Integrating Clinical Endoscopic Images into Electronic Patient Record - Pathway to Clinical and Technical Success

JKY Chan[a], WN Wong[a], J Tan[a], WWT Chan[b], KKH Tsang[b], AWM Cheung[b], NT Cheung[a]

[a] *Health Informatics, Head Office, Hong Kong Hospital Authority, HKSAR*
[b] *Information Technology, Hong Kong Hospital Authority, HKSAR*

Abstract and Objective

This paper described a new function for capturing and sharing of non Digital Imaging and Communications in Medicine (DICOM) clinical images in a regional scale Clinical Management System (CMS) and Electronic Patient Record (ePR). Non DICOM Clinical images and photos were valuable clinical information supporting clinical decision-making and communication. Huge amount of clinical photos were taken using various modalities in clinical practices without effective capturing and sharing. A generic way of identifying patients, capturing and archiving images, sharing on a common platform and integrating into a longitudinal multimedia-enabled electronic patient record is therefore essential and of great value. The architectural framework and workflow integration of image capturing and sharing were designed and piloted for endoscopy image. Post implementation review on user feedback and system usefulness was done. Utilization rate, system performance and clinician feedback were encouraging. With the successful pilot, further roll out of the endoscopy image capture function was planned after enhancement of system performance.

Keywords:

Endoscopy, DICOM, Electronic patient record

Methods

A clinical image capturing and sharing service were designed and implemented for endoscopic images in an endoscopy unit in a regional hospital in the Hong Kong Hospital Authority since January 09. The image capturing service was a .NET window application using Microsoft .Net Framework 2.0, LEADTOOLS imaging SDK, Java EE stateless session beans and on Oracle Application Server 10g Release 3 Version 10.1.3.3. The system performance, utilization rate and security issues were evaluated. Comprehensive system performance and loading tests were conducted for assessing feasibility and readiness for further roll out to other endoscopy units. User survey for clinician feedback was conducted to evaluate various aspects of the system functions.

Results

There were 2,039 image-embedded endoscopy records created since January 09. Nearly 100% of utilization with good user feedback was noted. An average of 3,000 views of image-embedded endoscopy record throughout 43 hospitals was noted per month. Feedback was collected for further enhancements in user interface design and functionality. To support a large-scale roll out, technical teams investigated various performance bottle-neck issues. Database schema was redesigned for better record creation and retrieval. A comprehensive system review and load test were done for ensuring system scalability given significant increase of user concurrency for further roll out. Huge data tables were normalized and partitioned. Single point of failure was removed to improve reliability. The system was re-developed under Java architecture to enhance scalability. An average 60% (from 5.1 seconds to 2.0 seconds) gain in system response time was achieved.

Conclusion

Clinical endoscopy image sharing was a welcomed and successful clinical function. By integration of images into the electronic patient record, better communication and patient care could be achieved. User feedback review was important for ensuring clinical acceptance and benefits. Technical challenges could be overcome with careful system design and continuous evaluation for further rollout.

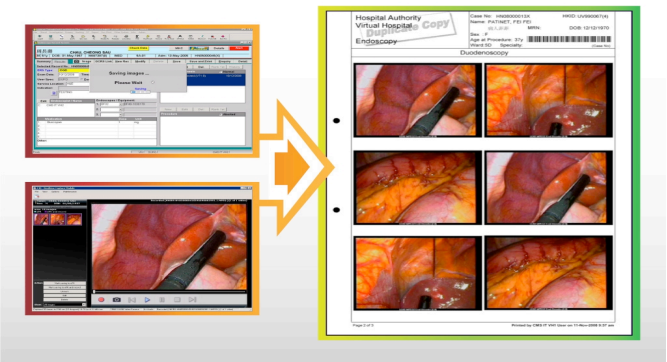

Figure 1-Image integration into ePR