Author(s): Darrell A. Campbell, Jr. MD, FACS

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The Power of Collaboration

In a real world setting

Health Informatics
Darrell A. Campbell, Jr. MD, FACS
Professor of Surgery, UM
“Managing Clinical Knowledge for Clinical Improvement” Balas and Boren

Yearbook of Medical Informatics 2000
The problem: Slow diffusion of knowledge

- New technology: 4-6 yrs to reach 25 citations
- Thrombolytic drugs for AMI: 13 years before experts recommended
- 6.3 yrs for evidence to reach reviews, papers and texts
- Increase rate of use for 9 landmark findings was 3.2% per year
- 15.6 years from 0% to 50% use
Diffusion of knowledge in surgery

Reputation based
Word of mouth referrals
Outcomes assumed to be good
"I am called eccentric for saying in public that hospitals, if they wish to be sure of improvement, must find out what their results are. Must analyze their results to find their strong and weak points. Must compare their results with those of other hospitals... Such opinions will not be eccentric a few years hence."

E. A. Codman, MD
(1869 - 1940)
The Present

Hospital based
Outcomes increasingly important
Diffusion of knowledge still a problem
What is a better approach?
- BCBSM pays for every penny of this initiative
- BCBSM sees only aggregate data
- A pay for participation model
How to improve surgical quality

- Develop a surgical registry
- Use the registry to examine variation in quality
- Identify best performing hospitals
- Identify “best practices” in the best performing hospitals
- Distribute the information
The importance of the site visit
Culture is important

FRIENDLY

- Collegial
- Non-competitive
- Evidence-based
The MSQC “Blood Oath”

- We will not use the data for competitive advantage (no billboards)
- Information shared at working group meetings is confidential
- There are no secrets among our group
Success factors for the MSQC

**STRUCTURE**
- Financial support
- Payer agnostic to results
- “Pay for participation”
- Reliable data, (doctors believe it), regular feedback
- Regional rather than national organization
- Multidisciplinary (doctors, nurses, administration)

**CULTURE**
- High quality workers
- Non threatening
- Non competitive
- Engagement
- Site visits welcomed
- Interest in discovery and innovation
Evidence based medicine

Made easily available to the sites
Antibiotics within 60 min of incision (SCIP1)

82% overall compliant

57% for emergent
Appropriate antibiotics (SCIP2)

80% overall compliant
53% emergent
Antibiotic dose adjustment based on weight

- 55% compliant
Redosing of antibiotic after 3 hours of surgery

7% compliant!!
Oral non absorbable antibiotics after mechanical bowel prep

39% compliant
Does this approach work?

Yes
EXHIBIT 2


SOURCE Michigan Surgical Quality Collaborative and National Surgical Quality Improvement Program registries, 2005–09. NOTES Morbidity rates declined faster in Michigan hospitals (p < 0.001) and, by 2009, were lower than in other hospitals participating in the National Surgical Quality Improvement Program (p < 0.001).
2009-2011

BCBSM estimated it had saved 85.9 million dollars in avoidable costs via MSQC
The Future

Of Surgical Quality Improvement
The national approach to hospital based QI

Is fundamentally flawed

Hospital bears all of the cost for QI

Financial penalties sometimes apply (never events, VBP)
Surgical complications are expensive

Reducing the incidence of expensive complications benefits the patients

Saves money— but whose money?
Who pays for poor surgical quality? Building a business case for quality improvement

JACS 2006 202:933

Justin B. Dimick, MD, MPH; Raj J. Karia, MPH; Smita Das, MPH; William B. Weeks, MD, MBA, Darrell A. Campbell, Jr., M.D.
Overall hospital costs and revenues for surgical patients with and without complications.

<table>
<thead>
<tr>
<th></th>
<th>Costs: Resources used by the Hospital</th>
<th>Reimbursement: Amount Paid to the Hospital</th>
<th>Hospital Profit (Revenues less Costs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No complications</td>
<td>$10,978</td>
<td>$14,266</td>
<td>$3,288</td>
</tr>
<tr>
<td>With complications</td>
<td>$21,156</td>
<td>$21,911</td>
<td>$755</td>
</tr>
<tr>
<td><strong>Change in Reimbursement:</strong></td>
<td></td>
<td><strong>$7,645</strong></td>
<td></td>
</tr>
</tbody>
</table>
### Costs: Resources used by the Hospital

<table>
<thead>
<tr>
<th></th>
<th>Costs: Resources used by the Hospital</th>
<th>Reimbursement: Amount Paid to the Hospital</th>
<th>Hospital Profit (Revenues less Costs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colon resection for benign or malignant disease</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No complications (n=40)</td>
<td>$15,464</td>
<td>$22,353</td>
<td>$6,889</td>
</tr>
<tr>
<td>With complications (n=11)</td>
<td>$35,950</td>
<td>$34,490</td>
<td>($1,460)</td>
</tr>
<tr>
<td><strong>Change in Reimbursement:</strong></td>
<td></td>
<td></td>
<td><strong>$12,137</strong></td>
</tr>
</tbody>
</table>
The stakeholder who bears the largest burden of additional costs from surgical complications would have a strong incentive to support quality improvement activities.
What are the options?

States have no money
CMS ? (never events, VBP)
Third party payers (BCBS)
BCBSM has a lot of skin in the game

Voluntary Employee Benefits Agreement
850,000 UAW member health benefits
BCBSM administers the VEBA
Responsible to UAW for improving quality
QI efforts should be facilitated

By modern information technology

Get the information to the hospital, but also the individual surgeon
User Flow

Log-in as usual
User Flow

Click on Reports/Charts
Reporting: Quality

Quality > By Procedure > Rankings

Provider
Univ. of Michigan

Specialty
General Surgery

Sub-specialty
Acute Care Surgery

Procedure
Colectomy

Approach
Open

Peer Group
All

Time Period
Program to date

Complications by Severity

Surgical Complications

Utilization Events

Medical Complications

Selected Provider
Benchmark
## Reporting: Quality

### General Surgery > Snapshot

#### General Abdominal Surgery

<table>
<thead>
<tr>
<th>Category</th>
<th>Selected Provider</th>
<th>Benchmark</th>
<th>Any (%)</th>
<th>Serious (%)</th>
<th>Readmit (%)</th>
<th>Reop (%)</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

#### Cancer Surgery

<table>
<thead>
<tr>
<th>Category</th>
<th>Selected Provider</th>
<th>Benchmark</th>
<th>Any (%)</th>
<th>Serious (%)</th>
<th>Readmit (%)</th>
<th>Reop (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Acute Care Surgery

<table>
<thead>
<tr>
<th>Category</th>
<th>Selected Provider</th>
<th>Benchmark</th>
<th>Any (%)</th>
<th>Serious (%)</th>
<th>Readmit (%)</th>
<th>Reop (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

#### Colorectal Surgery

<table>
<thead>
<tr>
<th>Category</th>
<th>Selected Provider</th>
<th>Benchmark</th>
<th>Any (%)</th>
<th>Serious (%)</th>
<th>Readmit (%)</th>
<th>Reop (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>
Reporting: Quality

Complications by Severity

Surgical Complications

Utilization Events

Medical Complications

Provider
Univ. of Michigan

Specialty
General Surgery

Sub-specialty
Acute Care Surgery

Procedure
Colectomy

Approach
Open

Peer Group
All

Time Period
Program to date

Selected Provider
Benchmark
Quality > By Procedure > Complications Drill-down

<table>
<thead>
<tr>
<th>Complications (%)</th>
<th>Selected</th>
<th>Benchmark</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any complication</td>
<td>7.2%</td>
<td>8.9%</td>
<td>0.03</td>
</tr>
<tr>
<td>Grade I</td>
<td>4.6%</td>
<td>6.0%</td>
<td>0.02</td>
</tr>
<tr>
<td>Grade II</td>
<td>1.9%</td>
<td>2.0%</td>
<td>0.58</td>
</tr>
<tr>
<td>Grade III</td>
<td>0.7%</td>
<td>0.9%</td>
<td>0.19</td>
</tr>
<tr>
<td>Acute Renal Problems</td>
<td>1.2%</td>
<td>1.4%</td>
<td>0.14</td>
</tr>
<tr>
<td>Cardiac Arrest /CPR</td>
<td>0.3%</td>
<td>0.3%</td>
<td>0.51</td>
</tr>
<tr>
<td>Cardiac Arrhythmias</td>
<td>1.7%</td>
<td>1.6%</td>
<td>0.74</td>
</tr>
<tr>
<td>Deep Incisional SSI</td>
<td>1.1%</td>
<td>1.3%</td>
<td>0.23</td>
</tr>
<tr>
<td>DVT req. Therapy</td>
<td>3.4%</td>
<td>3.5%</td>
<td>0.89</td>
</tr>
<tr>
<td>Myocardial Infarction</td>
<td>0.1%</td>
<td>0.1%</td>
<td>0.74</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>4.1%</td>
<td>4.0%</td>
<td>0.52</td>
</tr>
<tr>
<td>Pulmonary Embolism</td>
<td>0.7%</td>
<td>0.6%</td>
<td>0.51</td>
</tr>
<tr>
<td>Sepsis</td>
<td>5.1%</td>
<td>4.9%</td>
<td>0.42</td>
</tr>
<tr>
<td>Stroke/CVA</td>
<td>0.4%</td>
<td>0.5%</td>
<td>0.09</td>
</tr>
<tr>
<td>Superficial Incisional SSI</td>
<td>3.2%</td>
<td>3.1%</td>
<td>0.77</td>
</tr>
<tr>
<td>Transfusions w/i 72</td>
<td>2.6%</td>
<td>3.1%</td>
<td>0.02</td>
</tr>
</tbody>
</table>
A More Expansive Approach

To surgical quality improvement
MSQC

Optimal Preparation for Surgery

Prevention of Complications

Rescue after Complications
“Pre-hab” checklist-30 days prior to OR

- Stop smoking
- Incentive spirometer
- Walk 2-3 miles/day
- HgbA1c for diabetics, glycemic control
- Correct anemia (hct <30%)
- Nasal culture for Staph
- Antibacterial soap X 3 days pre op
- Consider starting a Beta blocker
- Consider starting a statin
Use the power of the group

To think differently about common problems
58 year old male with diabetes, previous myocardial infarction, and COPD who is pre-operative for a colectomy

58 year old male with diabetes, previous myocardial infarction, and COPD who is pre-operative for a colectomy
Analytic Morphomics

Body Composition
Analytic Morphomics

Core Muscle Size
Adjusted Complication Rates following Elective General and Vascular Surgery Stratified by tertiles of Core Muscle Size

- Smallest Core Muscles: 20.9%
- Largest Core Muscles: 12.3%

Tertiles of Core Muscle Size
Survival (Kaplan-Meier) following major surgery
Stratified by tertiles of lean core muscle size

Time 0: n=586 for tertile 1, 450 for tertile 2, 449 for tertile 3
Time 1 year: n=505 for tertile 1, 406 for tertile 2, 426 for tertile 3
Time 3 years: n=223 for tertile 1, 170 for tertile 2, 207 for tertile 3
SPECIAL ARTICLE

Variation in Hospital Mortality Associated with Inpatient Surgery

Amir A. Ghaferi, M.D., John D. Birkmeyer, M.D., and Justin B. Dimick, M.D., M.P.H.
“Rescue” after a complication

- Large variation among MSQC hospitals
- ICU staffing “closed” or not
- Academic vs community
- Nurse staffing
- Weekend coverage
- Rapid Response Team
- Sepsis identification protocol
Linkage with anesthesia

Complications after surgery are more closely associated with anesthetic management than we have ever imagined.
The OR of the Future

- AIMS
- Nursing database
- Video Analysis
- 30 day outcomes

The Operation
Anesthetic variables added to MSQC

- Total fluid given, and type, total out
- Blood product replacement
- Temp, glycemic control
- Anesthetic technique, agent
- Neosynephrine, hypotension
- Epidural placement, level
- Art line, CO monitoring
- BIS monitoring
Go where the money is

Emergency surgery
Case Breakdown

- Emergent Cases
- Elective Cases

n = 211,903

90.05%

9.95%
Mortality

- Emergent Cases
- Elective Cases

n = 4,899

- 67.97%
- 32.03%
Complications

Emergent Cases: 59.64%
Elective Cases: 40.36%

n = 52,224
Costs from Complications

- Emergent Cases
- Elective Cases

n = 52,224

Elective Costs: $305,707,805
Emergent Costs: $206,870,755
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