

MEDINF406-Fall2010-Assign1-Gordon Bleil

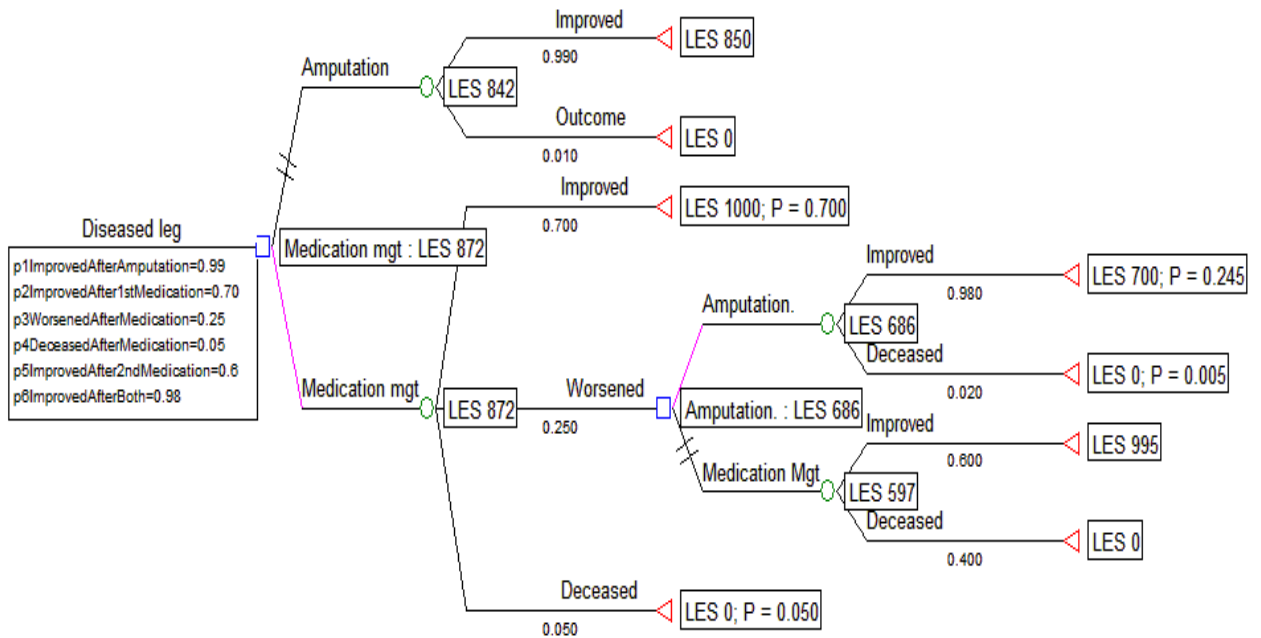
Question 1:

What is the preferred option when faced with the need to amputate a foot due to gangrene?

The optimal initial choice is medication management (Expected Value = 872), followed by amputation if the condition worsens (Expected Value = 842)

Improved after amputation	Amputation	Medication mgt
0.45	382.5	871.5
0.5875	499.4	871.5
0.725	616.3	871.5
0.8625	850.0	871.5

Decision Tree:



Question 2:

Should a coronary artery bypass be performed to decrease the operative risk during Colectomy?

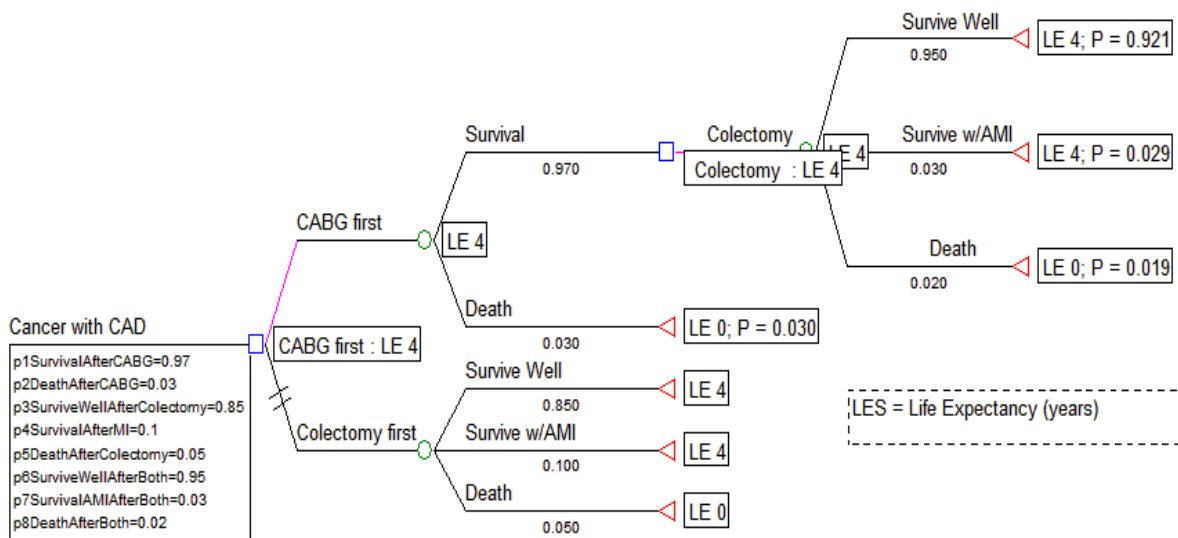
Expected value for CABG First is 4 – Although this is a minimal difference compared to doing Colectomy First, CABG is recommended to be done first. This is borne out by the minimal increase in the sum of probabilities on Monte Carlo simulation.

Statistic	CABG First	Colectomy First
Mean	4	4
Std Dev	1	1
Minimum	0	0
2.5%	0	4
10%	4	4
Median	4	4
90%	4	4
97.5%	4	4
Maximum	4	4
Sum (n*mean)	412	406

What is the gain in life expectancy (in years) that can be expected from the preferred approach?

The increase is extremely small, average .06 years (about 22 days).

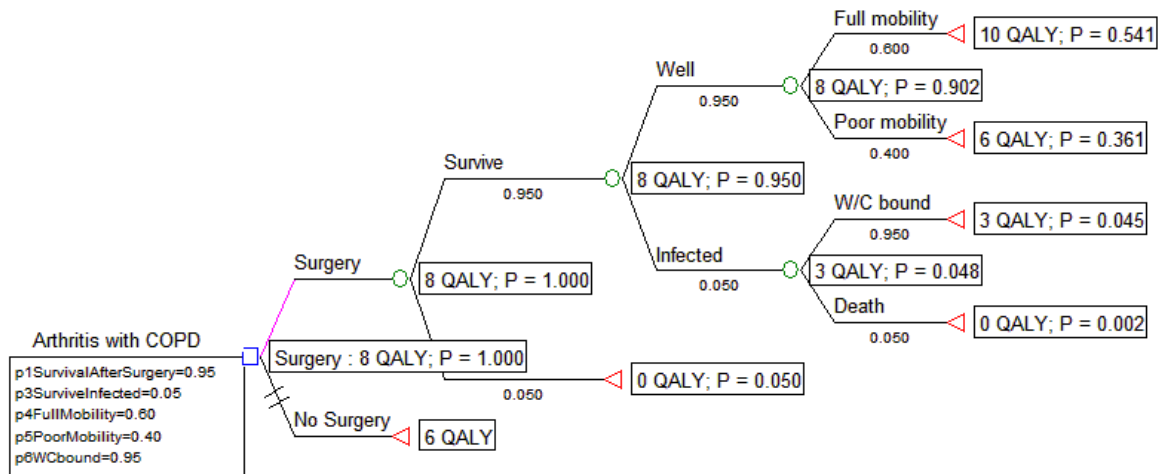
Decision Tree:



Question 3:

Decision Tree:

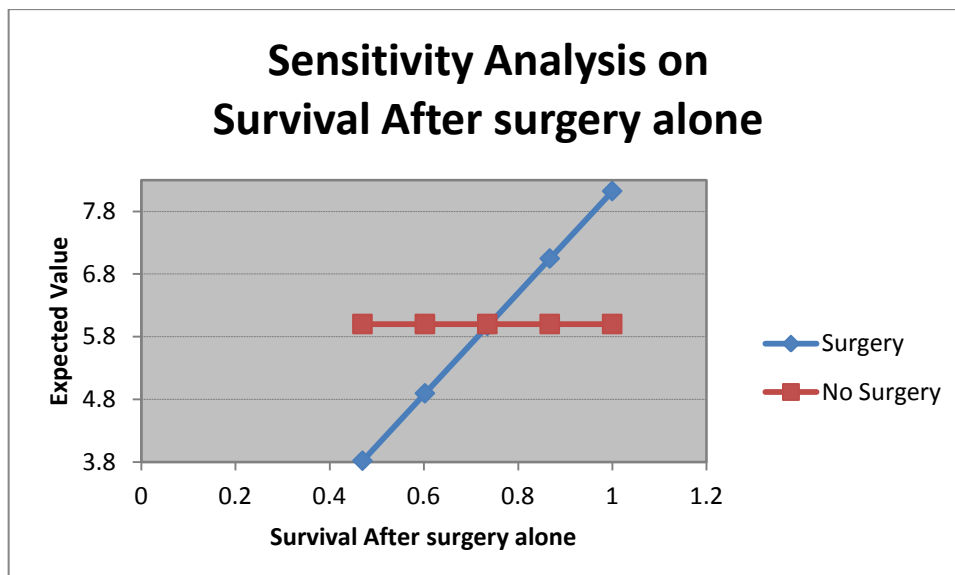
The preferred option is Surgery.



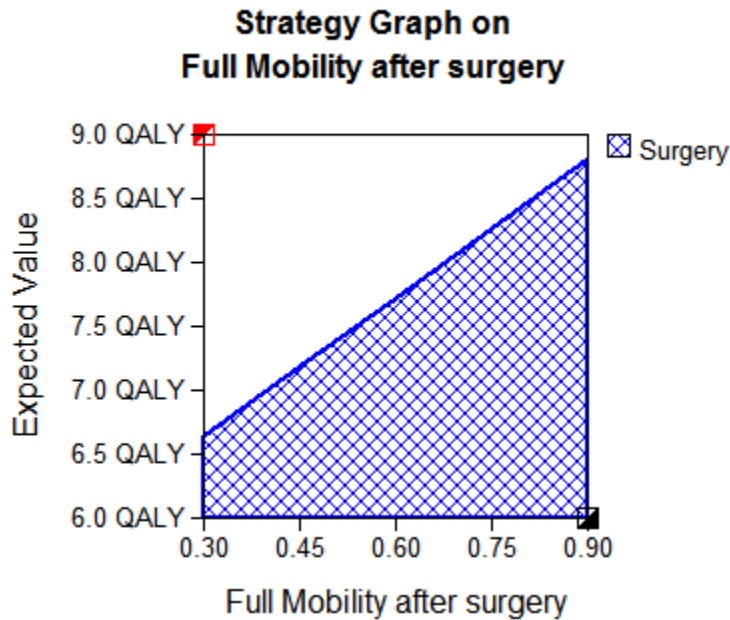
Survival After surgery alone	Surgery	No Surgery
0.47	3.82	6.00
0.6025	4.89	6.00
0.735	5.97	6.00
0.8675	7.05	6.00
1	8.12	6.00

Threshold Values: Lines (No Surgery, Surgery) Survival After surgery alone = 0.739/EV = 6.00

This indicates that when the probability of operative death is > 26.1% (survival 73.9%) that 'No Surgery' is the preferred option.



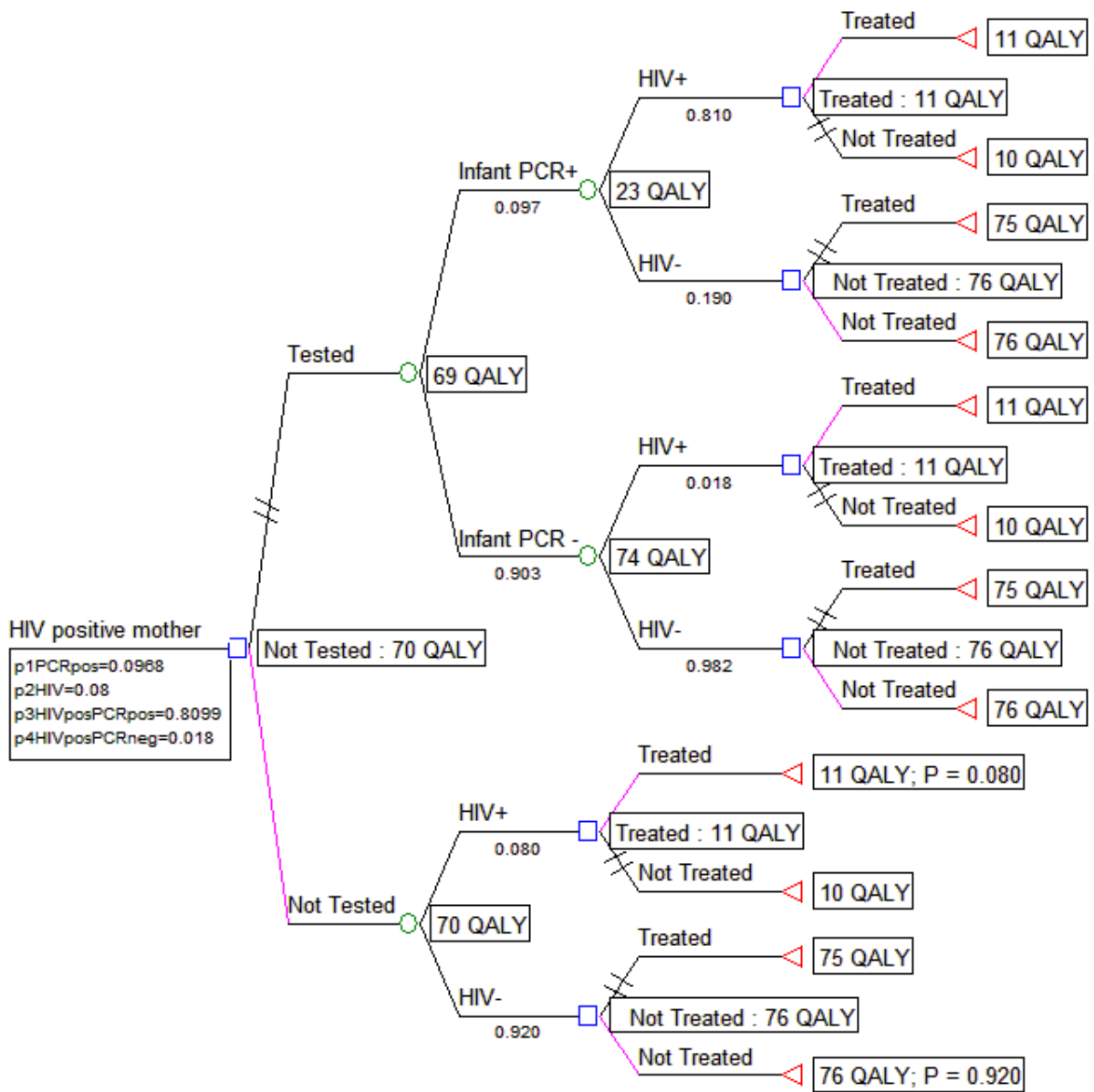
There is no difference between the minimum probability of success and the probability at which the operative death rate causes a change in the surgery/no surgery decision recommendation. What exactly is meant by a 'successful surgery' is not clear. If the assumption is that successful means Full Mobility, and therefore the risk of Poor Mobility is made variable, then extending this graph to the intersection of 6 QALY (the result of the No Surgery option) then the gain would average about 3.8 QALY and the minimum required probability of successful surgery would be about 12.5%



% success	QALY Surgery	QALY No Surgery
0.0%	5.55	6
12.5%	6.00	6
15.0%	6.09	6
30.0%	6.63	6
45.0%	7.17	6
60.0%	7.72	6
75.0%	8.26	6
90.0%	8.80	6

Question 4:

Decision Tree:



Simple influence diagram: Decision to test and/or treat possible HIV positive infant of a known HIV positive mother.

