Cost and outcome

Outcome →

Is defined as a consequence, and is defined in 3 ways;

1. Economic outcome.
2. Clinical outcome.
3. Humanistic outcome.

Outcome Research (OR)

Is the study of healthcare interventions care delivery process and healthcare quality that are evaluated to measure the extent to which optimal and desirable outcomes can be reached.

Examples of outcomes measures:

Economic outcomes include acquisition costs associated with care, labor costs associated with care, costs to treat adverse drug reactions, costs of treat adverse drug reactions, costs of treatment failure, costs of hospital readmission and cost of emergency room and clinic visits.

Humanistic outcomes include patient satisfaction functional status as measured by a validated instrument and quality of life assessment.

Cost: Is the value of resources consumed by a drug therapy or program.

Consequence:

- Is the effects, output or outcome of a drug therapy or a program.
- When we compare cost and consequence we are doing the pharmacoeconomic evaluation.
- Consequence can be measured by +ve and -ve function:
  - +ve effect: desired outcome (efficacy of treatment)
  - -ve effect: treatment failure, ADR, toxicity.

Cost →

Definition

1) **Total cost →** All expenses that are directly and indirectly necessary to provide a product or service.

2) **Average cost →** The average cost per unit output (total cost divided by quantity)

3) **Fixed cost →** Costs that do not vary with quantity of output short run production.

4) **Variable cost →** costs that vary with the level of output (eg - wages, supplies)

5) **Marginal cost →** The extra cost of producing one extra unit of output.

6) **Incremental cost →** Additional cost when comparing one alternative to another.
(eg - extra care like extra nurse, extra room)

7) **Direct cost →** Costs directly related to producing / providing a specific quantity of services or output :
(eg - salary drug cost and supply cost for the provision of pharmacy services)

8) **Indirect cost →** Costs that are allocated to the areas that produce / provide a specific quantity (of service) or output (eg - overhead cost)

9) **Opportunity cost →** The cost of benefit of pursuing an alternative course of action.
(eg - back, heart surgery)

Cost and change:

1. The meaning of the term cost depends on the perspective for the analysis.

Ex -> show differing perspectives - providers may include hospitals, physician officers or ambulatory surgery centers and the term cost means the total costs for providing the specific services.

Direct medical cost ->

① Medical purpose only and fees for doctor.
② for lab data.
③ for treating disease.
④ To prevent detected and treat a disease.
⑤ Divide.

1. Fixed: rent/ hospital/ electricity
2. variable: professional services / medication

Direct non-medical cost ->

Which do not involving a direct purchasing for hospital for hospital transportation especially did/ cost by the family.

Indirect Non-Medical cost ->

These are results from morbidity and mortality which leads to result of reduced protectivity.

eg - patient sick.

Decision Tree

Introduction:

Decision analysis can be broadly defined as a probabilistic method for modelling problems under uncertainty. Cost effectiveness evaluations represent a typical example of such a problem as they are performed for decision making regarding reimbursement of drugs on health care budget allocation, in presence and under the influence of random variables.

DTs are so far the most used tool to support decision making under uncertainty, The decision problem is represented by means of a tree-like structure combined with conditional probabilities and utilities associated with the different decisions.

However, drawbacks of DTs include the fact that in case of very complex problems they may become intractable, as they usually do not allow for a compact representation and the algorithms used to perform the computations are not the most efficient.

A. decision tree consists of 3 types of nodes:

1. Decision nodes - commonly represented by squares
2. Chance nodes - represented by circles.
3. End nodes - represented by triangles.

Decision trees are always read from left to right.

A decision tree is a graph that uses a branching method to illustrate every possible outcome of a decision.

The decision tree should start with a specific problem formulation. In pharmacoeconomic models these should represent the actual choice being made and should include the necessary descriptions of the population in which the decisions

and being made to allow the reader to understand the context of the choice. The context is followed by a decision node and should include as comparators the relevant, real choices. The context is followed by a decision node and should include as comparators the relevant, real choices the decision maker has at this on-her proposal.

The decision node is followed by a chance node circle with branches leading to the possible outcomes from each event. The chance node represents the probabilities beyond the control of the decision maker either a desired outcome or undesired outcome. The probabilities were obtained from the literature. Note that the probabilities at each node add to one and are mutually exclusive and exhaustive.

Just as in basic economic models in which consumers are assumed to purchase the best value the assumption in clinical decision analysis is that the decision makers and patients will choose the option that produces the outcome with the best value.

In the example shown in figure, Drug A may be more expensive (drug cost), however it is more effective, with lower overall costs and a shorter length of stay resulting from its use. Drug B has a higher rate of treatment failures, with the associated costs of managing these failures and prolonged LOS contributing to its higher overall cost. The resulting cost for each agent is obtained by multiplying the end cost by the probability of achieving that outcome. Depending on the relative costs associated with treatment failures when compared with the costs of cures, the decision to choice one agent over the others may change.

The goal of a pharmacoeconomic assessment is to enhance overall patient care for a given set of resources. It is important to realise that an evaluation needs to look at the decision that will maximise the value of healthcare services not simply reduce the costs of drug therapy.

Advantages:

- Decision trees are simple to understand and interpret.
- They have value even with little hard data. Important insights can be generated based on experts describing a situation and their preferences for outcomes.
- Allow the addition of new possible scenarios.
- can be combined with other decision tech.

Use →

- A decision tree may be used to compare the choice, costs and outcome for different agents. In an pharmacoeconomic evaluation, it is essential to identify, measure and compare all costs and outcomes of drug therapies.

Disadvantages:

calculations can get very complex particularly if many values are uncertain and/or if many outcomes are linked.

ROLE OF PHARMACOECONOMICS IN DEVELOPMENT OF HOSPITAL FORMULARY

- In recent years, in an attempt to manage resources and contain expenses, health care systems worldwide have had to make careful considerations of which drugs to provide.
- One of the strategies adopted in this effort is the use of formularies A formulary can be defined as a "list of drugs selected by formulary committees from the commercially available ones" and its primary purpose is to "discourage the use of marginally effective drugs and treatments" and to ensure the selection of medications that have been demonstrated to be safe, effective and affordable whilst maintaining or improving quality of patient care.

The Formulary decision-making process

- Decisions on formulary listing require transparency and should be justifiable to all stakeholders as they could have far-reaching consequences that may impact, a number of people such as patients, health care workers and employees of the manufacturers.
- Due to a wide variety of drugs that are available on the market, their escalating costs and the continuous introduction of new ones, a key consideration is which drugs to list in the formulary and which ones to exclude? This decision-making task is the responsibility of Pharmacy and Therapeutics Committees (FTC), whose members are appointed on the basis of their drug therapy expertise.
- In making a selection of drugs to be included in the formulary the PTC needs to be aware that there are several factors that can contribute to the choices that the members make.

Factors influencing the selection of drugs for formularies are the following:

1. **Emotional factors, a member's dislike of a drug can be based on a case of bad side-effects that one of his/her patient(s) once experienced regardless of the assurance from the research of the fact that such incidence was a rare occurrence.**
2. **Hidden factors, this might be influenced by the interaction (either positive or negative) that a member might have had with the pharmaceutical company.**
3. **Unconscious factors can result from the member's familiarity with the drug or class of drugs as well as an influence by the opinions of colleagues and well-informed patients. It can also be simply out of a habit.**
4. Hidden factors such as financial gain or any form of incentive from a pharmaceutical company. It is therefore important to exclude all the above-mentioned factors as far as possible. One way of achieving that is by making use of an evidence-based drug selection system for the formulary decision-making process.

There are two models that have been applied successfully in the formulary process, namely:

1. **Multi-Attribute Utility Theory (MAUI)**
2. **System of Objectified Judgment Analysis (SOJA).**

- **The MAUT model is a structured methodology that has been developed to handle the tradeoffs among multiple alternatives by assessing the strengths and weaknesses of each alternative.**
- **It has numerous applications including the formulary process. Bettinger (2007), successfully applied MAUT in choosing the cost-effective antipsychotic agent from a choice of 5.**
- **He identified the following attributes in his selection criteria, efficacy, adverse effects, cost, and adherence**
- **Similarly, the SOJA model is a structured approach to the selection of drugs in the formulary process.**
- **A selection criterion for a specific group of drugs is decided upon beforehand. The degree to which each drug meets the requirements of the criterion is**

Meta analysis:

Meta analysis is a statistical technique for combining the findings from independent studies.

Defined as the statistical analysis of a collection of analytic results for the purpose of investigating the findings.

It is used to identify sources of variation among study findings and, when appropriate to provide an overall measure of effect as a summary of those findings.

Meta analysis may be regarded as state of the art with literature review employing statistical methods in conjunction with a thoughout and systematic qualitative Review.

Meta analysis provides the conceptual and quantitative framework for rigorous literature reviews.

The most popular conception of meta analysis is the summary of a group of randomized clinical trials dealings with a particular therapy for a particular disease.

Typically, a meta-analysis would present an overall measure of the efficacy of treatment.

Purpose of Meta-analysis:

- To overcome publication bias and objectively present all relevant trials.
- To resolve apparent conflicts in results of several trials.
- To overcome inadequate size of individual trials
- To examine endpoints requiring larger samples than individual trials gathered.
- To evaluate generalizability of conclusion
- To determine if new trials are needed.

General steps involved in conducting a meta analysis:

1. Define the purpose.
2. Perform the literature search.
3. Establish inclusion/exclusion criteria.
4. collect the data.
5. Perform statistical analysis.
6. formulate conclusions and recommendations

1. Define the purpose:

It is particularly important to define precisely and in advance of its.
— Conduct the primary and secondary objects of a meta analysis.

2. Perform the literature search:

While computerized search of the literature can facilitate the retrieval of all relevant published studies. These search are not always reliable use of search terms that are too non-specific can result in large numbers of mostly irrelevant citations that need to be reviewed to determine relevance whereas use of too many restrictions can result in missing a substantial number of relevant publications

3. Establish inclusion / Exclusion criteria:

A set of rules for including and excluding studies from the meta-analysis should be defined during the planning stage of the meta-analysis and should be based on the specific hypotheses being tested in the analysis.

A key point is that exclusion criteria should be based on prior considerations of design of the original studies and completeness of the reports and specifically not on the results of the studies.

Another important role is that one published paper it is essential that only one report on the same patients be accepted into the meta-analysis.

The inclusion of a study more than once would assign undue weight to that study in the summary measure.

4. collect the Data:

When the relevant studies have been identified and retrieved the important information regarding study design and outcome needs to be extracted and recorded on data abstraction forms.

Careful specification in the protocol for the meta analysis of the design features and patient characteristics that will be of interest may help to avoid over or under collecting information.

Many articles on how to do a meta-analysis recommend that the meta analyst assess the quality of the studies being considered in a meta analysis using formal

quality scoring systems.

5. Perform statistical analysis:

In most situations, the statistical methods for the actual combination of results across studies are fairly straightforward.

A basic principle in most analytic approaches is that the comparisons blw treated (exposed) and untreated (unexposed)

In any meta-analysis, the possible existence of heterogeneity among study designs and results should be examined, and may warrant a set of exploratory analyses designed to investigate the sources of that heterogeneity.

6. Formulate conclusion and recommendation:

conclusions of a meta-analysis should be clearly summarized with appropriate interpretation of the strengths and weakness of the meta-analysis.

Authors should clearly describes the;

① population to which the results apply.
② How definitive the results are,

- should outline the areas that need future research.
- Investigation of adverse effects.
- New indications for existing therapy..
- Differential effects among subgroup patients.
- Selection from among several alternative therapies.
- Saving time and money.

Advantages:

1. Derivation and statistical testing of overall factors.
2. Generalization to the population of studies.
3. Ability to control for b/w-study variation
4. Including moderators to explain variation.

Applications of meta-Analysis:

1. Investigation of Advense effects:

Meta-analysis provides the benefit of vastly increased statistical power to investigate advense events.

The assessment of the excess risk of gastrointestinal side effects associated with NSAIDs, provides an excellent example of a situation in which meta-analysis has been helpful.

2. New indications for existing therapies:

Meta-analysis has also been used to assess the effectiveness of existing therapies for new indications.

3. Selection from among several alternative therapies:

In a meta analysis of therapies for the prevention of supraventricular arrhythmias after coronary bypass surgery, Andrews etal. looked separately at verapamil, digoxin and adrenoceptor blockers as prophylactic agents.

4. Saving time and money:

One of the potential benefit of meta-analysis is the possibility of shortening the time b/w a medical research finding and