A successful quality assurance program requires four steps: acceptance testing, development of performance standards, diagnosis of performance problems, and verification of corrective action. Medical physicists are familiar with these concepts for image acquisition devices, but these steps also apply to data storage, retrieval, transmission and display in PACS. In this lecture, these concepts will be explored in detail, covering both the design and operation of a PACS.

In designing a PACS, the requirements for redundancy, uptime, fault and failure tolerance, timeliness and appropriateness of service, and their implications on overall system operation must be considered for each component in the system. System designs that are dependent upon single points of failure should be avoided. Such failures can be anticipated by examining the flow of data in a PACS/HIS/RIS environment and determining which hardware and software components are used in each step from admission of patients to the facility until study completion or patient discharge. In the event of failure, contingency plans must exist to allow studies to continue to be produced and read.

Once a system is installed, one must design and use metrics by which to measure performance. In the operation of a PACS, one ultimately wants to deliver a digital study to a physician's review workstation, present that study in the correct layout, orientation, window/level, etc. with the correct demographics, necessary supporting studies and old reports, all with the minimum amount of interaction by the radiologist or other personnel. Each time the PACS fails in one of these tasks the radiologist will be required to take time away from reading images to make corrections. While most often this is only an annoying and inconvenient matter for the radiologist, more serious issues arise when for example the demographics are incorrect or the display is suboptimal, hiding subtle pathology. Both the PACS and the institution must have policies and procedures for dealing with such instances, including the interpretation of the performance metrics. Examples of such metrics will be provided.

Ultimately, it has been our experience that PACS can reduce the workload of x-ray technologists and fileroom personnel by automating the more mundane aspects of their jobs. Film printing, for example, is unnecessary if softcopy review is used. The result is an increase in patient throughput. Unfortunately, facilities do not usually allocate workstations for technologist's preparation and review of the electronic study record. The result is that when errors occur, the radiologist is the one who must respond. This is an inefficient use of radiologist's time. Thus, measures, either electronic or procedural, must be instituted which correct or circumvent as many errors as possible. In designing, purchasing, and operating a PACS one must forever be vigilant of how the PACS will integrate into the department's operation, and ensure the PACS conforms to the methods by which the department operates, rather than the converse.

Educational Objectives:

1) Develop acceptance testing and operating performance standards

2) Develop a QA program for PACS.
3) Develop a policy and procedure manual for PACS