Calculating “Cost”: Cost-to-Charge Ratios

Faith Asper, MHS
Director, ResDAC Assistance Desk
Objectives

- Define cost-to-charge ratios (CCRs)
- Examine uses and types of CCRs
- Provide CCR formulas
- Identify cost and charge variable locations within the cost reports
- Review an example from the literature
- Outline steps needed to calculate and apply CCRs to charges
Cost-to-Charge Definitions

- A ratio of the cost divided by the charges.
- Generally used with acute inpatient or outpatient hospital services.
- The following CCRs can be calculated from the Hospital cost reports
  - Total Hospital (all payers, all patients)
    » Hospital level
    » Cost center specific
  - Medicare specific
    » Hospital level
    » Cost center specific
Costs Defined for Other Facilities

- Skilled Nursing Facilities (SNFs)
  - CCRs for ancillary and outpatient services only
  - Use cost per diem instead
- HHAs report cost per visit
- Hospices report cost per day
- Renal Dialysis facilities report cost per treatment
- RHC report cost per visit
Use of CCRs

- Medicare uses CCRs for:
  - Calculation of outlier payments
  - DRG cost weighting
- Researchers use CCRs as a method to convert charges to cost
Types of CCRs Available

- **Cost center level CCRs**
  - Found in downloadable cost report data

- **Hospital overall total CCR**
  - Found in downloadable cost report data
  - Found in “CSTS_CHRGS...” report found in “...REPORTS...” Download

- **Medicare specific CCR**
  - Found in downloadable cost report data
  - Found in annual “Impact File” under Medicare Inpatient PPS website.
    - Medicare Capital CCR
    - Operating CCR
Cost-to-charge Formulas

All Payer Total or Cost Center CCRs

- **CCR = Cost / Charges**

- **Worksheet C, Parts I, Columns 5 (Cost), 6, & 7 (Charges)**
  - Hospital overall CCR
  - Cost center specific CCR

- Total all hospital cost and charge report available from CMS Hospital cost report website under “Reports” download.
  - **CCR = Cost (Column 5)/Charges (Column 6 + Column 7)**
Cost-to-Charge Formulas

Medicare Specific CCR

- Detailed formula found in the Internet Only Manuals 100-04 Claims Processing, Chapter 3, Section 20.1.2.1 – Cost to Charge Ratios, Section A – Calculating a Cost-to-Charge Ratio
- Worksheet D is used
- Medicare calculates Operating and Capital CCRs
- Can also find Medicare Hospital-specific CCRs in annual Impact Files
  - [http://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/AcuteInpatientPPS/Historical-Impact-Files-for-FY-1994-through-Present.html](http://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/AcuteInpatientPPS/Historical-Impact-Files-for-FY-1994-through-Present.html)
  - Medicare Hospital-specific CCR = Capital CCR + Operating CCR
Review Example from Literature

Reference Article Chen et al.

- Chen, LM “Hospital Cost of Care, Quality of Care, and Readmission Rates…”
  - (Free access) http://archinte.jamanetwork.com/article.aspx?articleid=774388

- Read p. 341, “Data” and “Hospital Cost Model” sections
  1. What was the name of the file that they used to calculate the cost-to-charge ratios?
  2. In paragraph 2 of the “Hospital Cost Model” section, which variables identified could possibly be found in the cost report data?
Review Example from Literature

Reference Article Chen et al.

- Review what is in the Impact File:

  - [http://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/AcuteInpatientPPS/Historical-Impact-Files-for-FY-1994-through-Present.html](http://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/AcuteInpatientPPS/Historical-Impact-Files-for-FY-1994-through-Present.html)
Review Example from Literature

Reference Article Chen et al.

- Impact File was used to adjust charges
  - Medicare operating cost-to-charge ratio
  - Medicare capital cost-to-charge ratio
  - Medicare Hospital cost-to-charge ratio = operating + capital CCR
  - Range: CCR .12 to .96
Review Example from Literature

Reference Article Chen et al.

- What is the difference between the Hospital Medicare CCR and the Total CCR?
- Examples:
  - Provider 01-0005
    » Total CCR = .21
    » Medicare CCR = .36
  - Provider 01-0006
    » Total CCR = .33
    » Medicare CCR = .23
Review Example from Literature

Reference Article Chen et al.

Observations:

- The data aren’t very timely
  - Impact file uses cost reports that are 2-3 years old
  - Cost to charge reports may take 2 years to obtain complete information

- Relatively easy to apply
Steps to Apply CCRs to Charges

1. Clean up cost reports
2. Calculate Hospital specific CCR
3. Check for missing or extreme values
4. Create a revenue center to cost center crosswalk
5. Multiply CCR times charges to obtain cost
Step 1: Clean up Cost Reports

- Identify hospitals with multiple cost reports
  - Try to find a 12-month cost report
  - Evaluate partial year cost reports to determine if you should combine cost reports

- Examine data for duplicate cost reports and determine which one to use
  - Duplicates are errors
  - This happens very, very seldom
Step 2: Calculate Cost-to-Charge Ratios

- Determine which CCR you wish to calculate
  - Total all payer Hospital-specific CCR
  - Total cost center level hospital-specific CCR
  - Medicare CCR
- Use the formulas provided in previous slides to calculate the CCR
Step 2: Calculate Cost-to-Charge Ratios

- Worksheet C, Part I (2010 forms)
- See README document for special unit coding for 1996 forms.

![Worksheet C, Part I (2010 forms)](image-url)
Step 2: Calculate Cost-to-Charge Ratios

- Example of cost center coding
- Resource document HOSP2010_CSTCODES.pdf

<table>
<thead>
<tr>
<th>Std.</th>
<th>Line</th>
<th>Description</th>
<th>Cost Center Code 1</th>
<th>Cost Center Code 2</th>
<th>Cost Center Code 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td></td>
<td>Adults &amp; Pediatrics (General Floor)</td>
<td>03000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31</td>
<td></td>
<td>Intensive Care Unit</td>
<td>03100</td>
<td>-</td>
<td>03119</td>
</tr>
<tr>
<td>32</td>
<td></td>
<td>Coronary Care Unit</td>
<td>03200</td>
<td>-</td>
<td>03219</td>
</tr>
<tr>
<td>33</td>
<td></td>
<td>Burn Intensive Care Unit</td>
<td>03300</td>
<td>-</td>
<td>03319</td>
</tr>
<tr>
<td>34</td>
<td></td>
<td>Surgical Intensive Care Unit</td>
<td>03400</td>
<td>-</td>
<td>03419</td>
</tr>
<tr>
<td>35</td>
<td>34</td>
<td>Psychiatric ICU</td>
<td>02140</td>
<td>-</td>
<td>02159</td>
</tr>
<tr>
<td></td>
<td>35</td>
<td>Pediatric ICU</td>
<td>02080</td>
<td>-</td>
<td>02099</td>
</tr>
<tr>
<td></td>
<td>35</td>
<td>Neonatal ICU</td>
<td>02060</td>
<td>-</td>
<td>02079</td>
</tr>
<tr>
<td></td>
<td>35</td>
<td>Trauma ICU</td>
<td>02180</td>
<td>-</td>
<td>02199</td>
</tr>
<tr>
<td></td>
<td>35</td>
<td>Detoxification ICU</td>
<td>02040</td>
<td>-</td>
<td>02059</td>
</tr>
<tr>
<td></td>
<td>35</td>
<td>Premature ICU</td>
<td>02120</td>
<td>-</td>
<td>02139</td>
</tr>
<tr>
<td>40</td>
<td></td>
<td>Subprovider IPF</td>
<td>04000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>41</td>
<td></td>
<td>Subprovider IRF</td>
<td>04100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Step 2: Calculate Cost-to-Charge Ratios

Example for Adult & Pediatrics Cost Center 03000
FY 2011 (2010 forms)

<table>
<thead>
<tr>
<th>Hospital Provider Number</th>
<th>CCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>01-0001</td>
<td>0.61</td>
</tr>
<tr>
<td>01-0005</td>
<td>1.36</td>
</tr>
<tr>
<td>01-0006</td>
<td>0.59</td>
</tr>
<tr>
<td>01-0007</td>
<td>1.39</td>
</tr>
<tr>
<td>01-0008</td>
<td>0.70</td>
</tr>
<tr>
<td>01-0009</td>
<td>1.23</td>
</tr>
<tr>
<td>01-0010</td>
<td>1.04</td>
</tr>
<tr>
<td>01-0011</td>
<td>0.52</td>
</tr>
<tr>
<td>01-0012</td>
<td>0.74</td>
</tr>
</tbody>
</table>
Step 3: Check for Missing or Extreme Values

- **Evaluate missing CCRs**
  - Use previous year CCRs
  - Use hospital overall total CCR
  - Eliminate provider from analysis

- **Evaluate extreme values**
  - CMS usually trims CCRs that are 3 SD from the geometric mean
  - CMS replaces extreme values with the Statewide average CCR or previous year CCR
Step 3: Check for Missing or Extreme Values

Example for Adult & Pediatrics Cost Center 03000
FY 2011 (2010 forms)

<table>
<thead>
<tr>
<th></th>
<th>Adult &amp; Peds 03000</th>
<th>Operating Room 05000</th>
<th>Anesthesia 05300</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zero CCR</td>
<td>18.1%</td>
<td>28.0% (12.3% didn’t report any cost or charges)</td>
<td>55.6% (43.5% didn’t report any cost or chgs)</td>
</tr>
<tr>
<td>&lt;10</td>
<td>79.7%</td>
<td>71.2%</td>
<td>44.2%</td>
</tr>
<tr>
<td>&gt;=10</td>
<td>1.86%</td>
<td>0.8%</td>
<td>0.2%</td>
</tr>
</tbody>
</table>
Step 4: Create Revenue Center to Cost Center Crosswalk

- Researcher needs to develop a crosswalk, no standard crosswalk available
- Utilization files contain revenue centers
- Cost reports contain cost centers
- Revenue center DO NOT EQUAL Cost centers
Revenue Centers to Cost Center Crosswalk Definitions

Source: Essentials of Cost Accounting for Health Care Organizations, Finkler 1994

- Usually, a health care organization is divided into areas or units of responsibility
- These units of responsibility are referred to as revenue centers or cost centers
- “Department” is often used to describe either a cost center or a revenue center.
- Managers of a revenue center are responsible for both revenues and expenses of that unit – Intensive Care Unit
- Managers of a cost center are responsible for only the expenses of the unit – Finance department
Revenue Centers in Utilization Files versus Cost Center in Cost Reports

<table>
<thead>
<tr>
<th>Inpatient Claims Revenue Center</th>
<th>MedPAR file Revenue Center Groups</th>
<th>Hospital Cost Reports Cost Center</th>
</tr>
</thead>
<tbody>
<tr>
<td>0141 Private room, medical/surgical</td>
<td>Private room charge amount (Rev ctrs 011X, 014X)</td>
<td>03000 Adult and pediatrics (general routine care)</td>
</tr>
<tr>
<td>0258 Pharmacy, IV solution</td>
<td>Pharmacy charge amount (025X, 026X, and 063X)</td>
<td>07300 Drugs charged to patients</td>
</tr>
</tbody>
</table>
# Example Revenue Centers to Cost Center Crosswalk

<table>
<thead>
<tr>
<th>Revenue Center</th>
<th>Revenue Center Description</th>
<th>Cost Center</th>
<th>Cost Center Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0100</td>
<td>All inclusive rate-room and board plus ancillary</td>
<td>03000</td>
<td>Adult and pediatrics (general routine care)</td>
</tr>
<tr>
<td>0101</td>
<td>All inclusive rate-room and board</td>
<td>03000</td>
<td>Adult and pediatrics (general routine care)</td>
</tr>
<tr>
<td>0110</td>
<td>Private medical or general-general classification</td>
<td>03000</td>
<td>Adult and pediatrics (general routine care)</td>
</tr>
<tr>
<td>0111</td>
<td>Private medical or general-medical/surgical/GYN</td>
<td>03000</td>
<td>Adult and pediatrics (general routine care)</td>
</tr>
<tr>
<td>0112</td>
<td>Private medical or general-OB</td>
<td>03000</td>
<td>Adult and pediatrics (general routine care)</td>
</tr>
<tr>
<td>0113</td>
<td>Private medical or general-pediatric</td>
<td>03000</td>
<td>Adult and pediatrics (general routine care)</td>
</tr>
</tbody>
</table>
Step 5: Multiply CCR times Charges to Obtain Cost

- When using overall hospital CCR, link on hospital provider number and multiply charges by CCR
- If calculating cost at cost center level, link on hospital and cost center then multiply charge by cost center CCR
  - Apply the provider specific CCRs to the revenue center total charges
Step 5: Multiply CCR times Charges to Obtain Cost

- **MedPAR**
  - Revenue Center Group Cost = [Revenue center group name] Charge Amount * Cost center group cost-to-charge ratio

- **Inpatient claims**
  - Revenue Center Cost = Revenue center total charge amount * cost center cost-to-charge ratio
Example from MedPAR File

- Knee replacement cohort from 2002 MedPAR

<table>
<thead>
<tr>
<th>Provider Number</th>
<th>Case</th>
<th>Rev Ctr Group</th>
<th>Rev Ctr Grp Chg Amt</th>
<th>CCR</th>
<th>Estimated Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>XX0001</td>
<td>A</td>
<td>Anesthesia</td>
<td>$1,883</td>
<td>.150</td>
<td>$282</td>
</tr>
<tr>
<td>XX0001</td>
<td>A</td>
<td>Blood Administration</td>
<td>$844</td>
<td>.000</td>
<td>$0</td>
</tr>
<tr>
<td>XX0001</td>
<td>A</td>
<td>Cardiology</td>
<td>$109</td>
<td>.434</td>
<td>$47</td>
</tr>
<tr>
<td>XX0001</td>
<td>B</td>
<td>Anesthesia</td>
<td>$1,088</td>
<td>.150</td>
<td>$163</td>
</tr>
<tr>
<td>XX0001</td>
<td>B</td>
<td>Blood Administration</td>
<td>$1,853</td>
<td>.000</td>
<td>$0</td>
</tr>
<tr>
<td>XX0001</td>
<td>B</td>
<td>Cardiology</td>
<td>$109</td>
<td>.434</td>
<td>$47</td>
</tr>
</tbody>
</table>
Comparison Between MedPAR & Inpatient

- Knee cohort from 2002, same population pulled from MedPAR and Inpatient files.
  - MedPAR Estimated Cost = $17,208
  - Inpatient Estimate Cost = $14,487
Summary

- Considerable amount of efforts is required to use CCRs at cost center level
- Need to evaluate the potential benefit of using this method and the time required
- Determine which CCR you need to use
  - Cost center specific,
  - Overall hospital specific,
  - Medicare specific