Evaluating The Financial Viability Of Particular Operative Procedures Using TDABC

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Agenda

- Impetus for this project at JGH
- Time-Driven Activity Based Costing
- Applying TDABC
- Recommendations borne out of TDABC
- Challenges
- Benefits of TDABC
- Questions
Sir Mortimer B. Davis
Jewish General Hospital (JGH)

- Publicly funded, acute-care McGill University medical school teaching hospital
  - Founded in 1934
  - 637 beds
  - Comprehensive set of inpatient and outpatient services

- Lady Davis Research Institute

- Operating Philosophy: “Care for All”
Impetus for this project at JGH

• Transition to per-procedure payment scheme
  ➢ Hospital analysis

• After election, 30% reduction
  ➢ Reinforced need for hospital analysis
Cataract procedures at JGH

• Over 2300 procedures performed in 2012

• Three to six month waitlist for operation

• Prior to study, cost of procedure unknown
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Overview of TDABC

• Select medical procedure
• Develop detailed process maps for cycle of care
• Calculate cost per min. of each resource
• For each activity, calculate time-based and non time-based costs
• Calculate total cost of each activity, by summing time-based and non time-based costs
• Calculate total cost of procedure by summing total cost of each activity
Select medical procedure

• Select medical procedure
  – Total knee replacement
  – Whipple procedure (pancreaticoduodenectomy)
  – Inguinal hernia repair
  – . . .
Develop detailed process maps

- Develop detailed process maps for cycle of care
  - Flow chart
  - Value stream map
  - Unified modeling language
Cost/min. of a resource

Cost per min. of resource = Annual cost of resource / Practical capacity of resource
Time-based cost of a resource for an activity

- Cost of resource #1 for activity
- Cost/min. of resource for activity
- Activity time
- Percentage of patients affected

- Cost of resource #2 for activity
- Cost/min. of resource for activity
- Activity time
- Percentage of patients affected

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Non time-based cost of an activity

Total non time-based cost of activity = Non time-based cost #1 + Non time-based cost #2 + Non time-based cost #3 + ...
Total cost of an activity

- Total cost of activity
- Time-based cost of resource for activity
- Non time-based cost of activity
Overview of TDABC

Total cost of procedure = Total cost of activity #1 + Total cost of activity #2 + Total cost of activity #3 + ...
Applying TDABC

• Once total cost has been calculated:
  – Try to create more value for the patient
  – Try to reduce total cost
Notes

• “Rule of 1”
  – If there is only one of a resource (human, non-human)
    ▪ Can be treated as a fixed cost
    ▪ Can be ignored in TDABC
  – If quantity of resource exceeds one, rule of 1 does not apply
    ▪ Can be treated as a variable cost as processes associated with procedure create additional demand for that resource
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Select medical procedure

• Cataract procedure
  – Simple cataract procedure
    ▪ Not classified by ophthalmologist as “complicated”
    ▪ No prior vitrectomy
    ▪ Minimal comorbidities: diabetes, hypertension fine
  – Sole procedure: no other ophthalmologic procedure
Develop detailed process maps

• Process maps for cataract procedure cycle of care:
  – Pre-operative appointment (JGH ophthalmology clinic)
  – Pre-surgery patient workup (One Day Surgery)
  – Cataract procedure (One Day Surgery)
  – Post-operative procedure (One Day Surgery)
  – Post-operative appointments (JGH ophthalmology clinic)
Ophthalmologist positions patient on bed, prepares eye for surgery and rolls patient into operating room

Patient waits while nurses prepare OR for surgery

Cataract extraction with IOL

Ophthalmologist administers post-op drops and gives patient instructions

Eye patch and/or eye shield?

Yes

80%

No

20%

Ophthalmologist places patch and shield over eye

Orderly wheels patient into the recovery room

Nurse offers patient juice and measures heart rate and blood pressure

Patient exits recovery room

Secretary unlocks his/her locker

Patient gets changed and goes home
Cost/min. of a resource - 1

• Operating Rooms (ORs)
  – Annual occupancy ($20/sq. ft.) - $7,110.75
  – Depreciation of computer system - $2,069.58
  – Computer software - $3,525.12
  – Depreciation of cataract sets - $70,400.00
  – Depreciation of ophthalmology equipment - $29,325.57
  – Cleaning costs - $2,162.24
  Total annual cost of ORs: $107,482.51
Cost/min. of a resource - 2

• ORs
  – Total annual cost of ORs - $107,482.51
  – Practical capacity of ORs -
    ▪ Non-human resource: 90% of total “working time”
    ▪ (5,040 hours * 0.90) * 60 min./hour = 257,040 min.

• Calculate cost/min.
  – $107,482.51 / 257,040 min. = $0.56 / min.
Cost/min. of a resource - 1

• OR Nurses
  – Labour costs - $3,051,862.03
  – Cost of supervision: share of total compensation based on number of employees supervisor oversees
    ▪ Supervisor #1 - $86,494.02
    ▪ Supervisor #2 - $96,245.63
    ▪ Supervisor #3 - $129,103.29
    ▪ Supervisor #4 - $80,066.00
    ▪ Supervisor #5 - $89,716.08

Total annual cost of OR nurses - $3,533,487.05
Cost/min. of a resource - 2

• OR Nurses
  – Total annual cost of OR nurses - $3,533,487.05
  – Practical capacity of OR nurses:
    ▪ Human resource: 85% of total “working time”
    – (63,936.50 hours * 0.85) * 60 min./hour = 3,260,761.50 min.

• Calculate cost/min.
  – $3,533,487.05 / 3,051,862.03 min. = $1.08 / min.

• Need to follow same procedure for other staff
Time-based cost of a resource for an activity

- OR during cataract procedure (14 min.)
  - OR $0.56/min. * 14 min. = $7.89
  - OR Nurse #1 - $1.08/min. * 14 min. = $15.17
  - OR Nurse #2 - $1.08/min. * 14 min. = $15.17
  - Other surgical costs - $1.60 * 14 min. = $22.38
  - Respiratory therapist - $0.81 * 14 min. = $11.38

Total time-based cost for cataract procedure - $71.99
Non time-based cost of an activity

• OR during cataract procedure:
  – Drops for cataract procedure only - $22.72
  – Cataract pack - $236.90
  – Viscoelastic agents - $110.00
  – Margin on lens - -$50.00
  – Gown, Royal Silk, Large (2), Extra Large - $11.70
  – Balanced salt solution (15mL bottle, 500 mL bag) - $8.10
  – Monarch II C Cartridge - $5.00
  – Cataract set sterilization costs - $3.76
  – Laundry- $3.75
  – Gloves Ansell Encore Powder Free 7.0 (3) - $2.64

Total non time-based cost for cataract procedure - $354.57
Total cost of an activity

- OR during cataract procedure
  
  = time-based costs + non-time based costs
  
  = $71.99 + $354.57
  
  = $426.56
Applying TDABC

• Need to ensure optimal level of utilization of resources
  – TDABC demonstrates the extent of underutilization and its associated cost
    ▪ Managers need to determine cause and address it to ensure optimal resource utilization (perform more procedures, reallocate to peak periods, etcetera)
## Utilization of Resources

### Ophthalmologic Equipment in OR

<table>
<thead>
<tr>
<th>Activity</th>
<th>Actual Usage (min.)</th>
<th>Practical Capacity</th>
<th>Percent Utilization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cataract Procedures</td>
<td>56,926.80</td>
<td>272,160</td>
<td>20.92%</td>
</tr>
<tr>
<td>Other Ophthalmologic Procedures</td>
<td>79,335.00</td>
<td>272,160</td>
<td>29.15%</td>
</tr>
<tr>
<td>Total</td>
<td>136,261.80</td>
<td>272,160</td>
<td>50.07%</td>
</tr>
</tbody>
</table>
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Recommendations

1. Make better use of OR time
2. Reduce surgical material costs
3. Improve utilization of sterilization room
Make better use of OR time

• Revise cancellation policy
  – Allow same-day scheduling

• Ensure surgery starts on time to minimize possibility of end-of-day cancellation
  – Ensure patients are adequately prepared
    ▪ E.g. jewelry removal in advance

• Run two ORs
## Turnover time and operating time for cataract procedures in 2011 - 2012

<table>
<thead>
<tr>
<th>Surgeon</th>
<th>Average Operating Time per Procedure (min.)</th>
<th>Average Turnover Time per Procedure (min.)</th>
<th>Total Time in OR Per Procedure (min.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgeon A</td>
<td>10.52</td>
<td>9.88</td>
<td>20.40</td>
</tr>
<tr>
<td>Surgeon B</td>
<td>12.22</td>
<td>8.78</td>
<td>21.00</td>
</tr>
<tr>
<td>Surgeon C</td>
<td>14.12</td>
<td>9.88</td>
<td>24.00</td>
</tr>
<tr>
<td>Surgeon D</td>
<td>14.88</td>
<td>10.32</td>
<td>25.20</td>
</tr>
</tbody>
</table>

Turnover time almost 50% of total OR time

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Run two ORs

• Two nurses in each OR
• Surgeon and respiratory therapist float between rooms
• Nurse could assume certain post-operative responsibilities, allowing the surgeon to start the next operation sooner
  – Post-operative drops, eye patch and shield
Eliminate non-value added steps

• Suturing (0.4% of cases at KEI)
  – Time-consuming (1 – 2 min.)
  – Suture(s) are costly

• Retrobulbar blocking (0.2% of cases at KEI)
  – Time-consuming (1 – 2 min.)
  – Poses unnecessary health risks (hemorrhaging)
  – Topical anesthesia is a better option
## Highest costs

<table>
<thead>
<tr>
<th>Resource</th>
<th>Percent of total procedure cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Custom Cataract Pack</td>
<td>40.8%</td>
</tr>
<tr>
<td>Viscoelastic Agents</td>
<td>19.0%</td>
</tr>
<tr>
<td>OR Nursing Labor</td>
<td>10.7%</td>
</tr>
<tr>
<td>Drops in OR</td>
<td>3.8%</td>
</tr>
</tbody>
</table>
Reduce surgical material costs

- Mitigate waste in “Cataract Pack”
  - Package expensive items separately unless used in every procedure (e.g. sideport knife costly used in less than two-thirds of cataract surgeries)
  - Potential to reduce cost of procedure by 10%
Reduce surgical material costs

- Viscoelastic agents
  - Standardize with room for flexibility
  - Smaller quantities to reduce waste
  - Potential to reduce cost of procedure by 10%
Reduce surgical material costs

• Some responsibilities of OR nurses could be assumed by less-skilled workers

• Pre-op and post-op drops/medications
  – Standardize
  – Smaller bottles to minimize waste
Improve utilization of sterilization room

- Sterilization turnaround time is 4-6 hours
  - Cataract set:
    - Required for each procedure
    - Quicker turnaround would enable increase in number of daily procedures

- Reduce costs and improve efficiency
  - RFID to reduce tracking time
  - Use sterile filters instead of sterilization wraps
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Improve utilization of sterilization room

• Advance notice of equipment requirements
  ➢ Better scheduling of processing
  ➢ Minimize partial loads (STATs)
  ➢ Reduction of unnecessary processing
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Challenges of this project

• Little standardization amongst surgeons

• Not all costs available on enterprise resource planning system

• Skepticism
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Benefits of TDABC

• Simple

• Easy to identify unused capacity

• Highlights potential areas of improvement
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