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# Risk, Uncertainty and Indeterminacy in Clinical Decisions



## Rationality, Science and the Legitimacy of Clinical Decisions

**This paper presents a typology for scientific uncertainty and discusses the significance of uncertainty in clinical decision-making.**

Funtowicz and Strand [1] described the growing interdependency between science and the State, from the Enlightenment into our time, in what they called the *modern model*:

"To develop a policy was thus a matter of becoming informed by science and then, in a second step, to sort out diverse values and preferences. We call this the modern model. A crucial feature of this model is that it captures the modern notion of rationality. We could say in a simplified manner that, within the Enlightenment tradition, rational actors act within the modern model and choose those policy options that, according to the scientific evidence, best meet their preferences."

Being "informed by" is to be taken in its strongest sense. Imagine a patient who will certainly die without surgery, but may survive if surgery is performed. If the patient's over-riding concern ("preference") is survival, there is *only one* rational option: to perform the surgery. Any other decision, given these assumptions, is *irrational*. This type of situation has occasionally served as a *definition* of rationality. It has two distinctive features: The relevant facts are known with certainty (by science), and the preferences are also known (pertaining to the patient).

In the two centuries after René Descartes and his famous *cogito ergo sum* as the exemplar of certainty and manifest truth, the concept of certainty was under replacement by that of objective *probability*. A strong claim for the rationality, and accordingly the legitimacy, of a decision could also be made in the absence of certain outcomes, as long as the probabilities could be quantified objectively in terms of frequencies. This was later formalized in the methodology of risk-cost-benefit-analysis.

### Risk, Uncertainty, Ignorance and Indeterminacy

"Risk" has many definitions. According to Knight [2], uncertainty is reduced to *risk* when the frequencies of the outcomes are known. There is (strict or irreducible) *uncertainty* when frequencies remain unknown (or even unknowable). *Ignorance* is the lack of knowledge of relevant outcomes (incomplete knowledge of the event space). The strong claim of rationality of the modern model hinges upon the possibility of reducing uncertainty to risk. Without sufficient knowledge of the event space and its probabilities, there is no answer necessary to what is the rational decision. The introduction of Bayesian concepts and methods, eliciting probabilities via experts' degrees of belief rather than objective frequencies, does not solve this problem. Bayesian methods are highly *useful*, but the subjective component compromises the original legitimizing force of the probabilities.

Finally, there is *indeterminacy*, which means that there is no unique way of defining the system to be studied and/or acted upon [3]. Causal chains and networks are open, but still the system must be

delimited somehow (the neck, the person, the person and their colleagues, the person and their family). Worse still, any definition of the system comes with its own set of 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 [4]. The following questions may elicit some of them:

Risks: What probabilities (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 my patient too different? Of which peculiarities of my patient am I ignorant, and how relevant are these peculiarities?

Ignorance: What consequences will the clinical decision have, other than its main effect and medically identified and studied side-effects? Which of these will feed back into health?

Indeterminacy: How did we define the clinical problem and the clinical 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, 68 years, slightly overweight*

The following hypothetical example is taken from Rørtveit and Strand [4]:

"Jane (68) comes to her GP because she wants a "check-up". She is somewhat overweight, does not smoke and feels quite well. She goes for a walk every day with her dog. On request, she says that her father died suddenly at age 55 "because of the heart", and her mother's brother "has angina". [...] The GP measures a blood pressure of 140/90 mm Hg. Clinical tests are normal except the cholesterol, being 8.5 mmol/l. 3 months later she has tried to change her diet. Now she has a cholesterol of 8.3 mmol/l. HDL is 1.3 mmol/l and triglycerides 1.0 mmol/l." (p. 1382, our translation).

The GP may now be in doubt about what to do, and whether medication should be prescribed. The point of this paper is not to indicate the correct decision. Indeed, our point is that there are several ways ahead. We shall begin by eliciting sources of risk, uncertainty, ignorance and indeterminacy.

Risk can be assessed by risk charts or other applications of scientific knowledge. Strict uncertainty, however, is present in this case, notably because the patient does not fit well with the typical person of any of the groups well characterized by existing epidemiology: she is a woman without established disease, with unclear familiar risk and living in a different country than those of the relevant studies. This means that it is of course *possible* to let the clinical decision be informed (in the strongest sense) by the risk charts, but it is not automatically *legitimate*, since the assumptions of the modern model are violated. Therefore, there might be other rational options.

One may search for other options through an elicitation of sources

of ignorance and indeterminacy. This requires more knowledge about the patient, some of it quite reliable, some perhaps quite speculative. Will she continue to walk her dog if she is on medication? Will she begin to identify herself as ill, and will this have a health effect? How do we know that she only wanted a check-up, and did not have something else in mind? (Incontinence? A small lump in her groin?) Why is she overweight? Is this a problem? What is important for this 68-year old woman to be able to do in her remaining healthy years, and how can the GP help her accomplish her objectives? Depending upon the answers to these questions, we may find (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 it to her without further ado and then concentrate her effort on a quite different health aspect of Jane.

### Conclusion: Creative Efforts May Be Rational

Sometimes one may hear the distinction *science versus art* when tensions of GP work are being discussed. We emphasize that our argument is not meant to downplay the importance of knowledge, or encourage unaccountable forms of judgment. On the contrary, we have argued that there are ways to strengthen the knowledge base and the rationality of clinical decisions in the prevailing presence of scientific uncertainty. We have outlined an approach where doctor and patient co-produce relevant knowledge about the patient. In some cases, this might lead to a re-framing of the clinical problem in which uncertainties are less critical. In other cases, uncertainties

remain unresolved, actually giving the GP and patient more autonomy to develop their own path ahead.

### References

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## Uncertainty, Balint and EBM



**ELPS Workshop at the Wonca Europe conference 2009 in Basel – Meeting with the patient: Between fascination and routine, certainty and doubt – how do doctors cope and develop emotionally and cognitively?**

Our primary motivations for practising medicine for satisfaction are: firstly, to solve medical problems, secondly, to satisfy the sense of closure, and thirdly, the desire to help people [1]. However, as Michael Balint said, medicine must compromise with: "The doctor, the illness and the patient" [2]. We (the doctors) have always and everywhere got criticism at all levels throughout all the ages. as if a "malaise" has always been set [3] (in France: Molière, Flaubert, Proust, Reverdy, Céline ...).

### "Difficult patients"

Nowadays, some patients are especially prone to remind us of our "malaise". We call them the "difficult patients". They are those who

lead us to our status as difficult doctors; for example the "MUS" patients (with Medically Unexplained Symptoms) and especially the "Heart sink" patients, who can lead us to burn-out syndrome [4]. Why is this? Four examples may illustrate these kinds of situations.

#### *The dependent clinger*

She is about sixty five years old. He is about eighty. They live in the building where my office is located. I meet them almost every day in the corridors or in the street. When they see me, they kiss me and tell me how their last visit with the specialist was, which I never ask them to go to: all is right thanks to me! "We have a good doctor" and they leave me, happy, smiling until the next demand for the next specialist!

#### *The entitled demander*

She is a young, unemployed woman. She doesn't pay me which is not the rule in France. She usually arrives with her three children as she cannot afford a baby-sitter. Today, she consults for a sore throat.