Smoke-filled risk

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The possibility to calculate the likelihood of illness is only a few keystrokes away.

Photo: Einar Nilsen

Life is fraught with uncertainty, and uncertainty can be hard to live with. For this reason, humans have always attempted to see into the future, generally using the alignment of the stars, or coffee grounds, or crystals. Statistical calculations of probability offer a more modern option, whereby information about what *is* or *has been* helps substantiate what *will happen*. However, the exact probability that a particular disease will affect me as an individual is problematic, both to calculate and to communicate.

Nevertheless, there are ample opportunities on offer: The possibility of calculating the probability of developing diabetes, heart disease or various types of cancer, and whether the cancer will metastasise once a person becomes ill, is only a few keyboard strokes away. Earlier this winter, the Norwegian public broadcaster NRK reported on a lung cancer calculator developed by researchers at the Norwegian University of Science and Technology, which is now freely available online (1, 2). The data on which the model is based have been obtained from the Nord-Trøndelag Health Study (HUNT2) and are validated in other Norwegian population studies (3). NRK reports on a woman in her late 20s who had smoked since she was 12 years old (1). After several failed attempts to quit, she wished to ascertain her level of probability of developing lung cancer. By entering information that included her smoking habits, BMI and cough, she was informed that her risk of developing the disease was 0.01 % in the next six years and 0.06 % in the next 16 years (1).

The risk turned out to be lower than the woman expected (1). Few people develop lung cancer before the age of 40 years, and the calculator does not estimate lifetime risk. Nor does it provide information about relative risk, i.e. how much lower the probability of cancer would have been if she had never smoked. This is not possible to give, because the prevalence of lung cancer among non-smokers in the dataset was so low that it was impossible to perform meaningful calculations (3). And – perhaps most important of all – this type of calculation gives no information on the risk of cancer if a person quits smoking (or continues).

Although both the website and the press reports may give a different impression, the primary purpose of the lung cancer calculator is not to motivate people to quit smoking (3). Its aim is to identify people who may benefit from CT screening for early identification of the disease. CT scanning is an intervention that (in contrast to quitting smoking) may have negative health effects, costs money and may give false positive as well as false negative results. It is therefore useful to calculate the risk level at which the potential advantages outweigh the disadvantages. Hence its purpose is similar to that of the Norwegian Directorate of Health's calculator for cardiac risk, NORRISK 2 (4). This should be used in conjunction with the guidelines for individual primary prevention of cardiovascular diseases to identify patients who may benefit from statin therapy (5). In both cases, the calculations form a starting point for patient and doctor to discuss the risk and advantages, and any disadvantages, of choosing screening or drug therapy, respectively.

Irrespective of the purpose, the problem of understanding the meaning of individual risk remains. According to the cardiologist John W. McEvoy, the expression is in fact an oxymoron – that is to say, a contradiction in terms (6,

7). One person's risk is generally impossible to calculate. Firstly, something cannot happen and not happen to the same person. Secondly, the confidence interval for the probability – if this could be calculated – would range from 0 to 100 (6). Therefore he never tells patients that 'the probability that *you* will become ill is x, y or z', but that 'among 100 patients who are similar to you, so and so many will become ill within such and such a period of time'. This is not just semantics, but a real and important difference.

'Would you board an aircraft if one in 12 planes crashed?' wheezed the lecturer, who had undergone surgery for laryngeal cancer, during an anti-smoking information campaign at my lower secondary school in the 1970s. It had very little impact on us. However, I hope that today's teenagers do not use the calculator only to discover that their probability of illness – in a future foreseeable to them – is so low that they might as well carry on smoking.

LITERATURE

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