Decision Analysis Using a Decision Tree

A construction worker with a badly infected compound fracture of the left ankle presents to your consulting room. The infection is not only threatening to destroy the ankle itself, but is spreading proximally and the septic complications are potentially life threatening.

You are now faced with the difficult decision:

(1) Should you perform a below knee amputation immediately?

(2) Should you perform a surgical debridement followed by antibiotic treatment to save the ankle?

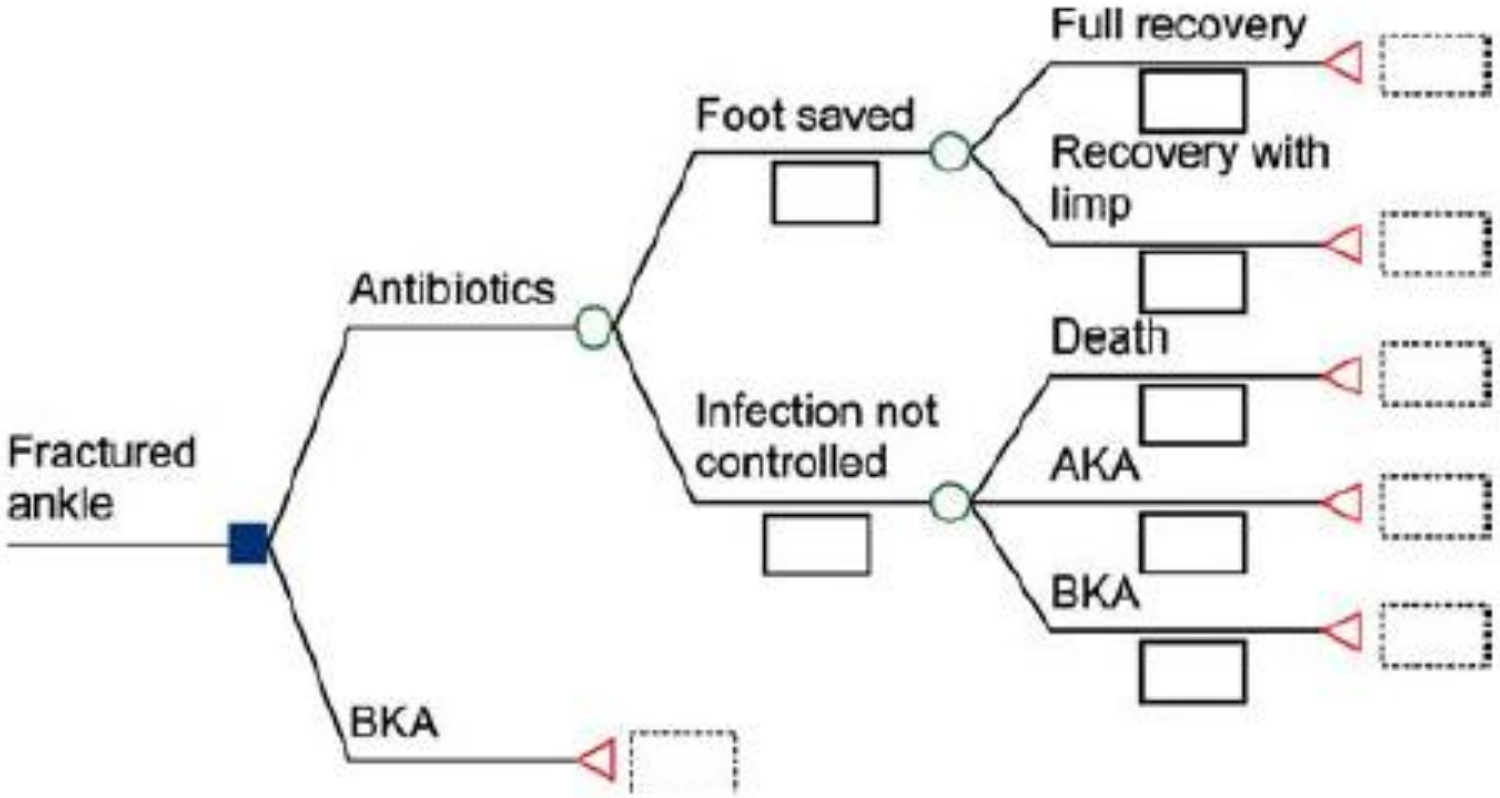
Although the second option offers a chance of complete recovery , it is associated with a substantial risk of infection that spreads, possibly leading to an above or below the knee amputation, or even death. Even this second option is successful, there is still a chance of minor long term disability of the limb.

Table 1. Representative Probabilities to be Assigned to All Outcomes Represented in the Decision Tree in Tip 1

Outcomes	Probability
Probability of foot saved using antibiotics	0.50
Probability of full recovery after foot saved	0.80
Probability of recovery with limp after foot saved using antibiotics	0.20
Probability of death after infection is not controlled by antibiotics	0.10
Probability of above the knee amputation if infection not controlled by antibiotics	0.80
Probability of below the knee amputation if infection not controlled by antibiotics	0.10
Probability of survival after immediate below knee amputation	1.00

Table 2. Patient Valuation of Different Possible Outcomes are Proportionately Represented as "Utilities"on a Scale Ranging from 0 (Death) to 1 (Full Recovery with No Amputation or Limp)

Possible outcome	Utility*
Recovery with a limp	0.98†
Recovery with foot amputation	0.70
Recovery with leg amputation	0.60†
Entire limb saved and no limp	1.00 (assumed)
Death	0.00 (assumed)


Fractured ankle
Antibiotics
BKA
Foot saved
Infection not controlled
Full recovery
Recovery with limp
Death
AKA
BKA