C8: Measuring Improvement

Richard Scoville, PhD

Moderator: Mr. Stephen Andrews

Sunday 27th April
9:30 – 11:30
Session Objectives

- Differentiate measurement for improvement from measurement for research & accountability
- Use a driver diagram to identify key interventions for improvement and measurement
- Discuss the relationship between process, outcome, and balancing measures
- Distinguish between population measures, current care measures and PDSA measures
- Identify critical attributes of measures needed to track improvement
- Discuss important aspects of reporting and feedback.
About Your Presenter

Richard Scoville, PhD

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  ✓ Institute for Healthcare Improvement
  ✓ NHS Quest
  ✓ Dentaquest Institute
  ✓ Cincinnati Children’s Hospital and Improving Performance in Practice

• Adjunct Associate Professor, School of Public Health, University of North Carolina, Chapel Hill
Acknowledgements

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• Special thanks to
  ✓ Robert Lloyd, PhD, Exec. Director of Quality Improvement, IHI
  ✓ Lloyd Provost, MS, Associates in Process Improvement
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  ✓ Gareth Parry, PhD, Sr. Scientist, IHI
  ✓ Sandy Murray, MS, Improvement Advisor, IHI
The Model for Improvement

AIM: What are we trying to accomplish?

MEASURES: How will we know if a change is an improvement?

CHANGE: What changes can we make that will result in improvement?

© Associates for Process Improvement
Measurement for Whom?

• Three faces of measurement
• Burden of measurement
# 3 Faces of Performance Measurement

<table>
<thead>
<tr>
<th></th>
<th>Improvement</th>
<th>Accountability</th>
<th>Research</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aim</strong></td>
<td>Improvement of care</td>
<td>Comparison, choice, reassurance, spur for change</td>
<td>New knowledge</td>
</tr>
<tr>
<td><strong>Test Observability</strong></td>
<td>Test observable</td>
<td>No test, evaluate current performance</td>
<td>Test blinded or controlled</td>
</tr>
<tr>
<td><strong>Bias</strong></td>
<td>Accept consistent bias</td>
<td>Measure and adjust to reduce bias</td>
<td>Design to eliminate bias</td>
</tr>
<tr>
<td><strong>What to Measure</strong></td>
<td>“Just enough” data, small sequential samples</td>
<td>Obtain 100% of available, relevant data</td>
<td>“Just in case” data</td>
</tr>
<tr>
<td><strong>Flexibility of Hypothesis</strong></td>
<td>Hypothesis flexible, changes as learning takes place</td>
<td>No hypothesis</td>
<td>Fixed hypothesis</td>
</tr>
<tr>
<td><strong>Testing Strategy</strong></td>
<td>Sequential tests</td>
<td>No tests</td>
<td>One large test</td>
</tr>
<tr>
<td><strong>Determining if a Change is an Improvement</strong></td>
<td>Run charts or Shewhart control charts</td>
<td>No change focus</td>
<td>Hypothesis, statistical tests (t-test, F-test, chi square), p-values</td>
</tr>
<tr>
<td><strong>Response to Context Variation</strong></td>
<td>Utilize to test resilience of process design</td>
<td>Ignore, acknowledge, or use risk adjustment</td>
<td>Control or eliminate effects of confounding vbls</td>
</tr>
<tr>
<td><strong>Confidentiality of the Data</strong></td>
<td>Data used only by those involved with improvement</td>
<td>Data available for public consumption and review</td>
<td>Research subjects’ identities protected</td>
</tr>
</tbody>
</table>

The Measurement Paradox

“You can’t fatten a cow by weighing it”

- Ancient Proverb

(But neither can you improve a system of care without measuring!)

An improvement measurement plan should be as lean as possible!
The Question of the Day

How can we design a set of measures that will guide our improvement work and show meaningful results \textit{without wasting everyone’s time}?
The System of Care

- Levels: Patients first
- Balancing stakeholder interests
- Balancing schemes
- Unintended consequences
Systems of Care

D: The environment (policy, payment, accreditation, etc.)

C: Organizations that support Microsystems

B: Microsystems

A: Lives of Patients
Advanced Illness at NSLIJ

- Patients of the NSLIJ system with advanced illness reliably receive care that
  - Is trustworthy
  - Aligns with their needs & preferences
  - Avoids unneeded or undesired tests and treatments
  - Engages with patients and families as respected partners in care
  - Encourages patient and family responsibility
Dimensions of Quality

• Balancing Outcomes
• Suboptimization
IOM Report: Dimensions of Healthcare Quality

- Safe - as safe in healthcare as in our homes
- Effective - matching care to science; avoiding overuse of ineffective care and underuse of effective care
- Patient-centered - honoring the individual and respecting choice
- Timely - less waiting for both patients and those who give care
- Efficient - reducing waste
- Equitable - closing racial and ethnic gaps in access and health status

## IHI ‘Whole-System’ Measures

### Table 1. Whole System Measures, IOM Dimensions of Quality, and Care Locations

<table>
<thead>
<tr>
<th>Whole System Measure</th>
<th>IOM Dimension of Quality</th>
<th>Outpatient Care</th>
<th>Inpatient Care</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Rate of Adverse Events</td>
<td>Safe</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>2. Incidence of Nonfatal Occupational Injuries and Illnesses</td>
<td>Safe</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>3. Hospital Standardized Mortality Ratio (HSMR)</td>
<td>Effective</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>4. Unadjusted Raw Mortality Percentage</td>
<td>Effective</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>5. Functional Health Outcomes Score</td>
<td>Effective</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>6. Hospital Readmission Percentage</td>
<td>Effective</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>7. Reliability of Core Measures</td>
<td>Effective</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>8. Patient Satisfaction with Care Score</td>
<td>Patient-Centered</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>9. Patient Experience Score</td>
<td>Patient-Centered</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>10. Days to Third Next Available Appointment</td>
<td>Timely</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>11. Hospital Days per Decedent During the Last Six Months of Life</td>
<td>Efficient</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>12. Health Care Cost per Capita</td>
<td>Efficient</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>13. Equity (Stratification of Whole System Measures)</td>
<td>Equitable</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
Value Compass for Outcomes

IHI Triple Aim

Better care for individuals, better health for populations, lower per capita costs
# IHI Triple Aim

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Population Health</strong></td>
<td>1. Health/Functional Status: single-question (e.g. from CDC HRQOL-4) or multi-domain (e.g. SF-12, EuroQol)</td>
</tr>
<tr>
<td></td>
<td>2. Risk Status: composite health risk appraisal (HRA) score</td>
</tr>
<tr>
<td></td>
<td>3. Disease Burden: Incidence (yearly rate of onset, avg. age of onset) and/or prevalence of major chronic conditions; summary of predictive model scores</td>
</tr>
<tr>
<td><strong>Patient Experience</strong></td>
<td>1. Standard questions from patient surveys, for example:</td>
</tr>
<tr>
<td></td>
<td>- Global questions from US CAHPS or How’s Your Health surveys</td>
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<tr>
<td></td>
<td>- Experience questions from NHS World Class Commissioning or CareQuality Commission</td>
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<tr>
<td></td>
<td>- Likelihood to recommend</td>
</tr>
<tr>
<td></td>
<td>2. Set of measures based on key dimensions (e.g., US IOM Quality Chasm aims: Safe, Effective, Timely, Efficient, Equitable and Patient-centered)</td>
</tr>
<tr>
<td><strong>Per Capita Cost</strong></td>
<td>1. Total cost per member of the population per month</td>
</tr>
<tr>
<td></td>
<td>2. Hospital and ED utilization rate</td>
</tr>
</tbody>
</table>
Balanced Scorecard

Suboptimization

If each part of a system, considered separately, is made to operate as efficiently as possible, then the system as a whole will not operate as effectively as possible.

Listen to the “Yeah, but’s…”

“Yeah, but…

• “… what’s it gonna cost?”
• “… will it really make a difference for my patients?”
• “… we’re already working too hard!”
• “… we don’t need to improve. We already do it every time!”
• “… our adjusted mortality ratio already compares favorably with national benchmarks.”

Beware of Unintended Consequences!
Three Types of Measures

- **Outcome Measures**
  - Point to qualities that stakeholders value.
  - Is this system meeting the needs of those who care about its operation?
  - Is our improvement work making a meaningful impact?

- **Process Measures**
  - Voice of the process.
  - Are the parts/steps in the system performing as planned? Are processes reliable? Efficient? Patient-Centered?
  - Are we on track to improve?

- **Balancing Measures**
  - Are we producing perverse consequences in our efforts to improve? What other factors may be affecting results?
<table>
<thead>
<tr>
<th>Topic</th>
<th>Outcome Measures</th>
<th>Process Measures</th>
<th>Balancing Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improve waiting time and patient satisfaction in the Emergency Department</td>
<td>Total ED Length of Stay (LOS)</td>
<td>Time to registration</td>
<td>Volumes</td>
</tr>
<tr>
<td></td>
<td>Patient Satisfaction Scores</td>
<td>Patient / staff comments on flow</td>
<td>“Left without being seen” (LWBS)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>% patient receiving discharge materials</td>
<td>Staff satisfaction</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Financials</td>
</tr>
</tbody>
</table>
Improving Systems of Care

• 3 Measurement Questions
• Theory of Improvement
• Drivers and measures
• Selecting Improvement Measures
3 Questions for Measuring Improvement

• Is the system of care predictable? Can we anticipate future performance in order to plan ahead? Counsel patients? Allocate resources? Improve?

• Over time, where are the gaps in performance that indicate a need for system change (i.e. improvement)?

• In our efforts to improve, are we on track to meet our aims? (‘How will we know that a change is an improvement?’)
The Model for Improvement

AIM: What are we trying to accomplish?

MEASURES: How will we know if a change is an improvement?

CHANGE: What changes can we make that will result in improvement?
Q3: What Changes Can We Make?

• **Understand the system.**
  ✓ Front-line expertise generates testable ideas for change: “I think we should try X because…”

• Use *change concepts* & directed creativity to generate additional change ideas
  ✓ Techniques for prompting fresh ideas for change

• **Copy** from successful colleagues.
  ✓ Who does this best? Who has successfully improved? How did they do it?
  ✓ Is there a change package available?
Theory Drives Improvement

“Without theory, there are no questions; without questions, there is no learning.”
A Theory for Weight Loss

“Every system is perfectly designed to achieve the results that it gets”

AIM: A New ME!

Primary Drivers

Reduce calories in

Increase calories out

Secondary Drivers

Eat less

Substitute low calorie foods

Avoid prepared foods

Exercise

Fidgiting

Ideas for Changes

Track Calories

Plan Meals

Drink H2O Not Soda

Work out 5 days

Bike to work

Hacky Sack in office
Early Childhood Caries Phase III

Outcomes

- Improve Oral Health of Children 1-5
  - O1 Reduce % of pts with new cavitation
  - O2 Reduce % of pts complaining of pain
  - O3 - Reduce % of pts with OR Tx

Primary Drivers

- P1 - Practice QI infrastructure supports sustainable improvement
- P2 - Reliable delivery of risk-based preventive & restorative care
- P3 - Engaged patients/families adequately manage their care

Secondary Drivers

- System supports patient/population management
- System supports reporting QI measures
- Practice staff has necessary QI skills and culture
- Scheduling system permits more frequent recalls
- Patients are screened for caries risk
- Patients are recalled at risk-appropriate intervals
- Treatment is conservative, based on a risk-based treatment plan
- Care is organized around patient self-management goals
- Patients / parents understand caries as a chronic disease

Changes

- Dentrix dummy codes; reports
- Registry
- Recall visits – alternative scheduling schemes
- Non-office patient contact & coaching

Revised 11/19/2012
Drivers for Improving Sickle-cell Care

**Outcomes**

- Improved outcomes and quality of life for individuals affected by SCD
  - Decreased mortality
  - Decreased morbidities, e.g.
    - Pain
    - Stroke
    - Acute chest syndrome
  - Decreased utilization
  - Improved function
  - Humane patient experience

**Primary Drivers**

- P1 Strong network vision, relationships, and plan
- P2 Individuals, families and providers are knowledgeable & proactive
- P3 PCP, CBO, HOSP: Reliable identification of SCD and trait, and follow-up
- P4 PCP/HEME: Care for persons with SCD is seamlessly co-managed
- P5 ACUTE: Appropriate individualized treatment for acute episodes

**Secondary Drivers**

- S1 Concurrent performance feedback
- S2 Local leaders promote, recruit, organize
- S3 Sustainable business model
- S4 QI methods utilized routinely in strategy & operations
- S5 Individual competence in self management
- S6 Providers are prepared to treat SCD
- S7 Reliable screening, counseling, and education for SCD and trait (>1 month old)
- S8 Reliable newborn screening & follow-up
- S9 Reliable provision of indicated treatment and immunizations
- S10 Reliable annual health and healthcare assessment
- S11 Care coordination based on individual care plan
- S12 Access to care
- S13 Timely triage and appropriate treatment in ED
- S14 Practice- and community-level IT & decision support for planned & acute care
Prioritizing Drivers

Limitations of resources, attention or will usually mean we cannot work on (or measure!) everything.

Priorities:

• Where is the ‘Bang for Buck?’ Which drivers do we believe will deliver the biggest impact?
• Which ones will be easiest to work on? Are some ‘beyond our control’?
• What is our current level of performance on these drivers?
SCD Driver Rankings

Average Rankings by 3 ETEC Workgroups

Complex

Easy

Impact = 5

Impact = 10
Drivers for Improving Sickle-cell Care

Outcomes

- Improved outcomes and quality of life for individuals affected by SCD
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= high-priority drivers
Measuring Improvement

Measures let us
• Monitor progress in improving the system
• Identify effective changes

Outcome

Primary Drivers

• Reduce calories in
  • Daily calorie count

Secondary Drivers

• Eat less
  • Serving sizes

• Substitute low calorie foods
  • # substitutions per day

• Avoid prepared foods

Ideas for Changes

• Track Calories

• Plan Meals
  • % meals on plan

• Drink H2O Not Soda
  • Count of sodas

• Work out 5 days

• Bike to work

• Hacky Sack in office

AIM: A New ME!

• Weight
• BMI
• Fat %
• Measurements

Increase calories out

• Est. calories expended

Fidgiting

Exercise

• Days between workouts
Drivers for Improving Sickle-cell Care

**Outcomes**
- Improved outcomes and quality of life for individuals affected by SCD
  - Decreased mortality
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- S12 Access to care
- S13 Timely triage and appropriate treatment in ED
- S14 Practice- and community-level IT & decision support for planned & acute care
- S15 Planning for and transition to adult system of care

A fundamental assumption of clinical QI:
**Reliable execution of key clinical driver processes improves outcomes measured at the population level**

= high-priority drivers
Measures Linked to Drivers

**Outcomes**
- Improved outcomes and quality of life for individuals affected by SCD
  - Decreased mortality
  - Decreased morbidities, e.g.
    - Pain
    - Stroke
    - Acute chest syndrome
  - Decreased utilization
  - Improved function
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**Secondary Drivers**
- S1 Concurrent performance feedback
- S2 Local leaders promote, recruit, organize
- S3 Sustainable business model
- S4 QI methods utilized routinely in strategy & operations
- S5 Individual competence in self management
- S6 Provider
- S7 Reliable screening, counseling, and education for SCD and trait (>1 month old)
- S8 Reliable newborn screening & follow-up
- S9 Reliable provision of indicated immunizations
- S10 Reliable annual health and healthcare assessment
- S11 Care coordination based on individual care plan
- S12 Access to care
- S13 Timely triage and appropriate treatment in ED

**EDO1:** % pts who agree that they were given appropriate and timely pain medication at ED

**EDP1a:** Average time to analgesic admin

**EDP1b:** % with analgesics w/in 30 min

**EDP1c:** % with pain reassessed within 30 min of analgesic admin

**EDP4:** Average time to triage
Measuring Processes

• Measures of process reliability
• Compliance measures
• Compliance versus average
• PDSA measures
• Examples
Reliability

Reliability = \[
\frac{\text{Number of Actions That Achieve The Intended Result}}{\text{Total Number of Opportunities for Action}}
\]

= ‘Percent Conforming’

Most healthcare process measures are percent conforming. Process goals are ‘baked into’ the measures.
Project JOINTS: Preventing Surgical Infections

• Process: Pre-screen total hip or knee replacement patients for nasal Staph; those who test positive will complete a course of mupirocin.

• Population: All patients undergoing TKA or HKA in our hospital (with exclusions)

• Process reliability measure: Percent of patients who screened positive for SA who report they had completed a course of mupirocin prior to surgery.

• Measurement interval: monthly

• Goal: 95%
Staph aureus (SA) Screening and Decolonization Process Example

1-4 weeks pre-procedure

- Schedule procedure
  - TKA or THA?
    - Yes
      - Insert lab request for SA culture
    - No

2-3 weeks pre-procedure

- Inform patient of SA screening
- % of cases with missing lab order

Day of surgery

- Pt presents for nasal swab
- Notify hospital
- Process specimen
- Positive for SA?
  - No
  - % of no-shows for swab
  - Time to receive lab results
  - Results to surgeon & hospital
  - % of positive results not acted on
  - Contact patient
  - Prescribe 5 day mupirocin
  - Confirm Rx complete
  - Document in record
  - Surgery
- Yes
  - Time to notify patient
  - % of no-shows for swab
  - % of positive results not acted on
  - Contact patient
  - Prescribe 5 day mupirocin
  - Confirm Rx complete
  - Document in record
  - Surgery
NSLIJ: Inpatient Sepsis Care

**Problem:** Timely Abx administration are not consistent for patients with sepsis, severe sepsis, and septic shock, resulting in increased morbidity and mortality

**Measure:** Average time from sepsis recognition to administration of antibiotics

**Act:** They break the process into the following steps:

1. Take vitals → Inform RN → Sepsis Screening → MD Notification → MD Order
2. Send to Pharmacy → Pharmacy Process → Receive Abx from Pharmacy → Admin Abx

The team decided to collect data for the steps that the team believes are problematic

★ Data are needed for further investigation

*Source: Shaghayagh Norouzzadeh, NSLIJ*
NSLIJ: Inpatient Sepsis Care

Retrospective Data (Jan-July)

Concurrent Data (Early August)

KQMI Data: Average Abx Administration Time

Higher than Expected Average Time and Big Variation

Source: Shaghayagh Norouzzadeh, NSLIJ
NSLIJ: Inpatient Sepsis Care

Solution: Abx now available in the Pyxis

Retrospective Data (Jan-Oct)

Concurrent Data (Early September)

Order to Admin

KQMI Data: Average Abx Administration Time

Source: Shaghayagh Norouzzadeh, NSLIJ
Average Time versus Percent Conforming*

- Specification = 30 min or less
- Which measure is most useful to an improvement team?

\(\%\) of cases with Abx within 30 min

Average time to Abx admin

*Simulated data via @Risk
Setting Goals

- A significant change from current performance
  - Make people anxious with goals—then give them change ideas that create hope

- When information is available, use absolute values to describe the performance of an excellent system of care
  - “Percent of diabetic patients screened for nephropathy = 95”
  - “Percent of diabetic patients with A1C < 7 = 65”

  ✓ (95% = standard benchmark for clinical reliability)

- When information on best performance or current performance is not available, use percentage or relative goals
  - “Improve wait time in the ED by 50%”
  - Close the gap between current performance and perfection by 50%
Time, Populations, & Measurement

- Time and prediction
- Levels of measurement
- Types of improvement measures
- Denominators
- Alignment
The Manager’s Dilemma

Every act of management is an exercise in predicting the future.
Why Time Is Important for Measuring Improvement

- “Improvement is temporal” – Lloyd Provost
- Displaying data over time (using run charts or control charts) allows us to make informed predictions, and thus manage effectively.
“Managing a company by means of the quarterly reports is like trying to drive a car by watching the yellow line in the rearview mirror.”

Myron Tribus
Did We Improve?

Percent of ER patients with Chest Pain Seen by a Cardiologist within 10 min

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3-Oct</td>
<td>88%</td>
</tr>
<tr>
<td>2</td>
<td>10-Oct</td>
<td>88%</td>
</tr>
<tr>
<td>3</td>
<td>17-Oct</td>
<td>94%</td>
</tr>
<tr>
<td>4</td>
<td>24-Oct</td>
<td>71%</td>
</tr>
<tr>
<td>5</td>
<td>1-Nov</td>
<td>88%</td>
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<tr>
<td>6</td>
<td>8-Nov</td>
<td>73%</td>
</tr>
<tr>
<td>7</td>
<td>15-Nov</td>
<td>78%</td>
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<td>8</td>
<td>22-Nov</td>
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<td>18</td>
<td>7-Feb</td>
<td>79%</td>
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<tr>
<td>19</td>
<td>14-Feb</td>
<td>84%</td>
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<tr>
<td>20</td>
<td>21-Feb</td>
<td>89%</td>
</tr>
<tr>
<td>21</td>
<td>28-Feb</td>
<td>95%</td>
</tr>
<tr>
<td>22</td>
<td>6-Mar</td>
<td>95%</td>
</tr>
<tr>
<td>23</td>
<td>13-Mar</td>
<td>91%</td>
</tr>
<tr>
<td>24</td>
<td>20-Mar</td>
<td>95%</td>
</tr>
</tbody>
</table>

Did we improve?
What will happen next?
Should we do something?
Did We Improve?

Percent of ER patients with Chest Pain Seen by a Cardiologist within 10 min

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3-Oct</td>
<td>88%</td>
</tr>
<tr>
<td>2</td>
<td>10-Oct</td>
<td>88%</td>
</tr>
<tr>
<td>3</td>
<td>17-Oct</td>
<td>94%</td>
</tr>
<tr>
<td>4</td>
<td>24-Oct</td>
<td>71%</td>
</tr>
<tr>
<td>5</td>
<td>1-Nov</td>
<td>88%</td>
</tr>
<tr>
<td>6</td>
<td>8-Nov</td>
<td>73%</td>
</tr>
<tr>
<td>7</td>
<td>15-Nov</td>
<td>78%</td>
</tr>
<tr>
<td>8</td>
<td>22-Nov</td>
<td>67%</td>
</tr>
<tr>
<td>9</td>
<td>29-Nov</td>
<td>69%</td>
</tr>
<tr>
<td>10</td>
<td>6-Dec</td>
<td>87%</td>
</tr>
<tr>
<td>11</td>
<td>13-Dec</td>
<td>83%</td>
</tr>
<tr>
<td>12</td>
<td>20-Dec</td>
<td>68%</td>
</tr>
<tr>
<td>13</td>
<td>3-Jan</td>
<td>83%</td>
</tr>
<tr>
<td>14</td>
<td>10-Jan</td>
<td>70%</td>
</tr>
<tr>
<td>15</td>
<td>17-Jan</td>
<td>73%</td>
</tr>
<tr>
<td>16</td>
<td>24-Jan</td>
<td>76%</td>
</tr>
<tr>
<td>17</td>
<td>31-Jan</td>
<td>78%</td>
</tr>
<tr>
<td>18</td>
<td>7-Feb</td>
<td>79%</td>
</tr>
<tr>
<td>19</td>
<td>14-Feb</td>
<td>84%</td>
</tr>
<tr>
<td>20</td>
<td>21-Feb</td>
<td>89%</td>
</tr>
<tr>
<td>21</td>
<td>28-Feb</td>
<td>95%</td>
</tr>
<tr>
<td>22</td>
<td>6-Mar</td>
<td>95%</td>
</tr>
<tr>
<td>23</td>
<td>13-Mar</td>
<td>91%</td>
</tr>
<tr>
<td>24</td>
<td>20-Mar</td>
<td>95%</td>
</tr>
</tbody>
</table>

Change here

Did we improve?
What will happen next?
Should we do something?

Source: R. Lloyd
How Many Different Processes?

Cycle time results for units 1, 2 and 3

Source: R. Lloyd
Average Performance: Good Enough?

- Recommended time to antibiotics for severe sepsis and septic shock patients in the ED: 60 min
- In our ED, our average is 58min! We’ve met the target!
Quantifying Prediction

• Shewhart control charts provide statistical tools to quantify the uncertainty associated with predictions.
Importance of Timely Data
Measuring Improvement

Many key drivers are care processes

Slow to change
Less frequent measurement

Rapid change
More frequent measurement

Aim: An improved system

P. Driver

S. Driver 1

Measure

P. Driver

S. Driver 2

Measure

S. Driver 3

Measure

Change 1

P. Driver

S. Driver 2

Measure

S. Driver 3

Measure

Change 2

P. Driver

S. Driver 1

Measure

S. Driver 2

Measure

Change 3

Measuring Improvement

List days cooking v. leftovers
List dishes to prepare
List ingredients
Ingredient on hand?
Add item to list
Shop from list
Set aside for meal

Many key drivers are care processes

Slow to change
Less frequent measurement

Rapid change
More frequent measurement

Testing
Aim: An improved system

Testing

• Denominator = total population (e.g. region, panel, membership)

• Assess the state of key care processes and outcomes
• Track improvement of the system

• Surveys, risk-adjusted measures, institutional databases

• Control Charts, ANOVA

Outcome, Key Processes
### Measuring Improvement

**Aim:** An improved system

**P. Driver**

**S. Driver 1**

**S. Driver 2**

**S. Driver 3**

**S. Driver 1**

**S. Driver 2**

**Change 1**

**Change 2**

**Change 3**

**Testing**

### Outcome, Key Processes

<table>
<thead>
<tr>
<th><strong>Outcome, Key Processes</strong></th>
<th><strong>‘Current Care’</strong></th>
<th><strong>‘PDSA’</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Denominator = total population (e.g. region, panel, membership)</td>
<td>• Denominator = patients seen in most recent measurement period, in areas targeted for improvement</td>
<td>• Single patients &amp; events</td>
</tr>
<tr>
<td>• Assess the state of key care processes and outcomes</td>
<td>• Track progress in improving processes &amp; outcomes</td>
<td>• Study process changes</td>
</tr>
<tr>
<td>• Track improvement of the system</td>
<td>• Assess reliability and efficiency of processes</td>
<td>• Identify opportunities for further testing</td>
</tr>
<tr>
<td>• Surveys, risk-adjusted measures, institutional databases</td>
<td>• Registries, institutional databases, chart reviews, team-level databases</td>
<td>• Team databases, paper flow sheets, clipboard</td>
</tr>
<tr>
<td>• Control Charts, ANOVA</td>
<td>• P, U, XbarS Charts</td>
<td>• XMR charts, RCA</td>
</tr>
</tbody>
</table>
Current Care Measures

Throughput…

Admissions

Discharges

…daily care…

…aggregated over a month…

…yields a measure of process reliability (‘% conformance’)…

…viewed over time.

Pts with Abx < 180m

Sepsis Pts discharged in month

Percent of Patients with Abx <180 minutes

Algorithm provides criteria for process quality
Typical Current Care Questions

- Did we do the right thing for patients last month (week, quarter)? Did anything unusual take place?
- Did patients suffer harm? What were their outcomes?
- What can we expect next month? What can we tell our patients? Leadership? Payers?
- Are our ongoing efforts to improve care processes having the desired impact? Should we change course or push ahead?
Population Measures

Throughput = visits…

…with reliable care process…

Population: who’s health are we responsible for?

…have an incremental impact on population.
Typical Population Questions

• What is the current state of the population for whom we are responsible (even those we haven’t seen for awhile?) re: Health status? Pt. Experience? Cost of care?

• How do our population’s risk factors and outcomes compare with those of other provider organizations?

• How should we plan for the long term?

• What has the impact of our improvement work been on the population? Are there other factors effecting changes in outcomes?
Outpatient ‘Look-Back’ Measures

Percent of population with current self-management plan as of most recent visit within the past 12 months.

- Current test
- No current test

Each measurement contains mostly the same patients as the previous month. These measures are slow to show improvement, but reflect the state of care for the population!
“Current Care” Measures

Percent of patients **seen last month** who lacked an up-to-date A1C and who got the test during the visit or were referred.

Each subgroup contains different patients & represents current work. **These measures are great for tracking process changes!**
PDSA Measures

Algorithm provides the ‘should’

Clinical team strives for ‘how’?

Patient in process:

Measure: What happened? How long did it take?…

Time from $T_0$ to Antibiotics (min)

Was this change an improvement?

PDSA measures assess process concurrently: ‘one patient at a time’

Measure: What happened? How long did it take?…

Time from $T_0$ to Antibiotics (min)

Was this change an improvement?
Typical PDSA Questions

• Are we consistent in providing care? Do we need to standardize?
• Why are some patients cared for differently from others? Or have different outcomes? Can we reduce the variation?
• For patients whose care did not conform to algorithm, why not? Does the algorithm need modification? How can we improve the process?
• Was our latest test of change successful? Are we getting better?
PDSA Tracking: Daily Data in the ED

Time to 1st Pain Medication

Source: James Moses, MD, MPH
Monthly Measure Tracks Improvement

% of SCD patients presenting with pain at the ED who had initial analgesics within 30 min*

*Simulated data
• Improvement in a pilot population (1 practice, 1 unit, etc.) will not be evident in measures based on the total population (city, hospital system)
To track improvement, we must measure in the same target population where we are working to improve.
Tracking Spread – Segment by Segment

Segment 1 - Pilot

Segment 2

Segment 3
Documenting Improvement Measures

• Operational definitions
• Annotated driver diagram
• Measure structure diagram
• Measurement plan
• Database query flow
Operational Definition

• A procedural description of what to measure and the steps to follow to measure it consistently...
  ✓ Gives communicable meaning to a concept
  ✓ Tells what you need to count or measure, and how to do it
  ✓ Specifies measurement methods and equipment
  ✓ Provides guidance on sampling
  ✓ Identifies detailed criteria for inclusion and exclusion

• ... is the basis for reliable measurement

Source: R. Lloyd
Operational Definition Example

**Measure:** Percentage of patients undergoing hip and knee replacement surgery during the measurement period who have had preoperative nasal swabs to screen for *Staphylococcus aureus* carriage

**Goal:** 95%

**Measurement Period Length:** Monthly

**Numerator Definition:** Number of patients undergoing hip or knee replacement surgery who have had a nasal swab specimen processed to screen for *Staphylococcus aureus* carriage prior to surgery

**Denominator Definition:** Number of patients undergoing elective hip or knee replacement surgery

**Numerator and Denominator Exclusions:**
- Patients who are less than 18 years of age
- Patients who had a principal or admission diagnosis suggestive of preoperative infectious diseases
- Patients with physician-documented infection prior to surgical procedures
- Patients undergoing non-elective hip or knee replacement surgery

**Definition of Terms:**
Hip or knee replacement surgery includes operations involving placement of a nonhuman-derived device into the hip or knee joint space. ICD-9 Codes include 00.70-00.73, 00.85-00.87, 81.51-81.53, 00.80-00.84, 81.54, and 81.55.

**Calculate as:** \((\text{numerator/denominator} \times 100)\)
Elimination of Dental Disease Measures

By August 2013, we will increase by X%* over baseline the proportion of patients that have achieved a mutually planned disease-managed state that incorporates timely treatment and patient self-management.

By August 2013, we will increase by X%* over baseline the proportion of patients that have achieved a mutually planned disease-managed state that incorporates timely treatment and patient self-management.

S1 Effective scheduling system
S2 Balance supply and demand
S3 Adequate provider mix
S4 Effective no-show prevention, mitigation
S5 Referral management & follow-up
S6 Standard approach among all practice providers
S7 Tx planning incl risk assess, disease management
S8 IT systems supports pt management
S9 Continuity of care: same provider
S10 Patient are knowledgable about disease & Tx
S11 Pt manages disease and Tx plan
S12 Effective care coordination
S13 Effective patient triage and engagement
S14 Fundraising
S15 Reliable fee collection

Sustainable business model
Engaged patients / families adequately manage their care
Reliable execution of DM protocol
Patients get needed care when required/ requested

M1 Percent of patients with treatment plan complete
M2 Percent of patients with treatment plan complete
M3 Percent of patients with new cavitation

M1 Percent of patients with treatment plan complete
M2 Percent of patients with treatment plan complete
M3 Percent of patients with new cavitation

Changes / Interventions
Facility capacity
Manage appointment duration
Maximize appt value
‘Retired’ dentists
Allocate tasks to optimal role
Tracking codes installed
Digit radiography
Patient panels
Self management ‘contracts’
incentive for compliance
Understand pt barriers
Link medical & dental care coordination

Source: Dentaquest Institute

*Goals will be set by each practice
**Definitions**

- **Measurement month** = month for which data are complete, e.g. August 2012, sampled after August 31, 2012.
- **Start month** = month 12 months prior to last day of measurement month, e.g. August 2011.
- **Active patient** = Patients with a comprehensive oral exam (w/ treatment plan) within 24 months of the last day of the measurement month, unless otherwise excluded.
## Measurement Plan Example

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Type (outcome, process, balance)</th>
<th>Driver Addressed (N/A for outcomes)</th>
<th>Numerator &amp; Denominator (or other operational definition)</th>
<th>Exclusions</th>
<th>Frequency</th>
<th>Goal</th>
<th>Data Collection &amp; Sampling Method</th>
<th>Chart for Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>D1 Count of patients active during the measurement month</td>
<td>Denominator</td>
<td>N/A</td>
<td>An active patient is one who has had at least one comprehensive oral exam (COE) (with Phase I treatment plan initiated) within 24 months (i.e., 730 days) of the last day of the measurement month. A COE includes comprehensive exam (ADA codes 0120, 1150) or a periodic recall (ADA code 0120)</td>
<td>Patients known to have left the practice, or deceased</td>
<td>As required</td>
<td>N/A</td>
<td>The count can be taken within various domains, such as an entire multi-site organization, within a single care site, or for a single provider. An electronic records system or registry yields the total population count For sampled measures, patients should be selected randomly with the desired domain until the required sample size is achieved</td>
<td>none</td>
</tr>
<tr>
<td>D2 Count of active patients with visits in the measurement month</td>
<td>Denominator</td>
<td>N/A</td>
<td>The total number of patients who completed appointments in the practice during the measurement month. If a patient had more than one visit during the month, measures M2, M4, &amp; M5 should be based on the most recent visit</td>
<td>No shows</td>
<td>As required</td>
<td>N/A</td>
<td>See D1</td>
<td>C-chart</td>
</tr>
<tr>
<td>D3 Count of active patients with initial or recall exams in the measurement month</td>
<td>Denominator</td>
<td>N/A</td>
<td>The total number of patients who completed initial or recall exams (codes D6120, D0150) in the practice during the measurement month. If a patient had more than one visit during the month, measures M2, M4, &amp; M5 should be based on the most recent visit</td>
<td>No shows</td>
<td>As required</td>
<td>N/A</td>
<td>See D1</td>
<td>C-chart</td>
</tr>
<tr>
<td>M1 Percent of patients with treatment plan complete within 12 months</td>
<td>Outcome</td>
<td>N/A</td>
<td>Denominator: Count of active patients who had a treatment plan initiated during the start month. Numerator: Count of patients in the denominator whose Tx plans were completed as of the last day of the measurement month. The start month is the month 12 months prior to the measurement month. For example, if the measurement month is June 2012, the start month is June 2011</td>
<td>Patients known to have left the practice, or deceased</td>
<td>Monthly</td>
<td>TOTAL POPULATION 1) After the last business day of the measurement month, count the total number of active patients who had a COE with treatment plan initiated during the corresponding start month. This is the denominator. 2) Identify these patients whose treatment plans were completed as of the last day of the measurement month. These are counted in the numerator. 3) Compute the percentage SAMPLE 1) Identify all active patients with a COE initiated during the start month. Use a random sampling scheme to identify 30 patients to include in the denominator. 2) Review the records for the 30 patients; if their Tx plan was completed as of the last day of the measurement month, include in the denominator</td>
<td>P-Chart</td>
<td></td>
</tr>
<tr>
<td>M2 Percent of patients with an up-to-date oral exam</td>
<td>Process</td>
<td>Numerator: Count of patients in the denominator who had a documented COE</td>
<td>Monthly</td>
<td>TOTAL POPULATION</td>
<td>Run chart</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Institute for Healthcare Improvement
Closing the Loop: Using Data to Improve

- The Data Cycle
- Dashboards
- Control charts
- A different approach
Stages of Grief

1. Denial
2. Anger
3. Bargaining
4. Depression
5. Acceptance

And now, the stages of data grief…
‘The data are wrong!’

- Acknowledge data quality problems
- Use M4I to improve data collection & reporting process, report progress to constituents
- Use control charts to investigate and respond to outliers (think RCA)
- Insist on transparency, educate on M4I and the culture of improvement
“The data are right, but it’s not a problem.”


• Beware of aggregate statistics! Use counts in addition to rates. Show data over time; show variation.

• Find the gap: seek out ‘best in class’ data for positive benchmarks, ask ‘How did they do that?’
“The data are right; it’s a problem; but it’s not MY problem.”

- Avoid data for judgment; educate on the ‘Three Faces of Performance Measurement’
- Desensitize users through transparent data discussions
- Promote ‘one at a time’, front-line PDSA data collection to generate ideas for change
- Align measures with improvement focus (segments)
- Use risk adjustment for outcomes data
“How Can We Improve?”

• Connect measures and drivers; Connect data patterns to process map; Use RCA to diagnose process failures
• Use qualitative contextual data to make quantitative results actionable.
• Coach teams on chart interpretation: random variation & sample size, shifts, trends, control charts and SPC principles
The Data Cycle

Measures identified and defined

Data collection process defined, tested

Data acquisition

Data Entry

Storage, aggregation, analytics

Interpretation and application

Reporting

Percent of Patients with Pressure Ulcers

Data Entry

Institute for Healthcare Improvement
Data Acquisition

• Operational IT systems gather granular data on standard processes
  ✓ Clinical: Nursing, EHR, Labs, Pharmacy, etc.
  ✓ Administrative: Billing, scheduling, etc.

• Supplemented by systems to gather clinical process data
  ✓ Institutional
  ✓ Ad-hoc

• PDSA data is real-time, front-line, manual.
Interpretation and Application

• Who needs to know what?
  ✓ What level of information
  ✓ How often? How soon?

• Will the audience interpret the measures appropriately?
  ✓ How will you train them?
  ✓ How will you keep them consistent?

• Will process owners know how to respond?
  ✓ How will you coach them?
A Common Type of Dashboard

This ‘specifications’ view does not provide a predictive view of system dynamics.

<table>
<thead>
<tr>
<th>FY 2009 Hospital System-Level Measures</th>
<th>FY 2009 Q1</th>
<th>FY 2009 Q2</th>
<th>FY 2009 Q3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Legend for Status of Goals (Based on Annual Goal)</strong></td>
<td>Goal Met (GREEN)</td>
<td>Goal 75% Met (YELLOW)</td>
<td>Goal Not Met (RED)</td>
</tr>
<tr>
<td><strong>Patient Perspective</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Overall Satisfaction Rating: Percent Who Would Recommend (includes inpatient, outpatient, ED, and Home Health)</td>
<td>60%</td>
<td>80%</td>
<td>37.98%</td>
</tr>
<tr>
<td>2. Wait for 3rd Next Available Appointment: Percent of Areas with appointment available in less than or equal to 7 business days (n=43)</td>
<td>65%</td>
<td>100%</td>
<td>53.5%</td>
</tr>
<tr>
<td><strong>Patient Safety</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Safety Events per 10,000 Adjusted Patient Days</td>
<td>0.28</td>
<td>0.20</td>
<td>0.35</td>
</tr>
<tr>
<td>4. Percent Mortality</td>
<td>3.50</td>
<td>3.00</td>
<td>4.00</td>
</tr>
<tr>
<td><strong>Emergency Care—Evidence</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Emergency Department Visits per 10,000 Adjusted Patient Days</td>
<td>3.5%</td>
<td>1.5%</td>
<td>6.1%</td>
</tr>
<tr>
<td>6. Emergency Department Length of Stay (minutes)</td>
<td>95%</td>
<td>100%</td>
<td>46%</td>
</tr>
<tr>
<td><strong>Inpatient Care—Evidence</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Patient Satisfaction with Inpatient Care</td>
<td>5.80%</td>
<td>5.20%</td>
<td>5.20%</td>
</tr>
<tr>
<td>8. Percent Mortality</td>
<td>4.00</td>
<td>4.25</td>
<td>3.90</td>
</tr>
<tr>
<td><strong>Community Perspective</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Average Length of Stay</td>
<td>88.0%</td>
<td>90.0%</td>
<td>81.3%</td>
</tr>
<tr>
<td>10. Physician Satisfaction: Average Rating Using 1-5 Scale (5 Best Possible)</td>
<td>4.30</td>
<td>3.80</td>
<td>6.20</td>
</tr>
<tr>
<td><strong>Financial Perspective</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Percent of Budget Allocated to Non-recompensed Care</td>
<td>7.00%</td>
<td>7.00%</td>
<td>6.91%</td>
</tr>
<tr>
<td>12. Percent of Budget Spent on Community Health Promotion Programs</td>
<td>0.30%</td>
<td>0.30%</td>
<td>0.32%</td>
</tr>
<tr>
<td><strong>Monthly Revenue (Million)—change so shows red—because good related to occupancy</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Operating Margin-Percent</td>
<td>1.2%</td>
<td>1.5%</td>
<td>-0.5%</td>
</tr>
<tr>
<td>14. Monthly Revenue</td>
<td>20.0</td>
<td>20.6</td>
<td>17.6</td>
</tr>
</tbody>
</table>

Source: Provost, Murray & Britto (IHI Forum 2010)
Alternative

A view where

• Each measure is displayed on an appropriate control chart
• All control charts are on same page to see the whole system

Advantages

• More accurately assess meaning of system changes
• Become aware of system interrelationships
• Appreciate dynamic complexity
• Base decisions for action on improvement signals

HOWEVER…

• Requires the viewer to understand variation!

Source: Provost, Murray & Britto (IHI Forum 2010)
Shewhart Control Chart

- 3-sigma control limits
- Center line
- Subgroup

Percent of Patients with Pressure Ulcers

Week
Where Do Special Causes Come From?

• Inherent instability in the process
  ✓ Lack of standardization – a chaotic process
  ✓ Changes in personnel, equipment, management, etc.

• Unusual extrinsic events
  ✓ Catastrophes, breakdowns, accidents, personnel issues

• Entropy
  ✓ Equipment wear, desensitization, habit, emerging culture

• Intentional changes – part of an improvement initiative
Are We OK?

Source: Provost, Murray & Britto (IHI Forum 2010)
API Rules for Detecting Special Cause

A single point outside the control limits

Six consecutive points increasing (trend up) or decreasing (trend down)

Two our of three consecutive points near a control limit (outer one-third)

Eight or more consecutive points above or below the centerline

Fifteen consecutive points close to the centerline (inner one-third)
A Common Type of Dashboard

Source: Provost, Murray & Britto (IHI Forum 2010)

<table>
<thead>
<tr>
<th>FY 2009 Hospital System-Level Measures</th>
<th>Goals</th>
<th>FY 2007</th>
<th>FY 2008</th>
<th>FY 2009 Q1</th>
<th>FY 2009 Q2</th>
<th>FY 2009 Q3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Patient Perspective</strong></td>
<td>Goal</td>
<td>Long</td>
<td>Goal</td>
<td>Term Goal</td>
<td>Goal</td>
<td>Term Goal</td>
</tr>
<tr>
<td>1. Overall Satisfaction Rating: Percent Who Would Recommend (Includes inpatient, outpatient, ED, and Home Health)</td>
<td>↑ 60%</td>
<td>80%</td>
<td>37.98%</td>
<td>48.98%</td>
<td>57.19%</td>
<td>56.25%</td>
</tr>
<tr>
<td>2. Wait for 3rd Next Available Appointment: Percent of Areas with appointment available in less than or equal to 7 business days (n=43)</td>
<td>↑ 65%</td>
<td>100%</td>
<td>53.5%</td>
<td>51.2%</td>
<td>54.3%</td>
<td>61.20%</td>
</tr>
<tr>
<td><strong>Patient Safety</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Safety Events per 10,000 Adjusted Patient Days</td>
<td>↓ 0.23</td>
<td>0.20</td>
<td>0.35</td>
<td>0.31</td>
<td>0.31</td>
<td>0.30</td>
</tr>
<tr>
<td>4. Percent Mortality</td>
<td>↓ 3.55</td>
<td>3.00</td>
<td>4.00</td>
<td>4.00</td>
<td>3.48</td>
<td>3.50</td>
</tr>
<tr>
<td>5. Total Infections per 1000 Patient Days</td>
<td>↓ 2</td>
<td>0</td>
<td>3.37</td>
<td>4.33</td>
<td>4.39</td>
<td>2.56</td>
</tr>
<tr>
<td><strong>Clinical</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Percent Unplanned Readmissions</td>
<td>↓ 3.5%</td>
<td>1.5%</td>
<td>6.1%</td>
<td>4.8%</td>
<td>4.6%</td>
<td>4.1%</td>
</tr>
<tr>
<td>7. Percent of Eligible Patients Receiving Perfect Care—Evidence Based Care (Inpatient and ED)</td>
<td>↑ 96%</td>
<td>100%</td>
<td>46%</td>
<td>74.1%</td>
<td>88.0%</td>
<td>91.7%</td>
</tr>
<tr>
<td><strong>Employee Perspective</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Percent Voluntary Employee Turnover</td>
<td>↓ 5.80%</td>
<td>5.20%</td>
<td>5.20%</td>
<td>6.38%</td>
<td>6.10%</td>
<td>6.33%</td>
</tr>
<tr>
<td>9. Employee Satisfaction: Average Rating Using 1-5 Scale (5 Best Possible)</td>
<td>↑ 4.00</td>
<td>4.25</td>
<td>3.90</td>
<td>3.80</td>
<td>3.96</td>
<td>3.95</td>
</tr>
<tr>
<td><strong>Operational Performance</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Percent Occupancy</td>
<td>↑ 88.0%</td>
<td>90.0%</td>
<td>81.3%</td>
<td>84.0%</td>
<td>91.3%</td>
<td>85.6%</td>
</tr>
<tr>
<td>11. Average Length of Stay</td>
<td>↓ 4.30</td>
<td>3.80</td>
<td>6.20</td>
<td>4.90</td>
<td>4.60</td>
<td>4.70</td>
</tr>
<tr>
<td>12. Physician Satisfaction: Average Rating Using 1-5 Scale (5 Best Possible)</td>
<td>↑ 4.00</td>
<td>4.25</td>
<td>3.80</td>
<td>3.84</td>
<td>3.96</td>
<td>3.80</td>
</tr>
<tr>
<td><strong>Community Perspective</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Percent of Budget Allocated to Non-recompensed Care</td>
<td>7.00%</td>
<td>7.00%</td>
<td>6.91</td>
<td>7.00%</td>
<td>6.90%</td>
<td>6.93%</td>
</tr>
<tr>
<td>14. Percent of Budget Spent on Community Health Promotion Programs</td>
<td>0.30%</td>
<td>0.30%</td>
<td>0.32%</td>
<td>0.29%</td>
<td>0.28%</td>
<td>0.31%</td>
</tr>
<tr>
<td><strong>Financial Perspective</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. Operating Margin-Percent</td>
<td>↑ 1.2%</td>
<td>1.5%</td>
<td>-0.5%</td>
<td>0.7%</td>
<td>0.9%</td>
<td>0.4%</td>
</tr>
<tr>
<td>16. Monthly Revenue (Million)—change so shows red—but sp cause good related to occupancy</td>
<td>↑ 20.0</td>
<td>20.6</td>
<td>17.6</td>
<td>16.9</td>
<td>17.5</td>
<td>18.3</td>
</tr>
</tbody>
</table>
How Is Error Rate Doing?

3. Safety Events per 10,000 Adjusted Patient Days

<table>
<thead>
<tr>
<th>Goals</th>
<th>FY 09 Goal</th>
<th>Long Term Goal</th>
<th>FY 2007</th>
<th>FY 2008</th>
<th>FY 2009 Q1</th>
<th>FY 2009 Q2</th>
<th>FY 2009 Q3</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Safety Events per 10,000 Adjusted Patient Days</td>
<td>↓</td>
<td>0.28</td>
<td>0.20</td>
<td>0.35</td>
<td>0.31</td>
<td>0.31</td>
<td>0.30</td>
</tr>
</tbody>
</table>

3. Safety Error Rate per 10,000 Adj. Bed Days

Source: Provost, Murray & Britto (IHI Forum 2010)
How is Perfect Care Doing?

Source: Provost, Murray & Britto (IHI Forum 2010)
Control Chart Dashboard

Source: Provost, Murray & Britto (IHI Forum 2010)
Questions?
Thank You!

Richard Scoville

richard@rscovville.net