Full house: The incidence and impact of boarding admitted patients in the emergency department

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Abstract

Increasingly, treatment areas within the emergency department are being occupied by admitted patients while they wait for an inpatient bed to become available. In this paper, the frequency with which admitted patients are boarded in the emergency department, factors contributing to the occurrence of ED boarding and its impact on patient outcomes are examined through a retrospective review of administrative data.

Crowded conditions and long wait times are occurring with increasing frequency in many emergency departments (EDs). The holding or boarding of admitted patients has been identified as a major contributing factor because it creates a bottleneck situation that disrupts the flow of patients into and out of the department (Hoot & Aronsky, 2008; Bradley, 2005; Canadian Institute of Health Information, 2007). Given this, practice changes that extend beyond the walls of the emergency department are required to effectively deal with this situation. However, to effect such change, evidence must first be acquired that demonstrates the nature and scope of the problem. Our goal in this research project was to take a closer look at the practice of boarding admitted patients in one Canadian emergency department by examining the frequency with which it occurred, factors contributing to its occurrence and its impact on emergency patients who are subsequently admitted to hospital, as well as those who are treated and released.

The seeds for this project were planted during a chance conversation with Nicole, who is the nurse manager for the emergency department of a 314-bed regional referral hospital. During this conversation, Nicole commented on the increasing number of emergency patients who were being boarded in the department for part or even all of their hospital stays, and her concerns about the effect this was having on patients and staff. She also mentioned that electronic charting had been successfully introduced into the emergency department, which allowed her to monitor trends from her desktop computer. For researchers, the mere mention of an untapped data source tends to induce an episode of paroxysmal supraventricular tachycardia. I left the meeting with visions of data fields dancing in my head. What transpired was a series of meetings during which we identified a number of questions pertaining to the boarding of admitted patients; reviewed the published research on this issue; consulted with a health information analyst to determine the feasibility of merging data from patients' emergency and hospital electronic records; obtained administrative permission to access the data; and secured ethical approval for the project from the local university and regional health authority. Once these steps were completed, we gained access to an electronic file with administrative data for 44,102 ED visits made by 28,075 people between September 1, 2005, and August 31, 2006. Approximately 44% of the cases were for people who accessed the emergency department only once in the 12-month period. Ten per cent of the visits were made by people who accessed the department more than five times. Eleven people accessed the emergency department more than 20 times, with one person seeking care on 50 separate occasions.

Question: What was the typical patient flow pattern in 2005–2006?

On an average day, 120 people accessed the emergency department. However, daily patient volumes fluctuated between 94 and 158. Little difference was observed in the percentage of people who accessed the emergency department by day of the week (percentages ranged from 13% of cases presenting on a Saturday to 15% on a Monday). The majority of people presented to the emergency department during the day or evening shifts (79%). Although cases ranged in age from 0 (delivered in the department) to 102 years, the average age of emergency patients was 40 years. Approximately two-thirds (65%) of the ED visits were by people between the ages of 17 and 64 years. Slightly more than half of the visits were made by females (53%) and were triaged as less urgent or non-urgent (55%) using the Canadian Triage and Acuity Scale (CTAS) (Bevridge et al., 1998). Thirty-seven per cent of cases were triaged as urgent.

Question: Which emergency cases resulted in hospitalization?

Seventeen per cent of cases (n = 7,606) resulted in a hospital admission. On average, there were 21 admissions per day (range nine to 34). Age was a significant predictor of hospital admission,

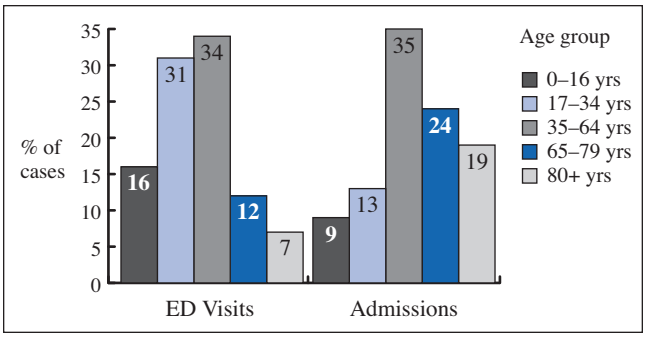

Figure One. Boxplot: Percentage of emergency department visits and hospital admissions by age group.

as evidenced by the fact that although people 65 years of age and older constituted only 19% of the total ED visits, they represented 43% of all admissions (Figure One). Even more notable is that half of all patients 80 years of age or older who presented to the emergency department were eventually admitted to hospital. Although patients presented with a wide range of health problems, the five major diagnostic groupings for admitted patients were gastrointestinal, cardiac, lower respiratory, musculoskeletal, and symptoms not yet diagnosed (Hodgins, Moore, & Legere, 2010). Almost half (48%) of the admitted cases were coded as medical based on their presenting complaint and admitting diagnosis. Ten per cent of the admitted cases were eventually transferred to a critical care unit.

Question: What factors contributed to the ED boarding of admitted patients?

Following receipt of an admission order, some patients remained in the department for up to 3.6 days before being transferred to an inpatient bed. Fourteen per cent of admitted patients (n = 1,031) were admitted and discharged from the emergency department. The Canadian Association of Emergency Physicians and the United States' Agency for Healthcare Research and Quality have both developed position statements in which boarded patients are defined as those patients for whom the interval between the decision to admit and their physical departure from the emergency department exceeds 120 minutes (Agency for Healthcare Research and Quality, n.d.; Canadian Association of Emergency Physicians, 2007). Using this definition, more than half (54%) of the admitted patients were classified as boarded, as they waited more than two hours for transfer to an in-hospital bed. On an average day, 11 admitted patients were boarded for more than two hours. There was only one day during the year that no admitted patient was held for more than two hours (February 18, 2006, which also had the lowest reported number of ED visits).

A moderate positive association (Spearman's rho [rs] = .37) was observed between the number of patient visits per day and the number of admitted cases, indicating that there tended to be more admissions on days with higher patient volumes. An even stronger positive association was observed between the number of admitted cases and the number boarded for more than two hours (rs = .66). These associations have workload implications, as they suggest that on days with high patient volumes emergency nurses not only were dealing with more patients in general, but also more admission and, subsequently, more boarded patients.

Table One. Proportion of cases meeting CTAS fractile response rates for time to physician assessment

Triage Level	Fractile Response Rates		
	Target Time	CTAS Target %	Observed %
Resuscitative	Immediate	98%	90%
Emergent	≤ 15 minutes	95%	54%
Urgent	≤ 30 minutes	90%	29%
Less Urgent	≤ 60 minutes	85%	28%
Non-Urgent	≤ 120 minutes	80%	63%

Patients with medical conditions tended to be boarded in the emergency department for longer periods than other admission types. More than half (69%) of the patients admitted with medical problems were boarded for more than two hours. Approximately 36% of the patients admitted to a critical care unit were boarded. However, a significant difference was observed between boarding times for patients admitted to the coronary versus intensive care unit, as 42% of patients awaiting transfer to the coronary care unit were boarded for more than two hours versus 14% of those admitted to the intensive care unit. Interestingly, the shortest boarding times were observed for patients awaiting transfer to the psychiatric unit. One possible explanation for this finding is the presence of a psychiatric nurse in the emergency department. The role of this nurse is to facilitate the assessment and management of patients presenting with psychiatric-related problems and to serve as a liaison between the two areas.

An analysis was conducted to examine whether the likelihood of being boarded for more than two hours could be predicted solely by factors specific to the type of admission (i.e., medical, surgical, critical care, or other speciality) and time of presentation (i.e., weekend versus weekday and day, evening or night shift), or whether patient characteristics (sex and age group) also played a role. Results suggest the likelihood of boarding was highest for those who were medical admissions and admitted on a weekday or during the night shift. However, even after accounting for these factors, patient characteristics improved the ability to predict ED boarding. Females and those over 65 years of age were more likely to be boarded (Hodgins, Moore, & Legere, in press).

Question: What effect does ED boarding have on patient outcomes?

To examine the effect of ED boarding on outcomes for emergency patients in general, an analysis was conducted to determine the proportion of cases per day for which the CTAS response rates were met for time to physician assessment (Bevridge et al., 1998). As evidenced by Table One, less than 30% of urgent and less-urgent cases were seen by a physician within the timeframes recommended by CTAS. These percentages are much lower than the target fractile response rates of 90% and 85%. The association between the proportion of cases per day seen by the physician within the recommended response time and the number of boarded patients was examined for each triage level. Only one statistically significant association was observed: a weak negative association between the number of boarded patients and the proportion of less-urgent cases seen by a physician within the recommended time (rs = -.17), suggesting that the proportion of cases tended to be lower on days with more boarded patients. One explanation for the relative lack of significant associations between these variables is that boarded patients primarily affect nurses' work.

To examine the effect of ED boarding on outcomes for admitted patients, an analysis was conducted to compare length of hospital stay for the five most common diagnostic categories (i.e., gastrointestinal, cardiac, lower respiratory, musculoskeletal, and symptoms not yet diagnosed) by occurrence of ED boarding. Statistically significant differences were observed for three of the five diagnostic groups. The median length of hospital stay was significantly longer, by one or more days, for patients boarded for more than two hours for those with gastrointestinal, lower respiratory and musculoskeletal conditions (Hodgins, Moore, & Legere, 2010).

Finally, we attempted to compare the rates of post-admission complications by the occurrence of ED boarding. Data for post-admission complications are currently based on information retrieved from physicians' discharge notes. Complications were documented for only 6% (479 of the 7,607) of the patients admitted to hospital from the emergency department. The number of complications reported for these cases ranged from one to four, resulting in a total of 602 complications. The most common complications were infections (40%), pulmonary complications (22%), treatment complications (21%), cardiac complications (15%), and skin breakdown (8%). (Note: percentages do not total 100 as some cases had more than one documented complication.) Post-admission complications were more likely to be reported for older patients. Patients 80 years of age and older were three times more likely to have a reported complication than middle-aged adults. Type of admission was also a significant predictor in that patients admitted to a medical unit were less likely to have a reported complication, and those admitted to a critical care unit were more likely to have a reported complication than those admitted to a surgical unit. Results of our analysis did raise questions as to the completeness of the data. For example, only 37 incidents of skin breakdown were reported, suggesting an incidence rate of 8%. This number is unexpectedly low given that 1,459 of the admitted patients were 80 years of age or older. It is also lower than the rate of 14% that was reported following a hospital-wide assessment of pressure ulcer prevalence and incidence conducted in 2006 (Esligar & Schuttenbeld, 2006).

Question: Where to from here?

This project has been a learning experience, as we attempt to create a functional research partnership. Results of this project have provided Nicole with some evidence to assist in her efforts to increase awareness of the problems associated with the ED boarding of admitted patients. However, as often occurs in a research project, we have ended up with more questions than we had in the beginning. Plans are underway to replicate this project to address these new questions and to determine whether the observed patterns have continued over time. Nicole predicts that we will find the incidence of ED boarding has actually increased.

Work on this project was facilitated by the availability of a pre-established definition for ED boarding. However, in our review of the literature, no study was found that operationalized ED boarding using the cut-point of two hours. Efforts to accumulate a body of evidence to support policy and practice changes would be facilitated not only by use of a common definition of ED boarding, but also a common set of clinically meaningful outcomes. Since boarded patients primarily affect the work of emergency nurses, we encourage NENA members to work to establish standards for research in this area. The upcoming NENA conference to be held in Saint John this May would provide an excellent venue to advance such work. With hospital occupancy rates in Canada averaging 89% (Organisation for Economic Co-operation and Development, 2009), it is doubtful that the situation of ED boarding will change without strong evidence demonstrating the effect of this practice on patient outcomes.

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References

Agency for Healthcare Research and Quality. (n.d.). **Emergency department performance measures and benchmarking summit: The consensus statement.** Retrieved July 2009, from http://www.qualityindicators.ahrq.gov/news/EDPerformanceMeasures-ConsensusStatement.pdf

Bevridge, R., Clark, B., Janes, L., Savage, N., Thompson, J., Dodd, G., et al. (1998). **Implementation guidelines for the Canadian Emergency Department Triage & Acuity Scale.** Retrieved August 2007, from http://www.caep.ca/template.asp?id=B795164082374289BBD9C1C2BF4B8D32

Bradley, V.M. (2005). Placing emergency department crowding on the decision agenda [Electronic version]. **Nursing Economics, 23,** 14–24.

Canadian Association of Emergency Physicians. (2007). **Position statement on emergency department overcrowding.** Retrieved May 2009, from http://www.caep.ca/template.asp?id=37C951DE051A45979A9BDD0C5715C9FE

Canadian Institute of Health Information. (2007). **Understanding emergency department wait times: Access to inpatient beds and patient flow.** Retrieved August 2005, from http://www.cihi.ca/cihiweb/dispPage.jsp?cw_page=AR_1266_E

Esligar, K., & Schuttenbeld, N. (2006, August/September). **2006 pressure ulcer prevalence and incidence report, River Valley Health.** Fredericton, NB.

Hodgins, M.J., Moore, N., & Legere, L. (2010). **After the party's over: The effect of ED boarding on patient outcomes.** Manuscript submitted for publication.

Hodgins, M.J., Moore, N., & Legere, L. (in press). Who's sleeping in our beds? Factors predicting the ED boarding of admitted patients for more than two hours. **Journal of Emergency Nursing.**

Hoot, N.R., & Aronsky, D. (2008). Systematic review of emergency department crowding: Causes, effects, and solutions. **Annals of Emergency Medicine, 52,** 126–136.

Organisation for Economic Co-operation and Development. (2009). **Health at a glance 2009: OECD Indicators** (5th ed.). [Electronic version]. Paris, France: Authors.