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Authors

McGarry, Jonathon
Krall, Scott P.
McLaughlin, Thomas

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Impact of Resident Physicians on Emergency Department Throughput

Jonathon McGarry, MD
Scott P. Krall MD, MBA
Thomas McLaughlin, DO

Christus-Spohn Hospital Corpus Christi-Memorial, Department of Emergency Medicine, Texas A&M Health Science Center, Corpus Christi, Texas

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Objective: Evaluate the impact of adding emergency medicine residents to a medium-size urban hospital by comparing emergency department (ED) admission rate, total census, length of stay (LOS), and proportion of patients who left without being seen (LWBS).

Methods: Using the student t-test, the study compared commonly used ED metrics for a mid-sized urban hospital (annual census 43,000) for the four-month period prior to (March-June 2006) and after (March-June 2007) residents began providing 24-hour coverage at the institution.

Results: There was no significant difference in the number of patients seen (NPS) in the two time periods, 14,471 and 14,699 patients respectively ($p=0.507$). Analysis of the NPS and LWBS was not statistically significant. The percentage of patients who LWBS decreased with the presence of residents (6.5% to 5.8%, $p=0.531$), and the overall ED LOS was similar (210 min vs. 219 min, $p=0.56$). Admission rate data demonstrated that residents had a similar admission rate (17.5% vs. 18%, $p=0.332$).

Conclusion: ED flow depends on a number of variables with complex interactions. When comparing two similar time periods in consecutive years, the presence of resident physicians in the ED had no effect on the number of patients seen, patient LOS in the ED, or LWBS, thus supporting the conclusion that residents did not adversely affect the patient flow within the ED. [West J Emerg Med. 2010; 11(4):333-335.]

INTRODUCTION

Over the past decade numerous studies have been published concerning physician shortages in the United States, including a shortage of emergency medicine (EM) physicians in rural areas.¹ Cheng et al. concluded that EM is the least-represented of all residency-trained physicians in rural areas.¹ The shortage of emergency physicians (EP) supports the need for expansion of EM residencies to increase the availability of residency-trained EPs.² The study by Branney et al. suggests that employing EM residency-trained physicians provides benefits, as residency-trained EPs have lower average malpractice claims.³ The hospital that employs EPs trained by EM residency programs may also benefit from lower malpractice cases. Although there are potential advantages for

hospitals to assume training of EM residents, the associated costs and the concern that residents will have a negative effect on patient flow can impact establishing training programs.

The creation of a new residency program, along with the incorporation of 16 residents over a single year, allowed us to measure the impact an EM residency on department function. The residents represented a class of eight postgraduate year one (PGY-1) and eight postgraduate year two (PGY-2) residents. The classes consisted of four newly matriculated and 12 transfer residents (four interns, eight PGY-2 residents) from a recently closed EM program. This study seeks to evaluate the effect of residents upon patient flow, admission rate, and time patients spent in the emergency department (ED) before disposition (either admission or discharge).

METHODS

The study took place at an urban tertiary referral hospital that is a level II trauma center. Annual census is 43,000. The ED is divided into an acute care area and a designated urgent care area. Prior to March 2007, there were 36 hours of attending coverage in the acute care area and 20 hours of mid-level coverage in urgent care. In March 2007, a supervising physician and two residents provided 24 hours of coverage daily in the acute care area with the additional 12 hours of attending coverage added to the 20 hours of mid-level coverage in the urgent care area. Two residents, a PGY-1 and a PGY-2, were the primary providers in the acute care area and would evaluate, treat, and give disposition of the patients. The institution also has a family practice residency that infrequently rotates residents through the ED.

The Meditech Health Care Information System used by the hospital is an electronic patient management system that tracks ED patient metrics. We obtained patient census data from March – June 2006, which represents the patients seen only by attending physicians and physician extenders. The same census data was obtained for March through – June 2007, a time period representing assumption of patient care duties by EM residents. We compared data from the same time period each year to reduce bias from seasonal fluctuations in the ED census.

We obtained year-to-year interrupted time series data, which included: total number of visits, average length of stay (LOS), the percentage of patients LWBS and the percentage of total patients admitted to the hospital. We compared pre- and post-residency data with the student t-test, and we used SPSS inc version 16, Chicago IL to analyze the data.

RESULTS

The number of patients seen prior to the start of the residency was 14,471, with 14,699 seen for the same period after resident coverage began in the ED, $p=0.507$. The census increased by only 1.6%, representing minimal change in census between the periods, supporting the comparison of similar patient groups. The number of patients LWBS did decrease from 6.5% to 5.8%, (950 vs. 856, $p=0.531$). The patients' total LOS increased by 9.4 minutes, which represents an increased average LOS of 4 %, (210.2 min vs. 219.6 min, $p=0.56$). The percentage of admissions increased from 17.5% without residents to 18.5 %, ($p=0.332$) Overall, none of the metrics showed a significant change.

DISCUSSION

The physician shortage in the United States continues for various reasons, among them the Congressional Balanced Budget act of 1997 that froze the available graduate medical education residency training spots supported by Medicare Part A.⁴ Freezing the number of Medicare-supported resident positions makes continued federally funded expansion of the

Table 1: Summary of Emergency Department Metrics Pre- and Post-Resident Addition

	Pre-Residents	Post-Residents	t-Test
Number of Patients Seen	14471	14699	$p=0.50$
Left Without Being Seen (%)	6.5% (950)	5.8% (856)	$p=0.23$
Mean Length of Stay	210 Minutes	219 Minutes	$p=0.56$
Admission Rate (%)	17.5% (2534)	18% (2676)	$P=0.06$

physician work force through graduate medical education programs difficult. While residents generally do not bill for their services, they provide a significant amount of patient care under the supervision of an attending physician, including a large percentage of indigent care.⁵ Without the support of the federal government, individual states and health institutions must decide if there is benefit to paying the cost of training additional residents.

The impact of EM residents upon patient throughput in an ED can be difficult to quantify, and the available literature is limited. Lammers et al. evaluated the effect of the presence of EM residents over time by looking at patient LOS.⁶ A before-and-after observational study was conducted one year prior and for the three years after the start of the EM residency. An additional year of data was collected during the fifth year after the residency started. A weak positive correlation was found between the ED patient LOS and the presence of postgraduate year three (PGY-3) EM residents, suggesting that residents took longer to provide a disposition for patients.⁶ French et al. studied quality indicators in the ED when residents were present and absent during the study period and found no measurable difference for most of the quality indicators studied, although faculty physicians without residents were less efficient in admitting patients.⁷ Our study represents the impact residents have over a much shorter period with immediate complete resident coverage within the acute care area of the ED due to filling a PGY-1 and a PGY-2 class in a newly established resident program. This decreases the impact of hospital census variables, minimizes other staffing effects, and limits bias. Our results confirm earlier studies that residents have a neutral effect upon ED efficiency.

LIMITATIONS

The study was limited in that only four months of resident coverage were included at a single institution with PGY-1 and PGY-2 residents. The residents' potential impact could change over time as the staff and residents become more familiar with the residency training system, as well as the hospital functions. The presence of PGY-3 residents could also affect patient throughput. The study addressed general trends and does not attempt to demonstrate causality.

CONCLUSION

The presence of an EM training program at the institution did not adversely affect patient flow within the ED. The previous physician and mid-level staffing was unchanged after residents began to staff the ED acute care area, so there was no change from previous staffing expenses and thus little opportunity for increased income based on the addition of residents. Training residents is not offset by an increased number of patient evaluations, and therefore is unlikely to provide increased income to support the administration of an EM residency.

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Address for Correspondence: Scott Krall MD, MBA, Graduate Medical Education, Department of Emergency Medicine, Christus Spohn Memorial Hospital, 2606 Hospital Blvd., Corpus Christi, TX 78404. Email: Scott.Krall@christushealth.org

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