Antimicrobial Stewardship: Core Measures and Clinical Decision Support

Health Care Quality Measurement and Reporting: Experiences from the National Quality Forum
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Learning Objectives

- Describe the National Quality Forum (NQF) and its role in healthcare
- Describe the process by which measures are developed and evaluated by the NQF for endorsement
- Differentiate between process- and outcome-oriented measures
- Discuss the impact of endorsement measures on health-care systems and pharmacy practice

Healthcare Quality and Patient Safety Organizations

- American College of Surgeons
  - Minimum Standard for Hospitals - 1917
- Joint Commission on Accreditation of Hospitals - 1951
  - Medicare Conditions of Participation - 1965
  - Agenda for Change – 1987
  - Core measures – 2002
  - Partnership with Centers for Medicare and Medicaid Services (CMS) - 2004
    - Hospital Quality Measures
- National Committee for Quality Assurance (NCQA) – 1990

Healthcare Quality and Patient Safety Organizations

- Healthcare Research and Quality Act – 1999
  - Agency for Healthcare Research and Quality (AHRQ)
- Leapfrog group – 2000
- Centers for Medicare and Medicaid Services (CMS)
  - Medicare Prescription Drug, Improvement, and Modernization Act - 2003
  - QualityNet
  - Value-based purchasing
  - Pharmacy Quality Alliance – 2006

National Quality Forum: Overview

- Established in 1999
- Coalition of public- and private-sector leaders
- Private, non-profit voluntary consensus standards-setting organization
- Response to the recommendation of the Advisory Commission on Consumer Protection and Quality in the Health Care Industry
  - Promote and ensure patient protections and healthcare quality through measurement and public reporting
    - Develop a plan for implementing quality measurement, data collection, and reporting standards throughout the healthcare continuum
    - Establish measurement priorities on national aims for quality improvement
    - Ensure the public has access to quality measurement and performance data
    - Support the development of health IT systems to advance measurement efforts
National Quality Forum: Overview

- Department of Health and Human Services (HHS) relies on NQF-endorsed measures
- NQF Board of Directors
  - 31 voting members — public and private-sector leaders who represent major stakeholders
  - Consumers and those who purchase healthcare hold a simple majority
  - In 2012, NQF convened more than 800 hundred experts across every stakeholder group for measure-review, measure-selection, and priority-setting committees

NQF’s Vision

- To be the convener of key public and private sector leaders to establish national priorities and goals to achieve healthcare that is safe, effective, patient-centered, timely, efficient, and equitable
- That NQF-endorsed standards will be the primary standards used to measure and report on the quality and efficiency of healthcare in the United States
- To be a major driving force for and facilitator of continuous quality improvement of American healthcare quality

Strategies for Driving Results: Improving Maternity Care

NQF-Endorsed Measures by Priority (n=917*)

Performance Measures: Anatomy and Types

- Types of measures
  - Structural - assess healthcare infrastructure
  - Measure 0205 – RN hours per patient day
  - Composite – combination of 2 or more measures that results in one score
  - Measure 0500 – HfH Severe Sepsis and Septic Shock: Management Bundle
  - Cost/resource use – utilization of resources by a population
  - Measure 1560 – Risk adjusted relative resource use of asthma patients/year

Types of measures

- Process – assess steps that should be followed to produce good care
  - Measure 0058 – Percentage of patients with acute bronchitis who were not dispensed an antibiotic prescription
- Outcome – assess the results of healthcare that are experienced by patients
  - Measure 1717 – CDC hospital onset CDI
  - Observed CDI/Expected CDI
- Measure 1716 – CDC hospital onset MRSA bacteremia
  - Observed MRSA bacteremia/Expected MRSA bacteremias
- Both measures recently recommended that HHS prioritize for inclusion in VBP programs
- Greater New York Hospital Association opposed
  - Attribution could lead to unfair penalties
NQF-Endorsed Measures: Process and Outcome Measures by Clinical Area*

Uses of NQF-Endorsed Measures in Accountability and QI Programs

Consensus Development Process
Timeline: Review of endorsed measures every 3 years
1. Call for Nominations
2. Call for Intent to Submit Candidate Standards
3. Call for Candidate Standards
5. Public and NQF Member Comment
6. NQF Member Voting
7. CSAC Decision
8. Board Ratification
9. Appeals

Measure Evaluation & Consensus Development

Multi-stakeholder Review: Criteria for Evaluating a Measure
- Four major criteria describe desirable characteristics of quality performance measures for endorsement
- Hierarchy and Rationale
  1. Importance to measure and report
  2. Scientific acceptability of measure properties
  3. Usable
  4. Feasible
  5. Assess related and competing measures

Rating Scale
- C = Completely (unquestionably demonstrated to meet the criterion)
- P = Partially (demonstrated to partially meet the criterion)
- M = Minimally (addressed BUT demonstrated to only minimally meet the criterion)
- N = Not at all (NOT addressed; OR incorrectly addressed; OR demonstrated to NOT meet the criterion)
- NA = Not applicable (only an option for a few subcriteria as indicated)
Criteria for Evaluating a Measure

1. Importance to Measure & Report
   Extent to which the specific measure focus is important to making significant gains in health care quality (safety, timeliness, effectiveness, efficiency, equity, patient-centeredness) and improving health outcomes for a specific high impact aspect of healthcare where there is variation in, or overall poor, performance
   a. High impact - must address a national health priority
   b. Gap in performance with opportunity for improvement
   c. Evidence supports measure focus – clear evidence of a link to improved health or avoidance of harm
   * Note: Importance to Measure & Report is a threshold criterion

Criteria for Evaluating a Measure

2. Scientific Acceptability of Measure Properties
   Extent to which the measure, as specified, produces consistent (reliable) and credible (valid) results about the quality of care when implemented.
   - Precisely specified
   - Reliability testing
   - Validity testing
   - Exclusions - justified
   - Risk adjustment - evidence-based, factors at start of care (not related to disparities)
   - Identification of statistically significant & practically/clinically meaningful differences in performance.
   - Multiple data sources – comparable results
   - Disparities – stratification

Criteria for Evaluating a Measure

3. Usability
   - Extent to which intended audiences (e.g., consumers, purchasers, providers, policy makers) can understand the results of the measure and are likely to find it useful for decision making
     - Useful for public reporting and quality improvement
     - Harmonized
     - Distinctive or additive value to existing measures

Criteria for Evaluating a Measure

• Hierarchy and Rationale
  1. Importance to measure and report – measure those aspects with greatest potential of driving improvements; if not important, the other criteria less meaningful (must-pass)
  2. Scientific acceptability of measure properties – goal is to make valid conclusions about quality; if not reliable and valid, risk of improper interpretation

Criteria for Evaluating a Measure

2b and 2c. Reliability and Validity

• Reliability
  - Extent to which the measurement is reproducible and repeatable
• Validity
  - Extent to which a measure achieves the purpose for which it was intended (e.g., to assess the quality of care)
• Reliability and validity
  - Not all-or-none properties – a matter of degree
  - Not static and can vary with different conditions under which the measure is used
• In order to be valid, a measure must be reliable; but reliability does not guarantee validity
Criteria for Evaluating a Measure

5. Superior to Competing Measures

- If there are competing measures – new or endorsed (i.e., have the same measure focus in the same target population)
  - First evaluate each measure individually to determine if meet criteria and could be recommended
  - Then select best measure to recommend for endorsement
  - Harmonize

Criteria for Evaluating a Measure

4. Feasibility

- Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement.
  - a. Clinical data generated during care process
  - b. Electronic sources
  - c. Exclusions – no additional data source
  - d. Susceptibility to inaccuracies/ unintended consequences identified
  - e. Data collection strategy can be implemented

Surgery Endorsement Maintenance Measures Project

- 2010-2012
  - Phase 1 – cardiac surgery
  - Phase 2 – general surgery and other surgical specialties
  - 73 surgery measures submitted for consideration
  - 13 measures withdrawn prior to consideration (1 maintenance, 12 new)
  - 51 measures recommended for endorsement (42 maintenance, 9 new)
  - 9 measures not recommended for endorsement (5 maintenance, 4 new)
- Measure stewards
  - CMS
  - Society of Thoracic Surgeons (STS)
  - Children’s Hospital of Philadelphia
  - ACS Quality Collaboration

Surgery Endorsement Maintenance Measures Project: Measures 0128 and 0529

- Measure 0128: Duration of antibiotic prophylaxis for cardiac surgery patients (48 hours)
  - Measure steward - Society of Thoracic Surgeons (STS)
  - Antimicrobial prophylaxis in cardiac surgery patients discontinued within 48 hours
- Measure 0529 (aka SCIP 3): Prophylactic antibiotics discontinued within 24 hours after surgery end time
  - Measure steward - CMS

Surgical Care Improvement Project

- SCIP INF 1: Prophylactic antibiotic received within one hour prior to surgical incision
- SCIP INF 2: Prophylactic antibiotic selection for surgical patients
- SCIP INF 3: Prophylactic antibiotics discontinued within 24 hours after surgery end time (48 hours for cardiac patients)
Surgical Care Improvement Project

- Pre-SCIP
  - 34% composite compliance in 2002
  - Nearly 10% of Medicare patients received antibiotics 4 or more hours after surgical incision
  - Long durations continued post-surgery

- Does performance predict outcomes?
  - Unneeded antibiotic use
    - Increased cost?
    - Increased infections?
    - Increased resistance?

Surgery Endorsement Maintenance Measures Project: Measures 0128 and 0529

- Debate over appropriate duration of surgical prophylaxis in cardiac patients (24 vs. 48 hours)
- SSI following CABG - CMS Pay for Performance hospital-acquired condition

- Member debate
  - Essentially antimicrobial stewardship measures
    - No studies have shown that duration impacts surgical infection rates
    - Increased resistance when infections occur
    - Increased cost

- STS response
  - Little evidence utilizing <24 hour prophylaxis
  - Significant risk of mortality with infection
  - Further studies needed
  - Cited meta-analysis by Mertz and colleagues

Does SCIP Compliance Improve Outcomes?

- Adherence to Surgical Care Improvement Project Measures and the Association With Postoperative Infections
  - A retrospective cohort study of 405,720 patients
  - Main outcome - reported adherence to SCIP infection-prevention process-of-care measures (using the 2 composite scores of S-INF and S-INF-Core) to predict postoperative infections

- Results
  - Decreased likelihood of developing a post-op infections with 2 criteria recorded
    - 14.2 to 6.8 per 1000 discharges (adjusted odds ratio [AOR], 0.45; 95% confidence interval [CI], 0.76-0.95)
  - No difference when all 3 antibiotic measures were met
    - 11.5 to 5.3 postoperative infections per 1000 discharges (AOR, 0.86; 95% CI, 0.74-1.01)
  - No difference with individual measures

NQF Criteria for Measurement

1. Importance to measure and report?

   A Yes
   B No

2. Scientific Acceptability of Measure Properties?

   C = Completely (unquestionably demonstrated to meet the criterion)
   P = Partially (demonstrated to partially meet the criterion)
   M = Minimally (addressed but demonstrated to only minimally meet the criterion)
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Does Duration of Perioperative Antibiotic Prophylaxis Matter in Cardiac Surgery? A Systematic Review and Meta-Analysis

- Compared the efficacy of short-term (<24 hours) versus longer-term antibiotic prophylaxis (≥24 hours) in open heart surgery
  - 48 hour vs. 24 hour duration
    - decreased surgical site infection (SSI) by 38% (risk ratio 1.38, 95% confidence interval [CI] 1.13-1.69, P = 0.002)
    - deep sternal SSI by 68% (risk ratio 1.68, 95% CI 1.12–2.53, P = 0.01)

- Significant limitations
  - Heterogeneity of antibiotic regimens used (teicoplanin vs. cefazolin)
  - Risk of bias
Clinical practice guidelines for antimicrobial prophylaxis in surgery

- Explicit recommended duration of <24 hours
- “meta-analysis does not provide evidence to support changing the currently accepted prophylaxis duration of less than 24 hours, particularly given the evidence from studies involving noncardiac operations. The currently accepted duration of prophylaxis for cardiac procedures is less than 24 h, but prophylaxis should be continued for the duration of the procedure”

NQF Criteria for Measurement
2. Scientific Acceptability of Measure Properties?

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Criteria for Evaluating a Measure

- Hierarchy and Rationale
  1. Importance to measure and report – measure those aspects with greatest potential of driving improvements; if not important, the other criteria less meaningful (must-pass)
  2. Scientific acceptability of measure properties – goal is to make valid conclusions about quality; if not reliable and valid, risk of improper interpretation
  3. Usable – ideally, cause as little burden as possible; if not feasible, consider alternative approaches
  4. Feasible – goal is to use for decisions related to selection and improvement; if not useful, probably do not care if feasible

Surgery Endorsement Maintenance Measures Project: Measures 0128 and 0529

- Usability and Feasibility high
- Topped out?
  - Antibiotics stopped within 24 (or 48) hours – 97%
  - Proper timing prior to procedure – 98%
  - Proper antibiotic selection – 99%

Overall, should these measures be recommended for endorsement?

- Yes
- No
Infectious Disease Endorsement Maintenance Measures Project

- 2012-2013
- 34 measures under consideration
  - 7 withdrawn from consideration
  - 16 measures recommended for endorsement (12 maintenance, 4 new)
  - 11 measures not recommended for endorsement (10 maintenance, 1 new)
- Topic areas
  - Acute bronchitis, upper respiratory infection, and ventilation
  - Line infections
  - Hepatitis C
  - HIV/AIDS
  - Severe sepsis and septic shock
- Measure stewards
  - National Committee for Quality Assurance
  - American Medical Association
  - Henry Ford Hospital
  - Health Resources and Services Administration – HIV/AIDS Bureau

Infectious Disease Endorsement Maintenance Measures

- Measure 0298 – Central line-associated bloodstream infection (CLABSI) bundle compliance
  - Original endorsement 2007
  - Institute for Healthcare Improvement
    - NPSG.07.04.01
      - “a catheter checklist and a standardized protocol for central venous catheter insertion”
    - CMS HAI VBP
    - Enroll in the NQIN
    - Collect and report data on specific CLABSI
  - Existing measure O139
    - National Healthcare Safety Network and CDC CLABSI outcome incidence measure
      - Standardized Infection Ratio (SIR) of healthcare-associated, central line-associated bloodstream infections (CLABSI) calculated amongst patients in various patient care locations

Measure 0298 – Central line bundle compliance

- Percentage of intensive care patients with central lines for whom all elements of the central line bundle are documented and in place.
  - Hand hygiene
  - Maximal barrier precautions upon insertion
  - Chlorhexidine skin antisepsis
  - Optimal catheter site selection, with avoidance of the femoral vein for central venous access in patients 18 years and older
  - Daily review of line necessity with prompt removal of unnecessary lines

Measure 0298 – Central line bundle compliance

1. Importance to measure?
   - Striking reductions in the rate of central line infections in many hospitals
   - Berenholtz et al. – near elimination of CLABSI
   - Pronovost et al. - 66% reduction in over an 18-month period in a state-wide effort in Michigan

Reducing Central Line-Associated Bloodstream Infection (CLABSI) Rates Across the US

2. Scientific Acceptability of Measure Properties
   - Extent to which the measure, as specified, produces consistent (reliable) and credible (valid) results about the quality of care when implemented.
     - Quality of traditional surveillance for public reporting of nosocomial bloodstream infection rates — Lin et al.
   - CLABSI rates determined by infection preventions vs. computer algorithm
     - Significant variation in application of definitions
   - Measure 0298
     - No reliability or validity testing
     - Endorsement removed!
NQF: Priorities for Performance
- Contracted with HHS to recommend priorities for performance
  - Adult immunization
  - Identify critical performance measures to optimize vaccination rates in adults
  - Alzheimer’s disease and related dementias
  - Care coordination
    - Team-based care in a “health neighborhood”
  - Health workforce
    - Emphasize the role of the workforce in prevention and care coordination
  - Person-centered care and outcomes
    - Patient-reported outcomes and how to maximize through health information technology

Pharmacy Measure Development
- NQF is just one link in the “supply chain”
  - Pharmacy Quality Alliance
  - Pharmacy performance measure development
    - Support clinical research and guideline development
    - ASHP Clinical Practice Guidelines for Antimicrobial Prophylaxis in Surgery
    - Develop, testing, and implementation of performance measures then seek NQF endorsement
    - Surviving sepsis care bundle
    - Development of the necessary data platforms to support measurement
    - Ongoing evaluation following implementation
    - Identification of national priorities for measurement and improvement
    - ASHP’s Pharmacy-sensitive Accountability Measures Workgroup

A suite of inpatient and outpatient clinical measures for pharmacy accountability: Recommendations from the Pharmacy Accountability Measures Work Group
- Goal - identify a suite of measures that address preventable harms in the inpatient and outpatient settings that can be adopted universally on pharmacy dashboards to reflect pharmacy accountability
  - Anticoagulant therapy
    - Venous thromboembolism patients with anticoagulation overlap therapy (VTE-3)
    - Hospital-acquired potentially preventable venous thromboembolism (VTE-6)
    - Educating patients and caregivers about discharge anticoagulation therapy (VTE-5)
  - Glycemic Control
    - Inpatient incidence of hypoglycemic events
    - Percentage of outpatients with diabetes who had hemoglobin A1c testing
    - Percentage of outpatients with HbA1C >9%

ASHP’s Pharmacy-Sensitive Accountability Measures Workgroup
- Antimicrobial Stewardship
  - SCIP-inf 2 – appropriate antibiotic selection
  - SCIP-inf 3 – discontinued within 24 hours
  - Initial antibiotic selection for community-acquired pneumonia
  - Avoidance of antibiotic treatment in adults with acute bronchitis
- Pain management
  - Existing measures do not adequately assess medication-use safety
  - Acetaminophen use
    - Currently being developed by the Pharmacy Quality Alliance
  - Naloxone reversal

Pharmacy’s Role in Quality Improvement
- Medication experts!
- Well positioned to assist in improving quality of care
- “Pharmacists need to broaden their responsibilities by taking on roles in quality and performance improvement projects”
- Opportunities
  - Transitions of care
  - VBP Outcome Measures
    - Acute MI
    - Heart failure
    - Pneumonia
    - Surgical prophylaxis
  - Antimicrobial stewardship, of course!
  - Additional opportunities...

Conclusion
- Quality measures are endorsed through a clear process to evaluate desirable characteristics of quality performance measures for endorsement
- Quality measures have already impacted patient care and health-care delivery and will continue to impact health-care in the future
- Pharmacists are well positioned to assist in improving quality of care