A complete and successful quality assurance program requires four major steps: acceptance testing, development of baseline performance standards, diagnosis of performance problems, and verification of corrective action. Although we are familiar with these concepts as medical physicists, new standards apply in PACS and teleradiology. In this lecture, each of these steps will be discussed.

In designing a PACS, the requirements for redundancy, uptime, fault and failure tolerance, timeliness of service, and their implications on overall system operation must be considered for each component in the system. System designs which are dependent upon single points of failure should be avoided. A common example in PACS is the use of a dedicated database server. The simplest method of anticipating such failures is to examine the flow of data in a PACS/HIS/RIS environment and determine which hardware components are used in each step from admission of patients to the facility, to reading of the study, and finally study completion or patient discharge. It is advisable to have contingency plans for producing and reading studies when equipment failures occur.

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.

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 being used. The result is an increase in patient throughput. Unfortunately, facilities do not usually allocate workstations for technologist's review and preparation 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 whether the PACS design is sufficient robust and flexible to allow it to conform to the methods by which the department operates, rather than the converse.

Educational Objectives:

- 1) Develop a QA program for PACS.
- 2) Develop acceptance testing and operating performance standards
- 3) Develop a fault tolerant PACS

4) Develop a policy and procedure manual for PACS