Implementation of PACS system in Diagnostic Imaging department – Towards an electronic future in x-ray imaging

Introduction

Radiology is a field of medicine which uses radiologic technologies for the diagnosis and treatment of human diseases. It covers nuclear radiology, computed tomography, diagnostic ultrasound, magnetic resonance, interventional procedures, and mammography. Of these, x-rays are the most familiar and fairly commonly used for various diagnostic imaging procedures (AAMC, 2015). They are a form of electromagnetic radiation that are used to create black and white pictures of the internal organs of a human body. This is based on the principle that different tissues in the body absorb different amounts of radiation and appear different shades of gray on an x-ray film (MedlinePlus, 2013).

PACS (Picture Archiving and Communication System) is an innovation in the field of radiology which aims to replace the conventional radiologic films by computerized image acquisition, storage, transmission, and digital display of data. The efficiency of handling PACS data is immense in terms of ease and convenience of use and there is absolutely no chance of misplacement or loss of data. Although currently there are only a few hospitals and clinics that have adopted this system, its popularity is on the rise and it is slowly becoming a preferred form of x-ray data acquisition (Strickland, 2000).

Rationale for the project

As a leader of the Radiology Department, the main problems faced in using x-rays can become quite frustrating when handling large amounts of data. According to recent statistics, at least 20% of x-ray films are missing when they are required for emergency diagnosis and

treatment (Brady et al, 2012). This means that the patient needs to go through the procedure again leading to a waste of time and resources and re-exposure of the patient to electromagnetic radiation. Also, often technicians need to search for a particular x-ray film among thousands of others leading to a waste of precious time (Strickland, 2000).

Another problem with conventional x-ray films is that it does not facilitate viewing and carrying out discussions at multiple locations due to spatial limitations. Hence, two doctors or radiologists in two different departments or facilities cannot simultaneously analyze a film and come to a conclusion. Also, it takes time for a film to become available to the patient and the referring doctor, again leading to a waste of time in emergencies. Organizing and arranging all x-ray films of a particular patient chronologically and doing this for all patients requires a lot of human labor and has a high chance of error. Once a radiologic image is acquired, it cannot be manipulated to provide differences in contrast or angle of viewing. Hence, in order to give a more in-depth analysis, the image would need to be acquired again (Strickland, 2000).

Due to all the above mentioned limitations of a conventional x-ray film, as a leader of the radiology department, it would be wise to initiate the installation and use of PACS for data acquisition and storage. Some of the many advantages of PACS are listed below:

- It is a filmless system for digital storage of x-ray images that allows a doctor or clinician to view the images on a monitor screen (Paskins and Rai, 2006).
- Images can be easily and quickly retrieved for analysis and comparison with older x-ray films is made convenient (Paskins and Rai, 2006).
- Images can be manipulated to provide greater contrast, magnify a particular region by zooming in, and view the image from different angles (Paskins and Rai, 2006).

- It does away with the issues of films being misplaced or lost as the images can be easily retrieved electronically (Paskins and Rai, 2006).
- It provides opportunities for saving money in the long run by eliminating storage costs of films and related resources, and a large amount of data as hard copy (Loux et al, 2008).
- Hospitals located in remote and rural areas where the availability of radiologists is scarce can, with the help of PACS, have their images viewed and analyzed by radiologists and doctors in another facility (Loux et al, 2008).

As we are living in times where costs of healthcare are going beyond the budget, it is quite necessary to look for ways to try and reduce expenses within the hospital. Installation of a PACS system in diagnostic imaging department will ensure that there is no longer a need to buy expensive silver-based films and associated materials for x-ray film development. It will also ensure saving in terms of storage space and human labor charges due to electronic storage and handling of data (Becker and Arenson, 1994).

Therefore, keeping in mind all the advantages of PACS over conventional x-ray films, it is worth considering its inclusion in the hospital setting to ensure ease of use, proper storage and retrieval of data, and significant cost savings in the future.

References

AAMC, 2015. *Radiology-Diagnostic*. [online] Available at: < https://www.aamc.org/cim/specialty/list/us/336872/radiology-diagnostic.html> [Accessed 18 February 2016].

Becker, S. H., & Arenson, R. L., 1994. Costs and benefits of Picture Archiving and Communication Systems. *The Practice of Informatics*, 1 (5), pp. 361-371.

Brady, A., O' Laoide, R., McCarthy, P., & McDermott, R., 2012. Discrepancy and error in radiology: Concepts, causes and consequences. *Ulster Medical Journal*, 81 (1), pp. 3-9.

Loux, S., Coleman, R., Ralston, M. and Coburn, A., 2008. Consolidated imaging: Implementing a Regional Health Information Exchange System for Radiology in Southern Maine. In: K. Henriksen, J. B. Battles, and M. A. Keyes, eds. 2008. *Advances in patient safety: New directions and alternative approaches*. Rockville: Agency for Healthcare Research and Quality (US).

MedlinePlus, 2013. *X-rays*. [online]. Available at: < https://www.nlm.nih.gov/medlineplus/xrays.html> [Accessed 18 February 2016].

Paskins, Z., & Rai, A., 2006. The impact of Picture Archiving and Communication Systems (PACS) implementation in rheumatology. *Rheumatology*, 45, pp. 354-355.

Strickland, N. H., 2000. PACS (Picture Archiving and Communication Systems): filmless radiology. *Archives of Disease in Childhood*, 83, pp. 82-86.