

## Optimizing Emergency Department Front End Operations

*An Information Paper*

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### INTRODUCTION

For nearly two decades emergency department (ED) crowding has been recognized as a growing problem. From 1995 through 2005, the annual number of ED visits in the US increased nearly 20% from 96.5 million to 115.3 million. The number of hospital EDs decreased nearly 10% over this same time period.<sup>1</sup> The American Hospital Association reports that 69% of urban hospital EDs and 33% of rural hospital EDs are operating at or over capacity.<sup>2</sup> Crowded conditions have resulted in prolonged ED ambulance diversions in 70% of urban hospitals and 74% of teaching hospitals.<sup>3</sup>

Much has been published in the academic and lay literature regarding the negative consequences of ED crowding. Prolonged patient wait times,<sup>3,4</sup> patient dissatisfaction, increased patient complaints,<sup>3,5,6</sup> decreased staff satisfaction,<sup>4</sup> and decreased physician productivity<sup>3,7,8</sup> are examples of the negative ramifications of ED crowding. More worrisome is burgeoning literature linking ED crowding to suboptimal patient outcomes.<sup>3,9</sup>

Optimizing ED throughput is one means by which to handle these increased demands for ED services. The Joint Commission in January 2005, implemented a new leadership standard “Managing Patient Flow,” which mandates that hospitals “... develop and implement plans to identify and mitigate impediments to efficient patient flow throughout the hospital.”<sup>10</sup>

In October 2006, the American College of Emergency Physicians (ACEP) Council passed a resolution directing ACEP to “develop a position paper which defines optimal emergency care related to the front-end processing of patients presenting to the emergency department.”<sup>11</sup> The ACEP Emergency Medicine Practice Committee (EMPC) was assigned this task. We, members of the EMPC, have defined the ED “front end” process as the span of time from patient’s initial arrival in the ED to the time an ED health care provider formally assumes responsibility for the evaluation and management of the patient. Attempts have been made to standardize the language of ED operations.<sup>12</sup> Accepted metrics for ED front-end processing include: ‘patient arrival to triage,’ ‘triage time,’ ‘triage to registration,’ ‘registration time,’ ‘registration to bed placement,’ ‘door to doctor,’ and ‘bed placement to physician/provider evaluation.’<sup>12,13,14</sup>

Operational activities occurring in the front-end time period vary greatly from one ED to another. This time frame typically includes initial patient presentation, registration, triage, bed placement, and medical evaluation. When these processes do not occur simultaneously or in immediate succession, a patient is typically required to wait in a queue. The time needed to complete these front end processes contributes to ED total length of stay (LOS). Measuring these time intervals, followed by the design, implementation, and assessment of innovative throughput solutions, are the building blocks of departmental quality and performance improvement efforts.

No one front-end process solution is likely to be optimal for all EDs, but a number or combination of potential interventions from a portfolio of options may help bring the patient and ED provider together more expeditiously. In this information paper, we review strategies to improve the front end processing of patients, including introducing a number of novel approaches to streamline the front end, and provide a comprehensive resource list to help providers tackle front end issues in their ED.

## **STRATEGIES TO IMPROVE FRONT END PROCESSING**

Designing a standardized, efficient “front-end” process is important to daily ED operations and becomes crucial during periods of full capacity, crowding, and surges. Standardizing front end processes decreases practice variation and improves efficiency. Evidence-based interventions include the establishment of:

- Immediate bedding
- Bedside registration
- Team approach patient care
- Resource-based triage
- Triage-based care protocols and pathways
- Practitioner in triage
- Waiting room design changes
- Tracking systems
- Dedicated fast track
- Full/surge capacity protocols.

These interventions may help alleviate critical bottlenecks, match resources to demand, decrease operational variation, identify department service lines (urgent care, pediatrics care, etc.), and track benchmark data, thereby optimizing ED front end operations and improving patient satisfaction in individual EDs.

### **Immediate Bedding**

Immediate bedding is a process in which patients who present for ED evaluation are taken immediately to an available room. Bedside registration, the nursing intake evaluation, and ideally the initial medical evaluation begin upon arrival to a room. The primary nurse for the patient performs the initial nursing assessment rather than a triage nurse. This can occur simultaneously with the physician evaluation, thus improving communication between both providers. Implementation of immediate bedding (ie, no triage), has led to reduced patient wait times, decreased overall length of stay, and reduced the numbers of patients waiting to be seen.<sup>15</sup>

In order for this intervention to achieve these endpoints, effective communication between the triage nurse and the charge nurse is essential. Communication devices such as two-way radios, television monitors, and portable phones can be critical to facilitate this process successfully.<sup>13</sup> This concept of immediate bedding is a definite contrast from traditional ED triage, which is a prioritization tool employed to determine the order in which patients need to be evaluated.<sup>16</sup> Therefore, prior to instituting this approach, a paradigm and culture shift about the role of triage is necessary; specifically discerning between the *space* of triage and the *function* of triage. Strategies to manage the front end when beds are not immediately available are discussed in later sections.

### **Bedside Registration**

As patients are immediately taken back to a bed, bedside registration can occur simultaneously with the initial nursing assessment and physician greeting. A “quick registration” capturing basic patient demographic information (eg, patient name, date of birth, and chief complaint) can often be the only necessary information to register the patient in the ED system and generate a chart. Additional information can be gathered at any point during the patient’s ED stay. Successful implementation of bedside registration requires portable registration equipment or dedicated registration equipment

geographically close to the patient care area (eg, mobile computer, printers, identification card or bracelet generators). Bed-side registration can lead to a: reduction in triage to bed placement times,<sup>17</sup> shorten door to physician time; decrease ED total LOS<sup>18</sup> and reduce left before treatment complete (LBTC) rates (including patients who leave: against medical advice (AMA), before treatment complete (LBTC) and without being seen (LWBS) by a physician); all of which could otherwise result in serious risk management situations.<sup>19</sup>

### **Team-Approach Patient Care**

There are several approaches to distributing nurse and physician work in the ED. The most commonly applied method is an “assignment model” whereby personnel are designated to specific rooms based upon geography or specialization. Inefficiency is inherent to this technique, as there is no incentive to facilitate patient flow through the ED. Communication between staff and physicians tends to be fragmented and inefficient. Often additional patients cannot be received by nurses into rooms that have reached nursing full capacity<sup>20</sup> which results in operational bottlenecks. In many EDs, patients are placed in a queue where physicians’ self-assign patients based on physician discretion, patient location in queue, and /or based on physician availability. The rate that physicians evaluate new patients is typically variable; determined primarily by the providers’ perceived workload, which may not equal actual workload. As a result, there may be unnecessary delays in the initial patient evaluation by the physician, thereby postponing management and treatment. Alternating assignment of newly bedded patients to physician-nurse (+/-tech) care teams is a possible solution to improve ED throughput.<sup>20,21</sup> One institution where delegation of patients to alternating care-teams was implemented cited improved patient satisfaction, improved patient perception of wait times, and an increased likelihood of patients to recommend the ED to others. Enhanced communication and teamwork between physicians and nurses were also noted.<sup>20</sup> A similar assessment of care-teams (one attending physician, two nurses, and one technician) in a community ED found statistically significant improvements in: patient wait times, door to doctor times, LBTC rates, and patient satisfaction with the physician, staff courtesy, and coordination of care.<sup>21</sup> In the ED, physician-led care teams, including nurse and technician members, represent an opportunity to augment the front end process and ED patient flow while improving patient satisfaction and reducing LBTC rates.

### **If Immediate Bedding Is Not Available...**

Although it is optimal for ED patients who present to the ED to be brought directly to a bed in the department; crowding, the presence of admitted patients in the ED (ie, boarders), and volume surges, make this not possible. During these instances, several processes may mitigate the subsequent delay. These include initiation of standing/preprinted orders and protocols, brief provider assessment in triage or waiting room, and recruitment of patient assistance in providing history (eg, past medical history, medications, allergies) while in the waiting room.

Department guidelines should be developed which also account for patients who are placed in the waiting area if immediate bedding and medical assessment are not possible. These guidelines should address the frequency of vital sign reassessment and the frequency of patient notification about expected wait times (important for patient satisfaction). The use of electronic notification devices (eg, as used in restaurants) to notify patients when there is an ED bed available (prevents patients from losing their place in queue if they are in the restroom or outside) may also be helpful.

### **Resource-Based Triage Systems**

A resource based triage system has been developed to prioritize patients based on acuity and expected resource requirements when immediate bedding is not possible. Various systems exist including the ESI (Emergency Severity Index) which stratifies patients with regard to anticipated ED resource utilization. This triage classification has the added benefit of standardizing triage definitions, allowing for more appropriate comparisons between EDs across multiple geographic regions.<sup>22,23,24</sup>

### **Triage-Based Care Protocols & Pathways**

Triage-based care protocols, also known as advanced triage protocols (ATPs), may be developed for specific disease conditions or complaints to expedite ED throughput when patients cannot be placed immediately in a bed. Pathways or protocols allow triage staff to initiate diagnostic, therapeutic, and management regimens before the complete physician examination is performed. Implementation of standing or preprinted orders by nurses is dependent upon state laws. For instance, New York state requires a brief clinician assessment prior to utilization of nursing protocols. As patients wait for an available ED bed, diagnostic testing and symptom management can be performed. This novel approach significantly decreases patient LBTC rates by employing a parallel and concomitant process design as opposed to the traditional sequential method.<sup>15,25,26</sup>

### **Practitioner In Triage**

The addition of a physician or mid-level provider (physician extender) to the triage team has been implemented in some institutions with varying success. The role of this provider is to perform a brief initial assessment or medical screening examination and initiate testing and treatment directly in the triage space. This allows for care and management to be started promptly without unnecessary delay. Then a comprehensive evaluation is performed, usually by a different provider, when the patient is assigned to an ED bed. Clinician management variation (eg, if the triage physician orders tests that the disposition physician would not have), the complexity of hand offs, and optimal utilization of the medical provider during fluxes in daily surge have yielded anecdotally variable success. Some departments have used the clinician-in-triage only during high volume times (also known as a “high volume doctor”), or have the clinician concentrate only on providing care to the non-urgent patients, including those who can be discharged directly from triage (also known as a “super track”). One study found that 48.9% of patients were discharged home immediately after examination and treatment by a senior clinician in triage.<sup>27</sup> It is important to include a registrar as part of this team, for patient discharge from triage to be a successful process.

Various study protocols with a clinician in triage have been implemented to evaluate this operational improvement strategy and have reported promising results including: decreased door to medical assessment time;<sup>27-30</sup> reduced ED LOS;<sup>28,31</sup> lowered LBTC rates;<sup>32,33</sup> and “high” nursing and physician satisfaction with the process.<sup>32</sup> With increased patient satisfaction and reduced LBTC rates, the clinician in triage, may help to reduce liability risk and increase patient referrals to the treating facility, all of which may improve revenues.

Notably, one institution implemented a rapid entry and accelerated care at triage (REACT) team, (a hybrid system of immediate bedding and clinician directed triage) that successfully decreased LBTC rates and shortened patient wait times and overall ED LOS. The REACT protocol called for immediate bedding with an abbreviated registration process and when this was not possible, the triage staff notified the physician, who then performed a brief patient evaluation and initiated the necessary diagnostic studies.<sup>15</sup> This may be an option for departments that do not have the resources to fund a clinician in triage fulltime.

### **Patient Waiting Area Design Considerations**

Geographic coordination of waiting patients based on acuity, may improve front end operations. Patients with a more concerning presentation (eg, with a chief complaint of chest pain) would be placed in a pre-designated “higher acuity waiting area.” Establishment of electronic monitoring capabilities in this area should identify early deterioration in the condition of patients who are waiting, which can enhance patient safety. Consideration should also be given to designated waiting areas for patients who have had advanced triage protocols initiated (eg, oxygen delivery equipment for nebulized medication treatments, bathroom facilities for collection of urine/stool samples, etc.).

### **Patient Tracking Systems/Informatics Technology**

Information technology has become a useful adjunct in many EDs across the world. Integration of computerized physician order entry (CPOE), electronic health records (EHR), pharmacy, nursing EHR, and prehospital records into an electronic format provide an opportunity to improve ED throughput and front end processing. EDIS (Emergency Department Information Systems) are a prime example of this technology and are being implemented in EDs at an exponential rate. These software systems use either radiofrequency or infrared tracking devices to passively monitor patients, providers, and assets in order to supply real time information about their location in the department.<sup>34-37</sup> With this knowledge, staff are afforded the opportunity “to see the department’s overall status at a glance.”<sup>34,35</sup> Additionally, with EDIS, standard ED metrics are automatically generated, and can then be sent to a server with online analytical processing (OLAP).<sup>34-37</sup> OLAP is a software tool that displays multiple data summaries in a rapid, interactive fashion and easily empowers its users to search for novel patterns, trends, and relationships related to ED operational metrics. This data can be used to identify throughput problems in real time and track implementation of solutions to solve identified problems.

In order to achieve the optimal benefits of an EDIS, the system should be integrated and interfaced with an electronic health record and all critical hospital information systems including: pharmacy, laboratory, radiology, registration/admitting, accounting/billing, and medical records systems.<sup>34</sup>

### **Implementation of “Fast Track” Service Line**

Urgent care or “fast track,” is an area or service line, in the ED where low acuity patients are evaluated and treated in a separate but concurrent parallel process from individuals who have more severe clinical presentations.<sup>38</sup> The improvement of ED throughput by utilizing an urgent care service line has been investigated in a wide variety of clinical settings (rural and urban areas, community and academic departments) in the United States, Canada, Australia, and Europe. Single and multicenter trials have been performed with both adult and pediatric patients, and with care provided by either a physician or mid-level provider. Studies have reported that a dedicated “fast track”: decreased LOS,<sup>39-41</sup>; shortened arrival to physician evaluation time for all ED patients;<sup>42-44</sup>; lowered LBTC rates;<sup>44,45</sup>; improved patient satisfaction;<sup>41</sup> reduced costs without adverse affect on clinical outcomes;<sup>40,46</sup> and allowed physicians more time to care for more critical patients<sup>40,46</sup> without increasing ED mortality or the incidence of 72 hour returns.<sup>44</sup> One study also noted a lower admission rate, decreased use of intravenous fluids, and performance of fewer diagnostic tests after implementation of a “fast track” in a pediatric ED.<sup>46</sup>

### **Create Full/Surge Capacity Protocol**

Much has been published in the recent Emergency Medicine literature about “surge capacity.”<sup>47</sup> A distinction has been made between daily surge and disaster-related surge capacity.<sup>48-50</sup> Creation of a surge capacity protocol, should define ED crowding and “full capacity” for the ED<sup>51</sup> and hospital (ie, hospital occupancy, pending discharges, anticipated admissions from ED and non-ED sources, etc.)<sup>52</sup> It should also detail the ED’s operational response to an unexpected influx of new ED patients, in order to optimize ED patient flow during these challenging times when resources are stretched. The recommended components of a surge capacity plan have been previously published.<sup>53,54</sup> They should define operational processes to increase the ED functional capacity including: triage, registration, physician tasks, staff duties, ancillary ordering, space utilization considerations, radiology and laboratory testing / completion, admission process, informatics, room turn-over, and supply issues. Many facilities have identified ways to increase the functional capacity of the ED by creating hallway or temporary beds,<sup>55</sup> utilizing chairs for mobile patients, and improving operations to facilitate ED throughput. The goal of the surge capacity protocol is to define how the department and hospital will expand and contract operations to maintain achievement of consistent patient throughput goals, despite additional system demands due to increased patient volume.

The creation of assigned responsibility for back-up systems is a vital component of any full capacity protocol and can help to relieve flow bottlenecks at surge times. Appropriate personnel back-up for all staff in the ED (including triage staff, registration, physicians, nurses, and support personnel) should be designated to help the ED increase functional capacity to accommodate significant volume surges. Some facilities have designated “buddy units” where hospital staff can temporarily be “pulled” to the ED to help manage a critical surge in patients. Back-up systems should be identified and prescribed action plans designed for any potential ED or hospital process that can be overwhelmed, to prevent an operational bottleneck. The back-up system operational process, designation of staff responsibilities, and defined expectations should be included in any surge capacity protocol.

### **Innovative Ideas**

Many advancements have been developed to improve ED front end processing. These novel innovations include kiosk check-in, “smart cards,” incentive based staff compensation, and time-guarantees. Kiosks, similar to those used in other industries (eg, airline check-in, grocery self-checkout), can make it possible for the patient to begin the process of entering the ED system without the use of hospital staff. By accessing a computer touch screen, patients enter registration information, past medical and family history, and a brief explanation of the reason for the ED visit. This information is then available to clinical staff for immediate patient processing.

Smartcards are plastic cards embedded with a computer chip that store important patient medical information (including past medical history, allergy information, organ donor status, emergency contact information, medication, prenatal information, do not resuscitate status, and personal insurance data) which patients carry much like a driver’s license.<sup>56</sup> This information is then readily available to medical personnel in order to make quick and informed medical decisions.

It is well recognized that physician, nurse and technician staffing directly impacts patient care. Motivating physicians based on performance is not novel (RVU-based compensation), but providing incentives to ancillary staff (nurses, technicians, patient transporters, registrars, financial counselors, and housekeepers) based on their contribution to ED patient throughput is less common. Optimal performance of these ancillary staff personnel directly impact ED front end processing, thus, consideration should be given to recruit the efforts of these providers to optimize ED flow (or prevent bottlenecks) based on their contribution to the process.

Some facilities have advertised an ED service guarantee. They assure a maximum time from arrival to ED physician evaluation as a marketing strategy. This pledge can motivate staff to expeditiously perform patient care tasks to decrease the front end processing times if matched with appropriate rewards.

### **Conclusion**

As ED crowding worsens, it is important for departments to improve operations to promote patient throughput. No doubt operational bottlenecks at the “backend” of the ED will ultimately lead to front end delays. However, proficient patient processing at the ED front end can minimize the time to physician evaluation, may increase patient satisfaction and decrease total ED LOS. Although an optimal approach to front end procedures for all EDs has not yet been identified, the strategies presented here can be important components of a department-specific initiative to maximize ED throughput.

### **References**

1. Nawar EW, Niska RW, Xu J. National Hospital Ambulatory Medical Care Survey-2005 Emergency Department Survey; Advance Data for Vital Health Statistics, Number 386, June 29, 2007. Available at: <http://www.cdc.gov/nchs/data/ad/ad386.pdf>. Accessed March 2008.

2. American Hospital Association. Taking the Pulse: The State of America's Hospitals. Available at <http://www.aha.org/aha/content/2005/pdf/TakingthePulse.pdf> Accessed March 2008.
3. Derlet RW, Richards JR. Overcrowding in the nation's emergency departments: complex causes and disturbing effects. *Ann Emerg Med.* 2000;35(1):63-68.
4. Richards JR, Navarro ML, Derlet RW. Survey of directors of emergency departments in California on crowding. *West J Med.* 2000; 172:385-388.
5. Andrulis DP, Kellermann A, Hintz EA, et al. Emergency departments and crowding in United States teaching hospitals. *Ann Emerg Med.* 1991; 21:980-986.
6. Lui S, Hobgood C, Brice JH. Impact of critical bed status on emergency department patient flow and overcrowding. *Acad Emerg Med.* 2003; 10:382-385.
7. Rondeau KV, Francescutti LH. Emergency department overcrowding: the impact of resource scarcity on physician job satisfaction. *J Healthc Manag.* 2005; 327-340.
8. Eckstein M, Chan LS. The effect of emergency department crowding on paramedic ambulance availability, *Ann Emerg Med.* 2004; 43:100-105.
9. Joint Commission. Sentinel Event Alert, June 17, 2002. Accessed June 4, 2007 at [www.jointcommission.org/sentinevents/statistics](http://www.jointcommission.org/sentinevents/statistics). Committee on the Future of Emergency Care in the United States Health System, Hospital-Based Emergency Care: At the Breaking Point, National Academies Press, Washington, DC (2006)
10. Joint Commission on Accreditation of Healthcare Organizations. New Standard LD.3.11 LD.3.10.10: JCAHO Requirement.
11. ACEP Council Resolution 25(06). Redefining the Front End Process to Optimize Emergency Department & Hospital Flow.
12. Welch S, Augustine J, Camargo CA Jr, et al. Emergency department performance measures and benchmarking summit. *Acad Emerg Med.* 2006;13(10):1074-80.
13. American College of Emergency Physicians. Approaching Full Capacity in the Emergency Department: An information paper. Accessed March 2008 at <http://www.acep.org/workarea/showcontent.aspx?id=8852>
14. Wilson MJ, Nguyen K. Urgent Matters The George Washington University Medical Center School of Public Health and Health Services Department of Health Policy Sept 2004. Bursting at the seams: Improving Patient Flow to Help America's Emergency Departments. Accessed March 2008. Available at: [http://www.urgentmatters.org/reports/UM\\_WhitePaper\\_BurstingAtTheSeams.pdf](http://www.urgentmatters.org/reports/UM_WhitePaper_BurstingAtTheSeams.pdf)
15. Chan TC, Killeen JP, Kelly D, et al. Impact of rapid entry and accelerated care at triage on reducing emergency department patient wait times, lengths of stay, and rate of left without being seen. *Ann Emerg Med.* 2005;46(6):491-497.
16. Iseron KV, Moskop JC. Triage in medicine, Part 1: Concept, history and types. *Ann Emerg Med.* 2007;49(3):275-281.

17. Takakuwa KM, Shofer FS, Abbuhl SB. Strategies for dealing with emergency department crowding: a one-year study on how bedside registration affects patient throughput times. *J Emerg Med.* 2007;32(4):337-342.
18. Gorelick MH, Yen K, Yun HJ. The effect of in-room registration on emergency department length of stay. *Ann Emerg Med.* 2005;45(2):128-133.
19. Carr C, Veser III F, Larson E, et al. The effect of in-room registration significantly decreases the rate of departmental LWTs. *Ann Emerg Med.* 2005;46:S39-40.
20. Debehnke D, Decker CM. The Effects of a physician-nurse patient care team on patient satisfaction in an academic ED. *Am J Emerg Med.* 2002;20:267-270.
21. Patel PB, Vinson DR. Team assignment system: Expediting emergency department care. *Ann Emerg Med.* 2005;46:499-505.
22. Williams S; Crouch R. Emergency department patient classification systems: A systematic review. *Accid Emerg Nurs.* 2006;14(3):160-170.
23. Siddharthan K, Jones WJ, Johnson JA. A priority queuing model to reduce waiting times in emergency care. *Int J Health Care Qual Assur.* 1996;9(5):10-16.
24. United States Department of Health and Human Services website. Emergency Severity Index, Version 4: Implementation Handbook. Accessed March 2008. Available at: [www.ahrq.gov/research/esi/esi1.htm](http://www.ahrq.gov/research/esi/esi1.htm)
25. Choi J, Claudius I. Decrease in emergency department length of stay as a result of triage pulse oximetry. *Pediatr Emerg Care.* 2006; 22(6):412-414.
26. Fulop M. Pretreatment testing in the emergency department. *Am J Emerg Med.* 1997; 15(1):96.
27. Terris J, Leman P, O'Connor N, et al. Making an IMPACT on emergency department flow: improving patient processing assisted by consultant at triage. *Emerg Med J.* 2004; 21(5):537-541.
28. Choi YF, Wong TW, Lau CC. Triage rapid initial assessment by doctor (TRIAD) improves waiting time and processing time of the emergency department. *Emerg Med J.* 2006;23(4):262-265.
29. Subash F, Dunn F, McNicholl B, et al. Team triage improves emergency department efficiency. *Emerg Med J.* 2004;21(5):542-545.
30. Travers JP, Lee FC. Avoiding prolonged waiting time during busy periods in the emergency department: Is there a role for the senior emergency physician in triage? *Eur J Emerg Med.* 2006; 13(6):342-348.
31. Rogers T, Ross N, Spooner D. Evaluation of a 'See and Treat' pilot study introduced to an emergency department *Accid Emerg Nurs.* 2004; 12(1):24-27.
32. Holroyd BR, Bullard MJ, Latoszek K. Impact of a triage liaison physician on emergency department overcrowding and throughput: a randomized controlled trial. *Acad Emerg Med.* 2007; 14(8):702-708.

33. Partovi SN, Nelson BK, Bryan ED, et al. Faculty triage shortens emergency department length of stay. *Acad Emerg Med.* 2001; 8(10):999-995.
34. Taylor TB. Information management in the emergency department. *Emerg Med Clin N Am.* 2004; 22:241-257.
35. Endom EE, Myers JH, Shook JE. The ED on line: Computerization of the pediatric emergency department. *Ped Emerg Care.* 1996; 12(4):301-304.
36. Gillam M, Rothenhaus T, Smith V, et al. Information technology principles for management, reporting, and research. *Acad Emerg Med.* 2004; 11(11):1155-1161.
37. Gordon BD, Asplin BR. Using Online Analytical Processing to Manage Emergency Department Operations. *Acad Emerg Med.* 2004; 11(11):1206-1212.
38. Meislin, HW, Coates SA, Cyr J, et al. Fast track: Urgent care within a teaching hospital emergency department: Can it work? *Ann Emerg Med.* 1988;17:453-456.
39. Simon HK, McLario D, Daily R, et al. "Fast tracking" patients in an urban pediatric emergency department. *Am J Emerg Med.* 1996; 14:242-244.
40. Simon HK, Ledbetter DA, Wright J. Societal savings by "fast tracking" lower acuity patients in an urban pediatric emergency department. *Am J Emerg Med.* 1997; 16(6):551-554.
41. Rodi SW, Grau MV, Orsini CM. Evaluation of a fast track unit: Alignment of resources and demand results in improved satisfaction and decreased length of stay for emergency department patients. *Q Manage Health Care.* 2006; 15:163-170.
42. O'Brien D, Williams A, Blondell K, et al. Impact of streaming "fast track" emergency department patients. *Australian Health Review.* 2006; 30:525-532.
43. Cooke MW, Wilson S, Pearson S. The effect of a separate stream for minor injuries on accident and emergency department waiting times. *Emerg Med J.* 2002; 19:28-30.
44. Sanchez M, Smally AJ, Grant RJ, Jacobs LM. Effects of a fast-track area on emergency department performance. *J Emerg Med.* 2006; 31:117-120.
45. Darrab AA, Fan J, Fernandes CM, et al. How does fast track affect quality of care in the emergency department? *European J Emerg Med.* 2006; 13:32-35.
46. Hampers LC, Cha S, Gutglass DJ, et al. Fast track and the pediatric emergency department: resource utilization and patient outcomes. *Acad Emerg Med.* 1999; 6:1153-1159.
47. Proceedings of the Consensus Conference: "The Science of Surge." May 17, 2006, San Francisco, CA, USA. *Acad Emerg Med.* 2006; 13(11):1087-1253.
48. Jenkins JL, O'Connor RE, Cone DC. Differentiating large-scale surge versus daily surge. *Acad Emerg Med.* 2006;13(11):1169-1172.
49. Kelen G, McCarthy ML. The Science of Surge. *Acad Emerg Med.* 2006;13(11):1089.

50. Asplin BR, Flottemesch TJ, Gordon BD. Developing models for patient flow and daily surge capacity research. *Acad Emerg Med.* 2006;13(11):1109-1113.
51. Asplin BR, Rhodes KV, Flottemesch TJ, et al. Is this emergency department crowded? A multicenter derivation and evaluation of an emergency department crowding scale (EDCS). *Acad Emerg Med.* 2004;11:484.
52. Handler JA, Gillam M, Kirsch TD, et al. Metrics in the science of surge. *Acad Emerg Med.* 2006;13(11):1173-1178.
53. Executive Summary: The Science of Surge Conference. *Acad Emerg Med.* 2006;13(11):1091.
54. Kaji A, Koenig KL, Bey T. Surge capacity for healthcare systems: a conceptual framework. *Acad Emerg Med.* 2006;13(11):1157-1159.
55. Sorelle R. CDC Confirms ED Crowding, but Will it Matter? *Emergency Medicine News.* Vol. XXIX, Number 1, January 2007, pg 1, 30-31.
56. Smart Card Alliance. <http://www.smartcardalliance.org>

## **Resource List of Topics Pertinent to Front-End Processes**

Ahwah I, Karpel M. **Using profiling for cost and quality management in the emergency department.** *Healthc Financ Manage.* 1997;51(7):48, 50-53.

Asplin BR, Magid DJ, Rhodes KV, et al. **A conceptual model of emergency department crowding.** *Ann Emerg Med.* 2003;42(2):173-180.

Barthell E, Felton CW, Jijina J, et al. **Getting the data and getting it straight: the Frontlines Project and similar initiatives.** *Topics in Emerg Med.* 2004;26(2):166-175.

Bursch B, Beezy J, Shaw R. **Emergency department satisfaction: what matters most?** *Ann Emerg Med.* 1993;22(3):586-591.

Fottler MD, Ford RC. **Managing patients waits in hospital emergency departments.** *Health Care Manage (Frederick).* 2002;21(1):46-61.

Gleeson P, Duckett S. **Modeling the emergency ambulance pass-by of small rural hospitals in Victoria Australia.** *J Rural Health.* 2005; 21(4):367-371.

King DL, Ben-Tovim DI, Bassham J. **Redesigning emergency department patient flows: application of lean thinking to health care.** *Emerg Med Australas.* 2006;18(4):391-397.

McD Taylor D, Bennett DM, Cameron PA. **A paradigm shift in the nature of care provision in the emergency department.** *Emerg Med J.* 2004;21(6):681-684.

Patel PB, Derlet RW, Vinson DR, et al. **Ambulance diversion reduction: the Sacramento solution.** *Am J Emerg Med.* 2006;24(2):206-213.

Patel PB, Vinson DR. **Team assignment system: expediting emergency department care.** *Ann Emerg Med.* 2005;46(6):499-506.

Evergreen Emergency Solutions [www.emergencysolutions.com](http://www.emergencysolutions.com)

A website for a consulting company that specializes in improving ED throughput/efficiency.

NY Emergency Room RN Website [www.geocities.com/nyerrn/er/index.htm#tr](http://www.geocities.com/nyerrn/er/index.htm#tr)

A website with multiple links to ED triage info.

Operational and Clinical Improvement in the Emergency Department

<http://www.ihl.org/IHI/Programs/InnovationCommunities/IMPACTICImprovingED2006.htm>

### **BEDSIDE REGISTRATION:**

Malhevy MA, Chansky M, Killian A, et al. **The Effects of Bedside Registration on Emergency Department Patient Care Time Intervals.** *Acad Emerg Med.* 2002;9(5):510.

[www.aemj.org/cgi/content/abstract/9/5/510](http://www.aemj.org/cgi/content/abstract/9/5/510)

Trudeau S, Ladue M. **Wireless bedside registration in the emergency department.** *J Emerg Nurs.* 1996;22(1):57-60. <http://www.ncbi.nlm.nih.gov/pubmed/8699662>

### **Emergency Department | Emergency Services | Fletcher Allen Health Care**

Care can be started immediately, and any private insurance issues are taken care of at the bedside.

Registration also handles check-out in the department. [www.fahc.org/Emergency/emergency\\_dept.html](http://www.fahc.org/Emergency/emergency_dept.html)

### **Fort Sanders Regional Medical Center - Emergency Department**

Bedside Registration - to avoid needless delays in the waiting room, ... For more information about the Emergency Care Center at Fort Sanders Regional ... [www.fsregional.com/fsrhc-er.cfm](http://www.fsregional.com/fsrhc-er.cfm)

### **Emergency Department | Princeton HealthCare System**

A focus on prompt treatment with a bedside registration process and a Fast ... The Emergency Department provides patients with prompt, quality care for two [www.princetonhcs.org/page3447.aspx](http://www.princetonhcs.org/page3447.aspx)

### **Baylor Regional Medical Center at Grapevine: Emergency Care**

The Emergency Department now contains 22 beds to help minimize waiting time, and a computerized bedside registration, using laptop computers. [www.baylorhealth.com/locations/grapevine/emergency.htm](http://www.baylorhealth.com/locations/grapevine/emergency.htm)

### **St. Joseph Medical Center**

Since its implementation, quick triage and bedside registration have reduced wait times in the St. Joe's emergency department by 83 percent (when beds are...

[www.thefutureofhealthcare.org/core/news/index.cgi?act=news\\_viewdet&id=134](http://www.thefutureofhealthcare.org/core/news/index.cgi?act=news_viewdet&id=134)

### **Emergency Department Technology**

Bedside Registration - Allows emergency patients to be taken immediately to ... Physiologic Monitoring Stations - Many emergency department patient bays are ...

[www.acep.org/webportal/PatientsConsumers/critissues/ed/edtech.htm](http://www.acep.org/webportal/PatientsConsumers/critissues/ed/edtech.htm)

### **EMORY – Department of Emergency Medicine**

The emergency department at Emory Crawford Long Hospital leverages technology ... Our tracking systems allow the option of quick registration or bedside ...

[www.em.emory.edu/hospital\\_crawfordlong.html](http://www.em.emory.edu/hospital_crawfordlong.html)

### **Emergency Department**

For patient convenience, emergency services were specially designed to meet their needs. The emergency department will not only offer bedside registration, ...

[www.stonecrestmedical.com/CustomPage.asp?guidCustomContentID=74716059-0ED3-477B-8D31-ECEA65CC3824](http://www.stonecrestmedical.com/CustomPage.asp?guidCustomContentID=74716059-0ED3-477B-8D31-ECEA65CC3824)

### **TRIAGE:**

No authors listed on MedScape. **Triage by Attending MDs shortens length of stay in ED, but at a cost.** *J Watch Emerg Med.* 2001; 1114:7.

Brillman JC, Doezema D, Tandberg D, et al. **Triage: limitations in predicting need for emergent care and hospital admission.** *Ann Emerg Med.* 1996; 27(4):493-500.

Choi YF, Wong TW, Lau CC. **Triage rapid initial assessment by doctor (TRIAD) improves waiting time and processing time of the emergency department.** *Emerg Med J.* 2006;23(4):262-265.

George S, Read S, Williams B. **Nurse triage increases emergency department waiting times.** *BMJ.* 1995; 311(7015):1305. [www.bmj.com/cgi/content/full/311/7015/1305/a](http://www.bmj.com/cgi/content/full/311/7015/1305/a)

Hadley N. **Triage: meeting the needs of today in a busy ED.** *Topics in Emerg Med.* 2005; 27(3):217-222.

Hughes G. **Triage: evolution or extinction.** *Emerg Med J.* 2006; 23(2):88.

Johnson LA. **Triage: Limitations and opportunities.** *Ann Emerg Med.* 1996;28(3):372-374.

Jones SS, Allen TL, Flottesmesch TJ, et al. **An independent evaluation of four qualitative emergency department crowding scales.** *Acad Emerg Med.* 2006; 13(11):1204-1211.

Partovi SN, Nelson BK, Bryan ED, et al. **Faculty triage shortens emergency department length of stay.** *Acad Emerg Med.* 2001; 8(10):990-995. [www.aemj.org/cgi/content/full/8/10/990](http://www.aemj.org/cgi/content/full/8/10/990)

Pollack CV. **A revolution in ED Triage.** *J Watch Emerg Med.* 1999; 1001(2).

Robertson-Steel I. **Evolution of triage systems.** *Emerg Med J.* 2006; 23(2):154-155.

Subash F, Dunn F, McNicholl B, et al. **Team triage improves emergency department efficiency.** *Emerg Med J.* 2004;21(5):542-544.

**TriageFirst** [www.triagefirst.com](http://www.triagefirst.com)

The Triage First mission has two equally important parts:

- To help professionals working in emergency departments develop a consistent, compassionate, and healthy approach from which to practice
- To provide ED professionals with the tools necessary to understand the conceptual and clinical aspects of emergency care

**ESI Implementation handbook** [www.ahrq.gov/research/esi/esi1.htm](http://www.ahrq.gov/research/esi/esi1.htm)

**ALABAMA ACEP RESOURCE LINK:** [http://www.alacep.org/acep\\_crowding\\_resources.htm](http://www.alacep.org/acep_crowding_resources.htm)

#### **ACEP CROWDING RESOURCES:**

**Responding to Emergency Department Crowding: A Guidebook for Chapters**  
<http://www.acep.org/WorkArea/downloadasset.aspx?id=33738>

**ACEP Model Practices (page 22 of the “Guidebook for Chapters”)**  
<http://www.acep.org/WorkArea/downloadasset.aspx?id=33738>

**Emergency Department Waiting Times (Fact Sheet)**  
<http://www.acep.org/WorkArea/linkit.aspx?LinkIdentifier=id&ItemID=25908>

**Crowding Brochure for patients: “What You Should Know About the Emergency Department”**  
<http://www.acep.org/workarea/showcontent.aspx?id=33078>

#### **OTHER CHAPTER RESOURCES:**

**Arizona Chapter: “Best Practices: Emergency Department Crowding and Ambulance Diversion”**  
In late January 2001, AzCEP published “Best Practices: Emergency Department Crowding & Ambulance Diversion.” [The full report is available at: [http://azcep.org/er\\_crowding/best\\_practices.html](http://azcep.org/er_crowding/best_practices.html)] The report illustrates best practices utilized across the country to deal with ED crowding and ambulance diversion. The most significant finding was that most of the solutions were local, and often individual hospital based. To that end, one of the most important aspects toward solutions is to assign the task to someone, provide them with the resources to fix it, and the time to do the job. This has been characterized as the appointment of a “Hospital Resource Utilization Manager.” For an example of such a program see: “Rapid Process Redesign in a University-Based ED: Decreasing Waiting Time Intervals & Improving Patient Satisfaction.” [Spaite DW, et. al. *Ann Emerg Med* 2002;39:168-177]

## **FRONT-END PROCESSES CONCEPT PAPERS:**

No authors listed on PubMed. **Accelerated triage cuts LBTC rate in half.** *ED Manag.* 2005; 17(10):115-116.

No authors listed on PubMed. **Rapid ED access reduces patients leaving without being seen.** *Perform Improv Advis.* 2005;9(10):109, 114-115.

No authors listed on PubMed. **Switching to bedside registration increases patient satisfaction.** *ED Manag.* 1997; 9(3):25-30.

No authors listed on PubMed. **Novel strategies decrease ED delays.** *ED Manag.* 1997; 9(5):49-54.

No authors listed on PubMed. **Increase the number of patients you treat in a day: examine your habits, learn to delegate.** *ED Manag.* 1998;10(5):49-52.

No authors listed on PubMed. **Creativity catches on with ED staff.** *Healthc Benchmarks.* 1999; 6(2):19-20.

No authors listed on PubMed. **Examine your emergency department, stat! ED is key to hospital reputation.** *Healthc Benchmarks.* 1999;6(2):13-15.

No author listed on PubMed. **Want to drastically cut LBTC numbers? Try ice packs and adding a fast track.** *ED Manag.* 2003;15(12):133-136.

No author listed on PubMed. **BMC improves patient flow throughout the hospital.** *Perform Improv Advis.* 2004;8(9):97-100.

No authors listed on PubMed. **Team improves throughput, avoids ED diversions.** *Hosp Case Manag.* 2007;15(3):41-42.

No authors listed on PubMed. **Initiative helps to improve patient throughput.** *Hosp Case Manag.* 2007;15(1):6, 11.

No authors listed on PubMed. **ED case managers can improve throughput, reduce denials.** *Hosp Case Manag.* 2007 Jan;15(1):1-3.

Aharonson-Daniel L, Fung H, et al. **Time studies in A&E departments--a useful tool for management.** *J Manag Med.* 1996;10(3):15-22.

Allen AB, Barnard BG, Falk W, et al. **A study of waiting time in an emergency department.** *Can Med Assoc J.* 1973;109(5):373-376.

Appleby C. **Customer service. Timeliness is next to godliness.** *Hosp Health Netw.* 1996;70(15):40.

Asaro PV, Lewis LM, Boxerman SB. **The impact of input and output factors on emergency department throughput.** *Acad Emerg Med.* 2007; 14(3):235-242.

Asaro PV, Lewis LM, Boxerman SB. **Emergency department overcrowding: analysis of the factors of renege rate.** *Acad Emerg Med.* 2007;14(2):157-162.

- Bernstein SL, Asplin BR. **Emergency department crowding: old problem, new solutions.** *Emerg Med Clin North Am.* 2006; 24(4):821-837.
- Bertoty DA, Kuszajewski ML, Marsh EE. **Direct-to-room: one department's approach to improving ED throughput.** *J Emerg Nurs.* 2007; 33(1):26-30; quiz 93.
- Bertram DA. **Managing an emergency department: the effect of patient flow on physician performance.** *QRB Qual Rev Bull.* 1983;9(6):175-180.
- Cameron P, Scown P, Campbell D. **Managing access block.** *Aust Health Rev.* 2002;25(4):59-68.
- Cassidy-Smith TN, Baumann BM, Boudreaux ED. **The disconfirmation paradigm: throughput times and emergency department patient satisfaction.** *J Emerg Med.* 2007;32(1):7-13.
- Chan L, Kass LE. **Impact of medical student preceptorship on ED patient throughput time.** *Am J Emerg Med.* 1999;17(1):41-43.
- Chan L, Reilly KM, Salluzzo RF. **Variables that affect patient throughput times in an academic emergency department.** *Am J Med Qual.* 1997 Winter;12(4):183-186.
- Chan TC, Killeen JP, Kelly D, et al. **Impact of rapid entry and accelerated care at triage on reducing emergency department patient wait times, lengths of stay, and rate of left without being seen.** *Ann Emerg Med.* 2005;46(6):491-497.
- Chin L, Fleisher G. **Planning model of resource utilization in an academic pediatric emergency department.** *Pediatr Emerg Care.* 1998;14(1):4-9.
- Choi J, Claudius I. **Decrease in emergency department length of stay as a result of triage pulse oximetry.** *Pediatr Emerg Care.* 2006; 22(6):412-414.
- Connelly LG, Bair AE. **Discrete event simulation of emergency department activity: a platform for system-level operations research.** *Acad Emerg Med.* 2004;11(11):1177-1185.
- Cooke J, Finneran K. **A clearing in the crowd: innovations in emergency services.** Pap Ser United Hosp Fund N Y. 1994:1-43.
- Counselman FL, Schafermeyer RW, Garcia R, et al. **A survey of academic departments of emergency medicine regarding operation and clinical practice.** *Ann Emerg Med.* 2000;36(5):446-450.
- DiGiacomo EV, Kramer LD. **A study of emergency unit waiting time.** *QRB Qual Rev Bull.* 1982;8(11):10-13.
- Docimo AB, Pronovost PJ, Davis RO, et al. **Using the online and offline change model to improve efficiency for fast-track patients in an emergency department.** *Jt Comm J Qual Improv.* 2000; 26(9):503-514.
- Fatovich DM, Nagree Y, Sprivilis P. **Access block causes emergency department overcrowding and ambulance diversion in Perth, Western Australia.** *Emerg Med J.* 2005;22(5):351-4. Erratum in: *Emerg Med J.* 2005;22(7):532.

- Fineberg DA, Stewart MM. **Analysis of patient flow in the emergency room.** *Mt Sinai J Med.* 1977;44(4):551-559.
- FitzPatrick MK, Reilly PM, Laborde A, et al. **Maintaining patient throughput on an evolving trauma/emergency surgery service.** *J Trauma.* 2006;60(3):481-486; discussion 486-488.
- Fottler MD, Ford RC. **Managing patient waits in hospital emergency departments.** *Health Care Manag (Frederick).* 2002;21(1):46-61.
- Fulop M. **Pretreatment testing in the emergency department.** *Am J Emerg Med.* 1997;15(1):96.
- Gorelick MH, Yen K, Yun HJ. **The effect of in-room registration on emergency department length of stay.** *Ann Emerg Med.* 2005;45(2):128-133.
- Hall MF, Press I. **Keys to patient satisfaction in the emergency department: results of a multiple facility study.** *Hosp Health Serv Adm.* 1996 Winter;41(4):515-532.
- Havill JH, Van Alphen S, Fairweather S, et al. **Waiting in the emergency department.** *N Z Med J.* 1996;109(1021):159-161.
- Hoffenberg S, Hill MB, Hour D. **Does sharing process differences reduce patient length of stay in the emergency department?** *Ann Emerg Med.* 2001; 38: 533-540.
- Holland LL, Smith LL, Blick KE. **Reducing laboratory turnaround time outliers can reduce emergency department patient length of stay: an 11-hospital study.** *Am J Clin Pathol* 2005; 124(5):672-674.
- Holleman DR Jr, Bowling RL, Gathy C. **Predicting daily visits to a walk-in clinic and emergency department using calendar and weather data.** *J Gen Intern Med.* 1996; 11(4):237-239.
- Hung GR, Whitehouse SR, O'Neill C, et al. **Computer modeling of patient flow in a pediatric emergency department using discrete event simulation.** *Pediatr Emerg Care.* 2007; 23(1):5-10.
- James D, Hess S, Kretzing JE, et al **Showing “what right looks like”--how to improve performance through a paradigm shift around implementation thinking.** *J Healthc Inf Manag.* 2007; 21(1):54-61.
- Jelinek GA, Mountain D, O'Brien D, et al. **Re-engineering an Australian emergency department: can we measure success?** *J Qual Clin Pract.* 1999; 19(3):133-138.
- Karas S Jr. **Patterns in the number of patients seen hourly in a community hospital emergency department.** *JACEP.* 1977; 6(10):449-452.
- Karpiel M. **Improving emergency department flow. Eliminating ED inefficiencies reduces patient wait times.** *Healthc Exec.* 2004; 19(1):40-41.
- Karpiel MS. **Benchmarking facilitates process improvement in the emergency department.** *Healthc Financ Manage.* 2000; 54(5):54-59.
- Kelen GD, Scheulen JJ, Hill PM. **Effect of an emergency department (ED) managed acute care unit on ED overcrowding and emergency medical services diversion.** *Acad Emerg Med.* 2001; 8(11):1095-1100.

Kelly AM, Bryant M, Cox L, et al. **Improving emergency department efficiency by patient streaming to outcomes-based teams.** *Aust Health Rev.* 2007; 31(1):16-21.

Kyriacou DN, Ricketts V, Dyne PL, et al. **A 5-year time study analysis of emergency department patient care efficiency.** *Ann Emerg Med.* 1999; 34(3):326-335.

Lee SR, Klippel AP. **Emergency department staffing to improve patient management.** *JACEP.* 1977; 6(2):53-55.

Lyons M, Brown R, Wears R. **Factors that affect the flow of patients through triage.** *Emerg Med J.* 2007; 24(2):78-85.

Maitra A, Chikhani C. **Waiting times and patient satisfaction in the accident and emergency department.** *Arch Emerg Med.* 1993; 10(4):388-389.

McGuire F. **Using simulation to reduce length of stay in emergency departments.** *J Soc Health Syst.* 1997; 5(3):81-90.

Milam JT. **Guidelines to increase efficiency of the hospital emergency department.** *J Miss State Med Assoc.* 1970; 11(2):61-64.

Miro O, Sanchez M, Espinosa G, et al. **Analysis of patient flow in the emergency department and the effect of an extensive reorganisation.** *Emerg Med J.* 2003; 20(2):143-148; discussion 148.

Moloney ED, Bennett K, O'Riordan D, et al. **Emergency department census of patients awaiting admission following reorganisation of an admissions process.** *Emerg Med J.* 2006 May; 23(5):363-367.

Munro J, Mason S, Nicholl J. **Effectiveness of measures to reduce emergency department waiting times: a natural experiment.** *Emerg Med J.* 2006;23(1):35-39.

O'Brien D, Williams A, Blondell K, et al. **Impact of streaming "fast track" emergency department patients.** *Aust Health Rev.* 2006; 30(4):525-532.

Poomkothammal V. **Business process study simulation for resource management in an emergency department.** *Stud Health Technol Inform.* 2006;122:1041-1042.

Rathlev NK, Chessare J, Olshaker J, et al. **Time series analysis of variables associated with daily mean emergency department length of stay.** *Ann Emerg Med.* 2007; 49(3):265-271.

Rotstein Z, Wilf-Miron R, Lavi B, et al. **Management by constraints: considering patient volume when adding medical staff to the emergency department.** *Isr Med Assoc J.* 2002 Mar;4(3):170-173.

Saunders CE, Makens PK, Leblanc LJ. **Modeling emergency department operations using advanced computer simulation systems.** *Ann Emerg Med.* 1989;18(2):134-40.

Scalise D. **Improving patient throughput.** *Hosp Health Netw.* 2006; 80(11):49-54.

Schneider SM, Gallery ME, Schafermeyer R, et al. **Emergency department crowding: a point in time.** *Ann Emerg Med.* 2003;42(2):167-172.

- Schull MJ, Morrison LJ, Vermeulen M, et al. **Emergency department overcrowding and ambulance transport delays for patients with chest pain.** *CMAJ*. 2003 Feb 4;168(3):277-283.
- Schumacher W. **Methods for improving emergency department operational process.** *Health Care Strateg Manage*. 1999;17(2):13-15.
- Shea SS, Senteno J. **Emergency department patient throughput: a continuous quality improvement approach to length of stay.** *J Emerg Nurs*. 1994;20(5):355-360.
- Siddharthan K, Jones WJ, Johnson JA. **A priority queuing model to reduce waiting times in emergency care.** *Int J Health Care Qual Assur*. 1996;9(5):10-16.
- Small D, Ragusa P, Kalitenko B, et al. **Proving that “less is more:” the emergency department at Florida’s North Broward Medical Center reduces minor care turnaround time.** *J Emerg Nurs*. 2006;32(3):258-60. Erratum in: *J Emerg Nurs*. 2006 Aug;32(4):321.
- Smeltzer CH, Curtis L. **Analyzing patient time in the emergency department.** *QRB Qual Rev Bull*. 1986;12(11):380-2.
- Smeltzer CH, Curtis L. **An analysis of emergency department time: laying the groundwork for efficiency standards.** *QRB Qual Rev Bull*. 1987;13(7):240-242.
- Spaite DW, Bartholomeaux F, Guisto J, et al. **Rapid process redesign in a university-based emergency department: decreasing waiting time intervals and improving patient satisfaction.** *Ann Emerg Med*. 2002; 39(2):168-177.
- Taylor C, Williamson D, Sanghvi A. **When is a door not a door? The difference between documented and actual arrival times in the emergency department.** *Emerg Med J*. 2006;23(6):442-443.
- Terris J, Leman P, O’Connor N, et al. **Making an IMPACT on emergency department flow: improving patient processing assisted by consultant at triage.** *Emerg Med J*. 2004;21(5):537-541.
- Travers JP, Lee FC. **Avoiding prolonged waiting time during busy periods in the emergency department: Is there a role for the senior emergency physician in triage?** *Eur J Emerg Med*. 2006;13(6):342-348.
- Twanmoh JR, Cunningham GP. **When overcrowding paralyzes an emergency department.** *Manag Care*. 2006;15(6):54-59.
- Walsh B, Eskin B, Allegra J, et al. **The effects of a physician slowdown on emergency department volume and treatment.** *Acad Emerg Med*. 2006;13(11):1242-5. Epub 2006 Apr 13.
- Weintraub B, Hashemi T, Kucewicz R. **Creating an enhanced triage area improves emergency department throughput.** *J Emerg Nurs*. 2006;32(6):502-505.
- Weiss SJ, Derlet R, Arndahl J, et al. **Estimating the degree of emergency department overcrowding in academic medical centers: results of the National ED Overcrowding Study (NEDOCS).** *Acad Emerg Med*. 2004;11(1):38-50.
- Wilbert CC. **Timeliness of care in the emergency department.** *QRB Qual Rev Bull*. 1984;10(4):99-108.

Williams S, Crouch R. **Emergency department patient classification systems: A systematic review.** *Accid Emerg Nurs.* 2006; 14(3):160-170.

Yancer DA, Foshee D, Cole H, et al. **Managing capacity to reduce emergency department overcrowding and ambulance diversions.** *Jt Comm J Qual Patient Saf.* 2006;32(5):239-245.

**Perfecting Patient Flow: America's Safety Net Hospitals and Emergency Department Crowding**  
<http://www.rwjf.org/files/publications/other/PerfectingPatientFlow.pdf>

**Institute for Healthcare Improvement ([www.ihf.org](http://www.ihf.org)) links:**

**IHI: Establish Emergency Department Protocols for Triage, Tests, and Treatment:** Flow: Patient Flow: Changes Developing protocols for the triage, testing, and treatment of patients with the most common diagnoses that staff see in the emergency department (ED) can greatly reduce delays in moving patients through the system.

**IHI: Leading Improvements in Emergency Flow:** Flow: Patient Flow: Improvement Stories The Emergency Services Collaborative (ESC) was a pan-England programme run by the National Health Service Modernisation Agency (London, UK) to achieve a 98 percent operational standard by December 2004 for patients to ...

**IHI: Overcrowding in the nation's Emergency Departments:** Complex causes and disturbing effects: Flow: Patient Flow: Literature ...2000; 35(1):83-85. An article discussing the "complex web of interrelated issues" responsible for emergency department overcrowding...

**IHI: Emergency department overcrowding following systematic hospital restructuring:** Trends in twenty hospitals over ten years: Flow: Patient Flow: Literature ...years. *Acad Emerg Med.* 2001; 8(11):1037-1043. Investigates the effect of hospital restructuring on emergency department overcrowding.

**IHI: Does sharing process differences reduce patient length of stay in the emergency department?:** Flow: Patient Flow: Literature ...length of stay in the emergency department? ...length of stay in the emergency department? *Annals of Emergency Medicine*...length of stay in the emergency departments (ED) of a large...

**IHI: Emergency departments and crowding in United States teaching hospitals:** Flow: Patient Flow: Literature ...*Emergency Medicine.* September 1991; 20(9):980-986. This study finds that overcrowding in the emergency department adversely impacts hospitals regardless of ownership.

**IHI: Hospital Emergency Departments:** Crowded conditions vary among hospitals and communities: Flow: Patient Flow: Literature ...71. A United States government report prepared in order to provide national data on issues of emergency department overcrowding.

**IHI: Reducing Transfer Time from the Emergency Department to Inpatient Bed:** Lee Memorial Hospital: Flow: Patient Flow: Improvement Stories ...Myers, Florida, USA) reduced their emergency department to inpatient bed transfer...But a recent report on emergency department (ED) overcrowding by the...was the inability to transfer emergency patients to inpatient beds once...

**IHI: Improvement Report: Eliminate Overcrowding in the Emergency Department: Flow:** Patient Flow: Improvement Stories Baptist Memorial Hospital (Memphis, Tennessee, USA) has improved flow throughout acute care and improved efficiency in the Emergency Department while achieving record patient satisfaction.

**IHI: Emergency Department Bibliography:** Flow: Patient Flow This bibliography was compiled as part of IHI's IMPACT Learning and Innovation Community on Operational and Clinical Improvement in the Emergency Department.

**IHI: National Hospital Ambulatory Medical Care Survey: 2003 Emergency Department Summary:** Flow: Patient Flow This May 2005 summary report describes ambulatory care visits to hospital emergency departments (EDs) in the United States, including statistics on selected hospital, patient, and visit characteristics and selected ...

**IHI: Getting Started:** Operational and Clinical Improvement in the Emergency Department: Flow: Patient Flow This getting started document, developed in IHI's IMPACT Learning and Innovation Community, provides guidance for establishing a team and setting aims to improve Emergency Department operations and clinical care.

**IHI: Emergency Department Hourly Patient Flow Analysis:** Flow: Patient Flow: Tools This tool helps identify patterns in the time of day of arrivals and admissions to the emergency department; developed by Luther Midelfort – Mayo Health System (Eau Claire, Wisconsin, USA)

**IHI: Root cause analysis of emergency department crowding and ambulance diversion in Massachusetts:** Flow: Patient Flow: Literature ...cause analysis of emergency department crowding and ambulance diversion...A. Root cause analysis of emergency department crowding and ambulance diversion...effect of different factors on emergency department overcrowding. It demonstrates that...

**IHI: Dynamics of bed use in accommodating emergency admissions:** Stochastic simulation model: Flow: Patient Flow: Literature ...of bed use in accommodating emergency admissions: Stochastic simulation model Bagust A...Posnett JW. Dynamics of bed use in accommodating emergency admissions: Stochastic simulation model. BMJ. July 17, 1999...

**IHI: ImPaCt - Improving Patient Care:** Flow: Patient Flow: Improvement Stories Ashford and St. Peters Hospital (Surrey, UK) has improved the flow through the emergency patients journey, increasing the percentage of inpatients being admitted from the emergency department within 4 hours, reducing ...

**IHI: Examine Average and Peak Daily Emergency Department Admissions: Flow:** Patient Flow: Changes Predicting demand based on historical data allows for planning capacity to meet demand. DRAFT Change Ideas for Operational and Clinical Improvement in the Emergency Department: Flow: Patient Flow Draft change ideas developed in IHI's IMPACT Learning and Innovation Community that are being tested and refined by participating organizations.

**IHI: DRAFT Measures for Operational and Clinical Improvement in the Emergency Department: Flow:** Patient Flow Draft measures developed in IHI's IMPACT Learning and Innovation Community that are being tested and refined by participating organizations.

**IHI: Emerging Content:** Flow: Patient Flow Hospitals are increasingly challenged to reduce waits and delays in moving patients into and out of inpatient beds. The “competition” for inpatient beds from the Emergency Department, surgery, direct ...

**IHI: ED Performance Measures and Benchmarking Summit Consensus Statement:** Flow: Patient Flow This consensus statement presents three primary reasons for emergency department practitioners to standardize language and terminology, and to implement performance measures and benchmarking practices in the ED.

**IHI: Restructuring the ER:** The NewsHour with Jim Lehrer Interview: Flow: Patient Flow: Improvement Stories ...show that more than half the nation's emergency rooms are facing overcrowding, a problem that has led to patients being turned away at...

**IHI: Hackensack University Medical Center Decreases Wasted Capacity in the ED from 23 to 10 Percent:** Flow: Patient Flow: Improvement Stories With 778 beds, more than 70,000 inpatient admissions and more than 59,000 emergency/trauma department visits a year, Hackensack University Medical Center (HUMC) in Hackensack, NJ, is one of the nation's busiest ...

**IHI: Better Patient Flow Means Breaking Down the Silos:** Flow: Patient Flow: Improvement Stories Patients who worry that their hospital's emergency department (ED) is too busy to reliably deliver prompt care are in good company. A majority of hospital leaders worry about this, too.

**IHI: Improving Patient Flow at Bon Secours Venice Hospital:** Flow: Patient Flow: Improvement Stories ...be very happy." Caissie, director of emergency care services at Bon Secours Venice Hospital in...flow problems begin and end in the emergency room. "People associate flow with the Emergency...

**IHI: Patient Flow:** Flow: Patient Flow Patient safety, hospital revenue, staff satisfaction, and patient satisfaction are all negatively impacted when patients, information, and materials do not move through hospitals in a timely and efficient way.

**IHI: Bellin Health Services Reduces the Average Time from ED Arrival to an Inpatient Bed to Less Than Three Hours:** Flow: Patient Flow: Improvement Stories Health care professionals who work to improve the flow of patients through the hospital learn one thing very quickly: the improvement team must focus simultaneously on the micro- and the macro-level system. "If ...

**IHI: Optimizing patient flow:** Moving patients smoothly through acute care settings: Improvement: Improvement Methods: Literature Institute for Healthcare Improvement. Optimizing patient flow: Moving patients smoothly through acute care settings. Institute for Healthcare Improvement. 2003.

**IHI: Improvement Report: Improving Flow of Patients:** Flow: Patient Flow: Improvement Stories Bon Secours Venice Hospital (Venice, Florida, USA) has achieved improved patient throughput by decreasing patient disposition time, while assuring safety and satisfaction for both the patient and the health care ...

**IHI: Doing an Extreme Makeover of Patient Flow: Going from Condition Red to Green in One Week (or Less):** Flow: Patient Flow: Improvement Stories Western Pennsylvania Hospital, Forbes Regional Campus (Monroeville, Pennsylvania, USA) decided to avoid condition red by trying to solve patient flow problems through an intense Extreme Team week and were able to ...

**IHI: Improving Flow without Adding Resources: A Success Story:** Flow: Patient Flow: Improvement Stories ...of the time, with ambulances waiting at emergency departments (EDs) for up to 90 minutes...rearranged staffing to place two nurses in triage during peak hours, and fewer during non...

**IHI: Urgent Matters: Improvement: Improvement Methods:** Resources ...Urgent Matters is an initiative of The Robert Wood Johnson Foundation to help hospitals eliminate emergency department crowding and help communities understand the challenges facing the health care safety net...

**IHI: A Pragmatic Approach to Improving Patient Efficiency Throughput:** Flow: Patient Flow:  
Improvement Stories Carondelet St. Mary's Hospital (Tucson, Arizona, USA) and the Ascension  
Health Operations Resource Group worked collaboratively to improve hospital flow and increase access  
to care, reducing the Emergency Center

## AMERICAN COLLEGE OF EMERGENCY PHYSICIANS

Council Resolution 25(06):  
Redefining the Front End Process to Optimize Emergency Department & Hospital Flow.

WHEREAS, The “Front-end” Process to Emergency Department (ED) and hospital patient flow includes patient sign in, triage, registration, and medical screening in the ED; and

WHEREAS, The order and time spent in each of these processes is variable and not standardized in EDs throughout the country; and

WHEREAS, Upon coming to an ED, a patient should be greeted and seen first by an individual with clinical expertise for a clinical assessment; and

WHEREAS, In many EDs, the initial patient contact is made by personnel without clinical training (ie, clerical or security staff person); and

WHEREAS, During peak ED patient visit volumes, there may be long lines for patients waiting to sign in or be registered, thereby delaying initial clinical assessment; and

WHEREAS, Such delays represent suboptimal patient care; and

WHEREAS, Initial clinical assessment in the ED may be accomplished by implementing, when ED beds are open and readily available for immediate occupancy, such processes as primary clinical assessment at the bedside (rather than waiting room triage) and bedside registration (rather than waiting room sign in and/or registration); and

WHEREAS, Many hospitals still insist upon waiting room sign in, registration and triage, even though open and readily available ED beds exist at the time of patient arrival to the ED; therefore be it

**RESOLVED, That the American College of Emergency Physicians (ACEP) develop a position paper which defines optimal emergency care related to the “Front End” processing of patients presenting to an ED.**

### **BACKGROUND**

This Resolution calls for ACEP to develop a position paper defining optimal emergency care related to the “Front-end” processing of ED patients and specifying that individuals with clinical expertise are the first personnel to interact with ED patients.

The College formed a task force in 2001 to provide resources to members about ED overcrowding. “Responding to Emergency Department Crowding: A Guidebook to Chapters” was reviewed by the Board in September 2002. The resource was developed as a practical tool to define the terms and address the causes of and solutions to ED overcrowding. The ED model outlined in the “Guidebook” addresses monitoring of ED crowding metrics, automation, horizontal integration, improvements in triage, flexible staffing, expanded fast-track and observation services.

In March 2004, the Emergency Medicine Practice Committee (EMPC) developed an information paper, *ED Crowding*, that addresses the ED patient flow process and the need to measure a variety of indicators to address hospital specific issues. It was pointed out that hospitals utilize many different triage and registration processes during the “input” phase.

In 2004 the EMPC also developed a compendium of operations management resources and tools from emergency medicine and business management sources for utilization in assessment and process improvement of the ED and hospital function.

ACEP hosted a one-day meeting on crowding in July 2005 where boarding concerns were discussed with hospital association representatives. Incentives for hospitals to reduce crowding and boarding were discussed, along with medical liability and payment relief necessary for EDs to continue to operate for the public good.

A standard on patient flow was implemented by the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) on January 1, 2005. The Joint Commission adopted the issue of ED crowding as its third public policy initiative in 2002 to address patient safety. In response to the initiative, input from ACEP, and feedback voiced at a national symposium in February 2003, JCAHO proposed a standard addressing ED crowding in June 2003. After review of the public comments, in February 2004 a modified standard was approved that de-emphasized ED crowding and stressed the role of leadership in managing patient flow throughout the hospital. The rationale states that the ED is “particularly vulnerable to experiencing negative effects of inefficiency in the management of the process.”

The information paper, *Approaching Full Capacity in the ED*, in development by the EMPC for review by the Board in October 2006, addresses some of the inefficiencies of triage processes and discusses potential process improvement techniques including bedside registration, use of standing orders, and patient tracking systems.

#### **ACEP Strategic Plan Reference**

Work to eliminate crowding and boarding.

#### **Fiscal Impact**

None, other than budgeted committee and staff time.

#### **Prior Council Action**

Substitute Resolution 18(04) Caring for Emergency Department Boarders adopted.

#### **Prior Board Action**

April 2005 reviewed “Operations Management in Emergency Care” information paper.

Substitute Resolution 18(04) Caring for Emergency Department Boarders adopted.

October 2004 approved policy statement “Caring for Emergency Department Boarders.”

April 2005 reviewed “Emergency Department Crowding” information paper.

April 2004 reviewed “Emergency Department Operations Management” information paper.

September 2002 reviewed “Responding to Emergency Department Crowding: A Guidebook to Chapters.”

October 2000 approved policy statement “Boarding of Admitted and Intensive Care Patients in the Emergency Department.”

Amended Resolution 34(00) Hospital Closures adopted.

Approved “Hospital Overcrowding and Emergency Department Backup” policy statement September 1989.

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