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### Quality Management in Radiology: Defining the Parameters

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Radiologists may find the terms of quality control (QC), quality assurance (QA) and continuous quality improvement (CQI) confusing. In short, in radiology, QC involves regular, intermittent technical testing of medical equipment and evaluation of image quality to ensure conformity to the regulations.

Quality control establishes ranges of acceptability for very specific measurements or data points, and only when a measurement falls outside a QC tolerance, is an action taken. Any data point inside the established tolerance is deemed acceptable. Quality control typically deals with issues such as acceptance testing and preventive maintenance of imaging equipment, the evaluation of shielding around x-ray facilities; and measurement of processing parameters like developer temperature, developer pH, base and fog, speed, and contrast.

Quality Assurance (QA) uses the systematic collection and evaluation of data to ensure excellence in healthcare. QA involves QC. QA focuses on specific indicators believed to affect the quality of services. These indicators are usually related to structure, process, or outcome. They may include repeat rate, pathology correlation, appropriateness of utilisation, availability of old films, and the timeliness of scheduling.

Through quality assurance, it becomes possible to make decisions about the clinical and operational functioning of the clinical imaging practice. In fact, because hospital accreditation programmes in healthcare in particular have emphasised the quality assurance concept, its primary objective is to enhance patient care.

Continuous Quality Improvement (CQI) is more a holistic philosophy than a strict operational methodology for improving the quality of a process. CQI attempts to combine professional knowledge with knowledge about making improvements. In essence, CQI is a philosophy of the continuous improvement of the processes associated with providing goods or services that meet or even exceed customer expectations.

In radiology, CQI dictates that every activity in an imaging facility be identified, and that clear standards (indicators) be set and measured to allow processes to be continuously improved. It is assumed that the resources devoted to this aim will yield a more efficient operation, thus saving money and increasing the quality of healthcare service provided. Quality assurance is a reactive approach. CQI attempts to anticipate problems and to improve the way a system functions.

#### Continuous Quality Improvement: How Does it Work?

CQI follows a straightforward process called the Deming or Shewhart cycle. The whole process is dependent both on data collected through

observation and statistical analyses.

- During the first stage of cycle, the quality department identifies a problematic functional work system, for example patient scheduling, equipment performance, image interpretation or report distribution. Once the department has identified an opportunity for improvement, a work is selected.
- The second stage of the process involves making observations, initiating tests, and selecting a course of action to make changes to improve the system being studied.
- In the third stage of the cycle, the team observes the effects of changes made to the system. It includes monitoring and feedback functions and uses some of the same means to identify the problem or opportunity for improvement at the beginning of CQI process.
- The fourth stage asks the question: "What did we learn?" The entire cycle is repeated continuously to fine-tune changes and explore the possibility of additional improvements.

One of the most important keys to a successful CQI programme is a critical process called "empowerment", which necessitates strong leadership. Empowerment involves the transfer of authority and responsibility from the department manager to front-line supervisory personnel of the improvement team.

## Quality Management Models

Healthcare institutions and radiology departments use a variety of CQI systems or models, including the models of:

- the Joint Commission on Accreditation of Healthcare Organisations;
- the Six Sigma Model;
- the Model for Business Excellence of the European

Foundation for Quality Management (EFQM); and,

- the International Organisation for Standardisation (ISO) 9000, which creates a suitable organisational environment for the implementation of a CQI system.

## Key Performance Indicators for Academic Radiology

Quality generally consists of two related but distinct components: technical or outcome quality and service delivery as perceived by the customer. Technical quality is measured in terms of how well the service is performed. Competence and expertise are major determinants of technical quality.

In radiology, a product of "good" technical quality is accurate diagnostic information obtained at the lowest possible exposure to all hazardous factors and at a minimal, realistic cost. Repeat exposures due to poor image quality, for example, by increasing patient risk and cost, lower the quality of the product.

Adverse reactions due to contrast material are also considered in this context. In radiology, regular monitoring of technical quality indicators such as repeat rate, pathology correlation, and frequency of adverse reactions is commonplace.

The second component of quality, measured in terms of service delivery as perceived by the customer, is sometimes referred to as delivery quality and differs from technical quality by also including the subjective experience of the customer with the product.

In radiology, customers are not only patients but are also referring physicians and employees of the department, and their satisfaction is based on impressions formed at all points of contact with the institution.

In particular, because patients lack the knowledge to assess technical quality, typically their quality judgment is based entirely on their subjective experiences throughout the process, necessitating the measurement and assurance of both quality components in a radiology department.

According to a survey of the members of the Society of Chairmen of Academic Radiology Departments (SCARD) in the US, the three main categories of quality management performance indicators used are: customer satisfaction, patient access to appointments and reporting time. See the attached table (Fig. 1) to review the most common indicators in each category.

(Fig. 1) Contingency Counts and Relative Frequencies of Use of Indicators of Delivery Quality by Academic Radiology Departments in the United States.

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