Introduction to Health Economics
AND ECONOMIC EVALUATION

Karen Kam, MD MSc
Section of Pediatric Respiratory Medicine
Residents and Fellows Research Course
November 9, 2021

Contact: karen.kam@ahs.ca
Did you learn about Health Economics in medical school?

Yes

No

What is Health Economics?
What is Alberta's healthcare budget for 2021?

- 15.0 billion
- 18.2 billion
- 20.6 billion
- 23.0 billion
Hospital has one dialysis machine that can run for 30 hrs/week. You are the boss. Decide how you will allocate the 30 hrs in order of preference.

55 year old male 5 hrs/week. He is married with grown up children.
6 year old male 10 hrs/week. Is awaiting a kidney transplant that will happen in about 1 year.
78 year old female 4 hrs/week. Is widowed.
3 year old male 4 hrs/week. Will need dialysis indefinitely.
7 year old female 4 hrs/week. Has 3 siblings.
8 year old female 5 hrs/week. Does not have any siblings.
65 year old female 10 hrs/week. Promises to buy the hospital another dialysis machine if she is alive in 1 year’s time.
30 year old male 4 hrs/week. Does not have children.
30 year old female 6 hrs/week. Has two young children.
45 year old male 6 hrs/week. Has no children. His brother will donate a kidney in 6 months’ time.
## Learning objectives

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Health economics alongside clinical research</td>
</tr>
<tr>
<td>2</td>
<td>Introduction to economic evaluation</td>
</tr>
<tr>
<td>3</td>
<td>Introduction to measuring costs and benefits</td>
</tr>
<tr>
<td>4</td>
<td>Combining costs and outcomes to aid in decision making</td>
</tr>
</tbody>
</table>
### Economics

- **Definition:** "The study of how people end up choosing to employ scarce resources that could have alternative uses". (Samuelson 1980)
- **Framework:** To help make choices that will maximize the health of the population subject to resource constraints.

### Health Economics
Opportunity cost

Benefit that a person could have received, but gave up, to take another course of action.
How would you invest $20 million?

MAXIMIZE HEALTH!

1. Build another wing at ACH
2. Hire more healthcare professionals
3. Buy state-of-the-art equipment
Where would you invest $20 million?

More building
More people
More technology
How would you devest $20 million?

1. Shut down Unit 4
2. Fire healthcare professionals
3. Cancel Connect Care

MAXIMIZE HEALTH!
Role of health economics – priority setting

To measure and evaluate:

• the demand and supply of healthcare

• allocation of resources within the healthcare system to promote efficiency and equity
Aim of health economics

To ensure that we do those activities whose **benefits** outweigh their opportunity cost

*i.e. we do the most beneficial things with the resources at our disposal*
1. Ensuring quality of care in our communities

2. Partnering for better health outcomes

3. Achieving health system sustainability

AHS strategy for clinical health research
Economic evaluation

Comparative analysis of alternative courses of action in terms of both their costs and consequences

https://www.cadth.ca/guidance-document-costing-health-care-resources-canadian-setting
Economic evaluation

Comparative analysis of alternative courses of action in terms of both their costs and consequences

https://www.cadth.ca/guidance-document-costing-health-care-resources-canadian-setting
Cost Categories

HEALTH SECTOR
Eg. Drugs, equipment, diagnostics, hospital, ambulance, homecare, healthcare providers

PATIENT/FAMILY
Out-of-pocket
Co-payments, travel

PRODUCTIVITY
Indirect

consider perspective
<table>
<thead>
<tr>
<th>Perspective</th>
<th>Types of Cost</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Societal perspective</td>
<td>Direct costs to publicly funded services (other than health care)</td>
<td>Social services, such as home help, meals on wheels*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Income transfer payments paid (e.g., disability benefits)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Special education</td>
</tr>
<tr>
<td>Public payer</td>
<td>Direct costs to publicly funded health care system</td>
<td>Drugs, medical devices</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Equipment, space, facilities, and associated overhead costs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Aids and appliances paid by government</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Health care providers and other staff</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Medical services, including procedures</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hospital services</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Emergency visits</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ambulance services</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Diagnostic, investigational, and screening services</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rehabilitation in a facility or at home*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Community-based services, such as home care, social support*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Long-term care in nursing homes*</td>
</tr>
<tr>
<td>Publicly funded health care system</td>
<td>Direct costs to patients and their families</td>
<td>Out-of-pocket payments (including co-payments) for drugs, dental</td>
</tr>
<tr>
<td></td>
<td></td>
<td>treatment, walking aids</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cost of travel for treatment, paid caregivers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Premiums paid to, and benefits received from, private insurers*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Income transfer payments received (e.g., disability benefits)</td>
</tr>
<tr>
<td></td>
<td>Time costs to patients and their families*</td>
<td>Patient’s time spent for travel and receiving treatment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lost time at unpaid work (e.g., housework) by patient and family caring</td>
</tr>
<tr>
<td></td>
<td>Productivity costs</td>
<td>Lost productivity due to reduced working capacity, or short-term or long-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>term absence from work (during friction period)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Costs to employer to hire and train replacement worker for patient</td>
</tr>
</tbody>
</table>
## Health Sector - Resources

<table>
<thead>
<tr>
<th>Category</th>
<th>Resource</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospitalization</td>
<td>Discharge Abstract Database (DAD)</td>
</tr>
<tr>
<td>Physician Visits</td>
<td>Physician Claims</td>
</tr>
<tr>
<td>Medications</td>
<td>PIN dispense data</td>
</tr>
<tr>
<td>ED visits</td>
<td>National Ambulatory Care Reporting System (NACRS)</td>
</tr>
<tr>
<td>Clinic Visits</td>
<td>NACRS</td>
</tr>
<tr>
<td>Diagnostic Imaging</td>
<td>Physician Claims</td>
</tr>
<tr>
<td>Lab Tests</td>
<td>Lab data</td>
</tr>
</tbody>
</table>

AHS Analytics, Data Integration, Measurement & Reporting (DIMR)
### Patient/Family - Resources

- Travel
- Parking
- Insurance
- Surveys

### Productivity - Resources

- Median hourly wage
- Surveys
Economic evaluation

Comparative analysis of alternative courses of action in terms of both their costs and consequences


https://www.cadth.ca/guidance-document-costing-health-care-resources-canadian-setting
Measuring benefits (consequences, outcomes)

Clinically meaningful effectiveness measures

- Condition-specific measures
- Disease rates
- Quality of life (QoL)
- Mortality rates
- Healthcare utilization
- Intermediate outcomes (BP, FEV\textsubscript{1}, viral load)

Caution!
# Measuring benefits - resources

<table>
<thead>
<tr>
<th>Resource</th>
<th>Data Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discharge Abstract Database (DAD)</td>
<td>healthcare utilization</td>
</tr>
<tr>
<td>Physician Claims</td>
<td>healthcare utilization</td>
</tr>
<tr>
<td>Ambulatory Care (NACRS)</td>
<td>healthcare utilization</td>
</tr>
<tr>
<td>Calgary Lab Services</td>
<td>blood biomarkers</td>
</tr>
<tr>
<td>PIN Dispense data</td>
<td>drugs</td>
</tr>
<tr>
<td>Alberta Blue Cross</td>
<td>drugs</td>
</tr>
<tr>
<td>Census</td>
<td>SES, income, education, smoking, BMI</td>
</tr>
<tr>
<td>Vital Statistics</td>
<td>births, deaths, migration</td>
</tr>
<tr>
<td>Health Quality Council</td>
<td>patient satisfaction</td>
</tr>
</tbody>
</table>
Measuring benefits - techniques

Quality adjusted life years (QALYs)
- Euroqol, HUI, SF-6D
- Discrete choice experiment
- Contingent valuation

<table>
<thead>
<tr>
<th>Health State</th>
<th>Utility Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>normal health</td>
<td>1.0</td>
</tr>
<tr>
<td>Atopic eczema – not recurrent</td>
<td>1.0</td>
</tr>
<tr>
<td>Asthma – symptom free</td>
<td>0.97</td>
</tr>
<tr>
<td>JIA – controlled</td>
<td>0.77</td>
</tr>
<tr>
<td>Vision loss</td>
<td>0.5</td>
</tr>
<tr>
<td>extremely bad health</td>
<td>0.0</td>
</tr>
</tbody>
</table>
WHAT BENEFITS SHOULD YOU MEASURE?

What type of economic evaluation are you doing?
Economic evaluations attempt to take into account the decision-maker’s viewpoint.
Cost Effectiveness Analysis (CEA)

Compares costs and outcomes (effects) of different courses of action.

Eg. deaths averted/year
decreased cases of NEC/year
# of RSV hospitalizations/year
Cost Benefit Analysis (CBA)

Like a CEA, but values the benefits in money terms

Often used to evaluate programs

Measure whether benefits exceed the costs

Eg.  Cost and cost benefits of a 12 hr vs 24 hr Peds ED at SHC
Cost Utility Analysis (CUA)

Like a CEA, but values the benefits in healthy years

*Quality Adjusted Life Year (QALY)

Eg. cost of cochlear implantation per QALY
    cost of ECMO per QALY
Framework for decision-making

*Putting costs and outcomes together relative to the comparator*
COSTS MAY:

A: DECREASE
B: REMAIN UNCHANGED
C: INCREASE
OUTCOMES MAY:

1 IMPROVE
2 REMAIN UNCHANGED
3 WORSEN
### Matrix linking effectiveness and cost

<table>
<thead>
<tr>
<th>EFFECTIVENESS</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>increasing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>decreasing</td>
<td>A</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>C</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Compared with the current drug/program, the new drug/program is:**

1. more effective
2. of equal effectiveness
3. less effective

- ✓ recommend new drug/program
- × do not recommend new drug/program
- ? judgement required
- ~ indifferent

- A. less costly
- B. of equal cost
- C. more costly
Now graphically

- New program is **dominated** (less effective & more costly)
- New program is more effective but more costly
- New program is less effective and less costly
- New program **dominates** (more effective & less costly)
Change in Costs

New program is dominated (less effective & more costly)

New program is more effective but more costly

New program is less effective and less costly

New program dominates (more effective & less costly)
The “ICER”

Incremental cost-effectiveness ratio

\[
\frac{\text{change in costs}}{\text{change in outcomes}}
\]
WHAT IS GOOD VALUE?

Program under consideration: Lung cancer screening among smokers using low-dose CT scans

Compared with no screening, the ICER is $52,000 per QALY

Would you fund this screening program?

How much would you pay for a year of perfect health?
WHAT IS GOOD VALUE?

Lung cancer screening among smokers using low-dose CT scans
Compared with no screening, the ICER is $52,000/QALY

**NICE (UK)** states that it employs an ICER of **$32,000-$48,000/QALY**
In practice, evidence shows that the threshold is closer to **$64,000/QALY**

**Canada** – general acceptability threshold of **$50,000/QALY** with a grey zone extending up to **$80,000/QALY**
https://www.cadth.ca/reimbursement-review-reports
In a time of financial restraint,

we should measure costs of activities we do and want to do

AND we need to measure outcomes

Economic evaluation provides data to assist in decision-making
Value for money

In a time of financial restraint, we need to consider:

Is this new treatment/program value for money?

Will the healthcare system overall see cost avoidance or cost savings?
Would an economic evaluation enhance your research project?

Yes

Yes, but as a Part II

Unsure

No
Costing websites

_**O’Brien Institute for Public Health. Costing Resources**_
https://obrieniph.ucalgary.ca/groups/health-economics/he-costing-resources

_**Canadian Institute for Health Information. Patient Cost Estimator**_

_**CADTH. List of Publicly Available Canadian Cost Information**_
https://www.cadth.ca/list-publicly-available-canadian-cost-information