The Institute for Health and Care Excellence (NICE) published positive recommendations in 2012 for the use of new-generation Computed Tomography (CT) scanners for the diagnosis of coronary artery disease (CAD) in patients who are difficult to image or who are at a low pre-test probability of CAD (10-20%). Other, high-levels of coronary calcification, arrhythmia and history of stent implant are amongst key signs that may be difficult to image. This new generation of CT scanners have a variety of advantages, including better spatial and temporal resolution as well as shorter scan acquisition times. This gives the scanners higher specificity and sensitivity than previous generations.

A budget impact model was developed to demonstrate the financial implications of CAD, which is the most common cause of death in Western countries. It is also the commonest cause of heart failure and stroke. The most recent European guidelines recommend the use of non-invasive coronary angiography (ICA) in the diagnosis of CAD in low-risk patients who are difficult to image with earlier generation CT scanners. The proposed value of these new generation CT scanners is in the prevention of adverse events experienced by patients who undergo an ICA procedure, which reduces the cost to the healthcare system. Other advantages of diagnostic CT scans include reduced diagnostic procedure time and reduced pain and discomfort to patients. The model has been developed from the perspective of the UK National Health Service (NHS) and can be used in the context of individual Clinical Commissioning Groups (CCGs), or Rapid Access Chest Pain Clinics (RACPCs).

A budget impact model was developed, focusing on the key financial drivers in the diagnosis of coronary artery disease including new generation CT scanner acquisition costs, costs of CT scans and costs associated with ICA procedures, including complications. The model was given a 10 year time horizon as this is the average time taken to accrue an additional CT scan.

A local RACPC was contacted to determine likely number of patients who are suspected of having CAD attending a clinic each year. This was found to be 900. Low-risk patients, defined as patients with a 10-20% pre-test probability of a CAD diagnosis, account for 86% of the suspected CAD population and 77% in the local RACPC. Different results could be observed in larger hospitals or centres.

A feature was included in the model to judge the budget impact when a patient is suspected of having CAD.

In order to achieve a positive return on investment within 10 years, 53 patients would need to be referred to the RACPC each year. This provides a target for the RACPC to meet once the CT scanner has been implemented.

The budget impact model demonstrates the benefit of investing in new generation CT scanners, especially with savings coming from avoidance of ICA procedures and resources of patients from earlier generation CT scanners as an alternative to invasive coronary angiography (ICA) in the diagnosis of CAD in low-risk patients who are difficult to image with earlier generation CT scanners. As well as avoiding costs for the NHS, the avoidance of ICA procedures will reduce the number of patients who could potentially benefit from reduced mortality and reduced complications. The reduction in the number of ICA procedures will also potentially free up capacity in catheter labs for other procedures, allowing resources to be used more effectively.

In the representative RACPC, only 23 more diagnostic image examinations would be required to enter the new pathway each year to at least break even on the initial investment. In addition, new generation CT scanners would demonstrate improved sensitivity and specificity and will potentially benefit non-cardiac patients in the radiology department.

This tool provides an effective means of demonstrating the potential value of introducing new generation CT scanners to help inform investment decisions taken by RACPCs in regards to cardiac screening.

Results

The budget impact model demonstrates the benefit of investing in new generation CT scanners, especially with savings coming from avoidance of ICA procedures and resources of patients from earlier generation CT scanners as an alternative to invasive coronary angiography (ICA) in the diagnosis of CAD in low-risk patients who are difficult to image with earlier generation CT scanners. As well as avoiding costs for the NHS, the avoidance of ICA procedures will reduce the number of patients who could potentially benefit from reduced mortality and reduced complications. The reduction in the number of ICA procedures will also potentially free up capacity in catheter labs for other procedures, allowing resources to be used more effectively.

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Conclusions

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References


4. CT Scanner Costs

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References

