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67 – Risk, Uncertainty and Indeterminacy in Clinical Decisions

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Rationality, Science and the Legitimacy of Clinical Decisions

We present a typology of scientific uncertainty and discuss how uncertainty can inform patient-centred clinical decision-making.

The emergence of modern states in 18th and 19th century Europe came with a particular model of policy-making, the modern model (Funtowicz and Strand 2007). Within this model, the legitimacy of decisions is rooted in being based on scientific facts. The modern model captures the economic concept of rationality. Rational actors choose those policy options that, given the scientific facts, best meet their preferences.

Accordingly, if a patient can only survive if surgery is performed and he “prefers” survival, surgery is the unique rational choice. Rationality in this model has two distinctive features: The relevant facts are known with certainty (by science), and the preferences are also known (by the patient).

Gradually, the concept of objective probability replaced certainty in empirical science. Rationality and legitimacy were also claimed in the absence of certainty as long as probabilities could be quantified objectively in terms of frequencies, a procedure requiring formalization in risk-cost-benefit-analysis. Below we discuss several other forms of uncertainty. How can physicians and patients make rational decisions in the absence of quantifiable knowledge?

Risk, Uncertainty, Ignorance and Indeterminacy

“Risk” has many definitions. According to Knight (1921) uncertainty is reduced to risk when the frequencies of the outcomes are known. There is strict uncertainty when frequencies remain unknown. Ignorance is the lack of knowledge of relevant outcomes (incomplete knowledge of the event space).

The rationality of the modern model hinges upon the possibility of reducing uncertainty and ignorance to risk. Without probability estimates there is no unique rational choice. Bayesian concepts and methods cannot solve this problem because their subjective component compromises the original legitimizing force of the probabilities.

Finally, there is indeterminacy: no unique way of defining the system (Wynne 1992). Causal chains and networks are open and any choice of system boundaries has an arbitrary component (the neck, the person, the person and his colleagues, the person and his family). Moreover, any definition of system boundaries introduces its own sources of risk, uncertainty and ignorance.

Sources of Risk, Uncertainty, Ignorance and Indeterminacy in Clinical Contexts

There are numerous sources of incomplete knowledge in clinical contexts (Rørtveit & Strand 2001). The following questions may elicit some of them:

Risks: What frequencies are known for the prognosis of patients similar to mine, given this or that treatment?

Strict uncertainty: Is my patient representative for the group(s) for which I have risk information, or is he too different? Of which relevant peculiarities of my patient am I ignorant?

Ignorance: Which non-medical (or hitherto unknown) consequences of the clinical decision will feed back into health?

Indeterminacy: How did we define the clinical problem and system? If we had defined it differently, what would the relevant options and outcomes be, and which sources of risk, uncertainty and ignorance would they entail?

Jane, 71 Years, Slightly Overweight

The following hypothetical example is adapted from Rørtveit & Strand (2001): Jane (71) goes to her GP, allegedly for a “check-up”. She is somewhat overweight, does not smoke and feels quite well. She walks the dog every day. On request she tells that her father died suddenly at age 55 “because of the heart”, and her mother’s brother “has angina”. Blood pressure is 140/90 mm Hg. Clinical tests are normal except the cholesterol, being 8.5 mmol/l. Three months later, following changes to her diet, she presents with a cholesterol of 8.3 mmol/l. HDL 1.3 mmol/l and triglycerides 1.0 mmol/l. The GP is in doubt about what to do and whether medication should be prescribed.

Our point is not to indicate the correct decision. Indeed, there are several ways ahead. We shall begin by eliciting sources of risk, uncertainty, ignorance and indeterminacy.

Risk can be assessed by risk charts and risk calculators, also for this patient. Strict uncertainty is present, however, notably because the patient does not fit into the groups well characterized by existing epidemiology: she is a Norwegian woman >65 years without established disease, with unclear familial risk and living in a different country than those of most relevant studies (Selmer et al 2008, Cooper et al 2008, Petursson et al 2010). Although it is always possible to base the clinical decision upon the risk charts it is not necessarily legitimate, since the assumptions of the modern model are violated. Therefore, there might be other rational options.

Other options can be found by eliciting sources of ignorance and indeterminacy. This requires more knowledge about the patient, some of it quite reliable, some of it not. Will she continue to walk her dog if she is on medication? Will she think of herself as ill and will this have a (positive or negative) health effect? Did she only want a “check-up” and had nothing else on her mind (for example a small lump in her groin)? Why is she overweight, and is it a problem? What is important for this woman to be able to do in her remaining healthy years, and how can the GP help her accomplish her objectives? Such questions may clarify (a) other sources of uncertainty and ignorance with respect to the decision to medicate or not; (b) other options for action; (c) that the decision on whether or not to medicate, loses importance. Perhaps the GP should just give the medication to her without further ado and then concentrate his/her effort on Jane’s other health aspects.

Conclusion: Creative Efforts May Be Rational

Knowledge is essential. We do not encourage unaccountable forms of judgement. However, when scientific uncertainty prevails, an approach where doctor and patient co-produce relevant knowledge about the patient may strengthen the knowledge base and the legitimacy of clinical decisions. Sometimes, this leads to a re-framing of the clinical problem in which uncertainties are less critical. Sometimes, uncertainties remain unresolved, actually giving GP and patient more autonomy to develop their own path ahead.

Take Home Messages

- Clinical decisions often have to be made in the presence of scientific uncertainty about premises and possible outcomes
- A model of rationality based on probabilities can be restrictive in clinical settings
- We present a typology of uncertainty and its application in a clinical example: risk (probability), strict uncertainty, ignorance and indeterminacy

Original Abstract

<http://www.woncaeurope.org/content/ws-036-risk-uncertainty-and-indeterminacy-clinical-decisions>

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