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Imaging Coronary Artery Disease: A Hospital Manager's Perspective

Authors:

Mathiys Goyen, Jorg F. Debatin

Title: University Medical Center Hamburg-Eppendorf

Email: GOYEN@UKE.UNI-HAMBURG.DE

Coronary artery disease (CAD) remains the leading cause of death in Western nations. To date, conventional coronary angiography (CA) remains the standard of reference for diagnosis of CAD. In 1999, more than 1.83 million CA examinations were performed in the United States alone. The strengths of CA relate to its unsurpassed spatial resolution and the option of guiding interventions such as balloon dilatation or coronary stent placement. However, over the past decade, both magnetic resonance angiography (MRA) and computed tomography angiography (CTA) have matured into reliable and accurate diagnostic tools.

Both cardiac MRA and CTA technology have rapidly become available in many medical centres throughout the world. While CT has been used for quite some time for determining risk of significant CAD in asymptomatic patients, using the non-invasive method of coronary calcium scoring, coronary artery imaging has moved into focus with the advent of 64-detector CT scanners. Combined with new visualisation software, this technology renders views of the coronary arteries that rival CA for spatial resolution and delineation. MRA, on the other hand, promises to offer coronary artery imaging without the need for iodinated contrast media. With MRI, the vision of a 'one-stop cardiovascular evaluation' that includes assessment of structural and coronary anatomy, myocardial function, viability, and perfusion, as well as assessment of the entire peripheral arterial vascular tree, has become reality.

The outlined technological developments harbour tremendous clinical and financial ramifications not only for patients and their physicians, but also for hospital managers and health care policy makers. CT and MRA will greatly reduce the need for invasive diagnostic CA thereby reducing cost for the individual patient and accelerating the trend towards assessing cardiovascular system on an out-patient basis. At the same time, the threshold for patients to undergo image-based assessment of their cardiovascular system will be lowered, resulting in more diagnostic procedures performed. These will result in the identification of more disease leading to more interventional procedures.

Furthermore, hospital managers are becoming keenly aware of the marketing potential associated with non-invasive diagnostic alternatives. As the internet is rendering the health-care market more and more transparent, patients are becoming more and more deliberate in their choice of health care provider. In this setting, the availability of non-invasive alternatives to CA represents a major marketing advantage increasing the attractiveness of the health care provider and translating directly into more patients. Hence every major cardiovascular centre will need to develop a non-invasive cardiovascular imaging program.

In doing so, hospital managers are confronted with two central issues: maintaining the technological edge in a dynamically moving field; and organising the human resources required to run such a programme.

Assuring 'State-of-the-Art' Equipment

Both 'state of the art' CT and MRI are expensive. Furthermore, the technology is rapidly evolving with equipment life cycles ranging between 2-4 years. In order to maintain flexibility without exorbitant capital cost, new payment models have been developed. Thus leasing and pay-per-use schemes are offered by equipment manufacturers. While leasing models have become quite commonplace, pay-per-use models are only recently gaining in popularity. By charging a fee only for exams actually performed, equipment manufacturers absorb a good portion of the investment risk. The fee levels depend on the number of exams performed. Thus fees will generally be decreased as the number of exams increase.

Both leasing and pay-per-use models can be enhanced by an 'evergreen' component that assures continuous cutting edge technology by means of continuous technological updates. For the health care provider, such a model assures continuous cutting edge technology. However, the health care provider is then bound to a single equipment manufacturer. In view of the very consolidated equipment market, the latter concerns do not weigh heavily.

Assuring 'State-of-the-Art' Human Resources

As in any rapidly evolving field, success in the clinical practice of cardiovascular imaging is dependent on the availability of well-trained staff. In the case of cardiovascular imaging, this requirement is not limited to physicians. Imaging technologists and technical personnel for fine-tuning of the very complex hard- and software components are essential. While technical support is frequently provided by equipment manufacturer as part of 'evergreen' contracts, technologists must be available at the imaging institution itself. Hospital managers must be aware of training capacity bottle necks and should begin planning for training as soon as a purchasing decision for new imaging equipment is made.

A more difficult problem relates to turf battles raging between radiology and cardiology. While radiologists are knowledgeable about imaging techniques, cardiologists are more familiar with cardiovascular physiology and pathophysiology. Hospital administrators are often left helpless in these rather unproductive turf battles. This type of in-fighting can paralyse any cardiovascular program as it often deters from the real clinical tasks at hand.

Solutions to this problem must first and foremost be based on the skill levels of the physicians involved. Patients expect expertise from the physician responsible for performing their cardiovascular scan. Radiologists need to familiarise themselves more in depth with cardiovascular disease processes while cardiologists need to learn about imaging techniques. Hospital administrators are well advised to open up both training avenues. Furthermore, hospital managers should attempt to implement shared responsibility models. Experience has shown that successful cardiovascular imaging programmes generally are run by mixed cardiology/radiology teams.

Teamwork is essential for realising the potential of a growing market.

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