COST EFFECTIVENESS OF HEALTHCARE INTERVENTIONS FOR CARDIOVASCULAR ILLNESSES IN TRINIDAD & TOBAGO

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Structure of the presentation

• Introduction – Healthcare Costs & Population Health Benefits
• Value of healthcare
• Cost-effectiveness of interventions for cardiovascular illnesses in T&T
• Inferences & recommendations for resource allocative efficiency
• Summary

Per capita healthcare spending (2012)

- USA: US$ 8895
  Expected to reach $25,000 by 2020
  Ranks 1st in the world!
- Jamaica: $318
- T&T: $972
- Barbados: $1031
- India: $61
- Ethiopia: $18

Reasons for increasing costs

- “Moral hazard” of insurance
- “Diffusion” of high-technology
- “Asymmetry” of information – parties on the opposite sides have differing amount of information
- Patient (consumer) pays for the product (to the manufacturer) as well as the service (healthcare provider)
- Demand is not necessarily created by the consumer – artificially created by health provider

Source: World Bank, OECD database

Folland S et al., 1997
Kumar RK, 2011
Other reasons

- Political and socio-cultural dimensions
- Modeling health systems following other countries
- Technocratic & pharmaceutical industry push

Gain in life expectancy

Gain in life-years vs increase in costs

Value of healthcare

- High quality healthcare expending low costs offers the best value
- A ‘gimmick’ affords no increase in value – there is increase in costs and probably decrease in quality

Source: WHO
Value of intensive care

<table>
<thead>
<tr>
<th>Low</th>
<th>Costs — High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor</td>
<td>USA, UK</td>
</tr>
<tr>
<td>Good</td>
<td>Barbados, T&amp;T</td>
</tr>
</tbody>
</table>

Pertinent questions

- Does “higher healthcare expenditure” imply “better outcomes”?  
- Has highly expensive high-technology tertiary care considerably improved societal health indices?  
- Many treatment modalities of high-technology medicine – are they not accessible only to relatively smaller number of patients?  
- What factors influence access - socioeconomic status, geographic location, willingness to pay?

Cost-effectiveness analyses (CEA)

- Cost of providing an intervention – compared to the outcome obtained  
- Originates from welfare economics  
- Opting between alternative interventions which are comparable: E.g., CEA determines if one new antiplatelet drug gives the population more health benefits per cost than one more angioplasty  
- Cost effectiveness ratio = cost / health outcome

CEA for cardiovascular illnesses - T&T

OBJECTIVES OF THE STUDY

- To conduct a cost-effectiveness analysis by estimating costs and population health outcomes, applying DALY as the measure  
- To compare the “allocative efficiency” of resources with respect to different modes of healthcare (primary - ICU - tertiary) (unique to this study)
METHODOLOGY
Steps of conducting CEA

1. Clear specification of the patient groups and interventions to be studied
2. Identification and measurement of relevant costs
3. Identification and measurement of relevant outcomes
4. Accounting for uncertainties - doing a sensitivity analysis to compensate for the assumptions made

Patient groups & cost of interventions

- Patients who suffered from cardiovascular illness – the most common cause of mortality in T&T
- Diseases under the ICD codes I-00 through I-99
- Age/gender specific mortality & disability
- Data sourced from Ministry of Health/CSO/RHAs
- Cost of interventions for cardiovascular diseases in T&T:
  - Primary care
  - ICU care
  - Angioplasty & coronary artery bypass grafting (CABG)
- Top-down (cost-block) model

Outcomes: Disability Adjusted Life Years (DALY)

- The sum of years of life lost (YLL) due to premature death and years of life lived with disability (YLD) [DALY = YLL + YLD]
- DALY - a measure of something ‘lost’ rather than ‘gained’ (cf. QALYs)
- DALYs are not desired themselves – but rather interventions should avert DALYs
- Widely used by WHO and WB


RESULTS - Cost blocks

Primary Health Centre

- Capital Expenditure
- Staff
- Non-clinical support
- Consumables

ICU

- Capital Expenditure
- Staff
- Non-clinical support
- Consumables
**Cost of interventions in T&T (2006)**

<table>
<thead>
<tr>
<th>Intervention for cardiovascular illnesses</th>
<th>Number of patients</th>
<th>Cost (international $)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary care</td>
<td>28964</td>
<td>236,962</td>
</tr>
<tr>
<td>ICU care</td>
<td>152</td>
<td>708,927</td>
</tr>
<tr>
<td>Angioplasty &amp; Coronary Artery Bypass Grafting</td>
<td>1119</td>
<td>3,282,639</td>
</tr>
</tbody>
</table>

**DALYs according to T&T longevity**

<table>
<thead>
<tr>
<th>Category</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years of Life Lost (YLL)</td>
<td>3898.6</td>
<td>4982.3</td>
<td>8880.9</td>
</tr>
<tr>
<td>Years Lost due to Disability (YLD)</td>
<td>122.0</td>
<td>775.6</td>
<td>897.6</td>
</tr>
<tr>
<td>DALY (YLL+YLD)</td>
<td>4020.6</td>
<td>5757.9</td>
<td>9778.5</td>
</tr>
</tbody>
</table>

* Male: 69 years  Female: 75 years

**DALYs averted by interventions**

<table>
<thead>
<tr>
<th>Intervention for cardiovascular illnesses</th>
<th>Mean DALYs per 100,000 population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary care</td>
<td>2158</td>
</tr>
<tr>
<td>ICU care</td>
<td>21</td>
</tr>
<tr>
<td>Angioplasty &amp; CABG</td>
<td>8</td>
</tr>
</tbody>
</table>

**Cost-effectiveness ratios (CER)**

<table>
<thead>
<tr>
<th>Intervention for cardiovascular illnesses</th>
<th>Mean CER (Cost / DALY)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary care</td>
<td>117</td>
</tr>
<tr>
<td>ICU care</td>
<td>34,938</td>
</tr>
<tr>
<td>Angioplasty &amp; CABG</td>
<td>444,893</td>
</tr>
</tbody>
</table>
Sensitivity analysis* - CER

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Lower 90% CI</th>
<th>CER</th>
<th>Upper 90% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary care</td>
<td>85.1</td>
<td>116.8</td>
<td>148.5</td>
</tr>
<tr>
<td>ICU care</td>
<td>25463.1</td>
<td>34938.3</td>
<td>44413.5</td>
</tr>
<tr>
<td>Angioplasty &amp; CABG</td>
<td>324239.8</td>
<td>444893.5</td>
<td>565547.2</td>
</tr>
</tbody>
</table>

* By bootstrapping

Findings of the study

* To avert deaths and disabilities due to cardiovascular illnesses in Trinidad & Tobago:
  - a relatively smaller amount of money is spent for primary healthcare
  - almost three times this money is spent for intensive care
  - more than ten times of the amount is spent for angioplasty and coronary bypass surgery

* Primary care averts most DALYs in all

Inferences of the study

- Resource allocation should be focused towards primary care interventions
- This does not imply other areas should not get funding!
- The interpretation is:

  Allocating funds for new ICUs and angioplasty centres may be less effective compared to funds to strengthen the primary healthcare system for population health

Funding healthcare – T&T

- Predominantly public-funded healthcare system
- Ministry of Health is the funding agency (through RHAs) – spans across all the levels – primary, secondary and tertiary healthcare
- Policy-decision makers do not have evidence-based allocation towards individual sectors
- Currently done on the basis of either ‘requests’ and/or what the decision-makers ’imagine’ to be important
Allocation of RHA resources - 2012

Why tertiary care gets priority?
- Brings profit in a private setting
- ‘Credentials’ or mileage (political or otherwise) in a publicly funded setting
- Currently, MoH is in the expansion mode, with more focus towards tertiary healthcare

Specialist versus Primary care
- Cultural change
- Specialist consultations far exceed visits to Primary Care Physicians (PCP)
- Far more pronounced in the elderly
- Major contributor to higher use of tests, imaging and other procedures & costs

Primary care – fell into disrepute – not remunerative
- Between 2000 and 2005, increase in practices (USA):
  - Colonoscopies – 40%
  - Stress tests – 45%
  - MRI – 94%
  - Primary care – 12%
- In 2004, the gap between the incomes of PCPs and specialists in USA:
  - Gastroenterologists 218%
  - Cardiologists 253%
  - Radiologists 260%
  - 10% reduction in the income of PCPs!

Ginsburg PB, 2008
What happens when primary care system declines? – the USA example

- Rising healthcare costs - lower gain in social health outcomes - due to 'decades-long decline' in the primary care system
- 'USA healthcare systems wasted $750 billion in 2009, due to unnecessary procedures, inefficient services and fraud' – Institute of Medicine

Do we follow failed systems?

- If countries emulate such patterns for modeling their health systems (e.g., prioritizing tertiary rather than primary healthcare) ……
- They can reach a state of unavoidable 'cost escalation'
- Urgent need for a 'preventative approach'
- Strong political will to address this situation and influence healthcare policy decision-making

Recommendations

- Systematic analysis of the impact of a particular technology in regard to its social, political, economic, legal and ethical consequences – HTA
- Incentives to use appropriate technology & disincentives to curb unnecessary use

Limitations of the study

- Cost estimation – inaccuracies, assumptions
- DALYs - extensive data requirement, often not readily available - complicated methodology - considered subjective
- Political resistance for reallocation
Messages from the CEA

- Back to basics – Alma Ata declaration
  - strengthening primary health care system by allocating more resources
  - regulating care provided at the secondary & tertiary care facilities
  - educating the society and population

Allocative efficiency of resources

Directly observed therapy (DOTS)  Observed ‘directed’ therapy??

THANK YOU