Procedural Quality
Continuous Quality Improvement (CQI)

- CQI should be an essential component of each PCI program\(^1,2\)

- CQI is an iterative method to evaluate operational approaches and remedy deficiencies

- Primary emphasis:
  - Evaluation of program structure, processes, outcomes of care
  - Evaluation of individual operator quality

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

CQI Committee

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

Objectives
- Identification and monitoring of PCI quality indicators
- Performance assessment (for-cause review, random case review)
- Serious adverse event review (Morbidity and Mortality Conference)
Performance measures
- Process, structure, efficiency, or outcome measures
- Developed by ACC/AHA task force using defined criteria
- Suitable for public reporting and external comparisons
- Examples reported by NCDR CathPCI registry include risk-adjusted mortality, bleeding and discharge medications post-PCI

Quality metrics
- Support self assessment and quality improvement at the local (provider, hospital, and/or health care system) level
- Examples include completeness of documentation (cath/PCI indication, radiation and contrast) and angiographic quality

Bonow RO et al. ACC/AHA classification of care metrics. JACC. 2008 Dec 9;52(9):2113-7
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
- SCAI partners with ACC for CathPCI registry

[Link to NCDR CathPCI registry]
Quality assessment is also important in diagnostic cardiac catheterization cases

Many facilities do not 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 becomes key to ensure quality documentation, reduction of access site complications, angiographic quality and tracking percentage of normal studies
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 with performance measures and quality metrics to compare an institution's performance with other institutions and national experience.
Interpretation of NDCR reports

Interpreting Box and Whisker Plots

Distribution of Hospital Performance

10th Percentile
If your hospital scores below the 10th percentile, the arrow will be on the left of this number.

25th Percentile

Median

75th Percentile

90th Percentile
If your hospital scores above the 90th percentile, the arrow will be on the right of this number.

10th Percentile
90% of the hospitals achieved “better” scores than the 10th percentile.

25th Percentile or 1st Quartile
75% of the hospitals achieved “better” scores than the 25th percentile.

50th Percentile or 2nd Quartile
Middle of the distribution: Half of the hospitals' data is above and half are below the median.

75th Percentile or 3rd Quartile
25% of the hospitals achieved “better” scores than the 75th percentile.

90th Percentile
10% of the hospitals achieved “better” scores than the 90th percentile.

Your Hospital Position
Your ‘Hospital Position’ in relation to all other hospitals’ data.

www.SCAI.org/QIT
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

<table>
<thead>
<tr>
<th>PCI Performance Measures</th>
<th>10th percentile</th>
<th>Distribution of Data</th>
<th>90th percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. PCI in-hospital risk adjusted mortality (all patients)</td>
<td></td>
<td>Better</td>
<td></td>
</tr>
<tr>
<td>My Hospital</td>
<td>1.76</td>
<td></td>
<td>1.40</td>
</tr>
<tr>
<td>Vol Group R4Q</td>
<td>1.40</td>
<td></td>
<td>0.73</td>
</tr>
<tr>
<td>All Hosp</td>
<td></td>
<td></td>
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<tr>
<td>90th Pctl</td>
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</tr>
</tbody>
</table>

Your hospital's PCI in-hospital risk adjusted mortality rate for all patients adjusted using the NCDR® risk adjustment model. [Detail Line:1979]
## Executive Summary Metrics

<table>
<thead>
<tr>
<th>Metric Name</th>
<th>My Hospital 2018Q1</th>
<th>US 50th Pctl 2017Q4</th>
<th>Metric Name</th>
<th>My Hospital 2018Q1</th>
<th>US 50th Pctl 2017Q4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PCI Performance Measures</strong></td>
<td></td>
<td></td>
<td><strong>PCI Outcome Metrics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 - PCI in-hospital risk adjusted mortality (all patients)</td>
<td>3.36</td>
<td>2.03</td>
<td>12 - Emergency CABG post PCI</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>38 - Composite: Discharge Medications in Eligible PCI Patients</td>
<td>99.2</td>
<td>96.9</td>
<td>13 - Proportion of PCI procedures with a post procedure MI (among hospitals routinely collecting post-PCI biomarkers)</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>40 - PCI In-Hospital Risk Standardized Bleeding (all patients)</td>
<td>2.95</td>
<td>2.81</td>
<td>14 - Proportion of PCI procedures with post procedure MI (among hospitals who do not routinely collect post-PCI biomarkers)</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>PCI Process Metrics</strong></td>
<td></td>
<td></td>
<td>16 - Proportion of PCI procedures with post procedure stroke</td>
<td>0.10</td>
<td>0.16</td>
</tr>
<tr>
<td>2 - Proportion of elective PCIs with prior positive stress or imaging study</td>
<td>38.89</td>
<td>66.91</td>
<td>17 - Composite: Proportion of PCI patients with death, emergency CABG, stroke or repeat target vessel revascularization.</td>
<td>3.01</td>
<td>2.82</td>
</tr>
<tr>
<td>3 - Median time to immediate PCI for STEMI patients (in minutes)</td>
<td>65</td>
<td>60</td>
<td>18 - PCI in-hospital risk adjusted mortality (patients with STEMI)</td>
<td>5.78</td>
<td>7.01</td>
</tr>
<tr>
<td>4 - Proportion of STEMI patients receiving immediate PCI w/in 90’</td>
<td>85.71</td>
<td>95.14</td>
<td>19 - PCI in-hospital risk adjusted mortality (STEMI patients excluded)</td>
<td>2.54</td>
<td>1.09</td>
</tr>
<tr>
<td>5 - Median time from ED arrival at STEMI transferring facility to ED arrival at STEMI receiving facility among transferred patients.</td>
<td>88</td>
<td>75</td>
<td>25 - Proportion of PCI procedures with transfusion of whole blood or RBCs</td>
<td>2.32</td>
<td>1.07</td>
</tr>
<tr>
<td>6 - Median time from ED arrival at STEMI transferring facility to immediate PCI at STEMI receiving facility among transferred patients (in minutes)</td>
<td>123</td>
<td>106</td>
<td>39 - PCI in-hospital risk adjusted acute kidney injury (all patients)</td>
<td>3.23</td>
<td>5.85</td>
</tr>
<tr>
<td>7 - Median fluoro time (in minutes)</td>
<td>12</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 - Proportion of patients with aspirin prescribed at discharge</td>
<td>100.0</td>
<td>99.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 - Proportion of patients with a P2Y12 inhibitor prescribed at discharge</td>
<td>99.8</td>
<td>99.8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 - Statins prescribed at discharge</td>
<td>99.4</td>
<td>97.8</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

[www.SCAI.org/QIT](http://www.SCAI.org/QIT)
Outlier values are opportunities to learn. They might represent:

- Actual poor performance
- Unusual cases
- Misinterpretation of physician documentation
- Incomplete data entry

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
**Thresholds for Concern**

- Hospital performance below the 25\textsuperscript{th} percentile of event rate for all US hospitals reporting to CathPCI Registry
- Example
  - Post-PCI Risk Adjusted Mortality (RAM)
    - 50th percentile or median: 1.83%
    - 10th percentile: 3.17%
    - 25th percentile: 2.47%
    - 75th percentile: 1.37%
    - 90th percentile: 1.01%
- Risk adjusted mortality > 2.47% suggests a consistent trend of poor outcome and needs to be immediately addressed
- After interventions are undertaken, look at change in outcome in the next quarter rather than wait for rolling four-quarter report
The CathPCI Registry was recently updated to version 5 (v.5). Data collection for v.5 started in July 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
New CathPCI v.5 metrics and measures

- Median time to immediate PCI for STEMI in-house patients (in minutes)
- Proportion of procedures where all three radiation dose measurements were recorded
- Median post-procedure length of stay for PCI patients with uncomplicated STEMI (in days)
- Proportion of STEMI and NSTE/ACS patients with high-dose statin prescribed at discharge
- Proportion of PCI patients referred to Cardiac Rehabilitation at discharge
- Composite: Proportion of PCI patients with death, emergency/salvage CABG (post-PCI), stroke or repeat target segment revascularization (all patients)
### PCI Performance Measures

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
<th>Description</th>
<th>Performance Trend</th>
<th>Data Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>38 - Composite: Guideline medications prescribed at discharge</td>
<td>98.4%</td>
<td>My Hospital R4Q Performance</td>
<td><img src="image1.png" alt="Performance Trend" /></td>
<td><img src="image2.png" alt="Data Distribution" /></td>
</tr>
</tbody>
</table>

**Quality Metrics**

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
<th>Description</th>
<th>Performance Trend</th>
<th>Data Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 - PCI within 90 minutes (patients with STEMI)</td>
<td>94.12%</td>
<td>My Hospital R4Q Performance</td>
<td><img src="image3.png" alt="Performance Trend" /></td>
<td><img src="image4.png" alt="Data Distribution" /></td>
</tr>
</tbody>
</table>
New v.5 Metrics

41 - Median time to PCI for in-house STEMI

Your hospital does not have metric value for this quarter

42 - Radiation Dose (PCI Procedures with or without DxCath)

97.4%

My Hospital R4Q Performance

10th 25th 50th 75th 90th
0.1 0.2 52.4 97.7 100

US Hospital R4Q Performance Distribution for 2018Q3

44 - Composite: Major adverse events (select PCI patients)

1.9%

My Hospital R4Q Performance

10th 25th 50th 75th 90th
4.4 3.2 2.2 1.2 0

US Hospital R4Q Performance Distribution for 2018Q3
New v.5 Metrics

45 - Cardiac rehabilitation referral

88.1%

3 Day

96.1%

46 - Median post-procedure length of stay (patients with uncomplicated STEMI)

47 - Radiation Dose (Diagnostic Cath Procedures without PCI)
Performance assessment
Why have performance review?

- CCL director ultimately answers for quality...
  - Physicians
  - Nurses
  - Technicians
  - Other allied health staff
- Mechanism for process improvement
- Quality remediation practices, policies, and records are reviewed by accrediting agencies such as The Joint Commission (TJC), ACE, DNV
- Required by ACGME if a fellowship training program
- Robust policies important to prevent legal action
- Adherence to policies should be ensured

...but everyone is responsible for quality
Effective Remediation Begins With Clear Expectations

- **Fair and rational quality assessment policies**
  - Transparent assessment processes
  - Independent adjudication process if necessary (e.g., review by outside entity)

- **Independent/objective benchmarking**
  - NCDR™ CathPCI Registry
  - HealthGrades

- **Public/aggregate performance reporting**

- **Private counseling of serious/persistent outliers**

- **Clear probation and termination policies**

- **Delivery of quality care should be taken into account for recredentialling providers**
Engage all team members in quality goals and expectations

Clear definitions of “complications”
  - Definitions maintained by CCL director, aligned with independent sources/references
  - NCDR CathPCI Registry, The Joint Commission provide standards

Independent chart abstractors collect information on post-discharge adverse events/ readmissions

Clear definitions of “performance issues”

4 Ps essential to peer review process

Protection of Patients, Participants and Process
Ongoing Professional Practice Evaluation (OPPE)

- Ongoing assessment of MD competency and behavior
- Conducted by: CCL Director or Quality Officer
- The Joint Commission requirement¹
- Must be frequent i.e. more than once per year
- 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
- Mechanism for evaluating performance of CCL Director
Performance Issues

- Criteria for “performance issue”
  - High rates of operator related adverse events identified on random case review that may raise signal of performance issues/ competence
  - Patients with lengths of stay longer than other providers
  - Patterns of unnecessary testing/treatments
  - Failure to follow clinical practice guidelines
  - Frequent readmission → inadequate initial treatment
  - “Triggers”- sentinel events, infection rates

- The above will trigger a Focused Professional Performance Evaluation (FPPE)
Focused Professional Practice Evaluation (FPPE)

- Required to evaluate competence for all privileges for new applicants and all 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.

FPPE for new privileges
FPPE process design has 4 components:

1) Criteria for conducting an evaluation
2) Method of establishing a monitoring plan specific to the area of concern
3) Method of determining the duration of performance monitoring
4) Circumstances under which monitoring by an external source is required
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 (minimum 10/year)
- Diagnostic and PCI cases included

Following are evaluated-
- Appropriateness based on AUC\(^1\)
- Quality of the angiogram
- Intraprocedural decision making- conformity to guidelines
- Procedural complications- prevention and management
- Contrast and radiation use
- Overall procedural results and areas for improvement
- Procedural documentation\(^2\)

\(^1\)2017 AUC for SIHD
\(^2\)2014 structured reporting
Adverse event review
Cath lab M&M

- **Aim**
  - Quality improvement rather than punitive

- **Objective**
  - Open review and assessment of cath lab 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
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, stent thrombosis)
- Major vascular complications
- Serious anaphylactoid reaction
- Respiratory depression requiring reversal/intubation
- Medication error, verbal miscommunication, wrong patient/procedure
- Cases with excessive radiation (>5Gy) and excessive contrast/AKI
Suggested format for M&M

- Should occur at least quarterly
- Case MD should ideally be present
- Begins with announcement “M&M 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
  - Identify major contributing causes of each quality concern
  - Individual (provider) issues
  - Process/ systems issues
- Propose solutions and process improvements
Resources & Support

- SCAI QI Committee Assistance: Info@scai.org
- SCAI QIT Updates: http://www.scai.org/QIT/default.aspx
- SCAI QIT Tip of the Month: http://www.scai.org/QITTip/default.aspx