Joseph E. and Nancy O. Whitley Award Winning Paper

# Radiology Report Turnaround Time:

## *Effect on Resident Education*

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**Rationale and Objectives:** To compare resident workload from Emergency Department (ED) studies before and after the implementation of a required 1-hour report turnaround time (TAT) and to assess resident and faculty perception of TAT on resident education.

**Materials and Methods:** Resident study volume will be compared for 3 years before and 1 year after the implementation of a required 1-hour TAT. Changes to resident workload will be compared among the different radiology divisions (body, muscuolskeletal (MSK), chest, and neuro), as well as during different shifts (daytime and overnight). Residents and faculty at two Midwest institutions, both of which have a required report TAT, will be invited to participate in an online survey to query the perceived effect on resident education by implementation of this requirement. A $P < .05$ was considered statistically significant.

**Results:** A significant decrease in resident involvement in ED studies was noted in the MSK, chest, and neuro sections with average involvement of the 3 years before the 1-hour TAT of 89%, 88%, and 82%, respectively, which decreased to 66%, 68%, and 51% after the 1-hour TAT requirement ($P < .05$). The resident involvement in ED studies only mildly decreased in the body section from an average before the 1-hour TAT of 87% to 80% after the 1-hour TAT requirement ($P < .1$). There was an overall significant decrease in resident ED study involvement during the daytime ($P = .01$) but not after hours during resident call ($P = .1$). Seventy percent of residents (43 of 61) and 55% of faculty (63 of 114) responded to our surveys. Overall, residents felt their education from ED studies during the daytime and overnight were good. However, residents who were present both before and after the implementation of a required TAT felt their education had been significantly negatively affected. Faculty surveyed thought that the required TAT negatively affected their ability to teach and decreased the quality of resident education.

**Conclusions:** Residents are exposed to fewer ED studies after the implementation of a required 1-hour TAT. Overall, the current residents do not feel this decreased exposure to Emergency room studies affects their education. However, residents in training before and after this requirement feel their education has been significantly affected. Faculty perceives that the required TAT negatively affects their ability to teach, as well as the quality of resident education.

**Key Words:** Resident education; turnaround time; Emergency Department.



Over the past several years, radiology residents have experienced major changes to their training and certification. From the growing emphasis on diagnostic milestones for resident training to the transition from an oral board examination to a more image-rich computer-based examination, radiology resident training is in a state of rapid evolution (1,2). In addition, the transition from film with tape/digitized recordings to a picture archiving and communication system (PACS) with speech recognition has dramatically changed the way academic radiologists process and review cases with residents (3). More recently, the effect on radiology resident education related to 24/7/365 in-house attending coverage was investigated (4). Another pressure now challenges academic radiologists further with a new variable to which they must adapt: the implementation of required reduced radiology report turnaround times (RTATs), potentially taking away from time spent in instruction of residents.

RTAT has increasingly become an important metric for measuring the quality of diagnostic radiology services. With the institution of PACS and speech recognition systems, RTAT has decreased over the last decade from days to near-real time (5–7). Increasingly, teleradiology companies have emphasized decreased RTAT to hospitals as a metric for improved services to compete with local radiology groups, or even other teleradiology companies (8). Some academic teaching hospitals have experimented with pay-for-performance programs to decrease their RTAT (9). This simple metric can

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easily be assigned a value by hospital administration and can be used to evaluate current radiology services and compare them to competing radiology services. The increased interest in this metric by radiology departments and hospital administrators over the last several years has led to hospital radiology RTAT requirements, particularly in the cases of Emergency Department (ED) studies and "stat" interpretations.

A survey of all Emergency Medicine chairs in 2002 showed that 49% of respondents were dissatisfied with radiology RTAT (10); it also showed that 39% of sites reported RTAT <4 hours and that only 2% of daytime radiology reports were completed in <1 hour. Although continued adoption of PACS and speech recognition systems has likely improved radiologists' RTAT since this survey was conducted, the importance that Emergency Medicine physicians place on prompt accurate final interpretations cannot be overstated. To address this concern from Emergency Medicine physicians, the American College of Radiology issued a resolution in 2001 that "all radiologic studies performed on Emergency Department patients should be promptly interpreted by radiologists" (11).

A coordinated effort on the part of our Radiology and Emergency Medicine departments to improve radiologists' RTAT led to the adoption of a 24/7 1-hour turnaround time (TAT) requirement for all studies performed in the ED. The goals of this requirement were to decrease patient wait time in the ED by increasing patient throughput and to improve patient care by eliminating "resident discrepancies" from preliminary reports, although the latter rationale remains controversial (12–15). The requirement led to the hiring of on-site dedicated nighttime and evening radiologists in 2012 to ensure that the RTAT metric was met throughout the night. The daytime ED studies are typically interpreted by a subspecialty division but with the continued requirement for a 1-hour RTAT.

We hypothesized the following: 1) 1 year after the implementation of the RTAT requirement, residents would become less involved in ED studies to comply with the metric, 2) faculty would be incentivized to forego resident involvement and dictate ED studies by themselves to decrease their RTAT, and 3) faculty and resident satisfaction with resident education would decrease as more emphasis was placed on report throughput and less emphasis was placed on resident education.

## MATERIALS AND METHODS

### *Emergency Department Study Volume*

A retrospective review of the medical records was performed to identify patients who had the following ED studies: radiographs of the chest, abdomen, knee, and pelvis; computed tomography (CT) examinations of the chest, abdomen, pelvis, brain, cervical spine, thoracic spine, and lumbar spine; and magnetic resonance of the lumbar spine and brain. The total number of studies performed from the ED for each of these modalities and the percent of these studies that were dictated by a resident were obtained for 1 year after the implementation of the 1-hour RTAT (July 1, 2012 to June 30, 2013) and for 3 years before the 1-hour RTAT (July 1, 2009 to June 30, 2010; July 1, 2010 to June 30, 2011; and July 1, 2011 to June 30, 2012).

The imaging studies were divided according to subspecialty section (spine studies were interpreted by the neuroradiology division.) The studies were further divided according to when they were performed, with "daytime" studies performed between 8 AM–5 PM and "call" studies performed between 5 PM–8 AM. The percent of resident-dictated cases were compared before and after the implementation of the RTAT requirement and during the different daytime/call periods using a paired *t* test. Changes in resident ED study volume were also assessed by subspecialty section. A *P* value of $\leq .05$ was considered significant.

### *Surveys*

An eight-question radiology resident survey and a nine-question radiology faculty survey were sent to two academic radiology programs that had adopted a 1-hour RTAT requirement (Appendix, resident survey, faculty survey). These surveys addressed resident/faculty demographics, perceived effects of resident case exposure, and effects on resident education/teaching.

These surveys were distributed online (via SurveyMonkey). Each resident and faculty member was sent an email requesting voluntary participation in this anonymous online survey. Consent was given online before the survey was completed. Residents and faculty had 2 weeks to complete the survey. An email reminder was sent after 1 week. Responses are presented as frequency distributions and were assessed by calculating the 95% confidence interval (CI) for the mean ($P < .05$). Intergroup comparisons were assessed using *t* tests.

The study was approved by the institutional review board at both institutions.

## RESULTS

### *Emergency Department Study Volume*

The average percent of ED studies dictated by residents during daytime hours (8 AM–5 PM) decreased significantly after the implementation of a required 1-hour RTAT ($P = .01$; Table 1). On the other hand, there was not a statistically significant decrease in the mean percent of resident ED study involvement before and after the required 1-hour RTAT during call (5–8 PM; $P = .10$; Table 2). However, when taking both periods into account, there was overall a significant decrease in resident ED study involvement after implementation of the 1-hour RTAT ($P = .027$).

Among the four divisions, musculoskeletal (MSK), chest, and neuroradiology had a significant drop in resident ED study involvement after the implementation of the 1-hour RTAT. The MSK division saw a decrease from an average of 88.68% (CI = 81–96; $P = .006$) to 65.74% (Fig 1). The chest division saw a decrease from an average of 88.36% (CI = 78–99; $P = .015$) to 68.12% (Fig 2). The neuroradiology division saw the most substantial decrease from an average of 82.89%