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

S. HARIHARAN MBBS, MD, FCCM, PhD
Professor of Anaesthesia & Critical Care Medicine
The University of the West Indies, St. Augustine
TRINIDAD & TOBAGO

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*

The Cost of a Long Life
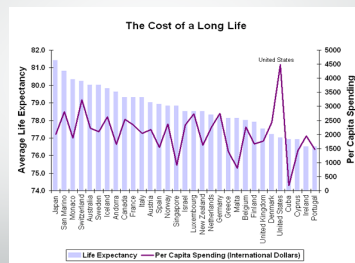
Source: World Bank, OECD database

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*
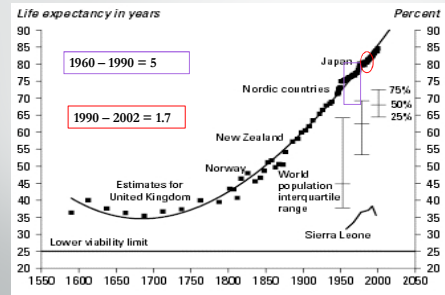
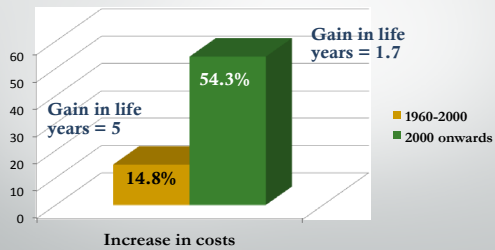*Folland S et al., 1997*   *Kumar RK, 2011*

Other reasons

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

Gain in life expectancy

Life expectancy in years — *Percent*

1960 – 1990 = 5

1990 – 2002 = 1.7

Japan
Nordic countries
New Zealand
Norway
World population interquartile range
Estimates for United Kingdom
Lower viability limit
Sierra Leone

75%
50%
25%

Source: WHO

Gain in life-years *vs* increase in costs

Gain in life years = 1.7

54.3%

Gain in life years = 5

14.8%

■ 1960-2000
■ 2000 onwards

Increase in costs

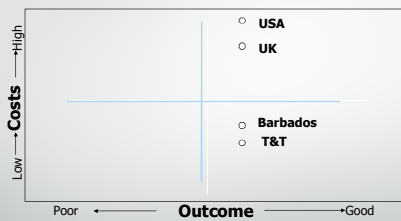## Value of healthcare

$$Value = \frac{Quality}{Costs}$$

- 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

Value of intensive care

High ← Costs → Low

○ USA
○ UK

○ Barbados
○ T&T

Poor ← Outcome → Good

Hariharan S *et al.* Outcome evaluation in a surgical intensive care unit in Barbados. *Anaesthesia* 2002; 57: 434-41.
Hariharan S *et al.* Cost evaluation in the intensive care units of Trinidad applying the cost-blocks method– an international comparison. *Anaesthesia* 2007; 62: 244–249

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

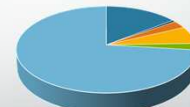*CJL Murray. Global Burden of Disease, WHO Bulletin; 1994*

RESULTS - Cost blocks

Primary Health Centre   ICU
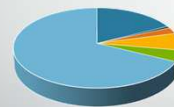
Capital Expenditure   Estate
Non-clinical support   Clinical Support
Consumables   Staff

Capital Expenditure   Estate
Non-clinical support   Clinical Support
Consumables   Staff

Cost of interventions in T&T (2006)

Intervention for cardiovascular illnesses	Number of patients	Cost (international $)
Primary care	28964	236,962
ICU care	152	708,927
Angioplasty & Coronary Artery Bypass Grafting	1119	3,282,639

DALYs according to T&T longevity*

Category	Male	Female	Total
Years of Life Lost (YLL)	3898.6	4982.3	8880.9
Years Lost due to Disability (YLD)	122.0	775.6	897.6
DALY (YLL+YLD)	4020.6	5757.9	9778.5

* Male: 69 years   Female: 75 years

DALYs averted by interventions

Intervention for cardiovascular illnesses	Mean DALYs per 100,000 population
Primary care	2158
ICU care	21
Angioplasty & CABG	8

Cost-effectiveness ratios (CER)

Intervention for cardiovascular illnesses	Mean CER (Cost / DALY)
Primary care	117
ICU care	34,938
Angioplasty & CABG	444,893

Sensitivity analysis* - CER

Intervention	Lower 90% CI	CER	Upper 90% CI
Primary care	85.1	116.8	148.5
ICU care	25463.1	34938.3	44413.5
Angioplasty & CABG	324239.8	444893.5	565547.2

* 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
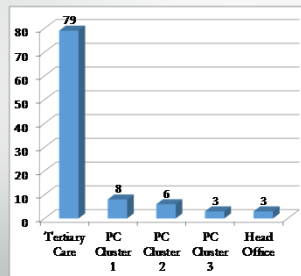
Why tertiary care gets priority?

- 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

Sandy LG et al, 2007; Lowe R, 2012

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

Vaccines cause autism

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