SecondOpinion: A Framework For Using Decision Models To Automate & Individualize Interactive Patient Decision Support Aids

George C. Scott1, Ross Shachter, PhD2, Leslie A. Lenert, MD MS3
1Stanford Medical Informatics, Stanford University School of Medicine, Stanford, CA
2Management Science & Engineering, Stanford University School of Engineering, Stanford, CA
3Veterans Administration San Diego Healthcare System, San Diego, CA

Patient-oriented decision support aids have a promising role in the delivery of health care. Most aids targeted at patients are designed to increase a patient’s knowledge about the decision domain or reduce anxiety or confusion about the decision. We describe lessons learned while implementing a novel approach to addressing this problem that involves an individualized decision-analytic conversation driven by real-time interaction with a decision model via a dynamically generated web site.

Background. Patient-oriented decision support aids range in complexity from simple literature pamphlets to multimedia presentations and computer software. Few approaches address the goal of educating the patient and their health-care provider about the patient’s individual values and the implication of their values on the decision. The understanding of patient preferences has been recognized as important in improving the quality of health care1,2 and that computer-based systems should play a key role3,4. In addition, patients have shown eagerness to use such systems5.

The use of decision modeling to evaluate the risks and benefits of medical treatments and screening programs for groups of patients or the nation as a whole is an often used and efficient method that has gained wide acceptance. The first proposed use in medicine was to aid in individual clinical decisions6,7. Computers have long been thought to be instrumental in this task4. Decision models are mathematical representations of problems that integrate outcome possibilities with utilities to predict which choice would result in the optimal cost/benefit tradeoff.

System Description. Our approach uses a computer system that conducts a “conversation” with a patient and provides report of the conversation to be shared with the patient’s healthcare provider. We use a hierarchical decision-analytic conversation model to structure the interaction8. A decision model for the domain drives the interaction. A general decision model is used with patient-specific parameters modeled as uncertain quantities. An intelligent algorithm selects which health values are most critical to the decision for a given patient, based on the patient’s prior answers, and determines when further assessments are no longer informative. The system provides the patient with a summary report of the conversation, highlighting how their values for health outcomes compare to the expected values for their demographic group and the influence each of the values has on the decision per the decision model.

Lessons Learned. Issues involved in the development of online, interactive decision support aids for patients range from human factors to scalability of design. We share some lessons learned about the creation and maintenance of individualized, computer-based decision aids. We discuss experience with the difficulties of providing recommendations and explanations to patients, the need for design considerations of scalability in the aid, and the difficulty in selecting development platforms and tools. We describe some limitations of using Internet populations for evaluation studies and how existing and emerging technologies may hamper, rather than help, development.

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References.