Editorial for "Development and validation of risk prediction equations to estimate survival in patients with colorectal cancer: cohort study."

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By estimating the probability of given outcomes for individuals based on a combination of clinical and socio-demographic characteristics the growing number of risk prediction models have the potential to support clinician and patient decision making.

In the linked paper, Hippisley-Cox and Coupland add to their suite of risk prediction models by using data from a large UK primary care database (the QResearch® database) to develop models to estimate survival in men and women following a diagnosis of colorectal cancer[ref]. They then validated them in a separate set of patients within the same database and in the Public Health England cancer registry. Using established statistical measures of performance, they show that the models are reasonably good at ranking individuals according to their survival and the predicted survival estimates closely match those observed in the study populations and other studies.

Compared to existing models, these new ones have a number of advantages(1,2). Firstly, existing models apply to patient sub-groups while these models are applicable to all patients. Secondly, the survival estimates can be updated conditional on the number of years survived since diagnosis, allowing patients and clinicians to obtain dynamic survival estimates annually up to 9 years after diagnosis. Thirdly, the models provide estimates for both all-cause mortality and colorectal cancer specific mortality.

The authors provide a web based calculator (http://qcancer.org/colorectal-survival/index.php) and suggest this could be used by patients and clinicians to inform discussions regarding cancer treatment and follow-up. Currently, discussions about treatment are based mainly on stage at diagnosis and trial evidence of effectiveness(3). Although other co-morbidities and overall performance status are taken into consideration, this is largely through subjective assessments. By providing more objective estimates of mortality risk from other causes alongside colorectal cancer specific mortality, these new models help put the risks from colorectal cancer into context for individual patients and so facilitate more individualised and informed discussions and decisions. For example, patients with a low risk of dying from colorectal cancer and a high risk of dying from other causes may be more inclined to decline aggressive treatments compared with those whose risk of death is predominantly due to colorectal cancer. The more accurate and longer term estimates of overall survival may also help with future planning and inform decisions around follow-up. A recent review(4) highlighted the on-going controversy around optimal surveillance protocols and suggested a need for risk models to enable personalised follow-up. Ideally such models would include additional risk factors known to influence recurrence rates, such as postoperative infection. However, being able to obtain dynamic survival estimates may facilitate such discussions.

Inevitably, however, there are limitations. The risk models were developed using observational data collected retrospectively from electronic patient records across England from 1998. The observed effects of treatment are therefore a reflection of both the effect of the treatment administered at the time and the characteristics of the individuals who were offered, and subsequently accepted, that treatment. The result is that, for example, surgery for colorectal cancer appears to decrease risk of death from non-colorectal cancer causes, presumably because surgery was undertaken on those with less co-morbidities, and chemotherapy appears to increase mortality in those with stage 1 or 2 disease which may reflect, among other things, the use of chemotherapy among patients with stage 2 disease and other poor prognostic indicators(5). Radiotherapy is also missing from the risk models as it did not reach statistical significance and all chemotherapy regimens are included together as a binary yes/no variable. Additionally, molecular features are increasingly used to classify tumours and guide response to adjuvant chemotherapy(6) and these are absent from the models. Finally, the models do not consider impact on morbidity and quality of life which influences treatment decisions.

The new models therefore cannot be relied on to accurately demonstrate to individual patients the effects on mortality of contemporary chemotherapy and surgery. Instead, clinicians should continue to apply estimates of treatment effects from trials, or decision aids designed for that purpose(7), to estimates of mortality derived from these new models. Patients would then see estimates of the absolute benefits of treatment in the context of their other co-morbidities. Used in this way, these models might enable more individualised discussions about prognosis both before treatment and in those who have completed treatment, and enhance the consent processes(8). Used incorrectly they may complicate an already difficult decision. As with all risk models, development and validation is only the first step in implementation(9) and research is now needed to assess the impact of these models in practice.

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Competing interests

We have read and understood the BMJ Group policy on declaration of interests and declare the following interests: None