

HHSC 601

- Economic Evaluation
- Program Evaluation

• Those who plan, provide and pay for health services receive a barrage of questions

- Should clinicians check all persons blood pressures?
- Should a scoliosis screening program be launched in secondary schools?
- Should hospital administrators purchase each new piece of diagnostic equipment?
- Should local health departments free up staff from well baby clinics to visit lapsed hypertensives?

• The Recurring Question

– *Who should do what to whom, with what health care resources, and with what relation to other health services?*

- *Answers are strongly influenced by our estimates of the relative merit or value of alternatives*
 - *Estimates are commonly determined through economic evaluation*

• Economic evaluation asks these questions

1. Is this health procedure, service, or program worth doing compared with other things we could do with these same resources?
2. Are we satisfied that the health care resources should be spent in this way rather than some other way?

• Economic evaluation only addresses one dimension of program decision making. It is most useful when preceded by 3 types of other evaluations

- CAN IT WORK – efficacy
- DOES IT WORK – effectiveness
- DOES IT REACH THE POPULATION IN NEED - availability

• Why is economic evaluation important?

1. Without systematic analysis, it is difficult to identify clearly the relevant alternatives
 - New programs are often offered without evaluation of existing alternatives
2. The viewpoint assumed in an analysis is important
 - A program which looks unattractive may look much better when other viewpoints are considered (eg. Patient, institution, gov. ministry, etc.)
3. Without some attempt at measurement, the uncertainty surrounding orders of magnitude can be critical
 - Recommended protocols may be extremely resource intensive (eg. Repeated diagnostic tests, practice guidelines, etc.)

• **What are the features of economic evaluation?**

- Inputs and outputs of activities
 - Costs and consequences are linked
- Concerned with choices
 - Resource scarcity
 - Inability to produce all desired outcomes/outputs
 - Identification of criteria which may be useful in deciding among different uses of scarce resources

• **Economic Evaluation** is *“the comparative analysis of alternative courses of action in terms of both their costs and consequences”*

• Distinguishing characteristics of health care evaluations

		Are both costs (inputs) and consequences (outputs) of the alternatives examined?	
		No	Yes
Is there comparison of two or more alternatives?	No	Examines only consequences 1A Partial Evaluation Outcome description	Examines only costs 1B Partial Evaluation Cost description
	Yes	3A Partial Evaluation Efficacy or effectiveness evaluation	3B Partial Evaluation Cost analysis
			2 Partial Evaluation Cost-outcome description
			4 Full Economic Evaluation Cost-minimization analysis Cost-effectiveness analysis Cost-utility analysis Cost-benefit analysis

• Techniques of economic analysis

- Cost-minimization analysis
- Cost-effectiveness analysis
- Cost-utility analysis
- Cost-benefit analysis

• **Cost-minimization Analysis**

- Assumes the consequences of a service or program are identical
- The search is for the least cost alternative
 - Similar to a straight cost analysis
 - In cost minimization some effort is made to determine if outcome differences are non-existent or unimportant.

• **Cost-effectiveness Analysis**

- Programs with differential success at achieving an outcome
 - Would not automatically lean towards the cheaper program
- Costs compared per unit of health gained
 - Eg. Cost per years of life gained, Cost per mm of blood pressure lowered, etc.
- Outcome is reduced to a single common effect

• **Cost-benefit Analysis**

- It cannot always be assured that the consequences of a service are identical
 - Multiple effects may be of interest
- Usually limited to costs and benefits that can be measured in monetary terms
 - eg. You might compare community vs inpatient care for mental illness. Community care might be more expensive but would be offset by better employment options for clients.
- Usually expressed as dollar benefit per dollar costs or vice-versa.

- **Cost-utility Analysis**

- Unit of outcome analysis is a utility measure
 - Health days gained, quality adjusted life-years
 - Values determined by preferences of individuals or society for any particular set of health outcomes.
- Results in costs per quality adjusted life-years differences between programs/services

Type of Study	Measurement/valuation of costs in both alternatives	Identification of consequences	Measurement/valuation of consequences
Cost-minimization analysis	Dollars	Identical in all relevant respects	None
Cost-effectiveness analysis	Dollars	Single effect of interest, common to both alternatives, but achieved to different degrees	Natural units (e.g. life years gained, disability –days saved, points of blood pressure reduction etc.)
Cost-benefit analysis	Dollars	Single or multiple effects, not necessarily common to both alternatives, and common effects may be achieved to different degrees by the alternatives	Dollars
Cost-utility analysis	Dollars	Single or multiple effects, not necessarily common to both alternatives, and common effects may be achieved to different degrees by the alternatives	Quality adjusted life - years

- **Program Evaluation or Evaluation Research**

- The application of scientific principles, methods, and theories to identify, describe, conceptualize, measure, predict, change, and control those factors or variables important to the development of effective human service delivery systems
 - *Basically were the goals and objectives achieved*

- **The Process of Evaluation**

- Questions that must be addressed
 1. Who is the client?
 2. What are the purposes of the evaluation?
 3. What are the methods to be utilized?
 4. How is the evaluation conducted?
 5. Who will use the results of the evaluation?

- **Who is the client?**

- The CEO
- The patients
- The funding body
- The regional health board
- Etc.

- **What are the purposes of the evaluation?**

- Management and administration
 - Planning
 - Curtailment or expansion of programs
- Assessment of program changes
- Identification of possible program improvement
- Accountability to funding agencies
- Testing of innovative ideas

- **What are the methods to be used?**

- Surveys
- Correlational studies
- Experimental and quasi-experimental designs
- Personnel assessment
- Expert judgement
- Testimony
- Etc.
- Considerations
 - Funding, available data, time schedule, ethical issues, administrative and political constraints.

- **What is included in the contract?**

- Time frames
- Funding
- Purpose of the evaluation
- Etc.
 - Details of methods
 - Levels of cooperation
 - Publicity of the final report
 - Controls to ensure adherence to the evaluation plan
 - Detailed budget

- **How is the evaluation to be conducted?**

- Use of a research design
 - Generalizability – to the population served by the program
 - Attribution – control groups, before/after tests, random assignment, etc.
- Measurement
 - Face validity – looks good
 - Content validity – range of all possible responses
 - Construct validity – permits inference about traits, behaviours, etc.
 - Predictive validity – accurately predict a future outcome
- Analysis of data
 - Correct statistical techniques as basis for conclusions

- **Who will use the results of the study?**

- Imperative to have decision makers involved in the evaluation
 - Commitment to the use of the findings
- Write up with consideration of the audience(s)
 - CEO's
 - Hospital boards
 - Funding agencies
 - Health care workers
 - Etc.

- **Types of Evaluation**

- **3 major types**
 1. Needs assessment
 2. Formative evaluation
 3. Summative evaluation

- **Needs Assessment**

- Conducted when there is a perceived discrepancy between acceptable service and the existing service
- Used to gain public or groups support
- Used to measure
 - Frequency – many could use a program
 - Intensity – consequences of no program may be grave
- Typical questions to be answered:
 - What is the background to the needs assessment?
 - Whose needs are we talking about?
 - How do we find out whether the needs are frequent or intense enough to justify intervention?
 - How much discrepancy presently exists?

- **Formative Evaluation**

- Conducted typically during the developmental stages of a program
- Used to provide information so that revisions and improvements can be made to the program operation
- Typical questions to be answered:
 - Did the program reach those it was targeted for?
 - Does the program account for all possible outcomes?
 - Does the program offer an appropriate range of services?
 - Does the program integrate well with other health services?
 - Etc.

- **Summative Evaluation**

- Purpose is to assess the overall effectiveness of a program and the extent to which the program is worthwhile in comparison to other services
- Concerned with the impact of the program
 - Outputs
 - Outcomes
- Used to measure
 - Successes
 - Weaknesses
- Typical questions to be answered:
 - How many went through the program?
 - Were participants satisfied?
 - Were the desired outcomes achieved?
 - How did the staff feel about the program's success?
 - Etc.

- **Threats to Internal Validity in Evaluation and Health Research**

- *History* – events occurring during the evaluation that are not part of the treatment
- *Maturation* – processes within the subjects that operate as a result of time passing, for example aging, fatigue, hunger
- *Testing* – the effects of one test upon subsequent administrations of the same test
- *Instrumentation* – changes in calibration including lack of agreement between raters

- **Threats to Internal Validity in Evaluation and Health Research (cont.)**

- *Statistical Regression* – groups selected on the basis of extreme scores are not as extreme on subsequent measurement
- *Selection biases* – identification of comparison groups in a non-randomized manner
- *Experimental mortality* – loss of subjects from comparison groups due to non-random reasons
- *Selection-maturation interaction* – specific to non-equivalent control group designs where the passage of time may affect one group more than another

- **Threats to External Validity**

- *Reactive or interactive effects of testing* – The pretest may make the subjects more aware of or sensitive to the upcoming treatment. The treatment would not be as successful without the pretest
- *Interaction of selection biases and the experimental treatment* – When a group is selected on one characteristic, the treatment may only work in those with that characteristic
- *Reactive effects of experimental arrangements* – Treatments may not work in real world situations
- *Multiple treatment interference* – when subjects receive more than one treatment, the effects of previous treatments may influence subsequent ones

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- Survey Research

- In health science literature, the survey may be viewed as unworthy or at best low level research
 - This is correct if surveys are conducted in a poor fashion
 - One needs to:
 1. Clearly define the research problem
 2. Design appropriate questions
 3. Have systematic data collection
 4. Consider statistical implications
 5. Ensure results could be generalizable to larger populations

- The Survey Flow Plan
 1. Planning the survey
 - a. Survey objectives
 - b. Monetary resources
 - c. Time lines
 - d. Personnel
 2. Overall design
 - a. Match objectives to data needs
 - b. Sample size requirements
 - c. Data collection techniques
 - d. Interviewer selection
 - e. Analysis techniques
 - f. Budget
 - g. Reporting

- The Survey Flow Plan (cont.)
 3. Method of data collection
 - Should match the objectives and fit within resource constraints
 4. Planning data analysis
 - A description of how the data are to be analyzed
 5. Drawing the sample
 - a. Define the population under study
 - b. Sample selection
 - c. Interviewers as appropriate
 6. Questionnaire construction
 - a. Requires detailed attention
 - b. Questions should match the objectives

- The Survey Flow Plan (cont.)
 7. Pre-test
 - The survey should be pre-tested with a sample comparable to population under study
 8. Questionnaire revision
 - Based on the findings from the pre-test
 - If extensive another pre-test should be conducted
 9. Carry out the survey
 - a. Regular mail
 - b. E-mail
 - c. Telephone
 - d. Personal interview
 - e. Internet

- The Survey Flow Plan (cont.)
 10. Code preparation
 - Translation of responses into specific categories
 - Pre-coding is preferred if possible
 11. Data Entry
 - Duplicate entry
 - Range restrictions

- The Survey Flow Plan (cont.)
 12. Verification of data
 - Range checking
 - Valid range of codes in data
 - Contingency checking
 - Related questions and how they line up
 - Non-correlated questions
 - Errors located and data corrected/re-collected where possible
 13. Tabulation
 - frequency count of all questions' responses
 - Most basic level of analysis

- The Survey Flow Plan (cont.)

- 14. Analysis

- Varies according to the purpose of the study
- Generally includes
 - Percentages
 - Averages
 - Relational indices
 - Tests of significance

- 15. Recording and Reporting

- a. All prior steps should be outlined
- b. Emphasis on the reliability of results
- c. Reporting of findings
- d. Implications of results
- e. Further research

- Data Collection Methods

- Mail surveys
- Interview surveys
- Telephone surveys
- Use of computers in surveys

- Mail Surveys

- Advantages

- Savings of money and time
- No interviewer bias
- Greater assurance of anonymity
- Convenient for responder
- Accuracy may be improved because respondents have time to ponder or check responses
- Identical wording for all respondents

- Mail Surveys

- Disadvantages

- Lack of flexibility
- Likelihood of unanswered questions
- Low response rate
- Inability to record spontaneous reactions
- Lack of control over immediate environment
- Inability to ask complex questions

- Mail Surveys

- Factors influencing mail surveys

- Organization effect
- Format and color
- Length
 - Less cluttered, even though longer is better
- Ease of completion and return
 - Directions are explicit
 - Self-addressed envelope supplied
- Incentives
 - Money, lottery tickets, copy of the results
 - » Should be sent on the first mailing
- Population
 - Select populations tend to respond better than the general public

- Mail Surveys

- Factors influencing mail surveys (cont.)

- Time and type of mailing
 - First class mailing if possible
 - Major holidays should be avoided
 - Surveys received towards the end of the week are more often returned
- Follow-up procedures
 - Reminder letters
 - Second questionnaire
 - Follow-up phone call
- Response Rate
 - 50-60% is considered permissible with the general population
 - » Higher with focused and motivated population

- Personal Interview

- Advantages

- Personalization of the study to the participant
- Flexibility so that further probing may occur or questions can be repeated
- Response rate higher than comparable mail survey
- Observation of both verbal and non-verbal behaviour
- Control over question order
- More complex questions can be used

- Personal Interview

- Disadvantages

- Cost in terms of time and money (extra training, travel, etc. as well)
- Openness to interviewer bias
- Vulnerability to personality clashes
- Lack of anonymity
- Inconvenience to the respondent (appointment)
- Lack of standardization of question wording

- Personal Interview

- Factors influencing interview surveys

- Interviewer characteristics
 - Race and ethnicity
 - Gender
 - Perceived social status
 - Education of interviewer
 - Dress
 - » Appropriate – look like an interviewer
 - » Neutral or like persons likely to be interviewed
 - » Not to flashy, so the emphasis is on the interview

- Telephone Surveys

- Advantages

- Savings of money and time over in-person interviewing
 - Faster than mail survey or interviews
- No travel – can select subjects from a very broad area
- Respondent is anonymous
- Interviews can be monitored to increase quality control
- Frequent call backs can be made to those not home
- Researcher is secure and not out on the street
- Better than face to face for sensitive information

- Telephone Surveys

- Disadvantages

- Respondents are less motivated
- Little control over the interview
- Not all persons have a telephone
- Not as good for sensitive questions as mail surveys
- Respondent fatigue (>20 minutes)

- Computers and Surveys

- CATI – computer assisted telephone interviewing

- Questionnaire displayed on screen
 - Data entered “live”
- Automatic routing to additional relevant questions
- RDD – random digit dialling

- CAPI – computer assisted personal interviewing

- CSAQ – computerized self-administered questionnaires

- Email surveys

- Internet based surveys

- Questionnaire Design and Development

- Pre-questionnaire planning
 - Define the problem
 - Determine information needed to test the hypothesis
 - Review previous research and speak with resource personnel
 - Develop preliminary questions
- Drafting the questionnaire
 - Considerations for the researcher, respondent, and interviewer
 - Types of questions
 - First draft of the questionnaire

- Questionnaire Design and Development (cont.)

- Preparing the final questionnaire
 - Physical layout
 - Reproduction
 - Identification of respondents on questionnaire
- Pre-testing
 - Respondent opinion
 - Evaluating respondent input
 - Questionnaire revision as necessary

- Researcher, Respondent and Interviewer Considerations

- Researcher
 - Instrument must be relevant to the objectives of the study
 - Worthless if data is not gathered that meets the goals of the study
- Respondent
 - Should appear to be relevant to respondent
 - Clarified and justified in lay terms
 - Cover letter
 - Respondents need to be able to understand the questions
 - Respondents should know the answers
- Interviewer
 - Questions must be phrased so that they cannot be misconstrued
 - Questions should follow a logical order
 - Smooth transition from topic to topic
 - All directions need to be clear and concise

- Types of Questionnaires

- Closed or fixed responses
 - List answered by checking appropriate box
- Advantages
 - Ease of completion
 - Ease of coding
 - Better response to sensitive questions (groups)
 - Minimum of irrelevant responses
- Disadvantages
 - Random guessing
 - Responses may be reduced by limitations of the list
 - Too many categories to be printed simplistically
 - Frustration with a lack of flexibility in possible responses

- Types of Questionnaires

- Open or unrestricted responses
 - Open ended with no pre-specified categories
- Advantages
 - Good when all possible responses are unknown
 - Better for complex and controversial issues
 - Allows for respondent creativity
- Disadvantages
 - Difficulty in coding and analysis
 - Greater demands on the respondent
 - Questions may be too general for the respondent to comprehend
 - Data collected may not be relevant

- Types of Questions

- Dichotomous responses
 - eg. Gender – male female
- Multiple response
 - How far would you travel for this service?
 1. 1 mile or less
 2. 2-4 miles
 3. 5-7 miles
 4. 8-10 miles
 5. 11 or more miles

- Types of Questions (cont.)

- Rating questions

- Several services are listed below, please indicate the importance of each to you.

	Very Important	Somewhat Important	Not Important
1. Diabetic Training	_____	_____	_____
2. Smoking Cessation	_____	_____	_____
3. Stress Reduction	_____	_____	_____

- This format allows for several items to be categorized with directions only given once

- Types of Questions (cont.)

- Ranking questions

- Eg: The following are health problems. Please place them in order of the greatest problem (rank it 1) to the smallest problem (rank it 5).

- ___ Unintentional injury
- ___ Alcoholism
- ___ Drug addiction
- ___ Teen Pregnancy
- ___ High Blood Pressure

- Types of Questions (cont.)

- Branching questions

- In the past month have you been injured?

Yes— No

If yes: Which of the following was done?	Yes	No
1. Took care of the problem at home.	1	2
2. Visited a family doctor.	1	2
3. Went to the emergency department.	1	2
4. Was admitted to hospital.	1	2
5. Other; Please name _____.	1	2

- Question Development Guidelines

- Phrase questions to be comprehended by all those in the target population
- Avoid double-barrelled questions
- Be careful with double negatives
- Define terms that could easily be misinterpreted
- Underline or boldface a word if special emphasis is demanded
- Be sure questions are not leading questions
- There should be no ambiguity in the questions

- Combining the questions

- Sensitive and open ended questions should be near the end of the questionnaire
- Place questions in a logical order
- Simpler questions should precede more difficult ones
- Vary questions by length and type
- Separate reliability check questions pairs

- The Cover Letter

- Should contain:

- Identification of the person or organization conducting the study
- The reason the study is conducted
- Why it is important for the respondent to complete the survey
- Assurance of no right or wrong answers
- Confidentiality of the information given
- Anonymity of the respondent
- How long it will take to complete
- The preferred date of return
- A notice on how to obtain results

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- Ethics and Epidemiology

- Obligations to study subjects

- Informed consent
 - Full disclosure of study objectives
 - Difficult if this compromises study objectives
 - » May lead to response bias
 - Some studies involve deception as part of the methods
- Balancing rights of the individual vs. society
- Communication of study findings
 - All participants should have a right to view the study results

- Privacy and Confidentiality

- Use of medical records
 - To generate data or validate data without contacting patients
 - To identify patients for subsequent follow-up
- Proposed restrictions
 - Consent for use of medical records
 - Impossible to have a first step of identifying the patients to be studied
 - Studies are often only conceived many years after patients receive treatment
 - Patients who refuse to participate can be compared to study subjects to assess impact of non-response
 - Data from medical records made available without identifiers

- Privacy and Confidentiality (cont.)

- Use of medical records
 - Data from medical records made available without identifiers
 - Often the first step in an epidemiologic study is to identify a group of patients to be followed-up.
 - Linkage of information from different sources is not possible without some identifying information

- Privacy and Confidentiality (cont.)

- Procedures to ensure confidentiality is maintained
 - Informed consent is required for all phases of research except for the review of medical records
 - All data obtained are stored under lock and key
 - Only study numbers are kept on data forms. Keys for linking are kept separately under lock and key.
 - Individual identifying information is destroyed at the end of the study unless there is specific justification
 - All results are published in aggregate form
 - The importance of maintaining privacy and confidentiality is regularly emphasized to research staff

- Conflict of Interest

- Researchers
 - Academic
 - Rigorous peer review
 - Employer has no vested interest in findings
 - Government
 - Industry
- } Subtle pressures to not initiate or prolong the release of information

- Interpreting Findings

- Conclusions must be drawn on the best available data
 - Policy makers usually cannot wait for the "perfect study"
- Epidemiologists should serve as educators as well as researchers
 - Interpretation of data
 - Presentation of policy options
 - Policy impacts
 - Evaluating the effects of policy options