

# HEALTHCARE SYSTEMS PROCESS IMPROVEMENT

CONFERENCE 2013

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SOCIETY FOR HEALTH SYSTEMS  
LEADING HEALTHCARE IMPROVEMENT

## 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

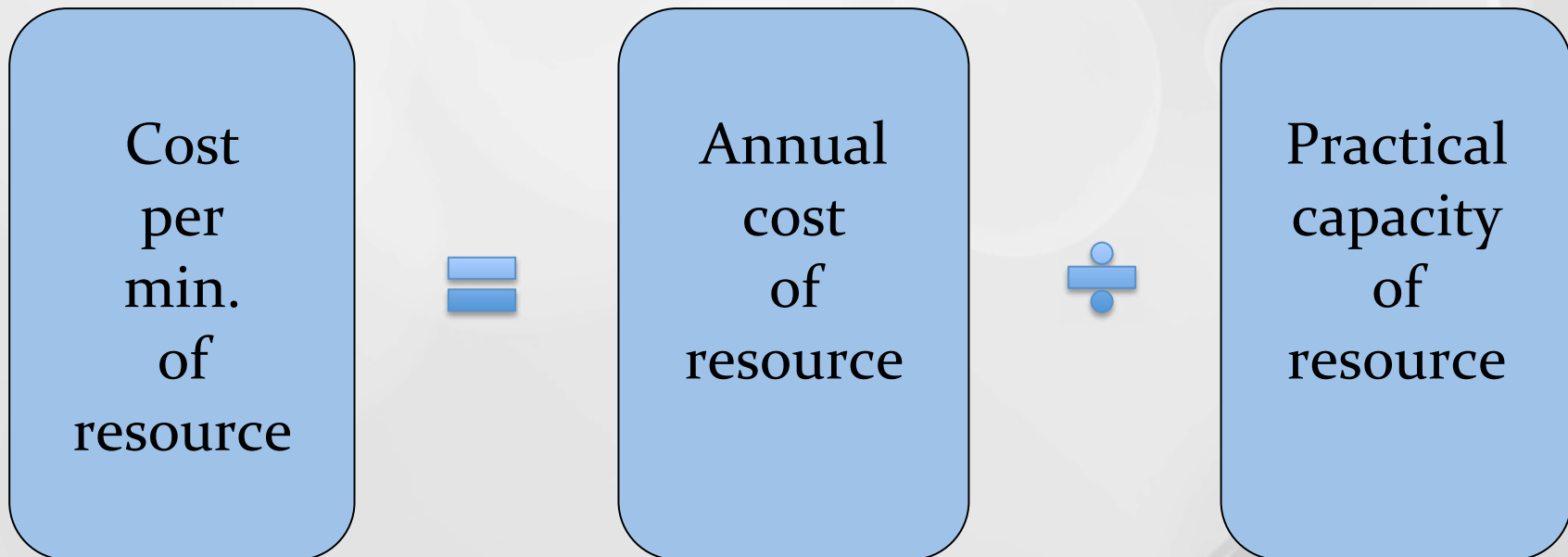
- Select medical procedure
  - Total knee replacement
  - Whipple procedure (pancreaticoduodenectomy)
  - Inguinal hernia repair
  - . . .



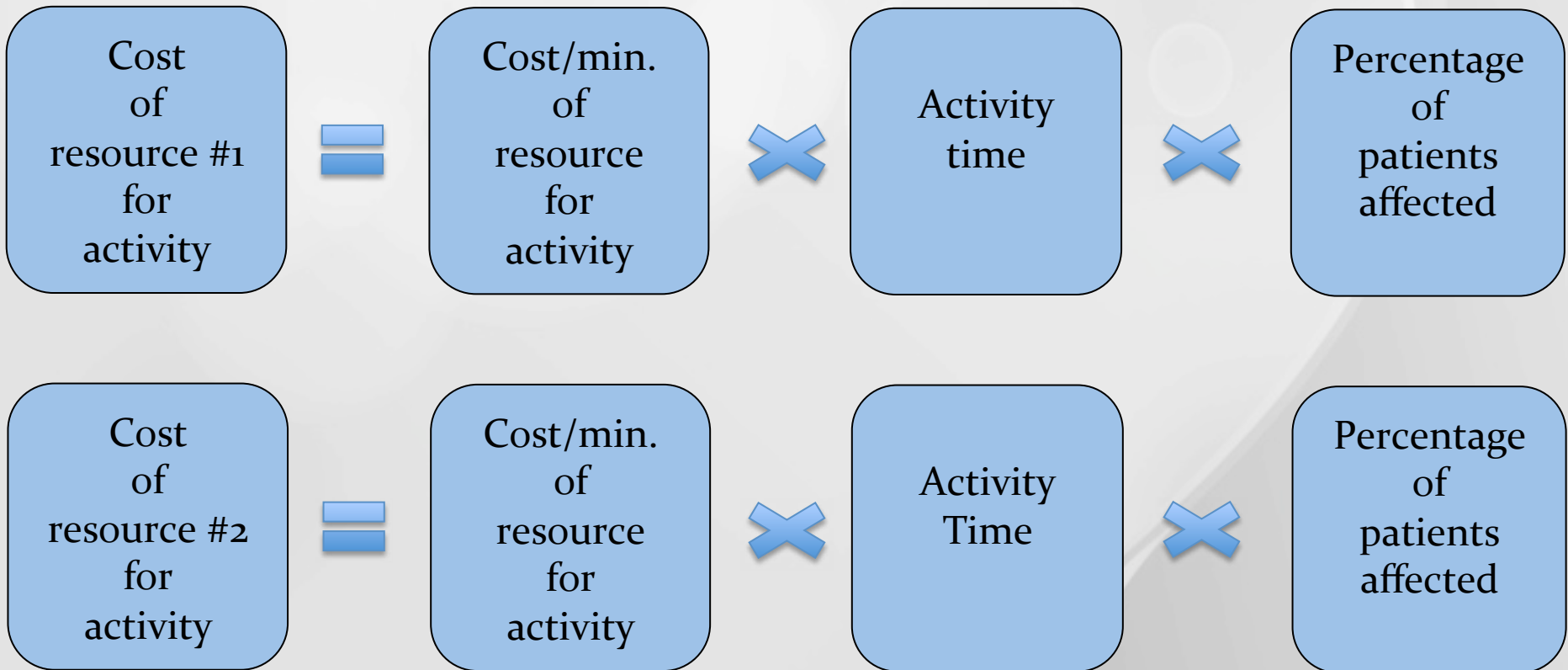
# Develop detailed process maps

- Develop detailed process maps for cycle of care
  - Flow chart
  - Value stream map
  - Unified modeling language

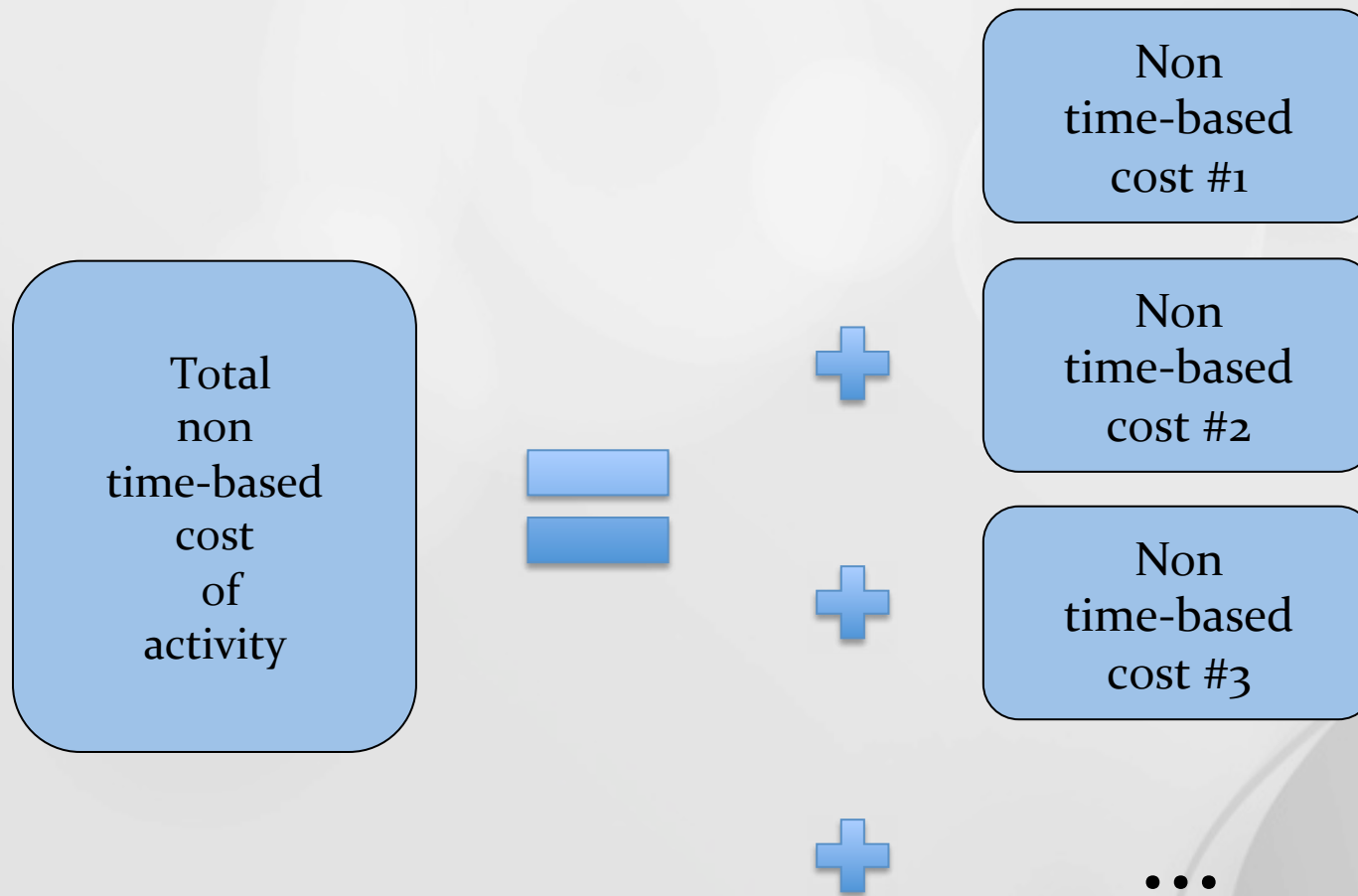
# Cost/min. of a resource



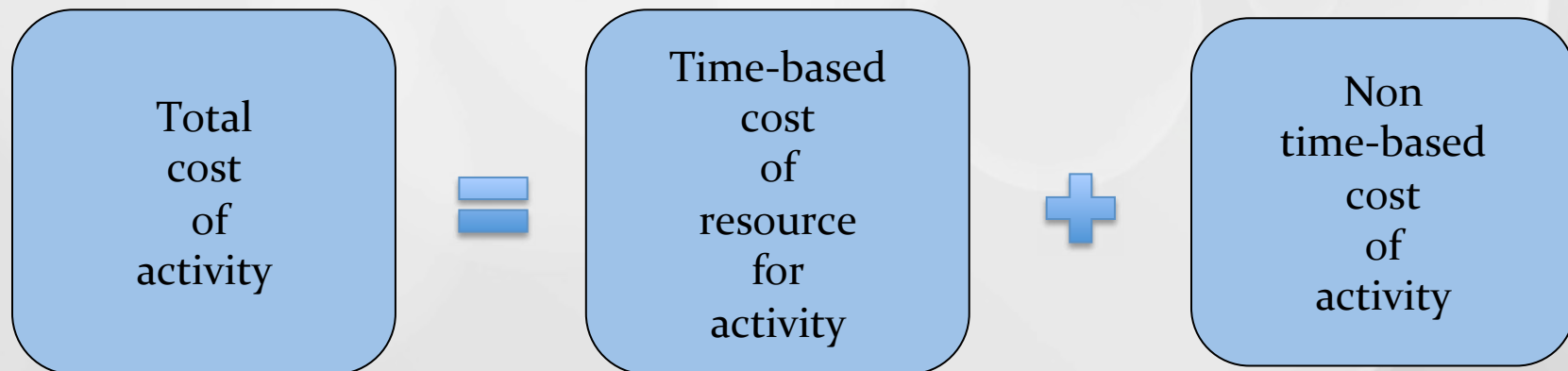
# Time-based cost of a resource for an activity



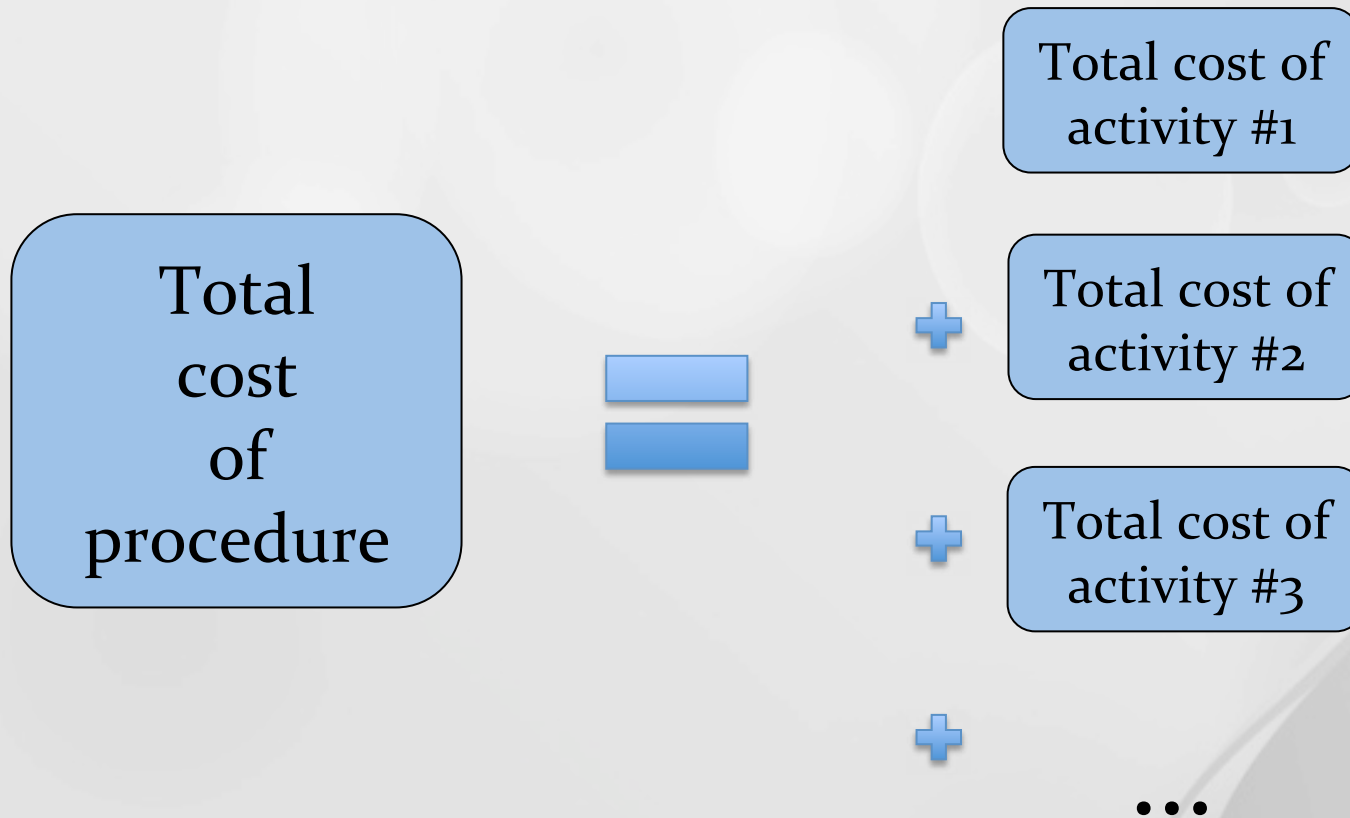
# Non time-based cost of an activity



# Total cost of an activity



# Overview of TDABC



# 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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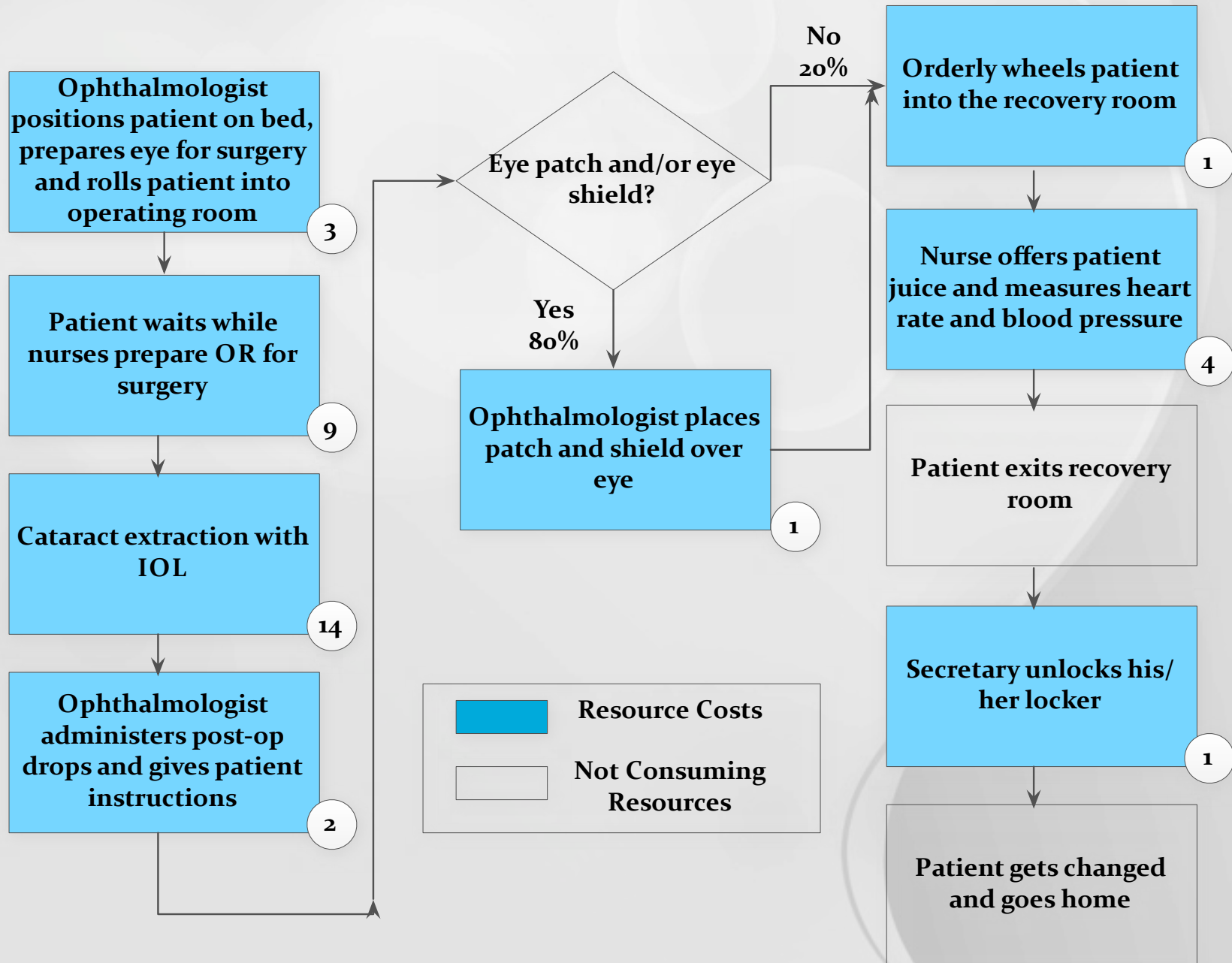
# Select medical procedure

- 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)

# Process map fragment for day of surgery



## 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”
    - $(5,040 \text{ hours} * 0.90) * 60 \text{ min./hour} = 257,040 \text{ min.}$
- Calculate cost/min.
  - $\$107,482.51 / 257,040 \text{ min.} = \$0.56 / \text{min.}$

# 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”
  - $(63,936.50 \text{ hours} * 0.85) * 60 \text{ min./hour} = 3,260,761.50 \text{ min.}$
- Calculate cost/min.
  - $\$3,533,487.05 / 3,051,862.03 \text{ min.} = \$1.08 / \text{min.}$
- 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

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



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

Surgeon	Average Operating Time per Procedure (min.)	Average Turnover Time per Procedure (min.)	Total Time in OR Per Procedure (min.)
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

## 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

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%

# 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



## 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?