Lessons Learned by

the *Urgent Matters*

Learning Network

BURSTING AT THE SEAMS

Improving Patient Flow to Help America's Emergency Departments

Urgent Matters

The George Washington University Medical Center

School of Public Health and Health Services

Department of Health Policy

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For more information about the Learning Network initiative and/or the *Urgent Matters* project, please visit our web site www.urgentmatters.org. To request copies of this report, please contact *Urgent Matters* at info@urgentmatters.org or call (202) 530-2335.

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Improving Patient Flow to Help America's Emergency Departments

By: Marcia J. Wilson, MBA
Khoa Nguyen, MPH

Urgent Matters
The George Washington University Medical Center
School of Public Health and Health Services
Department of Health Policy

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Urgent Matters Hospitals

Boston Medical Center

Boston, Massachusetts
Project Director: John Chessare, MD, MPH

BryanLGH Medical Center

Lincoln, Nebraska
Project Director: Ruth Radenslaben, RN, BS, MA

Elmhurst Hospital Center

Queens, New York
Project Director: Stuart Kessler, MD, FACEP

Inova Fairfax Hospital

Fairfax County, Virginia
Project Director: Thom Mayer, MD, FACEP, FAAP

Grady Health System

Atlanta, Georgia
Project Director: Leon Haley, Jr., MD, MHSA, FACEP

Henry Ford Health System

Detroit, Michigan
Project Director: William Schramm

St. Joseph's Hospital and Medical Center

Phoenix, Arizona
Project Director: Julie Ward, RN, MSN

The Regional Medical Center at Memphis

Memphis, Tennessee
Project Director: Rhonda Nelson, RN, BSN

University Health System

San Antonio, Texas
Project Director: David Hnatow, MD, FACEP, FAAEM

University of California at San Diego

San Diego, California
Project Director: Theodore C. Chan, MD, FACEP

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Introduction

Across America, hospital emergency departments (EDs) are in crisis. For many American communities, the local hospital ED has become the linchpin of the health care safety net. With their legal obligation to see all patients at all times, and with more people than ever seeking their services, EDs nationwide are bursting at the seams.

From 1992 to 2002, the number of annual ED visits increased 23 percent in the U.S., while the number of EDs decreased by 15 percent.[1] Many EDs are overwhelmed by the number of patients needing their services, with 62 percent of the nation's EDs reporting being "at" or "over" operating capacity.[2] Almost daily, newspaper headlines across the country relay stories about patients waiting for hours in the ED before being seen and tales of ambulances being diverted from one hospital to the next due to overcrowding. But while much of the blame for this situation has been placed on broader social issues—such as increasing numbers of uninsured Americans and increasing reliance on the ED by those who are insured[3]—many hospitals have done little to address the patient flow obstacles that lead to overcrowded EDs.

The *Urgent Matters* program, a national initiative of The Robert Wood Johnson Foundation, has worked intensely to try to find solutions to this problem that may be applicable nationwide. *Urgent Matters* has a commitment to develop and spread patient flow best practices to America's hospitals.

The program was initiated in 2002 with the solicitation of applications from all public or non-profit hospitals in the U.S. with Level I or Level II Trauma Centers. Ten hospitals were eventually selected to participate in a year-long Learning Network.

Working closely with the Learning Network, the *Urgent Matters* team developed a series of practical management tools to address issues related to ED overcrowding. However, as the initiative evolved, hospitals participating in the Learning Network developed a variety of strategies designed to improve patient flow and to reduce ED crowding, and, in the process, created their own best practices.

While each of the Learning Network hospitals decided which strategies to implement within their organizations, a number of common overarching themes for success quickly became apparent. Regardless of the strategy implemented or the best practice intervention, a handful of key internal factors were critical for success in first building a framework for change, then initiating strategies to improve patient flow.

***Urgent Matters* hospitals:**

Boston Medical Center

BryanLGH Medical Center

Elmhurst Hospital Center

Fairfax Inova Hospital

Grady Health System

Henry Ford Health System

St. Joseph's Hospital and Medical Center

The Regional Medical Center at Memphis

University Health System

University of California at San Diego

1 McCaig, L. F., Burt, C. W. National Hospital Ambulatory Medical Care Survey: 2002 Emergency Department Summary. Web Page, No. 340, March 18, 2004. Available at www.cdc.gov/nchs/data/ad/ad340.pdf. Accessed April, 2004.

2 Emergency department overload: A growing crisis. (2002, April). The Lewin Group analysis of AHA ED and hospital capacity survey.

3 Cunningham, P., May, J. Insured Americans drive surge in emergency department visits. (October 2003). Available at www.hschange.org/content/613/613.pdf. Accessed August, 2004.

Critical Success Factors

The *Urgent Matters* experience shows that hospitals can dramatically improve patient flow and decompress their ED without investing significant financial resources, but it takes commitment and several important ingredients.

- **Recognizing that ED crowding is a hospital-wide problem, not an ED problem.** If ED crowding is not viewed and addressed as a hospital-wide issue, any efforts to make changes will either fail or have limited success.
- **Building multi-disciplinary, hospital-wide teams to oversee and implement change.** While these teams must include representation from the ED, staff representing inpatient services and other support functions are also necessary. The ability to move patients in an efficient and timely manner relies upon the interactions of many different units throughout the hospital.
- **Determining the presence of a "champion."** In order for the effort to be successful, one individual in a well-respected position must serve in the role as champion—"selling" patient flow improvement to the medical staff and executive management. The champion must become an advocate for improving patient flow and easing ED crowding.
- **Guaranteeing management's support.** Reducing ED congestion and improving patient flow must be priorities at the highest level of the hospital. The CEO should be vocal in her or his support for these initiatives. If hospital leadership walks away from efforts to improve patient flow, the chances for success will drop dramatically.

"We needed to change the culture, shift the paradigm. Boarders lingering in ED hallways aren't ED patients. They're the hospital's patients. Therefore, we need to work together to create an environment that achieves the highest possible level of patient care, comfort and satisfaction. . ."

Candice Saunders
Chief Operating Officer
Inova Health System

- **Using formal improvement methods.** Rapid Cycle Change (RCC) is an effective quality improvement method to improve patient flow. Using RCC, hospital staff can bypass political and financial hurdles by testing small changes. This approach allows them to build quickly on successful results, accelerate towards the improvement process and achieve organizational buy-in. Thus, RCC offers flexibility and allows hospitals to initiate change with minimal financial risk.

- **Committing to rigorous metrics.** Data collection is an absolute requirement. Hospital staff must not only identify key performance measures, but collect and report them on a consistent basis. Although data collection is a significant challenge for many hospitals that may not already have collection methods in place, such data will ultimately drive important decision-making and increase executive support.

- **Making transparency an organizational value.** Sharing outcomes and results with all involved staff builds ownership and accountability. Data are not useful unless everyone participating in the process has access to the same information. Transparency of information can be achieved through simple, low-cost initiatives: in-house newsletter articles, staff emails, charts showing results and presentations to the hospital administration and board.

- **Finding the right balance between collaboration and competition.** Collaboration and healthy competition enhance performance improvement. Sharing results, such as run charts of the key performance indicators, between departments *and* with other institutions motivates internal staff and administration to perform at high levels in order to be recognized as leaders.

Building a Framework for Change

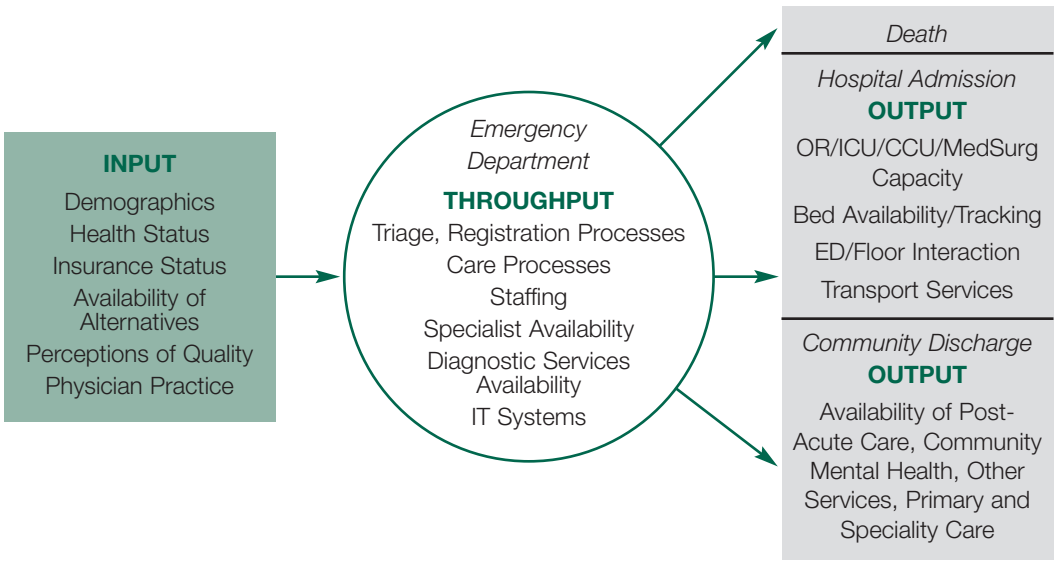
Any major improvement project requires more than just commitment. It requires putting a framework of tools in place to help understand and quantify the problem, as well as to provide support for changes to come. For the hospitals participating in the Learning Network, this meant exhaustive training in applying critical concepts and skilled utilization of available tools including:

- Input/Throughput/Output (I/T/O) model of patient flow and ED crowding
- Hospital-wide patient flow team
- Toolkit and RCC methods
- Core metrics
- *Urgent Matters* web-based project management system
- Expert advice and consultation

The I/T/O model of patient flow and ED crowding

Urgent Matters uses an Input/Throughput/Output (I/T/O) model as the framework for understanding why patient flow breaks down, ultimately contributing to ED back-up. Input includes the factors that create demand for ED services. Throughput is affected by the many processes influencing the speed with which a patient moves through the ED. Output is driven by the ability of the ED staff to either discharge patients or transfer them to another part of the hospital by admitting them. Utilizing this model allowed hospitals in the Learning Network to identify their own bottlenecks, and then initiate hospital-wide improvement strategies.

Urgent Matters Input/Throughput/Output Model

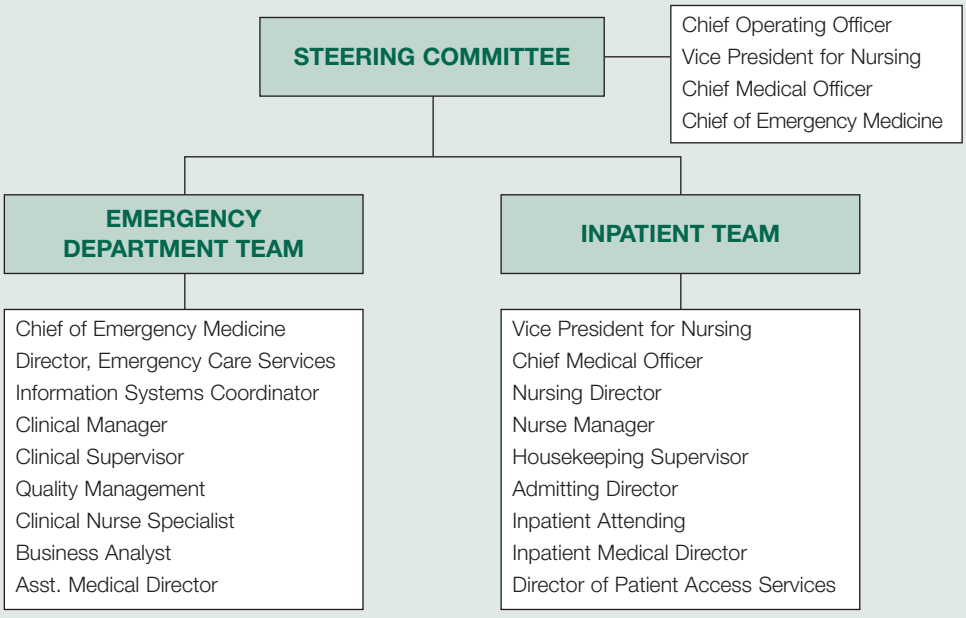


Creation of a hospital-wide patient flow team

Creating a hospital-wide team to participate in decisions and changes to patient flow is a critical factor for success. At the start of the *Urgent Matters* project, each of the Learning Network hospitals submitted a list of everyone selected to serve on their project team. These teams were then charged with identifying and overseeing all of the changes that would be implemented to reduce ED crowding.

The ED staff within each of the participating hospitals quickly recognized that they could not do it alone. Making changes to patient flow processes affects employees from many—if not all—departments throughout the hospital. Thus, the importance of including appropriate representatives from the inpatient side of the hospital quickly became apparent. EDs also found that expanding the number and types of departments represented on the team provided new ideas and creative suggestions that ED staff alone may never have generated. Hospitals restructured their teams until they had the right mix of people "at the table"—such as the representative team below:

Sample Team Structure



Toolkit and RCC

The *Urgent Matters* toolkit of best practices was developed based on expert interviews and site visits with dozens of hospitals. It included training in and examples of data collection methods, strategies for changing workflow, ways of achieving organizational buy-in and strategies for spreading and sustaining change throughout the organization.

Learning Network participants received training in RCC, which uses a "plan-do-study-act" cycle that allows organizations to test changes on a small scale, measure the results and then determine whether the change was successful. Improvements in patient flow processes at the Learning Network hospitals were most often achieved by making a series of small changes through RCC techniques that allowed the hospitals to achieve early buy-in through their early successes.

Core metrics

You cannot fix what you cannot measure. *Urgent Matters* identified 17 key performance indicators (KPIs) designed to evaluate each hospital's patient flow performance. Information systems varied greatly among the Learning Network hospitals. Many hospitals had to implement manual systems to capture the required data, although collecting the necessary data was sometimes eased by using data sampling strategies. While collecting and reporting data proved to be significant challenges, all agreed at the end of the project that using KPIs was a critical element in their success.

"The RCT (rapid cycle test) process continues to foster a culture of change management and team development. Clinical Nursing Directors have placed suggestion boxes in units to encourage suggestions for new RCTs from employees."

David Hnatow, MD
Medical Director
University Hospital Emergency Department

"[Rapid cycle change allows for] small-scale trials in a highly controlled area. If you try to make monumental changes, it will take a monumental amount of time without the data to prove that the change is necessary and worthwhile."

Thom Mayer, MD
Chairman Emeritus, Department of Emergency Medicine
Inova Fairfax Hospital

Key Performance Indicators

Factor	Key Performance Indicator		Reporting Interval
I. Inpatient Flow	1. Time from inpatient bed assignment to bed placement		Weekly
	2. Time of day of discharge		
	3. Bed turnaround time		
II. ED Throughput	1. Total ED throughput time		Weekly
	2. By treatment path: Admitted Fast Track Other ED discharged	a. Time from arrival to bed placement	
		b. Time from bed placement to examination	
		c. Time from disposition decision to departure	
III. Other ED	1. Hours on diversion		Monthly
	2. Percent incomplete treatment*		Monthly
	3. Patient satisfaction		Monthly
IV. Clinical Process	1a. Time to heart treatment**		Monthly
	1b. Time to pain management***		

** Percent incomplete treatment = Percentage of ED patients who left prior to completion of medical treatment*
*** Time to heart treatment = Average time between patient arrival at the ED and the time that thrombolytic medication is administered or a vessel is opened for patients receiving cardiac treatment*
**** Time to pain management = Average time between patient arrival at the ED and the first administration of pain-relieving medication, ice packs or other methods of pain management for patients with fractures or dislocations*

"Our numbers are coming in reliably on a weekly basis for all the KPIs. We have never had better data to make management decisions."

John Chessare, MD, MPH
Chief Medical Officer
Boston Medical Center

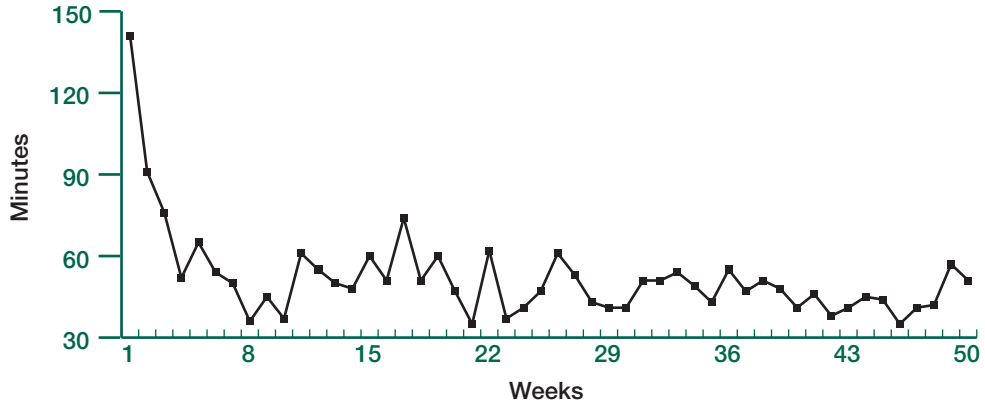
The Urgent Matters web-based project management system

Reporting and management of information via a web-based system was a key component of the program. Learning Network participants accessed the toolkit of available materials via the *Urgent Matters* web site and also posted action plans, monthly project reports and "Celebrating Success" stories to the web site as well. Data pertaining to all 17 KPIs were also entered via the web site and each institution could view the run charts from the other nine hospitals. (Selected charts highlighting KPI improvements are shown below.) Thus the web-based management system both spurred collaboration among hospitals, while also fostering healthy competition.

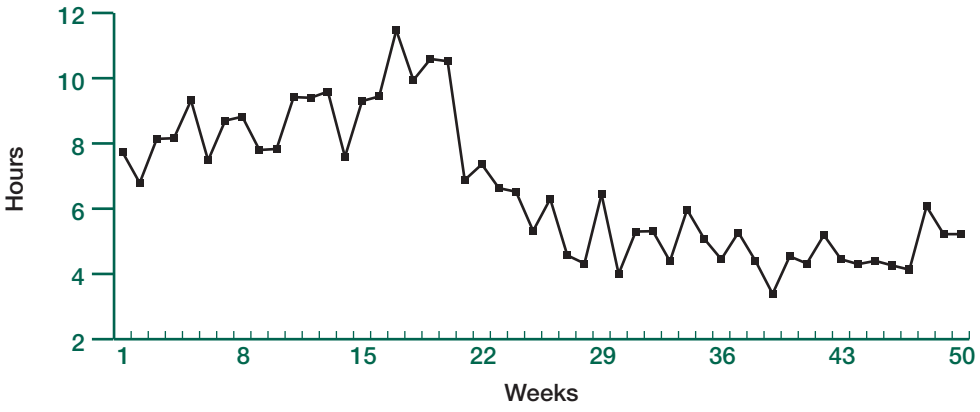
Expert advice and consultation

While the Learning Network participants were charged with improving patient flow, they were not left to achieve this end goal independently. The *Urgent Matters* team and its expert advisors provided technical assistance and consultation throughout the project—in the form of on-site visits and regular phone consultations. Learning Network hospitals also attended three in-person meetings during the year and participated in monthly phone calls that featured a topic presentation and updates from each hospital—again fostering collaboration through learning of the successes *and challenges* of other hospitals.

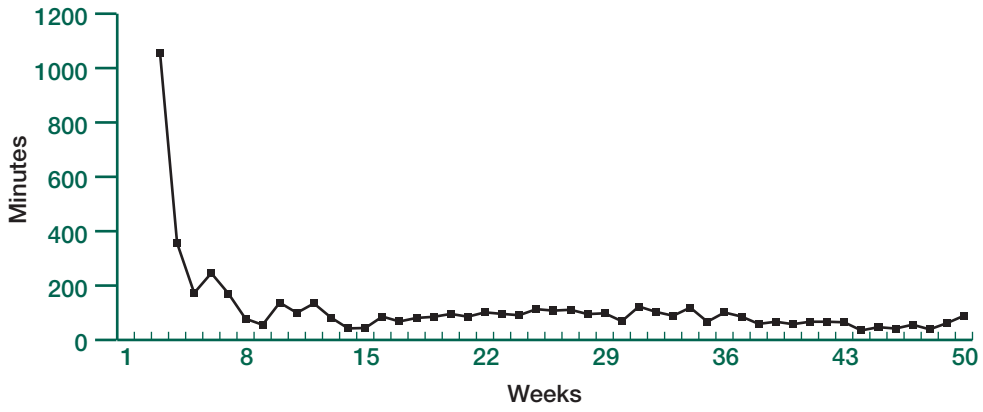
Average time from bed placement to physician examination (other ED discharge)—University Hospital San Antonio



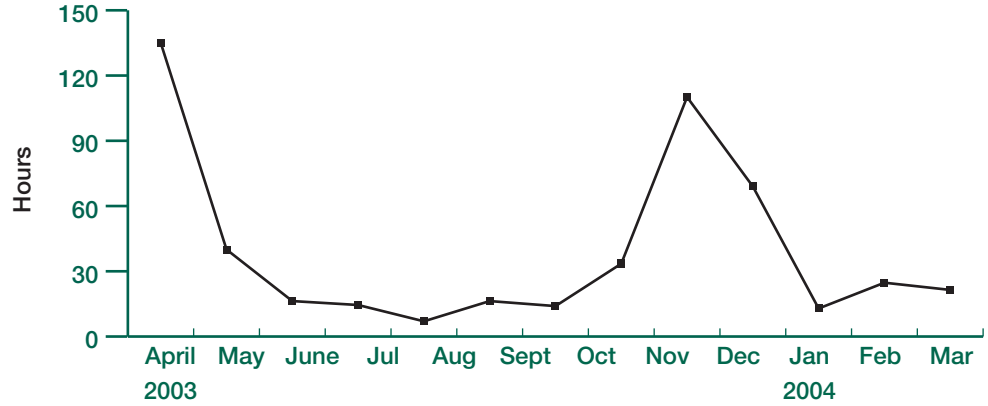
Average total ED throughput time—The Regional Medical Center at Memphis



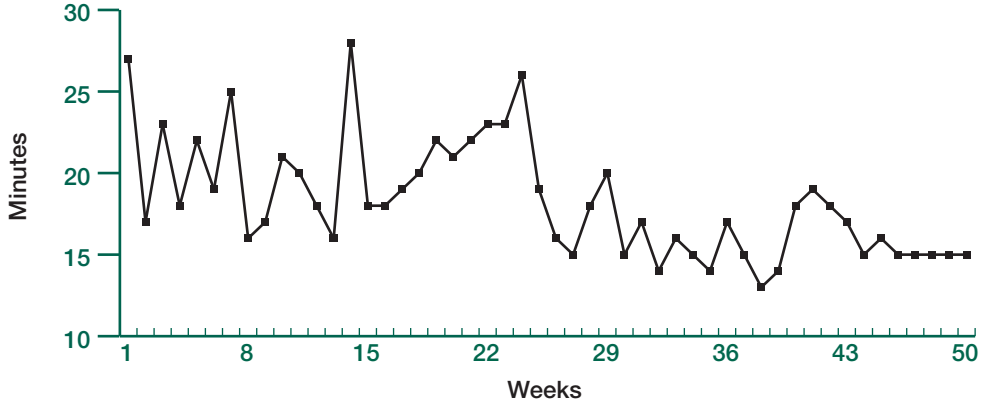
Average time from inpatient bed assignment to bed placement—The Regional Medical Center at Memphis



Total diversion hours—Inova Fairfax Hospital



Average time from disposition decision to actual disposition (fast track)—Henry Ford Health System



Strategies for Improving Patient Flow

Each hospital within the Learning Network relied on a variety of strategies and innovations to reduce ED crowding. While all of the hospitals needed to address similar challenges, each institution focused on strategies most appropriate for its own existing culture and available resources. To begin, hospitals drew from the original *Urgent Matters* toolkit and recommendations provided by their project advisors, but quickly moved to generating their own ideas internally—with many of those that proved successful then being adopted by other Learning Network hospitals. Hundreds of changes were piloted by the *Urgent Matters* hospitals, usually as part of a rapid cycle test (RCT).

Sample Strategies and Innovations

Category	Strategies/Innovations
Patient Flow Coordination and Facilitation	Implement a "Bed Czar" or patient flow manager by designating a specific position responsible for ensuring the timely transfer of ED patients to assigned inpatient beds
	Dedicate a nurse with admission/discharge/transfer duties who is specifically responsible for facilitating pending discharges to accelerate available beds for admits
	Develop accelerated triage and registration processes to triage more efficiently based on the patient's acuity and to reduce patient waiting times by re-ordering or combining triage and registration processes
Early Discharge	Initiate preliminary discharge by designating patients for early discharge the next day
	Redesign rounding and discharge processes to focus on patients ready for discharge
	Create a discharge room/lounge for inpatients that have been discharged and are awaiting transportation, medications or education
	Establish a discharge coordinator position to coordinate procuring information that is required to discharge the patient
	Implement financial (bonuses) and non-financial (movie tickets or cafeteria vouchers) incentives for physicians and nurses to promote efficient and early discharge of patients who are ready to go home
Boarding and Inpatient Bed Assignment	Replace the traditional "push system" with a "pull system" in which the inpatient floors play an active role in pulling ED patients into available beds
Diversion Management and Reduction	Establish new protocols and monitoring systems to determine when the hospital is approaching maximum operating capacity and its threshold for diversion
	Develop a hospital-wide diversion response protocol to focus existing resources on facilitating all appropriate patient discharges in a more timely manner
	Create a community-wide diversion plan in collaboration with local hospitals and the community's emergency medical services unit to establish common protocol for hospitals going on and off diversion or bypass

Tracking dozens of changes that are being implemented at one time in a single hospital can be a huge challenge. Yet in order for achievements or successes to be properly identified as outcomes of a specific change, each change must be closely tracked and monitored. To streamline the process, a number of Learning Network hospitals developed an RCT tracking worksheet to record all of the changes made, allowing them to maintain momentum while providing a redesign audit trail.

RCT Tracking Worksheet

	RCT #8	RCT #11
Date	**6/30**	**7/21**
RCT Initiative	Met with Pharmacy to develop par level and add Td to current EC PYXIS. Td was removed some time back because of a national shortage. Shortage has improved, but Td is expensive and often wasted. Td protocol added to standing orders for EC.	For this RCT, a registration specialist will be designated to register all Pediatric and PA Triage patients. During the RCT, nursing staff in triage will be asked to put triaged patient charts in a bin designated for Pediatric and PA Triage patients. This will ensure that these patient charts will not be included with other EC charts during the RCT. The designated specialist will be continuously monitoring the bin. Registration will be done continuously without delay due to other charts.
Resp Party	Haddix, triage nurses	Garcia
Data Collection	Manual tracking: pre-RCT Mon, Tues, Wed; post RCT Thurs, Fri, Sat.	Pre RCT data: Average Reg time for Pediatrics—15.08 minutes (Random audit 2003)
Summary Results	RCT was successful. Td added to PYXIS. Meeting planned with pharmacy to create additional list of meds to be added to PYXIS to reduce LOS for patients and decrease work for the pharmacy.	Average Reg time for PA Triage patient = 23.25 minutes (Random Audit 2003) After reviewing problems with RCT data collections, post RCT data for this project was collected manually. The time stamp indicated the actual time registration was requested and the actual registration time was taken from IDX. This was, in fact, a very successful RCT. With a registration specialist dedicated to Fast Track and Pediatric patients, there was no delay due to other charts. Post RCT data for Pediatric patients was 4.4 minutes and for PA Fast Track patients the time was 2.6 minutes.
KPI	Through-put Time	Arrival Process
% Change	69%	79% & 89%

Source: University Hospital in San Antonio

Selected Success Stories

All of the hospitals in the *Urgent Matters* Learning Network demonstrated improvement in patient flow, often with break-through results. Following are several case studies that showcase some of the most successful changes that participating hospitals made to dramatically affect patient flow as measured by the KPIs.

Grady Health System: Reducing ED Length of Stay for Fast Track Patients

From May 2003 to April 2004, Grady Health System (Grady) in Atlanta reduced its average total ED throughput from almost 7.0 hours to approximately 5.25 hours.

Grady initiated a number of strategies throughout the ED and the hospital—including changes to the processing of Fast Track patients within the ED. By adopting a series of changes that were tested in a pilot project over a two-week period, Grady eventually reduced two critical KPIs for Fast Track patients:

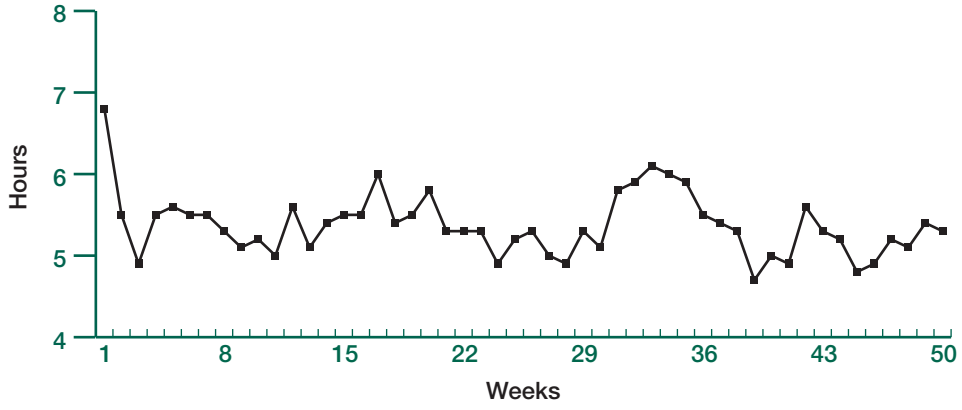
- Average time from arrival to bed placement decreased from 219 minutes to 94 minutes (a decrease of 57 percent); and
- Average time of bed placement to initial exam decreased from 43 minutes to 35 minutes (a 19 percent difference).

To achieve these results, Grady first relocated the patient chart in-basket from the Information Desk to the Fast Track unit and created three separate boxes to indicate the patient's status: "Ready to be seen," "Requiring pre-assessment" and "Requiring diagnostics." This effectively gave the Fast Track staff "ownership" of those patients waiting to be seen, and provided a highly visible system indicating which patients needed what type of services.

Next, Grady altered the role of the mid-level provider or the nurse responsible for patient assessment to change the screening process for those patients potentially needing ancillary tests. This new role required the mid-level provider or nurse to take a more active role in making sure the patient received the ancillary tests needed.

Ultimately, Grady succeeded in reducing the overall ED throughput time for patients in its Fast Track unit. To accomplish this, Grady created new standardized procedures, and then educated the affected staff about alterations to their role. In the process, Grady learned that they needed to provide more staff education than originally anticipated and that they needed to communicate the new process not just to staff, but to the patients as well.

Average total ED throughput time—
Grady Health System



University Hospital (University Health System): Reducing Inpatient Bed Turnaround Time

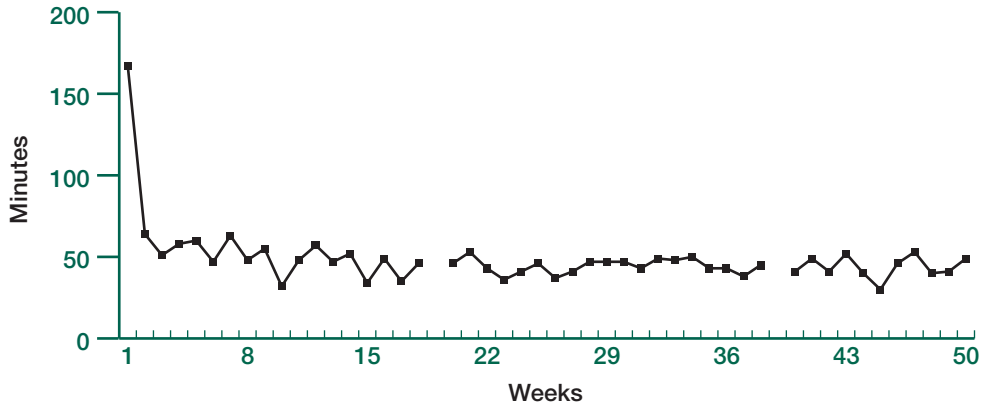
By engaging staff from the inpatient side of the hospital in the problem-solving process, University Hospital in San Antonio successfully reduced inpatient bed turnaround time from more than 160 minutes to less than 30 minutes, a decrease of 81 percent.

When a University Hospital ED patient needed to be admitted, one of the typical delays was the time it took for a clean bed to become available. The hospital's average bed turnaround time—the time from when a bed becomes empty to the time the bed is reported as clean and available for patient use—was almost three hours. By collecting staff suggestions and input, the hospital discovered that even in today's highly technical world, sometimes a simple solution works best.

The hospital's housekeeping staff actually came up with the low-cost, low-tech strategy that made a substantial difference in bed turnaround time. It consisted of two jars being placed at the nurses' station—one each to represent clean and dirty beds. Once a patient checked out, the nurse put a bright red slip of paper with the patient's room number into one of the jars. When housekeeping staff finished cleaning and preparing the room for an incoming patient, they removed the red slip from the first jar and put a green slip with the same room number on it in the second jar. The green slip in the jar served as a highly visible reminder to the unit clerk that an open bed was available and ready to be filled. As it turned out, this simple solution cut down on bed turnaround time more significantly than any other strategy implemented by the team.

University Hospital made additional changes that ultimately reduced the bed turnaround time to 23 minutes by June 2004. One of those changes was the implementation of an electronic bed tracking system, which provides a valuable electronic notification tool. Another change involved revising and rethinking an existing policy. Previously, housekeeping staff were prohibited from removing sheets from certain beds due to an out-dated policy created to prevent staff from being accidentally jabbed by stray needles in the bedding. In recent years, the hospital had moved to a needle-less system, rendering the policy obsolete—yet it had never been eliminated. By updating the policy, the hospital removed an unnecessary barrier and helped the housekeeping staff turn over beds with greater efficiency.

Average bed turnaround time—
University Hospital San Antonio



St. Joseph's Hospital and Medical Center: Comprehensive Diversion Reduction Plan Improves Efficiency of Hospital Discharges

When the ED at St. Joseph's Hospital and Medical Center (St. Joseph's) in Phoenix, Arizona, had to go on diversion due to crowding, responsibility for finding beds for the patients fell solely to the ED and the House Manager. While they struggled to find beds for the patients, the rest of the hospital proceeded with business as usual. In response to this problem, St. Joseph's implemented a hospital-wide Diversion Reduction Plan, designed to reduce the number of diversion hours for the ED. The Chief Nurse Executive (CNE) led the efforts by working with the ED Manager, the House Manager and additional hospital staff.

After its creation, the Diversion Plan team held preliminary meetings with senior hospital staff to share their work and explain how it compared to what other hospitals were doing. To simplify implementation, the team avoided creating a large approval committee. Instead, they simply secured approval one step at a time as they moved along in the process. Once the protocol had final approval by senior hospital staff, the team and the hospital nursing committee educated house staff on the plan and then put it into action.

The Diversion Plan team recognized that the way in which the hospital's various floors were handling patient discharges had a major impact on diversion. Consequently, crafting the Diversion Reduction Plan meant proactively involving a wide variety of staff in the discharge decision-making process—including patient care directors (Nursing, Case Management and Radiology), managers of patient care units (Floors, the Operating Room, ICUs and Rehab), housekeeping, transportation, lab, radiology and ultrasound, the medical officer of the day, case managers and social workers.

The House Manager and the ED Manager then became responsible for initiating a hospital-wide "capacity code." This code signaled that the hospital had reached maximum capacity (based on predetermined guidelines) and that the ED was poised to go on diversion. During a capacity code, each of the departments previously mentioned had specific responsibilities under the diversion plan protocol designed to focus all efforts on any patient ready for discharge. Once on capacity code, physicians and staff alike were to secure or to provide whatever information was necessary to facilitate the patient's discharge.

Since implementing the Diversion Reduction Plan and the associated protocol, St. Joseph's actually goes on diversion more frequently, but stays on diversion for significantly less time—which ultimately spells success. Additional benefits include:

- A reduction in the percentage of patients that left without being seen in the ED from a high of 21 percent to a low of 7 percent; and
- Improved efficiencies in hospital discharges that increased hospital occupancy by 5 percent.

As a result of the diversion protocols, which focus on processes associated with discharge, the lab has improved their batching protocols. Radiology attends daily bed rounds to ensure that patients slated for discharge have had all of their test results read and reported. Case managers and social workers now conduct rounds twice a day to expedite discharges. Now St. Joseph's can be confident that when its ED needs to go on diversion, it's because the hospital has made the right choice for its patients.

Conclusions

In an era when hospitals nationwide are being forced to do more with less, many factors contribute to crowded EDs—at times forcing facilities to go on bypass or diversion. While many of these factors are outside of a hospital's control, others can be influenced through staff's and management's focus on patient flow across the hospital. Many strategies are available for fixing these problems, but the critical first steps include having leadership's buy-in and commitment, followed by putting the right multidisciplinary teams *and* the right metrics and evaluation measures in place. Simply building bigger EDs is not the solution and turning patients away is hard to justify when we know that hospitals still have much that they can do to decompress their EDs. The right answer is improving patient flow.

Urgent Matters Demonstration Grants

Of the 10 Learning Network participating hospitals, four were selected to receive an additional grant of up to $250,000 to implement and evaluate a specific innovative program of their own design.

Boston Medical Center:
Tested whether careful scheduling of elective surgery—initially cardiothoracic and vascular surgery—can effectively "smooth" a facility's patient flow and ultimately reduce ambulance diversions.

Grady Hospital:
Created a new seven-bed Care Management Unit designed to provide both clinical and case management services to a core group of patients—including those with diagnoses of asthma, chest pain, heart failure and hyperglycemia. The goals were reducing hospital admissions and increasing utilization of community resources for patient care.

The Regional Medical Center at Memphis and the FedEx Institute for Supply Chain Management:
Determined the feasibility and applicability of using radio frequency identification (RFID) technology to track ED trauma patients.

Inova Fairfax Hospital:
Reduced ED wait times and increased patient satisfaction by implementing early care at triage through dedicated physician and nurse teams.