Improving Procedure Start Times and Decreasing Delays in Interventional Radiology:

A Department's Quality Improvement Initiative

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Abbreviations

IR
interventional radiology

NIR
neurointerventional

QA
quality assurance

CQI or, in short, QI
continuous quality
improvement

PPCA
preprocedure/postprocedure
care area

Rationale and Objectives: To identify and reduce reasons for delays in procedure start times, particularly the first cases of the day, within the interventional radiology (IR) divisions of the Department of Radiology using principles of continuous quality improvement.

Materials and Methods: An interdisciplinary team representative of the IR and preprocedure/postprocedure care area (PPCA) health care personnel, managers, and data analysts was formed. A standardized form was used to document both inpatient and outpatient progress through the PPCA and IR workflow in six rooms and to document reasons for delays. Data generated were used to identify key problems areas, implement improvement interventions, and monitor their effects. Project duration was 6 months.

Results: The average number of on-time starts for the first case of the day increased from 23% to 56% (*P* value < .01). The average number of on-time, scheduled outpatients increased from 30% to 45% (*P* value < .01). Patient wait time to arrive at treatment room once they were ready for their procedure was reduced on average by 10 minutes (*P* value < .01). Patient care delay duration per 100 patients was reduced from 30.3 to 21.6 hours (29% reduction). Number of patient care delays per 100 patients was reduced from 46.6 to 40.1 (17% reduction). Top reasons for delay included waiting for consent (26% of delays duration) and laboratory tests (12%).

Conclusions: Many complex factors contribute to procedure start time delays within an IR practice. A data-driven and patient-centered, interdisciplinary team approach was effective in reducing delays in IR.

Key Words: Quality improvement; process improvement; interventional radiology; operating rooms/ organization and administration; systems engineering.

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The focus on quality in radiology is expanding rapidly and includes quality control of equipment, quality assurance (QA) of our imaging and processes, and increasingly, continuous quality improvement (CQI or, in short, QI) (1). To perform QI, every step in a workflow process is mapped, measured, and analyzed with the goal of improving a process and reducing systems errors (2–8). Methods and principles of systems engineering have been widely recommended as a means to improve health care delivery, from staff planning and resource capacity allocation, to improving patient flow and reducing wait times and delays (9–14). Medical literature on the improvement of on–time starts and delay reduction is widely available but mostly limited to the hospital's surgical department setting (15–20).

The Radiology Department implemented a quality strategic plan with the following goals: 1) to foster a culture of quality, 2) to enhance patient satisfaction, 3) to promote standardization of workflow processes, and 4) to improve clinical quality and safety outcomes. Multiple projects were initiated to achieve these four goals. For instance, each of the 11 divisions within the department assigned a radiologist as quality officer to led efforts to monitor QA metrics and to develop practice quality improvement projects appropriate for their division. Next, we describe the creation and work of a QI project team in
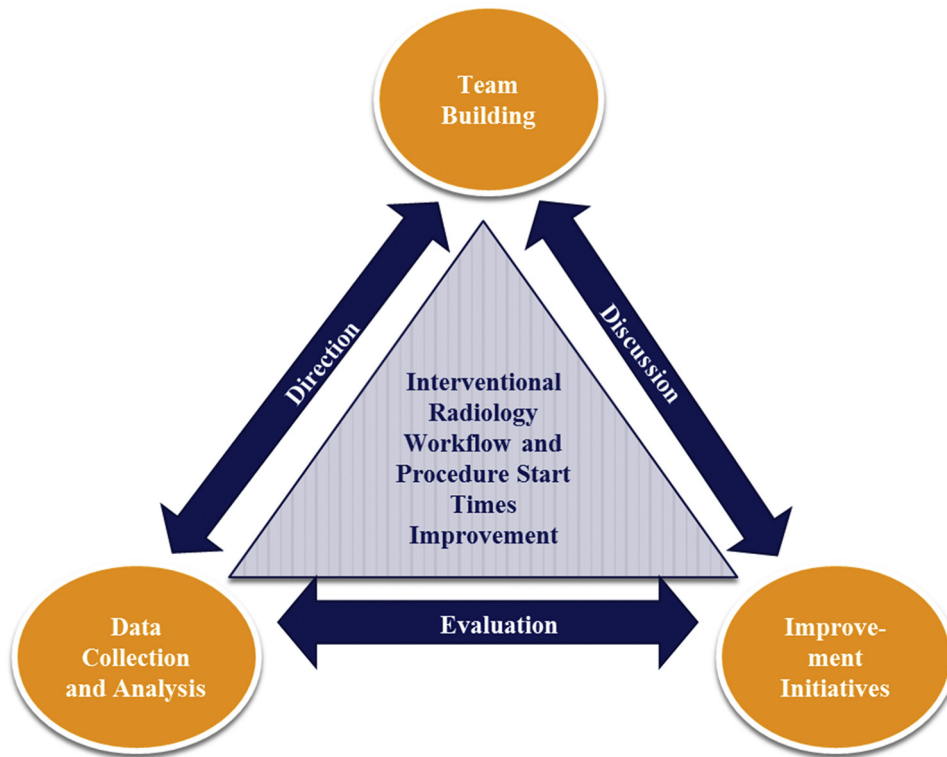
Figure 1. Project elements. (Color version of figure is available online.)

the interventional radiology (IR) and neurointerventional (NIR) divisions (together called "IR") that resulted from this strategic plan with the following objectives: 1) to improve on-time procedure start times and 2) to reduce delays in patient care (and thereby improve patient satisfaction). The purpose of this article was to describe the process of building the QI team, collecting and analyzing the data, selecting QI interventions, and evaluating for improvement changes.

MATERIALS AND METHODS

Through the principles of QI and patient-centered care, the project was built on three successive but interrelated tasks (6) (Fig 1):

- Team building;
- Data collection and analysis;
- Improvement interventions with repeat data collection, refinement, and analysis.

Initial Project Team and Team Building

We formed an interdisciplinary project team representative of all stakeholders in the process of patient care. The initial team consisted of a representative IR and NIR faculty member as well as a treatment nurse, technologist, manager, scheduler, and QI facilitators. The team also included a departmental administrator and data analyst. The initial meeting agenda was to introduce team members, their roles, meeting dates, and frequency and to set the goals of the project team. The team met weekly, with an emailed agenda, minutes, and data for discussion. Early in the process, during the creation of a flow chart of the process, the team was enlarged to include more stakeholders: an IR fellow, a preprocedure/postprocedure care area (PPCA) nurse manager, and a consultant from the anesthesia department. The team meetings were organized by the vice chair of quality (acting as QI team leader).

The next few meetings focused on 1) mapping out the patient workflow and 2) defining an appropriate set of metrics to collect. A graduate student in industrial engineering performed direct observations of the patient experience and interviewed key stakeholders in this process. This student served as both a facilitator and data analyst for the project and proposed an initial set of quality and performance metrics to the team.

Data Collection and Analysis

The project team revised an existing paper data collection form and implemented a more standardized and complete form to accurately record time stamps for the IR workflow from patient arrival to patient discharge (Fig 2). The data were recorded by the PPCA and treatment room nursing staff. These data were transferred into a database from which dynamic reports and graphs were generated. These reports gave the team weekly information necessary to identify potential areas of opportunity for improvement, to plan and implement interventions, and to evaluate the effect of these interventions.