Risk assessment gone mad:
the rise of risk evaluation and mass public deception

David Gray

Author

David Gray

Reader in Medicine and Consultant Physician and Cardiologist

Division of Cardiovascular Medicine, University Hospital, Nottingham, NG7 2UH

Correspondence to:
Dr D Gray
(D.Gray@nottingham.ac.uk)

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"My interest is in the future because I am going to spend the rest of my life there." – C F Kettering

Cardiovascular diseases are a massive public health problem in both the developed and developing world. UK statistics show, according to death certification, half a million people die annually, about 180,000 due to circulatory disease, 130,000 from neoplastic disease and 70,000 due to respiratory disease. With advancing age, the likelihood of dying from circulatory disease increases. So let's face it, most of us are going to die from clogged blood vessels, most commonly some manifestation of coronary disease. Add in the millions who will live with symptoms of coronary disease and the numbers stack up even higher.

In 1948, the US public health service financed an epidemiological study on a previously unprecedented scale to investigate why millions of Americans were dying prematurely from heart disease. The result was the Framingham study, from which we have a pretty good idea of what increases our chances of developing coronary disease – smoking, cholesterol, blood pressure and diabetes – well recognised now but unknown until 40 years ago. In fact, Framingham introduced *cardiovascular risk* and *cardiovascular risk factors* into the medical vocabulary in a landmark paper in 1961.

A risk scoring system soon followed. Despite listing several important caveats, the Framingham risk score was widely adopted around the world, largely because of its novelty, simplicity and practicality. Some four decades later, there is mounting criticism of the Framingham risk score. First, because it does not predict cardiovascular risk 'accurately' enough – when applied to different populations, the score tends to overestimate risk in low-risk populations and underestimate risk in high-risk populations. Second, because it does not take into account other factors such as family history or socio-economic status.

New risk scoring systems have been proposed, each claiming to predict, with greater accuracy than Framingham, the risk of a future cardiovascular event, at least in the population in which each was developed. Will 'better' scoring systems help us manage our patients better?

"A good forecaster is not smarter than everyone else – he merely has his ignorance better organised."
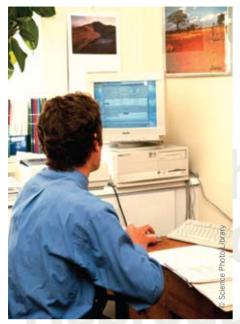
Why the Framingham (or any) risk score can never be a 'perfect' predictor

There are several factors. First, Framingham can *never* be truly predictive once applied to a different population – its data were obtained from a North-Eastern American, predominantly middle-class, urban, Caucasian population. Second, some age–gender groups were rather small, making these underpowered to provide anything like a reliable predictive estimate of cardiovascular risk. Third, with infallible 20:20 hindsight (not available to Framingham's originators), several risk factors might now reasonably be added to improve 'predictive accuracy', not least family history, ethnicity, fibrinogen, lipoprotein (a) and socio-economic status. Fourth, Framingham provides an estimate of the *absolute risk*, that is, the chances of developing cardiovascular disease within 10 years; as age is a major contributor to the score, *relative* risks are more appropriate in older age. Fifth, giving the score as a *point estimate* is not strictly correct – the score is the *median* of a range so some individuals with a specific risk score will do better (and have a lower risk) than the estimated risk and others will do worse (and have a higher risk) than predicted risk.

How 'predictive' should a score be?

There is no such thing as a reliable estimate for an *individual* – the estimate applies to the *group*

EDITORIAL

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"Prophesy is a good line of business but it is full of risks." – Mark Twain

It depends on what you expect of risk prediction. Ideally, reducing an individual's *risk score* would equate to a guaranteed reduction in risk. This cannot be, so suggesting otherwise is practising a self-deception. Do we need to look at risk, and risk scoring, in a different way?

Time to re-think the purpose of risk assessment

Like all biological parameters, cardiovascular risk has a normal distribution, which means the majority of people are at moderate risk and only a few outliers are at low or high risk. It is the first group that suffers the most events because that is where the majority of people are. It is time to think big. If the UK's unenviable position near the top of the international cardiovascular mortality league is to improve, we need a decisive *shift to the left*, to the low end of the population risk curve. With doctors practising medical communism, better known as population medicine, through mass-scale risk evaluation and intervention. Remember the *population paradox* – a preventive measure brings large benefits to the community but offers little to each participating individual. Treat the individual but think of your country.

The case for sticking with Framingham

The fact that Framingham is not accurate enough is immaterial. Familiarity makes us forget that it remains a simple, convenient method not only of evaluating risk but, more importantly, for focusing attention on treatable risk factors.

The risk score might be more critically and intelligently applied. For example, the idea of a 'threshold' below which risk need not be treated is inappropriate for two reasons – a time horizon of 10 years is woefully short when applied to a 40-year old with a potential lifespan of 35 years; and 'low risk' never means 'no risk'. Why don't we just accept that we should treat risk whenever possible? Framingham has served us well – it told us what risks we should address and provided a starting point for primary prevention

strategies. But are we in danger of losing sight of Framingham's primary findings? Forget thresholds, start treating risk.

Is it time to stop deceiving patients?

Most of our treatments affect only a small proportion of patients. Look at clinical trial results: if, say, 300 people on placebo have a heart attack and of those on active treatment, 90 fewer have a similar event (a 30% relative reduction), 210 have not benefited from the new treatment. Similarly, with risk intervention, some will take appropriate risk-reducing treatment from which they will not benefit – still infarct. In clinical practice, the aim is to expose people to the benefits of a drug in the hope, not expectation, that they will experience the potential benefits of the drug – it is for this reason that a lot of people need treating to shift risk to the safer end of the distribution curve.

Are more accurate risk scores needed? Most definitely not. By all means, use risk evaluation to assess individuals but let's be honest with our patients – let them know that they are being treated partly for themselves but mainly for the greater good. Medical communism is alive and well and living at a health centre nearby ●

"Forecasting future events is often like searching for a black cat in an unlit room that may not even be there." – Davidson

Conflict of interest

None declared.

of people with the same risk score. For any *individual* in that group, the risk of a future cardiovascular event cannot be predicted. Just because a person has a high risk of a cardiovascular event does not mean that the event will happen. Nor does 'low risk' mean that the event will not happen. Think of the UK National Lottery – almost every week, someone with a low risk of winning, having bought a single ticket, wins the jackpot, against all the odds. In clinical terms, those who successfully achieve a low-risk score may still experience a cardiac event, while those recidivists who ignore advice may die of old age.

At present, some doctors seem obsessed with the belief that risk of a future event can be accurately predicted, while avoiding treating risk because it has not reached a great enough threshold value.

Is it time to consign Framingham to the dustbin of history?

QRISK is just one of several risk assessment systems vying to replace Framingham. Admittedly, it has been developed from a mixed UK population of varying socio-economic status and claims to identify many of the same high-risk people as Framingham. Even so, the number of people differently classified is said to be equivalent to a city the size of Bristol. Does this improved 'accuracy' add anything?

Reference

Rose G. Strategy of preventive medicine: lessons from cardiovascular disease. *BMJ* 1981;**282**:1847–51.