Health Care Provider in Triage to Improve Outcomes

Authors: Susan Spencer, DNP, RN, NE-BC, Kimberly Stephens, DNP, RN, Brenda Swanson-Biearman, DNP, MPH, RN, and Kimberly Whiteman, DNP, RN, Akron, OH, Waynesburg, Pittsburgh, PA
Section Editors: Cindy D. Kumar, MSN, RN, AG-ACNP-BC, FNP-BC, ENP-C, and Darleen A. Williams, DNP, APRN, CEN, CCNS, CNS-BC, EMT-P

Contribution to Emergency Nursing Practice

- The purpose of this evidence-based practice improvement project was to implement and measure the impact of a combined split-flow model and provider-in-triage model on throughput.
- The primary outcome of this practice improvement project was improved throughput metrics and patient satisfaction in the emergency department.
- Key implications for emergency nursing practice based on this project are consistency and standardization in best practices, collaboration with advanced practice providers and physicians, and recognizing the positive outcomes for throughput relative to best practices.

Abstract

Problem: Emergency departments throughout the nation are experiencing crowding related to increased patient volumes and decreased hospital inpatient bed capacity. As a result of lengthy wait times, patients are leaving without having medical treatment, and satisfaction is poor. The purpose of this quality improvement initiative was placing a provider in triage to complement the existing split-flow process aimed to decrease wait times to see a provider, length of stay (LOS), left without being seen (LWBS) rates, and improve patient satisfaction.

Methods: A multiprofessional team was established. Nurses, advanced practice providers, and physicians collaborated on a project to place a provider in triage to assist in seeing patients as soon as possible and begin care or treatment.

Results: The outcomes of the initiative were positive for ED LOS metrics and patient satisfaction. Door-to-provider time decreased from a high of 56 minutes to a low of 13 minutes. The percentage of patients LWBS decreased from a high of 12% to a low of 1.62%.

Discussion: The project showed that the evidence-based practice of a combined split-flow and provider-in-triage model resulted in improvements in throughput for patients who were treated and released from the emergency department.

Key words: Provider in triage; Split flow; Throughput; Overcrowding; ED wait times; Left without being seen

Susan Spencer is Executive Director, Emergency Services, Cleveland Clinic Akron General, Akron, OH.

Kimberly Stephens is Assistant Professor of Nursing and Co-Director, GAPS Nursing Program and DNP Program, Waynesburg University, Waynesburg, PA.

Brenda Swanson-Biearman is Assistant Professor, Department of Physician Assistant Studies, Duquesne University, Pittsburgh, PA.

Kimberly Whiteman is Assistant Professor of Nursing and Co-Director, GAPS Nursing Program and DNP Program, Waynesburg University, Waynesburg, PA.

For correspondence, write: Susan Spencer, DNP, RN, NE-BC, 6578 Avalon Street NW, Canton OH 44708; E-mail: Susanspencer1004@yahoo.com.

J Emerg Nurs 2019;45:561-6.
Available online 1 March 2019
0099-1767

https://doi.org/10.1016/j.jen.2019.01.008

ED crowding is a symptom of a system-wide health care problem resulting from increased patient volumes and decreased hospital inpatient bed capacity.[1] Multiple studies show a correlation between ED crowding, long wait times, patients who leave without being seen (LWBS) by a provider, and poor patient satisfaction.[2] Overcrowding and long waits in the emergency department may compromise patient quality and safety.[3]

The Centers for Medicare & Medicaid Service (CMS) developed 5 ED overcrowding measures that are commonly used to assess efficiency: the median time for arrival to discharge, door-to-provider time, rate of LWBS, median time from arrival to admission, and median time from the decision to admit to ED discharge for admitted patients.[3] The Emergency Department Benchmarking Alliance

(EDBA) comprises a group of leaders dedicated to improving ED quality and satisfaction metrics. Survey results from the EDBA for more than 1,800 emergency departments show operating statistics for 2017.[4]

Description of the Problem

Our not-for-profit hospital experienced an increasingly high inpatient census that was blocking access to beds for patients admitted through the emergency department. In 2016 and 2017, hospital capacity was frequently greater than 90%, and ED metrics showed high levels of LWBS and patient wait times related to increased boarding, crowding, and inefficient throughput. Boarding occurred as frequently as 4 days per week, with an average range of 10 to 15 patients waiting in the emergency department for hospital beds.

Literature Review

A literature review was completed based upon the following problem/patient/population intervention/indicator, comparison, outcome (PICO) question: In the emergency department, what are the evidence-based best practices for improving patient throughput? Two themes emerged in the literature as solutions to ED throughput issues: using a split-flow model and combining split flow with a provider in triage. Split flow, also called fast track, has been associated with improved ED throughput and patient satisfaction. Bish et al and Garrett et al[5,6] both studied the outcome of implementing a split-flow model in the emergency department and reported decreased LOS. Trends of improving patient satisfaction were also noted in the areas of wait time to see a physician and overall ED, physician, and nursing satisfaction.[5,6]

Split flow plus provider in triage during peak hours of operation has been shown to improve ED efficiency. The combination of split flow and provider in triage has been reported to be successful in a variety of settings. Milsten et al[7] reported on a split flow plus provider in triage for 16 hours per day in a 47-bed department that had 86,000 visits per year. Traub et al[8] implemented the split flow plus provider in triage for 12 hours per day in a 24-bed department suburban tertiary-care teaching hospital. Both reported decreased LWBS rates. In addition, Milsten et al[7] reported decreased door-to-provider time, and Traub et al[8] reported decrease in LOS. Similar results were found by Wiler et al[9] in a large urban academic level 1 trauma hospital with 74,000 annual visits. Door-to-provider times, LOS, and LWBS were decreased for the 6 months after implementation compared with the previous 6 months.[9]

Bonalumi et al[10] described the use of a front area of the emergency department, super-track area for low-acuity patients to be seen by a registration clerk, nurse, and provider. Door-to-provider times were reduced. LWBS rates decreased by 40%, and patient rating of overall satisfaction improved.[10]

Rationale

The Johns Hopkins Nursing Evidence-Based Practice Model was chosen to guide the project, and Kotter's model of 8 steps to leading change was employed during the implementation of practice changes.[11,12] The plan, do, study, act (PDSA) model was used for implementing and evaluating small test of change during the initial implementation.[13]

Purpose

The purpose of this evidence-based quality improvement initiative was to improve the quality of care provided in our emergency department as measured by decreased ED wait times, decreased number of patients who LWBS, and improved patient experience.

Methods

CONTEXT

Our emergency department is a level 1 trauma center with 37 treatment beds and more than 58,000 visits per year. Before implementation of the project, our median throughput time was 356 minutes for admitted patients. The median throughput time for discharged patients was 241 minutes. The door to provider time was 41 minutes, and LWBS rates ranged from 6% to 12%. In a national survey completed by the EDBA, median LOS for admitted patients was 335 minutes. The median LOS for discharged patients was 171 minutes, and LWBS rates were 3.1%.[4] Wait times and delays posed a concern because of the risk of reduced quality of care, poor patient outcomes, high LWBS rates, and low patient satisfaction.

Following the review of literature, we formed a multiprofessional team to review the problem, evaluate the evidence, and make recommendations for practice changes. The team consisted of the executive director of emergency services, the chief nursing officer, chair of emergency medicine, emergency nurse educator, business manager, physician assistant, nurse practitioner, residents, nurse managers, and staff nurses. *Ad hoc* members included registration clerks, radiology

technicians, transportation technicians, patient liaisons, and senior technicians. Practice gaps identified by the team were that our split-flow model was inconsistently implemented, and we had no provider in triage.

INTERVENTIONS

Interventions to reinforce the split-flow model included communication at daily huddles and staff meetings as well as an electronic presentation that was distributed via e-mail. Nursing managers were present in the department to confirm that split-flow processes were being followed and that staff members felt supported. Experienced nurses served as champions to help maintain compliance and provide peer-to-peer support.

While planning the provider in triage practice change, we first completed an analysis of patient volumes by time of day and determined that patient volumes tended to be highest between the hours of noon and midnight. Most of the lower-acuity patients, who would benefit from the split flow model, were cared for between the hours of 10 am and 10 pm. Following administrative approval, the triage area was staffed with an advanced-practice provider (APP)—either a nurse practitioner or a physician's assistant—during the highest volume hours each day. As we needed to hire more APPs, a lead APP assisted the chair of emergency medicine with onboarding and mentoring new providers.

During the onboarding of APPs, we trialed our process for placing a provider in triage. In September 2017, APPs staffed the position of provider in triage for 14 random weekdays throughout the month. Using the PDSA model for improvement, the team refined the triage process.[13] Although only 14 days were staffed with a provider in triage, the number of LWBS decreased from an average of 493 to 298 patients for the month. By November 2017, the full complement of APP staff was available and oriented and split flow with a provider in triage was implemented for 6 months.

MEASURES

Baseline data for the 6-month period immediately before implementation (May to October 2017) and for same 6-month period in the previous year (November to April 2016) was abstracted from the ED electronic medical record (EMR). The outcome measures for this project were patient presenting or door-to-hospital admission or door-to-discharge times, median overall LOS for admitted or discharged patients, LWBS rate, and patient satisfaction. The hospital admission times were defined as the time when admission orders were entered into the EMR. The discharge time was recorded as the time when the discharge orders were written. Data were reviewed on a daily basis, and if more than 5 patients LWBS, the business manager shared the information with the staff at a daily huddle and posted it on the department bulletin board. The project was discussed at monthly staff meetings. Patient-satisfaction scores were gathered via the Press Ganey surveys that were routinely given to patients who were seen in the emergency department and discharged to home.

Process measures included completion of education by staff as measured by class rosters, percentage of shifts with a provider in triage between noon and midnight, use of the split-flow model between 10 am and 10 pm, door to provider times, and LOS for low-acuity patients. The compliance with placing a provider in triage and with the split-flow model was monitored through APP schedules, daily ED assignments, and the EMR. The lead APP, nursing managers, assistant managers, and charge nurses were responsible for observing and coaching staff members for compliance with the new model of provider in triage. Nursing leaders, physician leaders, and hospital executives increased their visibility and rounding efforts to observe, answer questions, and help reinforce the importance of the project.

The total number of patient visits to the emergency department was a balancing measure in this project and was obtained using the standard quality reporting measures for the emergency department.

ANALYSIS

The impact of placing a provider in triage was analyzed using SAS Software version 9.4 (SAS, Cary, NC). Pre- and postimplementation data were compared using for door-to-provider times, LWBS rates, door-to-disposition times, median LOS times for all patients, median LOS for lower–level-acuity patients, and patient-satisfaction scores. For all analysis, a P value of ≤ 0.05 denoted statistical significance. P values for bivariate analyses were obtained from Wilcoxon rank sum tests. Six months of baseline data (May to October 2017) were compared with postimplementation data for November 2017 to April 2018. To account for seasonal variations in the severity of illness that could affect ED census, baseline data from the same 6 months of November 2016 to April 2017 was also compared with the postimplementation 6-month timeframe. Descriptive statistics were used to evaluate the process measures for completion of education and providers available for triage at the assigned times.

ETHICAL CONSIDERATIONS

This project was approved by the Institutional Review Board at the health system and determined to be a quality initiative.

TABLE 1
Emergency department metrics pre- and post-practice change

Measure	6 Months Preimplementation, Median (SD), May to October 2017	6 Months Postimplementation, Median (SD), November 2017 to April 2018	P Value
Door to provider	38.00 (11.58)	14.17 (1.94)	0.0047*
Door to disposition Admit	244.32 (19.62)	238.0 (9.10)	0.5738
Door to disposition D/C	203.52 (5.10)	178 (4.93)	0.0367*
Median LOS ESI 4 and 5	169.82 (18.59)	134.71 (10.56)	0.2607
Median LOS admit	346.53 (35.89)	345.8 (19.17)	0.8726
Median LOS D/C	237.22 (22.75)	209.8 (4.45)	0.0301*
LWBS (%)	9.33 (2.16)	2.73 (0.80)	0.0051*

D/C, discharge; *ESI*, emergency severity index *LOS*, length of stay; *LWBS*, left without being seen; *SD*, standard deviation.
* $P < 0.05$.

Results

All staff nurses and APPs received some form of provider in triage and split-flow education. Most attended sessions in the department, and those who did not attend in person reviewed the education via electronic methods. During implementation months, a provider was in triage every day from noon until midnight, and split flow was staffed with a provider every day from 10 am to 10 pm. The baseline data for the 6-month period before implementation (May to October 2017) showed a total of 28,598 visits for the emergency department compared with the postimplementation phase (November 2017 to April 2018) with 25,577 visits. The comparison data showed statistically significant improvements in door to provider, door to disposition, median LOS for discharged patients, and percent LWBS (Table 1). Similar results were obtained when comparing the project period to the same months in the previous year (Table 2). The ED patient-satisfaction data also showed improvement. Although not statistically significant, satisfaction scores increased for questions related overall rating of care, arrival perception, and wait times to see physicians.

Discussion

The split-flow model with a provider in triage was an effective model for providing efficient and quality care in the emergency department. Similar to other studies,[5,6,8,9] we found that the LOS for low-acuity patients was significantly

TABLE 2
Emergency department metrics 2016 compared with 2017

Measure	Preimplementation, Median (SD), November 2016 to April 2017	Postimplementation, Median (SD), November 2017 to April 2018	P Value
Door to provider	42.1 (11.2)	14.1 (1.9)	0.0047*
Door to disposition admit	229.0 (9.4)	238.0 (9.1)	0.1228
Door to disposition D/C	191 (5.1)	178 (4.9)	0.3776
Median LOS ESI 4 and 5	153 (28.7)	134 (10.5)	0.2607
Median LOS admit	359.7 (35.8)	345.8 (19.1)	0.3785
Median LOS D/C	233.0 (13.2)	209.8 (4.4)	0.0048*
LWBS (%)	9.4 (2.9)	2.73 (0.8)	0.0050*

D/C, discharge; *ESI*, emergency severity index; *LOS*, length of stay; *LWBS*, left without being seen; *SD*, standard deviation.
* $P < 0.05$.

decreased. The LWBS rates were significantly decreased, as noted in literature supporting split-flow models and provider in triage.[7,9,10] We noticed an increase in patient satisfaction that was not significant. The literature supports an improvement in patient satisfaction with variability in significance in outcome.[5,6,10] It should be noted that the total number of visits was decreased during the postimplementation period compared with volumes in both comparison time frames. ED boarding continued despite improvements in the throughput. Hospital capacity remained a challenge, causing significant bed delays.

Although financial benefits were not a focus of this project, an argument can be made for a cost savings relative to the improved outcomes. Each LWBS outpatient represented an average of $480 of potential lost revenue. During the 6 months before implementation, the LWBS numbers totaled 2,641 patients versus postimplementation of only 697 patients. Using the conservative average dollars lost, there was a potential savings of $933,000. There were no additions to bedside nursing during the project. Two full-time APPs were employed at a cost of $127,000, including benefits. Total potential savings for the project was $806,000.

From the literature review, a positive outcome for the project was expected. Multiple studies provided validation of individual efficiencies for the split-flow model only, provider in triage only, and the most efficient combination of provider in triage and split-flow model. At the conclusion of the project, we demonstrated the value of combining the split-flow model with a provider in triage. The operational changes for the quality improvement project had a positive impact on the ED metrics. Over the course of the project, the postimplementation 6-month period showed positive trends in throughput and LWBS rates, which were sustained. Press Ganey survey results showed increased improvement in satisfaction scores.

Education sessions served to increase staff knowledge of the importance of compliance of the ED provider-in-triage and split-flow models related to improving throughput and the impact on LOS and LWBS rates. Although provider in triage was consistent throughout the project, there may be provider and nursing practice variability related to individual pace in caring for patients. Nurses and providers had varying levels of experience in caring for ED patients.

Hospital capacity and ED volumes remained consistently high during all timeframes. It is important to note that intermittent boarding took place during both baseline and the study timeframes. The ED LOS for admitted patients remained consistently greater than 320 minutes during both the pre- and postimplementation phases.

Limitations of this project included that it was an evidence-based quality improvement design that took place in a single institution. As boarding was a regular and frequent occurrence during the project, times for LOS for admitted patients may have been skewed. Volumes were unexplainably decreased during the implementation time frame. Practice efficiency is variable from provider to provider. Elopement rates were noted to increase during the project as patients were seen by provider but later left the emergency department before having complete examinations and treatment. Our next steps will include reviewing a breakdown of ED metrics and identifying additional areas for improvement as well as addressing the elopement rate.

Implications for Emergency Nursing

This article contributes to practice improvement by focusing on collaboration among nurses, APPs, and providers toward a consistent combined provider in triage and split-flow model of throughput. The result is a higher-quality, safer level of patient care by allowing patients to be seen by a provider and cared for in a timely manner.

Nurse leaders need to be vigilant to ensure that the provider in triage with the split-flow model is implemented and maintained as planned to sustain positive outcomes. Consistency in practice allows for standardization in care despite variable numbers of patient visits. Results will show improvement in throughput during high- or low-volume periods.

Conclusions

Despite the continued challenges of overcrowding and boarding in the emergency department, evidence-based practices of provider in triage, paired with a split-flow model, were used to improve and sustain improvements in throughput for patients who were treated and released from the emergency department.

REFERENCES

1. Pierce B, Gormley D. Are split flow and provider in triage models in the emergency department effective in reducing discharge length of stay? *J Emerg Nurs*. 2016;42:487-491. https://doi.org/10.1016/j.jen.2016.01.005.
2. Carter E, Pouch S, Larson E. The relationship between emergency department crowding and patient outcomes: a systematic review. *J Nurs Scholarsh*. 2014;46:106-115. https://doi.org/10.1111/jnu.12055.
3. Agency for Healthcare Research and Quality *Improving Patient Flow and Reducing Emergency Department Overcrowding: A Guide for Hospitals*. Retrieved from Agency for Healthcare Research and Quality https://www.ahrq.gov/research/findings/final-reports/ptflow/executive-summary.html; 2018.
4. Emergency Department Benchmarking Alliance. *Emergency Department Performance Measures 2017: Final Report;* 2017. Retrieved from www.edbenchmarking.org.

5. Bish P, McCormick M, Otegbeye M, Marlton V. Ready-jet-go: split flow accelerates ED throughput. *J Emerg Nurs*. 2016;42:114-119. https://doi.org/10.1016/j.jen.2015.06.003.
6. Garrett J, Berry C, Wong H, Qin H, Kline J. The effect of vertical split flow patient management on emergency department throughput and efficiency. *Am J Emerg Med*. 2018;36(9):1581-1584. https://doi.org/10.1016/j.ajem.2018.01.035.
7. Milsten A, Klein J, Liu Q, Vibhakar N, Linder L. Retrospective analysis of quality improvement throughput measures at a high-volume community emergency department. *J Healthc Qual*. 2014;36(5):13-25. doi: 10.1111/jhq.12014.
8. Traub S, Wood J, Kelley J, et al. Emergency department rapid medical assessment: overall effect and mechanistic considerations. *J Emerg Med*. 2015;48(5):620-627. https://doi.org/10.1016/j.jemermed.2014.12.025.
9. Wiler J, Ozkaynak M, Bookman K, et al. Implementation of a front-end split flow model to promote performance in an urban academic emergency department. *Jt Comm J Qual Patient Saf*. 2016;42(6):271-280.
10. Bonalumi N, Bhattacharya A, Edwards C, et al. Impact of planned workflow change: super track improves quality and service for low-acuity patients at an inner-city hospital. *J Emerg Nurs*. 2017;43:114-125. https://doi.org/10.1016/j.jen.2016.03.029.
11. Dearholt S, Dang D. *Johns Hopkins Nursing Evidence-Based Practice: Model and Guidelines*. 2nd ed. Indianapolis, IN: Sigma Theta Tau; 2012.
12. Kotter J. *Leading Change*. Boston, MA: Harvard Business School Press; 1996.
13. Institute for Healthcare Improvement. http://ww.ihi.org/resources/Pages/Tools/PlanDoStudyActWorksheet.aspx.

Submissions to this column are encouraged and may be sent to
Cindy D. Kumar, MSN, RN, AG-ACNP-BC, FNP-BC, ENP-C
cindyk.JENAP@gmail.com
or
Darleen A. Williams, DNP, APRN, CEN, CCNS, CNS-BC, EMT-P
darleenw.JENAP@gmail.com