THANKS FOR DANIA AL-HALHOULI,
FOR COLLABORATION IN THE LECT WITH THE DOCTOR 🙏😊

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Pharmacoeconomics Workshop 2018-2019

A Workshop is a class exercise based on group work. Students will be given a number of tasks alongside some reading materials. You will be asked to work through them with your group and this would be followed by feedback and class discussion.

There will be no marks assigned to your work, however this would be highly advised to help you master the skills required for the midterm and final exams.

You will be allowed to use the lecture notes, text books or your own notes and a calculator.

Learning outcomes

By the end of the workshop you will be able to:

- Critically read an economic paper
- Practice further

Process

- Workshop introduction (5 minutes)
- In groups of 3-4 students; start to work through the worksheet of this workshop papers (40 minutes)
- During the workshop Dr. Rimal will be available to advice and facilitate group discussions, please raise your hand and she will call up to your group.
- Final group discussion (all the class) (10 minutes)

(The Modeling Used For Chronic diseases)

Exercise 1: Decision tree

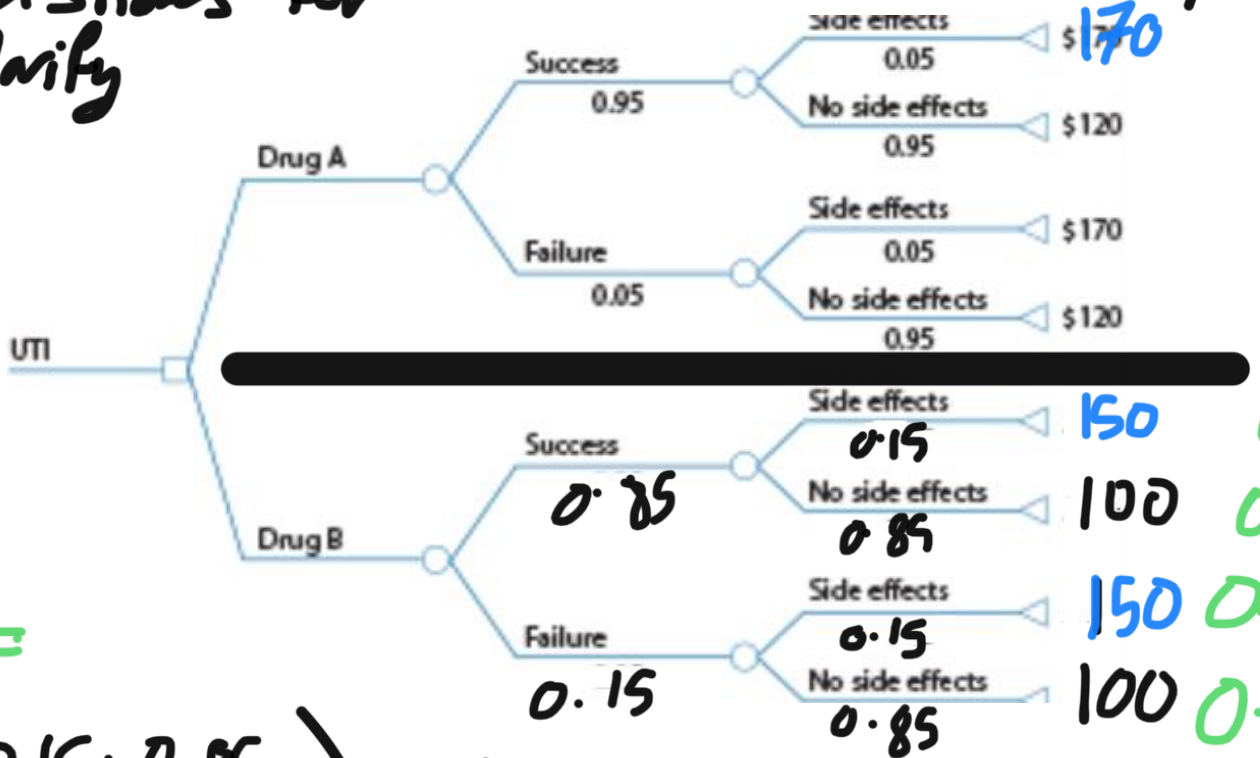
You are a hospital manger and looking to compare two drugs: A and B for the treatment of UTI to decide which to purchase in the formulary. Please review **Table 1**summarizing outcomes and probability

Table 1

Outcome and probability	Drug A	Drug B
Effectiveness probability	0.95	0.85
Side effect probability	0.05	0.15
Cost of medication	$120	$100
Cost of side effects	$50	$50
Utility of medication	0.9	0.7
Utility of side effects	0.5	0.6
Life year gained of medication	6	5
Life year gained of side effects	6	5

Please help to complete the following decision tree (estimated working time 20 min)

*check slides for more clarify



$$\left(0.6*0.15*0.85 + 0.7*0.85*0.85\right) + \left(0.6*0.15*0.15 + 0.7*0.85*0.15\right) =$$

Hint: use the calculation for Drug A as a guide to perform calculation to Drug B

Drug A	**Cost**	**Probability**	**Probability × Cost ($)**
Outcome 1	$120 + $50 = $170	0.95 × 0.05 = 0.0475	8.08
Outcome 2	$120	0.95 × 0.95 = 0.9025	108.30
Outcome 3	$120 + $50 = $170	0.05 × 0.05 = 0.0025	0.42
Outcome 4	$120	0.05 × 0.95 = 0.0475	5.70
Total	△	**1**	**122.5**

Drug B calculation

Drug B	**Cost**	**Probability**	**Probability × Cost ($)**
Outcome 1	100 + 50 = 150	0.85 * 0.15 = ○	○ * 150 =
Outcome 2			
Outcome 3			
Outcome 4			
Total	☆		□

Calculate ICER using the above two table

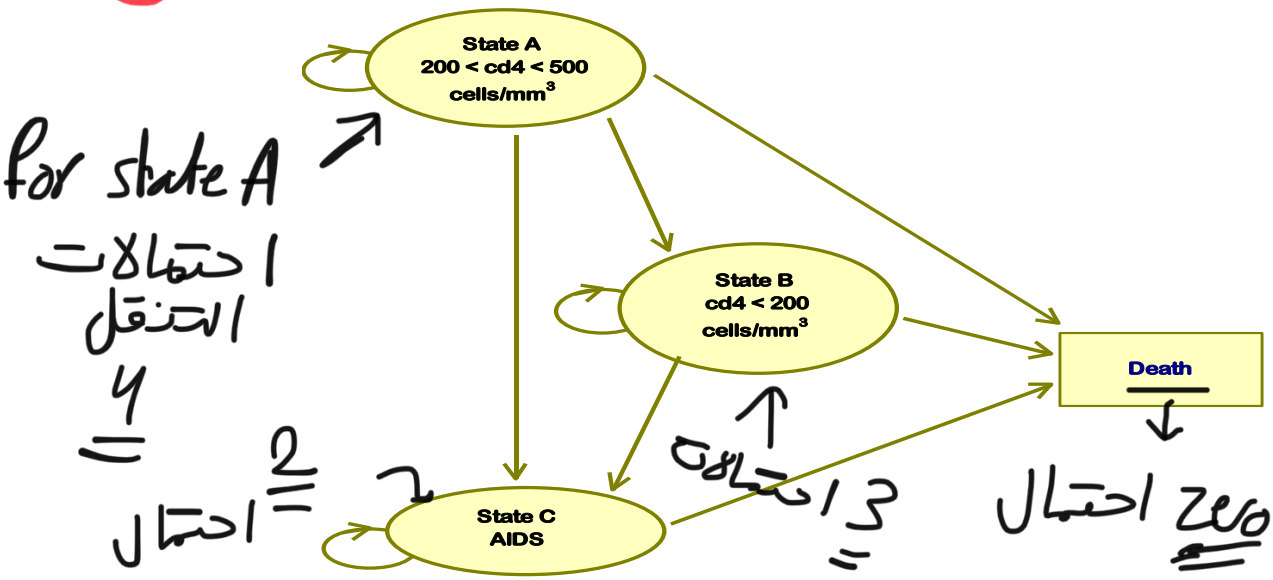
$$\text{ICER} = \frac{\text{cost}_A\,(\$) - \text{cost}_B\,(\$)}{\text{effect}_A\,(\%) - \text{effect}_B\,(\%)}$$

$$\frac{(\text{outcome})_A \quad (\text{outcome})_B}{\triangle - \text{☆}}$$

$$122.5 - \square$$

Exercise 2: Markov Model

The following is the basic structure of the model which evaluated the use of combination therapy (Lamivudine and AZT) for two years against monotherapy (AZT alone)



The cycle length is one year and it is evaluated **5 years**

Use the data given below to populate the model and calculate the incremental cost-effectiveness ratio for combination therapy

Transition probabilities

They were calculated from the counts of individuals that were observed to move between four health states each year. These counts were as the following.

	A	B	C	D	Total
A	1251	350	116	17	1734
B	0	731	512	15	1258
C	0	0	1312	437	1749

Calculate the transition probabilities from each state

	A	B	C	D
A	=1251/1734			
B	0	731/1258	512/1258	
C				

State costs

The costs for each state were reported as the following

Costs	A	B	C
Direct medical cost	1,701	1,774	6,948

community	1,055	1,278	2,059
Total	2,756	3,052	9,007

The yearly cost of AZT is given as 2,278 and Lamivudine as 2,086 (the cost of drug were added to each state.

Discounting

Consider yearly discounting of 3.5% for both costs and outcomes

Filling the following tables will help you to estimate the cost-effectiveness ratio

1. First, calculate the possible transition to each state within each cycle (example in the first cycle)
2. Second, calculate the LYG for each year and then discounted yearly using the discounting formula = undiscounted benefit/ (1+r)^t where t the number of cycle; r equals to the discount rate
3. Third, calculate the cost for each year and then discounted yearly
4. Fourth, sum the discounted LYG and cost across all the cycles for each therapy
5. Calculate the ICER

Year	MONOTHERAPY A	B	C	D	check	LYG no disc	disc	Cost no disc	disc
0	1000								
1	Number of patients in A*tpA2A 1000*0.72= 720	Number in A*tpA2B+ Number in B *tpB2B 1000*0.2+0* 0.52= 200	Number in A* tpA2C+Number in B*tpB2C+Number in C*tpC2C 1000*0.07+0*0.41 +0*0.75=70	=0.01*1000+ 0.012*0 +0.25*0= 10	1000	Sum (A:C)/100 0 =720+ 200 +70+ 10= 0.990	0.990/(1+0. 035)^1= 0.957	Total Prob in A*costA+ Total Prob in B*costB+ Total Prob in C* costC= (0.72*5034)+(0.2*5330)+(0 .07*11235)=5480	=5480/ (1+0.0 35)^1 =5278
2	518	260	185	37	1000	0.963	0.899		
3	373	254	281/2	12	1000				
4									
5									
					sum				

Year	COMBINATIONT HERAPY A	B	C	D		LYG no disc	LYG disc	Cost no disc	Cost disc
0	1				*check*				
1	858	103	34	5	*1000*	0.995	0.961	£ 7,328	£ 7,080
2	737	169	80	14	*1000*	0.986	0.920	£ 7,571	£ 7,067
3	531	247	178	44	*1000*	0.956	0.863	£ 6,002	£ 5,414
4	383	251	270	96	*1000*	0.904	0.788	£ 6,310	£ 5,499
5	277	223	330	170	*1000*	0.830	0.699	£ 6,305	£ 5,309
					sum				

Cost

$y = 2966 + SE \; x^{+}$

$= \frac{\text{Cost}_{B-A}}{\text{outcome}_{B-A}}$

$ICER = \frac{3039 - 27403}{4.231 - 4.025}$