

Commentary

Cardiac Computed Tomography is cost-effective compared with Exercise Stress Testing in investigating patients with stable chest pain

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Context

Computed Tomography coronary angiography (CTCA) is a non-invasive imaging technique used to detect coronary heart disease (CHD) in patients with stable chest pain of suspected cardiac origin. Exercise electrocardiography stress test (EST) use has previously been the choice of investigation of stable chest pain in Rapid Access Chest Pain Clinics (RACPC). However studies have shown that 30% of people attending RACPC are either unsuitable for EST or achieve non-diagnostic results.¹ Randomised control trials have shown cardiac CT of showing more significant disease identification and less inconclusive results when compared to EST.² This has led to NICE including cardiac CT in the diagnostic pathway for stable chest pain, and they have called for research on the cost-effectiveness of cardiac CT testing in the diagnosis of angina.

Methods

This trial based cost-utility analysis assessed the cost-effectiveness of using cardiac CT compared with EST. A total of 493 patients with stable chest pain were recruited from two RACPCs within one healthcare trust in Northern Ireland and were randomised to receive either cardiac CT or EST. Patients with significant renal dysfunction, a body mass index of >35, abnormal troponin levels and those with known CHD were excluded. The main outcome measure was cost per quality adjusted life year (QALY) gained at 1 year.

Findings

The study found that there was statistically significantly lower mean investigation costs over twelve months in the cardiac CT arm ((-£31.71 (95% CI -£52.58 to -£10.83)), with only 1.23% (n=3) requiring further investigation with a myocardial perfusion imaging (MPI) as opposed to 25.5% (n=60) of patients in the EST group. Marginally lower mean costs were observed in the cardiac CT arm for both GP services and hospital attendances however these results were not statistically significant. There was also no statistically significant difference in total health costs over 12 months between the two groups ((-£50.45(95% CI -£672.26 to -£571.36)).

Health-related quality of life (HrQoL) at baselines were similar between the two groups, with the HrQoL of the cardiac CT group being statistically significant higher at 12 months (0.02 ((95% CI -0.02 to 0.05))

At a willingness-to-pay threshold of £20 000 per QALY the probability of cardiac CT being cost-effective was 83%, however this value was found to 96% on sub-group analysis in patients with a likelihood of coronary artery disease (CAD) of <30%.

Commentary

This study is the first high-quality randomised trial that reports on the cost-effectiveness of cardiac CT in patients with stable chest pain. It shows that cardiac CT is both cost-effective and increases QALY at 1 year compared with EST.

Previous studies have either used simulation models or have been observational studies prone to multiple sources of bias. Limitation of this study include that it is a single centre study in the the United Kingdom and results may not be generalisable to other healthcare settings. It also excluded patients with a body mass index of >35 and the study had a low number of diabetic patients.

Implications for practice

Cardiac CT is cost-effective compared with EST in the investigation of stable chest pain, particularly in patients with lower likelihoods of CAD. Although cardiac CT is more expensive than EST the reduction in further investigation results in a non-statistically significant reduction in total costs in the cardiac CT arm.

Current Nice Guidelines on the management of patients with stable chest pain (CG95) recommends the use of cardiac CT in patients with a 10-29% likelihood of CAD, stress imaging in patients with a 30-60% likelihood of CAD, while recommending direct invasive coronary angiography in patients

with a 61%–90% likelihood of CAD. Results of subgroup analysis of this study supports these guidelines, with probability of cost-effectiveness of cardiac CT being highest in patients with <30% likelihood of CAD while being least effective in patients with a >60% likelihood of CAD. Results in the 30–60% group showed modest probability of cost-effectiveness. NICE now recommend EST use only in patients with established CAD.

Further studies will be required to analyse cost-effectiveness in the various CAD risk categories. Studies are also required to assess the cost-effectiveness of the stress imaging techniques such as Myocardial perfusion imaging which have been recognised as being clinically more effective than EST but more expensive than both EST and cardiac CT.

References

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2. McKavanagh P, Lusk L, Ball PA, et al . A comparison of cardiac computerized tomography and exercise stress electrocardiogram test for the investigation of stable chest pain: the clinical results of the CAPP randomized prospective trial. *Eur Heart J Cardiovasc Imaging* 2015;16:441–8