Healthcare Acquired Infections: At what cost?

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Hosted by Paul Webber
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Objectives

• Understand the key principles in calculating the economic impact of healthcare acquired infections (HAIs)
• Understand terminology: e.g. fixed and variable costs
• Appreciate the overall financial impact of selected HAIs
• Be able to describe key components of a business case

What will not be discussed

• The entire field of Economic Evaluation
• Economic evaluations of complex health system interventions

What is Health Economics?

The study of resource use

Assists with allocating scarce healthcare resources by identifying the potential for greatest financial benefits and further clinical improvements.

By choosing to use resources one way; those same resources are not available for other potentially beneficial interventions (opportunity costs)

Different types of Economic Analysis

Cost-Effectiveness:
- Comparative study design for using monetary and non-monetary results per unit of health outcome.
- Best suited to clinical trials assessing treatments in a given patient group.
- Assumes all other conditions remain constant.
- Consequences e.g. pain reduction, lost work time (duration, frequency)

Cost Benefit:
- Costs are estimated as monetary or non-monetary.
- The health outcome assessed is usually improved clinical care.

Cost Minimization:
- Compares costs only and assumes the consequences (outcomes) are equal.

Cost Utility:
- Includes multi-dimensional health outcomes and a broader range of conditions: monetary and non-monetary, with e.g. quality, rehabilitation, pain.

Assessing Effectiveness and Cost

Effectiveness → Clinical Studies
Cost:
  a) Accurate estimates of the extra cost of a new strategy
  b) Accurate assessment of the “cost savings” (including health benefits) associated with a predicted number of prevented cases of HAI

http://www.nlm.nih.gov/nichsr/edu/healthecon/01_he_01.html
(Drummonds Checklist for critical appraisal)
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General problems with costing
a) Partial not full evaluation performed
b) Poor methodological design e.g. overestimation of the costs of an HAI, underestimating cost of implementation
c) Inappropriate generalization of the results

Problems with costing additional days stay
Control studies may not account for bias because
1. unable to match for all the variables that affect length of stay
2. Total length of stay rather than length of stay AFTER the infection has occurred is measured
3. The “cost” of the bed-day is debated

A Matter of Perspective
The Economist
Goal: maximize the amount of health gained from a set resource pool
“The change to cost from a new intervention should be adequately compensated by the change to health benefit”
Cost = $ + Health benefit = quality-adjusted life-years or other tangible benefit (e.g. decrease in HAI, bed days)
Opportunity costs important – theoretic decrease in bed days and consumables

The Accountant
Goal: balance the overall budget
Any new intervention must be at least “revenue neutral”
Considers the “fixed” (infrastructure) (85%) and variable (consumables) costs
Do not consider the “opportunity costs”

Let’s look at an example
1. Evaluating the impact of an intervention
2. Using an economic evaluation for strategic planning and use of resources

3. Results
3.1 Evaluation of Costs
VCH spent more approximately $66.3M for the treatment of the selected HAIs over the last 4 years

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3. Results

3.1 Evaluation of Costs

- UTI is the most common HAI at VCH with 18,900 cases over the last 4 years.
- UTI, VRE, Bacteremia and MRSA are the main cost drivers.
- The total expenditures for the QPS Department were more than $11M and $6.7M for Infection Control over the last four years. The increased QPS costs reflect program expansion.

3.3 Overall Cost-Benefit Analysis

- A break-even point of costs and savings was realized in the second year of evaluation.
- VRE, MRSA and Bacteremia have the most potential for further benefits.

Preparing and Implementing a Business Case

When do you need a business case

“A business case is a way of presenting a logical and robust justification for a significant initiative or change project for which approval at departmental, directorate or board level is required. It must demonstrate that all the issues have been systematically and objectively considered”

From the National Health Services UK

Topics

• When you need to prepare a business case
• What should be in it
• Who should be involved
• How should it be communicated

The Framework

1. Background — current state, problem/opportunity
2. Project Description — Objectives, scope, deliverables, operational impacts, strategic alignment
3. Costs and Benefits — resource requirements, costs and benefits and assumptions
4. Risk Assessment — project risks and risk of not proceeding with project
5. Evaluation — how will we know the impacts
6. Alternative Analysis — what other options are there
7. High Level Implementation plan — what will be done by when

An Example

Healthcare-associated infections (particularly C.difficile) need to be improved

Roles/Responsibilities for cleaning of portable equipment have never been assigned (ward clutter, hoarding, mixing clean and dirty)

Cleaning of surfaces impeded by clutter, out-dated tools (e.g. cleaning carts, rags), inadequate instructional aids and logistical issues

Minimal antimicrobial stewardship program, limited accountability for antimicrobial resistance rates, prescribing practices and drug utilization contributes to the problem

1. Background: Clearly define the problem

2. Project Description: Develop the plan

• What are you trying to improve?
• How will you get there?
• What resources do you need?
• What is the ROI (return on investment)
• How long do you need?
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Current Situation

- **Environmental issues**: clutter, hoarding, poorly maintained and inconsistently cleaned equipment, poor separation clean and dirty, no assigned personnel for mobile equipment

- **Antimicrobial use**: no new antibiotics on horizon, emerging resistance in gram negative rods, lack of monitored policies and protocols, accountability re prescribing practices lacking.

Not delivering Best Value

No routine maintenance

No routine cleaning for all wheeled equipment

The Proposal

- Implement an **environmental program** to improve equipment and surface cleanliness
- Establish a VCH **antimicrobial stewardship** program to ensure appropriate, cost effective antibiotic use
- Implement a **risk-managed approach to the isolation of VRE** positive patients once the two programs are underway.

Decreased healthcare-acquired associated infections following implementation of the two programs
1. Evaluating an intervention

**Summary**

Nasal photodisinfection and chlorhexidine wipes decrease surgical site infections: a historical control study and propensity analysis.

**Cases Avoided**

- Neurosurgery: 6
- Cardiovascular: 3
- Orthopedics: 8
- Vascular: 2
- Thoracic: 1

**Total**: 35

**Cost Avoidance**

- Neurosurgery: $25,000
- Cardiovascular: $30,000
- Orthopedics: $33,000
- Vascular: $20,000
- Thoracic: $10,000

**Total**: $1,040,000

*Case Cost provided by A. Kepka Financial Planning and Business Support.
**Cases were rounded down by “1”

3. Costs and Benefits (Deliverables)

**Money, Money, Money…**

...Is not the only deliverable

Things you may consider

1. Quality Outcomes
   - Patient/Employee Satisfaction and Experiences
   - Adverse Events / Occurrences
   - Healthcare Acquired Infections
   - Mortality & Morbidity

2. Productivity & Efficiency
   - Admissions / Readmissions
   - Work Time / Direct Care Time
   - Employee Turnover and Staff Absence
   - Reducing inefficiencies / Returning time to nursing care

3. Health Economics
   - Cost-benefit analysis
   - Return-on-Investment
   - Cost Avoidance
   - ACOBRA (e.g. additional patient days, beds filled)

Impact: Financial

<table>
<thead>
<tr>
<th>Service</th>
<th>Cases Avoided</th>
<th>Case Cost</th>
<th>Cost Avoidance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neurosurgery</td>
<td>6</td>
<td>$25,000</td>
<td>$150,000</td>
</tr>
<tr>
<td>Cardiovascular</td>
<td>3</td>
<td>$30,000</td>
<td>$90,000</td>
</tr>
<tr>
<td>Orthopedics</td>
<td>8</td>
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</tr>
<tr>
<td>Vascular</td>
<td>2</td>
<td>$20,000</td>
<td>$40,000</td>
</tr>
<tr>
<td>Thoracic</td>
<td>1</td>
<td>$10,000</td>
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</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>35</strong></td>
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</tbody>
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Impact: Readmissions

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Project Period</th>
<th>Average previous two years</th>
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</thead>
<tbody>
<tr>
<td>Average number of readmissions/Fiscal period</td>
<td>1.25/pd</td>
<td>4.04/pd</td>
</tr>
<tr>
<td>Average days stay</td>
<td>16.5</td>
<td>16.5 days</td>
</tr>
<tr>
<td>Readmissions/Fiscal year</td>
<td>15</td>
<td>48.5</td>
</tr>
<tr>
<td>Days Stay x Cost/Day</td>
<td>15 x 16.5 x $500/day = $123,750</td>
<td>48.5 x 16.5 x $500/day = $400,125</td>
</tr>
<tr>
<td>Cost Avoidance</td>
<td>$276,375</td>
<td></td>
</tr>
<tr>
<td>Patient Days saved</td>
<td>552</td>
<td></td>
</tr>
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Impact: Cost Avoidance

1. LPNs able to treat 5176 patients/yr
2. 3608 were cases routinely followed for SSI outcomes
3. If remaining 1012 cases had a similar SSI rate reduction (0.016), 31 additional infections prevented.
4. $20,000/SSI x 31 = $611,840 avoided costs

Total Cost Avoidance: $1,040,000 + $276,375 + $611,840 = $1,928,215

4. Risk Analysis

SWOT ANALYSIS

Strengths:
- Integrated expert infection control team
- A recognized patient priority
- Surveillance system in place
- Strong ties with Patient Safety, Finance, Pharmacy, and local Operations

Weaknesses:
- No assigned responsibilities for cleaning mobile equipment
- Increasing clutter
- No regional plan for environmental cleanliness
- No regional plan for antimicrobial stewardship
- No infrastructure for either initiative
- No monitoring of outcomes

Opportunities:
- Partnerships with industry to assess new cleaning technologies
- Partnerships for student practicums
- PhD health economist for the next two years

Threats:
- Inability to transfer “savings” to other cost centres
- Inability to sustain program due to shifting priorities with SET/MOH
- Renegotiation of cleaning contract within next two years

A Practical Example

5. Evaluation: Measureable deliverables

- Identify indicators for each projected benefit
- This comes from being able to define and link each benefit “cause” to an “effect”
- Examples:
  - Improved environmental cleaning will show a change in spot UV audit results
  - Switching to less costly generic drugs that have the same efficacy will ↓ overall drug costs

The Budget of Course

- Include both the capital and the operating costs
- Clearly show where financial “savings” or “cost avoidance” will occur
- Be conservative in your estimates of savings!

Our deliverables

1. Implement an environmental program to improve equipment and surface cleanliness
2. Establish a VCH antimicrobial stewardship program to ensure appropriate, cost effective antibiotic use
3. Decrease healthcare-associated infections following implementation of the two programs
4. Implement a risk-managed approach to the isolation of VRE-positive patients

The Budget of Course

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6. Analysis of Alternatives
- Be honest and objective about what these are and what the impacts might be
- Illustrate these clearly and logically e.g. use a Pro/Con matrix
- Include the alternative of “doing nothing” and its impact

This proposal...
- Is fundamental to quality patient care
- Will decrease healthcare acquired infections
- Will prevent spread of resistant organisms
- Will be self-sustaining
- Will significantly improve patient flow
- Will require executive support for change management and sustainment

7. High Level Implementation Plan
- Who does what and when
  - Think Departments, Clinical areas not people
  - Be sure to include both clinical and operational teams
- Gant charts/timelines
- Communication plan

The Communication Process
- Start early
- Communicate at all levels
- Include both notification and feedback loops
- Be sure to include both clinical and operational teams
- Ensure that business case teams reports back to their relevant areas

Leadership support is the key
- When we think of leadership we need to think of in context of the layers within the organization
  - Senior Leadership
  - Project Leadership
  - Front Line Leadership

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The Business Case is Accepted!

6. Share the results early and often
1. Regular reporting and updates to leadership team(s)
2. Show them the results early
3. Look for low hanging fruit early
4. Remain focused
5. No surprises – if something goes sideways, must report
6. Spend the money early!

Speak the same language

Be Flexible
• You may have to change your plan along the way
• You may have to play many different roles: ... bookkeeper, labour lawyer, coach and expert

Stay calm and REMAIN FOCUSED!

About working together
• Goals have to resonate with the team
• Acknowledge and recognize team effort
• Thank team members
• Report on successes
• Share successes

Conclusions
• Economic Evaluations can provide context and relevance for projects/business cases
• Consider the perspective of the key decision makers in framing your proposal/evaluation
• Be objective in ascertaining costs and benefits
• Ensure “the plan or vision” is relevant, implementable and outcomes are measurable
• Communicate early, broadly, and honestly

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Questions

References and Acknowledgements
1. Mr. R Damji and Ms. S Scharf, Vancouver Coastal Health  

Coming Soon

September 29 (Free Teleclass – Broadcast Live from IPS Conference)  
THE TIMES THEY ARE A CHANGING  
Dr. Evonne Curran, Health Protection Scotland  
October 1 (Free Teleclass – Broadcast Live from IPS Conference)  
INFECTION CONTROL IN THE 21ST CENTURY  
Dr. Stephanie Dancer, NHS Lancashire  
October 2  
INFECTION PREVENTION & CONTROL IN CYSTIC FIBROSIS  
Prof. Lisa Saiman, Columbia University Medical Center, New York  
October 8 (Free WMO Teleclass – North America)  
PUBLIC REPORTING AND DISCLOSURE OF HAI RATES: POSITIVE IMPACT OR CONFUSION?  
Dr. Marianne McGuckin and John Govednik, McGuckin Methods International  
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