

A Study on DICOM Standardization of Monitoring Equipment for Medical Surgery

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Abstract. DICOM(Digital Imaging and Communications in Medicine) which is standard of PACS(Picture Archiving Communication System) is set up as draft international standard for the purpose of collection and exchange the data and image among main medical display equipments. Currently most of latest medical display equipments(CT, MR, DSA, CR(Computed Radiology, etc) support the image as DICOM standard form. These medical display equipments is normally utilized as connected feature with surgery monitoring devices like endoscope, X-lay camera.

Keywords: PACS, HIS, DICOM, HL7

1 Introduction

Currently most of latest medical image systems support the image by the international standard methodology. Many hospitals introduce PACS for getting the new type of image as standard DICOM grow up continuously. These days, PACS support the connection with DICOM, for example, these PACS can connect digital image devices like DR, CR using at surgery, internal medicine, and checkup section.[1]

Especially in case of surgery, various type of medical surgery monitoring devices like endoscope, ophthalmoscope, X-ray camera are utilized as the form of connection with existing PACS.

But, as yet, these medical surgery monitoring devices do not follow the standard format of HL 7, DICOM which are standard medical information, so it can't support interconnection among medical surgery monitoring devices and patient data like archiving and managing image which are required in hospital information system.

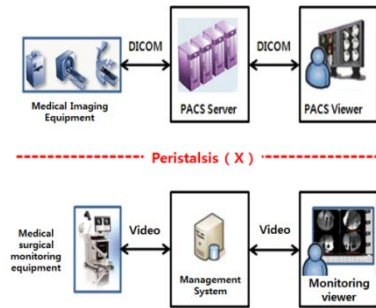


Fig. 1. The problem with the existing system

2 Main subject

2.1. Configuration of system

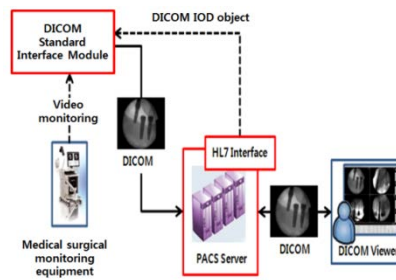


Fig.2. System Architecture

We designed and implemented core function module for the PACS application of medical surgery monitoring devices. As shown in Figure 2, we constructed standard communication using HL7 and DICOM among DICOM standard interface which operate as software module in medical surgery monitoring devices and HIS(Hospital Information System) interface in PACS.[4]

2.2. System design and implementation

DICOM standard is comprised as a type of pair. They are “Information Object Definition (IOD)” which is visual information for storage and communication, and the other one is DICOM Message Service Element (DIMSE) which is command language.

IDO includes text data and visual data related with decoding depending upon the regulation of visual information.



Fig.3. Dental implant surgery monitoring device (DreamRay 60F)

Visual data is acquired from medical visual devices and text data is from HIS (Hospital Information System).[9]

HIS system in PCS is required for the connection with DICOM data. Thus, we implemented HIS interface which can process HL7 message for the creation of object "DICOM IOD".

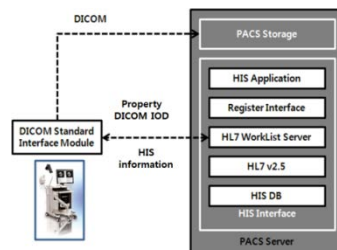


Fig.4. HL7 Interface module

HIS Interface deal with HL7 message which perform creation of DICOM IOD object, connection with PACS. It targets HIS fulfilled HL7 standard. We constructed database for the new patient's registration, treatment, inspection record using HL7 message and HIS information. Figure 4 is the software module structure of HL7

Interface. It is composed of simple application for worklist-server and testing based on HL7 2.5 message model. However it does not include service function (hospitalization, discharging hospital, treatment) of patients.

3 Conclusion

We suggested the conversion methodology from surgery monitoring visual data that is non-DICOM format to standard DICOM for the efficient PACS connection among various type of medical video systems and surgery monitoring devices.

Standard DICOM interface module suggested in this thesis creates DICOM IOD information class according to the checkup information received by HIS and also creates standard DICOM format after blending with surgery monitoring data.

Thus there's no need to construct extra management system and it makes possible to connect with HIS. i.e., store and manage the hospital patient's information.

For the more, it can reduce system management cost as the method of PACS connection in hospital, and we expect the medical surgery including decode could be more efficient as surgery monitoring and medical video devices are operating on same place.

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