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Triage physicians in an academic emergency department: Impact on resident education

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ABSTRACT

Background: Overcrowding in emergency departments (EDs) in the United States has been linked to worse patient outcomes. Implementation of countermeasures such as a physician-in-triage (PIT) system have improved patient care and decreased wait times. The purpose of this study was to evaluate how a PIT system affects medical resident education in an academic ED.

Methods: This was a retrospective observational comparison of resident metrics at a single-site, urban, academic ED before and after implementing a PIT system. Resident metrics of average emergency severity index (ESI), patients-per-hour, and in-training-examination scores were measured before and six months after the implementation of the PIT system.

Results: In total, 18,231 patients were evaluated by all residents in the study period before PIT implementation compared to 17,008 in the study period following PIT implementation. The average ESI among patients evaluated by residents decreased from 3.00 to 2.68 ($p < 0.01$, 95% confidence interval [CI] = 0.31 to 0.33), while average resident patient-per-hour rate decreased from 1.41 to 1.32 ($p < 0.01$, 95% CI = 0.05 to 0.13) and ITE scores saw no statistically significant change of 76.11 to 78.26 ($p = 0.26$, 95% CI = -5.75 to 1.45). While these differences are statistically significant, they are likely not clinically significant.

Conclusions: Our implementation of PIT system at one academic medical center minimally increased the acuity and minimally decreased the number of patients that residents see. This suggested that in our center, a PIT program did not detract from ED resident clinical education. However, further research with alternative markers in multiple centers is needed.

Emergency department (ED) overcrowding is a well-established and widespread problem for both providers and patients. In the United States, the number of ED visits continues to rise each year with 139 million ED visits in 2017, a 19% increase from 2007.¹ In response, many EDs have trialed various strategies to increase efficiency.² One such strategy is the physician-in-triage (PIT) system, which staffs a physician in the triage or waiting room area whose primary purpose is to perform a quick patient assessment. Previous studies have shown that the PIT model improves various ED performance metrics, such as decreasing

elopement and left-without-being-seen rates and decreasing total ED length of stay (LOS).^{3,4} Additionally, the PIT system has been shown to be a sustainable modification that continues to positively impact patient care and ED operations.^{5,6}

There is some previous research on the impact of PIT docs on resident education. Nicks et al.⁷ used a Likert scale to rate residents' opinions regarding the PIT process on resident education. They found that residents felt neither a negative nor positive impact on their education overall. However, the residents felt that development of differential diagnosis was negatively

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impacted and patient throughput was positively impacted. Svirsky et al.⁸ examined the effect of resident-driven triage system on patient LOS and found a 37-minute decrease in LOS when compared to a control group. However, this study did not measure any quantitative data related to the effects on resident education. The authors found no previous studies evaluating quantitative data of the effect of attending-staffed PIT systems on academic emergency medicine programs and resident education.

This paper sought to examine whether attending-staffed PIT systems detracted from resident education by evaluating quantitative surrogate markers of resident clinical education including the patient Emergency Severity Index (ESI) score, resident patients-per-hour, and resident in-training examination (ITE) scores. As PIT systems become more common, it is important for medical educators to know the effects it may have on resident education.

METHODS

Study Design

This study is a retrospective observational before-and-after comparison of resident metrics at a single-site, urban, academic, 3-year emergency medicine residency program with eight residents per class. This study was determined to be exempt by the university institutional review board.

Study Setting and Population

The hospital is a level I trauma center, stroke-receiving center, burn center, psych-receiving center, and STEMI-receiving center. The study was conducted over a 6-month period (July–December 2013) before the attending PIT system was implemented, and over a 6-month period (July–December 2015) after the attending PIT system was implemented in January 2015. Attending PIT shifts were scheduled for 10:00 AM to 01:00 AM, 7 days per week, for a total of 15 hours of attending PIT coverage per day. At our institution and many others advanced life support and trauma ambulance runs bypass the triage system and are therefore unaffected by the PIT system. We collected metrics for all patients seen by residents during this time period (24 hours daily) to get an overall view on resident clinical experience before and after.

Key Outcome Measures

We used the ESI as a surrogate marker for the percentage of critical patients, which is considered to be

an important aspect of emergency medicine resident education with minimums required by the Accreditation Council for Graduate Medical Education (ACGME).⁹ Resident patients-per-hour was selected as another indicator of educational quality because caring for more patients infers a wider breadth of clinico-pathologic exposure and experience. Finally, annual ITE scores were assessed. The American Board of Emergency Medicine (ABEM)¹⁰ has shown that ITE scores correlate to performance on the ABEM qualifying examination (and therefore board certification), although prior authors have acknowledged that ITE scores are subject to many confounding factors such as residency didactics and individual resident study habits and may not correlate directly with clinical ability. However, they were also examined as part of this study as an objective measurement of resident education.

Data Analysis

The electronic medical record (Allscripts Quest) was used to retrieve this data. We used Microsoft Excel 2016 and its native data analysis function to determine statistical significance with t-test analyses. The analysis was further subdivided by resident PGY-year to better evaluate the impact of a PIT system on the different stages of training.

RESULTS

A total of 17,860 patients were evaluated by all residents in the study period before PIT implementation compared to 16,525 in the study period following PIT implementation. The average ESI among patients evaluated by residents decreased from 3.00 to 2.68 ($p < 0.01$, 95% confidence interval [CI] = 0.31 to 0.33), while average resident patient-per-hour rate decreased from 1.41 to 1.32 ($p < 0.01$, 95% CI = 0.05 to 0.13]. These results are broken down in Tables 1–3. Furthermore, ITE scores saw no

Table 1
Average ESI Per Patient Before and After Implementation of PIT System

Average ESI	Before PIT	After PIT	p-value [95% CI]
All residents	3.00	2.68	<0.00001 [-0.31 to -0.34]
PGY-3	2.95	2.57	<0.00001 [-0.36 to -0.40]
PGY-2	3.05	2.66	<0.00001 [-0.37 to -0.41]
PGY-1	3.02	2.87	<0.00001 [-0.12 to -0.18]

ESI = Emergency Severity Index; PIT = physician-in-triage.

Table 2
Patient Count by ESI Before and After Implementation of PIT System

PGY Level	ESI	Patient Count (No.)		
		Before PIT	After PIT	% Change
PGY-3	1	69	170	+146%
	2	1,916	2,741	+43%
	3	4,225	2,561	-39%
	4	1,362	473	-65%
	5	141	18	-87%
PGY-2	1	49	117	+139%
	2	1,211	2,520	+108%
	3	3,667	3,158	-14%
	4	1,368	546	-60%
	5	133	12	-91%
PGY-3	1	32	8	-75%
	2	763	1,112	+46%
	3	2,083	2,535	+21%
	4	766	539	-30%
	5	75	15	-80%

ESI = Emergency Severity Index; PIT = physician-in-triage.

statistically significant change of 76.11 to 78.26 ($p = 0.26$, 95% CI = -5.75 to 1.45).

DISCUSSION

Our study demonstrates that while there may be small statistically significant differences after implementation of a PIT system, they are likely not statistically significant and do not detract from resident clinical experience. While both the average ESI seen and treated by residents and the residents' patients-per-hour decreased and were statistically significant, the small overall average changes of 0.32 and 0.11, respectively, are of unclear educational significance. We acknowledge that regardless of the statistical significance there is no definitive threshold at which these numbers would matter except if PIT caused overall patient numbers or percentage of critically ill patients to drop below ACGME requirements. Future research could evaluate

Table 3
Average Patients Seen Per Hour Before and After Implementation of PIT System

No. of Patients Seen Per Hour	Before PIT	After PIT	p-value [95% CI]
All residents	1.41	1.32	<0.00001 [-0.05 to -0.13]
PGY-3	1.77	1.75	0.6762 [-0.11 to 0.07]
PGY-2	1.58	1.39	<0.00001 [-0.13 to -0.25]
PGY-1	0.88	0.92	0.1302 [-0.01 to 0.09]

PIT = physician-in-triage.

more specific information such as patient complexity with chart billing.

Consistent with the findings of Nicks et al.⁷ there are some concerns that adopting an attending-PIT system may decrease opportunities for residents to evaluate undifferentiated patients or may introduce cognitive bias into the residents' decision-making process. Previous studies have shown that bias can be amplified during the triage process due to the limited evaluations and time spent with the patient resulting in anchoring or premature closure.¹¹ Other studies have shown that there can be variation between nursing and physician orders placed during the triage process with over and under ordering occurring; however, we were unable to find literature on physician-to-physician triage order variations or more in-depth analysis of cognitive or triage bias on resident learners at institution with PIT systems.¹² As such, residents should learn early how to manage this potential source of cognitive bias while still under the relative protection of their training program.

LIMITATIONS

The authors recognize that this study has limitations. This was a single-center study at an urban academic emergency medicine residency program and results may not be generalizable to other clinical settings. We did implement a nurse practitioner and fast-track system at around the same time so they may have had confounding effects. However, our overall ED volumes did not change significantly during this time. In addition, resident education is difficult to objectively quantify. Weston et al.¹³ used other quantitative surrogates including LOS, door-to-provider time, proportion of left without being seen, and patient satisfaction scores to determine effectiveness of residents in triage. However, this seems to weigh in on resident efficiency which does not necessarily correlate to educational value. Therefore, as the metrics chosen in this study and others are surrogates of resident education, there are other aspects such as procedures numbers, patient interactions, billing complexity, etc., that will require further research.

CONCLUSION

Our data suggest that attending physician-in-triage systems at academic medical centers minimally increase the acuity and minimally decrease the number of patients that residents see; however, these minimally statistically significant changes are unlikely to be

educationally significant. As EDs overcrowding increases, physician-in-triage systems may continue to grow in many academic centers. These results may be of interest to centers seeking to implement physician-in-triage systems.

References

1. Rui P, Kang K. National Hospital Ambulatory Medical Care Survey: 2017 Emergency Department Summary Tables. National Center for Health Statistics. Available at: https://www.cdc.gov/nchs/data/nhamcs/web_tables/2017_ed_web_tables-508.pdf. Accessed January 5, 2020.
2. Eitel DR, Rudkin SE, Malvey MA, Killeen JP, Pines JM. Improving service quality by understanding emergency department flow: a white paper and position statement prepared for the American Academy of Emergency Medicine. *J Emerg Med* 2010;38:70–9.
3. Partovi SN, Nelson BK, Bryan ED, Walsh MJ. Faculty triage shortens emergency department length of stay. *Acad Emerg Med* 2001;8:990–5.
4. White BA, Brown DF, Sinclair J, et al. Supplemented Triage and Rapid Treatment (START) improves performance measures in the emergency department. *J Emerg Med* 2012;42:322–8.
5. Soremekun OA, Biddinger PD, White BA, et al. Operational and financial impact of physician screening in the ED. *Am J Emerg Med* 2012;30:532–9.
6. Rogg JG, White BA, Biddinger PD, Chang Y, Brown DF. A long-term analysis of physician triage screening in the emergency department. *Acad Emerg Med* 2013;20:374–80.
7. Nicks BA, Mahler S, Manthey D. Impact of physician-in-triage process on resident education. *West J Emerg Med* 2014;15:902–7.
8. Svirsky I, Stoneking LR, Grall K, Berkman M, Stolz U, Shirazi F. Resident-initiated advanced triage effect on emergency department patient flow. *J Emerg Med* 2013;45:746–51.
9. Accreditation Council for Graduate Medical Education. ACGME Program Requirements for Graduate Medical Education in Emergency Medicine. Available at: https://www.acgme.org/Portals/0/PFAssets/ProgramRequirements/110_EmergencyMedicine_2019_TCC.pdf?ver=2019-06-11-153018-223. Accessed April 16, 2020.
10. ABEM. American Board of Emergency Medicine In-training examination overview Available at: <http://www.abem.org>. Accessed April 10, 2020.
11. Croskerry P. Achieving quality in clinical decision making: cognitive strategies and detection of bias. *Acad Emerg Med* 2002;9:1184–204.
12. Seaberg DC, MacLeod BA. Correlation between triage nurse and physician ordering of ED tests. *Am J Emerg Med* 1998;16:8–11.
13. Weston V, Jain SK, Gottlieb M, et al. Effectiveness of resident physicians as triage liaison providers in an academic emergency department. *West J Emerg Med* 2017;18:577–84.