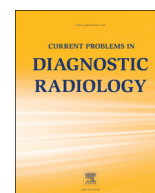




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Radiology 24/7 In-House Attending Coverage: Do Benefits Outweigh Cost?



Stephanie Coleman, MD, Nagaraj Setty Holalkere, MD, Julie O'Malley, Gemma Doherty, Alexander Norbash, MD, Nadja Kadom, MD*

Department of Radiology, Boston University School of Medicine and Boston Medical Center, Boston, MA

Many radiology practices, including academic centers, are moving to in-house 24/7 attending coverage. This could be costly and may not be easily accepted by radiology trainees and attending radiologists. In this article, we evaluated the effects of 24/7 in-house attending coverage on patient care, costs, and qualitative aspects such as trainee education. We retrospectively collected report turnaround times (TAT) and work relative value units (wRVU). We compared these parameters between the years before and after the implementation of 24/7 in-house attending coverage. The cost to provide additional attending coverage was estimated from departmental financial reports. A qualitative survey of radiology residents and faculty was performed to study perceived effects on trainee education. There were decreases in report TAT following 24/7 attending implementation: 69% reduction in computed tomography, 43% reduction in diagnostic radiography, 7% reduction in magnetic resonance imaging, and 43% reduction in ultrasound. There was an average daytime wRVU decrease of 9%, although this was compounded by a decrease in total RVUs of the 2013 calendar year. The financial investment by the institution was estimated at \$850,000. Qualitative data demonstrated overall positive feedback from trainees and faculty in radiology, although loss of independence was reported as a negative effect. TAT and wRVU metrics changed with implementation of 24/7 attending coverage, although these metrics do not directly relate to patient outcomes. Additional clinical benefits may include fewer discrepancies between preliminary and final reports that may improve emergency and inpatient department workflows and liability exposure. Radiologists reported the impression that clinicians appreciated 24/7 in-house attending coverage, particularly surgical specialists. Loss of trainee independence on call was a perceived disadvantage of 24/7 attending coverage and raised a concern that residency education outcomes could be adversely affected.

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Background

Radiology practices are increasingly considering attending coverage for 24 hours a day and 7 days a week (24/7).¹ It is conceivable that 24/7 attending coverage is perceived as providing higher-quality interpretations when compared with preliminary interpretations by trainees, which can be discrepant from final attending reports.² Decreased report turnaround times (TAT) are expected to improve efficiency of patient care in the emergency department (ED) and on inpatient units. Improved patient care, in turn, may subsequently result in better patient outcomes and higher satisfaction ratings.

Providing consistent 24/7 attending coverage in radiology requires a significant financial investment. In addition, working long overnight hours has been shown to result in fatigue and diminished diagnostic acumen.³ Lastly, residents in programs with 24/7 attending coverage rated their level of autonomy and the quality of their educational experience negatively when compared with programs without 24/7 attending coverage.²

In 2013, our institution implemented 24/7 in-house attending radiology coverage in an effort to improve patient care. In this

article, we assessed the implications of this initiative on TAT and work relative value units (wRVU) before and after implementation. We also qualitatively assessed perceived effects on resident education, estimated the institution's financial investment, and summarized the logistical consequences of 24/7 attending coverage.

Methods

The study met our Institutional Review Board's exempt criteria. We measured 24/7 effect on report TAT and wRVU calculated in our department as an ongoing key performance indicator. The TAT is defined as the elapsed time from initiation of a study by the technologist to finalized report status, recorded as hours and minutes (h:m). We used TAT for nighttime studies, defined as studies for ED patients, inpatients, and scheduled outpatients completed between 7 PM and 7 AM. We included computed tomography (CT), radiography (RX), magnetic resonance imaging (MRI), and ultrasound (US) imaging modalities. We retrospectively compared TAT before implementation of 24/7 attending coverage (January 2013–June 2013) with TAT postimplementation (July 2013–December 2013). The TAT was tabulated by imaging modality, and percentage changes in TAT for each modality were calculated.

wRVU were calculated for two 1-year time periods, preceding and following implementation of 24/7 coverage (Pre: July

* Correspondence to: Nadja Kadom, MD, Emory University, 1405 Clifton Rd NE, Atlanta, GA 30322.

E-mail address: nkpiano@gmail.com (N. Kadom).

Table 1
Baseline survey questions

1	What is your level of training (multiple choice item)?
2	What is your preference regarding the location of the overnight attending (multiple choice item)?
3	List which positive and negative effects you anticipate of 24/7 attending coverage for residents (open ended).
4	What changes do you anticipated in your radiology education with 24/7 coverage (open ended)?
5	What changes do you expect to see in patient care with 24/7 attending coverage (open ended)?
6	What effects on the radiology residency program do you anticipate from 24/7 attending coverage (open ended)?
7	Please share any other comments, concerns, and suggestions regarding 24/7 attending coverage (open ended).

The questions below were included in the baseline online survey sent to all residents and attendings in the radiology department before implementation of 24/7 attending in-house coverage.

2012–June 2013 and Post: July 2013–June 2014). We compared preimplementation and postimplementation wRVUs for a cohort of daytime neuroradiologists whose work schedules were unaffected by implementation of 24/7 coverage. We also compared wRVUs related to studies coded as “emergency radiology” studies before 24/7 implementation with wRVUs generated by the new dedicated nighttime in-house attendings following implementation.

Regarding the financial investment necessary for 24/7 attending coverage, the constituent added expenses were extracted from departmental administrative records, covered in greater detail in the discussion section, and totaled an expense of \$850,000 every year.

The changes to the logistics of daytime and nighttime in-house coverage were extracted from departmental work-hour policies.

Narrative data for qualitative analysis regarding the effect of 24/7 attending coverage on residency education were obtained in 2 ways. A baseline online survey (Survey Monkey, Palo Alto, CA) containing both closed and open-ended questions was distributed to all radiology residents, fellows, and attending radiologists 2 weeks before the implementation of 24/7 in-house attending coverage. Responders consented to having their anonymized responses used for publication. The questions in the survey are listed in Table 1.

A postimplementation survey was sent 6 months after 24/7 attending coverage to the same recipients, with appropriate modifications to the earlier questions. Changing opinions preceding and following implementation of 24/7 in-house attending coverage were recorded. Secondly, we interviewed 4 overnight attendings (AT1–AT4). A total of 2 investigators (S.C. and N.K.) performed the interviews using an interview guide (Table 2). Notes were taken during the interviews and transcribed into interview summaries afterwards. The 2 investigators independently reviewed the open-ended survey questions and interview responses, and coded responses into emerging themes and topics. The 2 investigators shared the various themes and topics they had identified and arrived at consensus regarding key themes and topics. Validity and reliability for qualitative data were achieved by application of established qualitative research methods.⁴

Results

The study was performed at a major academic level I trauma center. Turnaround times (Table 3): Before 24/7 implementation,

the TAT for CT was 11:57, for RX 4:22, for MRI 10:00, and for US 8:04. Postimplementation, the TAT for CT was 3:46 (69% reduction), for RX 2:29 (43% reduction), for MRI 9:22 (7% reduction), and for US 4:34 (43% reduction). Work RVUs (Table 4): The daytime neuroradiology section experienced a decrease in wRVUs of 11% (from 24,841.28–22,127.66). The emergency radiology section experienced a 6% decrease in wRVUs (from 18,709.92–17,625.72).

Logistics of 24/7 Coverage

Before 24/7 in-house attending coverage, there was in-house attending coverage for neuroradiology and body imaging in place between 8 AM and 5 PM Each day, an attending radiologist from any subspecialty was assigned to reading emergent and inpatient plain films from 5–9 PM. Attendings in neuroradiology and body imaging additionally covered call from home (on pager) daily between 5 PM and 8 AM. Postimplementation, 3 daytime shifts were introduced for neuroradiology and body radiology attendings from 7 AM–3 PM, 9 AM–5 PM, and 11 AM–7 PM. Further, 4 daytime attending radiologists switched to overnight coverage, 2 of them full-time and 2 part-time. The overnight radiology attending covered all studies from the ED and all inpatient studies between 7 PM and 7 AM. Each overnight attending worked 7 nights in a row followed by 2 weeks off. The overnight attending was stationed in the same room as the on-call residents; with residents responsible for initially reading all studies, providing preliminary results, protocoling, responding to consults, and answering any questions from technologists or patients.

The call schedule for residents did not change. Monday through Friday, first resident covered from 5–9 PM, a second resident covered 5 PM–4 AM, and a third resident covered 9 PM–8 AM. As a result, 2 residents covered between 5 PM–4 AM.

Qualitative Analysis

There were 65 radiology responses to the preimplementation survey, 22 were attendings, 30 were residents, and 13 did not identify their position. There were 55 responses to the postimplementation survey, 20 were attendings, 1 fellow, 24 residents, and 10 did not identify their position. In total, 4 overnight attendings were interviewed postimplementation (AT1–AT4). The themes that emerged after qualitative analysis of the

Table 2
Interview guide

1	How has residents' performance changed when compared with the time where there was no 24/7 attending coverage? Specifically in what ways? Change in motivation? Change in accuracy? Change in speed? Change in initiative or independence?
2	Do residents often ask questions before giving prelim read? If yes, are the questions appropriate?
3	Do residents provide accurate diagnoses or differentials?
4	Do you feel this change has benefited or hurt resident education? In what ways?

Two interviewers used the interview guide and questioned a total of 4 overnight attendings about their opinions and experiences with the new 24/7 coverage system.

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