

The implications of competing risks and direct treatment disutility in cardiovascular disease and osteoporotic fracture: risk prediction and cost effectiveness analysis

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Plain language summary

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Before offering a medicine to prevent disease, prescribers must expect it to do more good than harm. This balance depends on how likely it is that the person will develop the disease we want to prevent. But people might first die for other reasons. We call this a 'competing risk'. In most cases, the mathematical tools we use to estimate the chance of developing a disease do not account for competing risks. Another problem is that, when weighing up the benefits and harms of medicines, we ignore the hassle they cause patients, even when they do not cause side effects.

We used two examples: statins to prevent heart disease and bisphosphonates to prevent fractures. First, we assessed if existing tools get predictions wrong by not accounting for competing risks. We found that they exaggerate the chance of heart attacks and strokes. However, the exaggeration is greatest among people who would clearly benefit from preventative treatment. So it may not change treatment decisions much. The fracture prediction tool we studied was very inaccurate, exaggerating risk among older people, but underestimating risk among younger people. We made a new fracture risk prediction tool. It gave better predictions, but it was still inaccurate for people aged > 85 years and those with several health problems.

Next, we asked people questions designed to put a number on the hassle that statins and bisphosphonates cause. Most people thought that taking either is inconvenient, but the hassle factor for bisphosphonates is bigger.

Finally, we updated the mathematical models that the National Institute for Health and Care Excellence used when recommending statins and bisphosphonates. We worked out if competing risks and the hassle of taking medicines make a difference to results. Statins remain a good idea for almost everyone, unless they really hate the idea of taking them. But bisphosphonates would do more harm than good for anyone who agrees with the hassle factor we found.

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