

Administration of Emergency Medicine



THE IMPACT OF HOSPITAL AND PATIENT FACTORS ON THE EMERGENCY DEPARTMENT DECISION TO ADMIT

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Abstract—Background: Substantial variation exists in rates of emergency department (ED) admission. We examine this variation after accounting for local and community characteristics. **Objectives:** Elucidate the factors that contribute to admission variation that are amenable to intervention with the goal of reducing variation and health care costs. **Methods:** We conducted a retrospective cross-sectional study of 1,412,340 patient encounters across 18 sites from 2012–2013. We calculated the adjusted hospital-level admission rates using multivariate logistic regression. We adjusted for patient, provider, hospital, and community factors to compare admission rate variation and determine the influence of these characteristics on admission rates. **Results:** The average adjusted admission rate was 22.9%, ranging from 16.1% (95% confidence interval [CI] 11.5–22%) to 32% (95% CI 26.0–38.8). There were higher odds of hospital admission with advancing age, male sex (odds ratio [OR] 1.20, 95% CI 1.91–1.21), and patients seen by a physician vs. mid-level provider (OR 2.26, 95% CI 2.23–2.30). There were increased odds of admission with rising ED volume, at academic institutions (OR 2.23, 95% CI 2.20–2.26) and at for-profit hospitals (OR 1.15, 95% CI 1.12–1.18). Admission rates were lower in communities with a higher per capita income, a higher rate of

uninsured patients, and in more urban hospitals. In communities with the most primary providers, there were lower odds of admission (OR 0.60, 95% CI 0.57–0.68). **Conclusion:** Variation in hospital-level admission rates is associated with a number of local and community characteristics. However, the presence of persistent variation after adjustment suggests there are other unmeasured variables that also affect admission rates that deserve further study, particularly in an era of cost containment. © 2017 Elsevier Inc. All rights reserved.

Keywords—emergency department; hospital admission; admission variation

INTRODUCTION

As health care spending has become unsustainable, there has been an increased focus on reducing health care costs. Emergency department (ED) care, in particular, has been a focus of cost-containment discussions; especially as ED visit rates continue to grow faster than population growth (1,2).

At the center of discussions about ED costs are hospital admission decisions, which are one of the most common and costliest decisions made by ED providers. Of the 136 million ED visits in the United States in

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2011, 11.9% resulted in admissions (3). With more than 36 million hospitalizations in U.S. hospitals in 2011, nearly half of these admissions originated from the ED (4). Furthermore, ED admissions have also been demonstrated to account for 8.3% of national health expenditures (5). Identifying opportunities to reduce the number of potentially unnecessary admissions from the ED could result in significant cost savings; one analysis suggested that even a small reduction in admissions of 10% could reduce total national health expenditures by 1% (6,7).

Several factors have been shown to impact ED admission decisions. Variation occurs at the individual provider level as well as within the hospital and community environment (8,9). Provider-level variation has been partially explained by differences in experience, risk tolerance, concern of malpractice, and differences in local practice patterns (10–12). Within a hospital or a health care community, admission rates are associated with local standards of care (e.g., EDs in close proximity to each other tend to have similar admission rates), and higher admission rates tend to be in larger hospitals, trauma centers, and facilities with for-profit ownership (13). This study is unique in the use of a large database with patient-level data in combination with hospital and community factors to examine the collective effect on hospital-level admission rate variation.

Evaluating the factors ranging from individual patients to variables within the surrounding community and their role in hospital admissions is important for explaining how these elements work together to influence admission variation. A clearer understanding of these components of the decision to admit that are amenable to modification could help inform the development of interventions to reduce hospital admissions and eventually lower health care costs. In this study, we examine the association of patient, provider, hospital, and community factors on ED admission variation in a large sample of sites using patient-level data.

MATERIALS AND METHODS

Study Design and Setting

We conducted a retrospective, cross-sectional study using aggregated de-identified data from LogixHealth, Inc., a privately held company that provides billing, coding, and process improvement analytics services for EDs nationwide. We used encounter-level data from January 1, 2012 through December 31, 2013. The LogixHealth, Inc. dataset had a 100% capture rate for associated facilities and included 18 different sites in eight states. Although different ED characteristics were provided, no sites were individually identifiable. The studies' investi-

gators were blinded to identifying information about the hospital sites and protected health information. The Institutional Review Board at George Washington University determined that the study was not human subjects research.

Study Population

The primary objectives were to compute the adjusted hospital-level admission rate across facilities and assess the impact of patient, hospital, provider, and community factors as contributors to this variation. The main outcome measure was the admission rate, which was based on the disposition of each ED encounter. We defined admissions as encounters that resulted in admission to a hospital unit or the operating room. We also included patients who were admitted to observation status as well as those who were transferred to another hospital. Transfers were included because patients who are transferred often need a higher level of care and are frequently admitted at the accepting facility (14).

We used the Clinical Classification Software (CCS) diagnosis to identify disease categories within our study population and to adjust for case mix (15). This classification was developed by the Agency for Healthcare Research and Quality based on the International Classification of Diseases, Ninth Revision, Clinical Modification diagnosis codes to create mutually exclusive categories. We used this tool to identify a primary clinical condition for each encounter based on the admitting diagnosis.

All ED encounters over 2 years were considered for analysis in this study. Patients who left without being seen, left against medical advice, eloped, or expired in the ED were excluded, as it was not possible to determine the decision to admit in these encounters. In addition, we excluded patients seen by ED providers who worked part-time, which was defined as providers who saw fewer than 400 patients over the 2-year period, corresponding to less than one shift per month (assuming 8-h shifts and an average of 2 patients per hour). We excluded data with missing information for patient age or clinical diagnosis, as these were variables used in analysis. CCS categorization was used to exclude patients whose first diagnosis was a psychiatric condition as we intended to focus primarily on medical complaints.

Data Analysis

The unadjusted hospital-level admission rate was defined as the total number of admitted patients divided by the number of patients seen. Additional variables that could impact the decision to admit were identified for analysis from the LogixHealth, Inc. database as well as from the Area Health Resources File (AHRF) (16). The AHRF is

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