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RESEARCH ARTICLE

Geography, Not Health System Affiliations, Determines Patients' Revisits to the Emergency Department

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Objectives. To determine how frequently patients revisit the emergency department after an initial encounter, and to describe revisit capture rates for the same hospital, health system, and geographic region.

Data Sources/Study Setting. Florida state data from January 1, 2010, to June 30, 2011, from the Healthcare Cost and Utilization Project.

Study Design. This is a retrospective cohort study of emergency department return visits among Florida adults over an 18-month period. We evaluated pairs of index and 30-day return emergency department visits and compared capture rates for hospital, health system, and geographic units.

Data Collection/Extraction Methods. Data were obtained from the Agency for Healthcare Research and Quality's Healthcare Cost and Utilization Project and the American Hospital Association Annual Survey Database.

Principal Findings. Among 9,416,212 emergency department visits, 22.6 percent (2,124,441) were associated with a 30-day return. Seventy percent (1,477,772) of 30-day returns occurred to the same hospital. The 30-day return capture rates were highest within the same geographic area: county-level capture at 92 percent (IQR=86–96 percent) versus health system capture at 75 percent (IQR = 68–81 percent).

Conclusions. Acute care utilization patterns are often independent of health system boundaries. Current population-based health care models that attribute patients to a single provider or health system may be strengthened by considering geographic patterns of acute care utilization.

Key Words. Utilization of services, geographic/spatial factors, health care organizations and systems, payment systems, emergency medicine

The delivery system reform initiatives outlined by the Secretary of Health and Human Services (Burwell 2015) modify payment in a way that has led to health system consolidation (Mott 2015). In many alternative payment models, such as accountable care organizations (ACOs), medical homes, and shared savings programs, attribution of patients aligns incentives in order to coordinate care and decrease cost. However, these cost reduction strategies that are based on attribution work best when patients seek care from the same provider or stay within a single health system's network when choosing where to seek care. It is important to consider the variation in where patients seek recurrent care given that efforts to optimize the value of care delivery require full visibility and control of the patient's health utilization; poorly coordinated efforts across disparate health systems are unlikely to be efficient and of high value.

Prior research on whether recurrent hospital visits occur at the same or different hospital is limited, although the data available suggest that about one-third of return hospital visits after either an emergency department (ED) or inpatient hospitalization occur at a different institution than the index visit. Jencks, Williams, and Coleman (2009) performed a study of hospital readmissions among all Medicare recipients over a 15-month period and estimated that 20–40 percent of rehospitalizations occurred at different hospitals. A recent study of return visits to the ED found that 32 percent of revisits within 72 hours occurred at a different institution (Duseja et al. 2015). To our knowledge, there has not been a population-based assessment of where patients go when they do not return to the same hospital; specifically, little is known about the degree to which financial affiliations (hospital/health system affiliations) influence patient choices about where to seek care.

Importance

Population health has emerged as a key goal of the health care triple aim (Berwick, Nolan, and Whittington 2008) and is central to delivery system reform efforts. Population health is most commonly used to reference population health management, in which the goal is improvement of health outcomes

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through optimization of best practices and management of resource utilization for chronic conditions (e.g., hemoglobin A1C rates within a primary care practice, reduction in hospitalization rates for patients with chronic conditions). However, a clear distinction has been noted between the dominant conceptualization of population health within the health care sector and the broader concept of "total population health" endorsed by the Institute of Medicine (IOM) (Institute of Medicine 2012; Jacobson and Teutsch 2012) that refers to "the health of all persons living in a specified geopolitical area" (Jacobson and Teutsch 2012).

As health care shifts toward population-based value (Burwell 2015; Alley et al. 2016), it is important to understand whether patients use health care resources in a manner that is consistent with the dominant means of attribution based on health system affiliation (Vashi et al. 2013). This study aimed to explore how patients define their health care communities, based on ED utilization, and how well these definitions align with current health system-based definitions of community. Our analysis is focused on return visits after ED care, as the ED sits at the intersection of the community and the health care system. The ED is the only setting of care that sees all patients regardless of their ability to pay and where location of treatment is dictated by severity or choice rather than referral networks. The study of ED utilization thus provides an empiric indication of patient preferences in accessing health care resources.

Goals of This Investigation

In this analysis, we assess the location of return ED visits occurring within 30 days of an index ED discharge. To do this, we first provide a visit-level description of the daily rate of return ED visits occurring at the same hospital as an index ED discharge. We then perform a hospital-level assessment of location of return visits in relation to an index discharge to determine the "capture rate" when assessed at the level of (1) same hospital, (2) same health system, and (3) same geographically defined catchment area (described below). We hypothesized that a significant proportion of 30-day return ED visits occur at a different hospital compared with the index ED visit and that while health systems are the most commonly used unit of analysis for describing a health care "community" when assessing health outcomes, geographic definitions of community may be more reflective of patient acute care utilization patterns (higher capture rates).

Methods

Data Sources

This was a retrospective two-year, single-state analysis of 30-day return ED visits for adult patients in Florida (FL). Data were obtained from the State Emergency Department Database (SEDD) and the State Inpatient Database (SID) of the Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP). These databases have been developed through a Federal–State–Industry partnership sponsored by AHRQ to create a national information resource of all-payer patient-level health care data. The SEDD contains discharge-level data for all ED visits that do not lead to a hospital admission; the SID contains discharge-level data for all hospital admissions, including those that started in the ED. This analysis included index visits present in the SEDD and return visits present in the SEDD or the SID (see Appendix SA2, which provides detail about the set-up of the database). The study was determined exempt by our institutional review board.

Selection of Participants and Data Processing

The goal of the study was to assess the location of return ED visits after an ED discharge. Specifically, we sought to determine whether patients with 30-day return ED visits sought care in the same hospital, same health system, or same community as their index visit. We considered all ED treat-and-release visits occurring for adults age 18 and older from January 1, 2010, to June 30, 2011, to be potential index ED discharges. Each potential index discharge was followed forward to determine whether the ED discharge was associated with a return ED visit within 30 days. Each occurrence of an index ED discharge and a subsequent return ED visit within 30 days was tagged as a single revisit cycle, and both visits were included in the analytic dataset. All ED visits not associated with a revisit cycle were excluded from the dataset, as were index ED visits that ended in patients leaving without a formal discharge (i.e., left without being seen, left against medical advice, left without treatment complete). The unit of analysis was paired ED visits; therefore, multiple revisit cycles associated with the same patient were permitted into the final dataset as unique paired observations. We considered variability in return rates in terms of time (number of days) from initial ED discharge. Analysis was performed at the patient level (primary analysis) as well as the hospital level (secondary analysis).

Hospitals for each set of index and return visits were paired and flagged to indicate whether the two were located within the same health system and within the same community. We determined whether revisits took place at the same versus a different hospital and health system using data describing hospital ownership and affiliation contained in the American Hospital Association (AHA) Annual Survey Database, FY 2010 and 2011 editions. We also used hospital location to assess relationships between the index and return hospitals based on multiple geographic definitions of community, including ZIP code, ZIP code and neighboring ZIP code, county, county and neighboring county, hospital referral region (HRR), and proximity based on a fixed radial distance. ZIP code and county-based definitions that included "neighbors" were created using a spatial neighbor matrix to identify geographically contiguous neighbors. HRRs are geographic units developed by the Dartmouth Institute—these are contiguous regions formed by smaller hospital service areas (HSAs) that are based on ZIP codes and surgical referral patterns (Wennberg and Cooper 1999). Next nearest hospitals and distances traveled between hospitals were identified by computing the straight-line distance between each pair of hospitals. We used a kernel density measure to estimate the distribution of all distances between hospital pairs, which we then used to determine a meaningful radius to indicate local travel distance (defined in this case as 18 miles or less; see Appendix SA3, which provides detail about the variables used in the analysis). In addition to calculating distances between hospitals, the distance between patient home ZIP code and the index hospital was also computed and is reported in Table 1. All distance calculations were computed using spatial packages in *STATA* v14.0 (StataCorp 2015).

Outcome Measures

The primary outcome was whether each 30-day return ED visit occurred at the same hospital as each index ED visit. The secondary outcome was the hospital-level capture rate of return ED visits returning to the same health system and geographic community.

Primary Data Analysis

We report summary statistics characterizing the overall (30-day) study population of index ED revisits, comparing returns to the same versus a different hospital. All variables were based on values reported for the index visit and were obtained directly from the HCUP databases, with the exception of distance

Table 1: Summary of Study Population

		All 30-day Emergency Department Returns (n = 2,124,441)		*Emergency Department Return to Different Hospital (n = 646,669)*	
		n	*Percent ± 95% CI*	*n*	*Percent ± 95% CI*
Gender	Female	1,290,053	60.7% ± 0.07	394,088	60.9% ± 0.12
Age	18–24	378,861	17.8% ± 0.05	115,129	17.8% ± 0.09
	25–44	876,862	41.3% ± 0.07	300,614	46.5% ± 0.12
	45–64	568,031	26.7% ± 0.06	171,083	26.5% ± 0.11
	65–84	230,890	10.9% ± 0.04	48,301	7.5% ± 0.06
	85+	69,797	3.3% ± 0.02	11,542	1.8% ± 0.03
Payer	Medicare	466,071	21.9% ± 0.06	118,525	18.3% ± 0.09
	Medicaid	606,795	28.6% ± 0.06	191,584	29.6% ± 0.11
	Private	326,005	15.3% ± 0.05	94,381	14.6% ± 0.09
	Other (self, no pay, other)	718,112	33.8% ± 0.06	238,446	36.9% ± 0.12
	Unknown	7,458	0.4% ± 0.01	3,733	0.6% ± 0.02
Race	White	1,273,174	60.1% ± 0.07	394,773	61.3% ± 0.12
	Black	527,983	24.9% ± 0.06	153,845	23.9% ± 0.1
	Hispanic	284,623	13.4% ± 0.05	85,025	13.2% ± 0.08
	Asian	8,932	0.4% ± 0.01	2,394	0.4% ± 0.01
	Native American	2,307	0.1% ± 0	735	0.1% ± 0.01
	Other	21,239	1% ± 0.01	6,959	1.1% ± 0.03
Patient location (ZIP code)	Urban (metropolitan areas, or micropolitan areas with commuters to larger metro)	1,879,518	91.8% ± 0.04	569,215	91.8% ±0 .07

Continued

Table 1 *Continued*

		All 30-day Emergency Department Returns (n = 2,124,441)		*Emergency Department Return to Different Hospital (n = 646,669)*	
		n	*Percent ± 95% CI*	*n*	*Percent ± 95% CI*
Patient income	Median household income 1st quartile (poorest)	814,406	39.5% ± 0.07	249,614	40% ± 0.12
	Median household income 2nd quartile	656,365	31.8% ± 0.06	201,258	32.2% ± 0.12
	Median household income 3rd quartile	456,262	22.1% ± 0.06	134,060	21.5% ± 0.1
	Median household income 4th quartile (wealthiest)	134,460	6.5% ± 0.03	39,684	6.4% ± 0.06
Discharge diagnosis, broad diagnosis*	Injury and poisoning	378,343	17.8% ± 0.05	111,887	17.3% ± 0.09
	Other conditions	305,873	14.4% ± 0.05	99,583	15.4% ± 0.09
	Diseases of respiratory system	186,929	8.8% ± 0.04	49,192	7.6% ± 0.06
	Diseases of nervous system and sense organs	182,943	8.6% ± 0.04	62,662	9.7% ± 0.07
	Diseases of musculoskeletal connective tissue	180,654	8.5% ± 0.04	67,375	10.4% ± 0.07
	Diseases of genitourinary systems	177,915	8.4% ± 0.04	51,573	8% ± 0.07
Discharge diagnosis same at both visits	Specific diagnosis	522,030	24.6% ± 0.06	147,682	22.8% ± 0.10
	Broad diagnosis*	831,679	39.2% ± 0.07	242,257	37.5% ± 0.12
Chronic conditions	*Median (interquartile range)*	–	1 (0–2)	–	1 (0–2)
Days between visits	*Median (interquartile range)*	–	6 (2–15)	–	6 (2–15)
Distance between patient ZIP to index hospital, miles	*Median (interquartile range)*	–	5.3 (2.9–9.9)	–	6.3 (3.3–11.8)

Continued

Table 1 *Continued*

		All 30-day Emergency Department Returns (n = 2,124,441)		*Emergency Department Return to Different Hospital (n = 646,669)*	
		n	*Percent ± 95% CI*	*n*	*Percent ± 95% CI*
Distance between index hospital and return hospital, miles	*Median (interquartile range)*	–	0 (0–5.3)	–	13.9 (6.7–27.6)
	< 18 miles	1,852,105	88.2% ± 0.04	385,287	60.9% ± 0.12
	18–36 miles	136,826	6.5% ± 0.03	136,826	21.6% ± 0.1
	>36 miles	110,839	5.3% ± 0.03	110,839	17.5% ± 0.09
Market competition	Herfindahl–Hirschman Index Patient County *Median (interquartile range)*	0.3 (0.3)	0.3 (0.1–0.5)	0.3 (0.2)	0.2 (0.1–0.5)
	Herfindahl–Hirschman Index Hospital *Median (interquartile range)*	0.3 (0.1)	0.3 (0.3–0.4)	0.3 (0.1)	0.3 (0.2–0.4)

Notes. Authors' analysis of data from Florida 2011 State Emergency Department Database and Florida 2011 State Inpatient Database of the Healthcare Cost and Utilization Project (HCUP), Agency for Healthcare Research and Quality (AHRQ).

*Discharge diagnoses grouped into 17 major disease categories, based on methodologies developed in prior studies (Karaca, Wong, and Mutter 2012).

between hospitals which was computed using address location data from AHA for both hospitals. Discharge diagnoses were aggregated by the single-level Clinical Classification Software (CCS) for the International Classification of Disease, Ninth Revision, Clinical Modification (ICD-9-CM) developed by AHRQ. The single-level diagnosis CCS aggregates illnesses and conditions into 285 mutually exclusive categories (Table 1 reports the top five most common for each group; six in total; Agency for Healthcare Research and Quality 2014). To facilitate comparison of relatedness of diagnoses between index and return ED visits, diagnoses were also grouped into 17 major disease categories per methodology developed in prior studies (Karaca, Wong, and Mutter 2012), and comparisons of "broad diagnosis" were made between both visits.

Of the patients making a return visit, we modeled whether patients went to the same hospital for return ED visits, per day, using beta regression. Beta regression, developed by Ferrari and Cribari-Neto (2004), is a model for continuous variables that assumes values in the standard unit interval, for example, rates, proportions, or concentration indices, as we have in this study (see Appendix SA4, which provides detail about the regression method and results). We then compared index and return visit hospitals to identify whether return visits occurred to the same health system, and within each of the geographically defined communities, described above. At the hospital level, we computed capture rates for each of the defined communities, defined as the proportion of ED visits that had a subsequent visit occurring within each of the specified units (hospital, health system, geography). We report median hospital capture rate for each unit, for returns with 72 hours, 9 days, and 30 days. We selected these time points because 72 hours is the most commonly referenced time point when assessing ED returns (Liaw et al. 1999; Wu et al. 2010; Pham et al. 2011; Abualenain et al. 2013; Shy et al. 2015), 9 days is the first empirically defined time point for capturing acute ED returns (Rising et al. 2014), and 30 days is the time point in line with current benchmarks for unplanned readmission rates from the Department of Health and Human Services National Quality Strategy (U.S. Department of Health and Human Services 2011).

Results

Study Population

There were 9,416,212 ED treat-and-release visits during our study period. Of those, 22.6 percent (2,124,441) were associated with a return ED visit within

30 days; these were the visits included in our study population. For all patients with 30-day return ED visits, 61 percent were female, 41 percent were age 25–44 years, 29 percent had Medicaid as their primary payer, 22 percent had Medicare, 15 percent had private insurance, 60 percent were white, 92 percent lived in an urban county, 40 percent lived in a ZIP code in the lowest (poorest) median household income quartile, 18 percent were diagnosed with injury or poisoning, 23 percent had the same diagnosis at both the index and return visit, and on average patients lived 5.3 miles from the index hospital. Patient demographics were similar for the subset of patients with return ED visits occurring at a different hospital. On average, patients with different hospital returns lived 6.3 miles from the index hospital, and there was an average distance of 13.9 miles between index and return hospitals (Table 1). Three quarters (75 percent) of the 218 hospitals in the study were affiliated with a health system (total of 30 health systems), and there were 184 ZIP codes, 58 counties, and 19 HRRs represented in the study population.

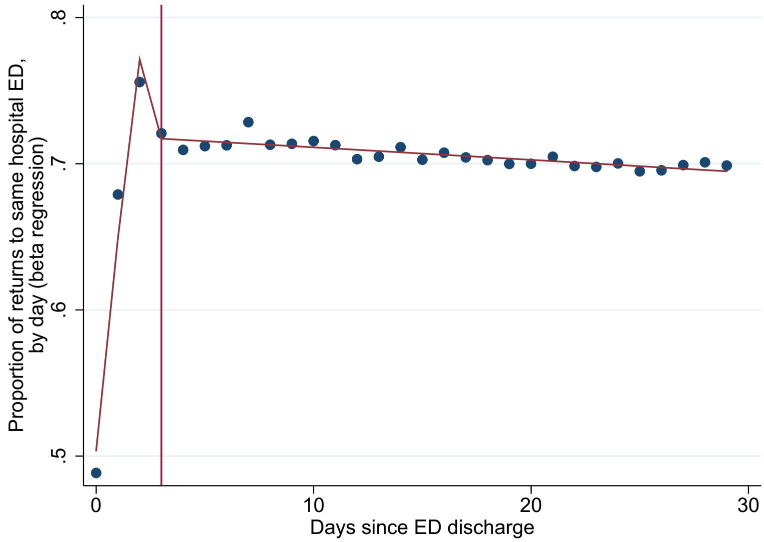
Primary Outcome: Same Versus Different Hospital

Overall, 1,477,772 (70 percent) of the return visits occurred to the same hospital. The proportion of ED returns occurring at the same hospital changed significantly in the first 72 hours after an index ED visit as compared to returns occurring after 72 hours ($p < .001$). In unadjusted analysis, 49 percent of returns occurring less than 24 hours after the initial ED visit were to the same hospital, 68 percent of returns occurring within 24–48 hours were to the same hospital, and 76 percent of returns occurring within 48–72 hours were to the same hospital. After 72 hours, the proportion of ED returns occurring at the same hospital as compared to the index visit was relatively steady at 71 percent (Figure 1).

Secondary Outcome: Capture Rates

There were 614,449 return visits within 72 hours of the index discharge, 1,226,454 return visits within 9 days, and 2,124,441 return visits within 30 days, inclusive. For returns to the same hospital, the per-hospital median capture rate was 63 percent (IQR = 57–70 percent) for 3 days, 66 percent (IQR = 61–72 percent) for 9 days, and 67 percent (IQR = 61–72 percent) for 30 days. For returns to the same health system, the median capture rate increased to 71 percent (IQR = 63–80 percent) for 3 days, 73 percent (IQR = 67–81 percent) for 9 days, and 74 percent (IQR = 67.8–81 percent)

Figure 1: Proportion of Returns to Same Hospital Emergency Department, by Day (Beta Regression)



Notes. The figure charts the proportion of return emergency department visits to the same hospital within 30 days, at 1-day intervals. Beta regression is used to fit a trend line, with inflection point at 72 hours, after which rates remain steady. Authors' analysis of data from Florida 2011 State Emergency Department Database and Florida 2011 State Inpatient Database of the Healthcare Cost and Utilization Project (HCUP), Agency for Healthcare Research and Quality (AHRQ). [Color figure can be viewed at wileyonlinelibrary.com].

for 30 days. Finally, for returns to the same county, the median capture rate went up to 92 percent (IQR = 83–96 percent) for 3 days, 92 percent (IQR = 84–96 percent) for 9 days, and 92 percent (IQR = 86–96 percent) for 30 days (Table 2 and Figure 2 report capture rates for nine units of analysis).

Discussion

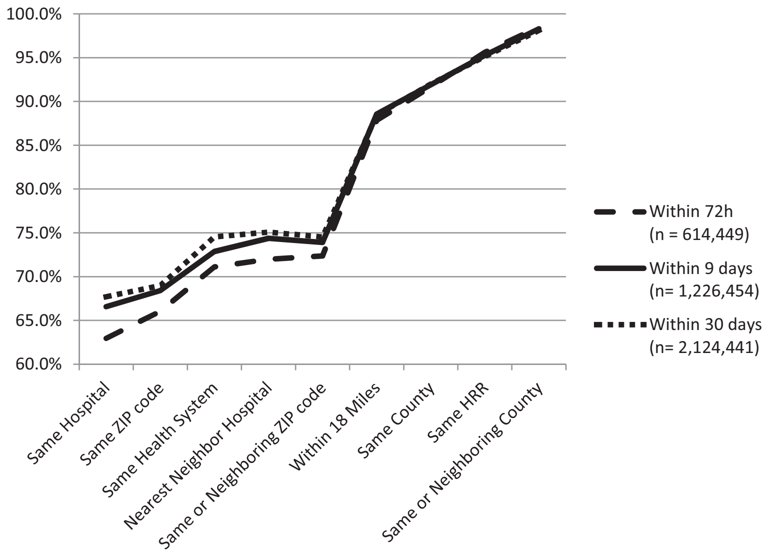
Our findings show that close to one-third of return ED visits occur at a different hospital than the site of the index ED discharge and that this rate is higher in the first 48 hours after an ED discharge. These findings emphasize the importance of acknowledging that patients may not follow conventional health care boundaries when seeking acute care, and they suggest that regional collaboration across unaffiliated institutions may be important to maximize

Table 2: Median Hospital Capture Rates for Emergency Department Returns within 3, 9, and 30 Days

	Within 72 hours (n = 614,449)		*Within 9 days (n = 1,226,454)*		*Within 30 days (n = 2,124,441)*	
	Median	*Interquartile Range*	*Median*	*Interquartile Range*	*Median*	*Interquartile Range*
Same hospital	63.0%	57.1–70.5%	66.6%	61.4–72.3%	67.7%	61.2–72.4%
Same ZIP code	66.0%	57.9–72.6%	68.4%	62.5–73.2%	69.0%	62.8–74.4%
Same health system	71.1%	63.2–79.9%	72.9%	66.7–81%	74.5%	67.8–80.9%
Nearest neighbor hospital	72.0%	63.1–79.2%	74.4%	66.8–81%	75.1%	67.3–81.1%
Same or neighboring ZIP code	72.4%	65.4–79.8%	73.9%	67.9–80.5%	74.5%	69–80.8%
Within 18 miles	87.8%	77.9–92.3%	88.6%	79.7–92.3%	88.5%	80.8–92%
Same county	91.7%	83.1–96%	91.9%	84.5–95.8%	92.0%	85.6–95.6%
Same HRR	95.6%	90.6–97.9%	95.3%	91.3–97.8%	95.1%	91.2–97.5%
Same or neighboring county	98.5%	97.2–99.1%	98.3%	96.9–98.9%	98.1%	96.7–98.7%

Notes. Authors' analysis of data from Florida 2011 State Emergency Department Database and Florida 2011 State Inpatient Database of the Healthcare Cost and Utilization Project (HCUP), Agency for Healthcare Research and Quality (AHRQ).

Figure 2: Median Hospital Capture Rates for Emergency Department Returns within 3, 9, and 30 Days



Notes. Hospital capture rates are defined as the proportion of a hospital's index emergency department visits that had a return emergency department visit at the same hospital, health system, ZIP code, etc. Geographic units are listed in ascending order by size. Authors' analysis of data from Florida 2011 State Emergency Department Database and Florida 2011 State Inpatient Database of the Healthcare Cost and Utilization Project (HCUP), Agency for Healthcare Research and Quality (AHRQ). [Color figure can be viewed at wileyonlinelibrary.com].

the delivery of safer and more efficient emergency care. Our assessments of capture rates suggest that the use of geographic boundaries rather than health system affiliations may be more meaningful from the perspective of patients.

Our findings are important to consider in the context of payment reform efforts that are dependent upon aligning incentives to decrease cost because all health care utilization is contained within a network. Attribution of patients to an ACO, for example, is carried out based on patterns of utilization—either prospectively or retrospectively (Lewis et al. 2013; Population-Based Payment [PCP] Work Group 2016)—but neither approach synergizes particularly well with new efforts to coordinate population-based prevention or treatment strategies as have recently been proposed by the Centers for Medicare and Medicaid Innovation (Alley et al. 2016). Indeed, in the recent editorial by the US Secretary of Health and Human Services outlining the department's value-based payment goals, the predicted end-state was population-based payment rather than payment to separate competing organizations (ACOs)—but as yet a roadmap does not exist to convert one into the other. We demonstrate significantly greater capture of patient returns when using a geographic definition of a community (ZIP code/neighboring ZIP code, county, etc.) compared to when using a health system definition, and we propose that shared accountability across competing health systems within geographic communities may represent a key step on the path to population-based payments.

Care provided in the ED differs from the predominantly elective or scheduled care delivered in the bulk of the health care system. Through referral patterns, preapproval procedures, and incentives to receive care in-network, health systems strive to retain patients and maximize market share. When patients are—or are afraid that they may be—seriously ill or injured (Rising et al. 2016), financial relationships between insurers and hospitals are rarely the patients' dominant priority. And even in less acute cases, it is important to note that EDs, as a result of the Emergency Medical Treatment and Labor Act (EMTALA), do not turn arriving patients away for financial reasons. In addition, destination protocols for emergency medical services (EMS) often determine which hospital a patient is taken to when arriving by ambulance. Systems of care for critical illness and injury are often population-based given the importance of minimizing time to treatment (Albright et al. 2010). Emergency care may thus represent the true market preferences of patients, reflecting the social and individual determinants of health as well as individual preferences for care delivery (Pines et al. 2016). Given our findings, emergency care may represent a potential use case for a novel, perhaps additional, means of attribution and/or payment for health outcomes that incentivizes regional cooperation to improve population health.

There are several limitations to this study. First, there are a variety of factors that contribute to where and when a patient presents to any given hospital. Mode of travel to the hospital affects location of presentation: Patients traveling by ambulance are often unable to impact the decision about where they will arrive, patients traveling by foot or bus are much more likely to present to the same hospital regardless of their own personal preference, and patients who travel frequently may just be more likely to present at different hospitals because of current location and not necessarily their own preference. Our findings describe patterns of patient utilization, although we are unable to determine any causation for why these patterns exist.

Our data are also limited to a single state, in which state-level regulations and other factors may impact patient utilization patterns in ways that make these findings have limited generalizability in other states (e.g., Medicaid expansion states). Our data also exclude patients that had an index or return visit in a state other than Florida. When findings were assessed by state of residence, only 4.5 percent (n = 425,157) of all ED visits during the study period were for out-of-state residents, and incidence of overall 30-day return visits as well as 30-day return visits to the same hospital was similar for out-of-state residents compared to Florida residents. Although we may have missed a small proportion of return cycles for out-of-state residents, it is the pattern of returns that we are most compelled by and not the overall incidence of occurrence of return.

In summary, future work is needed to better understand patterns of patient utilization across hospitals and health systems. In competitive markets, it may be helpful for hospitals and policy makers to understand how patients use health resources so that incentives can be developed that encourage cooperation across competitors in the interest of patients. Examples may include a focus on novel attribution methods, a strengthened investment in the emergency care use case for health information exchanges, the development of community-based incentive programs for emergency care conditions that require a coordinated multistakeholder systems response such as trauma, cardiac arrest, stroke, and myocardial infarction, and shared accountability across specialties (primary care, emergency care, specialists) and payers (Medicare, Medicaid, private insurers) within a region for delays to see a provider with an acute condition or exacerbation of a chronic condition. Specifically, more work is needed to empirically identify health care geographies that are based on patient utilization patterns for acute care rather than preexisting political jurisdictions. Additionally, future design of ACO or population health programs may benefit from inclusion of EMS destination considerations. As we move to population-based payments, lessons learned from acute care utilization may provide an opportunity to develop additional or alternative incentive and payment structures that create a system of care that meets the needs of both patients and payers.

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Disclaimer: None.

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Supporting Information

Additional supporting information may be found in the online version of this article:

Appendix SA1: Author Matrix.
Appendix SA2: Database.
Appendix SA3: Variables.
Appendix SA4: Analysis.