

Implementation of a Novel, Resident-Led, Nocturnal Curriculum

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ABSTRACT

Background Duty hour restrictions for resident physicians have led to radical changes in graduate medical education, including a shift to more night float rotations. These rotations have been viewed by residents as predominantly service focused with little opportunity for formalized education.

Objective To develop and deliver a resident-driven, nocturnal curriculum to enhance the educational content and value of night float rotations.

Methods The Hospital of the University of Pennsylvania is a 695-bed, tertiary care academic medical center. Upper-level internal medicine residents developed and peer-reviewed case-based scripts designed to be delivered in 15- to 20-minute teaching sessions. We evaluated the quality of teaching using anonymous, free-response surveys.

Results Twenty-four scripts were developed that explored the differential diagnoses, diagnostic pitfalls, and management of clinical problems that interns frequently encounter on night float rotations. Of 83 eligible residents, 45 (54%) responded to the survey. Teaching occurred an average of 4 nights per week and was uniformly viewed as high yield and topical by night float interns.

Conclusions A resident-driven, nocturnal curriculum was implemented through the use of case-based teaching scripts, allowing for delivery of a standardized curriculum that capitalizes on the teaching opportunities afforded by the night shift. This intervention may serve as a model for nocturnal education in other departments and institutions.

Introduction

Additional duty hour limits imposed by the Accreditation Council for Graduate Medical Education (ACGME) in 2011 further restricted postgraduate year 1 shift lengths to 16 consecutive hours in an effort to enhance resident alertness and improve patient care through fewer fatigue-related errors.¹ The nature of these revisions required residency programs to adopt nontraditional staffing models, including night float and night medicine rotations. In contrast to night medicine, interns on night float rotations typically have little faculty interaction, leading to fewer opportunities for bedside teaching and observation of direct patient care.²⁻⁴

Multiple studies have highlighted residents' perceptions of night float rotations as predominantly service-focused time with few formal educational opportunities.⁴⁻⁷ While night float rotations have been valued for their experiential learning potential, they have historically lacked a formalized educational component.^{8,9} As trainees now spend an increasing

amount of time on night float rotations, residency programs have evolved to leverage the potential learning opportunities available at night and to establish new metrics to define its success.¹⁰

Night float rotations have unique advantages and disadvantages to the delivery of high-value teaching. At night, residents have fewer administrative tasks, affording additional time for formal education.⁹ Challenges inherent in night float rotations include cross-coverage responsibilities and resident fatigue, leading to decreased alertness.¹⁰ Two studies^{2,3} showed perceived improvements in the value of care delivered and in resident education with the presence of dedicated, on-site, attending physicians. Critics, however, argue that this structure has a negative effect on resident autonomy overnight, decreasing the experiential learning component of such rotations that is felt to be so valuable to the professional maturation of resident physicians.⁹

Methods

Setting and Participants

The Hospital of the University of Pennsylvania is a tertiary care academic medical center located in Philadelphia, Pennsylvania. The internal medicine

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Editor's Note: The online version of this article contains a sample case-based script of a hemodynamic monitoring in heart failure.

residency program has a total of 166 residents in categorical, primary care, medicine-pediatrics, and preliminary training programs. Interns, in accordance with the ACGME duty hour regulations, work shifts up to 16 hours in length, and care for a maximum of 10 patients per day. On night float rotations, interns may care for up to 40 patients each, but have fewer administrative responsibilities, and thus have more time to focus on direct patient care. Upper-level residents assume more supervisory and didactic roles, and work with interns overnight in ratios of 1:1 or 1:2. Rotations are 2 weeks in length, with interns and residents spending 4 to 8 weeks per year on night float rotations.

Intervention

This innovation was developed by a group of upper-level residents interested in improving education during the overnight period. These residents formed a night curriculum committee and identified a series of topics useful for internal medicine interns. The curriculum was designed to address commonly encountered overnight topics as indicated by prior resident surveys. Scripts were written by upper-level residents, then peer reviewed by committee members, and finally, when possible, checked by an attending physician for accuracy and completeness. Twenty-four scripts were generated to provide residents 4 different topics to teach each week for the average 6 weeks that interns spend on night shifts (BOX). Scripts were designed around a standardized structure that promoted sequential progression through clinical cases with exploration of differential diagnoses, potential diagnostics, and management pitfalls (FIGURE and provided as online supplemental material). All scripts were designed to be delivered by any upper-level resident during a 15- to 20-minute time segment.

The curriculum was launched with the incoming intern class on July 14, 2014, and studied through November 2, 2014. Teaching sessions were scheduled 4 nights per week and assigned to a predetermined resident. In the event the designated resident was not available secondary to clinical volume, other night float residents were encouraged to teach. Scripts were made available online and selected at the discretion of the teaching resident, though residents were encouraged to seek input from interns to avoid redundancy.

Outcomes

As the curriculum was introduced, biweekly feedback was sought from interns and residents about the frequency and quality of teaching scripts and sessions via anonymous, free-response surveys.

What was known and gap

Night float rotations necessitated by the current duty hour limits are perceived to be of relatively low educational value.

What is new

A dedicated nocturnal curriculum for interns that is taught by senior residents and uses 24 case vignettes.

Limitations

Single site, single specialty study; outcomes limited to participant self-reporting of the utility of the intervention.

Bottom line

The curriculum is feasible and sustainable and explores topics of high relevance to interns, including differential diagnoses, diagnostic pitfalls, and management of clinical problems.

Given the nature of the intervention, our study was determined to be exempt from full Institutional Review Board approval.

Analysis

Survey data were analyzed in sum every 6 to 8 weeks to maintain anonymity. Frequency of teaching was averaged in sum and by resident level.

Results

Our innovative, resident-run curriculum was designed to capitalize on the learning environment at night. Twenty-four scripts were created over a period of 3 months for the overnight teaching of interns (BOX).

Scripts begin with the learning objectives for a given topic such that the expectations and discussion points for each vignette are clear. A case is then presented that incorporates clinical data such as chest x-rays, electrocardiograms, and hemodynamics. Following presentation of the case, the script guides residents toward identifying the problem broadly and then discussing its differential diagnosis. Residents are encouraged to create a dialogue with interns regarding diagnostic strategies and potential pitfalls. The script is meant to allow sequential progression through simulated medical cases, and, as such, residents are encouraged to provide continual updates to the case in light of new clinical data and/or therapeutic interventions. Alternative diagnoses are discussed briefly at the end of the case. At the conclusion of the script, the most salient points of the case are reiterated and the interns are given references for further reading (FIGURE and provided as online supplemental material). These case-based scripts ensure not only standardization of teaching methods and content, but also encourage a dynamic and

Box Topics for 24 Case-Based Scripts

- Approach to gastrointestinal bleeding
- Narrow complex tachycardia
- Altered mental status
- Hypertensive urgency and emergency
- Hypoxia
- Oncologic emergencies
- Sepsis
- Wide complex tachycardia
- Hemodynamics in heart failure
- Approach to the rapid response
- As needed (PRN) medications
- Hyperglycemia and diabetic ketoacidosis
- Inpatient management of the decompensated cirrhotic patient
- Hypotension
- Syncope
- Ventilator management
- Transplant medicine pearls
- Chest pain
- Transfusion reactions
- Atrial fibrillation
- Review of common inpatient rheumatologic conditions
- Management of alcohol and benzodiazepine withdrawal
- Approach to fever
- Acute leukemia

interactive learning environment. None of the scripts require use of technology, as the relevant images are included in supplemental material designed to be circulated among attendees.

Following each 2-week rotation, we sought feedback from night float residents regarding the frequency and quality of teaching. Forty-five of 83 (54%) possible residents responded to the survey. Thirty of these were interns, capturing data on eight 2-week night rotations. Interns attended teaching 4 nights per week on average. Of the 26 interns who used the free-response section to comment on the quality of teaching, all provided uniformly positive feedback. Interns repeatedly used words such as “high yield,” “topical,” and “bite-sized” to describe teaching sessions by their upper-level residents.

Discussion

We developed a nocturnal curriculum that was easily implemented by upper-level internal medicine resi-

dents and well received by interns at large given the perceived high-yield and topical nature of teaching scripts. Our night curriculum promotes the interactive exchange of clinical data between residents in a manner that recapitulates real-time medical decision making, differentiating it from the at-times reductionist approach of traditional educational models.⁸ Such interactive learning environments have been shown repeatedly to be 1 of the most effective modes of adult education.^{11–13} Furthermore, utilization of residents (near-peers) as teachers may allow for more effective teaching of interns who often lack an existing framework by which to process new information.¹⁴

Duty hour restrictions for resident physicians have led to radical changes in graduate medical education, including a shift to more night rotations. In 1991, only 30% of internal medicine residency programs used a night float system as compared to 76% in 2006.¹⁵ While limited, a few studies have addressed residency programs’ efforts to incorporate education into overnight rotations. Emory University detailed use of an on-site attending physician to supervise and teach night float residents.² Follow-up surveys indicated that night float residents saw learning value in attending supervision, and their daytime counterparts evaluated the quality of overnight care more favorably. Similarly, in response to high levels of dissatisfaction of surgical night float residents, the University of Virginia surgical residency program implemented attending-driven daily morning reports as well as attending-run evening tutorials, both of which were timed to allow participation of overnight residents.³ Given the lack of an on-site faculty presence at night, we designed a curriculum that harnessed the enthusiasm for teaching among residents by scripting structured presentations that promote stepwise progression through common clinical scenarios.

This resident-driven curriculum, like all interventions, has limitations inherent in its design. Variability exists in the quality of overnight presentations, with some residents more dedicated to, and adept at, teaching than others. Furthermore, sessions could be canceled in the instance that a resident’s clinical responsibilities precluded teaching. Despite this, our scripts were designed to be delivered by any upper-level resident without preparation, allowing other residents to fill in and teach if necessary. Informal survey data, however, indicated that teaching was rarely canceled in light of outstanding clinical demands.

Given its success, this curricular innovation will be maintained as part of our residency curriculum. The current focus of the curriculum is on management of commonly encountered clinical scenarios at night. We

Title



Author(s)

Learning Objectives

- 1.
- 2.
- 3.

Clinical Scenario

Brief paragraph describing initial clinical presentation with pertinent past medical history. If relevant, include vital signs and physical examination.

Include multimedia as indicated

Problem: State major clinical problem

Differential Diagnosis:

Diagnostic strategies: Physical exam, laboratory studies, radiology

Potential Diagnostic Pitfalls: How could specific thought processes or actions lead to an incorrect diagnosis and potential mismanagement of the patient

Management

Initial interventions/therapeutics:

Insert figure with management algorithm as appropriate

Discuss case evolution with appropriate management

Discuss relevant alternative diagnosis (if applicable) and how the case could unfold

Clinical Pearls

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References

- 1.

Hospital of the University of Pennsylvania
Internal Medicine Residency
Midnight Curriculum

FIGURE

Format for Case-Based Scripts

suspect that such content is more appropriate for early in the year, and we will be expanding the content to include evidence-based medicine that drives our clinical practice. We also acknowledge that the most effective learning strategies translate into durable learning. Future studies will evaluate whether our curriculum translates into enduring knowledge for both residents and interns.

Conclusion

We developed and implemented a resident-driven nocturnal curriculum designed around case-based

teaching scripts. Our approach, using scripted cases taught by upper-level residents, capitalizes on the teaching opportunities the night shift affords and recasts the perception of these rotations in light of their educational opportunities. Given the current duty hour limits, nighttime curricula will likely continue to evolve to enhance resident education.

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