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### PACS in the Cardiology Department: Report on Market Developments

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Managing cross-departmental communications in a healthcare setting has been greatly improved by the emergence of picture archiving and communications systems (PACS) as a vital supporting infrastructure, with specialists in healthcare departments like orthopaedics, neurology, oncology, histology and cardiology improving their communication and therefore patient wellbeing. The integration of all clinical specialties' images within an enterprise-wide PACS will take some more time in a majority of European and APAC practices in order to catch up to an already growing US market, issues which we will explore further here.

#### Cardiology Second-Largest PACS Revenue Source

The cardiology department is the largest producer of images, clinical and administrative information and data, which makes it the greatest PACS revenue source outside of radiology. These results essentially rolled out to the creation of dedicated cardiology PACS systems and solutions that include PACS hardware, workstations, archiving in either VHS/DVD storage, or the more advanced SAN application with networking. Some of the other features of these systems are post-processing, analytical tools, clinical reporting, administrative modules for scheduling, patient/material management, billing, and order management.

While there are similarities between a radiology and cardiology PACS, there are also significant differences. The similarities originate in an overlap in the support requirements and infrastructure of the two PACS. In fact, the potential to share core infrastructure such as networking, archiving, digital imaging and communications in medicine (DICOM) standardisation and, to a lesser extent, front-end equipment such as workstations and modality interfaces, has considerably facilitated the adoption of cardiology modules by PACS-literate hospitals. But with the improvement in the technology, a distinction is also emerging in cardiology between the levels of sophistication of workstations with diagnostic clinicians enjoying higher resolution displays and using more exhaustive software options, encompassed within more powerful workstations.

#### Challenges in Handling Cardiology Data

The other advantage with cardiology PACS is that it can share storage area networks (SAN), which helps in routing through other networks for viewing by cardiovascular surgeons or referring physicians over the hospital's web browser. This integration is certainly a challenge in such a complex and interoperability- dependent environment. The dynamic nature of cardiac images makes it difficult to have sufficient bandwidth to handle cardiology data. Cardiology has unique requirements; these needs come in the form of capturing sound, certain cardiac measurements, and structured cardiac catheter laboratory (cath-lab) and echocardiography laboratory reporting. Cath-lab and echo are the chief modalities that are connected to a cardiology PACS.

Outside of these two main modalities, cardiac magnetic resonance imaging (MRI) and cardiac computer tomography (CT) are gaining rapid popularity from a low base. Cardiology PACS uses information produced by these modalities, by performing intermediate and final reporting, with capabilities for dealing with blood level and haemodynamic data, as well as analytical tools for measuring stenosis. On the administrative side, cardiology PACS handles disparate tasks like order management, patient and materials management, and scheduling. These functionalities can be accomplished by integration of cardiology information system (CIS), which brings autonomy in the hospital set-up and increases mobility of cardiologists.

This is the reason why 99% of cardiology PACS sales are accompanied by CIS sales. These systems offer workstations that can link these disparate modalities in a single location. The technical conundrum of linking all these demands in one box, and making that box function intuitively, is exacerbated by the fact that cardiology workflow is completely heterogeneous.

#### Cardiology PACS Market Affected by Economic Factors

The market for cardiology PACS is affected by both micro- and macro-economic factors. Technology is expected to exert a great influence on the state of this market, as the level of investment needed by end users to acquire cardiology PACS decreases, while the number options opens to them increases. Advances in connectivity standardisation form the bedrock of this technological progression, as these available solutions will continue to be problematic to interface.

Some of the factors helping market growth for cardiology PACS are the high incidence of cardiovascular disease, which encourages the need for better management of cardiac examinations and information, and the increasing benefits of PACS, which encourages hospital investments in IT solutions for cardiology. The other factors driving the market is the increase in adoption rates of DICOM with development of cardiology-specific tools.

#### Pricing and Implementation Times a Negative Factor

These associated emerging advantages help enterprise-wide PACS to grow and bring greater workflow efficiency. The issues that impact market growth negatively at the moment are pricing factors and implementation times. In a typical situation, the cost of cardiology PACS installations goes up due to certain mandates like revamp of existing legacy systems, infrastructural costs and the reliability of the vendors, given the large outlay of capital involved. This increases the decision-making time and delays sales of these systems. Financing and leasing options, training and ongoing support services represent other key factors that the end-user seeks in the package.

#### US Market More Advanced than Europe

There is a vast difference between the rate of cardiology PACS adoption in the US and Europe. The US market is much more advanced, as the demand for these procedures is increasing due to increasing cardiac examination requirements. The cardiology PACS market in the US is

around three years behind radiology PACS, but in Europe there is a gap of nearly a decade. However, the number of single lab installations in Europe is higher when compared to the US market. The US market prefers engaging in multi-lab installations and enterprise PACS as advanced storage solutions, IT architecture, and multimodality integration helps in a holistic integration of the hospital's IT systems. The pricing difference between these variants also makes a lot of difference. The complete enterprise can easily cost from 550,000 – 650,000 dollars.

More and more end-users in the European market are becoming convinced by the increasing advantages of having a fully-fledged and comprehensive solution for cardiology as well as at an enterprise level for better long-term costs and profitability. The cardiology PACS market in future will be more integrated into the EMR and this trend is causing a growing demand by cardiologists to be able to make notations directly to the patient's EMR.

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