1. Basic Concepts & Definitions

- **Health Economics:** Applies economic principles to the production and consumption of health.
- **Pharmacoeconomics:** Applies economics specifically to pharmaceutical services.
- **Efficiency:** Getting the most benefit from resources.

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2. Classification of Costs

Cost Type	Definition & Examples
Direct Medical Costs	**Fixed Costs:** Costs present whether the patient is there or not (e.g., building, medical devices). **Semi-fixed Costs:** Staff costs that might vary slightly but are mostly fixed. **Capital Costs:** Building an operation room or buying medical devices. **Overhead Costs:** Running the services (electricity, heat, water). **Variable Costs:** Depends on the patient volume (e.g., medicine, interventions, disposables).
Direct Non-Medical Costs	Costs paid out of the patient's pocket regarding the visit but not the treatment itself: Child care, abuse, and the cost of coming to and back from the hospital (transportation).
Indirect Costs	Decreased productivity of the patient. Examples: Premature death or absence from work ("absence of remark").

Intangible Costs	Quality of life factors like feelings, pain, and anxiety. We cannot place a monetary value on it easily, so we measure it with Quality of Life (QoL) instruments.

3. Advanced Cost Concepts

- **Opportunity Cost:** Because of scarcity, we have to choose between A and B. The opportunity cost is the *benefit we lost* by choosing B over A (the value of the forgone alternative).

- **Incremental Costs:** The difference in cost between running a service or not, or comparing different healthcare programs (Cost A minus Cost B).

- **Average vs. Marginal Cost:**
  - **Average Cost:** Total Cost divided by Total Quantity.
  - **Marginal Cost:** The cost to treat *one extra* patient.
  - *Note:* Fixed costs are fixed, so we only deal with variables for marginal cost.
  - *Example:* If we treat 1,000 patients and need $10,000, for patient number 1,001 we only calculate the variable costs (without the fixed cost).

- **The Perspective Rule:** The benefits, outcomes, and costs are all related to the *patient*, not the healthcare provider.

4. Perspectives (Points of View)

Perspectives determine which categories of costs we choose to include in the study (e.g., for a new procedure, do we count indirect costs?).

Perspective	Description
Societal Perspective	The best and most comprehensive one. It chooses what is best for society without considering *who* pays. *Limitation:* It is hard to actually measure indirect and intangible costs.

Payer (Buyer) Perspective	Focuses on services and medications paid for by the service payer (e.g., Ministry of Health or Insurance). Most studies use this because of the difficulty of the societal perspective.
Provider Perspective	The *actual* cost paid to deliver the treatment (without considering how much they charge for it). Includes hospitals, clinics, and private practices. It can be similar to the Payer perspective in some systems.
Patient Perspective	What the patient pays out of pocket. Includes the parts not covered by insurance.

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5. Insurance & Healthcare Systems

Insurance Concepts

- **Deductible:** The amount of money you pay to reach the "milestone" where the insurance starts paying.
  - *Example:* If a treatment costs $1,000 and your deductible is $500, you pay the first $500, and the insurance pays the rest.

- **Co-payment:** A fixed number or percentage you pay for each service.
  - *Example:* Paying $2 for every clinic visit, or paying 10% of a $1,000 treatment.

Healthcare System in Jordan

- **Public Sector:** The government gives a budget to the Ministry of Health (Governmental hospitals), Royal Medical Services, and University Hospitals (like University of Jordan Hospital - UJH).
  - *Scenario 1:* Usually, the Provider and Payer are the *same* (Government).
  - *Scenario 2:* If MOH gives a medical transfer to UJH, then UJH is the **Provider** and MOH is the **Payer**.
- **Private Sector:** Like Jordan Hospital. The Payer is the Patient or Insurance, and the Provider is the Hospital.

Type of cost	Perspective			
	Societal	Provider	Payer	Patient
Direct medical cost	√	√	√	√
Direct non-medical	√	✗	✗	√
Indirect cost	√	?	?	√
Intangible costs (pain and suffering)	√	?	?	√

Cost Shifting

- Sometimes hospitals or insurance try to minimize costs, but they don't actually reduce the total cost; they just *shift* it.
- *Example:* A hospital sends a patient home early after a procedure. The hospital saves money (not actually saving it), but the cost shifts to the patient (buying their own medication) and their family (absence from work to care for them).

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6. Economic Evaluations

- **Goal:** To find the best investment in public health and the most efficient choice of resources (looking for better value for the best price).

- **Full Evaluation:** Compares **two or more alternatives** AND measures **both costs and consequences**.
- **Partial Evaluation:** Measures only costs, only consequences, or looks at a single option without comparison.

		Question2: Are both costs and consequences of alternatives examined?		
		NO		YES
		Examines only consequences	Examines only costs	
Question1: Is there Comparison of two or more alternatives?	NO	**Partial Evaluation**		**Partial Evaluation**
		Outcome description	Cost description	Cost-outcome description
	YES	**Partial Evaluation**		**Full Economic Evaluation**
		Efficacy or effectiveness evaluation	Cost analysis	Cost-effectiveness analysis Cost-utility analysis Cost-benefit analysis

A.Cost-Minimization Analysis (CMA)

- **Concept:** Compare two things that have the **exact same efficacy** or consequence.
- **Method:** Since the consequence is the same, we only look at the cost (which is changeable). We choose the **cheapest one**.
- **Limitation:** It is hard to use for new drugs because new drugs rarely have the exact same effect as previous ones.

B.Cost-Effectiveness Analysis (CEA)

- **Concept:** Calculates Cost + Effectiveness.
- **Effectiveness:** Measured in **Natural Units**. You might get the same type of result, but the *quality* or degree is different.
  - *Examples:* Successful diagnosis, decreased mortality, life years increased/saved, lowering LDL, lowering blood pressure.
- **The Cost-Effectiveness Plane (Plot):**
  - **Dominant (Accept):** Low Cost, High Effect (We always choose this).
  - **Dominant (Reject):** High Cost, Low Effect (We always reject this).
  - **Trade-off:** If Drug B is better but more costly, we have to decide.
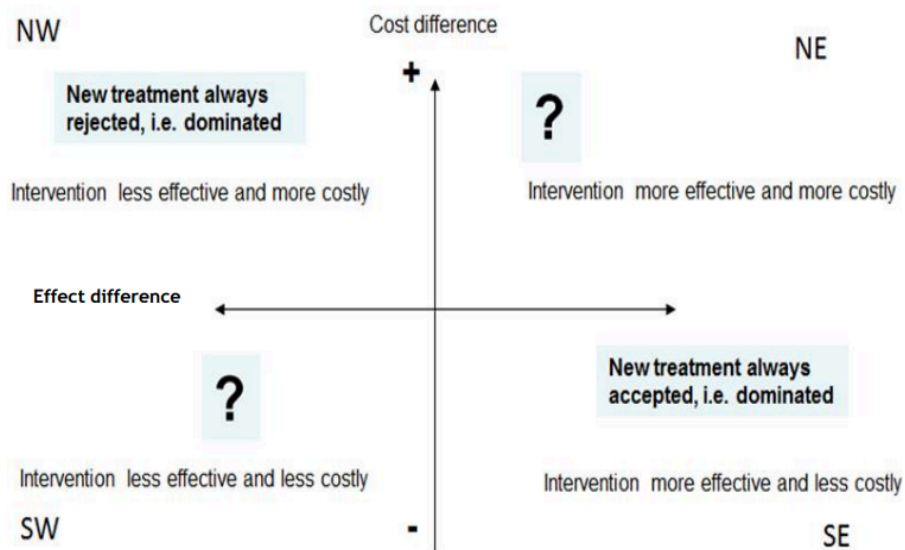
- **ICER (Incremental Cost-Effectiveness Ratio):**
  - Formula:

$$\frac{\text{Difference in Cost}}{\text{Difference in Effect}}.$$

  - *Interpretation:* If positive, it's a trade-off. If negative, one dominates the other.

C.Cost-Utility Analysis (CUA)

- **Concept:** A form of CEA but measures **Utility** (Quality of Life) instead of natural units.
- **Why use it?** It allows us to compare different domains (e.g., comparing a treatment that prevents falls vs. a treatment that decreases pain) by using a common unit: the **QALY** (Quality Adjusted Life Year).
- **Measuring Quality of Life (QoL):**
  - **Domains:** Psychological, cognitive, social, functional, subjective.
  - **Disease-Specific Instruments:** Good for detailed diseases (e.g., EORTC QLQ-C30 for cancer), but hard to compare different diseases (cannot compare cancer to heart disease).
  - **Generic Instruments:** Applied to any disease (e.g., SF-36, EQ-5D). Allows comparison between two different diseases.
- **Utility Score:** A subjective level of well-being on a scale from **0 (Dead)** to **1 (Perfect Health)**.

  - *Respondents:* Patients, general community, people at risk, or medical staff.
- **EQ-5D:** Has 5 domains (Mobility, Self-care, Usual activity, Pain/discomfort, Anxiety/depression).

  Each one has a 3 probabilities (245 possible health states (35 + dead + unconscious)).

  - If you answer "1" (no problems) for all, score is 1. If you have some problems, score might be 0.85.
- **Calculation:**
  - QALY = Years Gained X Utility Score.
  - *Example:* 1 year gained X 0.5 utility (poor life) = **0.5 QALY**.
  - *Scenario:* P gives better quality but no gain in quantity? We measure the gain in quality.
  - **ICER:** Difference in Cost / Difference in Benefit (QALYs).
- **Limitations:**
  - **Ageist:** It favors younger people (intervention gives them more years/quantity).
  - Hard to calculate utility due to different perspectives.

D.Cost-Benefit Analysis (CBA)

- **Concept:** The most comprehensive method. **Both Costs and Benefits are measured in MONEY**.
- **Method:** We don't need ICER because both sides are in money. We calculate **Net Benefit**.
- **Willingness to Pay (WTP):** How we determine the monetary value of health.
  - *Limitation (The "Pass"/Bias):* WTP depends on wealth, perceived need, and experience.

- ○ *Example:* If you are hungry, you pay more for food than if you are full. The bias is against the unemployed, poor, or elderly (who cannot pay as much).
- **Virtue:** Allows comparison between different sectors (e.g., Building a Hospital vs. Building a University) because the final outcome is just money.

- **Calculations:**
  - ○ **Net Benefit** = Total Benefit - Total Cost.
  - ○ *Decision:* If result > 0 (Positive), we do it. If < 0, we don't.
  - ○ **Benefit-Cost Ratio** = Total Benefit / Total Cost. (Shows how much return we get for every dollar spent).
- Quasi = partial , so it look like PE (only look at costs, or only look at outcomes, or they don't combine them properly)
- Most common example is Cost Consequence Analysis : they list everything (pros vs cons) but don't combine them (there is no maths) just listing everything separately The report will just list:
  - Blood pressure results (Outcome 1)
  - Side effects (Outcome 2)
  - Number of hospital days (Outcome 3)
  - Cost of drug (Cost)

You will never see an ICER (like "£5,000 per QALY") in a CCA. It stops before doing that division , The reader or the decision maker has to make their own judgment regarding the relative importance of costs and outcomes. The math doesn't decide for you; your judgment does.

Summary Table of Evaluations

Type	Cost Measurement	Outcome Measurement	Key Calculation
CMA	Money	Identical (None)	Cheapest Option
CEA	Money	Natural Units (Years, mmHg)	ICER
CUA	Money	QALYs (Utility)	ICER (Cost/QALY)
CBA	Money	Money ($)	Net Benefit

A. Discounting

- **Concept:** Money (and health benefits) received today is worth *more* than money received in the future due to time preference (people prefer benefits now rather than later).
- **The Rule:** If a study program extends **beyond 1 year**, you **MUST** discount future costs and benefits to their "Present Value".
- **Method:** We reduce future values by a specific percentage called the "Discount Rate" (commonly 3%–5%).
- **Note:** There is no single "standard" rate that everyone must use forever; it varies by country and guidelines, but using *some* rate is essential for long-term studies.
  - *Short-term studies (less than 1 year) do NOT need discounting.*

B. Sensitivity Analysis

- **Concept:** Economic studies rely on estimates and assumptions (e.g., "we *assume* the drug costs $10" or "we *guess* the discount rate is 3%").
- **Goal:** To test the **Robustness** of the study's conclusions. It checks if the result changes when we change our initial guesses (variables).
- **How it works:** You vary the uncertain variables (like price, efficacy, or discount rate) to see if the drug is still cost-effective. If the result stays the same, the study is "robust" (strong).

Health Economics Problem Solving

Before doing any math, look at your table and label every row as either **V** (Variable) or **F** (Fixed).

Type	Definition	Keywords to Spot
Variable (V)	Costs that occur *every time* you treat a patient.	Drugs, Disposables, Lab tests, "Per patient" items.
Fixed (F)	Costs that stay the same regardless of patient count (up to capacity).	Monthly salaries, Rent, Heating/Lighting, Laptops/Equipment.
Probabilistic	Costs that only happen sometimes.	"Side effect treatment", "Complications", "25% chance".

Step 2: The Calculation Formulas (Labour example in workshop)

Step 2: The Calculation Formulas

1. Variable Cost Per Patient (VC_{pt})

Rule: Watch out for frequency and probability!

$$VC_{pt} = (\text{Cost} \times \text{Freq}) + (\text{Cost} \times \text{Freq}) + (\text{Side Effect Cost} \times \%\text{Probabilit}$$

2. Total Fixed Cost Per Year (TFC)

Rule: Always convert months to years ($\times 12$).

$$TFC = (\text{Monthly Salary} \times 12) + (\text{Overheads} \times 12) + \text{Equipment Costs}$$

3. Total & Average Costs

How much to run the whole unit?

- **Total Cost (TC):** $(VC_{pt} \times \text{Number of Patients}) + TFC$
- **Average Cost (AC):** $\frac{TC}{\text{Number of Patients}}$

Phase 2: Marginal Cost

Calculate the cost of treating patients ABOVE the standard capacity.

The Golden Rule: When adding extra patients, **Fixed Costs (Salaries/Rent) usually disappear**. You only pay for Materials + **Overtime Labor**.

The 3-Step Algorithm:

1. **Material Cost:** Same as your Variable Cost in Phase 1 (Drugs + Disposables).
2. **Labor Cost :**
   - Most questions list nurse time **per session** (e.g., 25 mins). You must multiply this by the **frequency** (e.g., 12 sessions/year).

- **Formula:**

$$\text{Total Hours} = \frac{\text{Mins per session} \times \text{Sessions per year}}{60}$$

- **Cost:** $\text{Total Hours} \times \text{Overtime Hourly Rate}$

3. **Final Sum:**

$$\text{Marginal Cost} = \text{Material Cost} + \text{Labor Cost}$$

Phase 3: The Decision (Is it worth it?)

Goal: Compare Drug B (New) vs. Drug A (Old).

Step 1: Calculate the "Deltas" (Differences)

Always calculate: **(New - Old)** or **(B - A)**.

- $\Delta \text{Cost} = \text{Cost}_B - \text{Cost}_A$
- $\Delta \text{Effect} = \text{Effect}_B - \text{Effect}_A$
  - *Note: If given Utility (0.0–1.0), calculate QALYs first:* $\text{QALY} = \text{LYG} \times \text{Utility}$.

Step 2: The ICER Formula

How much does it cost to buy 1 extra unit of health?

$$ICER = \frac{\Delta \text{Cost}}{\Delta \text{Effect}}$$

Step 3: The "Compass" (The Cost-Effectiveness Plane)

Look at your results and place them in one of the four quadrants.

Quadrant	Scenario	Decision Rule
North-East (NE)	**More Costly, More Effective**	**Trade-off.** Calculate ICER. Compare to Willingness-to-Pay (WTP) threshold. If ICER < Threshold, accept.
North-West (NW)	**More Costly, Less Effective**	**DOMINATED (Bad).** Reject immediately. No threshold needed. You never pay more for worse health.
South-East (SE)	**Less Costly, More Effective**	**DOMINANT (Good).** Accept immediately. Best case scenario.
South-West (SW)	**Less Costly, Less Effective**	**Trade-off.** You save money, but patients die sooner. Needs ethical/financial weighing.

Before submitting your answer, check these common traps:

- [ ] **Time Units:** Did you convert "Monthly salary" to **Yearly** (x12)?
- [ ] **Labor Units:** Did you convert "Minutes" to **Hours** (/60) before multiplying by the wage?
- [ ] **Frequency:** Did you multiply the nurse time by the **number of visits**? (e.g., 25 mins x 12 visits).
- [ ] **Percentage:** Did you apply the probability % to the side effect cost?
- [ ] **QALY vs. LYG:**
    - If the question mentions **"Utility"** or **"CUA"**, you **MUST** use QALYs (LYG*UTILITY).
    - If the question asks for **"CEA"**, use natural units (LYG, symptom-free days, etc.).