1. Renovascular Disease

For a small percentage of individuals with high blood pressure, the cause is an obstruction of one or both renal arteries, which is known generally as renovascular disease (RVD). For such patients, the disease can often be corrected surgically, and this usually results in lowered blood pressure.

One test for RVD is the intravenous pyelogram (IVP), an x-ray procedure designed to measure kidney function. The IVP is not a perfect indicator of RVD, however; a patient with an abnormal IVP may not have RVD, and patient with a normal IVP may have RVD.

The only way to confirm the presence or absence of RVD after an IVP has been done is by renal arteriography, a procedure that involves some risk of death. Arteriography will reveal with certainty whether the patient has RVD and, if so, whether it is operable. No surgeon would operate unless renal arteriography were performed and revealed an operable lesion.

Surgery itself poses a risk of death and sometimes does not even result in a lowered blood pressure in a patient with RVD. The alternative to surgery for patient with or without RVD is medical management with antihypertensive drugs, which may or may not be successful in lowering the blood pressure.

Using DATA, draw a decision tree for the management of possible RVD in a patient with high blood pressure. Begin with the decision of whether to order an IVP and consider the subsequent decisions of whether to perform renal arteriography and surgery. Consider as possible end points mortality or survival and success or failure in lowering the blood pressure. Ignore all other complications. Assume that those patients without RVD and who have non-operable lesions will receive medical management and that the clinician may choose to order an arteriogram without first doing an IVP. Note that you cannot solve this tree because you have not inserted any numbers.
2. There are two alternative treatments for Disease Q: surgery and radiotherapy. You must decide whether to prescribe radiotherapy or to perform an exploratory procedure to determine whether the patient might be a candidate for surgery. The drawback of the exploratory surgery is that it compromises the effectiveness of radiotherapy. If you choose to prescribe radiotherapy without performing an exploratory procedure, the patient has a 80% chance of survival. If you choose to do the exploratory procedure, there is 50% chance that the patient’s condition will be operable. In that case you still have a choice between surgery and radiotherapy. Radiotherapy following the exploratory procedure gives the patient a 60% chance of survival. Surgery has a complication rate of 20%. If there are surgical complications, the chance that the patient will die is 30%, but if there are no complications, the chance that the patient will die is only 5%. You want to give the patient the highest probability of survival. Using DATA, draw the tree reflecting this decision.

a. Based on the tree, what would the best strategy be?
b. Would that strategy change if the complication rate for surgery changed to 40%?