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Mobile Medical Imaging



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Mobile medical imaging technologies are consistently changing the healthcare landscape. With ageing societies and increasing disease incidence on the one hand, and efforts towards cutting down healthcare expenditure and shortage of practitioners on the other, mobile medical imaging solutions are gaining momentum. This is especially because a large proportion of the installed base is already digital, and picture archiving and communications systems (PACS) are becoming routinely implemented and used.

The last bastion of non-digital radiography, analogue X-ray, is slowly becoming extinct, not only because of increasing variable costs (related to silver price increases), but also due to dissatisfying image quality.

There are two aspects of mobile medical imaging that need to be considered. The first is performing diagnostic procedures with mobile imaging units, the second mobile viewing of acquired images.

Benefits of Mobile Imaging

Mobile diagnostic imaging devices offer significant benefits to stakeholders: increased efficiency of healthcare services provision, better accessibility to healthcare and faster reaction time combined with their (usually) lower price. Not surprisingly, vendors are effortlessly launching new versions and types of mobile diagnostic imaging devices.

All major market participants offer mobile diagnostic imaging devices. Virtually every imaging modality, whether it is ultrasound, X-ray, MRI, CT or PET, has its mobile version. These devices are valuable in emergency rooms, as they permit immediate examinations without the necessity to move the patient and therefore allow for significant time saving, which in these cases is crucial. They bring benefits in smaller hospitals with lower throughput and are invaluable in intensive care units.

Some modalities such as ultrasound or X-ray also have portable versions, which are usually cheaper than their stationary counterparts. Portable units were initially developed with the idea to cater for patients in developing countries with limited access to healthcare services. They also gained popularity in the developed world, primarily for domiciliary use, as they allow for greater flexibility of the physician, due to their compact size and light weight, as well as the fact that they can be used in multiple locations.

Portable units are also a good solution for hospitals or clinics in sparsely populated areas, where the demand for specific type of scans (ultrasonic, X-ray) is low, and therefore there is no economic justification for having the machine permanently sited there.

The quality of mobile and portable diagnostic imaging units is drastically improving. Image resolution, decreasing size, lower weight and better connectivity are just some of the key areas where significant improvements are being observed.

Mobile Image Viewing

Progress made in the area of communication protocols, devices, and archiving systems has enabled image exchange and mobile viewing of diagnostic images. This has been made even easier by employing vendor-neutral archives (VNAs) and standardised archives, which are independent from PACS and enable storing data in interchange formats.

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In this way data obtained from diagnostic imaging units of different brands can be stored and shared between users. Today, practitioners can view the images mostly within the PACS environment. However, vendors of PACS systems are taking efforts to enable the use of tablets and smartphones (non-PACS agents) for viewing diagnostic images. This solution would allow for viewing the same image simultaneously in different locations, which can be a tremendous help in diagnosing a patient and providing them with therapy in a timely manner.

The quality of images viewed on mobile devices is usually still slightly lower than what can be seen at a stationary unit. Therefore doubts and concerns about the clinical value added offered by mobile devices are arising among some of the end users.

However, there are multiple situations when the advantage of immediate viewing outweighs the image resolution. This is an unprecedented advantage for example in emergency care or emergency situations, when a radiologist is not available at the venue, but their opinion is urgently needed for further diagnosis and therapy.

The speed at which the diagnostic image can be obtained is also crucial, not only for the radiologist's convenience but also for the time of reaction. The best answer to this challenge would be cloud-based data, of course properly protected. Even though the vision of secure accessing of cloud-based data to view medical images at diagnostic quality with a mobile device still seems slightly distant, progress is visible and hopes are high.

Early in 2011 the United States Food and Drug Administration approved a mobile radiology viewer and a smartphone ultrasound probe. The reaction of the market was immediate. Later in 2011, AT&T started offering cloud-based mobile access to medical images, which allows for storing, accessing, viewing and sharing medical images both within and outside a medical facility. At the end of 2011 GE launched Access 2.0, a mobile imaging diagnostics platform, enabling reviewing images on mobile devices with Apple iOS and Android 2.2 and above.

Data protection itself is a great challenge which developers of mobile medical imaging need to face. Confidentiality of data in healthcare is a very sensitive topic and there are a number of security concerns that need to be acknowledged, including strategies for safe accessing, storage and transmission of data.

Current status of development of mobile medical imaging is just the tip of the iceberg of what is actually possible. Focus on portability, decreasing the size and weight of devices, coupled with possibilities of modern information technology and development of tele-medicine is bound to bring changes, which all stakeholders, patients, practitioners and payers, will benefit from. There are obviously a few conditions that need to be met in order to make it happen: data needs to be secure, prices need to be affordable and most importantly, stakeholders need to be willing to let the mobile revolution happen.

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