Cardiac Imaging in a New Value Paradigm

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Disclosure

• No financial disclosures
• Chair, Steering Committee
  ImageGuide™ (ASNC Imaging Registry)
Cardiac Imaging in a New Value Paradigm

• How did we get where we are today?
• What is quality?
• How does quality allow us to change the discussion?
• Utilization of quality data going forward
Cardiac Imaging in a New Value Paradigm

• How did we get where we are today?
• What is quality?
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• Utilization of quality data going forward.
Escalating Healthcare Costs

- Medicare fee-for-service spending for physician services grew by 73% - from $37 b to $64 b from 2000-2010
  - Growth in the volume & intensity of services


*Medicare Economic Index is a measure of inflation
Trends in Imaging Services

Medicare Part B Physician Payments -
Myocardial Perfusion SPECT (MPS), Echocardiography (Echo)*, Cardiac Catheterization (Cath), & Exercise Tolerance Testing (ETT)

*Current Procedural Codes: MPS (Myocardial Perfusion SPECT) = 78465, Echo (Echocardiography) = 93307, ETT (Exercise Tolerance Test) = 93015, Cath (Left Heart Catheterization) = 93510. Source: www.cms.gov/DataCompendium/.
Inpatient Imaging MedAxiom

HOSPITAL INPATIENT IMAGED STRESS PER CALCULATED CARDIOLOGIST

Decreased 83%

<table>
<thead>
<tr>
<th>Year</th>
<th>My Practice</th>
<th>Average All Practices</th>
<th>Median All Practices</th>
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<td>320</td>
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<td>2009</td>
<td>213</td>
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<td>2010</td>
<td>45</td>
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</tr>
<tr>
<td>2011</td>
<td>40</td>
<td>26</td>
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</tr>
<tr>
<td>2012</td>
<td>38</td>
<td>25</td>
<td>19</td>
</tr>
</tbody>
</table>
Outpatient Imaging MedAxiom

Outpatient imaged stress studies (office + HOPD) per calculated cardiologist. Includes Stress Echos, Nuclear, & PET (as of 2008).

Increased 13%
Population Trends From 2000-2011 in Nuclear Myocardial Perfusion Imaging Use

Age- and Sex-Adjusted Annual Rates of Nuclear Myocardial Perfusion Imaging Imaging Error bars indicate 95% confidence intervals

If you had to name the biggest challenge you face in your practice today, what would it be?

- Lower Medicare Reimbursement: 47.1%
- Prior Authorization: 23.8%
- Gov't. Regulation: 17.4%
- Access to New Technology: 5.9%
- Patient Load: 5.9%
ASNC 2013 Membership Survey Results

What ownership model do you currently practice in?

- Private Practice: 39.1%
- Hospital Employee: 31.2%
- Academic: 19.8%
- Integrated/Aligned System: 16.9%

If you are not integrated into or employed by a hospital, do you have plans to do so in the next year or two?

- No: 70.7%
- Yes: 29.3%
Response to the Cost Problem

• Reimbursement reduction
  – 2008 reimbursement adjustment
• Radiology benefits managers
• Appropriate Use Criteria
• MIPPA
  – Requirement for accreditation
  – Emphasis on quality
Cardiac Imaging in a New Value Paradigm

• How did we get where we are today?
• **What is quality?**
• How does quality allow us to change the discussion?
• Utilization of quality data going forward
Quality Definitions

• Webster’s Dictionary

  – quality

  – *noun* \ˈkwä-lə-tē\ : how good or bad something is
  – : a characteristic or feature that someone or something has : something that can be noticed as a part of a person or thing
  – : a high level of value or excellence
Quality Definitions

• Deming – father of modern quality movement
  – Quality is defined by the satisfaction of the customer
  – Quality is dynamic and ever changing
  – To maintain a quality reputation, successful organizations must constantly adapt to change
Quality Definitions

- U.S. Office of Technology Assessment:
  “the degree to which the process of care increases the probability of outcomes desired by the patient and reduces the probability of undesired outcomes, given the state of medical knowledge”

U.S. Congress, Office of Technology Assessment 1988,x.
Quality of Care Defined by the Institute of Medicine (IOM)

- **Timely**: Rapid diagnosis and treatment
- **Effective**: Use of the right drugs / procedures
- **Safe**: At the right dose and / or done right
- **Equitable**: For all eligible people
- **Patient centered**: Considers the risks, benefits and desires of the individual patient
- **Cost-effective**: Avoid over-treatment; Emphasize value
Measuring Quality

• Three major measures of quality
  – Structure
  – Process
  – Outcome

• Progressively more sophisticated
## Measuring Quality Healthcare

<table>
<thead>
<tr>
<th>Structure</th>
<th>Process</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Facilities / Equipment</td>
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<td></td>
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<tr>
<td>- Accreditation</td>
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<tr>
<td>- MD / Staff Certification</td>
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<tr>
<td>- Order Decision Aids</td>
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<tr>
<td>- Patient Decision Aids</td>
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<tr>
<td>- Shared Decision Making</td>
<td></td>
<td></td>
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<tr>
<td>- AUC</td>
<td></td>
<td></td>
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<tr>
<td>- Fully Optimized Dose Reduction Practices</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Timely &amp; Standardized Reporting</td>
<td></td>
<td></td>
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<tr>
<td>- Decision Support</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Patient Satisfaction / Preferences</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Improved QOL / Symptom Relief / Physical Functioning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- ↓ Decreased Hospitalizations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Improved Life Expectancy</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Berwick 1996
Goals of Quality Imaging

- **Improved Quality Healthcare**: Improve overall quality by making healthcare more patient-centered, reliable, accessible, & safe.
- **Effectiveness**: Improve population health by supporting proven tests & interventions.
- **Efficiency**: Reduce healthcare cost & improve timeliness.

Adapted from AMA / JCAHO National Summit on Overuse, Chicago, IL (Sept 2012).
Cardiac Imaging in a New Value Paradigm

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• How does quality allow us to change the discussion?
• Utilization of quality data going forward.
Changing the Discussion
The Quality Cycle

Monitor → Assess → Improve
Changing the Discussion
The Quality Cycle

 Monitor → Assess → Improve
Methods to Assess Quality

• External – Lab Accreditation
  – American College of Radiology
  – Intersocietal Accreditation Commission
    • Nuclear/PET
  – The Joint Commission

• Application includes data regarding:
  – Physicians and technologists
  – Image review
  – Report review
  – Site visits
Methods to Assess Quality

• Internal QA and QI projects
  – Required as part of accreditation process
  – Intra departmental processes
    • Next available appointment
    • Critical result reporting
    • Result availability
    • Report availability
Changing the Discussion
The Quality Cycle

Monitor → Assess → Improve
Methods to Improve Quality

• Guidelines
  – ASNC
  – SNMMI
  – ACC

• Standards
  – IAC: Nuclear/PET
  – ACR
Methods to Improve Quality

ASNC “Excellence in Imaging”

- A broad, multi-faceted program to drive high quality education & research to improve the practice of nuclear cardiology across the US.
- Designed to meet the needs of patients and the challenges of a reformed health care and payment system.
- Innovative education, tools and resources to support physicians and the entire nuclear cardiology imaging team.
- Improving the overall quality of nuclear cardiac imaging through:
  - continuous performance assessment
  - implementation of radiation safety protocols
  - adherence to appropriate use criteria
Quality Improvement Efforts

Examples

• Reporting
• Appropriate use
Report Quality

- Examined 18 reporting elements in 1,301 labs
- Based on ICANL accreditation standards
- Assessed demographic characteristics associated with compliance
- Lab status after review

<table>
<thead>
<tr>
<th>Status</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Granted</td>
<td>22%</td>
</tr>
<tr>
<td>Provisional</td>
<td>14%</td>
</tr>
<tr>
<td>Delay</td>
<td>64%</td>
</tr>
</tbody>
</table>

Tilkemeier, et al, JNC 2011
Reporting Elements

- Succinct impression 59 (4.5)
- Defect quantification 253 (19.4)
- Wall motion findings 77 (5.9)
- Indication 170 (13.1)
- Timeliness 85 (6.5)
- Nomenclature or standardization 71 (5.5)
- Signature 205 (15.8)
- Description of procedure 158 (12.1)
- Date of report 343 (26.4)

- Non-radioactive dose and route 125 (9.6)
- Exact dose 211 (16.2)
- Demographic items 17 (1.3)
- Separate reports 307 (23.6)
- Referring physician 115 (8.8)
- Age/birth date 108 (8.3)
- Gender 108 (8.3)
- Route of administration of the RP 296 (22.8)
- Typographical errors 69 (5.3)

Element N (percentage)
Characteristics of Labs
Average Number of Reporting Errors

• Location
  – Northeast - 1.6
  – Midwest – 1.7
  – South – 2.4
  – West – 3.3

• Type of Lab
  – Hospital – 1.6
  – Private office – 2.1
  – Multi-specialty – 2.2
  – Mobile – 4.2

• Larger volume labs perform better than small volume labs

Tilkemeier, et al, JNC 2011
Improving Reporting
Next Steps

• Development of tools and standards based on the guidelines
• Implementation of standards by manufacturers and clinical practices
• Integration of tools into clinical practice
Quality Improvement Efforts
Examples

• Reporting
• Appropriate use
Appropriate Use Criteria

• First published in 2005 for nuclear cardiology myocardial perfusion scans
• Revised and published in 2009
• Utilizes a modified Rand methodology to develop consensus for selected clinical settings resulting in classification as:
  – Inappropriate (Rarely appropriate)
  – Uncertain (Maybe appropriate)
  – Appropriate (Appropriate)
APPROPRIATE USE CRITERIA USING THE RAND/DELPHI METHODOLOGY

Writing Group

External Reviewers

Technical Panel

Implementation Working Group

Literature Review and Synthesis of the Evidence

List of indications and definitions

Outside Review of Indications and Additional Modification Prior to Rating

Balanced panel comprised of different types of experts rates the indications in two rounds

1st Round – No interaction

Face-to-Face Meeting

2nd Round – Panel interaction

Appropriateness Score

(7-9) Appropriate

(4-6) Possibly Appropriate/Uncertain

(1-3) Inappropriate

Retrospective comparison with clinical records

Prospective clinical decision aids

% Use that is Appropriate, Uncertain, Inappropriate

Increase Appropriateness

WHAT IS AN APPROPRIATE IMAGING STUDY?

An appropriate imaging study is one in which the expected incremental information, combined with clinical judgment, exceeds the expected negative consequences* by a sufficiently wide margin for a specific indication that the procedure is generally considered acceptable care and a reasonable approach for the indication.

*Negative consequences include the risks of the procedure (i.e., radiation or contrast exposure) and the downstream impact of poor test performance such as delay in diagnosis (false negatives) or inappropriate diagnosis (false positives).
APPROPRIATE USE CRITERIA

COMPLETED
✓ Nuclear cardiology (SPECT)-2005
✓ Cardiac CT/CMR-2006
✓ Echocardiography (TTE, TEE)-2007
✓ Echocardiography (Stress) -2007
✓ Coronary revascularization-2008
✓ Revised radionuclide imaging-2009
✓ Revised CT criteria-2010

✓ Revised echocardiography criteria -2010
✓ Diagnostic catheterization-2012
✓ Multi-modality criteria (with ACR)
  ◦ Heart failure

IN PROGRESS

▸ Multi-modality criteria (with ACR)
  ◦ Acute chest pain
▸ Peripheral vascular disease
▸ ICD/Biventricular pacemakers
Utilization of Appropriate Use Criteria

• Entry level point of care
• Progression to next level of care
• Understanding effect on outcome
Effect of Ordering MD

• PCP
  – Non-cardiac CT and MRI outpatient studies
  – 74% appropriate/26% inappropriate
  – 58% of appropriate studies were positive and affected outcomes
  – 13% of inappropriate studies were positive and affected outcomes

• Need for decision support tools

Lehnert BE, Bree RL, JACR 2010 March
Effect of Ordering MD

• Cardiac CT
  – No difference in exam appropriateness between PCP or cardiologists
  – Older providers (in practice > 25 years) ordered fewer appropriate and more inappropriate studies

• Need for knowledge dissemination and decision support tools at point of order

Murphy MK et al, JNC, 2010, Oct
Effect of Ordering MD

• Referral to angiography post MI
  – Cardiologists more appropriately referred complicated cases than PCP’s
  – Uncomplicated cases
    • Invasive more likely to rank as appropriate
    • Non-invasive/PCP less likely to rank as appropriate
    • On site cath/CABG – more likely to rank appropriate
    • New York or HMO employed – ranked angiography as less appropriate compared to others

• Need for decision support tools – practice variability

Effect on Outcomes

SPECT

• Inappropriate studies
  – More normal imaging studies
  – Lower summed stress scores
  – Abnormal imaging studies still present
    • Women 26%
    • Men 50%

• Appropriate studies
  – Women had more normal imaging studies and lower summed stress scores

Mehta R, JNC, 2008, May-June
Effect on Outcomes

MPI SPECT

• Preoperative evaluation
  – 39.8% were inappropriate
  – 6.25% post-op event rate – death, MI, stroke
• High risk group – AUC and functional class
  – Positive MPI – 50% event rate
  – Normal MPI – 14% event rate
• Low or Intermediate risk group – AUC and functional class
  – Abnormal MPI – 40%
  – Low risk event rate - 0%
  – Intermediate risk event rate - 4%
• Same event rates in inappropriate patients with normal or abnormal MPI

Koh AS, et al. JNC, 2012 April
Summary

• Selection and referral of appropriate populations of patients for testing
• Use of decision support tools to guide
  – Referring MD’s
  – Test selection
  – Treatment decisions
• Improved analysis and understanding of outcomes based on imaging results
Reducing Inappropriate Rates
Changing Behavior
“The Conversation”

- Will it reduce referrals from the source?
- Will it increase work for my office staff?
- Do I need to be the first one in the community to start having the conversation?
- Why can’t one of the junior partners do this?
- Can’t we just sneak it in and see what happens?
Leading Physician Behavior Change

• Between 1989 and 2000 – 3,969 guidelines were published

• Guideline implementation often fails

• AHRQ
  – 16 evidence based guidelines
  – Multi-million dollar effort
  – Little evidence of influence on behavior
Leading Physician Behavior Change

• Proven therapy utilization in cardiology
  – 25-68% variability
  – 55% adherence to evidence based care

• Use of data to drive change
  – Data presentation, registries and reminders
  – Interpersonal involvement more successful
  – Most effective if attitudinal change is not normatively driven

• Data alone is not enough
Guideline for Implementing Guidelines

• Major approaches:
  – Evidence Based Quality Assessment
  – Internal Processes and External Influences
  – Behavioral models
    • Stages of Change – Transtheoretical Model
So What Works?

• Education (99 RCT’s and Cochrane analysis)
  – CME alone – very little effect
  – Printed materials – small effect
  – Outreach with opinion leaders – additive effect

• Academic detailing (Cochrane analysis 18 trials)
  – Multi-factorial approach (written, conferences) – somewhat effective
  – Professional societies – most effective
Education Alone

• Grand Rounds presentation
• Staff newsletter
• Administrator meetings
• Dept/division presentations

So What Works?

• Reminders (42 RCT’s)
  – Effective on processes of care
    • Preventive measures
    • At time of care delivery

• Audit and feedback
  – Significant but minimal effect on utilization
    • 12 studies, p<0.05 for direction of effect
    • 8 studies, p<0.05 direct comparison groups
    • 5 studies, OR 1.091, CI 1.045 – 1.136
Utilization of Data

- Data analysis allows for targeted intervention
- Pre-op testing by anesthesia was an outlier
- Focused education

Reducing Inappropriate Rates

![Chart showing quality characteristic over samples with control limits: UCL = 10.860, Center line = 10.058, LCL = 9.256.](chart.png)
Reducing Inappropriate Rates

Inappropriate Test Rates by MD

Percent Inappropriate
So What Works?

• Guidelines (72 trials)
  – 55/59 demonstrated process improvements
  – 9/11 significant outcome improvements
  – 5/13 (38%) statistically significant differences in primary care
  – High degree of variability in results
So What Works?

• Economic Incentives
  – Performance bonuses work
    • 25.3% improvement due to documentation of immunization coverage
  – Fee for service compared to salaried
    • FFS - More visits /patient
    • FFS – more well visits
    • FFS – better continuity of care
So What Works?

• Combined interventions
  – Passive information dissemination ineffective
  – Small dose education ineffective
  – Guideline dissemination effective but source important
  – Disparate results for any one method
  – Multiple methods are most effective
Multi-Center Approach

- Internal analysis, group meetings, education prioritized by management — Site 1
- No active review or educational sessions — Sites 2-4

ACC FOCUS Voluntary Community

p<.0001 (n = 53) for change in inappropriate testing from pre to post intervention
FOCUS: Cardiovascular Imaging Strategies

POTENTIAL SAVINGS

• Replace inefficient utilization control with more efficient utilization control

• Reduce /realign 2 – 3 FTE currently devoted to third party authorization

• Reduce costs of utilization management from $.30 - $1.00 PMPM to $.06 - .08 PMPM

• Save or better utilize $271,000,000 - $926,400,000 currently spent on third party control
Having “The Conversation”

• Gather the data
  – Know the referring baseline information
  – Develop a plan to implement change

• Senior partner/knowledge expert
  – Respected opinion leader in the community
  – Guidelines available for reference (FOCUS handout)

• Goal Alignment
  – Financial incentives for all
  – Improved outcomes by working together
  – Transparent data sharing

• Varied approach for each constituency
Reducing Inappropriate Rates

"The kid's good."
Changing the Discussion
The Quality Cycle

Monitor → Assess → Improve → Monitor
Monitoring Quality

- Tool development to allow continuous assessment
- Part of the routine department workflow
- Research participation
- Registry participation
“Degree to which health care services increase the likelihood of desired health outcomes and are consistent with current professional knowledge”

- Are we doing the right things? (evidence)
- Are we doing the right things right? (application)
- Are our patients better off for it? (outcomes)
Role of Registries in the Development and Implementation of Evidence

- **Disease characterization and surveillance**
  - Community-based event rates

- **Clinical and comparative ‘effectiveness’**
  - Real world look at therapy’s benefits, risks and costs

- **Quality measurement**
  - Is community adopting and implementing evidence-based care?

- **Quality improvement**
  - Use measurement to stimulate practice change
  - Track impact of changes in health policy

- **Identify unmet needs and knowledge gaps**
Cycle of Clinical Discovery and Adoption

- Concept
- Clinical Evidence
- Outcomes
- Clinical Registries
- Guidelines
- Measurement + Feedback
- Decision Support + QI Initiatives

Adapted from Califf RM, Peterson ED et al. JACC 2002;40:1895-901
ASNC and its registry will be a valuable asset to key stakeholders

**VALUE**

**Physicians**
- Cardiovascular Imagers
  - Leading Publications: JNC, JACC, JACC Imaging
  - Dominant membership position
  - Negotiations
- Clinical Team
  - Technologists
- Primary Care
  - Improved referrals
  - Informed clinical decision-making

**Industry**
- Innovation and Growth
  - Clinical Research Network and Credibility
  - Informed Payer Coverage
  - Inform Payers and CMS
  - Drive Core Measurement of the Field
  - Defined Value of Technology

**Payers**
- Nuclear Lab Report Card
  - Incentivizing high quality CV care
- Centers of Excellence
  - Promoting Appropriate Use Criteria
  - Links with ACO, PCMH, ICNAL, CBNC, ABIM

**Government**
- Federal
  - CMS Value-based purchasing
  - FDA post market surveillance, NIH/AHRQ research
- State
  - State-level reporting and mandates
Collaborative Framework
Standards: The Building Blocks

• Societal Standards and Guidelines
  – Data standards committees
    • ACC/AHA/ACR/ASE/ASNC/HRS/NASCI/RSNA/SAIP/SCAI/SCCT/SCMR/SIR 2008 Key Data Elements and Definitions for Cardiac Imaging
    • FDA (2012) Imaging Data Standards Initiative
Standards: The Building Blocks

• Societal Standards and Guidelines
  – Health Policy committees
    • ACCF/ACR/AHA/ASE/ASNC/HRS/NASCI/RSNA/SAIP/SCAI
      /SCCT/SCMR 2008 Health Policy Statement on
      Structured Reporting in Cardiovascular Imaging
Standards: The Building Blocks

- Societal Standards and Guidelines
  - Guideline writing committees - ASNC
    - Standardized Reporting of Radionuclide Myocardial Perfusion and Function – 2009
    - Preferred Practice Statement – Patient Centered Imaging – 2012
Standards: The Building Blocks

• Societal Standards and Guidelines
  – Accreditation standards
    • American College of Radiology
    • Intersocietal Accreditation Commission – Nuclear/PET
    • The Joint Commission

• Expert opinion and consensus – when all else fails
Strategies: Personalized and Targeted QI

Standard QI Feedback

Registry SITES

Individualized GAP Analysis

Top 3 Quality or Safety Targets

Targeted Data Reports

Educational Modules and QI Tools

EVALUATION

- Composite metrics of quality and safety
- Benchmarks achieved
- Surveys assessing implementation and usability
Expanding the Applications of Clinical Registries

- Clinical Registry
- Claims Data
- Biomarkers/Genetics
- Detailed Pharm + Device Info
- Device/Drug RCT
- Image Collection
- Cross sectional Studies
- Longitudinal Evaluations
- Translational Discovery
- CER-Safety Surveillance
- Practical Clinical Trials
- Improved imaging care
What’s Next?

• Paradigm shift is occurring from volume to quality
• Payment based on quality and volume
• Efficiency calculation
• Physician level reporting
  – Publicly reported
  – Quality Resource and Use Reports
Updated Definition of Patient-Centered Imaging

Imaging decision-making used by patients & physicians regarding which technique will safely & appropriately deliver maximum benefits to be realized while minimizing risk & waste*

*Adapted ABR Foundation

Patient-centeredness is mutually beneficial partnerships among patients, families, & providers
Value Based Payment - FY 2014

13 Clinical Process of Care Measures
1. AMI-7a Fibrinolytic Therapy Received within 30 Minutes of Hospital Arrival
2. AMI-8 Primary PCI Received within 90 Minutes of Hospital Arrival
3. HF-1 Discharge Instructions
4. PN-3b Blood Cultures Performed in the ED Prior to Initial Antibiotic Received in Hospital
5. PN-6 Initial Antibiotic Selection for CAP in Immunocompetent Patient
6. SCIP-Inf-1 Prophylactic Antibiotic Received within One Hour Prior to Surgical Incision
7. SCIP-Inf-2 Prophylactic Antibiotic Selection for Surgical Patients
8. SCIP-Inf-3 Prophylactic Antibiotics Discontinued within 24 Hours After Surgery
9. SCIP-Inf-4 Cardiac Surgery Patients with Controlled 6 a.m. Postoperative Serum Glucose
10. SCIP-Inf-9 Postoperative Urinary Catheter Removal on Postoperative Day 1 or 2.
11. SCIP-Card-2 Surgery Patients on a Beta Blocker Prior to Arrival That Received a Beta Blocker During the Perioperative Period
12. SCIP-VTE-1 Surgery Patients with Recommended Venous Thromboembolism Prophylaxis Ordered
13. SCIP-VTE-2 Surgery Patients Who Received Appropriate Venous Thromboembolism Prophylaxis within 24 Hours

Domain Weights
- Clinical Process of Care Domain (45%)
- Outcome Domain (25%)
- Patient Experience of Care Domain (30%)

8 Patient Experience of Care Dimensions
1. Nurse Communication
2. Doctor Communication
3. Hospital Staff Responsiveness
4. Pain Responsiveness
5. Medicine Communication
6. Hospital Cleanliness and Quietness
7. Discharge Information
8. Overall Hospital Rating

3 Mortality Measures
1. MORT-30-AMI Acute Myocardial Infarction (AMI) 30-day mortality rate
2. MORT-30-HF Heart Failure (HF) 30-day mortality rate
3. MORT-30-PN Pneumonia (PN) 30-day mortality rate

Represents a new measure for the FY 2014 Program not in the FY 2013 Program.
Value Based Payment – FY 2015

1. AMI-7a Fibrinolytic Therapy Received within 30 Minutes of Hospital Arrival
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Domain Weights
- Efficiency 20%
- Clinical Process of Care 20%
- Patient Experience of Care 30%
- Outcome 30%

8 Patient Experience of Care Dimensions
1. Nurse Communication
2. Doctor Communication
3. Hospital Staff Responsiveness
4. Pain Management
5. Medicine Communication
6. Hospital Cleanliness & Quietness
7. Discharge Information
8. Overall Hospital Rating

5 Outcome Measures
1. MORT-30-AMI – Acute Myocardial Infarction (AMI) 30-day mortality rate
2. MORT-30-HF – Heart Failure (HF) 30-day mortality rate
3. MORT-30-PN – Pneumonia (PN) 30-day mortality rate
4. PSI-90 – Patient safety for selected indicators (composite)
5. CLABSI – Central Line-Associated Bloodstream Infection

1 Efficiency Measure
1. MSPB-1 Medicare Spending per Beneficiary measure
Innovation Moving Forward

• Radiotracers and camera technologies
  – Population vs. personal science
• Comparative effectiveness research
  – Included in new “product” development
• Non-inferiority based trials will not be enough
• Registry based Randomized Control Trials
• Cost of innovation/development and new payment paradigms
Thank You!