OR Efficiency and Throughput: Benchmarking and Process Optimization

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Enhance Healthcare
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No Relevant Financial Relationships to Disclose
Objectives

• Discuss the heightened importance of OR Efficiency under healthcare reform
• Review the sequential processes which constitute the OR continuum
• Discuss key indicators of OR process performance
• Overview Benchmarking options
• Overview prioritization and implementation of process improvement initiatives
HC Reform – from Volume to Value

**Volume-Based First Curve**
- Fee-for-service reimbursement
- High quality not rewarded
- No shared financial risk
- Acute inpatient hospital focus
- IT investment incentives not seen by hospital
- Stand-alone care systems can thrive
- Regulatory actions impede hospital-physician collaboration

**Value-Based Second Curve**
- Payment rewards population value: quality and efficiency
- Quality impacts reimbursement
- Partnerships with shared risk
- Increased patient severity
- IT utilization essential for population health management
- Scale increases in importance
- Realigned incentives, encouraged coordination

THE GAP
OR’s and Healthcare Reform

• A focus on patient safety, efficiency and customer service
• Reimbursement linked to performance
• “Patient friendly” care
• Pressure on reimbursement and margins
• Ultimately reimbursement pressure, service pressure and outcome pressure create a Darwinian “survival of the fittest” environment. Efficiency and best practices are a must.
OR Continuum

**OR CONTINUUM**

**PRE-OPERATIVE PROCESSES**
- Surgeon Calls to Book Case
- Case Scheduled
- EOB Day before Surgery
- Patient ready for OR in Holding

**INTRA OPERATIVE PROCESSES**
- Patient Ready for OR in Holding
- Anesthesia Induction Complete
- Dressing or Cast On
- Ready for PACU Transport

**POST OPERATIVE PROCESSES**
- Ready for PACU Transport
- PACU Report and Acceptance
- Discharge Criteria Met
- Transfer Out of PACU
Measuring Efficiency
OR Continuum – Key Metrics

**Pre-Operative**
- Scheduling Accuracy
- Labs/Consults on chart
- Consents/H&P on chart
- % seen in PAT
- % charts complete

**Intra-operative**
- OR Utilization
- Turnover Time (TOT)
- Block Utilization
- OR “Pyramid”
- Pt. in to Incision
- % On Time starts
- % DOS Cancellations
- % TOT > 1 Hour
- Excess Staffing Costs

**Post-operative**
- Overnight Stays
- PACU “OR Holds”
- % Reintubation
- % Narcotic reversal
- % Relaxant reversal
Outpatient Chart Completion

• Key indicator of pre-op preparation
• PAT has meaningful impact on cancellations and on time starts

Definition:
• All chart work complete by EOB day before surgery
• Required labs on chart
• Required consults on chart
• Anesthesia Review
• H&P on chart
• Consents may be pending

• Results are highly variable
• Varies from 0 to 92% completed
• Most facilities do not track
• A valuable data point but requires some internal resources to track
Day of Surgery Cancellations

- Frequency varies greatly from <1-15% in published studies
- Often higher cancellation rates are in facilities with poor PAT, distant patients, or overbooked OR’s
- Cancellations lead to potentially large gaps in surgical schedules – leaving expensive resources unused
- Expensive – loss of $4,550 per cancelled case to hospital per Tulane ASA study
- Consistently reduced by evaluation in PAT
- Many similar attributes for delayed first case starts
## "Real World" Day of Surgery Cancellations

<table>
<thead>
<tr>
<th>HOSPITAL</th>
<th>Cancel same day</th>
<th>Total Cancels</th>
<th>Actual Cases</th>
<th>Total resched</th>
<th>% resched</th>
<th>Cancelled DOS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>18</td>
<td>61</td>
<td>428</td>
<td>13</td>
<td>21%</td>
<td>4.21</td>
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<tr>
<td>2</td>
<td>0</td>
<td>15</td>
<td>177</td>
<td>10</td>
<td>67%</td>
<td>0.00</td>
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<tr>
<td>3</td>
<td>26</td>
<td>105</td>
<td>592</td>
<td>39</td>
<td>37%</td>
<td>4.39</td>
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<td>4</td>
<td>6</td>
<td>21</td>
<td>359</td>
<td>6</td>
<td>29%</td>
<td>1.67</td>
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<tr>
<td>5</td>
<td>4</td>
<td>31</td>
<td>323</td>
<td>9</td>
<td>29%</td>
<td>1.24</td>
</tr>
<tr>
<td>6</td>
<td>12</td>
<td>40</td>
<td>230</td>
<td>13</td>
<td>33%</td>
<td>5.22</td>
</tr>
<tr>
<td>7</td>
<td>10</td>
<td>134</td>
<td>1011</td>
<td>43</td>
<td>32%</td>
<td>0.99</td>
</tr>
<tr>
<td>8</td>
<td>5</td>
<td>49</td>
<td>383</td>
<td>12</td>
<td>24%</td>
<td>1.31</td>
</tr>
<tr>
<td>9</td>
<td>8</td>
<td>32</td>
<td>178</td>
<td>8</td>
<td>25%</td>
<td>4.49</td>
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<tr>
<td>10</td>
<td>4</td>
<td>39</td>
<td>427</td>
<td>11</td>
<td>28%</td>
<td>0.94</td>
</tr>
<tr>
<td>11</td>
<td>1</td>
<td>26</td>
<td>186</td>
<td>8</td>
<td>31%</td>
<td>0.54</td>
</tr>
<tr>
<td>12</td>
<td>12</td>
<td>45</td>
<td>300</td>
<td>10</td>
<td>22%</td>
<td>4.00</td>
</tr>
<tr>
<td>13</td>
<td>55</td>
<td>110</td>
<td>929</td>
<td>51</td>
<td>46%</td>
<td>5.92</td>
</tr>
<tr>
<td>14</td>
<td>11</td>
<td>58</td>
<td>417</td>
<td>8</td>
<td>14%</td>
<td>2.64</td>
</tr>
<tr>
<td>15</td>
<td>14</td>
<td>37</td>
<td>333</td>
<td>6</td>
<td>16%</td>
<td>4.20</td>
</tr>
<tr>
<td>16</td>
<td>2</td>
<td>63</td>
<td>462</td>
<td>17</td>
<td>27%</td>
<td>0.43</td>
</tr>
<tr>
<td>TOTALS</td>
<td>188</td>
<td>866</td>
<td>6735</td>
<td>264</td>
<td>30%</td>
<td>2.79</td>
</tr>
</tbody>
</table>
• Many ways to measure
• Need “Apples to Apples”
• EH uses Actual minutes in OR
• EH uses staffed locations
• Mixing utilization calculations is misleading
• Properly measured, utilization is the “bottom line” of efficiency analysis
"Real World" Utilization Data

EH Database OR Utilization 7A-3P

\[ \bar{X} = 45.86 \]
Turnover Time

- Key surgeon satisfier
- Multiple inter-related processes
- Impact increases with more cases per OR
- In order to understand TOT, need to standardize the definition
  - Close to cut
  - Wheels out to wheels in
  - Close to wheels in
  - Are flip rooms counted?
- Expected TOT varies greatly by specialty
Orthopedic Surgery: Turnover Data MD TAT following same surgeon

**Orthopedic Surgery**

**Closure to Next Incision**
(In Minutes)

**Orthopedic Surgery**

**Patient Exit to Next Entrance**
(In Minutes)

**Industry Average**
61 minutes

**Industry Average**
26 minutes

Patient In → Cut → Close → Patient Out

34.1 min → 3.2 min → 7.4 min → 44.8 min
ENT: Turnover Time  MD TAT following same surgeon

ENT Cases

Closure to Next Incision
(In Minutes)

ENT Cases

Patient Exit to Next Entrance
(In Minutes)

Industry Average= 42 minutes

Industry Average= 17 minutes
"Real World" Turnover Time Examples

12 Hospitals in a single system in the Northeast

MD Turnaround Time (Minutes)
Benchmarking Efficiency
## ORC Benchmarking from McKesson

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Actual</th>
<th>Mean</th>
<th>Achievement 1</th>
<th>STAC Weighted</th>
<th>Achievement 2</th>
<th>ASC Mean</th>
<th>Achievement 3</th>
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</thead>
<tbody>
<tr>
<td><strong>Start Time Accuracy</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% First Case On-Time or Early +/- 5%</td>
<td>96.0%</td>
<td>65.3%</td>
<td>147.00%</td>
<td>82.3%</td>
<td>116.72%</td>
<td>64.7%</td>
<td>148.47%</td>
</tr>
<tr>
<td>% Subsequent Case On-Time or Early</td>
<td>79.1%</td>
<td>55.0%</td>
<td>143.77%</td>
<td>58.1%</td>
<td>138.16%</td>
<td>59.4%</td>
<td>133.24%</td>
</tr>
<tr>
<td><strong>Case Time Effectiveness</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient In to Patient Out</td>
<td>82.6%</td>
<td>92.0%</td>
<td>146.99%</td>
<td>99.4%</td>
<td>158.88%</td>
<td>64.0%</td>
<td>102.25%</td>
</tr>
<tr>
<td>Patient In to Anesthesia Ready</td>
<td>11.6%</td>
<td>10.0%</td>
<td>85.94%</td>
<td>11.9%</td>
<td>102.65%</td>
<td>6.0%</td>
<td>51.57%</td>
</tr>
<tr>
<td>Patient In to Incision</td>
<td>15.0%</td>
<td>22.0%</td>
<td>146.65%</td>
<td>25.2%</td>
<td>168.12%</td>
<td>15.0%</td>
<td>99.99%</td>
</tr>
<tr>
<td>Incision to Close</td>
<td>42.4%</td>
<td>61.0%</td>
<td>143.76%</td>
<td>63.8%</td>
<td>150.43%</td>
<td>42.0%</td>
<td>98.98%</td>
</tr>
<tr>
<td>Close to Patient Out</td>
<td>5.2%</td>
<td>8.0%</td>
<td>155.11%</td>
<td>9.5%</td>
<td>184.87%</td>
<td>6.0%</td>
<td>116.33%</td>
</tr>
<tr>
<td>Average Turnover Minutes</td>
<td>11.4%</td>
<td>21.0%</td>
<td>183.73%</td>
<td>28.7%</td>
<td>251.50%</td>
<td>18.0%</td>
<td>157.48%</td>
</tr>
<tr>
<td>% Scheduling Accuracy</td>
<td>64.3%</td>
<td>49.8%</td>
<td>120.23%</td>
<td>40.8%</td>
<td>157.56%</td>
<td>59.7%</td>
<td>107.75%</td>
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<tr>
<td><strong>Utilization</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Utilized 7am-3pm</td>
<td>97%</td>
<td>78.2%</td>
<td>123.54%</td>
<td>71.8%</td>
<td>134.60%</td>
<td>72.3%</td>
<td>133.68%</td>
</tr>
<tr>
<td>% Utilized 3pm-5pm</td>
<td>76%</td>
<td>76.3%</td>
<td>99.62%</td>
<td>72.8%</td>
<td>104.42%</td>
<td>54.4%</td>
<td>139.79%</td>
</tr>
<tr>
<td>% Utilized 5pm-7pm</td>
<td>60%</td>
<td>72.1%</td>
<td>95.76%</td>
<td>69.4%</td>
<td>99.58%</td>
<td>194.3%</td>
<td>35.56%</td>
</tr>
<tr>
<td>% Utilized 7pm-11pm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Same Day Add-On Weekdays</td>
<td>4.1%</td>
<td>11.9%</td>
<td>289.00%</td>
<td>6.7%</td>
<td>162.97%</td>
<td>1.0%</td>
<td>24.63%</td>
</tr>
<tr>
<td>% Block Utilization</td>
<td>92.2%</td>
<td>77.8%</td>
<td>118.76%</td>
<td>58.1%</td>
<td>158.61%</td>
<td>59.4%</td>
<td>155.31%</td>
</tr>
<tr>
<td>% of Schedule Blocked</td>
<td>24.6%</td>
<td>34.6%</td>
<td>529.48%</td>
<td>99.9%</td>
<td>1540.06%</td>
<td>9.4%</td>
<td>7.83%</td>
</tr>
<tr>
<td>% Same Day Cancelled / Postponed</td>
<td>0.6%</td>
<td>3.4%</td>
<td>529.48%</td>
<td>99.9%</td>
<td>1540.06%</td>
<td>9.4%</td>
<td>7.83%</td>
</tr>
<tr>
<td><strong>Quality</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Patients Screened Prior to Surgery</td>
<td>85.1%</td>
<td>69.7%</td>
<td>121.99%</td>
<td>44.1%</td>
<td>192.73%</td>
<td>1.1%</td>
<td>7.83%</td>
</tr>
<tr>
<td>% Surgical Pause Compliance</td>
<td>100.0%</td>
<td>97.4%</td>
<td>102.68%</td>
<td>99.9%</td>
<td>100.05%</td>
<td>99.6%</td>
<td>100.44%</td>
</tr>
<tr>
<td>% Returns to Surgery w/ 24 hrs</td>
<td>0.3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>
## OR Efficiency Scoring System

<table>
<thead>
<tr>
<th>Measurements</th>
<th>poor performance</th>
<th>medium performance</th>
<th>high performance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Excess Staffing Costs</strong></td>
<td>&gt;10%</td>
<td>5-10%</td>
<td>&lt;5%</td>
</tr>
<tr>
<td><strong>Start-time tardiness</strong> (mean tardiness for elective cases/day)</td>
<td>&gt;60 min</td>
<td>45-60 min</td>
<td>&lt;45 min</td>
</tr>
<tr>
<td><strong>Case cancellation rate</strong></td>
<td>&gt;10%</td>
<td>5-10%</td>
<td>&lt;5%</td>
</tr>
<tr>
<td><strong>Post Anesthesia Care Unit (PACU) admission delays</strong> (% workdays with at least one delay in PACU admission)</td>
<td>&gt;20%</td>
<td>10-20%</td>
<td>&lt;10%</td>
</tr>
<tr>
<td><strong>Contribution Margin</strong> (mean) per operating room hour</td>
<td>&lt;$1,000/hr</td>
<td>$1–2,000/hr</td>
<td>&gt;$2,000/hr</td>
</tr>
<tr>
<td><strong>Turnover Time</strong> (for all cases mean time from previous patient out of the OR to next patient in the OR including setup and cleanup)</td>
<td>&gt;40 min</td>
<td>25-40 min</td>
<td>&lt;25 min</td>
</tr>
<tr>
<td><strong>Prediction Bias</strong> (bias in case duration estimates per 8 hours of operating room time)</td>
<td>&gt;15 min</td>
<td>5-15 min</td>
<td>&lt;5 min</td>
</tr>
<tr>
<td><strong>Prolonged turnovers</strong> (% turnovers lasting more than 60 minutes)</td>
<td>&gt;25%</td>
<td>10-25%</td>
<td>&lt;10%</td>
</tr>
</tbody>
</table>

From Macario, A. Are your hospital operating rooms efficient? Anesthesiology. 2006; 105:237-240
Vendor Internal Benchmarks

- Anesthesia Groups
- Anesthesia Billing Companies
- OR Information Systems
- Consultant Databases
Process Improvement
Initial Steps

• Establish an OR improvement committee
  – Surgeons
  – Anesthesia
  – Nursing
  – Administration
  – Other support areas as indicated (PAT, PACU, Central Sterile etc)

• Dashboard or similar – where are the biggest opportunities (furthest deviation from target)?

• Quantify financial and operational impact

• Create a list of initial target opportunities

• Focus resources on a short list (1 to 3) of the highest priorities
<table>
<thead>
<tr>
<th>Operating Room Metrics</th>
<th>Target</th>
<th>March 2013</th>
<th>YTD March</th>
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</thead>
<tbody>
<tr>
<td>Operating Room Utilization (Prime Time)</td>
<td>0.75</td>
<td>0.63</td>
<td>0.61</td>
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<tr>
<td>Average Turnover Time (Prime Time)</td>
<td>22 Minutes</td>
<td>36</td>
<td>38</td>
</tr>
<tr>
<td>PAT Charts Complete</td>
<td>95%</td>
<td>85</td>
<td>73</td>
</tr>
<tr>
<td>Excess Staffing Costs</td>
<td>&lt;6%</td>
<td>4%</td>
<td>3.40%</td>
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<tr>
<td>Add-On Cases</td>
<td>N/A</td>
<td>200</td>
<td>210</td>
</tr>
<tr>
<td>Total Cases Scheduled &lt; or &gt; 20 Minutes</td>
<td>80</td>
<td>82%</td>
<td>80%</td>
</tr>
<tr>
<td>Total Surgical Cases/Location</td>
<td>1,000</td>
<td>1,045</td>
<td>1,070</td>
</tr>
<tr>
<td>Call Cases</td>
<td>N/A</td>
<td>140</td>
<td>150</td>
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<tr>
<td>PACU Delays</td>
<td>&lt;8%</td>
<td>12%</td>
<td>12%</td>
</tr>
<tr>
<td>Timely First Case Start Percentage</td>
<td>0.85</td>
<td>0.8</td>
<td>0.78</td>
</tr>
<tr>
<td>Same Day Case Cancellation Percentage</td>
<td>&lt;1%</td>
<td>0.74%</td>
<td>0.83%</td>
</tr>
</tbody>
</table>
Process Improvement

- Create a process map
- Observe and measure component processes
- Parallel processing where practical
- Engage operational teams to improve processes
- Test and measure results
- Document improved process steps
- Ongoing measurement of performance
TOT Process Initial – Observe and Measure Components

Surgeon TOT 60 Minutes
TOT Process Improved – Parallel Processing

Surgeon TOT 45 Minutes
Take Home Points:

• Healthcare reform will likely result in “survival of the fittest”
• View the OR as a continuum of inter-related processes
• Measure Key Process Indicators
• If benchmarking, make sure you are comparing “apples to apples”
• Approach process improvement analytically, prioritize efforts and focus your resources
QUESTIONS?

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