Case Study: ICERs

> **!** Important
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> Please note that you can download PDF and Microsoft Word versions of this case study using the links on the right.

Case 1 Description

You seek to explore different drug strategies to treat HIV infection. Single agent therapy with retrocyclovir at 200mg per day has a mean discounted lifetime cost of $20,000 and results in a quality-adjusted life expectancy of 70 years. Single agent therapy with retrocyclovir at 400mg per day has a mean discounted lifetime cost of $22,000 and a quality adjusted life expectancy of 65 years (given the increased incidence of side effects with the higher dose). Another drug, centroflexavir (which comes only in one dose of 250 mg/day) has a mean total lifetime cost of $10,000 and a quality-adjusted life expectancy of 50 years. The combination of centroflexavir with low-dose retrocyclovir has a mean-life time cost of $40,000 and an average quality adjusted life expectancy of 80 years, while the combination of centroflexavir with high-dose retrocyclovir has a mean lifetime cost of $35,000 and a quality-adjusted life expectancy of 75 years.

Newer ARTs are also available and their lifetime costs/QALYs are detailed below:

Table 1: Cost and QALY Outcomes for ARTs

	Cost	QALY
ART 1/2	11,000	63.4
ART 1	15,525	73.52

Instructions

Perform a cost-effectiveness analysis of the treatment options using QALYs as the measure of health effects. Which strategy would you choose and why, if the willingness-to-pay threshold is $50,000 per quality-adjusted life year?

Treatment	Costs	QALYs
Do nothing	36,000	43.8
ART 1	15,525	73.52
ART 1/2	11,000	63.4
Retro 200	20,000	70.0
Retro 400	22,000	65.0
Centro	10,000	50.0
Centro / Retro 200	40,000	80.0
Centro / Retro 400	35,000	75.0

Order the strategies by their associated total average lifetime costs:

Strategy	Lifetime Costs ($)	Quality-Adjusted Life Expectancy (QALEs)
Centro	10,000	50
ART 1/2	11,000	63.4
ART 1	15,525	73.52
Retro 200	20,000	70
Retro 400	22,000	65
Centro/Retro 400	35,000	75
Do Nothing	36,000	43.8
Centro/Retro 200	40,000	80

Calculate the incremental differences in costs and quality-adjusted life expectancy and ICERS:

Screening strategy	Discounted costs ($)	Discounted QALYs (yrs)	Inc. Costs ($)	Incr. QALYs (yrs)	ICER ($/QALY)
Centro	10,000	50	--	--	--
ART 1/2	11,000	63.4	1,000	13.4	
ART 1	15,525	73.52	4,525	10.12	
Retro 200	20,000	70	4,475	-3.52	Strongly dominated
Retro 400	22,000	65	2,000	-5	Strongly dominated
Centro/Retro 400	35,000	75	13,000	10	
Do nothing	36,000	43.8	1,000	-31.2	Strongly dominated
Centro/Retro 200	40,000	80	4,000	36.2	

Calculate the incremental differences in costs and quality-adjusted life expectancy and ICERS:

Screening strategy	Discounted costs ($)	Discounted QALYs (yrs)	Inc. Costs ($)	Incr. QALYs (yrs)	ICER ($/QALY)
Centro	10,000	50	--	--	--
ART 1/2	11,000	63.4	1,000	13.4	
ART 1	15,525	73.52	4,525	10.12	
Retro 200	20,000	70	4,475	-3.52	Strongly dominated
Retro 400	22,000	65	2,000	-5	Strongly dominated
Centro/Retro 400	35,000	75	13,000	10	
Do nothing	36,000	43.8	1,000	-31.2	Strongly dominated
Centro/Retro 200	40,000	80	4,000	36.2	

FINAL TABLE

Screening strategy	Discounted costs ($)	Discounted QALYs (yrs)	Inc. Costs ($)	Incr. QALYs (yrs)	ICER ($/QALY)
Centro	10,000	50	--	--	--
ART 1/2	11,000	63.4	1,000	13.4	74.63
ART 1	15,525	73.52	4,525	10.12	447.13
Centro/Retro 200	40,000	80	24,475	6.48	3,777.01

You would choose the combination of **centroflexavir with low-dose retrocyclovir (Centro/Retro 200mg) strategy, which gives the greatest cost per QALY while still being under the $50,000/QALY threshold.**

Table 3: Treatment Options

Strategy	Discounted Costs	Discounted QALYs	Incremental Costs	Incremental QALYs	ICER ($/QALY)

Table 4: ICER Calculation Table 1

Strategy	Discounted Costs	Discounted QALYs	Incremental Costs	Incremental QALYs	ICER ($/QALY)

Table 5: ICER Calculation Table 2

Strategy	Discounted Costs	Discounted QALYs	Incremental Costs	Incremental QALYs	ICER ($/QALY)

: ICER Calculation Table 3 {tbl-colwidths="[20,20,20,20,20,20]"}

Case 2 Description

You are interested in performing a cost-effectiveness analysis of different cancer screening recommendations for anal squamous intraepithelial lesions and anal cancer in men.

Below is a table of the costs and quality-adjusted life years gained associated with different screening strategies over a six-year time span.

Instructions

Calculate incremental cost-effectiveness ratios for each strategy and determine which screening strategy you would choose if, as a decision maker, you were prepared to pay $50,000/QALY (using discounted quality-adjusted life years)

Screening strategy	Discounted costs ($)	Discounted QALYs (yrs)	Inc. Costs ($)	Incr. QALYs (yrs)	ICER ($/QALY)
No screening	4,130	10.05	--	--	--
Every 3 years	5,178	10.798	1048	0.748	1,401.07
Every 2 years	5,583	10.83	405	0.032	12,656.25
Every 1 year	6,417.19	10.973	834.19	0.143	5,817.34
Every 6 months	8,744	10.988	2326.81	0.015	159,341.74

Remove strategy "every 2 years" (weakly dominated by annual screening strategy)

Final Table:

Screening strategy	Discounted costs ($)	Discounted QALYs (yrs)	Inc. Costs ($)	Incr. QALYs (yrs)	ICER ($/QALY)
No screening	4,130	10.05	--	--	--
Every 3 years	5,178	10.798	1048	0.748	**1,401.07**
Every 1 year	6,417.19	10.973	1239.19	0.175	**7,065.05**
Every 6 months	8,744	10.988	2326.81	0.015	**159,341.74**

The "every 6-month" strategy is above the threshold maximum willingness to pay, **so you would choose screening every 1 year** to maximize QALYs.

Table 6: Cost and QALY Outcomes, by Strategy

Screening Strategy	Discounted QALYs	Discounted Costs ($2022)
No screening	10.05	4,130
Every 3 years	10.798	5,178
Every 2 years	10.830	5,583
Every 1 year	10.973	6,417
Every 6 months	10.988	8,744

Table 7: ICER Calculation Table 1

Strategy	Discounted Costs	Discounted QALYs	Incremental Costs	Incremental QALYs	ICER ($/QALY)

Table 8: ICER Calculation Table 2

Strategy	Discounted Costs	Discounted QALYs	Incremental Costs	Incremental QALYs	ICER ($/QALY)