How to Win Under Bundled Payments

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MPA Healthcare Solutions
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Adjunct Professor of Surgery
Northwestern University Feinberg School of Medicine
Clinical leaders in developing and applying innovative analytical methods in the healthcare industry

Over two decades of experience measuring and improving risk-adjusted clinical outcomes

Over a decade of experience designing episode-based payment systems

Clients represent all major healthcare industry stakeholders

Research studies in peer-reviewed journals
Healthcare Payment Reform: “Rearranging the Deck Furniture”

- Pay-for-Performance Initiatives
- Public Reporting of Outcomes
- Health Savings Accounts
- Utilization Review
- Villain-izing Industry
- Punitive Government Measures
Learning Objectives: Bundled Payments

- Defining Bundled Payments
- Defining the Adverse Outcomes of Care
- Importance of Risk-Adjustment
- Importance of Post-discharge Adverse Outcomes
- Comparative Effectiveness: Pathway to Better Outcomes
Bundled Payments

• Definition: A Single payment that covers the entire episode of care and is inclusive of
  • Inpatient Facility Costs
  • Total Professional Costs
  • Post discharge costs for a defined length-of-time (e.g., 90 days)

• Bundled Payments may include
  • Inpatient Surgical Care
  • Ambulatory/Outpatient Procedures
  • Inpatient Medical Admissions
  • Obstetrical Services
  • Outpatient Chronic Disease Management (Temporal Bundle)

Total Prospective Payment of Episode of Surgical Care = Routine Cost of Episode + Margin + Surgical Warranty

Surgical Warranty = \(P\{\text{Adverse Outcome}\} \times \text{Risk-Adjusted Cost of the Adverse Outcome}\)

Intelligent Bundles Inherently Link Quality and Cost

Quality and cost are interdependent. Bundled payment should incentivize high quality, efficient care – rewarding outcomes rather than adherence to process measures.

Global Bundle Budget
- Rewards efficiency
- Penalizes over-utilization

Warranty
- Rewards high-quality care
- Penalizes under-utilization

Prospective Risk-adjustment
- Ensures consistency of pricing within each bundle
- Eliminates incentives to ‘cherry pick’
- Encourages appropriate selection of cases
- Ensures patient access to high quality care regardless of risk
Calculating the Warranty

In commodity industries...

Expected defect rate \times \text{Expected cost of repair or replacement} = \text{Warranty}

In healthcare...

Expected adverse outcome (AO) rate \times \text{Expected cost of care associated with treating AO} = \text{Warranty}
A Holistic Approach: Measure *Everything* For Which You’re Assigning Responsibility

**In commodity industries...**

Must consider what can go wrong with all of the parts

**In healthcare...**

Quality measures must likewise be holistic in nature and reflect outcomes that drive cost

- Death
- Prolonged length of stay
- Emergency Department visits
- Readmissions
- Post-discharge deaths
What is the Objective of Bundled Payment?

Moving from the current system of misaligned incentives

To align all interests, with all parties working to improve quality and reduce costs

If one party “wins” everyone “wins”

Physician, Hospital, Payer

Encourages flexibility to practice the best medicine possible
The Adverse Outcome
What is a Complication?

When I use a word, it means just what I choose it to mean—neither more nor less.

-Humpty Dumpty

**Complications?**

<table>
<thead>
<tr>
<th>Lack of accepted definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of severity; i.e., an SSI is an SSI but commonly have not been differentiated by severity</td>
</tr>
<tr>
<td>There are hundreds of surgical complication codes; are all created equal?</td>
</tr>
<tr>
<td>Surveillance is inconsistent, especially with post-discharge events</td>
</tr>
<tr>
<td>Not risk-adjusted</td>
</tr>
</tbody>
</table>

Lewis Carroll: Through the Looking Glass, Chapter 6, 1871.
# Quality in Surgical Care: Effective Measurement of Outcomes

<table>
<thead>
<tr>
<th>Objective</th>
<th>Consistent</th>
<th>Reproducible</th>
<th>Clearly Defined</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk-adjusted</td>
<td>Not Self-Reported!</td>
<td>“No Fault”</td>
<td>Composite Evaluation</td>
</tr>
</tbody>
</table>
Medicare post-discharge deaths and readmissions following elective surgery

Donald E. Fry, M.D.\textsuperscript{a,b,c,*}, Michael Pine, M.D, M.B.A.\textsuperscript{a,d}, Gregory Pine, B.A.\textsuperscript{a}

Composite Measurements of Adverse Surgical Outcomes

- Inpatient Mortality
- Inpatient Complications
- Readmissions
- Post-Discharge Mortality
Risk-Adjustment:

*All Patients Are Not the Same*
The Necessity of Risk-Adjustment in the Healthcare Warranty

• Significant variability of inputs is unacceptable in manufacturing. However, this variation is a given in healthcare, where each patient is intrinsically different.

Some patient characteristics that influence outcomes are beyond the control of providers. Case severity increases the risk of adverse events and increases the resources necessary to treat those adverse events.

Expected adverse outcome rate should be calibrated to the demonstrated adverse outcome (AO) rate of good quality providers.
Elements of the Adverse Outcome Logistic Modeling

- All Qualifying Cases At Admission
- Inpatient Deaths
- All Live Discharges
- Prolonged LOS (prLOS)
- Live Discharges; no prLOS
- 90-Day PD Readmissions
- 90 Day PD Deaths; No Readmission
- Routine Cases
Risk-Adjusted Excess Costs

Model cost of routine care (cases without adverse events): Linear models

Model of excess costs

Excess Cost of Inefficiency (Routine Cases): Observed routine costs minus Predicted routine costs

Excess Cost of Adverse Outcomes (Warranty Computation): Observed Costs of Adverse Outcomes minus Predicted routine costs for that patient risk profile.

Establish per case budgets:

Total Predicted (p) Cost = p(Routine Cost) + p(Deaths) \times p(Excess Death Costs) + p(prRALOS) \times p(Excess prRALOS Costs) + p(PD-90 Deaths) \times p(Excess PD-90 Deaths Costs) + p(90-Readmissions) \times p(Excess 90-Readm Costs)
Case Severity Increases Bundle Budgets

*For Illustrative Purposes Only:* Risk-adjusted Budgets for CABG Surgery

(standardized to 2012 dollars)

<table>
<thead>
<tr>
<th>Case</th>
<th>Age 65 without risk factors</th>
<th>Age 75 with CHF and lung disease</th>
<th>Age 85 with CHF, lung disease, AMI and chronic renal disease</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Budgeted Routine Cost</strong></td>
<td>$22,555</td>
<td>$33,069</td>
<td>$45,514</td>
</tr>
<tr>
<td><strong>Warranty</strong></td>
<td>$356</td>
<td>$1,491</td>
<td>$10,664</td>
</tr>
<tr>
<td><strong>Total Budget</strong></td>
<td>$22,911</td>
<td>$34,560</td>
<td>$56,178</td>
</tr>
</tbody>
</table>

Data Source: MPA analysis of CMS LDS 100% inpatient sample (2010-2012). Costs were estimated by multiplying CMS cost-to-charge ratios for each hospital by patient-level total charges for cases treated at that hospital.

Distribution and risk factors that drive costs of routine care differ from those that drive costs after a complication has occurred.
Building Bundled Payment Models

MPA has built bundle models for 32 clinical categories (and the list is growing...)

Orthopedic Surgery
- Hip Replacement
- Knee Replacement

Spine Surgery
- Cervical Spinal Fusions
- Non-cervical Spinal Fusion
- Discotomy

Cardiovascular/Thoracic
- Coronary Artery Bypass Graft
- Cardiac Valve Replacement
- Percutaneous Cardiac Intervention
- Major Vascular Procedure
- Major Chest Procedure

General Surgery
- Anal Surgery w/o Bowel Surgery
- Hernia Repair w/o Bowel Surgery
- Breast Surgery
- Obesity Surgery
- Appendectomy
- Carotid Endarterectomy
- Laparoscopic Cholecystectomy
- Major Small and Large Bowel Surgery

Obstetrics
- Cesarean Section
- Vaginal Delivery
- Neonates

Genito-Urinary Surgery
- Hysterectomy and Adnexal Surgery
- Gynecological Procedure w/o Hysterectomy
- Prostatectomy and Cystectomy
- Nephrectomy

Coming soon...
Outpatient procedures

Medical Management
- Acute Myocardial Infarction
- Cerebrovascular Accident
- Respiratory Infection
- Heart Failure
- Gastrointestinal Hemorrhage
- Obstructive Pulmonary Disease
- Medical Back Disorders

*Blue categories are currently being implemented at a large health system*
Post-Discharge Adverse Outcomes
Over 13 million Medicare patients studied for one 15 month period:

- 30-day readmission rate after index hospitalization: **19%**
- 90-day readmission rate after index hospitalization: **34%**
90-Day Post-Discharge: Deaths and Readmissions (After Exclusions)

<table>
<thead>
<tr>
<th></th>
<th>CABG</th>
<th>Total Joint Replacement</th>
<th>Colon Resection</th>
<th>All Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inpatient Deaths</td>
<td>2.40%</td>
<td>0.11%</td>
<td>2.70%</td>
<td>0.54%</td>
</tr>
<tr>
<td>Live Discharges</td>
<td>155,596</td>
<td>682,459</td>
<td>69,986</td>
<td>2,054,189</td>
</tr>
<tr>
<td>With Coded Complications</td>
<td>81%</td>
<td>51%</td>
<td>67%</td>
<td>764,969 (37%)</td>
</tr>
<tr>
<td>With prRALOS Outliers</td>
<td>12%</td>
<td>5%</td>
<td>10%</td>
<td>147,292 (7%)</td>
</tr>
<tr>
<td>Post Discharge Deaths</td>
<td>1.2%</td>
<td>0.15%</td>
<td>3.0%</td>
<td>0.71%</td>
</tr>
<tr>
<td>Post-Discharge Readmission</td>
<td>15.5%</td>
<td>5.4%</td>
<td>14.3%</td>
<td>9.0%</td>
</tr>
</tbody>
</table>

Readmission rates are very heterogeneous across different index operations.

Readmissions After Colon Surgery

28,073 Readmissions After Exclusions

<table>
<thead>
<tr>
<th>Readmission Category</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infections</td>
<td>26.6%</td>
</tr>
<tr>
<td>GI Complications</td>
<td>24.5%</td>
</tr>
<tr>
<td>Cardiopulmonary</td>
<td>6.2%</td>
</tr>
<tr>
<td>Other Acute Problems</td>
<td>14.8%</td>
</tr>
<tr>
<td>Other Chronic Problems</td>
<td>27.9%</td>
</tr>
<tr>
<td>• Behavioral health issues</td>
<td></td>
</tr>
<tr>
<td>• COPD</td>
<td></td>
</tr>
<tr>
<td>• Diabetes</td>
<td></td>
</tr>
<tr>
<td>• GU readmissions</td>
<td></td>
</tr>
<tr>
<td>• CNS (non-CVA) issues</td>
<td></td>
</tr>
<tr>
<td>• Pressure Ulcers</td>
<td></td>
</tr>
<tr>
<td>• Minor GI Procedures</td>
<td></td>
</tr>
<tr>
<td>• Many Others</td>
<td></td>
</tr>
</tbody>
</table>

Comparative Effectiveness: Defining the Opportunity for Improved Outcomes and Cost Savings
Elective Medicare Colon Surgery (2010-2012)
129,861 Patients; 1,903 Hospitals

Risk-Adjusted Adverse Outcome Rate

Mean Adverse Outcome Rate 27.8%
First Decile 15.8%
Tenth Decile 39.4%

Error Bars: Interquartile Range

Inpatient Laparoscopic Cholecystectomy (2010-2012)
83,274 Patients; 1,570 Hospitals

Risk-Adjusted Adverse Outcome Rate

Mean Adverse Outcome Rate 20.8%
First Decile 10.0%
Tenth Decile 32.1%

Error Bars: Interquartile Range

# Total Joint Replacement

**Hips:** 253,978 Patients; 1,483 Hospitals  
**Knees:** 672,215 Patients; 2,349 Hospitals

### Hospital Outcome Deciles

<table>
<thead>
<tr>
<th></th>
<th><strong>Total Hip Replacement</strong></th>
<th><strong>Total Knee Replacement</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Avg. Adverse Outcome Rate</strong></td>
<td><strong>12.0%</strong></td>
<td><strong>11.6%</strong></td>
</tr>
<tr>
<td>Hospitals 2 SD better than avg.</td>
<td>98 (6.6%)</td>
<td>223 (9.5%)</td>
</tr>
<tr>
<td>Hospitals 2 SD poorer than avg.</td>
<td>142 (9.6%)</td>
<td>319 (13.6%)</td>
</tr>
<tr>
<td>Median First Decile</td>
<td>6.6%</td>
<td>6.4%</td>
</tr>
<tr>
<td>Median Tenth Decile</td>
<td>19.8%</td>
<td>19.3%</td>
</tr>
</tbody>
</table>

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**Outcome Deciles (Minimum 50 Cases/Hospital)**

<table>
<thead>
<tr>
<th>Decile</th>
<th>Hip</th>
<th>Knee</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6.6%</td>
<td>6.4%</td>
</tr>
<tr>
<td>2</td>
<td>8.3%</td>
<td>8.2%</td>
</tr>
<tr>
<td>3</td>
<td>9.6%</td>
<td>9.3%</td>
</tr>
<tr>
<td>4</td>
<td>10.6%</td>
<td>10.3%</td>
</tr>
<tr>
<td>5</td>
<td>11.6%</td>
<td>11.2%</td>
</tr>
<tr>
<td>6</td>
<td>12.4%</td>
<td>12.1%</td>
</tr>
<tr>
<td>7</td>
<td>13.4%</td>
<td>13.1%</td>
</tr>
<tr>
<td>8</td>
<td>14.6%</td>
<td>14.4%</td>
</tr>
<tr>
<td>9</td>
<td>16.4%</td>
<td>16.2%</td>
</tr>
<tr>
<td>10</td>
<td>19.8%</td>
<td>19.3%</td>
</tr>
</tbody>
</table>

Fry et al: J Bone Joint Surgery, 2017

© MPA 2017
Total Joint Replacement
Hips: 22,868 Readmits; 4,235 Infections
Knees: 49,896 Readmits; 11,261 Infections
Cardiac Surgery
CABG: 96,623 Patients; 1,031 Hospitals
Valves: 68,825 Patients; 794 Hospitals

**Coronary Artery Bypass Grafting**

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg. Adverse Outcome Rate</td>
<td>27.2%</td>
</tr>
<tr>
<td>Hospitals 2 SD better than avg.</td>
<td>56 (5.4%)</td>
</tr>
<tr>
<td>Hospitals 2 SD poorer than avg.</td>
<td>71 (6.9%)</td>
</tr>
<tr>
<td>Median First Decile</td>
<td>17.0%</td>
</tr>
<tr>
<td>Median Tenth Decile</td>
<td>38.8%</td>
</tr>
</tbody>
</table>

**Cardiac Valve Replacement**

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg. Adverse Outcome Rate</td>
<td>32.3%</td>
</tr>
<tr>
<td>Hospitals 2 SD better than avg.</td>
<td>45 (5.7%)</td>
</tr>
<tr>
<td>Hospitals 2 SD poorer than avg.</td>
<td>57 (7.2%)</td>
</tr>
<tr>
<td>Median First Decile</td>
<td>20.4%</td>
</tr>
<tr>
<td>Median Tenth Decile</td>
<td>45.8%</td>
</tr>
</tbody>
</table>

Standardized Hospital Costs and Adverse Outcome Rates
350 High Performance Hospitals and 113 Hospitals with Suboptimal Performance (Total Knee Replacement)
Elimination of Differences in Clinical Performance Can Improve Quality and Lower the Cost of Knee Replacement
Care Redesign: A Necessity for Improved Results

Hospitals and surgeons need to know their outcomes and how they benchmark to national-level performance. Transparency improves outcomes.

Patients with high-risk comorbidities for adverse outcomes needed special post-discharge follow up and management.

Inpatient prLOS predicts post-discharge adverse outcomes: Post-discharge follow up needs to be structured and intensified in these high-risk patients.

Anemia at discharge predicts readmission

Pain management is a major culprit in inpatient and post-discharge adverse outcomes. Consider pre-emptive analgesia programs.

Infection continues to be a major adverse event across all procedures
- SSI
- UTI
- Pneumonia
- Clostridium difficile
Summary: Intelligent Bundled Payments

*Linking objective and reproducible outcomes to costs* of inpatient care is fundamental to any payment redesign model.

Outcomes and cost analyses must be across the *entire continuum of care* (90 day post-discharge)

Effective *risk-adjustment* is essential for both outcomes and cost assessment.

Physician and Hospitals must engage in *coordinated efforts* for identification and rescue of post-discharge events without readmissions.

Bundled payments for inpatient and procedure-based care have the potential for the *realignment of provider incentives* to better outcomes at lower costs.
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