Challenge #3:

How to incorporate multi-criteria decision frameworks into economic evaluations and decision making

Multi-Criteria Decision Analysis (MCDA) and Priority Setting

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ARCC
Canadian Centre for Applied Research in Cancer Control

BC Cancer Agency
CARE & RESEARCH
An agency of the Provincial Health Services Authority

Overview

- Priority setting and Program Budgeting and Marginal Analysis (PBMA)

- Multi-Criteria Decision Analysis (MCDA)
  - Criteria, Weights, Aggregation

- Interdisciplinary issues
  - Interface between economics, decision analysis, and ethics

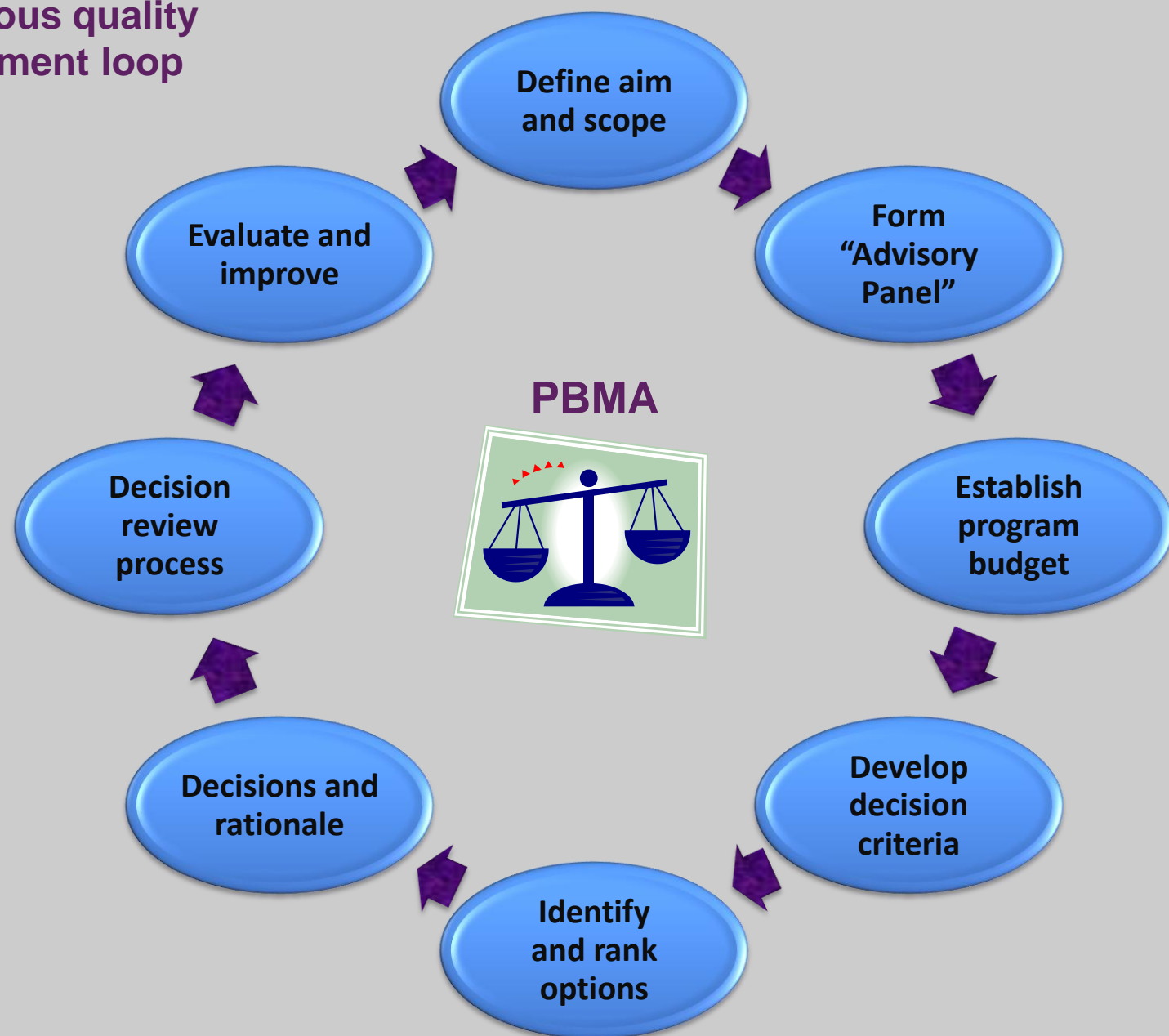- Thoughts on a decision analysis perspective

What is PBMA?

- A practical economic method for priority setting used in >100 studies
- Based on economic principles for priority setting
  - need to consider opportunity costs
  - need for marginal analysis of costs and benefits
  - existence of a fixed budget - some services must be contracted if others are to be expanded
- Unlike economic evaluation, PBMA considers the budget constraint
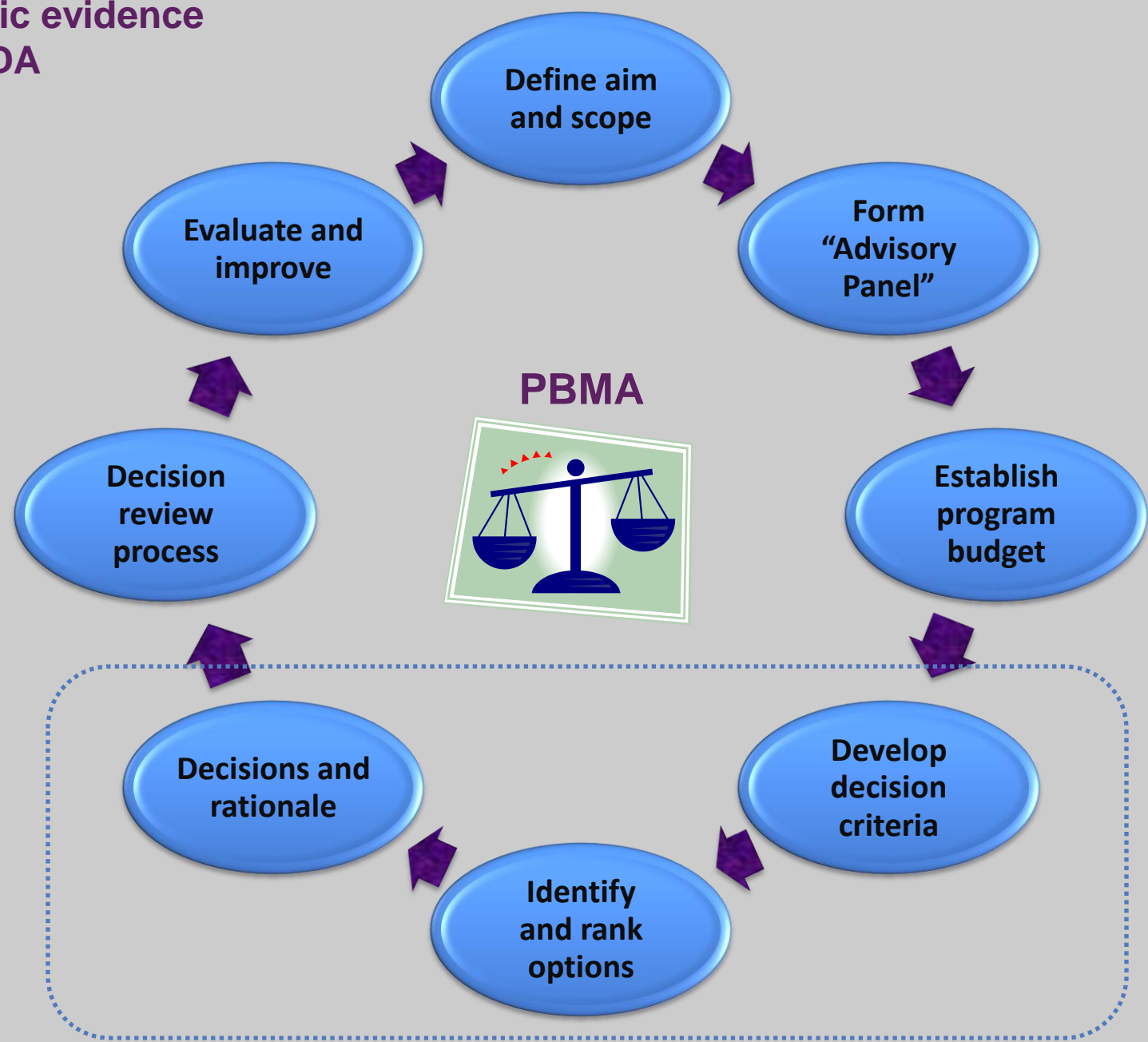- Is compatible with sustainability and deficit financing

Basic PBMA principles

- "If we had $100 000 more to spend, which services would we expand?"

- "If we had $100 000 less to spend, which services would we contract?"

- That is "What is the extra benefit we could get by shifting $100 000 from service A to service B?"

- Allocate resources to services with higher benefits per dollar spent

- Benefit based on consideration of health outcomes and other decision-making criteria

Continuous quality improvement loop

PBMA

- Define aim and scope
- Form "Advisory Panel"
- Establish program budget
- Develop decision criteria
- Identify and rank options
- Decisions and rationale
- Decision review process
- Evaluate and improve

Economic evidence and MCDA

PBMA

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- Decision review process
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What is MCDA?

- Some relevant priority setting questions:
  - what objectives would decision-makers choose to pursue (what are relevant decision-making criteria)?
  - How important are different criteria?
  - How should health care interventions be evaluated or 'scored' against those criteria?
  - How should scores be combined in a model to reflect the overall performance of different interventions?

- MCDA is a 'tool' designed to help decision-makers make such complex choices

Two main stages in MCDA

1. **<u>Problem structuring</u>**: generating a set of alternatives and a set of criteria against which the alternatives are to be evaluated and compared

2. **<u>Model building</u>**: constructing some form of model which represents decision-makers' objectives and their value judgements

Key methodological considerations:

– methods used to describe decision-makers preferences and elicit importance weights for decision-making criteria

– type of aggregation model used to combine criteria scores

A simple MCDA Model

$$WBS_j = \sum_{i=1}^{n} w_i s_{ij}$$

i = 1,…,n criteria

w_i = criteria weights

j represents alternatives

s_{ij} = scores for alternatives for different criteria

WBS = Weighted Benefit Score

'Evidence-Based' Marginal Analysis

PBMA

- Define aim and scope
- Determine current program budget
- Form Steering Committee
- **Establish decision-making criteria**
- Identify areas for new resource use
- Identify areas for resource release
- Make allocation recommendations
- Validity check and final decisions

Objective: to pilot innovations in PBMA process, by generating program-specific empirical evidence and incorporating that evidence into a decision analytic approach to resource re-allocation (EBMA)

EBMA

For each area identified:

- Form Advisory Panel
- Collect local costs/outcomes
- Build Markov model - CUA
- **MCDA Models**

5 areas identified:
- Adjuvant trastuzumab in breast cancer
- Bevacizumab in metastatic colorectal cancer
- Mammography for women with dense breast tissue
- PET for lung cancer staging
- MRI for breast cancer screening

MCDA in priority setting

- Literature review
  - searched PUBMED, ECONlit, grey literature since 2001
  - hand searches of references and contacting key authors
  - 14 PBMA applications using MCDA
  - 21 PBMA methods papers
  - much of grey literature 'not accessible' or embargoed
  - MCDA examples go back to the mid 90s and maybe earlier
  - earlier literature review identified 109 published papers on PBMA, with 90 applications in 70 health organizations

Decision criteria

- 52 different criteria listed in 14 studies
- Most common:

Criteria	Frequency
Accessibility	10
Reducing inequalities	10
Effectiveness	8
Alignment with strategic plan/policies	7
Value for money	7
Affordability	7
Integration with other programs	7

Criteria Domains

Domain	Frequency
Acceptability	4
Affordability	7
Alignment with policy	10
Availability of alternatives	1
Burden of disease	11
Effectiveness	18
Equity	26
Feasibility	14
Partnerships	10
Prevention	3
Public/patient centredness	16
Quality of evidence	5
Quality of intervention	5
Research and development	2
Value for money	18

Complexity and equity

- **Inequality** is concerned with measures of (statistical) variation
- **Inequity** is concerned with a fair or socially just distribution of the burden of health care finance and access to health care - normative judgements
- Horizontal vs. vertical equity
- Equity in health care finance vs. delivery vs. outcomes
- Equal access for equal need
- Reducing health inequalities

Criteria weights

- 4 studies did not report weights

- 7 studies used allocation of points (direct rating)

- 2 studies used a combination of ratio estimation and direct rating

- 1 study used indifference methods (DCEs)

- Previous studies have also used swing weights (hybrid of indifference method)

- No studies have used gambles – all choices riskless

Aggregation rule

- Where the aggregation rule was presented almost all applications (9) used an additive functional form
- 3 did not state the functional form used
- 1 used an exponential function
- 1 used a variant of the multiplicative function
- Choice of functional form was rarely justified

Whose Criteria Count?

- Criteria will reflect values of different players
- Society at large
    - Public involvement but some challenges
- Health care system/ organization
    - Dept. of Health, Clinical groups, Board of Directors
- Individual decision-makers
    - Easiest but may be limiting
- Surveys, focus groups, business plans

Interdisciplinary challenges

- Integrating economic and ethical frameworks
  - Fairness and legitimacy of the process
  - Accountability for Reasonableness (A4R)

- (Barriers and facilitators)
  - (Participatory Action Research)

Incorporating Ethics

Accountability for Reasonableness (A4R)

Relevance	Agreement of relevance on **principles, reasons, and evidence** under the circumstances
Publicity	Processes, **decisions, and rationales** should be accessible to managers, doctors, patients, & the public
Revision	Challenging decisions & facilitating resolution of disputes, if necessary **revising decisions**
Enforcement	Voluntary or public regulation mechanisms

Summary

- Main methodological challenges

  - methods used to elicit and describe decision-makers preferences, including the relationship between objectives and criteria

  - methods used to elicit importance weights for decision-making criteria

  - type of aggregation model used to combine criteria scores

A decision analysis perspective

- Primary aim of MCDA is to develop models of decision-maker objectives and their value trade-offs so that alternatives under consideration can be compared with each other in a consistent and transparent manner

- Process is often more important than the numbers

- Value focussed thinking and values clarification

- MCDA practice suggests preferences are constructed as part if the decision-making process, not endowed

A decision analysis perspective

- Economics has often focussed on prescriptive behavioural rules, based on utility maximisation and game theory

- Psychology has sought to explain actual individual behaviour, and why it can deviate from prescriptive rules

- Decision analysis tries to **combine prescriptiveness with practicality** (to a greater or lesser extent)

- All share common heritage from von Neumann and Morgenstern

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