

# Economic Evaluations in Health

## An introduction for clinicians, researchers, and policy makers

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# *Economics in health care*

- Limited health producing resources
- Unlimited health improving wants
- Choosing between wants given our resource 'budget'

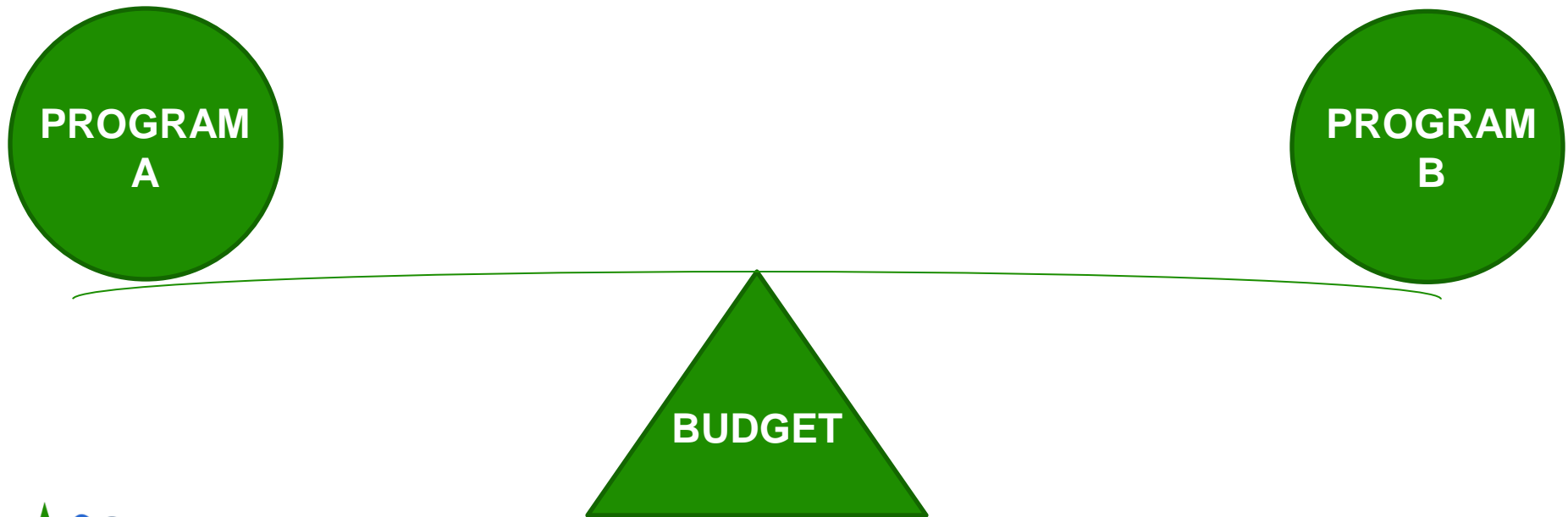


# *Economics is about choices*

- Opportunity cost = The **cost** of the best alternative that must be forgone in order to pursue a certain action. Put another way, the benefits you could have received by taking an alternative action.

# *Economic Evaluation*

- Aim is to choose interventions where the benefits outweigh the opportunity cost



# *Economics is also about efficiency*

## Efficiency

- Maximizing benefit for resources used

## Technical Efficiency

- Meeting a given objective at least cost (resources)

## Allocative Efficiency

- Producing the pattern of output (supply) that matches with the patter of consumer wants (demands)

# *Def'n: Economic evaluation*

- Compares BOTH the costs AND consequences (effectiveness, benefits) of TWO or more interventions.
- A FULL economic evaluation requires the identification, measurement and valuation of BOTH costs and consequences.
- Is the ONLY type of economic analysis that provides valid information on efficiency.

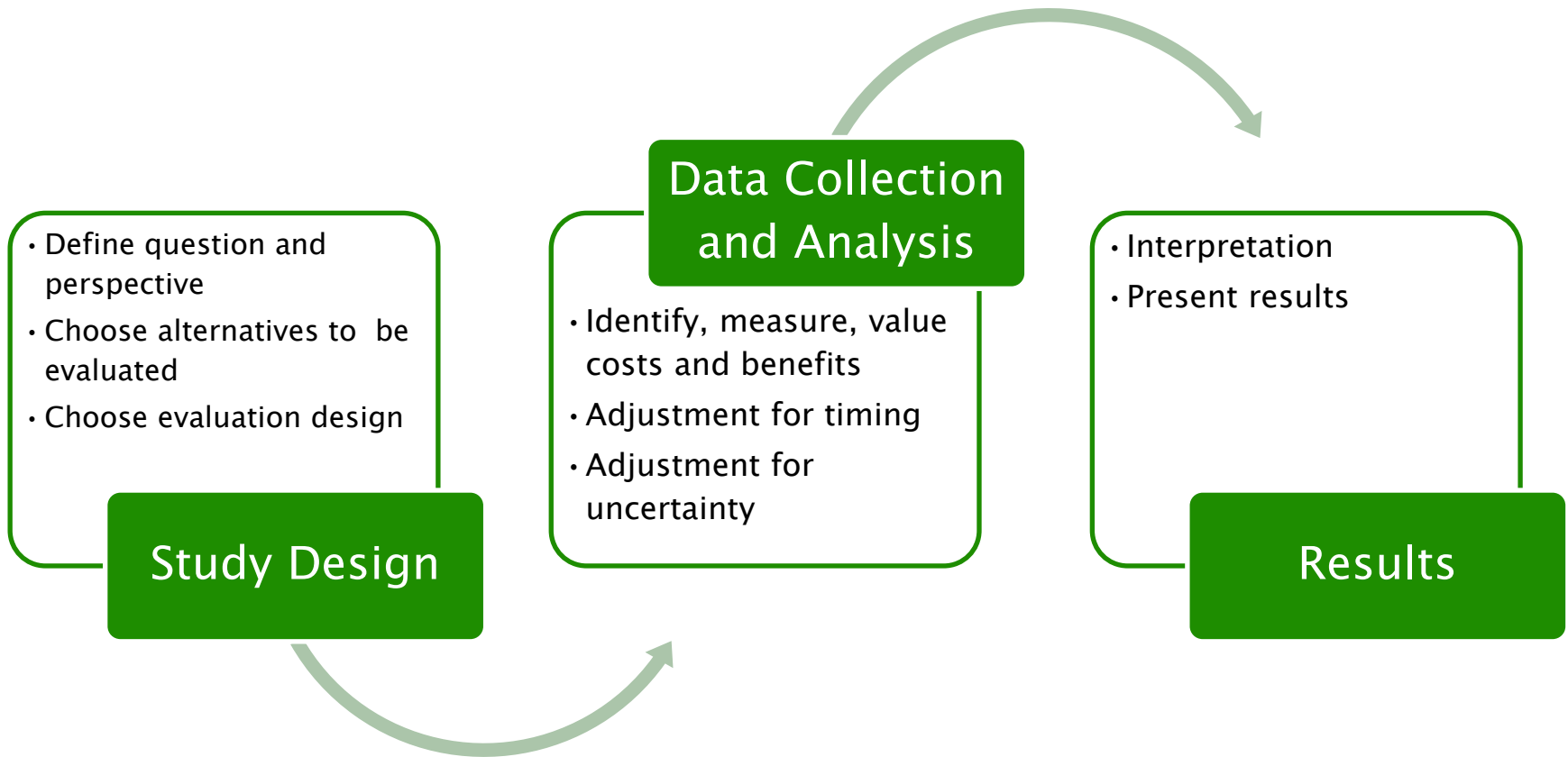
## Economic Analysis

- Is it good value for \$\$?
- Goal: Efficiency of alternatives
- Health outcomes included
- Measures added cost/unit of benefit
- Usually longer term (may be lifetime)

## Financial Analysis

- Is it affordable?
- Goal: plan for financial impact
- Health outcomes excluded
- Measures total expenditures
- Usually short term (1–5 years)

# General Evaluation Process





# *Study Design:*

## *Examples of Answerable Questions*

- Is new drug A cost effective for preventing strokes?
- What is the marginal cost and benefit of surgical procedure L over procedure M?
- Is strategy Y cost effective in preventing falls?

# *Study Design: Perspective*

- The benefits and costs of using an intervention to prevent or treat a disease depend upon whose perspective is taken
- Patient? Physician? Hospital? Payer? Society? Employers? Insurers?
- Also consider study format:  
prospective/retrospective/model

# *Study Design: alternatives*

- Must describe the interventions accurately
- Define the counterfactual intervention (the comparator) – must be realistic and a currently effective treatment option, usually the current standard treatment for the population of interest

# *Cost Minimization*

- Specific type of analysis in which the outcomes of 2 or more healthcare interventions are *assumed equal*.
- Therefore economic evaluation is based solely on comparative costs.
- Result: least cost alternative

# *Cost-Benefit Analysis*

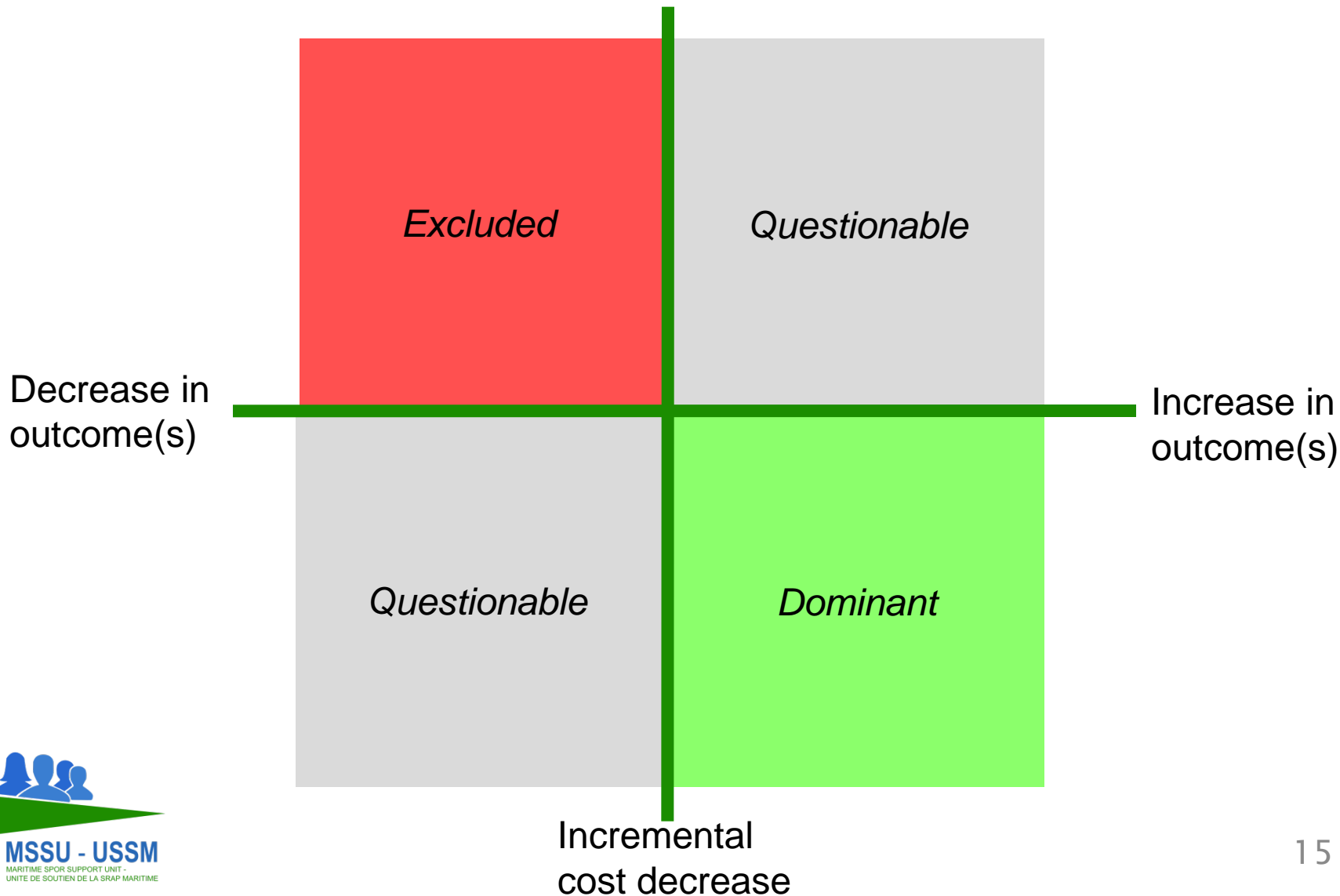
- CBA (also referred to as BCAs) try to value the outcomes in monetary terms
- CBAs are less often used in health care
- Result: Net benefit or cost-benefit ratio

# *Cost-Effectiveness Analysis*

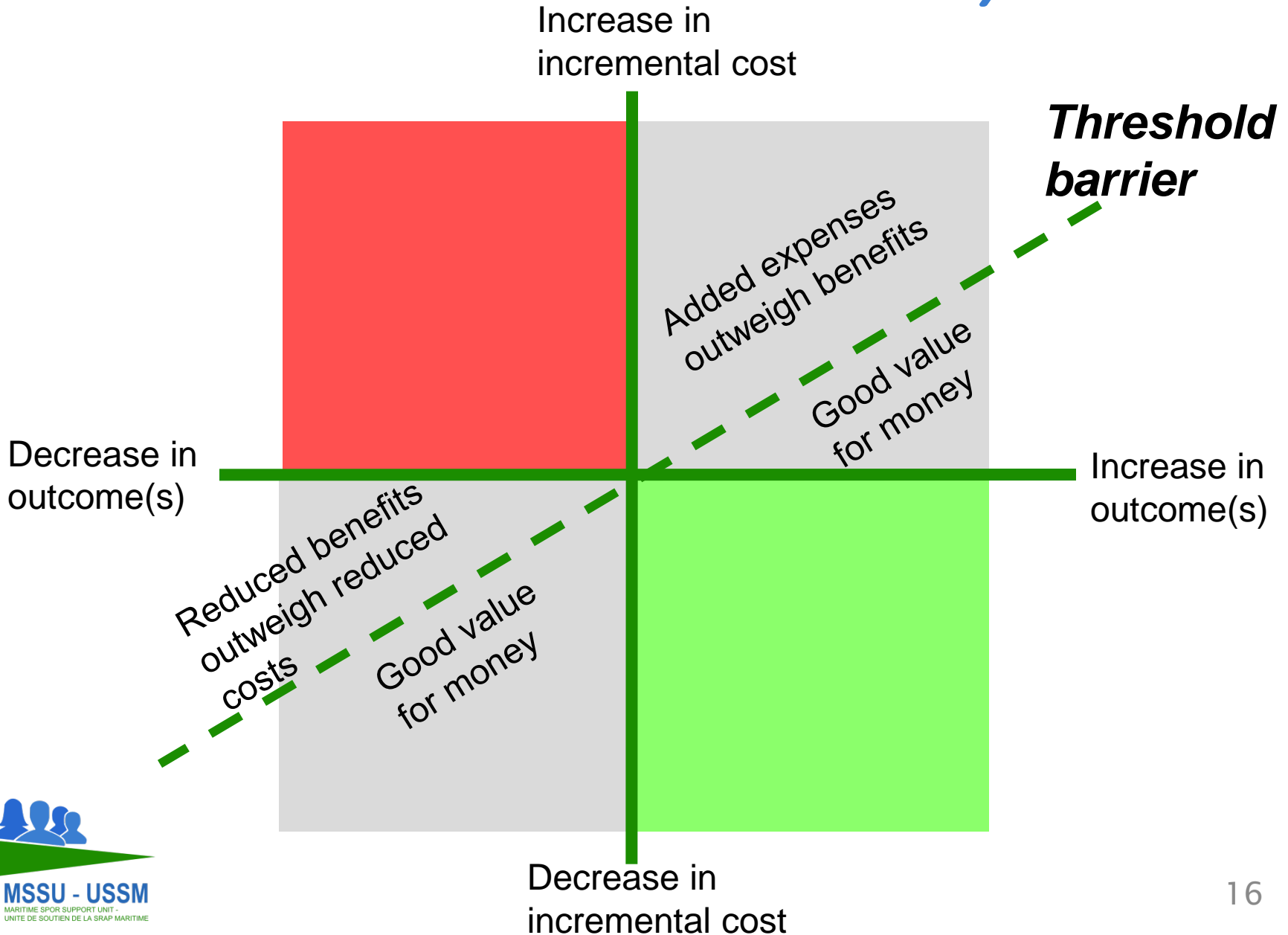
- In CEA, outcomes are measure in natural or physical units (e.g. heart attacks avoided, deaths avoided...)
- Only one domain of outcomes can be explored at a time
- Result: cost per unit of consequences (e.g cost / life year gained)

# Cost-Effectiveness Analysis

Incremental  
cost increase



# Cost-Effectiveness Analysis





# *Cost-Utility Analysis*

- In CUA, the outcomes are measured in healthy years, to which a value has been attached.
- Is multidimensional and included both quality of life and quantity using a common unit
  - QALY=quality adjusted life year
  - DALY=disability adjusted life year
  - HYE=health year equivalent
- Result: cost per unit of consequence

# *Study Design: Types of Economic Evaluation*

Method	Costs	Benefit / consequence	Result
Cost-minimization	Money	Do not measure - must be identical	Least cost alternative
Cost-Benefit	Money	Dollars	Net \$ Cost-benefit ratio
Cost-effectiveness	Money	Health outcome	Cost per unit of consequence
Cost-utility	Money	Utility measure	Cost per unit of utility measure

# *Data:*

## *Identify What to Measure and Value*

- *Cost type:* direct vs indirect vs intangible
- *Cost category:* program, patient
- *Org. level:* national, provincial, regional, provider
- *Input category:* capital vs recurrent
- *Intervention activities:* planning, admin, media, training
- *Time:* start-up vs post-implementation
- *Funding:* public, private, donor

May choose not to measure: common costs, magnitude of costs, those not reliably estimated, among others

How to find? *Literature, experts, current program*

# *Data: Measure the Costs*

- Direct costs (e.g. equipment, doctor's fee, medication)
  - Market prices
- Indirect costs (e.g. lost productivity, caregiver support, volunteer time)
  - Market prices (e.g. wage estimates)
- Intangible costs (e.g. suffering, pain, fear)
  - Willingness-to-pay

# *Data: Value the Benefits*

- CBA
  - same as for costs (market values, WTP)
- CEA
  - Intervention outcomes (e.g. illness avoided, vegetable eaten)
- CUA
  - expert opinions, previous studies, surveys

# *Data: Adjust for timing*

- Discounting
  - Prefer to have benefits now and bear costs in the future – “time preference” – known as the discount rate
  - To allow for differential timing of costs (and benefits) should be stated in terms of their present value using the discount rate
  - Thus, future values are given less weight than present values
- Inflation
  - Costs and benefits that may be affected by inflation must be adjusted
- Annuitization of capital costs
  - Capital costs represent an investment at start-up in an asset which is used/depreciated over time, leaving residual value
  - Annualise the initial capital cost outlay over the useful life of the asset

# *Data: Adjust for Uncertainty*

Must assess the robustness of an economic evaluation by considering effects of uncertainty

- Identify the (uncertain) variables
- Specify plausible range over which they should vary
- Recalculate results
  - Decision tree
  - Markov model
  - Monte Carlo model
  - Threshold analysis

# *Results: present results*

- Present incremental cost-effectiveness ratio or net benefit – NOT average!

- NOT like this:

	Costs	Effects	C/E
Drug A	\$4500	15	\$300
Drug B	\$2750	10	\$275

- Looks like extra \$25 for better outcomes
- BUT incremental  $(4500-2750)/(15-10)=\$350$  for each increase in effectiveness



# *Results: interpretation*

- Be careful not to assume generalizability
- Report what differences may exist in study setting versus others that may change results
- Present underlying assumptions

# Common Pitfalls

## Study Design

- Omission of important costs and benefits
- Selection of alternatives for comparison

## Data and Analysis

- Making indirect clinical comparison
- Inadequate representation of the effectiveness data
- Inappropriate extrapolation beyond the period observed in clinical studies
- Excessive use of assumptions rather than data
- Inadequate characterization of uncertainty

## Interpretation or Reporting of Results

- Problems in aggregation of results
- Reporting average cost-effectiveness ratios
- Lack of consideration of generalizability of issues
- Selective reporting and general emphasis on findings

# *So, your research/grant/program needs an evaluation but you aren't an economist?*

- Consider decisions that must be made: the perspective, the comparators, data sources, model (prospective, retrospective, etc), evaluation type
- The decisions can help frame the evaluation and evaluate how challenging it may be
- Contact MSSU for help from our expert health economists

# Resources

- *Guidelines for the economic evaluation of health technologies: Canada* [3<sup>rd</sup> Edition]. Ottawa: Canadian Agency for Drugs and Technologies in Health; 2006.
- *Health Economics Information Resources: A Self-Study Course*. [Updated Feb 23, 2016]. Bethesda, MD. National Information Center on Health Services; 2016.
- Meltzer MI (2001). *Introduction to health economics for physicians*. *The Lancet*, 358 (993-998).
- Drummond M, Sculpher M (2005). *Common Methodological Flaws in Economic Evaluations*. *Medical Care*, 43:7suppl (II-5 – II-14).
- Drummond MF, Stoddart GL, Torrance GW (1988). *Methods for the Economic Evaluation of Health Care Programmes*. Oxford University Press, Oxford.



CIHR IRSC



Canadian Institutes of Health Research / Instituts de recherche en santé du Canada

Strategy for Patient-Oriented Research / Stratégie de recherche axée sur le patient

SPOR SRAP

Putting Patients First

Le patient d'abord



New Brunswick Health Research Foundation



Fondation de la recherche en santé du Nouveau-Brunswick



MSSU - USSM  
MARITIME SPOR SUPPORT UNIT -  
UNITE DE SOUTIEN DE LA SRAP-MARITIME