Patient Flow in the ED: Phase II—Diagnostic Evaluation through Disposition Decision

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ABSTRACT

The total number of emergency department (ED) visits in the United States increased 35% between 1995 and 2010, according to the Centers for Disease Control and Prevention. However, according to the American Hospital Association, between 1991 and 2011, the number of hospitals with EDs decreased by 647, leaving less EDs to manage increased visits. These factors contribute to ED crowding, which causes bottlenecks in patient flow and creates patient safety hazards. In 2013, Pennsylvania hospitals reported 23,749 events to the Pennsylvania Patient Safety Authority in which the ED was selected as the care area. Of these reports, 2,495 (10.5%) were submitted as no-harm events requiring monitoring or events resulting in harm or even death for patients being seen during the period between diagnostic testing and disposition decision. This time frame consists of several components, of which most are inputs to the diagnostic process leading to the output of diagnosis and disposition decision. ED measures from the Centers for Medicare and Medicaid Services affect reimbursement. This article is the second in a three-part series that addresses patient safety related to ED flow, and it focuses on strategies to improve processes of care and patient safety during the diagnostic evaluation through disposition decision phase of ED care. (Pa Patient Saf Advis 2015 Mar;12[1]:7-18.)

Scan this code with your mobile device's QR reader to access the Authority's toolkit on this topic.

INTRODUCTION

In a survey of departmental chairs and emergency department (ED) medical directors in Pennsylvania, 83.0% agreed that crowding was a problem, 84.0% reported that a high proportion of patients leave without being seen, 79.0% stated that quality of care suffers, and 65.0% reported that crowding had worsened in the past two years (the survey was conducted in 2008).[1] EDs are an integral and unique part of the healthcare delivery system. Operationally, the ED is one of the more complex clinical settings in the hospital.[2]

Between 1995 and 2010, the total number of visits to EDs increased from 97 million to 130 million (34.0%), and the visit rate, which accounts for changes in population size over time, increased from 37 to 43 visits per 100 individuals (16.2%).[3] According to the American Hospital Association, between 1991 and 2011, the number of hospitals with EDs decreased by 647.[4] In Pennsylvania, 41 hospitals have closed since 2001, according to the Pennsylvania Health Care Cost Containment Council.[5] The number of ED visits continues to rise.[6,7]

The care that is provided in EDs includes both emergency and primary care. ED staff must maintain the capacity to manage expected variation in patient volume as well as unpredictable surges caused by events such as natural disasters and multivehicle accidents, which may occur with limited or no advance warning.[3] This article addresses patient safety related to ED flow, and it focuses on strategies to improve processes of care and patient safety during the diagnostic evaluation through disposition decision phase of ED care.

In 2010, the Pennsylvania Patient Safety Authority published an article that delineated the patient's ED stay into the following phases:[8]

- Phase I: patient arrival in the ED to diagnostic testing
- Phase II: diagnostic testing through disposition decision
- Phase III: disposition decision to departure from the ED

The article discussed utilization, census, and clinical performance metrics and best practices to improve patient safety and flow in phase I. Figure 1 depicts the phases, including components and potential hazards to patient safety.

Recognizing the challenges in balancing ED flow and patient safety, federal agencies and quality organizations have defined ED metrics that will affect reimbursement and encourage quality improvement. At present, most EDs have developed dashboards to help track quality improvement performance over time.[2,3,5,9,10]

COMPONENTS OF ED PHASE II

Phase II of ED flow, the focus of this article, encompasses much of the patient and caregiver activity in the ED and comprises key components of inputs (e.g., information) and outputs (e.g., decisions) and related activities, recognizing that these may be iterative and nonlinear processes.

Inputs

- Treatments and procedures (including medication): nursing and physician interventions, including ordering, completing, and patient response
- Diagnostic testing: radiologic, laboratory, respiratory (e.g., arterial blood gas), cardiac (e.g., electrocardiogram), or other test ordering, completion, and results reporting

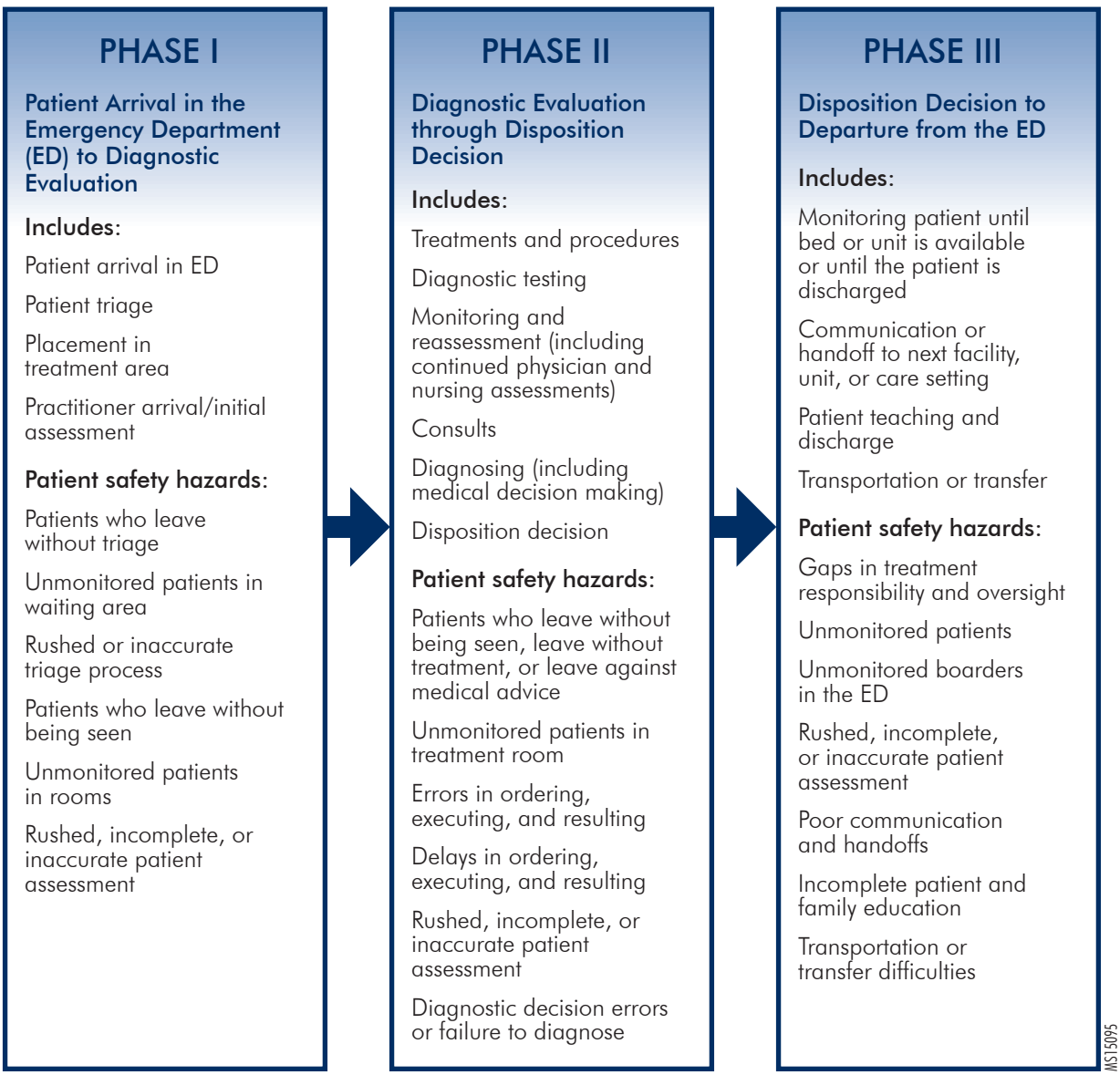
- Monitoring and reassessment: routine observation, nursing reassessments, and physician reassessments
- Consults: specialists and hospitalists ordering, communicating, and completing consults (including requests for additional testing and treatment)

Output

- Diagnosis and disposition decisions (admit, discharge, or transfer): interpreting and assimilating the information from the inputs to reach a diagnosis, then determining disposition.

Figure 2 provides an illustration of the components of phase II.

Figure 1. Emergency Department Flow Phases



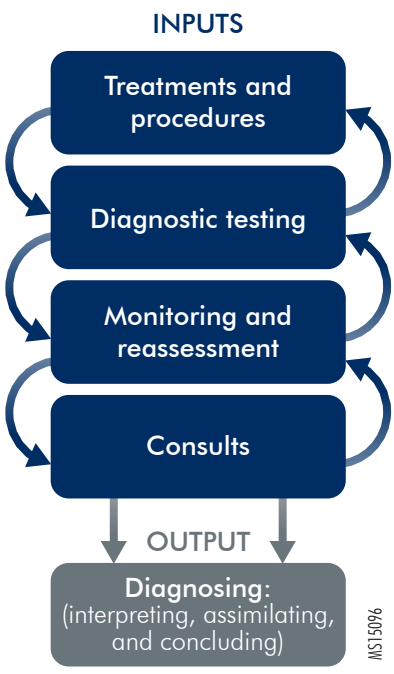
Hazards

Each component is susceptible to patient safety hazards, including (1) rushed, incomplete, inaccurate, or omitted patient assessments and monitoring; (2) delays and errors in ordering, communicating, executing, and providing results of diagnostic tests, treatments, procedures, and consults; and (3) errors in interpreting, assimilating, and diagnosing to determine the correct disposition for the patient. Additionally, untoward events—such as falls and patients leaving without being seen or leaving against medical advice (AMA)—may occur, particularly when patients are left unattended in examination rooms or hallways or feel they have waited too long.

ED flow can both impact and be impacted by these components. A mass-casualty incident resulting in a sudden surge in patient volume or other causes of crowding creates an environment more susceptible to error, and any error or delay can interrupt or halt patient flow.[11] When ED crowding occurs, the number of patients can outweigh available resources, potentially increasing patient safety hazards.[1,12]

ED crowding is also a hospital-wide problem. Escalation in ED patient population increases the demand on hospital resources such as ancillary services, operating rooms, and inpatient beds. Lack of availability of inpatient beds may result in admitted patients being "boarded" in the ED.[13]

Figure 2. Phase II: Diagnostic Evaluation through Disposition Decision Components



METHODS

Authority analysts queried the Pennsylvania Patient Safety Reporting System (PA-PSRS) database for events reported during calendar year 2013 that identified the ED as the care area; facilities reported 23,749 such events. An illustration of the data analysis methodology, Emergency Department (ED) Flow Phase II Methodology Algorithm, is available exclusively in the online version of this article.

Analysts identified events associated with phase II by first excluding reports with keywords relevant to phases I and III (e.g., "triage," "arrived," and "arrival" [phase I]; "discharge," "dispo," "inpatient," and "admit" [phase III]). Of the remaining 17,561 reports, 14,642 were reported as an unsafe condition or no-harm event, with a harm score of A through C, and were excluded from analysis. The Authority's event reporting system uses an adaptation of the National Coordinating Council for Medication Error Reporting and Prevention harm index and the Veterans' Administration National Center for Patient Safety severity assessment code system to distinguish between harm and no-harm events.[14,15] The Pennsylvania Patient Safety Authority Harm Score Taxonomy is available exclusively in the online version of this article.

The remaining 2,919 reports submitted as no-harm events requiring monitoring (i.e., harm score D) or as events resulting in harm or even death (i.e., harm scores E through I) were included in the analysis to ensure a large enough sample size to reflect the activity of this phase and to capture events resulting in harm that were reported as harm score D. These reports were individually analyzed to confirm they were ED events that occurred between diagnostic evaluation and disposition decision.

Non-ED and additional phase I and III reports were excluded (n = 90, 84, and 221, respectively). There was a small number of reports submitted as "unplanned returns to the ED" (n = 29); these events could not be attributed to a single phase and were also excluded from the analysis.

Analysts sorted the resulting 2,495 reports into one of the phase II components depicted in Figure 2. Once sorted, analysts identified events associated with a stated or inferred delay (e.g., delay in administering the medication, wrong test ordered) using the key terms in "Types of Stated or Inferred Delay Key Terms," available exclusively in the online version of this article.

RESULTS

As can be seen in Figure 3, the predominant number of events reported in phase II involved treatments and procedures (e.g., errors in ordering and executing, complications, adverse reactions). Stated and inferred delays were not frequently reported in this component.

Diagnostic testing reports comprised the third largest number of phase II input events submitted to the Authority but included the largest number of stated or inferred delays, both in absolute terms and as a percentage of total reports in each category. Reports also included errors in ordering, executing, and resulting, such as misidentification of patients, delays, contrast infiltrations, and laboratory or radiology test problems.

Monitoring and reassessment comprised the second largest number of phase II

input reports submitted to the Authority. Reports included unwitnessed falls with injury, leaving AMA or without treatment being completed, clinical status changes, equipment malfunctions, unplanned extubations, self-inflicted injuries, and accidental injuries during care (e.g., skin tears, injured body part). Falls comprised the largest number of reports in this component (n = 494, 77.5%).

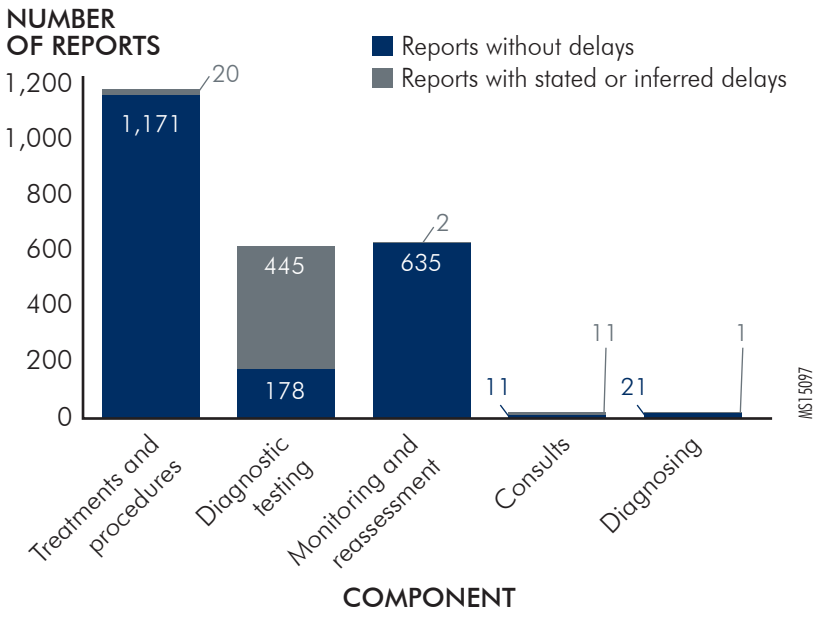
Consults comprised the smallest number of phase II input reports submitted to the Authority. Stated and inferred delays were 50% of the reported consult events. The Table displays the number of phase II reports by component and provides examples of report narratives for each component. The potential hazards to patient safety are outlined in Figure 1.

DISCUSSION

EDs face the challenge of managing patient flow, crowding, and unpredictable surges in volume while maintaining patient safety. Phase II components comprise much of the patient and caregiver activity in the ED, often simultaneously (nonlinear) and iteratively (clinicians often must restart their care in light of new information [e.g., change in patient condition, new diagnosis]).

It is important to ensure patient safety during these activities. Delays can impact patient safety and flow. This is consistent with data from the survey conducted by Pines et al., which identified several factors affecting ED crowding in Pennsylvania hospitals, including ED inefficiency, radiology delays, and delays in consultation.[1] Additionally, Farley et al. studied the use of electronic health record (EHR) systems in the ED and their impact on the quality and safety of the care delivered and reported the potential harm from an inferior EHR product or suboptimal execution of that product in the clinical setting.[16]

Figure 3. Stated and Inferred Delays during ED Flow Phase II Events Reported to the Pennsylvania Patient Safety Authority, 2013 (N = 2,495)



Because of the numerous and varied activities of each component, as seen in the narratives, general principles are provided to enhance patient safety during ED phase II.

Inputs

Treatments and procedures. The Joint Commission states these general principles to minimize safety hazards when administering treatments and procedures:[17,18]

- Use two patient identifiers when providing care, treatment, or services, including blood transfusions, and label specimen containers in the presence of the patient.
- Check for allergies and, if possible, set alerts in the EHR to warn of allergies, contraindications, and interactions.
- Use checklists when performing complex procedures such as central-line or chest tube insertions.
- Reconcile medications.
- Reduce the likelihood of patient harm associated with anticoagulant use, such as by using approved protocols and programmable pumps.
- Involve the patient whenever possible.

Diagnostic testing. Review testing protocols to assess for opportunities for improvement. For example, in an arterial blood gas needle study, larger-gauge needles caused more complications and had a poorer success rate than smaller needles.[19] In addition to the recommendations above, the following are general principles to increase the likelihood of success without incident:

- Simplify and standardize patient identification and specimen labeling procedures.[18,20]
- Verify the identity of the patient before entering orders or performing testing, especially where laterality is concerned.[18]

(continued on page 12)

Table. Report Narrative Examples from Emergency Department (ED) Flow Phase II Reports Submitted to the Pennsylvania Patient Safety Authority, Calendar Year 2013 (N = 2,495)

NO. OF REPORTS	COMPONENT	NARRATIVE EXAMPLES
1,191	Treatments and procedures	*The tech reported that the patient weighed 22 kg, which was [used to administer a weight-based medication]. Before giving the next medication, [staff] realized the patient weighed 22 pounds not kg. The [electronic medical record] was corrected, and there were no adverse reactions.* *Patient was emergently intubated, and upon reviewing x-rays, a tracheal tear [was suspected]. [Patient was taken to surgery,] and tracheal tear repaired. [There were several] IV [intravenous] attempts, causing delay in [administering] IV medications, hydration, and CT [computed tomography] scan.*
623	Diagnostic testing	*A patient had an EKG [electrocardiogram] performed, which was read by the resident. The EKG was misplaced. It was not until the final reading of the EKG, which was available electronically [about two days] later, that it was discovered that the EKG was [abnormal].* *Respiratory therapist drew an ABG [arterial blood gas], which resulted in a large hematoma formation.* *[Lab] specimens were in one bag with two different [patient identification] labels. Specimen[s] were re-collected.* *Due to [multiple other patients], there was a [four-] hour delay in having a CT scan performed on the patient.* *Specimen tubes were sent to lab via the [pneumatic] tube system; however, lab never received them. After waiting [nearly an hour] for maintenance to repair system, had to redraw patient's blood work.*
637	Monitoring and reassessment	*Patient was [found unresponsive] while toileting. Patient required intubation and admission.* *A noise was heard in patient's room. The patient was found on the floor. A CT scan showed a subarachnoid bleed and [nasal] fractures.* *Patient was waiting for results, became tired of waiting, and left with the IV [line] in place. Unable to reach patient by phone, and police were notified. Police unable to locate patient.* *Monitor alarming and pulse ox decreased and heart rate correlated; however, the oxygen tank ran out, and patient was [experiencing] of shortness of breath.*
22	Consults	*A [cardiac arrest alert] was called. Calls were placed to two different cardiologists who stated they were not on call. This resulted in a 12-minute delay in getting the patient to the cath lab.* *Neurology consult was not called in when ordered [resulting in a delay].* *Patient was assigned to a physician who was not on duty in the ED at the time. This resulted in a critical test result not being reported to a physician.*
22	Diagnostic decision process	*The ED read the EKG as [normal] without significant changes, and cardiology read as ST [segment] elevation, possible ACS [acute coronary syndrome].* *A patient was diagnosed with hypertension and Bell palsy. Patient returned with no control of right arm, and CT scan [showed] an infarct in left frontal parietal region.* *Patient was diagnosed with fractured ribs. X-rays [done and read by the ED] stated no pneumothorax. [Radiology] read the x-ray as [positive for] pneumothorax.*

(continued from page 10)

Monitoring and reassessment. Protocols and toolkits are available to evaluate and improve patient monitoring and assessments. A falls risk assessment is considered best practice, regardless of the clinical setting, including assessing for risk of injury, screening for a history of falls within the previous 12-month period, asking about gait or balance problems in patients who have not had a fall in that time period, and performing simple mobility testing (e.g., Timed Up and Go).[21-25] Effective falls prevention interventions are multifaceted and can be tailored to patient characteristics, risk factors, and clinical settings.[22-24]

Patients requiring mechanical support or device-related monitoring (e.g., ventilator, telemetry, pulse oximetry) require expert care and ongoing monitoring of their clinical status. Monitoring failures such as alarm fatigue and limitations of monitoring systems have been discussed in the literature. Being aware of the monitoring device limitations, tailoring device default settings to the individual patient, using unit-wide alarm notification, and ensuring staff competency are some strategies to reduce hazards and enhance outcomes when employing mechanical support and device-related monitoring.[26-29]

Patients leaving the ED before being seen or receiving treatment are also reported in the literature. According to the Agency for Healthcare Research and Quality's guide for hospitals, "In 2007, the most recent year for which data are available, 1.9 million people—representing 2 percent of all ED visits—left the ED before being seen, typically because of long wait times."[30] Patients who leave AMA are at an increased risk of mortality and readmission and are a significant source of stress for ED physicians.[31-33] Strategies to prevent patients from leaving the ED prematurely include decreasing wait times, providing frequent communication and updates about wait times and statuses, determining what constitutes a medically safe treatment plan, understanding what motivates the patient, and actively inviting the patient back for continued care and treatment.[31,34,35]

Consults. The timeliness of consults can be enhanced. Delays in specialty consultations in the ED and for admitted ED patients contribute to increased lengths of stay, long wait times, and patients leaving before treatment is complete.[9,36-38,39] Critical specialists are often unavailable to the ED, and three-quarters of hospitals report difficulty finding specialists to take call and cover these types of ED patients.[13] In 2003, 53% of ED directors in Pennsylvania reported that on-call specialist availability had worsened and contributes to poor flow and crowding.[1]

Recent literature points to some unique approaches to addressing consultant and hospitalist response times, such as implementing short electronic messaging reminders (e.g., via pager or cell phone), organizational response time guidelines, and active bed management strategies (e.g., hospitalist-managed admissions).[9,37,38] In one study, the department of general internal medicine used a quality improvement initiative involving education, goal-setting, and performance feedback to improve ED flow of admitted medical patients.[39] Timeliness goals were set, such as a one-hour target from consultation request to admission order entry, and personal performance feedback was provided to the resident every two weeks with comparative mean data.[39] In addition, telemedicine has been shown to improve timeliness and quality of care in rural settings, with stroke care, and in the prehospital setting.[40-42]

Output

Diagnostic decision process. Events related to the diagnostic decision process comprised less than 1% of the total number of ED phase II event reports submitted to the Authority in 2013. The diagnostic decision process reports included unplanned returns to the ED within 24 to 48 hours requiring an admission, discrepancy between the ED interpretation of the x-ray or EKG and the final reading, incorrect readings, and delays. Only one report stated that a delay contributed to the event.

While it is beyond the scope of this article to address diagnostic error, it is worth mentioning in the context of this component. The impact of diagnostic errors on patient care is receiving increasing attention. A diagnostic error is defined as a "diagnosis that is wrong, missed or delayed."[43] Diagnostic error rates have been estimated to be between 0.6% and 12.0%.[44] In a webinar, Dr. Mark L. Graber stated that "most diagnostic errors are made by excellent clinicians in first-rate healthcare organizations."[45] Organizations exist that focus on efforts to study and address diagnostic errors.[43,46-50] Strategies to prevent diagnostic errors include identification and measurement.[43,45] Practical steps include finding and learning from errors, hosting grand rounds on diagnostic error, and establishing ways for providers to receive feedback.[45] Errors in radiologic diagnosis in particular have received attention and arise during acquisition and processing of images (diagnostic testing errors) and during interpretation.[51]

Dispositions include decisions to admit, transfer, or discharge a patient with follow-up care or instructions. The disposition decision is one of the most important decisions made during the ED visit and is the culmination of the inputs received and diagnosis formed.[52] According to a Centers for Disease Control and Prevention report, "In 2009-2010, 81% of emergency department visits were discharged for follow-up care as needed, 16% ended with the patient being admitted to the hospital, 2% ended with patient leaving without completing the visit, and less than 1% ended in the

patient's death."[3] This aspect of the ED visit will be described in more detail in a future *Pennsylvania Patient Safety Advisory* article on ED phase III: disposition decision to departure from the ED.

PATIENT FLOW BEST PRACTICES

The 2011 Agency for Healthcare Research and Quality guide for hospitals *Improving Patient Flow and Reducing Emergency Department Crowding* provides comprehensive information on addressing ED flow and was "compiled from the experiences of the hospitals affiliated with Urgent Matters, a national program funded by the Robert Wood Johnson Foundation dedicated to finding, developing, and disseminating strategies to improve patient flow and reduce ED crowding."[30] It is important for hospitals to manage patient flow as an organization-wide concern and not just treat it as an ED problem.[12]

Patient Tracking Systems

Patient tracking systems vary and are often used in combination. For example, white boards or computerized boards with or without manual or electronic interfaces may be used to provide information at the system (ED) level while electronic and passive radio-frequency identification locators may provide information at the individual patient level. Regardless of the system, tracking ED patients in real time provides information to the provider about the patient's status relative to interventions and location. Ensuring the ED staff can track waiting patients is an efficient care strategy to improve flow.[20] Early warning systems and overcrowding quantifiers such as the Emergency Department Work Index and the Emergency Department Overcrowding Scale have been employed to alert clinical and administrative staff prior to overcrowding.[53]

EDs may also benefit from using a gatekeeper for patient flow. One study empowered the charge nurse to be the gatekeeper by problem-solving during volume surges, coordinating assessments and interventions, and expediting bed access.[2] In an interview with Thomas Kurtz, MHS, PA-C, EMT-P, CHEP, senior director of clinical operations at Aria Health, he described the successful use of the ED charge nurse in the role of bed coordinator for improved bed assignment and flow.[54] Additionally, staff wear walkie-talkies with earpieces, and according to Mr. Kurtz, "This improves communication and decreases the amount of walking through a large department to assess bed status and communicate with staff."[54] In a systematic review of the literature, Dobson et al. found 22 relevant articles supporting the use of tracking technology to enhance patient safety or improve efficiency.[55]

In an interview, John J. Kelly, DO, FACEP, associate chair and director of ED quality improvement and patient safety at Einstein Medical Center (EMC), describes the use of a passive tracking system in the form of an electronic badge attached to patients, staff, ED physicians, and consultants and equipment with sensors in the ceiling that provide real-time information and help the ED to adjust operations to enhance flow.[56] This system interfaces with the EHR system to provide visual cues on the computers. Some best practices for improving patient flow with technology include examining variations in work processes and in patient volume, viewing patient flow as a system-wide phenomenon, and using a multidisciplinary team to identify opportunities for improvement; aggregated data can support computer simulation to identify system bottlenecks and inform interventions to improve patient flow.[57,58]

Robust Hospital Surge Capacity Plans

In an ED, patient volume can increase suddenly and unexpectedly and can negatively impact patient flow and safety. Hospitals are "first responders" to disasters, and regulatory agencies mandate that hospitals have surge plans in place.[3,4,17] The key to adequately managing this increase is to have a hospital-wide surge capacity plan, which, according to an American College of Emergency Physicians' position statement, "requires augmenting existing capacity as well as creating capacity by limiting elective appointments and procedures and practicing 'surge discharge' of patients that can be effectively managed in non-hospital environments."[59]

Since September 11, 2001, substantial resources have been allocated to surge capacity capabilities.[60] Non-surge or disaster patients continue to arrive at the ED during surge or disaster events, and EDs must be prepared to manage surges while continuing to manage normal operations. Aspects of a comprehensive surge capacity plan include ensuring the plan is hospital-wide; addressing the need for increased staff, space, and supplies; clearing the ED to accommodate casualties; avoiding ED crowding to preserve access; and maintaining preparedness by conducting drills.[60-62]

Flow Enhancement Mechanisms

The following are mechanisms that can enhance ED operations and improve efficiency:

Chest pain/observation units. Chest pain is a common complaint among ED patients, and conducting a comprehensive cardiac evaluation takes time. Implementation of a separate chest pain unit can improve care for patients and decompress the ED. Chest pain units have been shown to increase the number of patients discharged, thus decreasing both unnecessary admissions and the number of patients leaving AMA.[63,64] Dr. Kelly attributes improved ED efficiencies to having a stand-alone observation unit, managed by ED staff, for those patients not needing admission but requiring longer stays for observational purposes.[56] The American College of Emergency

Physicians endorses and has set forth principles of best practice for the observation of appropriate ED patients.[65]

Diagnostic services within the ED. Having diagnostic testing services, such as point-of-care (POC) laboratory testing and radiology available within the ED, can improve turnaround times. POC laboratory testing has been available for decades and includes blood glucose, urine dipsticks, and rapid strep tests. New POC testing is emerging, such as complete blood count, platelet functioning, and platelet reactivity tests.[66,67] While POC testing provides rapid results and is efficient, the testing does have a risk of error if quality controls and staff competency are not maintained.[68]

Dr. Kelly attributes improved radiology turnaround times to in-department x-ray and ultrasound rooms, a 64-slice computed axial tomography (CAT) scanner, and radiology technicians to staff the rooms.[56] When Aria Health built its expanded ED at the Torresdale campus, x-ray and CAT scan rooms were built within the ED and staffed with dedicated radiology technologists. "These rooms improve the radiology turnaround times," says Mr. Kurtz.[54]

POC ultrasound in the ED positively affects safety and flow.[69] POC ultrasound, including echocardiogram, is commonplace in the ED, and it is imperative that practitioners be accurately trained. Errors may be reduced by improvements in knowledge and systems, such as ensuring careful selection of the proper study and awareness that the clinical picture takes priority over images, defining the benefits of appropriate use, limiting unnecessary imaging, and analyzing error.[51,69,70]

Scribes or voice recognition software (VRS). Studies have shown that EHR and computerized physician order entry systems can have negative effects on ED flow and patient satisfaction.[71,72] Scribes have shown to improve "doc-to-dispo" time (phase II) and patient satisfaction scores.[71] Another study found that scribes improved the number of patients treated per hour and the relative value units generated per hour but not the overall turnaround time to discharge.[73]

Similarly, VRS can aid physicians with clinical documentation. In one study, VRS used for physician charting in the ED resulted in shorter turnaround times; it was also less expensive and nearly as accurate as traditional transcription.[74] Dr. Kelly's facility uses a voice recognition program, and he says that "it is essential to optimizing the use of the EHR."[56] At EMC, VRS is used in real time during patient care, at the end of care to summarize the visit, and for creating discharge instructions.[56] Mr. Kurtz's facility uses scribes and says, "Scribes are able to assist the physicians with their workflow, such as reminding them of tasks and presenting them with test results, and this additional support improves flow."[54]

***In situ* simulations.** These simulations, which involve care providers managing a simulated patient in an actual patient care environment, may be used to identify and mitigate conditions that adversely impact flow. Protocols and focus groups do not always bring to light the actual conditions under which patient care is accomplished. Healthcare providers, in their determination to provide optimal care, often compensate for resource or other limitations by creating workarounds or temporary solutions. Simulation provides an opportunity to identify process problems and to iteratively test potential improvements.[75]

Measuring ED Performance

Measurement is a basic quality improvement principle. In order to manage patient flow and improve safety, facilities are encouraged to understand performance through measurement. The Centers for Medicare and Medicaid Services has mandated the collection and reporting of ED throughput and clinical measures.[76] The Joint Commission prescribes adherence to standards to manage the flow of patients throughout the hospital, boarded patients in the ED, ambulance diversion, the safety of areas where patients receive care, and care of patients in overflow areas such as hallways.[17]

Measures to assess ED flow include patient volume by hour, staffing measures (number and complement per shift), and total ED length of stay and its submeasures (e.g., time of patient arrival to triage, time in treatment room until being seen by a provider, time from provider assessment to disposition decision, time from disposition to departure from ED).[2,3,10,36] Measures specific to crowding include ambulance diversions (number by hour and month), boarding of patients (number and duration), wait times (minutes), and patients leaving before care is complete (AMA, left without being treated, and elopements).[2,3,10]

In 2011, Hwang et al. published results of a comprehensive systematic review of measures of crowding in the ED and concluded that a combination of time interval measures (e.g., length of stay) and patient count measures (e.g., census) is emerging as the most promising approach for measures of flow and nonflow, respectively.[77] An ED dashboard, inclusive of a set of representative measures, is a sound operational tool to capture performance over time to allow for tracking, trending, and improvement.

LIMITATIONS

Data searched was limited to events reported under the ED care area; relevant reports for which an ED location was misclassified would not have been captured. Similarly, removing reports based on the phase I and III keyword sort at the beginning of the analysis may have eliminated some phase II reports. The search for reports on inferred delays is limited by the information provided in PA-PSRS event report narratives. Instances of diagnostic

error may be underrepresented because of follow-up challenges inherent to ED care or delays in recognition.

CONCLUSION

EDs provide 24/7 emergent, urgent, and nonurgent care, including specialized resources. EDs care for all patients regardless of ability to pay and must ensure staff and facilities are prepared to care for sudden large influxes of patients. As the number of EDs decreases and volume of patients increases, EDs are challenged to provide safe, timely, efficient, and efficacious care to the communities they serve. Analyzing and understanding the key components of phase II, employing best practices in patient flow, and improving and standardizing operations from diagnostic evaluation through disposition decision improves timeliness of care, limits the opportunity for hazard occurrence, and directly contributes to the safety of patients in this phase of ED treatment.

Managing patient flow with mindfulness toward safety can positively impact patient care. Balancing the management of patient flow while mitigating hazards to patient safety is a continuous process. Further analysis and research on individual hazards to patient safety within each component could expand the cumulative knowledge of error prevention and safety in the ED. A review and analysis of event reports for phase III, from disposition decision to departure from the ED, is planned.

Acknowledgments

Edward Finley, BS, data analyst, Pennsylvania Patient Safety Authority, contributed to the abstraction, analysis, and preparation of data for this article.

NOTES

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LEARNING OBJECTIVES

- Recognize common emergency department (ED) flow and throughput performance measures.
- Distinguish ED crowding measures from ED flow and throughput measures.
- Recall the most frequent phase II component events reported to the Pennsylvania Patient Safety Authority.
- Select the phase II component delay type depicted in a scenario.
- Identify best practices that can be implemented to manage patient flow.

SELF-ASSESSMENT QUESTIONS

The following questions about this article may be useful for internal education and assessment. You may use the following examples or come up with your own questions.

1. Which of the following is *not* a measure of ED flow and throughput?
   a. Number and complement of staff per shift
   b. Patient arrival time to discharge time in minutes
   c. Patient volume by hour
   d. Total ED length of stay (arrival time to departure time) in minutes
   e. Number of ambulance diversions per hour
2. Which of the following is *not* a measure of ED crowding?
   a. Boarding patients (number and duration)
   b. Patient arrival time to triage time in minutes
   c. Number of patients leaving before treatment is complete
   d. Patient wait times in minutes
   e. Number of ambulance diversions per hour
3. Which component was involved in the greatest number of phase II events reported to the Authority?
   a. Treatments and procedures
   b. Diagnostic testing
   c. Monitoring and reassessment
   d. Consults
   e. Diagnosing

Question 4 refers to the following scenario:

A patient's elbow was aspirated for synovial fluid. The resident sent the tubes to the lab and then gave the ED unit secretary the lab order sheet with the orders for a routine synovial fluid analysis, including a culture and sensitivity (C&S) test. The unit secretary became distracted when entering the orders and only entered orders for the C&S. The lab "held" the other synovial fluid tubes but failed to cross-check the computer orders with the ED order sheet. The routine synovial fluid analysis was not run until the resident, who was looking for the results two hours later, discovered the error.

4. Which of the following components represents the delay type depicted in this scenario?
   a. Treatments and procedures
   b. Diagnostic testing
   c. Monitoring and reassessment
   d. Consults
   e. Diagnosing
5. All of the following are examples of patient flow best practices *except*:
   a. Consults
   b. Robust hospital surge capacity plan
   c. Diagnostic services in the ED
   d. Patient tracking systems
   e. Use of dashboards

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