

Chapter 5.13

Computerised Decision Support for Women's Health Informatics

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ABSTRACT

Decision analysis techniques attempt to utilize mathematical data about outcomes and preferences to help people make optimal decisions. The increasing uses of computerized records and powerful computers have made these techniques much more accessible and usable. The partnership between women and clinicians can be enhanced by sharing information, knowledge, and the decision making process in this way. Other techniques for assisting with decision making, such as learning from data via neural networks or other machine learning approaches may offer increased value. Rules learned from such approaches may allow the development of expert systems that actually take over some of the decision making role, although such systems are not yet in widespread use.

INTRODUCTION

Decision analysis involves formally identifying the important aspects of making decisions in terms of the required information, the process followed, and the outcomes expected. Of course, people make decisions all the time without going through this process, so decision analysis is often reserved for situations where the decisions are particularly difficult because there is no good precedent or the decision maker is uncertain, the consequences of making the wrong decision are serious or because the decision making process needs to be particularly explicit and verifiable. As with all informatics activities, computer support is helpful, but not a complete replacement for clinical judgement, or a remedy for poor knowledge of the area.

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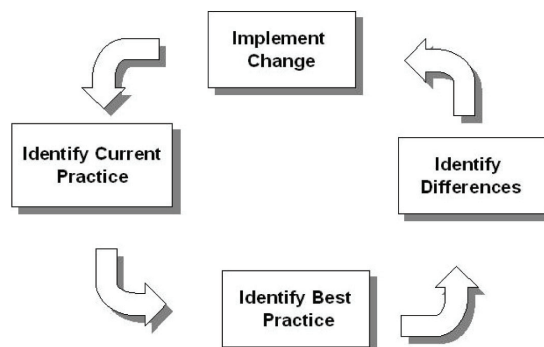
Computational intelligence involves the use of computers to make decisions themselves, in conjunction with humans, or independently.

Formalising decision making processes allows for a reflection on the decision-making process, and the sharing of this process with others such as colleagues, patients or researchers. The audit of behaviour is linked to the use of evidence-based practice (Rosenberg & Donald, 1995). As part of evidence based practice, clinicians are seen to need to justify their actions in the light of scientific research. Briefly, evidence based practice requires the following stages:

- Identification of a clinical problem
- A systematic search for evidence
- Assessment of the evidence in a structured way
- Synthesis of the evidence
- Decision on what is “best practice”

The best practice thus identified becomes the second part of the audit cycle (Figure 1). Decision analysis involves the incorporation of data from good sources of evidence, such as clinical trials in order to identify best practice. This best practice may involve a quite complex process of decision making that depends on many factors, and it may be that decisions need to be segmented in terms of whether they apply to individual cases, groups of patients or whole populations.

Figure 1. The audit cycle



CLINICAL DECISION MAKING

Decision analysis is intended to both model and improve decision-making. The techniques used have a number of similarities but the importance of different aspects of the decision changes with the size of the group being affected. In general, as the groups affected get larger, the distribution of values for parameters are easier to predict, while as groups get smaller then the variation between individuals becomes more important. Dowie made an important point in a 1996 paper (Dowie, 1996) that the decision making process needs to incorporate evidence, cost effectiveness and preferences of the people involved. The use of evidence of clinical benefit, although it is necessary for the choice of action, is not always sufficient to make the decision obvious.

Decision Making for One Patient

Classically, clinical decision making concerns the actions taken to improve the health of one patient. This is at the heart of the clinicians role and has been expressed in the form of the Hippocratic Oath “*To practice and prescribe to the best of my ability for the good of my patients, and to try to avoid harming them.*” (Anonymous, 2007). In the case of decisions affecting a single patient, it is obviously important to know what the patient herself regards as an acceptable outcome. The acceptability or otherwise of an outcome is known as its “utility” in decision analysis terms. It is important to realise that these utilities can vary to quite a large degree. For example work described in (J. Thornton & R. Lilford, 1989; J. G. Thornton & R. J. Lilford, 1989) has shown that there is a very wide variation in the risk that women are prepared to accept, and that this is not simply a matter of lack of information, or an immediate emotional response. Thus, blanket policies for decision making may not reflect the patient’s wishes, and reflects back on the importance of patient preference. This is not surprising if one

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