Decision Tree with Outcome Probabilities

By convention a “nodal” depicts an event. Nodes are depicted as “decisions”, which are under the operator’s control, “chance” which are not controlled and “endpoints” which are final outcomes. “Decision” nodes are represented by green squares, “chance” nodes are represented by red circles, and “end” nodes are represented by blue triangles. Sometimes a chance outcome may be represented by a series of “chance” nodes. At each chance node there is a list of probabilities associated with each chance outcome are placed in the corresponding line in the decision tree and must add up to 1.0 for each chance node. The probability of any outcome then is the product of all the chance nodes that led up to it. See Figure 2. The same information could be displayed on a hand-drawing or in a table of values, arriving at the same conclusion. For complex examples this may become difficult and a decision tree may simplify the analysis.

Simple consideration of the probabilities of the outcomes often suggests the best decision. Examining Figure 1 it appears that if tonsillectomy is performed the probability of improvement and complications is 0.57, and tonsillectomy would be indicated.

Calculating Individual Utilities (b-values)

In complex situations.

Data and Assumptions

Without tonsillectomy it is assumed that the patient will continue to experience from four to six throat per year.

Main data and analysis indicate that tonsillectomy reduces the incidence of pharyngitis by 43% so tonsillectomy might reduce the number of sore throats in the next year from 4.0 to 2.2.

An estimate from the literature of the expected post-operative rate is 4.5% / 9.4%.

According to Cohen & Dor the death rate for anesthesia for tonsillectomy is about 1 case in 12,000 for a probability of 0.000833.

Rounding: Data were rounded to two significant figures.

References


