Know It to Fix It: A Quality Improvement Evaluation to Improve Turnaround Times in the Interventional Radiology Suite

C B Ortiz, MD; A Moturu; K U Kukreja, MD; S Hayatghaibi, MA, MPH; G C Gardner, MD; S B Desai, MD*
†Division of Interventional Radiology, Texas Children's Hospital, Houston, TX; *Baylor College of Medicine, Houston, TX

INTRODUCTION

Pediatric IR turnarounds times at Texas Children's Hospital were subject to repeated delays.

However, no measurable data was available to identify workflow issues.

Finding solutions to improve turnaround times was needed.

Work Environment:

- 2 IR suites: outpatient and inpatient procedures
- 6 PACU beds shared between IR and MRI, pre-op evaluation, recovery
- 1 nurse coordinator
  - Per room: 2 radiology techs, 1 nurse, 1 IR physician, 1 anesthesiologist
- Most cases require general anesthesia due to pediatric population

OBJECTIVES

1. Attain baseline timing data on the workflow of IR
2. Identify areas for improvement, create interventions to address these areas, implement changes, measure implementation outcomes
3. Create a process map showing workflow and team assignments

METHODS

- A 4th year medical student was assigned to follow cases
- We limited our study to all inpatient cases undergoing general anesthesia
- We excluded ICU patients
- Predetermined variables were recorded for each case, including the following times:
  - Initiation of transfer to IR
  - Arrival to preop holding
  - Arrival to IR suite
  - Case start and finish
- PACU nurses were tasked with recording PACU arrival and discharge times.
- These variable were compiled and targeted changes were implemented where deficiencies were identified.
- A 2nd observation was then performed to assess for improvement utilizing the same variables
- With all members of the IR team, including IR nurses and radiology technologists, a process map was created to map the roles of each team member.

LIMITATIONS

- Evaluation limited to single patient observations
- Does not integrate scheduling problems or other cancellations encountered throughout the day
- Does not include outpatient cases and their impact on scheduling
- Staff may change behavior with awareness they are being observed

RESULTS

Initial Observations (n = 14)

- We found notable intervals in patient transport times (mean 38 mins, range 22–68 mins, n=9) and patient preparation (mean 22 mins, range 13–31 mins)
- Preoperative/PACU space availability was also identified to cause delays in 2 cases (14%)
- Estimated time for procedure duration in the IR suite (mean 68.5 mins, range 60–120 mins) was shown to be an underestimate when compared to the measured procedure duration (mean 77 mins, range 31–181 mins)

	Procedure time (hr:min:s)	Pre-op to IR room time (hr:min:s)	Patient in room to incision (hr:min:s)	Patient close to out (hr:min:s)	In room to out of room time (hr:min:s)	In room to radiology consent (hr:min:s)	In room to anesthesia consent (hr:min:s)
Inpatient average time	0:36:50	**0:31:33**	0:22:05	0:17:20	1:16:15	0:12:50	0:13:40
Outpatient average time	0:26:45	**1:32:22**	0:20:55	0:15:36	0:56:27	0:53:26	0:52:43

Implementation of Intervention

- Transport times resulted in delays: to improve efficiency of transport, primary IR nurse transport of patients was encouraged rather than using hospital transport services. We also standardized when nurses call for patient transport if using hospital transport.
- Time allotted for procedures to be in the IR suite was shorter than measured time in the IR suite: to account for this discrepancy, we increased the time allotted for procedures
- Pre-op and PACU space are barriers to evaluating and recovering patients: to improve PACU space, other holding areas were utilized for preoperative evaluation

Second Observations (n = 10)

- After the intervention, patient transport time (mean 31 mins) was significantly decreased from initial observations

	In room to out of room time (hr:min:s)	Time in holding (hr:min:s)	Patient in room to incision (hr:min:s)	Procedure finish to out of room (hr:min:s)	Transfer time (hr:min:s)
1st inpatient average time (n = 14)*	1:16:15	0:31:33	0:22:05	0:17:20	**0:38:20**
2nd inpatient average time (n = 10)*	1:09:44	1:04:44	0:24:38	0:19:16	**0:30:54**

* = more observations were made during these periods, but data is limited to cases where applicable variables were fully recorded

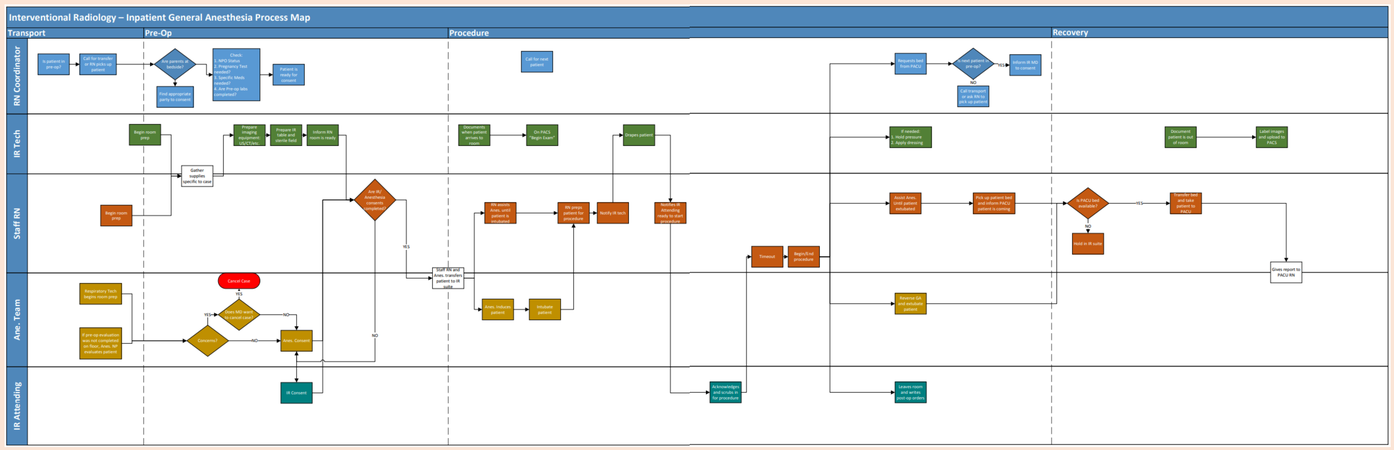

Figure 1. IR Process Map. Boxes denote a task, diamonds denote a decision point. Rows represent different members of the care team, columns represent different "locations" throughout the care process.

CONCLUSION: By analyzing our workflow, causes of delays in coordination of patient care were identified and improved. Implementation of targeted changes at our institution lead to improved efficiency. This process can be used by other IR departments to improve their workflow.

NEXT STEPS: We will continue to fine tune the implementations above and be watchful for any unintended consequences. We also plan to identify and implement a second wave of process improvements based on our data and process map.