reporting as a way to achieve high-quality healthcare and to empower patients to participate in their medical care. However, it acknowledges the unintended consequence of counterproductive risk-aversive behavior by physicians and expresses serious concern that operator-specific mortality statistics may not be the best measure of identifying low-performing operators. Society for Cardiac Angiography and Interventions proposes a transition from procedure-based reporting of outcomes (whereby only patients who undergo PCI at a specific hospital are included in public reporting) to disease-based reporting of outcomes (whereby all patients with a specific disease state, eg, acute MI, treated at that hospital are included in public reporting whether or not they undergo PCI) and proposes

Table 4. Patient and Physician Opinions Regarding the Public Reporting of Physician-Specific Data

	Patient, % (n)	Physician, % (n)	*P* Value (χ^2)	*P* Value (Trend)
Accurate				
1: strongly disagree	7.8 (16)	40.0 (64)	<0.0001	<0.0001
2: disagree	32.4 (66)	50.6 (81)	<0.0001	<0.0001
3: agree	46.1 (94)	8.1 (13)	<0.0001	<0.0001
4: strongly agree	13.7 (28)	1.3 (2)	<0.0001	<0.0001
Useful				
1: strongly disagree	5.4 (11)	37.5 (60)	<0.0001	<0.0001
2: disagree	15.2 (31)	40.6 (65)	<0.0001	<0.0001
3: agree	54.4 (111)	21.3 (34)	<0.0001	<0.0001
4: strongly agree	25.0 (51)	0.6 (1)	<0.0001	<0.0001
Benefit				
1: strongly disagree	3.4 (7)	11.3 (18)	<0.0001	0.0004
2: disagree	35.3 (72)	10.6 (17)	<0.0001	0.0004
3: agree	46.6 (95)	40.0 (64)	<0.0001	0.0004
4: strongly agree	14.7 (30)	38.1 (61)	<0.0001	0.0004
Improve				
1: strongly disagree	3.9 (8)	33.1 (53)	<0.0001	<0.0001
2: disagree	18.6 (38)	42.5 (68)	<0.0001	<0.0001
3: agree	58.3 (119)	23.1 (37)	<0.0001	<0.0001
4: strongly agree	19.1 (39)	1.3 (2)	<0.0001	<0.0001
Reimbursement				
1: strongly disagree	15.7 (32)	63.1 (101)	<0.0001	<0.0001
2: disagree	43.1 (88)	31.9 (51)	<0.0001	<0.0001
3: agree	30.4 (62)	5.0 (8)	<0.0001	<0.0001
4: strongly agree	10.8 (22)	0 (0)	<0.0001	<0.0001

Accurate: Mortality statistics provides an accurate measure of physician quality. Useful: Mortality statistics provides information that is useful for the public in terms of selecting a physician or hospital for angioplasty. Benefit: Public reporting of physician-specific mortality rates may result in some patients who might benefit from the procedure not receiving the angioplasty. Improve: The New York State Angioplasty Report serves to improve patient care in NYS. Reimbursement: Mortality statistics should be used to help determine individual physician and hospital reimbursement levels.

de-emphasizing mortality rates as the sole outcome measure, instead incorporating other nonmortality quality care measures. Society for Cardiac Angiography and Interventions also proposes that physician-specific mortality rates after PCI should be de-emphasized, while hospital-specific mortality rates should be reported inclusive and exclusive of high-risk cohorts.

The American College of Cardiology Interventional Council and the Board of Governors also recently took a similar stance in expressing concern with the current risk-adjustment model and emphasized the need to better develop quality assessment metrics and also to exclude cardiogenic shock patients and patients resuscitated from out-of-hospital cardiac arrest from publicly reported PCI mortality statistics.[11]

Despite concerns raised by physicians and medical societies, there is data to suggest that public reporting can benefit patient outcomes. At the institution level, a possible benefit of public reporting was recently reported in a study by Waldo et al,[12] which looked at the impact of public reporting of institutions as negative outliers and in-hospital outcomes among patients with acute myocardial infarctions in the Massachusetts and NYS PCI databases from 2002 to 2012. Hospitals identified as negative outliers had a statistically significant bigger decrease in in-hospital mortality among patients undergoing PCI after public reporting of negative outlier status. The authors hypothesize that public reporting at the institution level may lead to improved changes in health-care delivery that leads to improved patient case selection and improved patient outcomes.

Risk-aversive behavior by cardiologists in NYS is suggested in studies showing an increase in rates of PCI in NYS among patients with acute myocardial infarction and cardiogenic shock after such patients were excluded from public reporting cards.[8,13] Although the rate of PCI in cardiogenic

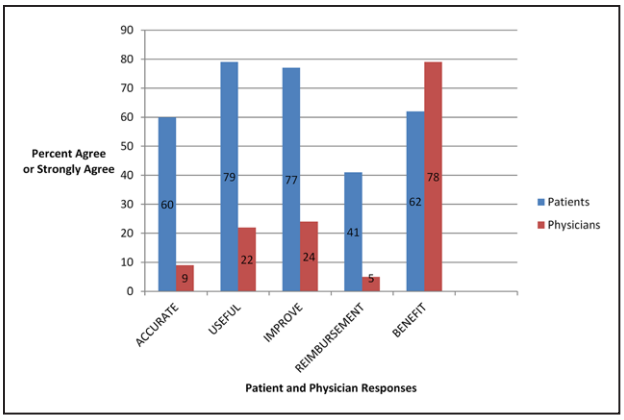

Figure 2. Patient vs physician responses. Accurate: mortality statistics provide an accurate measure of physician quality; Useful: mortality statistics provide information that is useful for the public in terms of selecting a physician or hospital for angioplasty; Improve: the New York State Angioplasty Report serves to improve patient care in the NYS; Reimbursement: mortality statistics should be used to help determine individual physician and hospital reimbursement levels; Benefit: public reporting of physician-specific mortality rates may result in some patients who might benefit from the procedure not receiving the angioplasty.

shock patients in NYS increased after public reporting policy changes with a concomitant beneficial decrease in mortality, the rate of PCI in cardiogenic shock patients is still lower than the comparator states. One potential explanation for the persistent lower rate of revascularization is that in NYS, only a narrowly defined subset of patients with cardiogenic shock, refractory shock, defined as hypotension with systolic BP <80 mm Hg and cardiac index <2.0 L/min/m^2 despite inotropic, vasopressor, or mechanical support, are excluded from public reporting. The majority of physicians surveyed agreed that the continued inclusion of nonrefractory but still hemodynamically unstable cardiogenic shock, defined as an episode of hypotension with systolic blood pressure <90 mm Hg and cardiac index <2.2 L/min/m^2 and the requirement of inotropic, vasopressor, or mechanical support to maintain blood pressure or cardiac index above the specified levels, continued to make them less likely to perform PCI in these high-risk patients. Interestingly, a recent analysis by Hannan et al[14] looked at the theoretical impact of modifying the current NYS public reporting of outliers by (1) including all refractory shock patients or (2) excluding all shock (hemodynamically unstable and refractory) patients in the risk adjustment model and found a similar number of outlier physicians and institutions, regardless of shock inclusion or exclusion. However, when looking at specific physician outliers in each of the models and not just the total number of outliers, correlation was not 100%. Specifically, concern has been raised that 13.5% of good operators may have been labeled falsely as poor operators, as well as the converse that 20% of poor operators may have been labeled falsely as good operators.[15] Although the risk adjustment model works well in aggregate, individual physicians may still have concern that they might be labeled falsely as poor operators when shock is included in publicly reported statistics.

Despite the growing focus on public reporting within the medical field and the impact of scorecard reports on physician behavior, our results indicate that patients remain largely unaware of this data. Interestingly, only a small minority of patients was aware of the NYS scorecard; however, patients were significantly more likely than physicians to think that publication of physician-specific mortality data can provide an accurate measure of physician quality, serve to improve patient care, and provide useful information in terms of physician selection. Despite a high level of education, high use of the internet, and despite most having existing heart disease, few patients responding to our survey knew of the NYS DOH website's existence as only 13% of physicians responding to our survey had ever been asked about their scorecard data by a patient, and only 5% of patients surveyed were aware of the NYS PCI report. Additionally, <2% of patients indicated that the PCI report had influenced their decision regarding choice of a hospital or physician. This is in line with a prior survey conducted in 1996, which showed that only 12% of Pennsylvania cardiac surgery patients were aware of that state's publicly available cardiac surgery report card prior to undergoing cardiac surgery.[16] Despite limited knowledge of the PCI reporting scorecard, more than half of the patients expressed interest in discussing the report with their referring cardiologist. Most were interested in finding out more information about their interventional cardiologist, and as opposed to the physicians surveyed, most patients thought that the reports could provide useful information for the public in terms of selecting a physician or hospital and could serve to improve patient care. However, both physicians and patients agreed that public reporting of physician mortality rates might lead to risk-aversive behavior by physicians in the treatment of high-risk patients.

Our study had several potential limitations. Despite multiple mailings, the response rate to our physician survey was 51%, down from a response rate of 65% in our 2003 survey. The response rate among patients was much higher. While a higher response rate among physicians would have been ideal, studies have demonstrated that response rates above 50% for mailed surveys, especially e-mailed surveys, are reasonable.[17] Nevertheless, it is possible that physicians who chose not to participate in the study may have different opinions than those who responded. Because we were interested in examining changes in opinions over time, we surveyed cardiologists who have been in practice for at least 10 years and not those who graduated more recently and may have had different opinions. There could have been a bias by selecting physicians who have been in practice longer. Unfortunately, the raw data from the 2003 survey was not available to adjust for potential confounding between 2003 and 2016 responses in a multivariable model. In regards to the patient survey, all respondents were from Rochester, New York, and the surrounding areas. It is possible that patients in this region feel differently about the NYS scorecards than the rest of the NYS residents.

Conclusions

Although NYS public reporting policy changes seem to have had a positive effect of increasing the performance of PCI in one subset of cardiogenic shock patients, most physicians continue to disagree with the premise that publicly reported physician PCI mortality rates are an accurate measure of

physician quality, are useful for the public, or improve patient care. These attitudes can lead to risk-aversive behavior by physicians in the care of high-risk patients.[18] There are data to suggest that publicly releasing performance data may stimulate quality improvement at the hospital level, but the overall effect on effectiveness, safety, and patient-centeredness remains unclear.[19] In conclusion, as public reporting of outcome data continues to grow in scope, we think it is crucial that investigators continue to assess the impact of such reporting on physicians and patients to help better accomplish the meritorious goals of improving public health and patient awareness.

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Disclosures

None.

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Patient and Physician Perspectives on Public Reporting of Mortality Ratings for Percutaneous Coronary Intervention in New York State

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Supplemental Table: Multivariable ordinal logistic regression analysis of responses by different physician characteristics

	ACCURATE		USEFUL	
	OR (95% CI)	**p**	**OR (95% CI)**	**p**
Age	1.06 (0.98 - 1.14)	0.17	1.00 (0.93 - 1.08)	0.99
NYC (Yes)	1.55 (0.75 - 3.23)	0.24	1.43 (0.71 - 2.87)	0.31
Board Certified	1.26 (0.41 - 3.88)	0.69	1.63 (0.56 - 4.71)	0.37
Years in Practice	0.96 (0.88 - 1.04)	0.28	1.02 (0.94 - 1.10)	0.65
Major Teaching	0.42 (0.21 - 0.83)	0.013	0.43 (0.23 - 0.81)	0.010
Case Load	1.00 (0.99 - 1.00)	0.014	1.00 (1.00 - 1.00)	0.57

	BENEFIT		IMPROVE	
	OR (95% CI)	**p**	**OR (95% CI)**	**p**
Age	0.98 (0.91 - 1.05)	0.56	0.99 (0.92 - 1.06)	0.75
NYC (Yes)	0.78 (0.40 - 1.56)	0.49	1.48 (0.74 - 2.97)	0.27
Board Certified	1.17 (0.41 - 3.28)	0.77	1.65 (0.57 - 4.77)	0.35
Years in Practice	1.03 (0.96 - 1.11)	0.44	1.03 (0.95 - 1.11)	0.45
Major Teaching	0.82 (0.44 - 1.53)	0.53	0.41 (0.21 - 0.77)	0.006
Case Load	1.00 (1.00 - 1.00)	0.65	1.00 (0.99 - 1.00)	0.16

	2008DEC		REIMBURSEMENT	
	OR (95% CI)	**p**	**OR (95% CI)**	**p**
Age	0.95 (0.88 - 1.02)	0.19	0.99 (0.91 - 1.08)	0.79
NYC (Yes)	1.03 (0.52 – 2.04)	0.94	2.01 (0.94 – 4.32)	0.07
Board Certified	0.9 (0.32 – 2.52)	0.84	2.43 (0.62 – 9.51)	0.2
Years in Practice	1.03 (0.96 - 1.11)	0.4	1.03 (0.95 - 1.12)	0.46
Major Teaching	0.91 (0.49 - 1.69)	0.76	0.50 (0.24 - 1.02)	0.06

Case Load	1.00 (1.00 - 1.00)	0.59	1.00 (1.00 - 1.00)	0.55

	MDPANEL		2010ANOXIC	
	OR (95% CI)	**p**	**OR (95% CI)**	**p**
Age	1.00 (0.93 - 1.09)	0.92	0.96 (0.89 - 1.03)	0.25
NYC (Yes)	0.97 (0.46 – 2.07)	0.94	0.94 (0.47 – 1.85)	0.85
Board Certified	2.25 (0.77 – 6.55)	0.14	0.46 (0.16 - 1.32)	0.15
Years in Practice	0.99 (0.91 - 1.07)	0.75	1.04 (0.96 - 1.12)	0.33
Major Teaching	1.60 (0.82 – 3.14)	0.17	0.8 (0.43 - 1.5)	0.49
Case Load	1.00 (1.00 - 1.01)	0.17	1.00 (1.00 - 1.01)	0.38

	2015SHOCK	
	OR (95% CI)	**p**
Age	0.97 (0.91 - 1.05)	0.49
NYC (Yes)	1.06 (0.54 - 2.12)	0.86
Board Certified	0.53 (0.19 – 1.51)	0.24
Years in Practice	1.03 (0.95 - 1.01)	0.48
Major Teaching	0.95 (0.51 – 1.78)	0.87
Case Load	1.00 (1.00 - 1.00)	0.58

Accurate	Mortality statistics provide an accurate measure of physician quality
Useful	Mortality statistics provide information that is useful for the public in terms of selecting a physician or hospital for angioplasty
Benefit	Public reporting of physician-specific mortality rates may result in some patients who might benefit from the procedure not receiving the angioplasty
Improve	The New York State Angioplasty Report serves to improve patient care in NYS
2008Dec	NYS' decision in 2008 to exclude patients with cardiogenic shock (SBP <80mmHg or low cardiac index (<2.0L/min/mw) from public reporting has made you more likely to perform angioplasty on patients with cardiogenic shock
Reimbursement	Mortality statistics should be used to help determine individual physician and hospital reimbursement levels
MDpanel	Creation of a physician panel to review all post-PCI deaths and exclude those deemed not to be procedure-related from public reporting would improve the quality of the reporting system
2010Anoxic	Creation of a physician panel to review all post-PCI deaths and exclude those deemed not to be procedure-related from public reporting would improve the quality of the reporting system
2015Shock	Do you feel NYS' 2015 new definitions for cardiogenic shock where Cardiogenic Shock is still included in public reporting analyses will make you less likely to perform angioplasty