Increasing Median Time Between Interruptions in a Busy Reading Room

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Introduction and Aims
Radiologists are required to perform complex cognitive tasks during the course of their daily work, often interpreting studies with thousands of images. Prior research has shown that repeated interruptions can have a negative effect on humans performing complex tasks, resulting in errors, decreased efficiency and increased stress levels. Interruptions can also increase the amount of time required to perform a specific task, resulting in decreased clinical output.

Cincinnati Children’s Hospital Medical Center is a large, quaternary care academic pediatric hospital. The radiology department consists of 35 pediatric radiologists and pediatric neuroradiologists, working with a staff of over 190 technologists and ancillary staff. The main reading room consists of four separate reading rooms (thoracoabdominal, neuroradiology, musculoskeletal and fetal/cardiac), connected by an L-shaped hallway. The thoracoabdominal reading room is located in the middle of the reading area, and is also where the "resus” radiologist for the day is located (the go-to radiologist for technologist questions), as well as functioning as the primary reading room for the on-call radiologists after hours. As such, radiologists in the thoracoabdominal reading room frequently complained about the middle of the reading area, and is also where the "resource" radiologist for the day is located (the go-to radiologist for technical questions), as well as functioning as the primary reading room for the on-call radiologists after hours. As such, radiologist in the thoracoabdominal reading room frequently complained about the number of interruptions that occurred during the workday and many radiologists found the working in this reading room to be a very stressful and unpleasant experience.

The aim of this project was to use quality improvement methodology to increase the median time between interruptions in the thoracoabdominal reading room.

METHODS
Baseline data was collected manually by trained observers. Observers sat in the thoracoabdominal reading room and manually counted the number of interruptions that occurred, the type of interruption (telephone, pager, question, etc.), and the time between each interruption (in seconds) for 1 hour per day, 5 days per week, between the hours of 10 am – 3 pm. Weekends and holidays were excluded. The median time between interruptions was calculated. Data was displayed in a run chart. An improvement team was established, consisting of 2 radiologists, 2 technologists, a reading room coordinator and an operations and quality improvement specialist.

A basic process map was developed and a simplified failure modes effect analysis was performed. Failures were grouped into 1 of 5 categories by the project leader (EAS). A Pareto chart was produced demonstrating the most common failures, and a key driver diagram was developed. To address common failures, several interventions were tested on a small scale and ramped up to a larger scale or abandoned, depending on their success. Successful interventions were adopted. Throughout the project, data was manually collected in the same manner as the primary reading room for the on-call radiologists after hours. As such, radiologists in the thoracoabdominal reading room frequently complained about the number of interruptions that occurred during the workday and many radiologists found the working in this reading room to be a very stressful and unpleasant experience.

RESULTS
At baseline, the median time between interruptions was 187 seconds. The most common failures (most frequent sources of interruptions) were technologist calling for image "checks" (image QC), redundant phones ringing in multiple locations, and pagers. A key driver diagram listing key drivers included making sure image "checks" are appropriately limited, having clear expectations for clinicians and other visiting the reading room, and developing a phone system that will eliminate the problem of multiple phones ringing at once by eliminating redundant phone numbers and having a central system that allowed the reading room assistants to route phone calls to the appropriate area of the reading room.

CONCLUSION
Using quality improvement methodology and a team approach, we were able to increase the time between interruptions in our busiest reading room by 77%. Although we met our initial project goal, we plan to continue our work to optimize the number of interruptions and to further increase the time between interruptions, thus decreasing radiologist stress levels and increasing efficiency.