Managing Patient Access and Flow in the Emergency Department to Improve Patient Safety

ABSTRACT

From 1996 to 2006, the annual number of emergency department (ED) visits increased approximately 32% from 90.3 million to 119.2 million, according to the Centers for Disease Control and Prevention. Simultaneously, as the number of patient visits increased, the number of hospital EDs decreased from 4,019 to 3,833, increasing the number of annual visits per ED and contributing to crowding. In 2009, Pennsylvania healthcare facilities reported to the Pennsylvania Patient Safety Authority 1,930 events of complications of procedures or treatments or tests from the ED. Existing and proposed ED measures (e.g., from initial patient presentation to final departure)—specifically those from the Hospital Quality Alliance, the Centers for Medicare and Medicaid Services, the Oklahoma Foundation for Medical Quality, and the National Quality Forum—show that national payment and quality organizations have recognized the importance of standardizing ED performance measures. Facilities can use this data to manage patient access and flow in the ED, to increase patient satisfaction, to improve quality of care, and to optimize patient safety. This article focuses on strategies to increase patient safety and improve quality during the ED visit from the point of patient arrival to the diagnostic evaluation. (Pa Patient Saf Advis 2010 Dec;7[4]:123-34.)

Emergency Department Statistics

Emergency departments (EDs) are under pressure to provide care that is safe, effective, patient-centered, timely, efficient, and equitable—a difficult task under any circumstances, but one that is even more difficult in the presence of ED crowding. According to the Centers for Disease Control and Prevention (CDC), from 1996 to 2006 the annual number of ED visits increased approximately 32% from 90.3 million to 119.2 million. Simultaneously, as the number of patient visits increased, the number of hospital EDs decreased from 4,019 to 3,833, increasing the number of annual visits per ED. CDC also found that the ED was the portal of entry for more than 50% of the non-obstetric acute care admissions in the United States, an increase from 36% in 1996.[1] Furthermore, the role of the ED has evolved from providing primarily life-saving treatment to providing urgent unscheduled care to patients unable to gain access to their primary care providers, as well as to providing care to Medicaid beneficiaries and to patients without insurance.[2]

All these factors contribute to crowding in the ED, which can be measured by average patient wait times, average door-to-doctor times, and the percentage of patients who leave without being seen (LWBS), as well as by measuring other discrete blocks of time between patient initial presentation and final disposition.[3] Delays in care and treatment can result in further patient illness or even death.[4] According to Joint Commission sentinel event statistics, there was a 31% increase in the number of reports linked to delay in treatment, from 7.7% of total reports in 2007 to 10.1% of total reports in 2008.[5] Recognizing that when patient flow becomes impeded EDs become crowded, a 2005 Joint Commission patient flow standard requires hospitals to plan, implement, monitor, and measure patient flow activities related to admitted patients who are in temporary bed locations in areas like the ED ("boarders"); patients who are placed in overflow locations; ambulance diversions; the supply of available beds; efficiency of areas where patients receive care; safety of areas where patients receive care; and access to patient support services.[6]

Several studies have presented further evidence that ED crowding contributes to poor quality care. A retrospective analysis of patients older than 30 years with chest pain syndrome who were admitted to tertiary care hospitals from 1999 through 2006 (n = 4,574) showed an association between ED crowding and a higher risk of adverse cardiovascular outcomes.[7] Additional studies show correlations between high ED wait times and the following: patient mortality,[8,9] time to antibiotic for patients with pneumonia,[10] time to thrombolysis,[11] and time to analgesia for patients with severe pain.[12] Addressing ED crowding and wait times may be the first step in addressing patient safety and quality of care in the ED.

National Payment and Quality Organizations Endorsing ED Metrics

Recognizing the potential problems associated with ED crowding, several national payment and quality organizations have developed ED metrics that measure periods between patient initial presentation to the ED and final departure from the ED. Currently, the Hospital Quality Alliance is collecting two voluntary emergency department parameters: (1) median time from ED arrival to ED departure for admitted ED patients and (2) admission decision time to ED departure time for admitted patients.[3] These parameters are likely to be included in the Reporting Hospital Quality Data for Annual Payment Update in 2012, highlighting the importance of ED data collection and tracking for payment as well as for quality and patient safety purposes. Additionally, the Centers for Medicare and Medicaid Services (CMS) and the Oklahoma Foundation for Medical Quality propose a third metric," median time from ED arrival to ED departure for discharged ED patients" to be included in the clinical quality measures for electronic

submission.[13] In 2008, the National Quality Forum (NQF) endorsed 10 ED quality measures for hospital-based ED care to help decrease patient wait time, increase physician productivity, and increase patient safety.[14] Three of these NQF-endorsed benchmarks are being considered by CMS for inclusion in the public reporting system in 2012.

NQF's measures 1 and 3 represent length of stay in the ED. Measure 2 represents throughput in the ED—how efficiently patients are moved from the ED to the next care setting. Measures 4 and 5 represent patient arrival and triage efficiency.

Care Along the ED Continuum of Quality Metrics

Table 1 shows that EDs must begin tracking—and will soon start reporting—this data to national payer groups. Once this data is consistently collected, it will be important to improve metrics without jeopardizing quality or negatively affecting patient safety. Two of the data metrics span the entire length of the ED encounter (ED arrival to final disposition for admitted and discharged patients). Two additional data metrics occur in the patient arrival to diagnostic evaluation phase (LWBS; door-to-diagnostic evaluation). Finally, the last data metric occurs in the final phase of ED treatment (admission decision to departure time) (see Figure).

The Pennsylvania Patient Safety Authority received 1,930 reports of complications of procedures or treatments or tests from the ED care setting in 2009.* One hundred were Serious Events (events that harmed patients; 5%), and 1,830 were Incidents (so-called near-miss or no harm events; 95%). Analysis of these events shows that potential threats to patient safety can occur during the patient arrival to diagnostic evaluation phase, the diagnostic evaluation to disposition decision phase, or the disposition decision to final discharge phase of ED treatment. The Figure shows a breakdown of these processes in the ED with correlating data collection points.

* As of January 16, 2005, the Authority ceased report classifications for "Complication of Procedure/Treatment/Test, Emergency Department, Left without Being Seen/Left before Visit Completed." Reports submitted under these categories were not counted in the analysis.

Table 1. Summary of Emergency Department (ED) Data Parameters under Consideration for Public Reporting in 2012 by the Centers for Medicare and Medicaid Services

MEASURE NO. IDENTIFIER	METRIC	DEVELOPER	DESCRIPTION
Centers for Medicare & Medicaid Services (CMS) Emergency Department-1[1] National Quality Forum (NQF) NQF 0495	1. Median time from ED arrival to ED departure for admitted patients	CMS; Oklahoma Foundation for Medical Quality (OFMQ); Reporting Hospital Quality Data for Annual Payment Update (RHQDAPU)	Median time (in minutes) from ED arrival to ED departure for admitted patients (NQF 0495)
CMS ED-2[1] NQF 0497[2]	2. Admission decision time to ED departure time for admitted patients	CMS; OFMQ; RHQDAPU	Median time (in minutes) from admission decision time to departure from the ED for ED patients admitted to inpatient status (NQF 0497)
CMS ED-3[1] NQF 0496[2]	3. Median time from ED arrival to ED departure for patients discharged from the ED	CMS; OFMQ	Median time (in minutes) from ED arrival to departure from the ED for patients discharged from the ED (NQF 0496)
NQF 0498[3]	4. Door-to-diagnostic evaluation by qualified medical personnel	Louisiana State University (LSU)	Median time (in minutes) from first contact in the ED to the time when the patient sees qualified medical personnel* for the first time for evaluation and management (NQF 0498)
NQF 0499[3]	5. Left without being seen by qualified medical personnel	LSU	Percentage of patients leaving without being seen by qualified medical personnel (NQF 0499)

* The designation of qualified medical personnel must be set forth in a document approved by the board of trustees or governing body of the hospital and meet the requirements of CMS manual §482.55.

Notes

1. QualityNet. Reporting Hospital Quality Data for Annual Payment Update (RHQDAPU). Measure comparison (inpatient hospital quality measures) [online]. [cited 2010 Apr 29]. Available from Internet: http://www.qualitynet.org/dcs/ContentServer?c=Page&pagename=QnetPublic%2FPage%2FQnetTier3&cid=1138900298473.
2. Table 20: Proposed clinical quality measures for electronic submission by eligible hospitals for payment year 2011-2012. In: Centers for Medicare and Medicaid Services. Medicare and Medicaid programs; electronic health record incentive program; proposed rule. *Fed Regist* 2010 Jan 13;75(8)1896.
3. National Quality Forum (NQF). NQF endorses measures to address care coordination and efficiency in hospital emergency departments [online]. 2008 Oct 29 [cited 2010 May 12]. Available from Internet: http://urgentmatters.org/media/file/NQF%20Press%20Release.pdf.

The Authority further analyzed 412 of the reports submitted from August 1, 2009, through December 30, 2009. Forty of these events occurred during the patient arrival to diagnostic evaluation phase, 258 during the diagnostic evaluation to disposition decision phase, and 114 during the disposition decision to discharge from the ED phase of treatment.

Eighty-eight contributing factors were identified as being associated with these 412 event reports (see Table 2).

Table 3 lists the variety of factors that can contribute to events that occur in the ED setting. For the 40 reports in the patient arrival to diagnostic decision phase, there were 17 contributing factors in 12 categories. The remainder of this article focuses on the strategies for optimizing patient safety and improving data metrics during the first phase of ED treatment: patient arrival in the ED to diagnostic evaluation (also referred to as the "door-to-doctor" phase).

Patient Arrival in the ED to Diagnostic Evaluation

Patient arrival in the ED to diagnostic evaluation encompasses the patient registration and triage processes, as well as placement in a treatment room or area to await diagnostic evaluation. These time intervals can pose threats to patient safety in a variety of ways. For example, as reported in a Philadelphia-area news source, the following event occurred in a Pennsylvania hospital in 2009:[15]

> A 63-year-old male had gone to an area ED and reported feeling pain in his left side. Security camera tapes showed that the man stopped moving 11 minutes after his arrival in the waiting room, and that he was found to be dead of a massive heart attack almost an hour after he had come to the ED—and only after another patient had alerted ED staffers to the motionless man.

The Pennsylvania Department of Health's investigation found that ED employees were not aware of a facility policy for checking on patients in the waiting room and that no nursing staff monitored or maintained an awareness of activity in the ED waiting room.[16]

The first step in improving the ED intake process is to collect the necessary data to analyze patient flow and front-end processes. The American College of Emergency Physicians' (ACEP) Emergency Medicine Practice Committee defines the ED front-end process as the span of time from the patient's initial arrival in the ED to the time the ED healthcare provider formally assumes responsibility for the evaluation and management of the patient (diagnostic evaluation by a qualified provider).[17] Timeliness of care during this initial period can influence the outcome of the entire ED visit and is an important consideration for patient safety, as well as one of the strongest predictors of patient satisfaction.[18] In order to improve timeliness of care, EDs must first understand facility-specific utilization and census patterns.

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Figure. Emergency Department Care Metrics

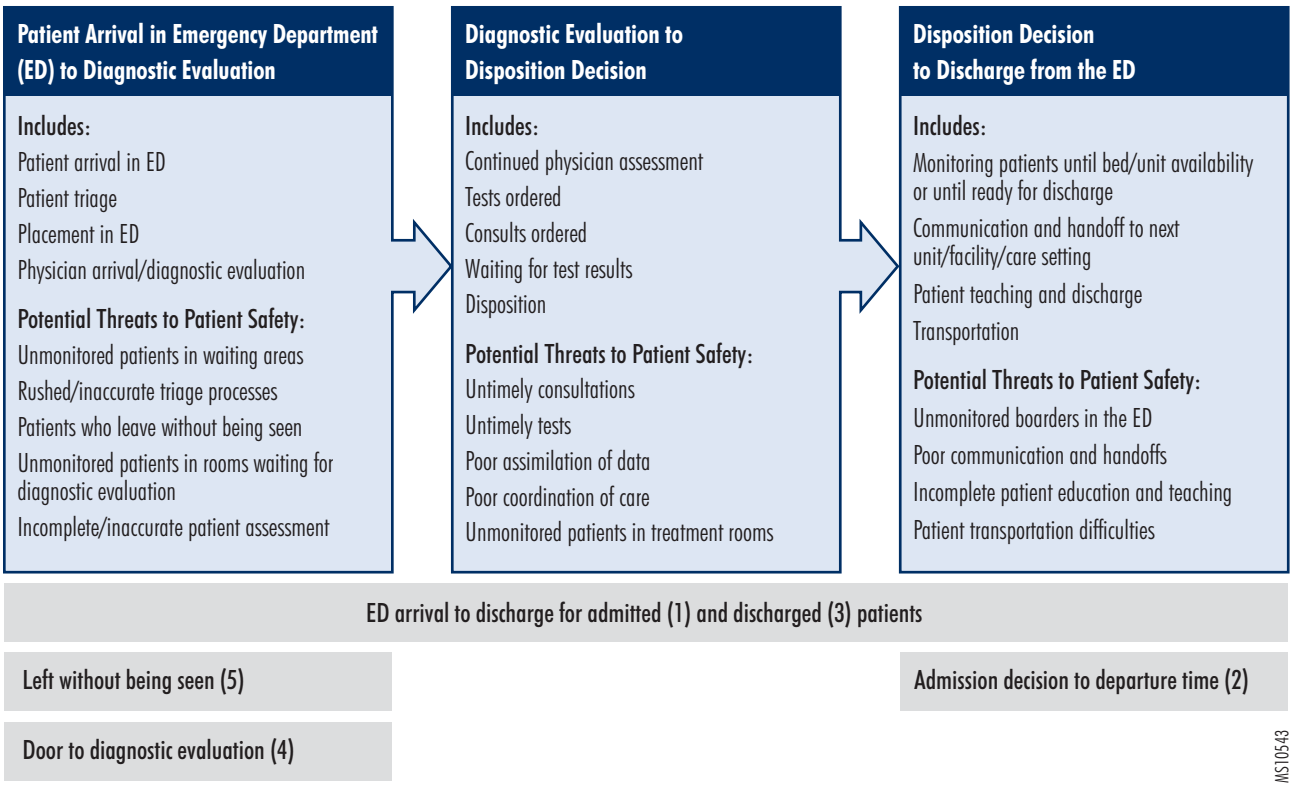

Table 2. Pennsylvania Patient Safety Authority Serious Events and Incidents by Patient Treatment Phase, August through December 2009

PATIENT TREATMENT PHASE	TOTAL REPORTS	SERIOUS EVENTS	INCIDENTS
Patient arrival in emergency department (ED) to patient assessment	40	2	38
Physician assessment to disposition decision	258	9	249
Disposition decision to discharge from ED	114	3	111
Total	**412**	**14**	**398**

Table 3. Contributing Factors Reported to the Pennsylvania Patient Safety Authority by Patient Treatment Phase, August through December 2009

CONTRIBUTING FACTORS IDENTIFIED	FACTORS BY PATIENT TREATMENT PHASE			
	Patient Arrival To Diagnostic Evaluation	Diagnostic Evaluation To Disposition Decision	Disposition Decision To Final Discharge	Factor Total
Team Factors				
Communication problems between providers	2	4	2	8
Change of service		1		1
Cross-coverage situation		1		1
Shift change	1			1
Total	**3**	**6**	**2**	**11**
Work Environment				
Distractions/interruptions	1	4	2	7
Limited access to patient information	1			1
Equipment malfunction	1			1
Total	**3**	**4**	**2**	**9**
Task Factors				
Training issues	1	3	1	5
Emergency situation		2		2
Total	**1**	**5**	**1**	**7**
Staff Factors				
Inadequate system for covering patient care	1			1
Insufficient staffing			1	1
Issue related to proficiency	1	7	2	10
Total	**2**	**7**	**3**	**12**
Patient Characteristics				
Lack of patient compliance/adherence	3	6	3	12
Lack of patient understanding		4	1	5
Lack of family member cooperation			1	1
Total	**3**	**10**	**5**	**18**
Organization/Management Factors				
Presence of boarder patient			1	1
Unclear or ambiguous policies or procedures	1			1
Procedures not followed	2	13	3	18
Total	**3**	**13**	**4**	**20**
Other Contributing Factors (not specified)	**2**	**6**	**3**	**11**
Total Contributing Factors	**17**	**51**	**20**	**88**

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Forecasting ED Utilization

Studying data over time permits accurate predictions regarding utilization. According to a May 2010 National Center for Health Statistics data brief, approximately one-fifth of the civilian, noninstitutionalized U.S. population had one or more ED visits in a 12-month period in 2007.[19] The Emergency Department Benchmarking Alliance Annual Data Survey 2007 highlighted some recognizable trends in ED data, including the following:[18]

- Total arrivals increase from midmorning until noon and then hold steady until midnight, when they decrease.
- Pediatric arrivals surge before adult arrivals and decrease sooner.
- Senior citizen arrivals surge in the late afternoon, and these patients will wait longer before leaving without being seen.
- The census (see discussion below) increases until noon, stays high through the evening shift, and then quickly decreases to its lowest point at 5 a.m.; the cycle then repeats.
- The busiest days of the week are Saturdays and Mondays.
- The busiest months are July, August, and December.
- The most common chief complaints are abdominal pain, chest pain, and orthopedic injuries.

Individual ED statistics may not match the above list exactly, but the list provides a benchmark for facilities to analyze in the context of specific ED trends. Once facilities can accurately predict demand (utilization), they can begin to plan ED capacity to match the demand. Utilization patterns must be analyzed in conjunction with departmental census data.

Tracking Census Data

Census data describes what is happening in an ED during specific time intervals. For example, data can illustrate the following:

- Census by hour, day, month, or year
- Waiting room census
- ED occupancy (occupied beds/total beds)
- Percentage of patient admissions
- Percentage of trauma cases
- Percentage of patient admissions to the intensive care unit
- Percentage of pediatric patients
- Percentage of patients with certain clinical complaints

Census data allows EDs to predict utilization for given periods and avoid bottlenecks in ED intake processes before they occur. It is important to understand how different census measures correlate to facility capacity. For instance, a high waiting room census may indicate either a long triage queue or a high ED occupancy rate (during patient arrival to diagnostic evaluation phase). Occupancy (percentage of filled beds) may indicate that the department itself is at full capacity (during diagnostic evaluation to disposition decision phase). The number of boarders in the ED may indicate decreased capacity within the hospital units (during disposition decision to discharge from the ED phase).[7]

Once demand has been predicted through analysis of historical utilization and census data, staffing levels can be matched to the demand. Departments can develop a series of early warning signals (triggers) that signify a capacity-to-demand mismatch, and interventions aimed at mitigating the mismatch. For instance, if capacity (department census/total available beds) exceeds 80%, an ED may elect to implement a discharge team to quickly discharge stable patients, have physicians meet to determine whether any patients can return at a later time for diagnostic testing during low census times (offloading), or create an express admissions team to move admitted patients through the ED.[18,20] These strategies must comply with the Emergency Medical Treatment and Labor Act (EMTALA) (i.e., the patient must receive a medical screening examination, and it must be determined that the patient does not have an emergency medical condition and is stable for discharge). Per EMTALA, "stable" means that the patient is unlikely to deteriorate during discharge within a reasonable medical certainty.[21]

Accurate utilization and census tracking has led to a number of EDs publicly posting forecasted ED wait times on their websites (e.g., Gulf Coast Medical Center: http://www.egulfcoastmedical.com; Baton Rouge General: https://www.brgeneral.org/site.php).

Tracking Clinical Performance Metrics

In addition to the operational metrics listed in Table 1, EDs monitor a number of clinical performance measures, some of which are reported on the CMS website at http://www.hospitalcompare.hhs.gov/Hospital/Search/SearchMethod.asp. Most ED personnel are aware of the clinical performance measures for surgical care, myocardial infarction, heart failure, pneumonia, and childhood asthma care. NQF also endorses 10 quality measures for the ED, 4 of which are related to clinical performance measures (i.e., sepsis, pregnancy tests for females with abdominal pain, anticoagulation for acute pulmonary embolus patients, pediatric weights in kilograms). These are available at http://www.qualitymeasures.ahrq.gov/browse/nqf-endorsed.aspx?term=emergency+department+and+national+quality+forum. Overlaying clinical performance metrics with utilization and census data can assist EDs with predictive utilization patterns. For instance, if the busiest time in the ED is from 10 p.m. to 1 a.m., analyzing the clinical presentation of patients during this high-census time can help managers ensure that the appropriate type and level of staff are available to handle the patient population. A large body of clinical literature suggests that

ED crowding and long wait times are associated with both unfavorable clinical endpoints (mortality rates) and delays in various clinical process measures, such as time to treatment for conditions like acute myocardial infarction, thrombosis, antibiotic administration for pneumonia, and pain management.[7, 9-12]

Front-End Patient Flow Processes and Patient Safety Concerns

Patient Triage

The purpose of ED triage is to quickly assess and categorize incoming patients and to identify emergent patients. Triage nurses or other professionals are trained to quickly recognize patients who require immediate, life-sustaining care and to categorize and prioritize the remaining patient population. Rapid, accurate triage of patients in the ED is key to successful ED operations. Patients who are undertriaged are at risk for deterioration while waiting; patients who are overtriaged may use scarce resources (e.g., taking an open bed, which may be needed for another patient requiring immediate care). Accurate triage categorization can only be accomplished when a reliable and validated triage tool, in which all applicable healthcare providers have been trained, is used.

There are several triage systems in the United States, consisting of three-, four-, or five-level triage parameters. The National Center for Health Statistics converted to a five-level triage data collection system in the 2005 National Hospital Ambulatory Medical Care Survey (NHAMCS) for the ED.[22] The prevailing triage method is the Emergency Severity Index (ESI), which is endorsed by the Emergency Nurses Association and ACEP.[23] Other frequently used tools are the Australian Triage Scale (ATS) and the Canadian Triage and Acuity Scale (CTAS).

ESI is a five-level triage tool that categorizes ED patients by evaluating both patient acuity level and resource needs (see Table 4 for ESI level definitions). Initially, the triage nurse assesses only acuity level, which is determined by the stability of vital functions and potential for life, limb, or organ threat. If a patient does not meet high acuity level criteria (ESI level 1 or 2), the triage nurse then evaluates expected resource needs to help determine a triage level (ESI level 3, 4, or 5). Resource needs are defined as the number of resources a patient is expected to consume in order for a disposition decision to be reached. Detailed information about the ESI triage system can be found at http://www.ahrq.gov/research/esi/esihandbk.pdf.

Door-to-Doctor Time

Door-to-doctor time is the median time (in minutes) from first contact in the ED to the time that the patient sees qualified medical personnel for the first time for evaluation and management of the medical condition (NQF 0498), also referred to as the patient arrival in the ED to diagnostic evaluation phase. The universal service quality goal is to have patients seen by a physician in less than 30 minutes.[18] Data from the 2006 National Hospital Ambulatory Medical Care Survey (NHAMCS) (n = 119,191,000) shows that 61.8% of patients waited more than 30 minutes but less than one hour to see a physician (mean 55.8 minutes; median 31 minutes).[2] When the door-to-doctor time increases, the percentage of patients who leave without being seen increases, too (see "Walkaway Population"). The national LWBS rate, according to the 2006 NHAMCS report, was approximately 2%.[2] While ESI does not specify door-to-doctor benchmarks in minutes per acuity level, both ATS and CTAS do, as shown in Table 5.

In the ED, situational awareness is critical, and it encompasses patients in waiting rooms, as well as patients in various stages of treatment throughout the department. The Authority has received reports involving patients at various points during the patient arrival to diagnostic evaluation phase of ED treatment.

Table 4. The Emergency Severity Index (ESI)

CATEGORY	DEFINITION	STATISTICS
ESI 1	Severely unstable patient, must be seen immediately by a physician, often requires an intervention (e.g., intubation) to be stabilized	Represents 2% of all patients; 73% of ESI 1 cases are admitted
ESI 2	Potentially unstable patient, must be seen promptly by a physician (within 10 minutes), often requires laboratory and radiology testing, medication, and admission	Represents 22% of all patients; 54% of ESI 2 cases are admitted
ESI 3	Stable patient, should be seen urgently by a physician (within 30 minutes), often requires laboratory and radiology testing and medication, and usually is discharged	Represents 39% of all patients; 24% of ESI 3 cases are admitted
ESI 4	Stable patient, may be seen nonurgently by a physician or midlevel provider, requires minimal testing or a procedure, and is expected to be discharged	Represents 27% of all patients; 2% of ESI 4 cases are admitted
ESI 5	Stable patient, may be seen nonurgently by a physician (or midlevel provider), requires no testing or procedures, and is expected to be discharged	Represents 10% of all patients; 0 of ESI 5 cases are admitted

Source: Reiter M, Scaletta T. On your mark, get set, triage! Emerg Physicians Mon [online]. 2008 Aug 31 [cited 2010 May 25]. Available from Internet: http://www.epmonthly.com/subspecialties/management/on-your-mark-get-set-triage.

- Before patient registration:

  The patient was found on the street and brought in by fire rescue and stated he wanted to stay warm and refused to be seen by a physician. The patient was in a wheelchair and was placed in the waiting room. Later, he was noted to be snoring in the wheelchair; subsequently, he was found unresponsive. [He was] taken to the treatment area and advanced cardiac life support protocol was initiated.

- During and after the triage process:

  The patient was triaged with a history of chest pain on and off, but not present at triage. [The patient was] sent back to waiting area and then developed pain. [The patient was] taken back to [the treatment] area, an EKG [electrocardiogram] was done and myocardial infarction noted. The patient was treated emergently. . . .

  [A patient was] triaged, but not in lobby [several hours later]. The patient had complaint of chest heaviness, noncardiac reasons. . . .

  The patient was triaged but was not in the waiting room when called [about four hours later]. . . .

- While waiting for physician assessment:

  The patient was not seen in the litter area. [The patient] was observed in a sitting position with a cord wrapped around the neck. [The patient was] assisted by ED staff in removing the cord . . . assisted by staff back to bed. [The patient was] placed on direct observation. . . .

The current state of crowding in many EDs has threatened patient safety and placed an increased focus on triage. Using a reliable triage scale such as ESI and implementing promising new triage strategies can help EDs improve on the data metrics outlined previously, while simultaneously safeguarding patient safety.

Walkaway Population

"Walkaways" are patients who leave the emergency department (ED) before treatment is completed, patients who leave against medical advice, and patients who leave without being seen (LWBS). While the Centers for Medicare and Medicaid Services is collecting data related to the LWBS population, many EDs realize the benefit of tracking all walkaways from the ED. Not only is it a patient safety issue when patients requiring medical treatment leave a facility before treatment is rendered, but this population also potentially increases facility liability and contributes toward lost revenue. Rapid patient assessment and triage is the most effective way to decrease the LWBS patient population.

Source: Welch SJ. *Quality matters: solutions for a safe and efficient emergency department*. Joint Commission Resources. Oakbrook Terrace (IL); 2009:11.

Alternative Triage Strategies

Patient Registration

Door-to-triage time is the first detectable period within the patient arrival to diagnostic evaluation phase of the ED visit. Minimizing this time is an important patient safety goal. One efficient means to do this is through an evaluative registration process. This may consist of a "quick look" triage process whereby a nurse stationed at the ED entrance performs an abbreviated triage assessment in conjunction with a preregistration process designed to capture just enough demographic detail to assign a patient account number and produce a patient identification band, ideally within 30 seconds.[20] Once this basic information is captured and entered into a system to generate a medical record, the rest of the patient registration information can be captured at any point during the ED stay.[17] Combining registration and triage into parallel rather than serial processes can increase department efficiency.

Using Midlevel Providers or Physicians in Triage

Many alternative triage strategies are described in the literature. One of the most successful strategies is to elevate the level of education and experience of the staff member in triage by placing a midlevel provider (e.g., advanced nurse practitioner, physician assistant) or a physician in triage. This intervention alone has been shown to reduce throughput time, reduce waits, and reduce the LWBS population.[24] One study shows that emergency medical technicians can predict whether patients would need to be admitted from the ED 62% of the time.[25] Other studies show that physicians can accurately predict patient outcome and disposition with 85% to 95% accuracy.[18]

Midlevel providers are typically stationed close to the triage station and receive patients to initiate the plan of care and order diagnostic testing. The patient's care is then transferred to the ED physician for a definitive diagnosis and completion of treatment through patient disposition. Midlevel providers are frequently used during times of high acuity or volume. The success of this model depends on the competence of the midlevel providers and their ability to quickly begin treatment. When this model is used successfully, it has improved patient satisfaction scores, reduced the LWBS population, and improved the door-to-doctor benchmarks at a relatively low cost. The disadvantages are that midlevel providers tend to order more diagnostic tests and the number of patient handoffs is increased.[18]

Another successful model is the placement of a board-certified emergency physician in triage. In addition to being able to accurately predict admission status, emergency physicians have both the knowledge and authority to make broad-based decisions, including those related to earlier patient admissions when warranted.

In the triage rapid initial assessment by doctor (TRIAD) study, the average patient wait time was reduced by 38% and the average processing time by

Table 5. Comparison of Australian Triage System (ATS) and the Canadian Triage and Acuity System (CTAS) Benchmark Times

ACUITY LEVEL	ATS DOOR-TO-DOCTOR TIME[1]	CTAS DOOR-TO-DOCTOR TIME[2]
Level I	Immediate	Immediate
Level II	10 minutes	15 minutes
Level III	30 minutes	less than 30 minutes
Level IV	60 minutes	less than 60 minutes
Level V	120 minutes	120 minutes

Notes

1. Western Australian Centre for Evidence Based Nursing and Midwifery. Triage in the emergency department: general principles [online]. 2004 [cited 2010 May 25]. Available from Internet: http://wacebnm.curtin.edu.au/workshops/Triage.pdf.
2. Jimenez JG, Murray MJ, Beveridge R, et al. Implementation of the Canadian Emergency Department Triage and Acuity Scale (CTAS) in the Principality of Andorra: Can triage parameters serve as emergency department quality indicators? *CJEM* 2003 Sep;5(5):315-22.

23% without adding extra staff. Benefits highlighted in this study included the following:[26]

- Many simple medical conditions could be treated and patients discharged directly from triage.
- Patients were admitted faster when a physician identified an appropriate medical condition during triage.
- Treatments for symptom control (e.g., pain management) were initiated in triage, leading to symptom relief by the time a patient was evaluated by an attending physician, eliminating the time-consuming need for reassessment before discharge.
- Prompt and succinct communication between a triage physician and other attending ED physicians streamlined care in complicated cases.

Physicians in triage can decrease the LWBS patient population, because patients are more apt to stay in the ED once a physician has assessed their condition and explained the plan of care.[18] Patient satisfaction scores tend to be higher with early physician assessment and care. Finally, board-certified emergency physicians tend to order fewer unnecessary diagnostic tests because of their knowledge and experience. Disadvantages to this model include the difficulty in recruiting board-certified emergency physicians to work in this triage model, the high cost of labor, and the reluctance of some physicians to hand off care to a subsequent emergency physician for care posttriage.[26]

Team Triage

Rapid triage can increase patient safety by decreasing bottlenecks in the front end of ED treatment because of shorter cycle times and because patients are guided to treatment areas immediately, decreasing the time to treatment.[20] Team triage is one way to expedite patient evaluation and treatment. In this model, physicians, nurses, and ED technicians meet in the patient treatment area to perform the patient triage assessment and formulate the diagnostic plan of care. The emergency department at Vanderbilt University Medical Center, a Level I trauma center in Tennessee, established a program in which patients are quickly assessed in a triage area by a team consisting of a physician, a nurse, and a paramedic. Patients with urgent problems are promptly moved to a treatment room. Patients with nonurgent problems are tested and treated in the team triage area and then released or returned to the waiting area until test results and a treatment room become available. Because of this program, most patients see the triage doctor within 10 minutes of arriving, the percentage of LWBS patients has decreased from 5% to less than 1%, and patient satisfaction has increased markedly.[27]

No Triage

Another strategy being successfully used by a number of EDs involves directing patients immediately to an open bed in the ED and performing bedside registration while simultaneously triaging and treating the patient. In this model, the primary nurse performs the initial patient assessment, often with the ED physician in attendance performing a parallel medical evaluation, thereby decreasing the amount of time spent by the triage professional and improving communication between healthcare providers. Where it can be implemented, this model has led to reduced patient wait times, decreased overall length of stay, and reduced numbers of ED patients waiting to be seen.[24]

Advanced Triage Protocols

Advanced triage protocols are order sets that include diagnostic and therapeutic orders that are locally developed and are driven by the patient chief complaint. Most EDs have approximately 20 medical conditions, which are responsible for about 50% of ED patient visits.[18] For example, protocols for treating patients presenting with chest pain may include immediate electrocardiogram and administration of aspirin followed by physician assessment. Developing evidence-based treatment protocols with regard to particular medical conditions can increase medical care reliability and patient safety and decrease medical errors and costs. Additionally, if diagnostic tests are ordered early in the triage process, results can be accessed by the treating ED physician as the patient enters the treatment room.

Patient Flow Managers

Many EDs are using patient flow manager positions to expedite patient treatment and to provide real-time troubleshooting of patient flow problems. Staten Island University Hospital in New York City uses a high-level manager, an administrator on duty, to directly escort patients to treatment areas. In addition to monitoring the progress of patient care, the administrator increases the direct-to-bed patient flow process and significantly decreases patient wait times for care.[28]

Environmental Design of ED Waiting Rooms

Facilities that have the opportunity to design or redesign the ED can use design principles to improve patient flow and communication among staff members. Considerations include embedding departments like radiology in the ED to reduce turn-around time; dedicating space for specialty staff (e.g., phlebotomy, radiology, high-demand consultants) in the ED; building pods of services for adults, pediatrics, and levels of "fast track" patients; and clustering registration and triage areas to facilitate parallel processing. Pod-type design structures allow teams of providers to work closely together and to keep benchmark and trigger information regarding ED census and turn-around time, as well as patient-specific clinical information, easily accessible.[29] Conversely, pod-type models require a higher level of staffing and may be designed for a specific patient population that may or may not materialize at any given point in time. Designing space for needed equipment and supplies at the bedside and designing "universal" treatment rooms may significantly increase staff productivity and decrease the time-to-treatment for patients.

Authority reports and local news stories highlight the importance of maintaining keen awareness of activity in ED waiting rooms. In addition to specific triage strategies, it is important to configure existing ED waiting areas so that ED staff can easily track and monitor patients. Optimally, there is line of sight awareness of the waiting room patient population by the ED staff. If the waiting room is out of sight, EDs may elect to station a healthcare provider within or near the waiting room or use video monitoring technology. If medical staff is unavailable, specially trained volunteers or paraprofessionals can be used to facilitate information exchanges regarding patient condition to the triage professional. However, instead of performing and documenting repeat assessments of patients in waiting rooms, many organizations recommend that patients be assessed and moved expeditiously from waiting area to treatment area. If waiting must occur, it is best that patients wait on the back end of an ED visit, after assessment has been completed and diagnostic evaluation begun.[18]

Fast-Track Service Lines

Urgent care or fast-track service lines can improve front-end ED patient flow by routing low-acuity patients to separate treatment areas where they are evaluated and treated separately from acutely ill ED patients. In this model, either a physician or a mid-level provider can treat patients in the fast-track area. This allows the more acutely ill patients to receive treatment in closely monitored areas. Two studies have shown that dedicated fast-track service lines can decrease ED length of stay,[30] decrease door-to-doctor time, and lower the ED walkaway rate.[31]

Information Technology

Information technology used within most ED departments can be as simple as an electronic patient registration system or as complex as a comprehensive emergency department information system (EDIS). EDISs are electronic health record systems designed specifically to manage data and workflow in support of emergency department patient care and operations. The EDIS patient tracking component is either patient- or department-centered and takes into account both clinical course and physical location tracking. Clinical course tracking follows the patient's care throughout the ED process, providing information such as patient status, completed and anticipated events, order status, vital signs, and other clinical information. Physical location tracking follows the patient through the physical space in all phases of the ED visit, from prearrival to disposition, and can be accomplished manually through data entry into the system or through the use of radio-frequency identification (RFID) or other similar technologies.[32] Standard ED operational metrics are tracked and displayed in a dashboard fashion, proving practitioners with access to real-time departmental status. In order to receive the optimal benefit of EDIS, it should be fully integrated and interfaced with other critical information technology systems, including the electronic medical record, pharmacy, radiology, laboratory, registration/admitting, billing, and medical record systems.[17] For smaller departments without sufficient funding for EDISs, manual tracking of patient status and department operational metrics is necessary. (The Authority hosts a toolkit of sample tracking tools on its website; for more information, see http://patientsafetyauthority.org/EducationalTools/PatientSafetyTools/Pages/home.aspx).

Customer Service Culture and Communication

While it is unrealistic to believe that all wait times in the ED could be eliminated, preparing for and explaining wait times to patients is important from both a patient safety and a customer service point of view. Previous Authority reports have shown that unmonitored patients in the initial phase of ED treatment can quickly become a liability. Patients who spend more than two hours in the ED report less overall satisfaction with their visit than those who are there for less than two hours.[28] Since much of the time in the ED is spent waiting (e.g., to see a physician, for consults, for tests and test results), understanding the psychology of waiting can lead to innovative solutions. Consider the following principles of waiting:[33]

- People want to get started.
- Anxiety makes waits seem longer.
- Uncertain waits seem longer than known, finite waits.
- Unexplained waits seem longer than explained waits.
- Unfair waits seem longer than equitable waits.
- The more valuable the service, the longer the customer will wait.
- Solo waits feel longer than group waits.

While decreasing delays in the ED would certainly improve customer satisfaction, Press Ganey data shows that keeping patients informed about delays in the department and having a caring attitude toward patients can mitigate the negative effects of patient wait times in the ED.[28] Some innovative strategies that hospitals have implemented to decrease wait times include the abbreviated triage model, the parallel processing of registration and triage, bedside triage, patient involvement in progress tracking throughout the ED stay, shifting patient waiting to the end of the ED visit (after receiving the diagnostic evaluation), designing ED waiting areas with patient comfort in mind, and providing activities to occupy both patients and families while they wait for ED disposition.

Communication is important throughout the ED visit, both between healthcare providers and patients and their families, and also between healthcare providers themselves in the ED. Handoffs are a known risk factor for increased medical errors; in a busy ED, handoffs can become even more dangerous. Bedside transitions during shift change, when possible, can help facilitate the transfer of information from one practitioner to the next in busy ED environments. Customer satisfaction surveys can provide the ED with cost-effective feedback regarding patient perceptions of timeliness and quality of care in the ED.

Risk Reduction Strategies for Front-End ED Processes

Consider the following strategies to simultaneously decrease the amount of time patients spend in the "patient arrival in the ED to physician assessment" phase of ED treatment and to enhance patient safety:

- Implement a predictive model of staffing in the ED and staff accordingly. Analyze a minimum of four weeks of volume, key metrics, and admissions (see sample "Emergency Department Census Tracking Tool" available on the Authority website). Determine the average daily demand for each day of the week and for time periods throughout the day.[2,18,28]
- Use strategies to optimize low-census/low-utilization times in the ED, and prepare for busier times. Ensure that staffing is adequate during the busiest parts of the day. Expedite patients early in the day (or during less busy times) so that beds are open during the busier times. During shift changes, have practitioners do bedside transitions to facilitate accurate flow of information.[7, 18-20, 28]
- Monitor ED capacity in real time. Develop early warning systems (e.g., number of patients waiting to be seen, capacity) to alert staff to large fluctuations in demand or capacity (see sample "Emergency Department Front-End Process Measures Threshold Tool" on the Authority website). When an ED is at 80% capacity, initiate a variety of actions to prevent increases in capacity such as sending boarders to units; assembling a discharge team to quickly discharge waiting patients; having physicians determine whether any patients can return for diagnostic testing at another time (offloading); or creating an express admissions team to expedite admissions out of the ED.[18]
- Adopt an accurate and reliable triage methodology, and ensure that staff are trained in its use.[18,23]
- Consider alternative triage strategies to expedite patient door-to-registration time, including the following:
  - Abbreviate patient registration: collect only as much data as needed to generate the medical record and create the patient wristband. All other data can be collected at any point during the ED stay.[20]
  - Elevate the level of experience or education of the triage personnel: consider using midlevel staff (e.g., physician assistant; nurse practitioner) or ED physicians in triage.[18,24,25]
  - Implement team triage: use a team of nurses and physicians to perform triage at the bedside in order to decrease front-end cycle time and decrease patient time to treatment. This model helps pull patients directly into treatment rooms—a much safer place for ED patients to wait for treatment.[20,27]
  - Bypass triage completely, and place patients in available beds immediately. Abbreviated registration and bedside triage combine to make this model efficient and safe for patients when beds are available.[24]
  - Use evidence-based advanced triage protocols for the department's common ED chief complaints.[18]
- Assign a patient flow manager to facilitate patient arrival in, and flow through, the ED department.[28]
- Implement fast-track or urgent care treatment areas where low-acuity patients receive separate but parallel care from dedicated practitioners. This practice helps preserve beds for acutely ill patients who need closer oversight and monitoring services.[18,30,31]
- Consider environmental design principles in ED areas:[18,29]
  - Look for and decrease waste and non-value-added steps. Observe patient flow processes, and redesign staff work areas to be closer to patients. Stock needed items in each room or by each bed.
  - Consider embedding high utilization personnel (e.g., laboratory, radiology, consultants) in the ED department.
  - Maintain line-of-sight and situational awareness of all patients in ED waiting rooms.
  - Redesign the ED to ensure that the majority of patient wait time occurs at the back end of the ED visit, after the patient has received the diagnostic evaluation.

- Develop a culture of customer service that takes into account the psychology of waiting.[33] Realize that parallel processes are better than serial processes whenever possible.[18] Create and maintain a way to inform patients about probable wait times and potential delays.[33] Collect and use information from patient satisfaction surveys.[18] Consider creating comfortable patient waiting areas, preferably at the back end of the ED visit, equipped with room for family, and find ways to keep patients and families occupied.[27]

Conclusion

EDs in the United States provide a critical service for patients in need of urgent, often life-saving medical care. Additionally, the role of the ED has evolved from providing primarily life-saving treatment to providing urgent unscheduled care to patients unable to gain access to their primary care providers, to providing care to Medicaid beneficiaries, and to providing care to patients without insurance. These factors contribute to crowding in the ED. Timeliness of care in the ED is a matter of patient safety, and it starts with the period of the patient's arrival through to the diagnostic evaluation segment of the patient visit. This treatment phase can influence the timeliness of care for the remainder of the visit and has been connected to clinical outcomes and patient safety issues. Standardizing front-end operations not only improves important time metrics, it also directly contributes to the safety of patients in this phase of ED treatment.

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