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Cardiac Imaging

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Cardiovascular diseases account for 31 percent of deaths from all diseases globally and for almost 48 percent of non-communicable disease deaths. It is estimated that by 2030, there are likely to be around 23.6 million cardiovascular deaths.

It is considered to be extremely difficult to assess the burden/prevalence of cardiovascular diseases globally. An estimated 80 million adults suffer from cardiovascular disease in the US, which has the highest prevalence of cardiovascular diseases, closely followed by Germany and India. It is interesting to note that more than 60 percent of the coronary heart disease occurs in developing countries. Early diagnosis is as big a burden as treatment of these complex conditions, globally.

The volumes of diagnostic imaging procedures have increased a lot in the last decade, especially for cardiology applications. In the US, cardiovascular imaging accounts for nearly one-third of diagnostic imaging services and most of them include echocardiography and nuclear imaging. With improving reimbursement trends for most procedures, the diagnostic imaging market has been steadily increasing over the years.

Cardiology imaging diagnostic techniques can be broadly classified into **interventional cardiac imaging** - cardiac catheterisation or coronary angiogram and **non-invasive imaging** - cardiac magnetic resonance imaging (Cardiac MRI), cardiac computed tomography (Cardiac CT), electrocardiography, position emission tomography (PET)/ thallium or myocardial perfusion scan etc.

Interventional Cardiology

Catheterisation labs (Cath Labs) are considered to be at the heart of interventional cardiology procedures. It is estimated that in countries like the US, at least 35-40 percent of hospitals have these facilities, equipped with interventional cardiology equipment.

C-Arms have been a part of cardiac imaging sector for a long time now. The growth in minimally invasive surgical procedures and the increasing burden of the cardiovascular disease population have supported higher adoption of these products.

In developed countries that account for the higher volume of cardiac imaging procedures conducted globally, noninvasive cardiac imaging procedures have increased adoption, thus impacting the diagnostic interventional procedure volumes negatively. The shift to non-invasive imaging is largely driven by the inconvenience caused by invasive imaging such as hospitalisation, insertion of catheters and a higher economic burden. Hence the newer installations of C-arms have declined steadily and installations are largely replacementdriven in this segment.

The market for C-arms was estimated to be worth around \$7.3 billion globally in 2011.

Cardiac CT

This is one of the biggest revenue generators in the cardiac imaging segment globally.

The main reason for higher preference for CT is that its image acquisition optimisation strategies allow clinicians to assess blood vessels with the same efficiency as coronary angiography, non-invasively and almost instantaneously. The most widely known application of cardiac CT is estimation of coronary artery score, which is the main indicator of coronary artery disease.

Advances in cardiac CT have brought its use in clinical routine to unprecedented levels.

The 64 slice CT is considered the gold standard in the world of CT. The last 10 years has witnessed escalating numbers of slices to dose reduction in CT scanners. These have greatly acted as drivers to upgrade or replace existing CT scanners. Cardiac CT is one of the fastest growing segments in the CT market, in terms of volume of the procedures conducted.

Three-dimensional Cardiac CT is a revolutionary new method for evaluating heart conditions non-invasively. Prior to the development of this technology, only an invasive and expensive cardiac catheterisation could show this level of detail.

With the introduction of these 3D models, there has been a decline in invasive imaging procedure volumes. This technology has enabled long-term diagnosis and treatment without disrupting the whole body's functionality.

The market for Cardiac CT was estimated to be worth around \$2.5 billion globally in 2011.

Cardiac MRI

Cardiac MRI is one of the growing segments in cardiac imaging. This market is driven by technological advancements. It offers high contrast resolution in any oblique plane along the cardiac axes with temporal and spatial resolutions. The technique allows estimation of left and right ventricular size and function. The technique is considered to be a standard in evaluating myocardial infarction and cardiac ischaemia. The main reasoning for sparse usage of MRI than other modalities such as CT is the long scan time needed to get the same or similar clinical information. In emergency situations, where results are needed quickly, the use of MRI does not serve this purpose.

Clinical studies have proved that 1.5T is effective in detecting myocardial function and perfusion. The 3T system offers better quality machine hardware, pulse sequence design and image reconstruction. Thus, these technologically advanced systems are fuelling the replacement of the low strength MR systems.

The market for Cardiac MRI was estimated to be worth around \$1 billion globally in 2011.

Conclusion

The cardiac imaging market has been slowly transitioning from invasive to non-invasive techniques over the years. The choice of modality used is largely influenced by the cardiologist/ radiologist's preference, and, interestingly, the pattern of preference for a particular modality varies across regions. The cardiologists' community has moved away from conducting multiple diagnostic imaging tests to diagnose a particular condition. Recent research indicates that preference is for using fewer types of scans.

The lack of guidelines linking technique to be used for a given ailment has been a drawback in the cardiac imaging space. Hence with sufficient clinical data, one of these (Cardiac CT and Cardiac MRI) technologies could become the gold standard of imaging in the future.

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