HEALTHCARE SYSTEMS PROCESS IMPROVEMENT
CONFERENCE 2013

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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

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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"

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Impetus for this project at JGH

- Transition to per-procedure type 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 minute 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

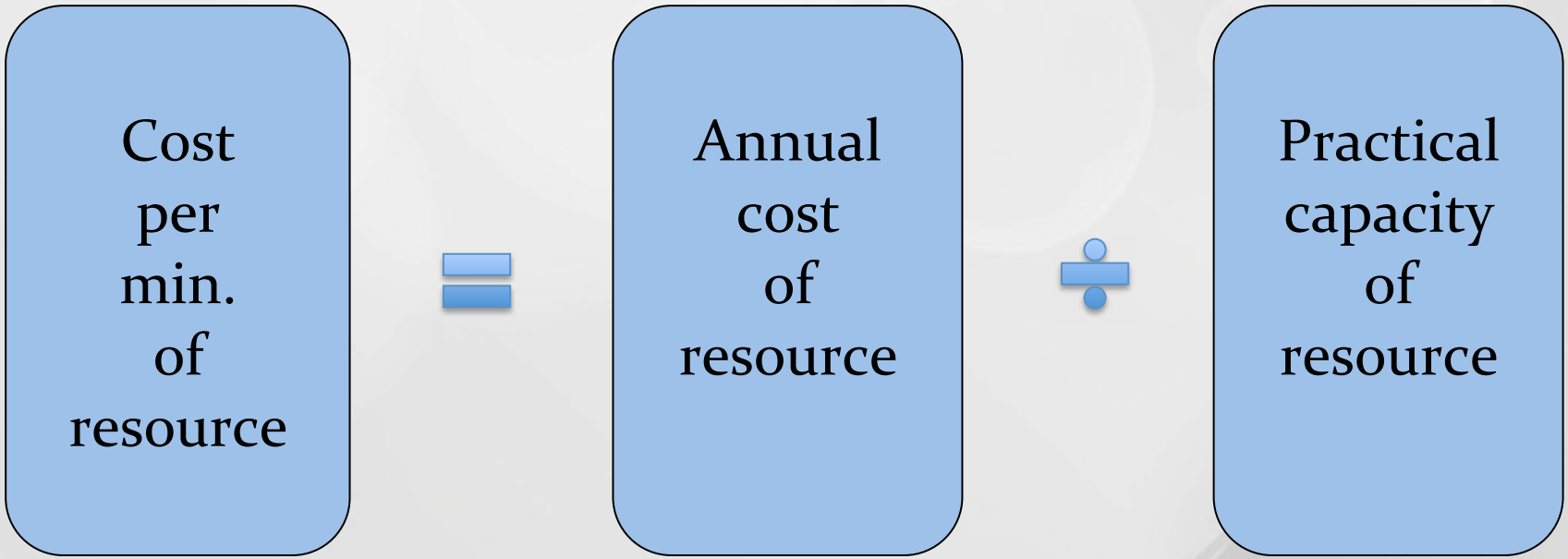
Select medical procedure

- 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/minute of a resource



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Time-based cost of resources 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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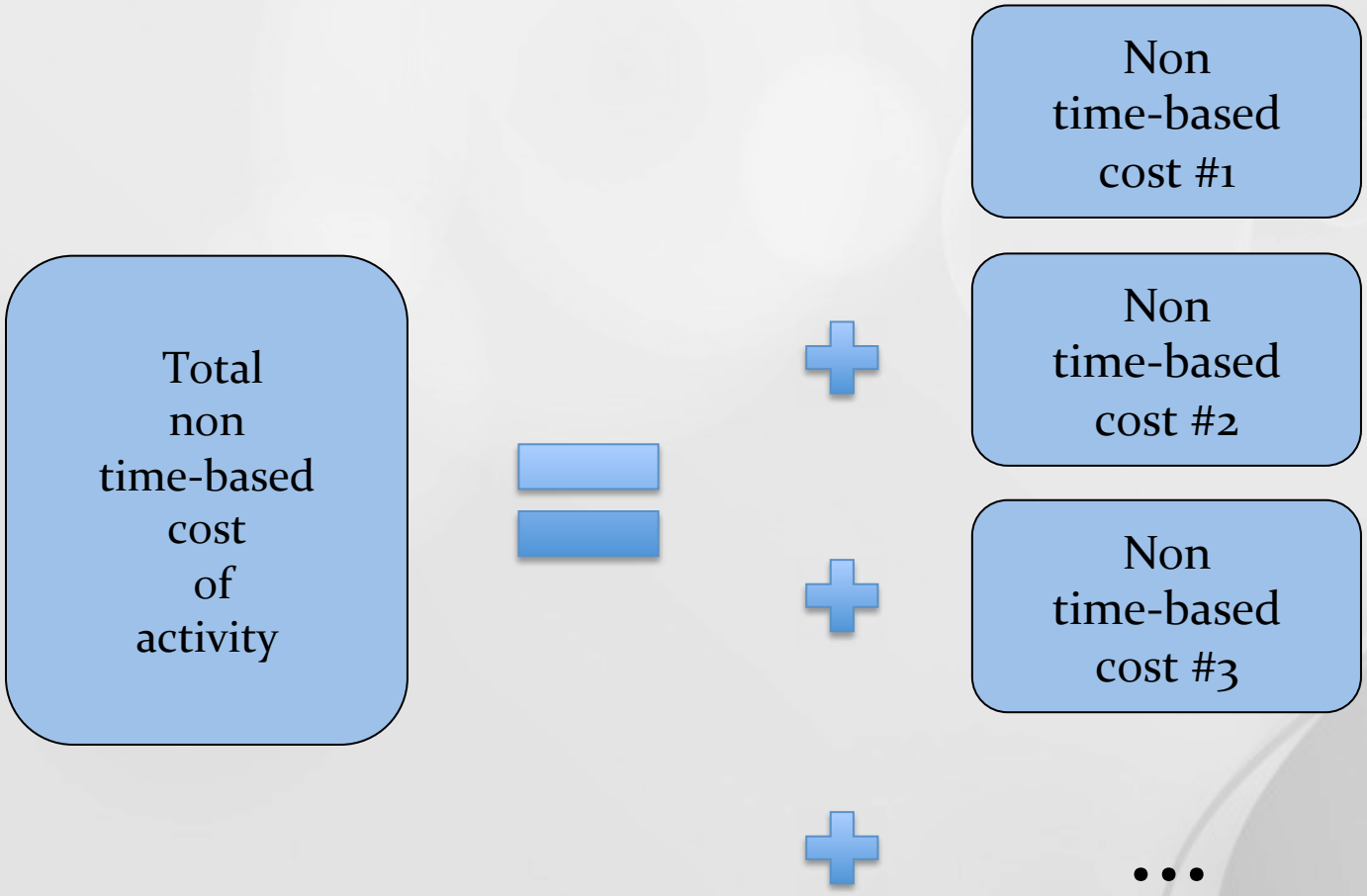
Non time-based cost of an activity



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Total cost of an activity

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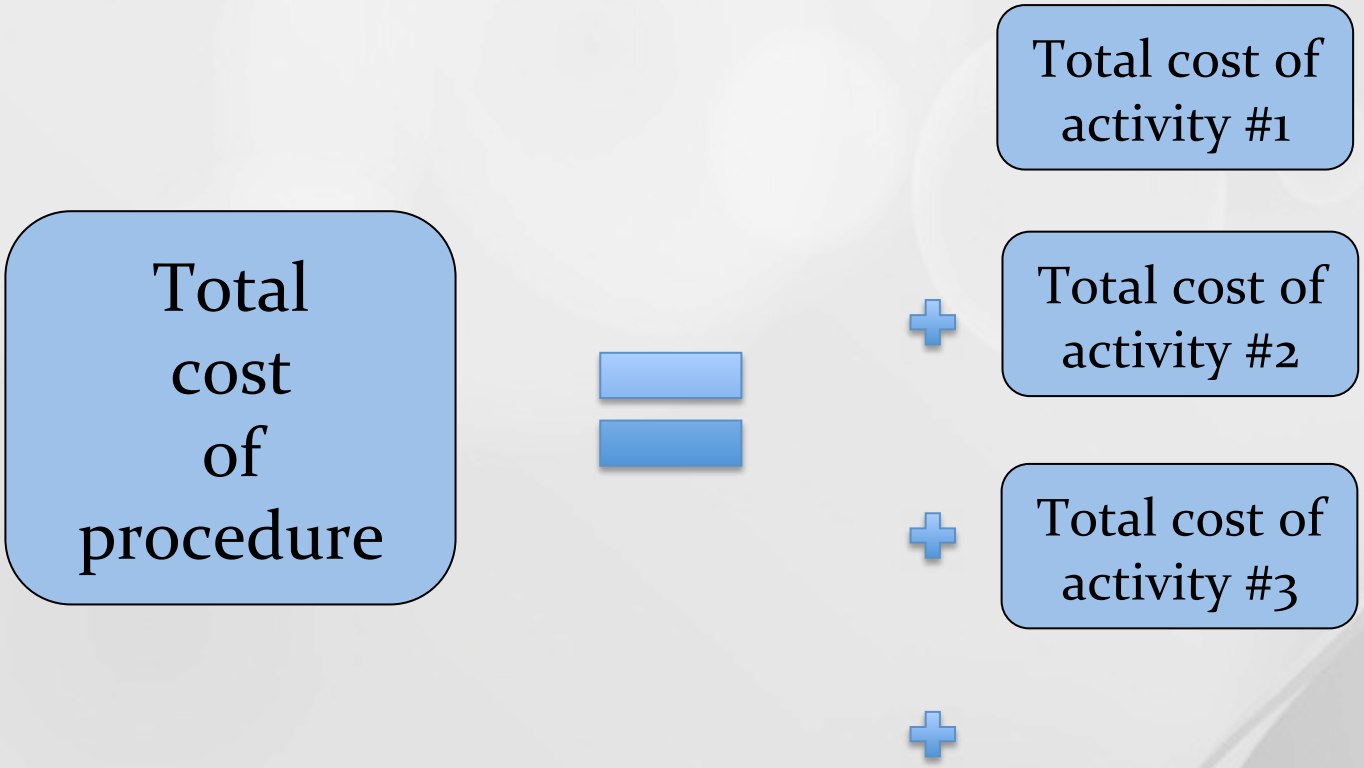
Overview of TDABC



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Applying TDABC

- Once total cost has been calculated:
  - Try to improve clinical outcomes without increasing cost
  - Try to reduce cost while maintaining clinical outcomes
  - Try to reduce cost and improve clinical outcomes

Notes

- "Rule of 1"
  - If there is only one of a resource (human, non-human)
    - Can be ignored in TDABC

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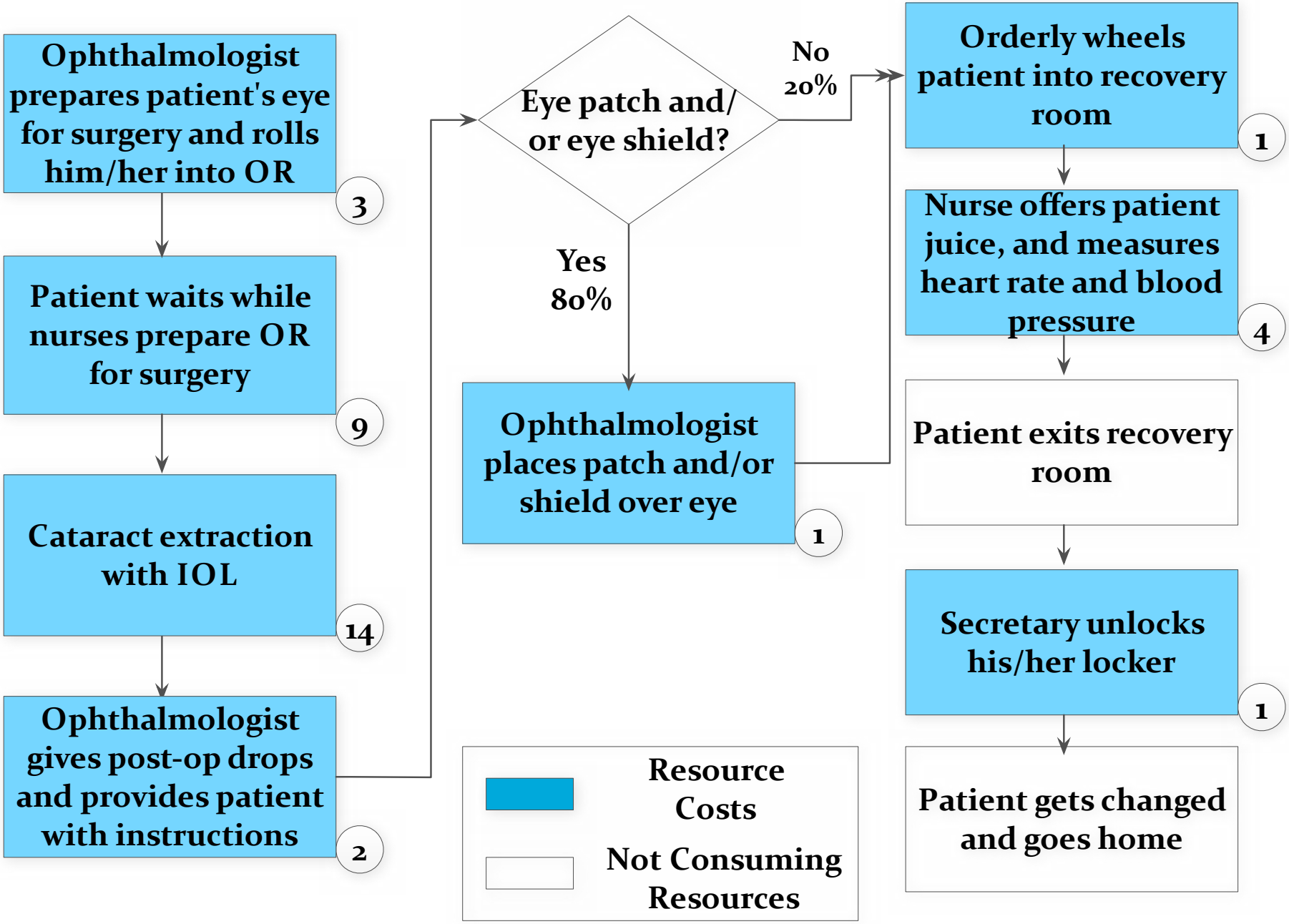
Select medical procedure

- Cataract procedure
  - Simple cataract procedure
    - Not classified by ophthalmologist as “complicated”
    - No prior vitrectomy
    - Included common comorbidities: diabetes, hypertension
  - 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-operative patient workup (One Day Surgery)
  - Cataract procedure (One Day Surgery)
  - Post-operative procedure (One Day Surgery)
  - Post-operative appointments (JGH ophthalmology clinic)

Process map fragment for day of surgery



Cost/minute 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/minute 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/minute
  - $107,482.51 / 257,040 min. = $0.56 / min.

Cost/minute 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/minute 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/minute
  - $3,533,487.05 / 3,051,862.03 min. = $1.08 / min.
- Need to follow same procedure for other staff

Time-based costs of cataract procedure in OR

- Cataract procedure (14 minutes)
  - 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 costs of cataract procedure in OR

- 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 cataract procedure in OR

Total cost of cataract procedure in OR

= time-based costs + non-time based costs

= $71.99 + $354.57

= $426.56

Total cost of cataract procedure

Process	Cost
Pre-operative appointment(s)	$18.98
Pre-operative procedure	$89.32
Cataract procedure	$426.56
Post-operative procedure	$17.61
Post-operative appointments	$13.70
Sterilization	$24.50
Total	**$590.67**

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Applying TDABC

- TDABC does not reflect level of utilization
- May wish to monitor it
- TDABC makes it easy to do so

Utilization of Resources

Ophthalmologic Equipment in 3 Operating Rooms

Activity	Actual Usage (min.)	Practical Capacity	Percent Utilization
Cataract Procedures	56,926.80	272,160	20.92%
Other Ophthalmologic Procedures	79,335.00	272,160	29.15%
Total	136,261.80	272,160	50.07%

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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: flipping rooms

Turnover time and operating time for cataract procedures in 2011 - 2012

Surgeon	Average Operating Time per Procedure (minutes)	Average Turnover Time per Procedure (minutes)	Total Time in OR Per Procedure (minutes)
Surgeon A	10.52	9.88	20.40
Surgeon B	12.22	8.78	21.00
Surgeon C	14.12	9.88	24.00
Surgeon D	14.88	10.32	25.20

Turnover time almost 50% of total OR time

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Flipping rooms

- 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 minutes)
  - Suture(s) are costly
- Retrobulbar blocking (0.2% of cases at KEI)
  - Time-consuming (1 – 2 minutes)
  - Poses unnecessary health risks (hemorrhaging)
  - Topical anesthesia is a better option

Highest costs

Resource	Percent of total procedure cost
Custom Cataract Pack	40.8 %
Viscoelastic Agents	19.0 %
OR Nursing Labor	10.7%
Drops in OR	3.8%

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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 and Pre-/post-op drops
  - Standardize with room for flexibility
  - Smaller quantities to reduce waste
  - Potential to reduce cost of procedure by 10%

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

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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Questions?

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