



▶ **Researchers Use TreeAge Pro Healthcare to Evaluate the Cost-Effectiveness of Healthcare Options**

“It’s quite user friendly. You can quickly do simple things with it, but at the same time it is a versatile program and you can do very complicated things if you want to. I built a tree with more than 6,000 nodes.”

Ralph Crott
Head of Department of Health Economics
European Organisation for Research and Treatment of Cancer
Brussels, Belgium

Profile

Surgical procedures. New drug therapies. Alternative treatments.

Any health problem can be met with any one of a number of possible responses, running the gamut from nonintervention to a combination of treatments. Some more effective. Others more affordable. Still others causing fewer side effects or less discomfort.

And even before the onset of disease, there are preventive measures to consider. When is it worthwhile to screen individuals for potential medical conditions? What screening methods should be used, and on which members of the population?

Whether helping to formulate public health policy for the European Organisation for Research and Treatment of Cancer (EORTC), conducting research as a faculty member at the University of Montreal, or carrying on pharmacoeconomic studies as a consultant for the pharmaceutical industry, Ralph Crott has spent his working life addressing such questions – helping both clinicians and policy makers establish the value of healthcare alternatives.

Challenge

Given adequate time and resources, researchers can conduct longitudinal studies that follow individuals over time to determine the effects of various genetic profiles, behavioral choices or medical treatments. But medical decisions must often be made in the absence of comprehensive clinical data.

Decision tree modeling offers a practical alternative, allowing researchers like Crott to construct scenarios that mirror real-life possibilities. Reviewing the probable results of all of the scenarios mapped on a decision tree can help decision makers identify the best medical strategies to treat different kinds of patients. But the effort depends on the ability to create a model that incorporates all of the relevant complexities and uncertainties, thorough analysis of the appropriate data, and the ability to communicate results in a way that decision makers can understand.

To accomplish their objectives, researchers need decision analysis software that is powerful and flexible, yet easy to use – helping them deal with real-life complexity without adding to it.

Solution

Crott's choice for decision tree modeling is TreeAge Pro Healthcare. Easy to use and tailored to the needs of healthcare professionals, it is the standard in the healthcare industry, he said.

In his position as head of the Department of Health Economics at EORTC, Crott assesses the cost-effectiveness of cancer screening policies, sometimes reviewing decision tree and Markov models created by other researchers who use TreeAge Pro Healthcare. But his academic research at the University of Montreal provided frequent hands-on experience with the software.

“It's quite user friendly,” Crott said. “You can quickly do simple things with it, but at the same time it is a versatile program and you can do very complicated things if you want to. I built a tree with more than 6,000 nodes.”

That tree was used in a study conducted in collaboration with the Department of Gastroenterology at McGill University, and the results have been documented in a paper entitled “Cost Effectiveness of Alternative Approaches in the Management of Dyspepsia,” published in the summer of 2003 in the International Journal of Technology Assessment in Healthcare (Volume 19, Number 3).

Crott's study was designed to help define optimal strategies for treating dyspepsia in patients who present with symptoms such as heartburn or stomach pain. “There are five to seven management strategies a doctor could start with,” Crott said. The tree's branches diverge depending on which strategy is selected and the hypothetical decisions that follow, and reflect a time span of one year after the patient's initial visit.

Researchers used the complex decision tree model to compare different strategies to one another based on cost and effectiveness. In addition to establishing all of the tree's branches or pathways based on all of the hypothetical treatment decisions, they had to populate the tree with data reflecting all of the probabilities of the different consequences as well as the costs of procedures and treatments.

A doctor's initial options often include referring the patient to a gastroenterologist for an endoscopy, Crott said. To accurately reflect that procedure's costs in the model, researchers included all of the related expenses, down to the cost of the vials and the syringes used to prepare the patient for the test.

“It’s a costly and invasive procedure. You want to do that only when really necessary,” Crott concluded. It is typical for medical decisions to involve such tradeoffs, he said. For decision makers, “That’s the whole problem.”

“Sometimes the most efficient alternative is the most costly. And sometimes for a very small clinical benefit, you have to spend a lot of money,” Crott said. The question facing clinicians, HMOs or other managed care providers – as well as governments such as those in Europe and Canada which support public health – is, “Is it worth it?”

TreeAge Pro provides researchers with a rich set of features that help them build models that can really help answer that question. For example, the software’s “tracker variables” help trace the progress of hypothetical patients with different histories.

“Everyone has different risk factors,” Crott explained. Smokers, for example, have an increased risk of lung cancer. Tracker variables allow researchers to build those risks and their probable effects into their models – more accurately mimicking real life processes.

“Each patient is taxed with a number of items,” Crott said. If a patient stops smoking, the smoking value would change from one to zero, and that change would affect the probabilities of subsequent outcomes.

“I still run across new uses for tracker variables,” Crott said. “Depending on the problem you have, you can use the feature in very different ways.” The feature’s flexibility reflects one of TreeAge Pro Healthcare’s most valuable assets: its versatility. “I am still discovering different uses for some functions,” Crott said.

TreeAge Pro Healthcare includes reporting capabilities specific to medical technology assessment and the economic evaluation of new therapies and drugs, Crott said. He makes frequent use of bootstrapping and Monte Carlo simulations to perform sensitivity analyses, and uses the software’s incremental cost and incremental effectiveness graphs to display the results. Reviewing this type of output helps decision makers compare the relative cost-effectiveness of drugs and other treatments.

The end result is that TreeAge Pro Healthcare helps optimize healthcare policymaking and clinical decisions, Crott said.

Note: Since this case study was written, Ralph Crott has left the European Organisation for Research and Treatment of Cancer and is now with the Scientific Institute of Public Health in Brussels, Belgium.