

# Procedural Quality

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# Contents

- Continuous Quality Improvement (CQI)
- Quality Monitoring and Reporting (NCDR/CathPCI)
- Benchmarking
- Performance review



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# Continuous Quality Improvement (CQI)

- CQI is an iterative method to evaluate operational approaches and remedy deficiencies
- CQI should be an essential component of each PCI program
- Primary emphasis-
  - Evaluation of program structure, processes, outcomes of care
  - Evaluation of individual operator quality

[SCAI standards for QI in Interventional Cardiology Part 1 Klein L et al 2011 ACCF/ACA/SCAI PCI guidelines](#)



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## 5 elements of CQI program

1. Identification of quality indicators
2. Systematic data collection using standard definitions
3. Data analysis with benchmarking to determine areas for improvement
4. Development of plan to correct deficiencies
5. Systematic repeat data collection to determine effect of corrective action

Klein LW et al. CCI. 2011;77(7):927-35



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# CQI Committee

- **Composition**

- Cardiac Cath Lab (CCL) Director
- CCL Administrative Director
- Interventional and Non-Interventional Cardiologists
- CCL administrator/manager and staff

- **Objectives**

- **PCI quality indicators**- identification and monitoring
- **Performance assessment** (for-cause review, random case review)
- **Serious adverse event review** (Morbidity and Mortality Conference)



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# Quality Indicators

- **Quality metrics**

- Support **self assessment and quality improvement at the local** (provider, hospital, and/or health care system) **level**
- Examples include completeness of documentation and angiographic quality

- **Performance measures**

- Include process, structure, efficiency or outcome measures
- Developed by ACC/AHA task force using defined criteria and some are endorsed by the NQF
- **Suitable for external comparisons, public reporting and possibly pay-for-performance**
- Examples include risk-adjusted mortality, bleeding and discharge medications post-PCI

[2008 ACC/AHA classification of care metrics](#)

[2014 ACC/AHA performance measures for PCI](#)

[2017 STEMI and NSTEMI performance measures](#)



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# Quality Monitoring and Reporting

- **NCDR**

- QI resource developed by ACC in 1997
- Collects and reports data to measure and compare quality of cardiovascular care with help of registries

- **CathPCI registry**

- Assesses characteristics, treatments and outcomes of patients undergoing diagnostic coronary angiography & PCI
- Measures adherence to guidelines, performance standards and appropriate use criteria for coronary revascularization

[Link to NCDR CathPCI registry](#)



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# Quality assessment for diagnostic cardiac catheterization

- Quality assessment is also important for diagnostic cardiac catheterization cases
- Many facilities do not report diagnostic cath data to NCDR due to logistic reasons such as case volume and cost of data abstraction
- Internal review, self assessment and monitoring trends then become key to ensure quality documentation, reduction of access site complications, angiographic quality and tracking percentage of normal studies



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# Benchmarking

- A benchmark is a standard or point of reference against which things may be compared or assessed
- Comparison with benchmarks (**benchmarking**) allows for assessment of performance relative to other institutions
- Benchmarking must be **risk-adjusted** for certain outcome measures to account for patient characteristics, complexity and type of procedures
- NCDR provides quarterly risk-adjusted benchmark reports to compare an institution and operator's performance with other institutions/operators

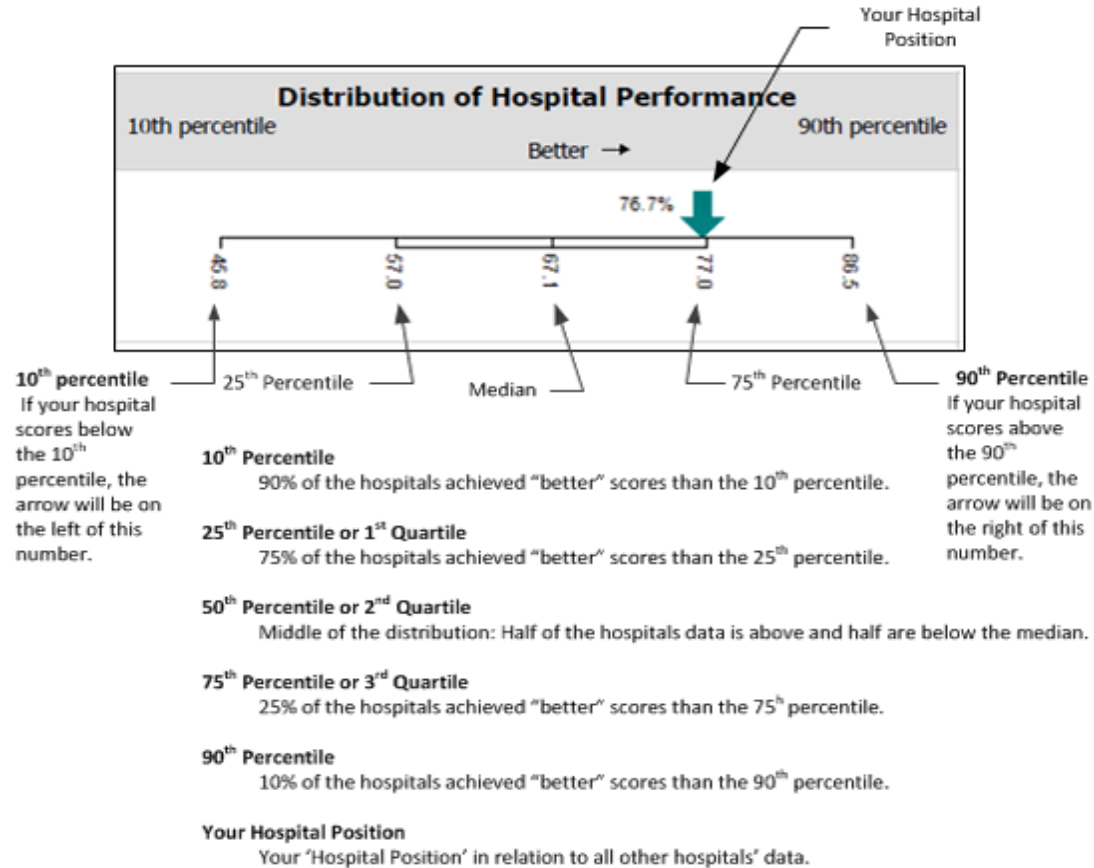


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# Interpretation of NDCR reports

## Interpreting Box and Whisker Plots



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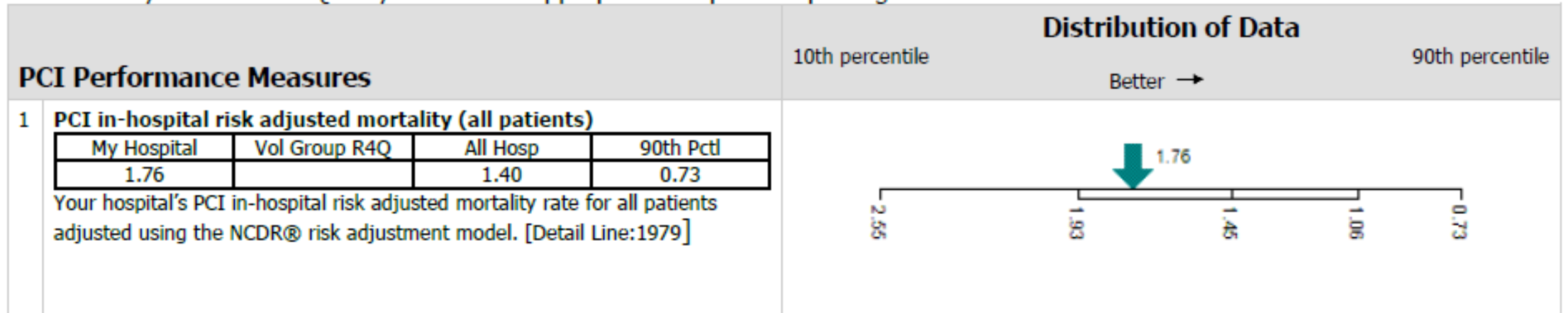
# Executive Summary

CathPCI Registry®

compared to Rolling Four Quarters (R4Q) for All Hospitals ending 2010Q3

## Section I: PCI Performance Measures

Endorsed by the National Quality Forum and appropriate for public reporting



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# Sample Report from NCDR

Executive Summary Metrics						
Metric Name	My Hospital 2018Q1		US 50th Pct 2017Q4	Metric Name	My Hospital 2018Q1	US 50th Pct 2017Q4
<b>PCI Performance Measures</b>						
1 - PCI in-hospital risk adjusted mortality (all patients)	3.36	▼	2.03			
38 - Composite: Discharge Medications in Eligible PCI Patients	99.2	▲	96.9			
40 - PCI In-Hospital Risk Standardized Bleeding (all patients)	2.95	▼	2.81			
<b>PCI Process Metrics</b>				<b>PCI Outcome Metrics</b>		
2 - Proportion of elective PCIs with prior positive stress or imaging study	38.89	▼	66.91	12 - Emergency CABG post PCI	0.0	0.0
3 - Median time to immediate PCI for STEMI patients (in minutes)	65	▼	60	13 - Proportion of PCI procedures with a post procedure MI (among hospitals routinely collecting post-PCI biomarkers)		0.00
4 - Proportion of STEMI patients receiving immediate PCI w/in 90'	85.71	▼	95.14	14 - Proportion of PCI procedures with post procedure MI (among hospitals who do not routinely collect post-PCI biomarkers)	0.00	0.00
5 - Median time from ED arrival at STEMI transferring facility to ED arrival at STEMI receiving facility among transferred patients.	88	▼	75	16 - Proportion of PCI procedures with post procedure stroke	0.10	▲
6 - Median time from ED arrival at STEMI transferring facility to immediate PCI at STEMI receiving facility among transferred patients (in minutes)	123	▼	106	17 - Composite: Proportion of PCI patients with death, emergency CABG, stroke or repeat target vessel revascularization.	3.01	▼
7 - Median fluoro time (in minutes)	12	▼	10	18 - PCI in-hospital risk adjusted mortality (patients with STEMI)	5.78	▲
8 - Proportion of patients with aspirin prescribed at discharge	100.0	▲	99.3	19 - PCI in-hospital risk adjusted mortality (STEMI patients excluded)	2.54	▼
9 - Proportion of patients with a P2Y12 inhibitor prescribed at discharge	99.8		99.8	25 - Proportion of PCI procedures with transfusion of whole blood or RBCs	2.32	▼
10 - Statins prescribed at discharge	99.4	▲	97.8	39 - PCI in-hospital risk adjusted acute kidney injury (all patients)	3.23	▲



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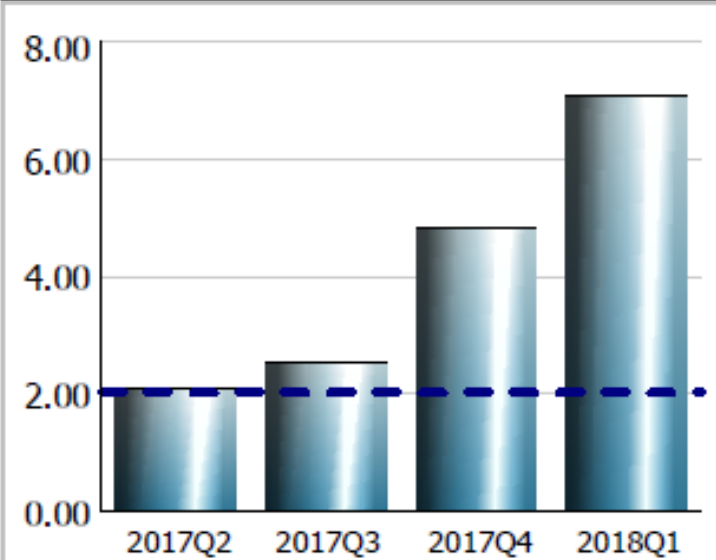
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# Rolling 4 Quarter Reports

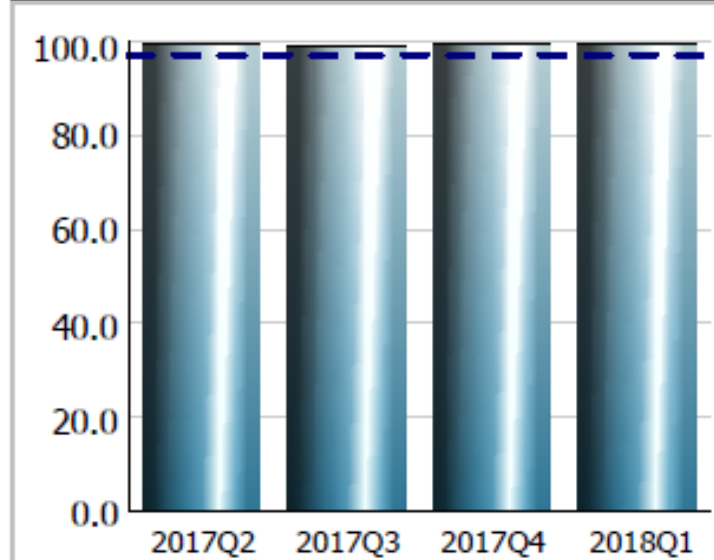
## PCI Performance Measures

■ My Hospital Quarterly Metric      - - - US Hospital 50th Percentile

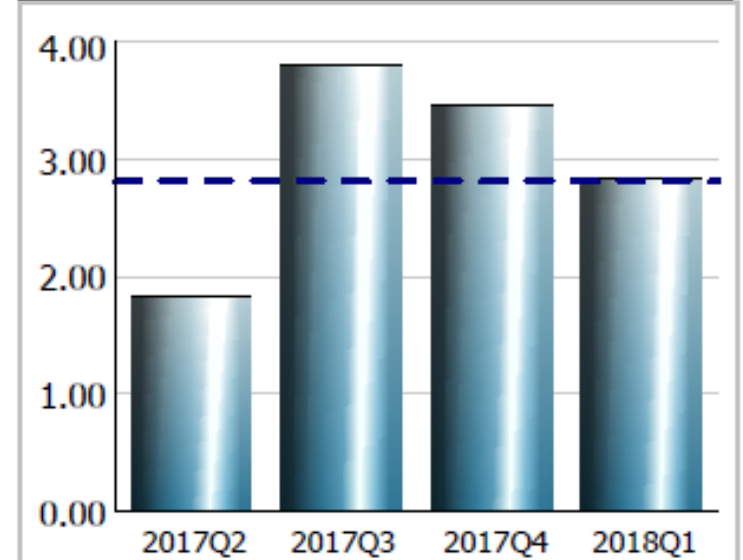
1 - PCI in-hospital risk adjusted mortality (all patients)



38 - Composite: Discharge Medications in Eligible PCI Patients



40 - PCI In-Hospital Risk Standardized Bleeding (all patients)



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# Troubleshooting sub-optimal performance measures

- **Outlier values are opportunities to learn. They might represent:**
  - Actual poor performance
  - Unusual cases
  - Misinterpretation of physician documentation or incomplete documentation
  - Incomplete data entry by abstractors
- **Can improve quality by:**
  - Shifting the curve by improving performance on every case by a little bit
  - Reviewing unusual behavior, e.g., performing elective PCI on intermediate lesion without documented ischemia
  - Accurate, complete documentation and physician oversight to help data abstractors



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# Thresholds for Concern

- Hospital performance below the 25<sup>th</sup> percentile of event rate for all US hospitals reporting to CathPCI Registry
- Example
  - Post-PCI Risk Adjusted All-Cause Mortality (RAM)
    - 50th percentile or median: 1.83%
    - 10th percentile: 3.17%   ■ 25th percentile: 2.47%   ■ 75th percentile: 1.37%
    - 90th percentile: 1.01%
- Important to look at quarterly trends, in addition to rolling quarters, to identify early changes that can be addressed proactively
- After interventions are undertaken, look at change in outcome in the next quarter
- “Topping out”- difference in performance between the 10th and 90th percentile is small (98% rate of aspirin prescription on discharge vs. 99%) and likely clinically insignificant



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# CathPCI v.5

- The CathPCI Registry data collection form was updated to version 5 (v.5) in 2018
- **Key New Data Elements**
  - Details about the timing and type of mechanical support devices
  - Cumulative air kerma as a patient radiation-exposure parameter
  - Surgical turndown and patient refusal for surgery
  - Frailty assessment
  - Hypothermia details and timing
  - Details of out-of-hospital cardiac arrest
  - Assessment of fractional flow reserve (FFR) and instantaneous wave-free ratio (iFR) in all scenarios to identify ischemia-producing lesions and to support AUC for PCI

[SCAI Tip of the Month on CathPCI v.5](#)

[CathPCI v.5 form](#)

[CathPCI data dictionary v5.0](#)

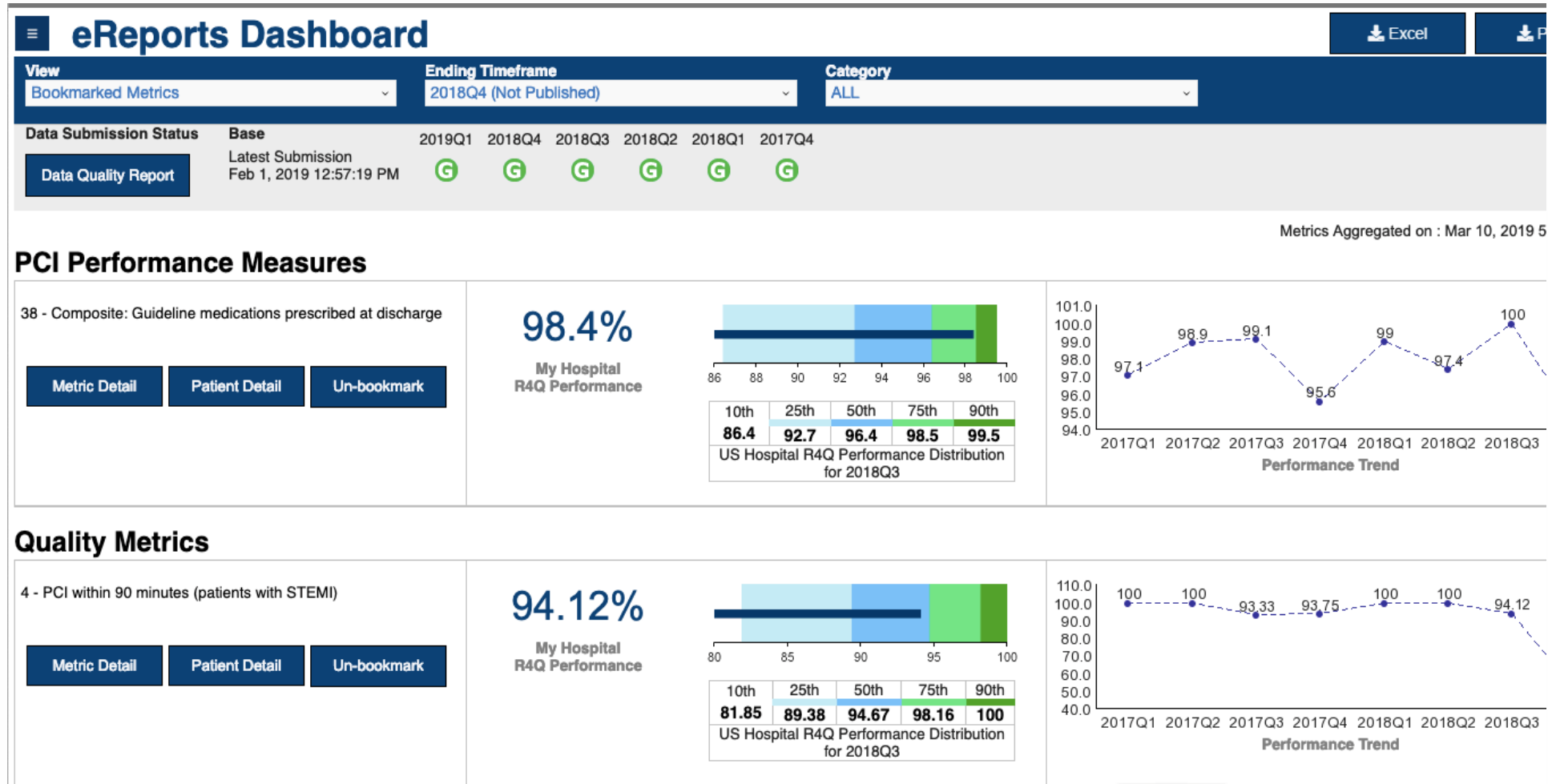


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# New Dashboard Design CathPCI v.5

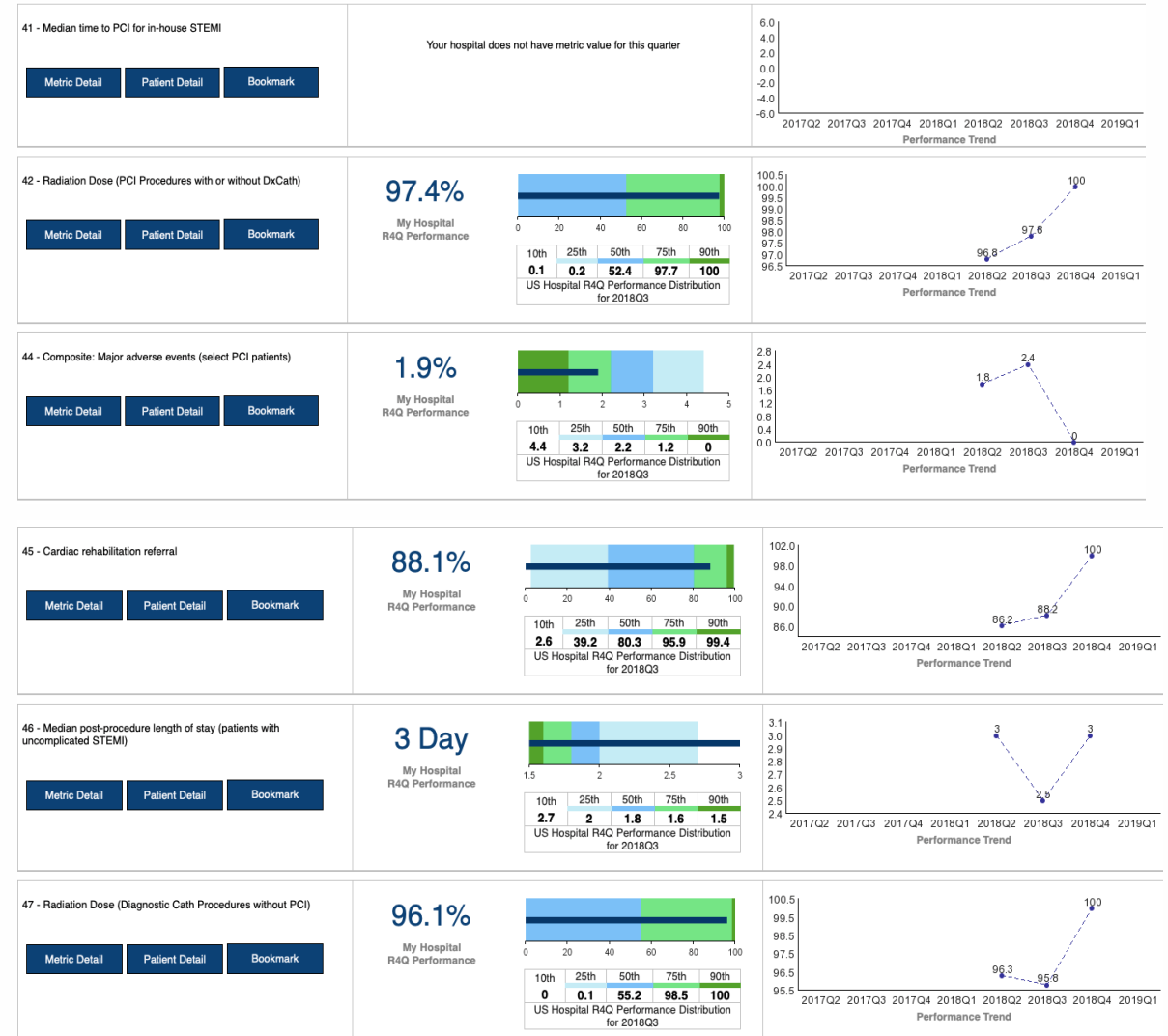


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# New CathPCI v.5 metrics and measures

- Median time to immediate PCI for in-house STEMI (in minutes)
- Proportion of PCI and diagnostic procedures in which all 3 radiation dose measurements were recorded
- Composite major adverse events post-PCI
- Proportion of PCI patients referred to cardiac rehabilitation at discharge
- Median post-procedure length of stay for PCI patients with uncomplicated STEMI (in days)
- Proportion of STEMI and NSTEMI-ACS patients prescribed high-dose statin at discharge



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# Performance and peer review

- Purpose and importance
  - Mechanism for process improvement
  - Quality remediation policies and records are reviewed by accrediting agencies, such as The Joint Commission (TJC), Accreditation for Cardiovascular Excellence (ACE) and Det Norske Veritas (DNV)
  - Required by ACGME, if site is a fellowship training program
  - Delivery of quality care may be taken into account for recertifying providers
- Robust policies are important to prevent legal action
- Adherence to policies should be ensured
- 4 Ps essential to peer review process
  - **Protection of Patients, Participants and Process**



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# Key Principles

- Engage all team members in quality goals and expectations
- Fair, rational and transparent quality assessment policies
- Clear definitions of complications
  - Definitions aligned with independent sources/references
  - NCDR CathPCI Registry, The Joint Commission standards
  - Independent chart abstractors collect information on post-discharge adverse events/ readmissions
- Clear definitions of performance issues
- Independent adjudication process, if necessary (e.g., review by outside entity)
- Independent/objective benchmarking
  - NCDR™ CathPCI Registry
  - HealthGrades
  - Accreditation for Cardiovascular Excellence (ACE)
- Private counseling of serious/persistent outliers
- Clear probation and termination policies



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## Ongoing Professional Practice Evaluation (OPPE)

Ongoing assessment of MD competency and behavior

Conducted by CCL Director or Quality Officer

Required by TJC<sup>1</sup>

Examples of criteria for evaluation- procedure outcome, morbidity and mortality data, length of stay, readmission

Data sources- chart review, direct observation, discussion with peers

Information used to determine whether to renew, limit, or revoke privileges

There should be a mechanism for evaluating the performance of the CCL Director as well

## Focused Professional Practice Evaluation (FPPE)

Required to evaluate competence for all privileges for new providers and newly requested privileges for existing practitioners , regardless of board certification/experience

Also performed when question arises regarding ability to provide safe, high-quality care

A corrective action plan is devised on the basis of a FPPE with need for follow-up regarding plan's efficacy

[TJC criteria for FPPE](#)



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# Random case review

- Written policy detailing review process mandatory
- Cases and reviewers selected randomly by CCL Director or designate
- 5-10% of cases per operator (suggested minimum 10 cases/year)
- Diagnostic and PCI cases included
- **Following are evaluated-**
  - Appropriateness based on AUC<sup>1</sup>
  - Quality of the angiogram
  - Intraprocedural decision making- conformity to guidelines
  - Procedural complications- prevention, recognition and management
  - Contrast and radiation use
  - Overall procedural results and areas for improvement
  - Completeness and accuracy of cath report and procedural documentation<sup>2</sup>

[<sup>1</sup>2017 AUC for SIHD](#)

[<sup>2</sup>2014 structured reporting](#)



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# Cath lab Morbidity, Mortality and Improvement Conference (MM&I)

- **Aim-** quality improvement rather than punitive
- **Objective-** Open review and assessment of complications following invasive cardiovascular procedures by a formal phase of care (pre-procedure, intra-procedure, post-procedure) analysis to achieve consensus regarding preventability of event
- **Types of events suitable for M&M**
  - In-lab death or death within 30 days of procedure
  - In-lab cardiac arrest
  - Emergency CABG
  - Stroke
  - Unanticipated PCI (for vessel dissection during cath, acute stent thrombosis)
  - Major vascular complication
  - Serious anaphylactoid reaction
  - Respiratory depression due to sedation, requiring intubation
  - Serious medication error, wrong procedure
  - Cases with excessive radiation and/or contrast resulting in skin damage/acute kidney injury



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# Suggested format for MM&I

- Should occur at least quarterly
- Case MD should ideally be present
- Begins with announcement “MM& I are medico-legally confidential. All the data and conclusions of this conference are not to be discussed outside of this conference except as part of a performance improvement project.”
- Case presentation, chronology of hospital course
- In-depth and evidence based hypothesis
  - Identify all major quality concerns potentially resulting in adverse outcome
  - Identify potentially contributory structural and process issues
  - Root cause analysis identifying all major contributing causes using fish-bone diagram
- Assign level of care based on standardized grading criteria
- Propose solutions and process improvements



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Question 1- Your CCL QI committee asks you to review the following NCDR data for your facility with regard to PCI in-hospital risk adjusted mortality.

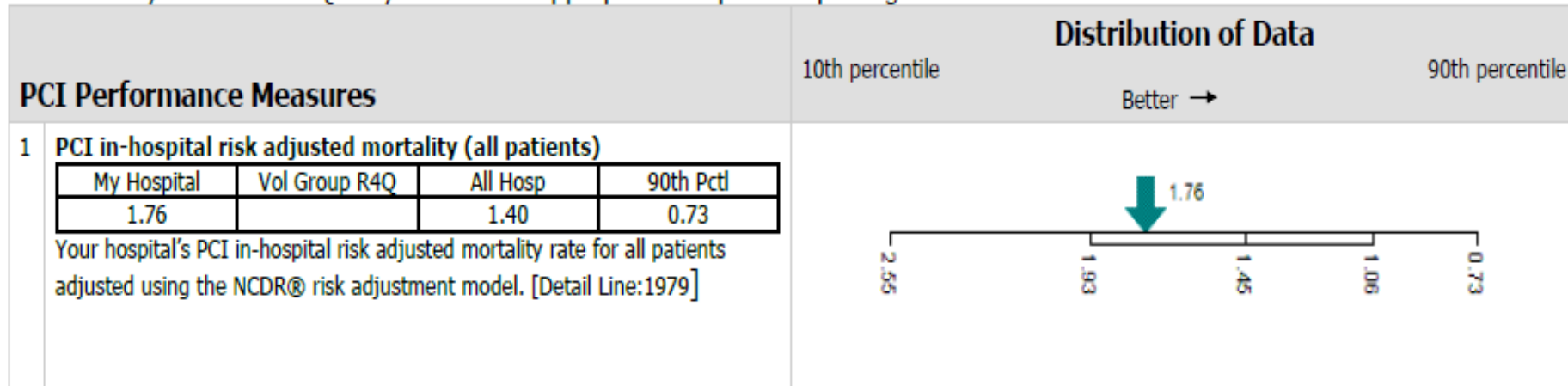
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(Question 1) Based on the metrics and benchmark presented, what will be your advice to the CCL QI committee?

- a. Your facility's PCI in-hospital risk-adjusted mortality (RAM) is below the 25<sup>th</sup> percentile and the committee should immediately initiate a root-cause analysis.
- b. Your facility's PCI in-hospital RAM is likely inaccurate, and you recommend looking at the observed mortality as a better indicator.
- c. Your facility's PCI in-hospital RAM is below the 50<sup>th</sup> percentile; you recommend reviewing mortality cases from the last quarter to better understand the report.
- d. Your facility's PCI in-hospital RAM is above the 50<sup>th</sup> percentile; you recommend to reviewing mortality cases from the last four quarters to better understand the report.
- e. Your facility's PCI in-hospital RAM is above the 25<sup>th</sup> percentile, you recommend to move on with next item in agenda.



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## Correct answer- c

- Looking at the display graphic, the facility's 2010Q3 (third quarter of year 2010) RAM falls within the "brackets", which represent the 25<sup>th</sup>-75<sup>th</sup> percentile margins, but is closer to the 25<sup>th</sup> percentile, and corrective actions may need to be taken once more information is available about the specific cases (mortality is one of the metrics can be looked into detail because of the limited number of cases which need review, compared, for example, with radiation dosing that requires review of all cases). Answer **a** is therefore incorrect.
- Answer **b** is also incorrect, because the observed mortality does not take into account predicted mortality based on patient risk. On the other hand, the risk-adjusted mortality is the ratio of observed divided by expected mortality, and this ratio tends to decrease once severity of illness is included.
- Answer **d** is incorrect as the facility is below the 50<sup>th</sup> percentile- the middle bar of the bracket.
- Answer **e** is contrary to the basic principles of data analysis, benchmarking and instituting corrective actions.



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Question 2-Your CCL QI committee is trying to determine the cause for an unexpectedly high PCI in-hospital risk-adjusted mortality (RAM). Which of the following are possible explanations?

- a. Your facility's PCI in-hospital RAM is accurate. A new operator had had a higher than expected PCI mortality; a focused professional practice evaluation (FPPE) should be considered.
- b. Your facility's PCI in-hospital RAM is inaccurate. The cath lab data abstractor was away for a month and a substitute abstractor was entering data in his absence.
- c. Your facility's PCI in-hospital RAM is accurate, however there was an unusual number of extremely ill patients that render the RAM formula less precise.
- d. Your facility's PCI in-hospital is RAM is inaccurate; there was incomplete and missing data entry by some physicians.
- e. All of the above



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## Correct answer- e

- This question highlights the need for quarterly review of data outliers with the cath lab quality team and accurate capture of risk to ensure valid comparisons against benchmarks.
- Option **a** represents the effect on an outlier on a quality metric. Recognition and appropriate corrective action is required in this case.
- Option **b** emphasizes the importance of accurate data entry by a data abstractor who is very familiar with the facility and its health professionals and electronic medical record (EMR).
- Option **c** is a sobering reminder that RAM formulas sometimes do not reflect the actual expected mortality in high acuity cases. Some facilities can have RAM < 50<sup>th</sup> percentile and still be providing above average care to a higher proportion of very sick patients, whereas other facilities can have > 50<sup>th</sup> percentile RAM due to avoidance of high acuity cases.
- Option **d** is probably the most common reason for inaccurate RAM, specially when the EMR does not allow direct data element collection (requiring data abstractors to review consultations, progress notes, operative reports, etc, looking for data elements which accurately reflect acuity and complexity of treated patients).



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### Question 3-Regarding professional practice evaluation, which statement is FALSE?

- a. OPPE is periodic assessment of physician competency and behavior with defined areas of assessment and evaluation.
- b. In the peer review process, the CCL QI committee must behave equitably and transparently to ensure fairness to the operator, quality for the patient, and credibility for the committee.
- c. FPPE is performed regularly for every physician, with clear criteria for evaluation and use of an external source if required.
- d. Random case review should evaluate quality indicators such as procedure appropriateness, quality of angiogram, decision making process, radiation and contrast use, documentation and complication prevention and management.
- e. High rates of adverse events identified in random reviews, longer length of stays, pattern of unnecessary procedures or sentinel events can trigger a FPPE.



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## Correct answer-c

- Ongoing professional practice evaluation (OPPE) is performed for every physician, including the medical director of CCL, with clear criteria for evaluation, transparency and independent objective benchmarking. This is different from a focused professional practice evaluation (FPPE), which is triggered for high rates of adverse events identified in random reviews, longer length of stays, pattern of unnecessary procedures or sentinel events. It is also performed for new providers and when a provider wishes to add new privileges. A FPPE must have clear criteria for evaluation, monitoring plan, duration of supervision of performance and external reviewers used if required. There should be clearly defined and objective medical staff bylaws and CCL policy regarding how this information can be used to renew, limit, or revoke privileges.
- Options **b** and **d** summarize the non-punitive and fair aspect of peer review (Protection of Patients, Participants and Process) and elements included in random case review, respectively.



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#### Question 4-Regarding Cath Lab MM&I, which statement is FALSE?

- a. It is a non-punitive and confidential review and assessment of complications (both in-hospital and within 30 days) following invasive cardiovascular procedures by a formal phase of care (pre-procedure, intra-procedure, post-procedure) analysis to achieve consensus regarding preventability of event.
- b. Should be performed at least quarterly and physician involved in case should ideally be present.
- c. It is an open forum, and participants are encouraged to discuss details and findings with others to improve outcomes and prevent future complications.
- d. Types of events suitable for an M&M conference include serious medication error, excessive radiation or contrast leading to patient risk or harm.
- e. The purpose of MM&I is non-punitive quality improvement, with a proposed plan for improvement to prevent future similar adverse events.



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## Correct answer-c

- Adverse event review or MM&I conferences are commonly used during medical training as an educational tool. There may be a misconception that their purpose is to target or blame the individuals involved in a case. Instead, MM&I is non-punitive and meant to improve care through a systematic analysis of the procedure (pre, intra and post). There should be a clear performance plan for improvement or policy changes with follow up to determine the effectiveness of the plan. It is not an “open forum”; rather it is strictly confidential. The data and conclusions of this conference are not to be discussed outside of this conference, except as part of a performance improvement project.



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Question 5- Your CCL QI committee reviews the last quarter NCDR report and there is a significant increase in the risk adjusted bleeding of PCI cases as well as an increase in the proportion of acute kidney injury (AKI). Which of the following represents a quality metric as opposed to a performance measure regarding these data analysis?

- a. Percentage use of ultrasound to get vascular access.
- b. Percentage of radial cases in the cath lab.
- c. Percentage of proper documentation of BMI and eGFR.
- d. Percentage of use of evidence-based hydration protocol .
- e. All of the above.



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## Correct answer-e

- While the importance of performance measures and quality metrics is known, the difference between them is sometimes not quite clear. Both are measurements or metrics; however only performance measures are suitable for public reporting, external comparisons, and possibly pay-for performance programs. Risk adjusted bleeding risk and rates of AKI are both performance measures. All the options mentioned in the question, however, are quality metrics that can be used internally at the local level for self-assessment and improve quality. Eventually some of these can become performance measures. For instance, radial access has been shown to lower major bleeding, vascular complications, acute kidney injury and mortality, and in the future, may be included as a performance measure.



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