Repeat Elective Caesarian Section in Low Risk Women: Economic evaluation comparing births before vs. after 39 weeks

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Introduction

- Evidence shows increased risk of adverse outcomes in elective CS performed before 39 weeks
  - Adverse respiratory outcomes, mechanical ventilation, sepsis, hypoglycemia, admission to NICU, hospital LOS ≥ 5 days
    - Tita et al NEJM 2009
Introduction

- Little work has been done to examine the costs and effects of early term CS (38 to 39 weeks) versus later term (39 to 40 weeks)

- Goal – to examine how costs and gross clinical effect compare between elective low risk CS at 37-38 versus 39-40 weeks
Cohort

- Used the KPI definition from the dashboard
- Elective repeat CS (ERCS) in low risk pregnancies
  - Mothers with no comorbidities before or during pregnancy
  - Singleton fetuses with no anomalies or fetal reasons for early delivery
Methods

- Data extracted from BORN BIS April 2012 - March 2013
- Neonate costs for mother-baby care and level II NICUs
  - more homogeneous group
  - simplify the costing exercise (preliminary)
- Excluded those missing LOS data
- Sensitivity analysis excluding outliers
Methods - Costs

- Included costs of NICU stay and ward stay for neonate
- Long term complications related to neonatal events were not measured and hence excluded from the analysis
- Additional exclusions: costs incurred outside of hospital, maternal treatment costs, family out-of-pocket costs.
Results

- 3637 early, and 3282 late observations
  - 96 excluded for missing LOS
- Early group 0.92% NICU admission rate
  - 334 of 3637 babies
- Late group 0.72% NICU admission rate
  - 235 of 3282 babies (p=0.002 cf early)
- Cost/neonate $1297 (early) vs $1210
- 5 min APGAR
  - NICU 8.68 (early) vs 8.72 (ns)
  - ward 9.03 (early) vs. 9.06 (ns)
Results

- $315K annual savings if all early group converted to late group (conservative estimate)

- Reduced cost without a decrement in outcome in economic terms is a “Dominant scenario”
# Results - COSTS

<table>
<thead>
<tr>
<th>Description</th>
<th>37-38</th>
<th>39-40</th>
<th>37-38 (no outliers)</th>
<th>38-39 (no outliers)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NICU costs (n)</td>
<td>$1954 (334)</td>
<td>$1346 (235)</td>
<td>$1327 (326)</td>
<td>$826 (223)</td>
</tr>
<tr>
<td>Ward costs (n)</td>
<td>$1136 (3578)</td>
<td>$1124 (3251)</td>
<td>$1075 (3503)</td>
<td>$1096 (3191)</td>
</tr>
<tr>
<td>Ward prior costs (n)</td>
<td>$83 (42)</td>
<td>$232 (29)</td>
<td>$83 (42)</td>
<td>$212 (28)</td>
</tr>
<tr>
<td>Ward after costs (n)</td>
<td>$870 (211)</td>
<td>$848 (165)</td>
<td>$863 (210)</td>
<td>$844 (164)</td>
</tr>
<tr>
<td>TOTAL COSTS</td>
<td>$1297 (3637)</td>
<td>$1210 (3282)</td>
<td>$1180 (3559)</td>
<td>$1145 (3216)</td>
</tr>
<tr>
<td>CHANGE</td>
<td>REFERENCE ($87)</td>
<td>REFERENCE (REFERENCE ($35)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Results - OUTCOMES

<table>
<thead>
<tr>
<th>Description</th>
<th>37-38</th>
<th>39-40</th>
<th>37-38 (no outliers)</th>
<th>38-39 (no outliers)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NICU APGAR-5</td>
<td>8.68</td>
<td>8.72</td>
<td>8.68</td>
<td>8.71</td>
</tr>
<tr>
<td>Ward APGAR-5</td>
<td>9.03</td>
<td>9.06</td>
<td>9.04</td>
<td>9.06</td>
</tr>
<tr>
<td>CHANGE NICU</td>
<td>REFERENCE</td>
<td>0.04 (ns)</td>
<td>REFERENCE</td>
<td>0.03 (ns)</td>
</tr>
<tr>
<td>CHANGE Ward</td>
<td>REFERENCE</td>
<td>0.03 (ns)</td>
<td>REFERENCE</td>
<td>0.02 (ns)</td>
</tr>
</tbody>
</table>

### Cost-effectiveness

<table>
<thead>
<tr>
<th>Description</th>
<th>37-38 wks</th>
<th>39-40 wks</th>
<th>Cost-effectiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total NICU cost</td>
<td>$652,760</td>
<td>$350,496</td>
<td>---</td>
</tr>
<tr>
<td>Total Ward cost</td>
<td>$4,063,596</td>
<td>$4,050,856</td>
<td>---</td>
</tr>
<tr>
<td>Total cost</td>
<td>$4,716,357</td>
<td>$4,401,352</td>
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</tr>
<tr>
<td>Incremental cost</td>
<td>Reference</td>
<td>(315005)¹</td>
<td>---</td>
</tr>
<tr>
<td>Outcome</td>
<td>Reference</td>
<td>No change</td>
<td>39-40 weeks DOMINANT</td>
</tr>
</tbody>
</table>

¹ Adjusted for matched sample sizes
Assumptions & Limitations

- This is an early simplified examination - goal is to continue with a more extensive evaluation
- Maternal cost differences not yet examined – data were extracted
- Analysis limited to Level II hospitals in this analysis
- These and other factors will be explored as part of a more comprehensive analysis
Conclusions

- Delaying ERCS until after 39 weeks will save health system resources, without negatively affecting outcomes - a dominant scenario
- The savings estimated here are likely conservative
- Plan further analysis using a probabilistic approach (Bayesian methods) and employing a variety of sensitivity analyses to test the robustness of these findings
Thank you.

Questions?