

A Model of a Hospitalist Role in the Care of Admitted Patients in the Emergency Department

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Emergency Department (ED) overcrowding has become an important problem in North American hospitals.^{1–3} A national survey identified the prolonged length of stay of admitted patients in the ED as the most frequent reason for overcrowding.⁴ This complex problem occurs when hospital inpatient census increases and prevents admitted patients from being assigned and transported to hospital beds in a timely manner.⁵ The practice of holding admitted patients in the ED, known as “boarding,” is typically defined as the length of stay (LOS) in ED beginning 2 hours after the time of admission to the time of transfer to the wards.

In a study of daily mean ED LOS, Rathlev et al.⁶ concluded that a 5% increase in hospital occupancy resulted in 14 hours of holding time for all patients in the ED, and an observational study found that when hospital occupancy exceeds a threshold of 90%, the ED LOS for admitted patients correspondingly increased.⁷ Thus, efforts to decrease overcrowding will need to address both ED and hospital throughput and LOS. Most importantly, overcrowding has important consequences on physician and patient satisfaction and the quality of patient care.^{8–11}

Between 1995 and 2005, ED visits rose 20% from 96.5 million to 115.3 million visits annually, while the number of hospital EDs decreased from 4176 to 3795, making an overall 7% increase in ED utilization rate.¹² Similarly, there was a 12% increase in the total inpatient admissions for all registered hospitals in the United States from 31 million in 1995 to 35.3 million in 2005.¹³ However, despite this increase in demand of ED utilization and inpatient admissions, there had been a steady decline in the supply of hospital beds, from 874,000 in 1995, to 805,000 in 2006.¹³ These factors have exacerbated the problem of ED overcrowding and boarding.

Not only does boarding entail additional consumption of space, resources, equipment, and manpower, it also potentially compromises patient safety. Typically, hospitalists and inpatient medical teams are engaged in providing care to patients in the wards, while ED physicians and nurses are busy taking care of newly-arrived ED patients. Non-ED physicians may have the false impression that their boarded patients, while in the ED, are receiving continuous care and

so may decide to delay seeing these patients, which can jeopardize the quality and timeliness of care. Studies have shown that ED overcrowding may potentially lead to poor patient care and outcomes and increased risk for medical errors.^{14–16} ED overcrowding potentially causes multiple effects, including prolonging patient pain and suffering, long patient waiting time, patient dissatisfaction, ambulance diversions, decreased physician productivity, and increased frustration among medical staff.¹⁵ In a report by the Joint Commission Accreditation of Healthcare Organizations,¹⁷ ED overcrowding was cited as a significant contributing factor in sentinel event cases of patient death or permanent injury due to delays in treatment. Boarding critically ill patients who are physiologically vulnerable and unstable can allow them to be subjected to treatment delays at a pivotal point when time-sensitive interventions are necessary, ie, sepsis or cardiogenic shock—the “golden hour” in trauma.¹⁶ Medical errors are usually not caused by individual errors but by complex hospital systems; and ED overcrowding is a prime example of a system problem that creates a high-risk environment for medical errors and threatens patient safety.¹⁸

Our hospital commonly has 5 to 15 boarders and often has 20 to 30 boarders at any time. Approximately 90% of these patients are admitted to the Medical Service. In response to this challenge, our institution has designated a full-time hospitalist to manage boarded patients. The primary goal of this new role is to ensure patient safety and the delivery of high-quality care while admitted patients are in the ED (Table 1).

The objectives of the study were to determine: (1) the impact on quality of care by assessing laboratory results acted upon and medication follow-up by the ED hospitalist, and (2) the impact on throughput by assessing the number of ED discharges and telemetry downgrades.

Methods

Setting

The Mount Sinai Medical Center is a tertiary-care 1121-bed acute care teaching hospital located in New York City. The hospital borders East Harlem and the Upper East Side of

TABLE 1. Responsibilities of the ED Hospitalist

1	Round on all patients admitted to the Department of Medicine located in the ED, including those on the Teaching and Nonteaching Services. Rounds focus on patient safety, such as ensuring vital home and hospital medications are administered and changes in stability are noted. All patient updates are documented in the ED electronic medical records (IBEX).
2	Identify admitted patients who may be “downgraded” from telemetry to nontelemetry status. Telemetry and cardiac beds are in high demand, and decreasing utilization facilitates obtaining the appropriate ward bed for ED patients.
3	Assess admitted patients for possible discharge. The patient’s condition may have improved or results may indicate that admission is no longer required. The ED hospitalist communicates with the ED physician and wards teams, facilitates management, implements the discharge, and ensures adequate follow-up.
4	Refer patients to an ED social worker as needed.
5	Facilitate referrals to other medical or surgical specialties if indicated.
6	Clarify the plan of care with the ED staff and facilitates ED communication with the ward team. Acts as a liaison and a resource for the ED physicians and nursing staff.
7	Supervise the triage duties of the medical admitting resident.
8	Provide medical consultation to ED physicians for patients not being admitted to the hospital or who are being admitted to other services (eg, surgery).

Abbreviation: ED, emergency department.

Manhattan. The Medical Service is composed of a Teaching Service, composed of house staff and attendings, and a non-Teaching Service, composed of nurse practitioners, physician assistants, and attendings. Hospitalists and private attendings may have patients on either the Teaching or the non-Teaching Service. In 2007, there were 56,541 patients admitted for a total of 332,368 days. The mean LOS for medical inpatients was 5.89 days. The total ED visit was 79,500 with a total inpatient and critical care admissions of 24,522. The mean and median LOS for all ED patients were 623 minutes and 493 minutes, respectively. There were 11,488 patients who qualified as boarders, averaging 31.5 boarders per 24 hours; with a mean and median LOS per boarder of 288 minutes and 198 minutes, respectively. The ED LOS for admitted patients ranged from 2 minutes to 4074 minutes (2.83 days).

Admission Process

Once an ED attending physician decides that a patient is to be admitted, the patient is placed on a computerized list in the ED’s electronic medical record (IBEX software). The Medical Admitting Resident (MAR) evaluates and triages admitted patients, and assigns and gives a verbal report to the appropriate Medicine Service (ie, Teaching, non-Teaching, cardiac telemetry unit, intensive care, etc.). The Admitting Office searches for and assigns the appropriate unit and bed for the patient. A hospitalist or resident physician performs the patient’s initial assessment and evaluation in the ED, and admission orders are placed in the inpatient computerized order entry system (TDS). When the bed is ready, the ED nurse gives a verbal report to the floor nurse, and the patient is transported to the ward.

Responsibilities

The specific responsibilities of the ED hospitalist are listed in Table 1. The primary role is to round on patients admitted to the Medicine Service who are located in the ED. This encompasses a wide array of patients and services, including patients assigned to a hospitalist service attending or who have a private attending, patients admitted to the Teaching or non-Teaching Service, patients admitted to the intensive care

unit, and patients admitted to a general medicine or specialty service (eg, telemetry, oncology, human immunodeficiency virus [HIV]). Rounding includes review of the ED’s electronic medical record as well as direct examination of patients. The hospitalist focuses on patients with longer ED LOS and on aspects of care that may lapse while patients remain in the ED for prolonged periods. At our institution, the follow-up of subsequent tests, laboratory values, and medications for ED boarders is the responsibility of the primary inpatient team, though the ED physicians act on urgent and critical results and continue to deliver all emergency care. Through rounding, the ED hospitalist is able to identify abnormal results in a timely manner, alert the ED physician and primary inpatient team, and address abnormalities. Specific examples of laboratory results acted upon include hypokalemia, hyperglycemia, and elevated cardiac enzymes. The ED hospitalist is also able to determine whether any outpatient medications have not yet been administered (eg, antihypertensives, immune suppressants) and ensure that subsequent doses of medications initiated in the ED (eg, antibiotics) are administered during the appropriate timeframe.

Communication is emphasized, as contact with ED physicians, ward physicians, and often the outpatient primary care physician is required when any change in management is considered. The ED hospitalist also provides the capability of rapid response to changes in patient status (eg, a new complaint or fever). In addition, the hospitalist is available to consult on medical patients who may not require admission and on nonmedical patients for whom an internal medicine consult may be beneficial (eg, preoperative optimization of a surgical patient). The ED hospitalist documents the evaluation in the IBEX system. Bills were submitted for visits in which patients were discharged as these encounters are comprehensive, but not for other encounters.

Data Collection

The ED hospitalist role began March 10, 2008 and is a 10-hour shift (8 AM to 6 PM) on weekdays. The study period was from March 10, 2008 through June 30, 2008. The study was approved by the hospital’s institutional review board.

TABLE 2. Elements of Care Delivered by the ED Hospitalist to ED Boarders

Elements	Boarders (n = 3555) [n (%)]	Patients Intervened on (n = 634) [n (%)]
Laboratory results acted upon	472 (13.2)	472 (74.5)
Medication follow-up	506 (14.2)	506 (79.8)
Discharges from the ED*	46 (1.3)	46 (7.3)
Admissions avoided	6 (0.2)	6 (0.95)
Telemetry downgrades	61 (1.8)	61 (9.6)

Abbreviation: ED, emergency department.

*Forty-four patients improved and 2 left against medical advice.

Data were collected on aspects of care that could have been impacted by the ED hospitalist, including medication and laboratory orders, ED discharges, ED admissions avoided, and telemetry downgrades. “Discharges from ED” refers to boarded admitted patients in the ED, who by the judgment of the ED hospitalist were ready for discharge. “Admissions avoided” refers to patients who the ED physician planned to admit but had not yet been admitted, and whose admission was avoided through the recommendations made by the ED hospitalist. The ED LOS was defined as the duration of time from when the patient was admitted to the Medicine Service to the time the patient was transferred to a medical ward. Telemetry downgrades were defined as patients assigned to the cardiac telemetry unit who the hospitalist determined required only telemetry on a general medical unit or did not require telemetry, or patients assigned to telemetry on a general medicine unit who the hospitalist determined no longer required telemetry.

Results were expressed as percentages of patients admitted to a Medicine Service and percentage of patients evaluated by the ED hospitalist, as indicated. 95% confidence intervals (CI) were calculated.

Results

During the study period, there were 4363 patients admitted to the Medicine Service and 3555 patients who qualified as boarders (mean of 29 boarders per 24 hours). The mean boarding time of admitted patients was 440 minutes. A total of 634 patients (17.8% of all boarded patients) were evaluated by the ED hospitalist. The mean daily number of patients seen by the ED hospitalist was 8.0.

The key elements of the delivery of care by the ED hospitalist are summarized in Table 2.

The care of boarded patients included follow-up of laboratory tests for 74.5% (95% CI, 71-78%) and medication orders for 79.8% (95% CI, 77-83%) of patients. A total of 46 patients were discharged by the ED hospitalist (0.6 discharges/day) and telemetry was discontinued for 61 patients (0.8 downgrades/day). The discharge rate was 7.3% (95% CI, 5-10%) and telemetry downgrade rate was 9.6% (95% CI, 8-

TABLE 3. Diagnoses of Patients Discharged from the ED by the ED Hospitalist

Diagnoses	Patients (n = 46) [n (%)]
Chest pain	12 (26)
Syncope/dizziness	7 (15)
Pneumonia	4 (9)
COPD	4 (9)
Congestive heart failure	3 (7)
Gastroenteritis	3 (7)
Dermatitis/rash	3 (7)
Alcohol abuse	3 (7)
Abdominal pain	3 (7)
End stage renal disease	2 (4)
Vaginal bleeding	1 (2)
Fall	1 (2)
Asthma	1 (2)

Abbreviations: COPD, chronic obstructive pulmonary disease; ED, emergency department.

12%) of those patients assessed by the ED hospitalist. Expressed as a percentage of the total ED boarders (n = 3555), the combined discharge rate and the admissions avoided rate was 1.5%.

Table 3 shows the discharge diagnoses made from the ED. Chest pain was the most common diagnosis, followed by syncope, pneumonia, and chronic obstructive pulmonary disease (COPD).

Discussion

Our hospital has successfully implemented an innovative strategy utilizing a hospitalist to help provide seamless care to medical patients located in the ED. Other solutions at our hospital had previously been implemented, but had not adequately addressed the problem, including: (1) protocols to monitor length of stay patterns and deviations, (2) discharge planning activities, (3) organized computerized bed tracking, (4) improvement in the timeliness of ancillary services, (5) daily bed briefing among nurse managers, and (6) 24-hour presence of a MAR to facilitate triage in the ED.

The current study demonstrates the potential for substantial impact on patient care. The substantial number of the assessed boarder patients for whom laboratory tests (74.5%) and medications (79.8%) were ordered by the ED hospitalists suggests that the quality and timeliness of care was enhanced by this initiative. In addition, the considerable number of patients discharged from the ED and downgraded from telemetry (1.5% and 1.8% of all boarder patients, respectively) suggests that an ED hospitalist may have a meaningful impact on bed utilization and thus decrease ED overcrowding. In 2007, there were 11,488 who qualified as boarders; our data suggest that an ED hospitalist would result in approximately 172 boarders not being admitted annually.

Though the ED LOS was higher during the study period compared to 2007, it was lower than the 2 months immediately preceding implementation of the ED hospitalist role.

The ED LOS was 732 and 658 minutes for January and February 2008, respectively, which was markedly increased from 2007 (288 minutes), and prompted development of the ED hospitalist role. The ED LOS during the study period subsequently decreased to 440 minutes. Though the wide fluctuations in ED LOS and the short time period with high ED LOS prior to implementation preclude concluding that the ED hospitalist role decreased ED LOS, the data suggest that an ED hospitalist may be able to improve ED throughput.

The majority of the discharges made by the ED hospitalist are patients who had been admitted for chest pain, had improved, and had negative cardiac enzymes and stress tests. Patients with syncope who were discharged were likely patients without any comorbidities. The COPD and pneumonia admissions were likely patients who improved after aggressive treatment in the ED.

The impact of ED overcrowding on the quality of patient care and outcomes may be substantial. Hwang et al.¹⁹ found a direct correlation between ED census and time to pain assessment and administration of analgesic medication. A study at an academic medical center found that higher ED volume was associated with less likelihood of antibiotics being administered within 4 hours for patients with community-acquired pneumonia.²⁰ A comprehensive review of the literature identified 41 studies examining the effects of ED overcrowding on clinical outcomes and the investigators noted that ED overcrowding was associated with increased in-hospital mortality.⁸

Causes of poor outcomes during periods of overcrowding may be the high volume of acute patients preventing adequate time and attention for each ED patient, as well as confusion during the transition from ED to ward physicians. For example, a patient may receive their initial dose of antibiotics from the ED physician, but subsequent doses may be overlooked in the transition of care from the ED physician to the inpatient team. In addition, having admitted patients located in the ED for extended periods of time may lead to these patients not being seen as frequently as patients admitted to the inpatient wards. Another potential consequence of prolonged ED stay for admitted patients is delay in inpatient management. Tests done in the ED may prompt further studies that may not be ordered promptly while patients remain in the ED, which subsequently increases LOS. Other potential issues may be an increase in confusion among geriatric patients in a noisy and crowded ED; decreased access to specialized nursing care that may be available on a hospital ward; decreased access to physical therapy and occupational therapy services; and decreased comfort and satisfaction as patients wait in overcrowded EDs for prolonged periods.

Several other potential innovative solutions to ED overcrowding have been proposed, studied, and tested. These measures generally are focused on improving the three interdependent components of ED workflow: INPUT → THROUGHPUT → OUTPUT.^{21,22} However, process redesign and intervention on these 3 interdependent ED workflow

components may be difficult to achieve, especially when hospital resources are limited and when inpatient hospital capacity is already maximized. In some institutions, efforts have been reported to successfully streamline the transfer of admitted ED patients to inpatient beds, through transfer-to-ward policy interventions (eg, physician coordinators for patient flow and bed management or transfers made within a defined period of time).^{23–26} However, in a study by Quinn et al.,²⁷ implementation of a rapid admission policy resulted in a decrease of only 10.1 minutes in the ED LOS. Several studies have demonstrated the benefits of an acute medical admissions unit in alleviating ED overcrowding.^{28,29} Other unconventional solutions by some hospitals include sending admitted patients to the unit's hallways or placing discharged patients in the hallway while waiting for transportation so that the ED bed will be readily available.³⁰

The ED hospitalist is well-situated to have an impact on several key hospital outcomes. As the ED hospitalist role was shown to affect processes that relate to ED throughput, it is possible that the role will improve ED overcrowding and decrease ED LOS. Specifically, identifying patients who can be discharged and for whom telemetry is no longer indicated decreases unnecessary bed utilization and allows these beds to be available for other ED patients. This initiative also may promote patient satisfaction by assuring patients that their medical and concerns are being fully addressed while they are in the ED. Increased emphasis on hospital reporting will make patient satisfaction a priority for many hospitals, and the ED hospitalist will be in a unique position to “meet and greet” patients admitted to the Medicine Service and to reassure them that the medical team is present and addressing their concerns. The hospitalist's ability to facilitate diagnostic testing and treatment while patients remain in the ED may also help decrease the total LOS in the hospital. In addition, the ED hospitalist is also in position to recognize social factors at the earliest stage of admission so that they can be immediately addressed. Future studies will need to be done to determine if this model of transitional care impacts these important factors.

Our study has several important limitations. Most notably, the lack of a comparison interval for which a hospitalist was not assigned to this role prevents us from drawing any definitive conclusions on the benefits of the ED hospitalist model. Also, we collected only summary data and do not have demographic data on the patients managed by the ED hospitalist or information on the ED course of patients who were discharged or had telemetry downgraded. This prevents determination of whether discharged patients did not require admission initially or whose condition evolved over a prolonged ED stay. In addition, other key outcomes, such as patient satisfaction and satisfaction of the ED physicians and nursing staff have not yet been formally measured. Future studies will be needed to determine if an ED hospital model can improve important process and clinical outcomes.

The greatest challenge of this initiative was introducing and familiarizing this role to the key stakeholders, including

the ED physicians and nursing staff, house staff, and private practice physicians. Though we did not perform structured surveys on satisfaction, through informal discussions we noted that the role was welcomed with enthusiasm by the ED physicians. Notably, several ED physicians expressed appreciation that they were able to focus their care on new ED patients rather than on the boarded ED patients. Through feedback, we noted soon after implementation that ED faculty and nurses needed further clarification about the potential overlapping roles of the ED hospitalist and ED physicians and ward physicians. These concerns were addressed by educational sessions and announcements, including presentations at ED faculty and staff meetings. The hospitalist assigned to the role each month received individualized orientation prior to assuming the role, and an "ED Hospitalist Manual" was distributed. Possibly due to these focused sessions, the hospitalists assigned to the role became quickly acclimated.

Conclusions

We have found that designating a hospitalist to directly address the care of ED boarders can enhance the quality and timeliness of care and decrease bed and telemetry utilization with the potential to impact ED and hospital LOS. Given the success of the pilot model, the role was expanded at our institution to 10 hours per day, 7 days per week. Hospitals struggling to address the needs of their admitted patients in the ED should consider incorporating an ED hospitalist to enhance clinical care and address issues relating to throughput. A follow-up study is needed to more precisely describe the impact of the ED hospitalist model.

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