

DOES A PROVIDER IN TRIAGE AND RAPID MEDICAL EVALUATION HELP WITH LEFT WITHOUT BEING SEEN RATES AND ED CROWDING?



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CE Earn Up to 7.5 Hours. See page 114.

Contribution to Emergency Nursing Practice

- The current state of scientific knowledge points to the benefits of rapid medical evaluation (RME) and RME with a provider in triage (PIT) on crowding metrics.
- The main findings of this research are that RME may reduce ED crowding, particularly for less acute patients, and that anecdotal benefits associated with a PIT may overshadow length of stay increases for some patients.
- Key implications for emergency nursing practice associated with implementation of RME include creating standardization, reducing variability, and potentially reducing crowding.

Abstract

Introduction: Attempting to reduce ED crowding, the ED team at a rural academic medical center and specialty hospital

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implemented rapid medical evaluation (RME) with and without a provider in triage (PIT). The purpose of this performance improvement project was to explore how these interventions affected crowding metrics of door-to-disposition time, ED length of stay (LOS), and left without being seen (LWBS) rates for all patients.

Methods: Using a prospective 2-group design, the pre-RME population served as the historical control group, and postintervention groups included both RME with and without PIT. Group comparisons of crowding metrics included pre- and post-RME with and without PIT.

Results: There were no statistically significant differences in any of the crowding metrics for the emergency severity index (ESI) 3 groups pre- or post-RME. However, mean door-to-disposition times for the post-RME ESI 5 population were shorter compared with the pre-RME ESI 5 patients (2:59:23 vs. 2:00:42; $P = 0.037$). Analysis of the post-RME population with and without PIT did not demonstrate significant differences across ESI 3 or 5 groups. Comparisons of post-RME data revealed a significant increase in ED LOS for all admitted patients regardless of their ESI ($P = 0.023$) and also door-to-disposition times for ESI level-4 patient groups, both with and without PIT ($P = 0.022$).

Implications for Practice: The findings support other studies demonstrating that RME can have positive impact on ED crowding metrics for some patients. Although PIT took longer for some patients, anecdotal findings revealed benefits related to direct discharges and admission occurring during the RME process.

Key words: ED crowding; Triage; Rapid medical evaluation; Provider in triage; Physician in triage; Left without being seen

The Emergency Nurses Association 2014 Position Statement on Holding, Crowding, Boarding, and Patient Throughput, recognizes that crowding is a hospital-wide systems issue and encourages emergency

nurses to participate in research and generate solutions that address ED crowding.¹ Defined as the need for services exceeding the department's resources that affects the staff's ability to administer timely patient care, crowding is often caused by boarding patients in the emergency department and is further exacerbated by a lack of psychiatric resources.^{1,2}

The impact of boarding on ED wait times (from registration to bed placement in the treatment area) is well documented in the literature.¹⁻³ Nationally, these wait times, ranging from 1 to 4 hours, also affect ED length of stay (ED LOS).³ Current Centers for Disease Control (CDC) data estimate that 23.4% of patients experience ED LOS greater than 4 hours.³ Regardless of the cause, extended wait times and LOS have a negative impact on the ability to bed new patients and increase the likelihood that patients leave before they are examined by a physician, advanced practice RN, or physician's assistant.^{2,4}

Patients who register, but leave without being seen (LWBS or leave before being seen-LBBS), accounted for 1.2% of all ED visits in 2014.³ Although 1.2% may seem like a small percentage, this data point implies that 2.68 million people left emergency departments without seeing a provider.³ Every patient who leaves without being seen is a cause for concern because a severely ill patient may be walking away untreated, thus increasing their individual risk of morbidity and mortality. Recognizing the importance of efficient ED care, timeframes associated with LWBS, ED LOS, and the patient's arrival time to disposition (door-to-disposition) are considered valid indicators of ED crowding.⁴⁻⁶ Therefore, targeted evidence-based strategies are needed that improve access to timely appropriate treatment, decrease LWBS rates, and ultimately promote healthy outcomes.^{5,6}

Addressing these needs for emergency departments facing capacity challenges, the American College of Emergency Physicians (ACEP) recommends placing a physician in triage (PIT) to identify and initiate care for higher-acuity patients and discharge less acute patients.² A review of triage interventions that measured LWBS rates confirmed the use of the PIT as a strategy that could be effective in reducing LWBS rates.^{6,7} Another triage strategy shown to be effective in decreasing LWBS and wait times in some studies was implementation of a rapid medical evaluation (RME).⁸ RME is both a process to start diagnostic evaluations routinely on ambulatory patients with the longest waits and a physical location with the space to conduct them.⁸ However, a systematic review of the RME literature found that process and staffing levels varied among studies.⁸

Background

The emergency department at the center of this performance improvement (PI) project had variable LWBS rates, some surpassing our unit goal of 1.8%. Seeking to decrease LWBS rates and ED LOS rates for our patients, a team consisting of ED leadership and hospital systems engineers reviewed 2 years of ED metrics and discovered that Monday was the busiest day of the week, with a 6% higher volume.⁹ The emergency department was frequently at bed capacity early in the afternoon, and this crowding resulted in creating hallway beds for patients with census peaks by the evening.

Further data analysis revealed 60% of all our ED visits involved obtaining laboratory work, and 40% involved radiologic examinations.⁹ The data analysis trends also indicated that emergency severity index (ESI) level-3 patients had the highest average wait time from registration to room placement.⁹ Based on these trends, ED leadership implemented triage strategies aimed at reducing the time spent in the emergency department by the ESI 3 patient population. The rationale underlying ED leadership's decision to target the ESI 3 population was based upon the premise that decreasing ED crowding metrics (door-to-disposition time, ED LOS, and LWBS) for this group could also affect these timeframes across all ESI categories. Although boarding and throughput challenges were also factors affecting our ED crowding, another team was exploring solutions to address these challenges. Therefore, these data were excluded from this PI initiative, and we did not include boarding times as a metric in this project.

The purpose of this PI project was to standardize processes for and evaluate differences of RME with and without a PIT on ED crowding metrics (door-to-disposition time, ED LOS and LWBS).

Methods

Using a prospective 2-group design with a historical comparison group, the pre-RME population served as the control group. The pre-RME control group included ED patients treated on Mondays during an 8-week period in the year before implementation of the intervention (2015). The post-RME population with and without PIT served as the 2 intervention groups with data collection occurring in 2016. The post-RME population included patients treated in the emergency department on Mondays during an 8-week timeframe: 4 Mondays with and 4

without a dedicated PIT. The project compared preimplementation ED crowding metrics (door-to-disposition time, ED LOS, and LWBS rates) with post-RME metrics on 8 consecutive Mondays 1 year apart. Post-RME data were further analyzed to compare days with a PIT and without a PIT, when nurse protocols were used. This design allowed the PI team to control for day of the week and time of the year, thus reducing the seasonal variations of patient volume experienced within the emergency department. Additional method design incorporated controls for staffing levels and flow processes. As patients moved throughout in the RME with and without PIT, tracking measures were standardized to promote nurse-physician-ED tech communication in the RME. Staffing levels were adjusted to provide consistent staff patterns and roles on Mondays during the project.

SETTING AND SAMPLE

The setting was a 41-bed emergency department (that can increase to 56 with hallway beds) at a rural safety-net tertiary-care academic medical center (AMC) located in the southeastern United States. The emergency department has 61,000 annual visits; 25% of these patients are admitted to the hospital, which has 600 inpatient beds. The department consists of 3 areas: the main emergency department for adults, express care for ESI 4-5 patients, and a pediatric area. The Institutional Review Board approval was obtained before implementation of the RME and PIT. No consent was required.

The RME/PIT program was housed in the former triage area of the emergency department and encompassed 5 treatment bays to accommodate diagnostic or treatment interventions. All patients registering in the emergency department on the Mondays during the PI period were included in this project. Any patient with a chief complaint that required a mental health evaluation was excluded.

INTERVENTION

The goal of the RME intervention was to begin diagnostic evaluation during periods of increased patient volume, with the patient spending less than 15 minutes in the designated RME area. Afterward, the patient returned to the waiting room and waited for a main ED bed. The RME without PIT operated through the use of protocols, which allowed the nurse to initiate diagnostic interventions for patients. For example, a urine specimen was collected when a patient presented with a complaint of pain with urination or patient with a potential fracture could be sent for an x-ray. Nurse-

protocol interventions were not performed if wait times were less than 30 minutes or if patients could be directly bedded to the main emergency department, express care, or pediatric areas. However, electrocardiograms (ECGs) were performed for all patients with chest pain, regardless of presence of PIT, and patients awaiting triage took precedence over initiating nurse-protocols and patient discharges.

The established RME hours were from 1100 to 1900 and reflected the largest patient volumes in the department. The RME was staffed with 2 emergency nurses and 2 ED techs. This workforce pattern represented an additional ED tech resource, which was greater than normal staffing levels. One emergency nurse acted as the primary triage nurse and the other as the intake nurse who focused on patient placement and triaged as needed.

The processes for the RME with PIT phase mirrored the RME phase with the addition of a dedicated third-year emergency medicine resident under the supervision of an emergency medicine attending physician. The PITs voluntarily signed up for RME shifts (1100–1900) as additional work time with added pay. The PIT either listened to the assessment as the nurse triaged the patient or stepped in to evaluate the patient further. Based on this assessment, the PIT entered orders into the electronic health record (EHR). The nurses did not use protocol orders in the RME with the PIT. The exception to this approach was the chest-pain protocol, which allowed RME staff to initiate ECGs as soon as patients presented to the emergency department. With all other diagnostic conditions, the PIT initiated orders in the EHR with the goal of providing safe and timely care.

PROCEDURES

ED clinicians implemented the PI project on 8 Mondays to avoid the introduction of variability due to day of the week. The pre-RME data were derived from 8 Mondays during the same timeframe in the previous year. The post-RME included 4 RME Mondays with a PIT and 4 RME Mondays without a PIT. All emergency nurses and physicians received e-mails with detailed instructions on the RME mission and general process. To standardize the RME process, 5 to 10 minutes before team members began their shift in the RME, staff members were reminded of procedures and processes to track patient flow. During the team huddle, the importance of triage nurse documentation in the EHR to capture all patient movement from the RME back to the waiting area, as well as procedure completion, was emphasized. These were key data points that contributed

TABLE 1

Rapid medical evaluation (RME) staff process with and without a provider in triage (PIT)*

Step	RME without PIT using nurse protocols	RME with PIT
1	Triage nurse or ED tech physically brings patient to triage bay.	SAME
2	Triage nurse drags patient name, in electronic health record (EHR) from waiting room to respective triage bay.	SAME
3	Nurse triages patient.	Nurse triages patient while PIT either passively listens to triage or actively questions patient.
4	If intervention or evaluation is required, nurse or tech moves patient to another RME bay physically and drags patient name to RME bay in the EHR. Triage nurse inputs desired protocol orders in computer.	PIT places desired orders in computer and types “labs ordered,” “UA ordered,” and/or “x-ray ordered” in patient comments section of EHR.
5	ED tech or RME nurse collects any ordered blood or urine specimens, places IV, and changes comments to “labs done” or “urine done” in EHR.	SAME plus simple treatments may be performed or different labs could be ordered.
6	If patient requires an x-ray, ED tech drags patient name in EHR to waiting room, changes comments to “x-ray done,” and ED tech physically takes patient to radiology.	SAME
7	If no interventions required or when all orders completed, patient physically leaves RME and name in EHR is dragged from RME bay to waiting room.	SAME
8	Second nurse coordinated patient placement in main ED bed, performed as second triage nurse as needed, monitored waiting room and monitored lab results and changed comments to “labs resulted.”	SAME, but PIT monitored labs. Patient discharges and admission direct from RME with PIT but also required an attending physician evaluation.

* The process time-stamped patient movement in an RME bay location in EHR, but reports were not available at time of PI project. The RME was staffed with 2 nurses plus 2 ED techs on both days with and without the PIT.

to the assessment of PIT versus protocol-driven RME. The tasks of the RME triage nurse with and without the PIT are outlined in [Table 1](#).

Pertinent EHR data points for each patient in the post-RME group were compiled no sooner than 24 hours after each Monday, but analysis was not conducted until all project data were collected. The ED-crowding metric data for this evaluation were pulled from previously established ED reports that compiled EHR patient data as a standard. Demographic information was obtained from these reports and an additional pre-established registration system so that between-group differences could be analyzed.

MEASURES

ED crowding metrics measured number of patients registered, door-to-disposition time (calculated by adding door-to-MD time plus MD-to-disposition decision time),

and overall ED LOS categorized by admission and discharge category, and number of patients LWBS. Demographic data obtained from EHR included age, gender, ethnic background, admitting complaint or diagnosis, and ESI triage category.

DATA ANALYSIS

The quantitative data analysis was completed in coordination with—and reviewed for accuracy by—university statisticians using IBM SPSS statistics v.24 (SPSS, IBM, Armonk, New York). Descriptive statistics were computed on demographic information including age, gender, ethnicity, race, and disposition. Pearson’s chi-square was conducted to evaluate differences between the pre- and post-RME patient population in terms of age, gender, ethnicity, race, and disposition. A simple Student’s *t*-test was used to compare average door-to-disposition time by

ESI level, and average ED LOS by admission and discharge category. Descriptive statistics were also calculated for these variables, including the number and percentage of LWBS patient encounters.

Results

PRE- AND POST-RME RESULTS

The pre-RME patient population consisted of 1,417 patients with an average age of 41 years. The majority of patients were non-Hispanic (93.8%), female (51.6%), and white (66.0%). The post-RME population included 1,469 patients with an average age of 42 years. The majority of patients were non-Hispanic (93.7%), female (54.6%), and white (65.3%). Pearson's chi-square demonstrated no statistically significant difference in age, gender, ethnicity, race, or disposition among the populations. There were fewer ESI 2-3 patients in the pre-RME population ($N = 938$, 69.3%) compared with the post-RME population ($N = 1019$, 73.9%). A statistically significant difference between the pre- and postintervention groups ($P = 0.029$) indicated that the post-RME patients had a higher acuity and required additional resources.

There were no statistically significant differences in any of the crowding metrics for the pre-RME ESI 3 group compared with the post-RME group. In fact, there were very few differences between any of the pre-RME and post-RME crowding metrics across any patient groupings. Even with higher-acuity level in the overall post-RME group, the LWBS rate was not statistically different among populations (5.6% vs. 5.4%; $P = 0.585$) and neither was the ED LOS for admissions (8:09:00 vs. 7:56:00; $P = 0.515$) or discharges (4:32:00 vs. 4:36:00; $P = 0.649$). However, the average door-to-disposition times were significantly different for patients with ESI 5 acuity levels. The pre-RME ESI 5 patients' average time was 2:59:23, compared with the shorter post-RME ESI 5 time of 2:00:42 ($P = 0.037$). No statistical differences were noted in other pre- and post-RME ESI categories (Table 2).

POST-RME WITH AND WITHOUT PIT

The RME with PIT population was composed of 714 patients. The RME without PIT population included 755 patients. Further analysis of the post-RME population comparing Mondays with and without PIT did not demonstrate any significant differences between the 2 groups. Pearson's chi-square demonstrated no statistically significant difference in age, gender, ethnicity, race, or disposition

between the populations. Furthermore, the LWBS rate was not statistically different between populations (5.5% vs. 5.3%; $P = 0.482$). On post-RME with PIT days, both the average ED LOS of admitted patients (53-minute increase; $P = 0.023$) and ESI 4 door-to-disposition times (28-minute increase; $P = 0.022$) were statistically different from the post-RME without PIT days (Table 3). All other metrics did not demonstrate statistical differences in the pre- and post-RME process with or without PIT.

Discussion

Despite the interventions targeted at the ESI 3 patient population, no statistically significant differences were identified between these pre-RME and post-RME with or without PIT groups. It is, however, interesting that although the overall post-RME sample population had a significantly higher acuity than the pre-RME population, the LWBS and ED LOS did not differ. In fact, the RME processes may have helped to stabilize the LWBS rate and ED LOS metric, thus preventing patients from leaving and increasing ED LOS. Perhaps the RME processes aimed at ESI 3 patients influenced other ESI populations. Efforts to streamline procedures, standardize communication, and reduce variability in care may have positively influenced metrics across all ESI populations. The statistically significant decrease in door-to-disposition time for the ESI 5 patient population between the pre- and post-RME intervention is a noteworthy point. The reduction in ESI 5 door-to-disposition times by approximately 59 minutes is clinically relevant and could translate into increased throughput for the emergency department. This reduction in door-to-disposition could reallocate additional minutes devoted to caring for higher-acuity patients. Perhaps the faster pace at which ESI 5 were treated and discharged could have decreased crowding and improved satisfaction, and therefore contributed to stable LWBS rates.

In the post-RME group with PIT, no statistical differences were found with LWBS rates. Yet, in the post-RME with PIT group, increases in both the LOS for admitted patients ($P = 0.023$) and door-to-disposition times for ESI 4 patients ($P = 0.022$) were statistically significant. Although these findings may appear to indicate that the RME with a PIT was not of benefit or detrimental to throughput, these results may instead be the outcomes associated with implementing a new process. Furthermore, anecdotal findings from ED leadership revealed that PIT was able to discharge multiple less acute patients who did

TABLE 2
Average door-to-disposition times: pre-RME (historical control) vs. post-RME

Acuity level*	Pre-RME N	Pre-RME average door-to-disposition [†] (h:mm:ss)	Post-RME N	Post-RME average door-to-disposition (h:mm:ss)	Missing cases	Average Difference (h:mm:ss)	P value (t-test)
Null Acuity	9	2:55:53	5	2:00:48	40	-0:55:05	0.245
ESI 1	5	1:14:00	4	1:40:45	2	+0:26:45	0.298
ESI 2	173	3:36:16	219	4:03:00	8	+0:26:44	0.079
ESI 3	765	4:46:10	800	4:52:07	103	+0:05:57	0.474
ESI 4	323	3:11:18	300	2:57:28	55	-0:13:50	0.125
ESI 5	36	2:59:23	23	2:00:42	16	-0:58:42	0.037
Missing cases	106		118		N/A		
Total	1417		1469				

RME, rapid medical evaluation.

* Acuity defined by emergency severity index (ESI) level used in triage. The most emergent patient requiring lifesaving measures is ESI 1, and the lowest resourced routine patient is ESI 5.

† Door-to-disposition times in hours: minutes: seconds. *P* < 0.05 is significant.

not require any further care. Acutely ill patients were also treated more expeditiously; 1 patient was even sent to the operating room directly from the RME before a main treatment bed was available. The ability to perform these func-

tions in the RME instead of waiting longer for a main ED space is a patient care benefit and decreases the number of people in the waiting room. Unfortunately, the frequency of these occurrences by the PIT were not captured in these

TABLE 3
Mean door-to-disposition times: RME without PIT vs. RME with PIT

Acuity level*	RME w/o PIT N	RME w/o PIT average door-to-disposition [†] (h:mm:ss)	RME with PIT N	RME with PIT average door-to-disposition (h:mm:ss)	Missing cases	Average difference (h:mm:ss)	P value (t-test)
Null Acuity	3	2:21:20	2	1:30:00	20	-0:51:20	0.584
ESI 1	3	1:56:40	1	0:53:00	1	-1:03:40	0.263
ESI 2	118	4:00:09	101	4:06:18	3	+0:06:09	0.757
ESI 3	404	4:44:19	396	5:00:05	64	+0:15:45	0.157
ESI 4	153	2:43:41	147	3:11:49	25	+0:28:09	0.022
ESI 5	12	1:44:35	11	2:18:16	5	+0:33:41	0.228
Missing cases	62		56		118		
Total w/missing cases	755		714				
Disposition							
ED LOS Admission	205	7:32:00	175	8:25:00	1	+0:53:00	0.023
ED LOS Discharges	491	4:26:00	484	4:46:00	0	+0:20:00	0.052
Total	696		659				

RME, rapid medical evaluation; PIT, provider in triage; ED LOS, emergency department length of stay.

* Acuity defined by emergency severity index (ESI) level used in triage. The most emergent patient requiring lifesaving measures is ESI 1, and the lowest resourced routine patient is ESI 5.

† Door-to-disposition times in hours: minutes: seconds. *P* < 0.05 is significant.

results, and the scope of these events are not fully appreciated. In addition, as the PIT was an emergency medicine resident, increased times could also reflect additional time spent waiting for the required attending physician evaluation prior to any admission, transfer, or discharge recommended by the resident. Using independent providers, such as an attending physician or nurse practitioner, could have decreased the time patients spent in the emergency department. The true influence of the PIT on crowding metrics needs further exploration.

LIMITATIONS

Several limitations associated with this PI project. The lack of a power analysis to determine sample size could have had an impact on the ability to detect the pre- and postintervention differences. In addition, the year separating the pre- and post-RME samples created a historical threat to internal validity related to time, which could have influenced the findings but accounts for season variation. Generalizability is limited, as the project was performed at 1 site. Data collection was limited to 8 Mondays related to staffing availability and may not have allowed staff to gain fluency and proficiency with the RME process and PIT workflow. The EHR limited the variables, such as "time to lab work collected" or "time spent in RME," which would be more direct measures of the RME/PIT. The EHR was unable to capture that the PIT had evaluated a patient in the RME, which, if accounted for, would have reduced the LWBS rate. This distinction was important to medical leadership, as any patient who left after a provider (PIT) evaluation would not be included in the reportable LWBS rate. Other factors that could have had impact on the findings are related to physical space limitations of the triage/RME area.

Implications for Emergency Nurses

The findings support and build on other studies that demonstrate the RME can affect ED crowding metrics. Despite the increased acuity, the ED crowding metrics remained stable in the post-RME population. It is inferred that the RME processes that were established positively contributed to efforts that stabilized the metrics. Standardizing procedures, streamlining communication, and reducing variability in practice may have benefitted patients who underwent RME. The findings and the methods used may be of interest to other rural academic medical centers

that wish to implement the RME and PIT strategies to have an effect on ED crowding.

Conclusion

Although the RME with and without PIT interventions were built to target the ESI 3 patient population, the interventions did not significantly improve ED crowding metrics for this group. However, the RME process may have positively influenced other patient-acuity populations. Despite an increase in acuity within the post-RME patient population, LWBS rates, door-to-disposition times, and ED LOS did not differ between the pre- and post-RME groups. The statistically significant reduction in ESI 5 door-to-disposition times in the post-RME group highlights the potential benefit of the RME process. Although the post-RME with PIT did not demonstrate any significant time improvements over RME without PIT, anecdotal findings revealed that some patients were discharged or admitted directly from the RME.

The RME with PIT was a new process and was only studied across 4 Mondays. Additional time to acclimate to the new process may lead to different results. Subsequent evaluation is warranted to determine if RME with PIT is more or less effective as RME without a PIT using nurse protocols. Future projects with tighter controls will shed additional light on the opportunities that RME processes may provide.

RME/PIT are possible strategies to mitigate ED crowding by initiating diagnostic interventions when there is no space available in the traditional ED treatment area.

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