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In-Hospital Outcomes and Costs Among Patients Hospitalized During a Return Visit to the Emergency Department

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Abstract

Importance: Unscheduled short-term return visits to the emergency department (ED) are increasingly monitored as a hospital performance measure and have been proposed as a measure of the quality of emergency care.

Objective: To examine in-hospital clinical outcomes and resource use among patients who are hospitalized during an unscheduled return visit to the ED.

Design, Setting, and Participants: Retrospective analysis of adult ED visits to acute care hospitals in Florida and New York in 2013 using data from the Healthcare Cost and Utilization Project. Patients with index ED visits were identified and followed up for return visits to the ED within 7, 14, and 30 days.

Exposures: Hospital admission occurring during an initial visit to the ED vs during a return visit to the ED.

Main Outcomes and Measures: In-hospital mortality, intensive care unit (ICU) admission, length of stay, and inpatient costs.

Results: Among the 9036483 index ED visits to 424 hospitals in the study sample, 1758359 patients were admitted to the hospital during the index ED visit. Of these patients, 149214 (8.5%)

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had a return visit to the ED within 7 days of the index ED visit, 228370 (13.0%) within 14 days, and 349335 (19.9%) within 30 days, and 76151 (51.0%), 122040 (53.4%), and 190768 (54.6%), respectively, were readmitted to the hospital. Among the 7278124 patients who were discharged during the index ED visit, 598404 (8.2%) had a return visit to the ED within 7 days, 839386 (11.5%) within 14 days, and 1205865 (16.6%) within 30 days. Of these patients, 86012 (14.4%) were admitted to the hospital within 7 days, 121587 (14.5%) within 14 days, and 173279 (14.4%) within 30 days. The 86012 patients discharged from the ED and admitted to the hospital during a return ED visit within 7 days had significantly lower rates of in-hospital mortality (1.85%) compared with the 1609145 patients who were admitted during the index ED visit without a return ED visit (2.48%) (odds ratio,0.73 [95% CI,0.69–0.78]), lower rates of ICU admission (23.3%vs 29.0%, respectively; odds ratio,0.73 [95% CI,0.71–0.76]), lower mean costs ($10,169 vs $10,799; difference, $629 [95% CI, $479-$781]), and longer lengths of stay (5.16 days vs 4.97 days; IRR, 1.04 [95% CI, 1.03–1.05]). Similar outcomes were observed for patients returning to the ED within 14 and 30 days of the index ED visit. In contrast, patients who returned to the ED after hospital discharge and were readmitted had higher rates of in-hospital mortality and ICU admission, longer lengths of stay, and higher costs during the repeat hospital admission compared with those admitted to the hospital during the index ED visit without a return ED visit.

Conclusions and Relevance: Compared with adult patients who were hospitalized during the index ED visit and did not have a return visit to the ED, patients who were initially discharged during an ED visit and admitted during a return visit to the ED had lower in-hospital mortality, ICU admission rates, and in-hospital costs and longer lengths of stay. These findings suggest that hospital admissions associated with return visits to the ED may not adequately capture deficits in the quality of care delivered during an ED visit.

Introduction

Ensuring safe transitions of care is an important goal for policy makers and other stakeholders wishing to promote a better patient experience, to improve quality outcomes, and to reduce costs. All-cause hospital readmissions are considered to capture deficits in transitions of care from the hospital setting and are now a reportable measure of hospital quality tied to financial penalties for poor-performing hospitals.[1] Similar to the rationale for monitoring performance using hospital readmissions, unscheduled return visits after emergency department (ED) discharge may also reflect inadequate ED discharge practices or follow-up procedures.

Short-term unscheduled return visits to the ED are increasingly monitored as an administrative performance measure and have been considered for wider adoption as a measure of the quality of emergency care, particularly if the patient requires hospitalization during the return ED visit.[2–6] However, the ramifications of using return visits to the ED as a measure of quality are uncertain and may be associated with unintended consequences. Emergency departments provide care for a heterogeneous patient population and the majority of patients are discharged home after evaluation and treatment.

Emergency physicians must balance the expected benefits of hospitalization against clinical uncertainty, the risks associated with the inpatient environment,[7,8] and the cost associated

with a hospital stay[9] in their decision to hospitalize patients. Ideally, an effective measure of quality of ED dispositions would reflect a fair accounting of clinician decision making and discriminate between high and low performance as demonstrated in patient outcomes. To date, little is known about the subsequent clinical outcomes of patients who have had a return visit to the ED and subsequent hospital admission.

The goal of this study was to examine in-hospital clinical outcomes and resource use among patients who had a return visit to the ED and subsequent hospital admission compared with patients who were hospitalized and did not experience a return visit to the ED. If hospital admissions during return visits to the ED reflect poor quality of emergency care or unsafe discharge practices, we hypothesized that patients with a return visit to the ED would be more likely to return with severe symptoms or at a later stage of their acute illness, and therefore experience relatively poorer clinical outcomes and increased resource use during their hospitalization as a result of delayed care.

Methods

Data

A retrospective study of adult patients with ED visits to hospitals in Florida and New York in 2013 was performed using data from the Healthcare Cost and Utilization Project of the Agency for Healthcare Research and Quality. These 2 states were chosen for analysis because they are populous, have robust ED-level data, and include patient identifiers to track return visits to the ED. Hospital discharge records from the State Inpatient Database were linked with ED discharge records from the State Emergency Department Database. The data sets used in this study were determined by the Human Subjects Division at the University of Washington to not require review by an institutional review board.

Healthcare Cost and Utilization Project state databases include records from all acute care hospitals in participating states, including public (state, federal, Veteran's Affairs hospitals) and private community hospitals. Each State Inpatient Database includes encounter-level data for all hospitalizations regardless of admission source, whereas the State Emergency Department Database contains similar information on treat-and-release ED visits. These databases track visits to all hospitals and EDs within each state.

To identify hospitalizations that originated in the ED, the data set was first limited to inpatient records in the State Inpatient Database with evidence of ED-level services (either ED revenue code, *Current Procedural Terminology* code, charge, or source of admission listed as the ED). Records for elective or scheduled admissions and admissions for deliveries were excluded. Hospitals without ED admissions were assumed to not operate an ED, and were excluded from the data set. Once ED admissions were identified, they were combined with ED discharge records in the State Emergency Department Database, creating a complete data set of all ED visits within the year.

Identification of Return Visit Cohorts

Unique patient identifiers and time variables were used to track return visits across the State Inpatient Database and State Emergency Department Database. Records for patients younger

than 18 years, those missing either return visit variable, and those resulting in transfer out of the ED to another short-term hospital (transfers result in duplicate records in the Healthcare Cost and Utilization Project data sets) were excluded.

To characterize ED admissions into 3 return visit cohorts, distinct episodes of emergency care were identified, which included an index visit plus any corresponding short-term return visits (Figure). An index visit was defined as the first ED visit (regardless of disposition) for a unique patient or any successive visits in which the patient had no prior visit or hospitalization during the preceding 30 days. Therefore, 1 patient could have had multiple index visits available for analysis. In further defining episodes, ED index visits were excluded in which the patient died or left against medical advice, transferred from or to another short-term hospital, and those that occurred during the months of January and December (New York only; Florida does not specify visit month) because it was not possible to assess prior visits and return visits.

The remaining index visits were followed up for all-cause return visits to the ED within 7, 14, and 30 days. A recent analysis evaluating the time-to-revisit curve demonstrated that return visits within 9 days of an index ED visit are most likely to represent an acute episode related to the original ED visit, whereas return visits to the ED occurring 9 days after the initial visit increasingly represent ED visits unrelated to the original visit.[10] As a result, the 7- and 14-day visit intervals are likely to capture the majority of patients experiencing a return admission or readmission related to their original ED visit. Return visits to the ED within 30 days of the index ED visit also were examined for comparison because this is the standard timeframe for assessing hospital performance regarding readmissions and ED visits after hospital discharge.[11,12]

Patients who were hospitalized during their return visit to the ED were further stratified into the following 2 groups depending on disposition during their most proximate index ED visit: (1) ED return admissions (ie, patients who were discharged from the ED at the index visit and were hospitalized during the return visit to the ED) and (2) readmissions (ie, patients who were discharged from the hospital, made another visit to the ED, and were rehospitalized). For consistency of comparison, the analysis was limited to the first return visit to the ED after an index ED visit; however, a minority of patients had multiple return visits within an episode.

For readmitted patients, only outcomes during the readmission and not during the original index admission were assessed (therefore, the return visit cohorts were mutually exclusive). Discharge diagnoses during the index ED visits and return visits to the ED were ranked and compared using *International Classification of Diseases, Ninth Revision* codes. To assess the proportion of patients with a return visit to the ED for the same condition, the Clinical Classification Software codes[13] were compared for the primary diagnosis during each index and subsequent return visit. Inpatient clinical outcomes and resource use for the return visit cohorts were compared with outcomes for patients who were admitted to the hospital during the index ED visit but who did not have a return visit to the ED.

Outcomes

Outcomes of interest were in-hospital mortality, intensive care unit (ICU) admission, length of stay, and total inpatient costs. Patients who died in the ED during the return visit and prior to hospital admission were counted as having died in the hospital. Admission to the ICU was chosen to include patients with a severe clinical course and was identified by critical care UB-92 revenue codes (0200–0209, 0210–0219).

As done in previous studies,[14–16] costs for each hospitalization were estimated by applying Healthcare Cost and Utilization Project cost-to-charge ratios to the total hospital charges provided in the State Inpatient Database. Because hospital-wide cost-to-charge ratios are imperfect estimates of costs, the actual dollar amounts may not represent the true costs. However, because this standard was applied to all 3 return visit cohorts equally, the comparative costs are informative.

Statistical Analysis

To evaluate adjusted differences in outcomes and resource use between the return visit cohorts, a series of multivariable generalized linear models were developed controlling for age, sex, race, Elixhauser comorbidities,[17] and primary payer. The logit-link function was used for the dichotomous outcomes of mortality and ICU admission. Both length of stay and total cost were highly skewed to the right and overdispersed. Therefore, a log-link model with a negative binomial distribution was applied for length of stay and a log-link model with γ distribution was applied for inpatient costs.

Patients who died during their admission were excluded from the modeling for length of stay and cost. To account for within-hospital correlation of patient outcomes, clustered standard errors were used. To avoid bias from very low–volume hospitals, the analysis was limited to hospitals with at least 100 total admissions in 2013.

Statistical analyses were performed using Stata version 13 (StataCorp); P values of ≤.05 were considered significant. Two-tailed tests were used for the χ^2 and nonlinear regression models by convention.

Results

Cohort Characteristics

There were a total of 9036483 visits among approximately 7 million unique patients to 424 hospitals meeting criteria for an index ED visit (Figure), with 55.8% of patients in the study sample having only 1 ED visit within the calendar year. Overall, 19.5% of patients were hospitalized during their index ED visit. Among the 1758359 patients initially admitted to the hospital during their index ED visit, 149214 (8.5%) had a return visit to the ED within 7 days, 228370 (13.0%) within 14 days, and 349 335 (19.9%) within 30 days. Of these patients, 76151 (51.0%) were readmitted to the hospital within 7 days, 122040 (53.4%) within 14 days, and 190768 (54.6%) within 30 days.

Among the 7278124 patients initially discharged from the ED during their index visit, 598404 (8.2%) experienced a return visit to the ED within 7 days, 839 386 (11.5%) within

14 days, and 1 205 865 (16.6%) within 30 days. Of these patients, 86012 (14.4%) were admitted to the hospital within 7 days, 121587 (14.5%) within 14 days, and 173279 (14.4%) within 30 days.

Comparison of Return Visit Cohorts

The characteristics of the study cohorts for the return visit interval of within 7 days appear in Table 1. Characteristics of ED visits by state appear in eTable 1 in the Supplement. Characteristics among the study cohorts were similar within the 14- and 30-day intervals (eTables 2 and 3 in the Supplement).

Patients with high use of the ED (≥5 visits/year) were more likely to experience a return visit to the ED and comprised 24.7% of the total sample, but accounted for 31.3% of the hospital admissions that occurred during return visits to the ED and 34.8% of readmissions. Among patients with a return visit to the ED, 24.2% returned to the ED for the same condition as their index ED visit in the cohort of patients who were admitted during a return ED visit and 25.9% in the cohort of patients who were readmitted. Compared with admissions among patients who did not have a return visit to the ED, patients with a hospital admission during a return ED visit were more likely to be younger, have fewer comorbidities, and have Medicaid coverage or be uninsured. In contrast, patients with a readmission were more likely to be older (≥65 years) and have Medicare coverage.

Admission diagnoses were also different between the groups (Table 2). Patients with an admission during a return visit to the ED had several diagnoses (eg, urolithiasis, cholecystitis, gastroenteritis, and cellulitis) not included in the 10 most common diagnoses in the other comparison groups.

Outcomes Associated with Return Visit to ED

Multivariable regressions were used to generate the adjusted outcomes in Table 3 and Table 4. In the multivariable models adjusting for patient case-mix, patients initially discharged from the ED at their index visit who were admitted to the hospital during a return ED visit within 7 days were found to have a significantly lower risk of mortality (1.85%) compared with hospital admissions in which the patient did not experience a return ED visit (2.48%) (odds ratio [OR], 0.73 [95% CI, 0.69–0.78]) and a lower rate of ICU admission (23.3% vs 29.0%, respectively; OR, 0.73 [95% CI, 0.71–0.76]).

In contrast, patients who were discharged from the hospital and then readmitted during their return ED visit had a significantly higher risk of mortality (3.43%) compared with admissions in which the patient did not experience a return ED visit (2.48%) (OR, 1.43 [95% CI, 1.37–1.50]) and a higher rate of ICU admission (30.4% vs 29.0%, respectively; OR, 1.08 [95% CI, 1.04–1.11]).

Among only those patients who had a return visit to the ED, the mortality for patients with a readmission during the return ED visit was 3.43% compared with 1.85% for patients with a hospital admission during a return visit to the ED (difference, 1.58% [95% CI, 1.41% −1.74%]). The greatest difference in mortality between patients with a return ED visit and readmission was observed for return visits within 7 days and was less for return visits within

14 days (difference, 1.50% [95% CI, 1.36%−1.65%]) and within 30 days (difference, 1.32% [95% CI, 1.20%−1.44%]).

Patients who were admitted to the hospital during a return ED visit within 7 days had significantly longer lengths of stay (5.16 days) compared with admissions in which patients did not experience an ED return visit (4.97 days) (IRR, 1.04 [95% CI, 1.03 to 1.05]) but lower mean total inpatient costs ($10,169 vs $10,799, respectively; difference, −$629 [95% CI, −$781 to −$479).

However, patients who had been hospitalized and were readmitted during their return ED visit had longer lengths of stay (5.70 days) compared with admitted patients who did not experience a return visit to the ED (4.97 days) (IRR, 1.15 [95% CI, 1.14–1.16]) but greater mean inpatient costs ($11,051 vs $10,799, respectively; difference, $252 [95% CI, $63-$442]). Clinical outcomes and inpatient resource use was similar for patients returning within the 14- and 30-day intervals.

Discussion

To our knowledge, this is the first study to assess in-hospital outcomes among ED patients experiencing a short-term return visit to the ED that resulted in a hospital admission. Contrary to our initial hypothesis, patients who experienced an ED return visit that was associated with admission shortly after ED discharge had significantly lower rates of in-hospital mortality, ICU admission, and costs, but higher lengths of stay compared with admissions among patients without a return visit to the ED. In contrast, readmissions among patients with return visits to the ED were associated with higher mortality and ICU admission rates during the repeat hospitalization. Results were consistent for patients returning to the ED within 7, 14, or 30 days of their initial ED visit. These findings suggest that ED return admissions may not adequately capture deficits in the quality of care delivered during an ED visit based on information from administrative data sets.

Numerous studies have examined factors associated with hospital admissions during return visits to the ED.[18–24] Our study adds to the literature by investigating outcomes for these patients after hospitalization. Return visits after ED discharge are frequently considered an adverse event, especially if the patient is admitted to the hospital during the return visit to the ED.[23,24] Our findings complement a prior study by Pham et al[25] that found that patients who revisited the ED had fewer comorbidities, lower triage acuity, fewer procedures and tests performed during their return visit to the ED, and similar hospital admission rates as patients who did not experience a return visit. Their study did not specifically examine outcomes among patients admitted to the hospital during the return visit to the ED.

Some ED return visits are likely due to medical errors, such as missed diagnoses, inappropriate treatment, or failure to secure a close follow-up plan for vulnerable patients. The data from the present study suggest that the majority of hospital admissions that occur on a return visit to the ED represent a reasonable and expected rate of failure of outpatient management. Prior studies that have specifically attempted to assess the quality of care

leading to a return visit to the ED found that a minority (5%−13%) of return visits are due to potential deficiencies in the quality of care provided during the initial visit.[23,26,27]

Patients who experience a return visit to the ED as a result of potential medical error have previously been shown to have higher rates of hospital admission than the general ED population,[23] and presumably are the subset at greatest risk for poor clinical outcomes. However, as is often the case with retrospective chart review, these studies are likely subject to some hindsight bias and an incomplete picture of the clinical decision-making process, which may explain why the findings from our study did not demonstrate inferior outcomes among those patients who experienced an ED return admission. Other studies have shown higher rates of error associated with a return visit to the ED, but included progression of disease that should have been foreseen by the treating clinician as an error,[28] which fails to account for the clinical uncertainty present in a significant number of ED encounters.

How rates of return visits to the ED are interpreted—as reflecting medical error or as a failure of an appropriate trial of outpatient management—has important policy implications for a value-driven health care system. Recent changes in health care financing, such as payer scrutiny over short-stay hospitalizations, physician profiling with pay-for-performance incentives or penalties, and expansion of risk-sharing agreements have placed increased pressure on hospitals and physicians to reduce unnecessary admissions.

Furthermore, several recent studies have shown marked variation in ED admission rates adjusted for case-mix,[29–31] suggesting the potential to significantly reduce health care costs by optimizing disposition decision making in the ED.[32] Even though there is value in tracking ED return visits as an internal quality assurance process, emphasizing hospital performance on ED return visits as a blunt measure of quality, especially if those revisit rates are linked to economic incentives, may have unintended consequences. For example, it may encourage unnecessary hospitalizations as emergency physicians attempt to guard against clinical uncertainty and maintain favorable revisit metrics. The emphasis on ED return visits would be well placed if a hospital admission during a return visit to the ED was associated with a poor clinical course; however, the data do not appear to support this broad assumption. Choosing appropriate measures that accurately identify the quality of ED care will be increasingly important so physicians and hospitals are incentivized in a way that benefits patients while avoiding unintended consequences.

If clinicians act prudently and allow appropriate patients a trial of outpatient care following their ED visit, it is expected that some patients will necessarily progress in their illness, requiring a return visit to the ED and hospital admission. For example, conditions for which patients who were initially discharged from the ED and experienced a return visit to the ED with hospital admission in our study included diagnoses, such as cellulitis, urolithiasis, and gastroenteritis, which are commonly first treated on an outpatient basis.

A clinician’s decision to discharge a patient from the ED also depends on patient preferences and his or her ability to safely manage the condition as an outpatient, both of which may have an effect on revisit rates. For example, provision of anticipatory guidance for when a patient should return to the ED is an important component of ED discharge that is not

typically assessed in studies examining return ED visits. In addition, there is limited research on patients' acceptance of risk and their preferences for treatment venue. Many patients may prefer to have their illness treated at home even if that means risking a return visit to the ED if their symptoms worsen. Hess et al[33] reported that among 101 patients with chest pain who would have otherwise been admitted to an observation unit, up to 42% would choose outpatient management after a simple explanation of their treatment options and risks with a decision aid. Striking a balance between safe discharge practices and appropriate stewardship of hospital-based resources in a way that respects patients' preferences for care is likely associated with some optimal rate of ED return visits, which is currently unknown.

This study should be interpreted with the following limitations. First, the retrospective analysis of a secondary data set limited the outcomes that could be studied. Even though this study is a good first step toward examining downstream clinical outcomes among patients who experience a hospitalization during a return visit to the ED, there may be other more nuanced outcomes, such as adverse events, the use of specific procedures, and other indicators of morbidity among patients who have a return visit to the ED and hospital admissions not captured here.

Second, we could not assess mortality among patients who died outside the hospital because our data set only tracked hospital-based outcomes. However, prior studies have found that death outside the hospital shortly after ED discharge is rare, occurring in less than 0.05% of discharges.[34,35]

Third, in assessing outcomes, we did not seek to explain all factors that accounted for differences among cohorts, but report case-mix-adjusted outcomes between patients with and without a return visit to the ED. As is the case with all cross-sectional secondary data analyses, there may be additional unmeasured severity that accounts for differences in outcomes observed between groups. We recognize that hospital factors, such as ED crowding,[36] may also account for differences and would need to be explored in future studies.

Fourth, we realize that our methods may have failed to capture some return visits to the ED. We only examined the first return visit to the ED after each index ED visit, although a minority of patients have complicated episodes with multiple return ED visits before hospital admission. In addition, we also excluded inpatient records for patients transferred in or transferred out, recognizing that some may be return visits. Our analysis does not include direct admissions that may have been return visits. Each of these factors may lead to an underestimate of return visits to the ED.

Conclusions

Compared with adult patients who were hospitalized during the index ED visit and did not have a return visit to the ED, patients who were initially discharged during an ED visit and admitted during a return visit to the ED had lower in-hospital mortality, ICU admission rates, and in-hospital costs and longer lengths of stay. These findings suggest that hospital

admissions associated with return visits to the ED may not adequately capture deficits in the quality of care delivered during an ED visit.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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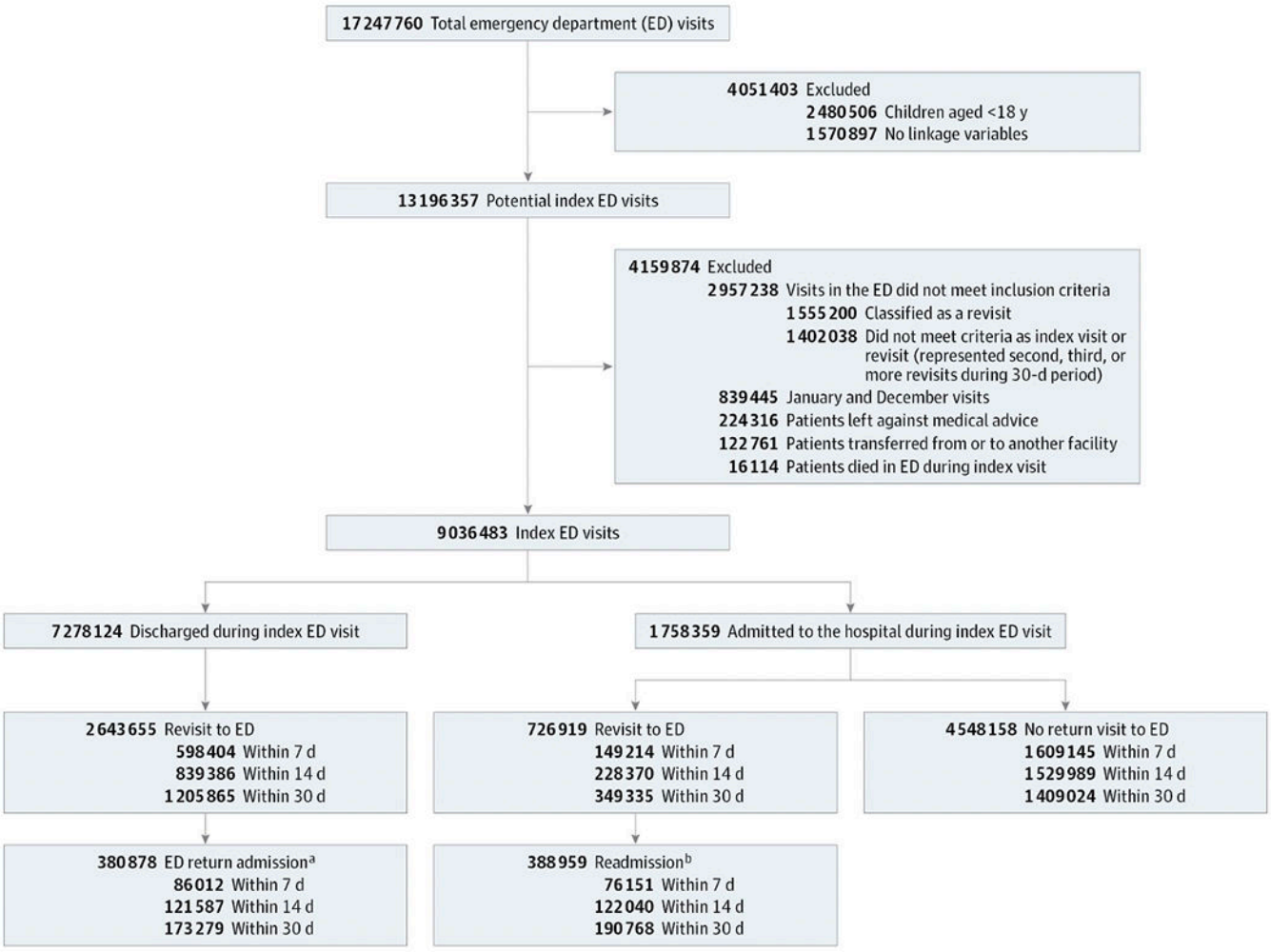

Figure.
Derivation of Study Cohorts

Table 1.

Characteristics of Emergency Department (ED) Admissions Stratified by ED Revisit Status

		Revisit to ED[a]	
	Hospital Admission Without ED Revisit (n = 1609 145)[a]	ED Return Admission (n = 86 012)[b]	Readmission (n = 76 151)[c]
Patient Characteristics			
Age, mean (SD), y	64.0 (19.0)	54.9 (20.2)	66.4 (18.4)
Female sex, %	52.7	53.3	50.0
Race, %			
White	62.3	59.0	62.2
Black	16.3	18.6	17.0
Hispanic	15.0	16.1	14.7
Asian/Pacific Islander	1.5	1.1	1.3
Native American	0.2	0.2	0.1
Other[d]	4.8	4.9	4.7
≥2 Comorbidities, %	71.1	62.3	81.3
Primary payer, %			
Medicare	57.6	39.4	65.8
Medicaid	13.3	21.3	14.7
Private	18.9	12.8	5.2
Uninsured	7.7	12.8	5.2
Other[e]	2.5	3.2	2.1
High use of ED, %[f]	12.6	31.3	34.8
Visit Characteristics			
Weekend visit, %	25.3	25.3	25.9
Same diagnosis on revisit, %[g]	NA	24.2	25.9
Died in hospital, %	2.47	1.35	4.59
Length of stay, d			
Median (25th-75th percentile)	3 (2–6)	3 (2–6)	4 (2–8)
Mean (SD)	5.04 (7.00)	4.96 (6.55)	6.43 (7.63)
Intensive care unit admission, %	29.1	21.2	33.5
Total cost, $			
Median (25th-75th percentile)	7102 (4437–12 304)	6436 (3982–10 891)	7824 (4650–26 041)
Mean (SD)	11143 (15 841)	9823 (13911)	12 767 (17 214)

Abbreviation: NA. not applicable.

[a]The revisit period used for this Table was within 7 days.

[b]Defined as patients who were discharged from the ED at the index visit and were hospitalized during the return visit to the ED.

[c]Defined as patients who were discharged from the hospital, made another visit to the ED, and were rehospitalized.

[d]Self-identified as race other than one of the categories available or was unknown.

[e] Auto insurance claims for motor vehicle collisions, labor and industries claims, TRICARE.

[f] Defined as a person with 5 or more visits during a calendar year.

[g] Determined by comparing Clinical Classification Software (CCS) codes for the primary diagnosis on each index ED visit and subsequent ED revisit. The CCS is used by the Healthcare Cost and Utilization Project and groups related *International Classification of Diseases, Ninth Revision (ICD-9)* codes into meaningful categories (eg, all *ICD-9* codes for congestive heart failure into a single category).

Table 2.

Most Common Diagnoses for Admissions From the Emergency Department (ED) Stratified by ED Revisit Status[a]

Hospital Admission Without ED Revisit (n = 1 609 145), No. (%)		Revisit to ED, No. (%)			
		ED Return Admission (n= 86 012)[b]		Readmission (n = 76 151)[c]	
Sepsis	55 803 (3.5)	Cellulitis[d]	3010 (3.5)	Sepsis	3850 (5.0)
Pneumonia	49 904 (3.1)	Sepsis	2167 (2.5)	Congestive heart failure[d]	2361 (3.1)
Chest pain	36 524 (2.3)	Pneumonia	2151 (2.5)	Pneumonia	2359 (3.1)
COPD exacerbation	36 215 (2.3)	Urinary tract infection	1660 (1.9)	Acute kidney injury	2000 (2.6)
Atrial fibrillation	33 861 (2.1)	Urolithiasis[d]	1595 (1.9)	COPD exacerbation	1697 (2.2)
Urinary tract infection	32 657 (2.0)	Acute kidney injury	1387 (1.6)	Atrial fibrillation	1533 (2.0)
Acute kidney injury	31 175 (1.9)	COPD exacerbation	1257 (1.5)	Urinary tract infection	1356 (1.7)
Stroke	27 609 (1.7)	Chest pain	1062 (1.2)	NSTEMI	1105 (1.8)
NSTEMI	26 912 (1.7)	Cholecystitis[d]	1021 (1.2)	Acute respiratory failure	1059 (1.4)
Syncope	24 208 (1.5)	Gastroenteritis[d]	908 (1.1)	Syncope	1018 (1.3)

Abbreviations: COPD, chronic obstructive pulmonary disease;

NSTEMI, non-ST-segment elevation myocardial infarction.

[a]The top 10 *International Classification of Diseases, Ninth Revision* code diagnoses comprise 19.3% of the hospital admissions without ED revisit, 18.9% of ED return admissions, and 24% of readmissions.

[b]Defined as patients who were discharged from the ED at the index visit and were hospitalized during the return visit to the ED.

[c]Defined as patients who were discharged from the hospital, made another visit to the ED, and were rehospitalized.

[d]Indicates nonoverlapping condition.

Table 3.

Adjusted In-Hospital Mortality, Intensive Care Unit (ICU) Admission, Length of Stay, and Inpatient Costs Stratified by Emergency Department (ED) Revisit Status[a]

			ED Revisit			
		Hospital Admission Without ED Revisit	ED Return Admission[b]	Difference[c]	Readmission[d]	Difference[c]
Within 7 d	In-hospital mortality, % (95% CI)	2.48 (2.38 to 2.58)	1.85 (1.71 to 2.00)	−0.63 (−0.74 to 0.51)	3.43 (3.25 to 3.61)	0.95 (0.82 to 1.09)
	ICU admission, % (95% CI)	29.0 (26.4 to 31.6)	23.3 (21.0 to 25.6)	−5.7 (−6.4 to 5.0)	30.4 (27.7 to 33.2)	1.4 (0.9 to 2.0)
	Length of stay, mean (range), d	4.97 (4.86 to 5.08)	5.16 (5.03 to 5.28)	0.19 (0.13 to 0.25)	5.70 (5.57 to 5.85)	0.74 (0.67 to 0.81)
	Cost, mean (range), $	10 799 (10 409 to 11 188)	10 169 (9800 to 10 538)	−629 (−781 to −479)	11051 (10 564 to 11 538)	252 (63 to 442)
Within 14 d	In-hospital mortality, % (95% CI)	2.58 (2.48 to 2.69)	1.92 (1.80 to 2.04)	−0.66 (−0.76 to −0.58)	3.42 (3.25 to 3.60)	0.84 (0.72 to 0.96)
	ICU admission, % (95% CI)	29.0 (26.4 to 31.6)	24.0 (21.7 to 26.2)	−5.0 (−5.6 to 4.4)	30.3 (27.5 to 33.0)	1.3 (0.7 to 1.8)
	Length of stay, mean (range), d	4.94 (4.83 to 5.20)	5.09 (4.97 to 5.20)	0.15 (0.10 to 0.20)	5.65 (5.51 to 5.79)	0.71 (0.66 to 0.77)
	Cost, mean (range), $	10 748 (10 363 to 11132)	10 119 (9756 to 10482)	−629 (−752 to 505)	11 004 (10 530 to 11 477)	251 (87 to 416)
Within 30 d	In-hospital mortality, % (95% CI)	2.75 (2.64 to 2.86)	1.94 (1.83 to 2.05)	−0.81 (−0.90 to 0.72)	3.26 (3.10 to 3.41)	0.51 (0.41 to 0.60)
	ICU admission, % (95% CI)	29.0 (26.4 to 31.6)	24.7 (22.4 to 27.0)	−4.3 (−4.8 to 3.8)	29.8 (27.1 to 32.5)	0.8 (0.3 to 1.3)
	Length of stay, mean (range), d	4.90 (4.79 to 5.01)	5.00 (4.89 to 5.11)	0.10 (0.05 to 0.14)	5.56 (5.43 to 5.69)	0.66 (0.61 to 0.71)
	Cost, mean (range), $	10 706 (10 326 to 11 086)	10 093 (9732 to 10 454)	−614 (−731 to 496)	10 880 (10 428 to 11 332)	174 (26 to 322)

[a] Models were adjusted for age, sex, race, Elixhauser comorbidities, and primary payer. The predicted outcomes are from regression models.

[b] Defined as patients who were discharged from the ED at the index visit and were hospitalized during the return visit to the ED.

[c] Relative to the reference group (hospital admissions during index ED visit without ED revisit).

[d] Defined as patients who were discharged from the hospital, made another visit to the ED, and were rehospitalized.

Table 4.

Multivariable Regression of Patients by Emergency Department (ED) Revisit Status[a]

		Odds Ratio (95% CI)			
		In-Hospital Mortality	ICU Admission	Length of Stay, IRR (95% CI)	Cost Difference (Range), $[b]
Within 7 d	ED return admission[c] vs no ED revisit	0.73 (0.69 to 0.78)	0.73 (0.71 to 0.76)	1.04 (1.03 to 1.05)	−629 (−781 to 479)
	Readmission[d] vs no ED revisit	1.43 (1.37 to 1.50)	1.08 (1.04 to 1.11)	1.15 (1.14 to 1.16)	252 (63 to 442)
Within 14 d	ED return admission[c] vs no ED revisit	0.72 (0.69 to 0.76)	0.76 (0.74 to 0.78)	1.03 (1.02 to 1.04)	−629 (−752 to 505)
	Readmission[d] vs no ED revisit	1.36 (1.31 to 1.41)	1.07 (1.04 to 1.09)	1.14 (1.13 to 1.16)	251 (87 to 416)
Within 30 d	ED return admission[c] vs no ED revisit	0.69 (0.66 to 0.72)	0.79 (0.78 to 0.81)	1.02 (1.01 to 1.03)	−614 (−731 to 496)
	Readmission[d] vs no ED revisit	1.20 (1.17 to 1.24)	1.04 (1.02 to 1.07)	1.13 (1.13 to 1.14)	174 (26 to 322)

Abbreviations: ICU, intensive care unit; IRR, incidence rate ratio.

[a]Models were adjusted for age, sex, race, Elixhauser comorbidities, and primary payer.

[b]Reported as mean difference in whole dollars rather than the exponentiated coefficient for ease of interpretation. All reported outcome differences are statistically significant.

[c]Defined as patients who were discharged from the ED at the index visit and were hospitalized during the return visit to the ED.

[d]Defined as patients who were discharged from the hospital, made another visit to the ED, and were rehospitalized.