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Perspective

The Growing Role of Emergency Departments in Hospital Admissions

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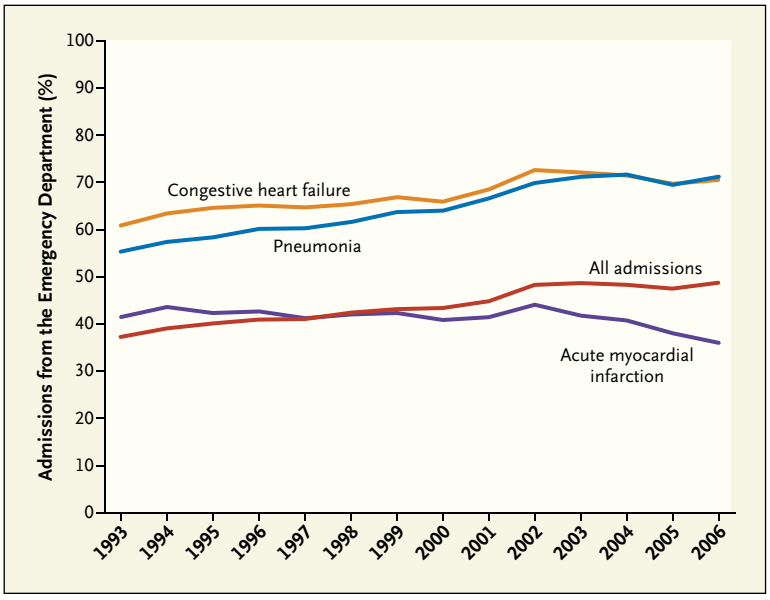
Growing use of U.S. emergency departments (EDs), cited as a key contributor to rising health care costs, has become a leading target of health care reform. ED visit rates increased by more than a third between 1997 and 2007, and EDs are increasingly the safety net for underserved patients, particularly adult Medicaid beneficiaries.[1] Although much attention has been paid to increasing ED use, the ED's changing role in our health care system has been less thoroughly examined. EDs serve as a hub for prehospital emergency medical systems, an acute diagnostic and treatment center, a primary safety net, and a 24/7 portal for rapid inpatient admission. Approximately a quarter of all acute care outpatient visits in the United States occur in EDs, a proportion that has been growing since 2001.[2] We examined the proportion of hospital admissions that come through the ED, hypothesizing that use of the ED as the admission portal had increased across conditions.

We analyzed data from the Nationwide Inpatient Sample (NIS), the largest all-payer database of U.S. inpatient care, from 1993 to 2006 (the most recent year for which the ED admission data are available on HCUPnet, an interactive Web-based tool that uses data from the Healthcare Cost and Utilization Project of the Agency for Healthcare Research and Quality). The NIS contains data from approximately 8 million hospital stays each year and is weighted to produce national estimates. We used HCUPnet to query the NIS regarding trends in the 20 clinical conditions for which patients were most frequently admitted to the hospital in 2006. Clinical Classifications Software was used to group the conditions into clinically meaningful categories. We excluded two conditions for which patients are rarely admitted through the ED (osteoarthritis and back problems), one psychiatric condition that was not consistently coded in claims data (affective disorder), and four obstetrical diagnoses that are generally evaluated in other care settings, such as labor-and-delivery triage areas (liveborn infant, maternal birth trauma, other complications of birth, other complications of pregnancy).

The number of hospital admis-



Proportion of U.S. Hospitalizations in Which Patient Was Admitted through the Emergency Department, 1993–2006.

Data were obtained from the Nationwide Inpatient Sample with the use of HCUPnet. Clinical conditions were grouped by Clinical Classification Software into clinically meaningful categories.

sions increased by 15.0%, from 34.3 million in 1993 to 39.5 million in 2006; admissions from the ED increased by 50.4%, from 11.5 million to 17.3 million. The proportion of all inpatient stays involving admission from the ED increased from 33.5 to 43.8% ($P<0.001$). In 12 of the 13 conditions for which patients were most frequently admitted and that met our inclusion criteria, an increased proportion of admitted patients came through the ED ($P<0.001$), regardless of the trend in overall admissions; the exception was coronary atherosclerosis, for which rapid "rule-out" protocols and ED-based chest-pain observation units have reduced the need for inpatient admission. (For details on the 12 conditions, see the Supplementary Appendix, available with the full text of this article at NEJM .org.) The graph shows the trend in admissions from the ED for conditions that the Centers for Medicare and Medicaid Services includes in assessments of 30-day readmission and mortality rates.

Historically, clinically stable patients with acute problems who required hospital care for conditions such as community-acquired pneumonia would see an outpatient provider and be directly admitted from the physician's office. Our findings show that since 1993, EDs have played an increasing role in admissions for almost all conditions.

There are several possible explanations of this growing role. One frequently cited hypothesis is that overuse of the ED for conditions that would more appropriately be treated in primary care providers' offices could lead to increased admission rates — either because reduced access to primary care leads to worsening of patients' conditions and greater need for emergency hospitalization or because emergency physicians are more likely than primary care providers to admit patients to the hospital. The latter theory is based in part on assumptions that emergency physicians are trained to assume the worst and are more likely to admit patients with uncertain diagnoses and with whom they don't have an ongoing relationship, and that they are unwilling to discharge patients when they cannot guarantee outpatient follow-up.[3]

Alternatively, the trend could be driven by changes in the organization of medical services that favor the rapid diagnostic technologies and early treatment available in the ED. As diagnostic services have improved (with the introduction of such tools as computed tomographic scanning and troponin testing) and expectations of rapid and accurate diagnosis and treatment have become standard (e.g., percutaneous coronary intervention for ST-segment–elevation myocardial infarction), the evaluation of common symptoms such as chest pain, abdominal pain, and shortness of breath has become de facto reasons for ED referral. Public education campaigns emphasizing the importance of early emergency care for symptoms suggestive of heart attack or stroke have encouraged this approach.

In addition, primary care providers are less likely than EDs to provide regular access for unscheduled acute care — and therefore less likely to admit patients to the hospital. A large national survey and observational studies have found that it is difficult for patients to arrange a sick visit with a primary care provider in a timely fashion, because schedules are often full, after-hours service is unavailable, and many acute problems are not

well suited to office practices lacking basic laboratory and imaging capabilities.[4] As hospitals strive for administrative efficiency by maximizing occupancy rates, it becomes more difficult for outpatient providers to admit patients directly to the hospital. Yet since such hospitals' practices have largely been reactive, it is unclear whether this trend reflects high-value use of limited emergency care resources and whether it has resulted in more or less appropriate use of scarce inpatient beds.

This increasing use of EDs for inpatient admissions has important implications for the redesign of delivery systems. The need for more efficient use of inpatient resources is a clear focus of the Affordable Care Act (ACA), and the increased role of EDs in inpatient admissions will affect the implementation of central ACA principles, such as quality measurement, care coordination, and payment reform. Yet policymakers seem to view EDs as little more than a locus of inefficient or unnecessary care — the place where patients without access or insurance seek care at great expense to taxpayers. This popular view fails to address the ED's increasingly important role in hospital admissions, and it is not supported by the data.[5]

EDs' growing role in hospital admissions is a clue to their critical role in the health care system. Rigorous research to identify drivers of this trend and determine the value or cost of emergency care is needed to inform health policy. For example, comparative effectiveness studies on admission from the ED versus direct admission can evaluate whether early access to diagnostic and therapeutic services improves outcomes while shortening lengths of stay. Similarly, studies of conditions that are ideally evaluated in the ED, such as chest pain, must demonstrate the ability of evidence-based rapid diagnostic pathways to safely stratify patients according to risk level and reduce admissions rates.

Should we return to having primary care providers initiate and direct hospital admissions? Because of the increasingly specialized nature of patient care, our systems have evolved into separate arenas of hospital-based and ambulatory care provided by clinicians with different types of training. As reimbursement models shift from providing incentives for admissions as a hospital's revenue source to providing incentives for reducing admissions, EDs will probably reduce their use of hospital admission. Yet the ACA's expansion of insurance coverage, the reality of an aging population with complex conditions, and the expectation of timely, specialized, and coordinated care mean that the trend toward increasing percentages of ED admissions is unlikely to be reversed. New models of acute care delivery aiming to improve the use of scarce intensive, hospital-based services should take into account this change in patient and provider expectations.

Disclosure forms provided by the authors are available with the full text of this article at NEJM.org.

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1. Tang N, Stein J, Hsia RY, Maselli JH, Gonzales R. Trends and characteristics of US emergency department visits, 1997-2007. JAMA 2010;304:664-70.
2. Pitts SR, Carrier ER, Rich EC, Kellermann AL. Where Americans get acute care: increasingly, it's not at their doctor's office. Health Aff (Millwood) 2010;29:1620-9.
3. Asplin BR, Rhodes KV, Levy H, et al. Insurance status and access to urgent ambulatory care follow-up appointments. JAMA 2005; 294:1248-54.
4. Beal AC, Doty MM, Hernandez SE, Shea KK, Davis K. Closing the divide: how medical homes promote equity in health care — results from the Commonwealth Fund 2006 Health Care Quality Survey. New York: The Commonwealth Fund, June 2007 (http://www.commonwealthfund.org/Publications/Fund-Reports/2007/Jun/Closing-the-Divide--How-Medical-Homes-Promote-Equity-in-Health-Care--Results-From-The-Commonwealth-F.aspx).
5. Newton MF, Keirns CC, Cunningham R, Hayward RA, Stanley R. Uninsured adults presenting to US emergency departments. JAMA 2008;300:1914-24.

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Supplementary Appendix

This appendix has been provided by the authors to give readers additional information about their work.

Supplement to: Schuur JD, Venkatesh AK. The growing role of emergency departments in hospital admissions. N Engl J Med 2012. DOI: 10.1056/NEJMp1204431

Online Supplement Table of Contents

Online Supplement Table 1: Proportion of US Hospitalizations Admitted Through the Emergency Department: 1993-2006

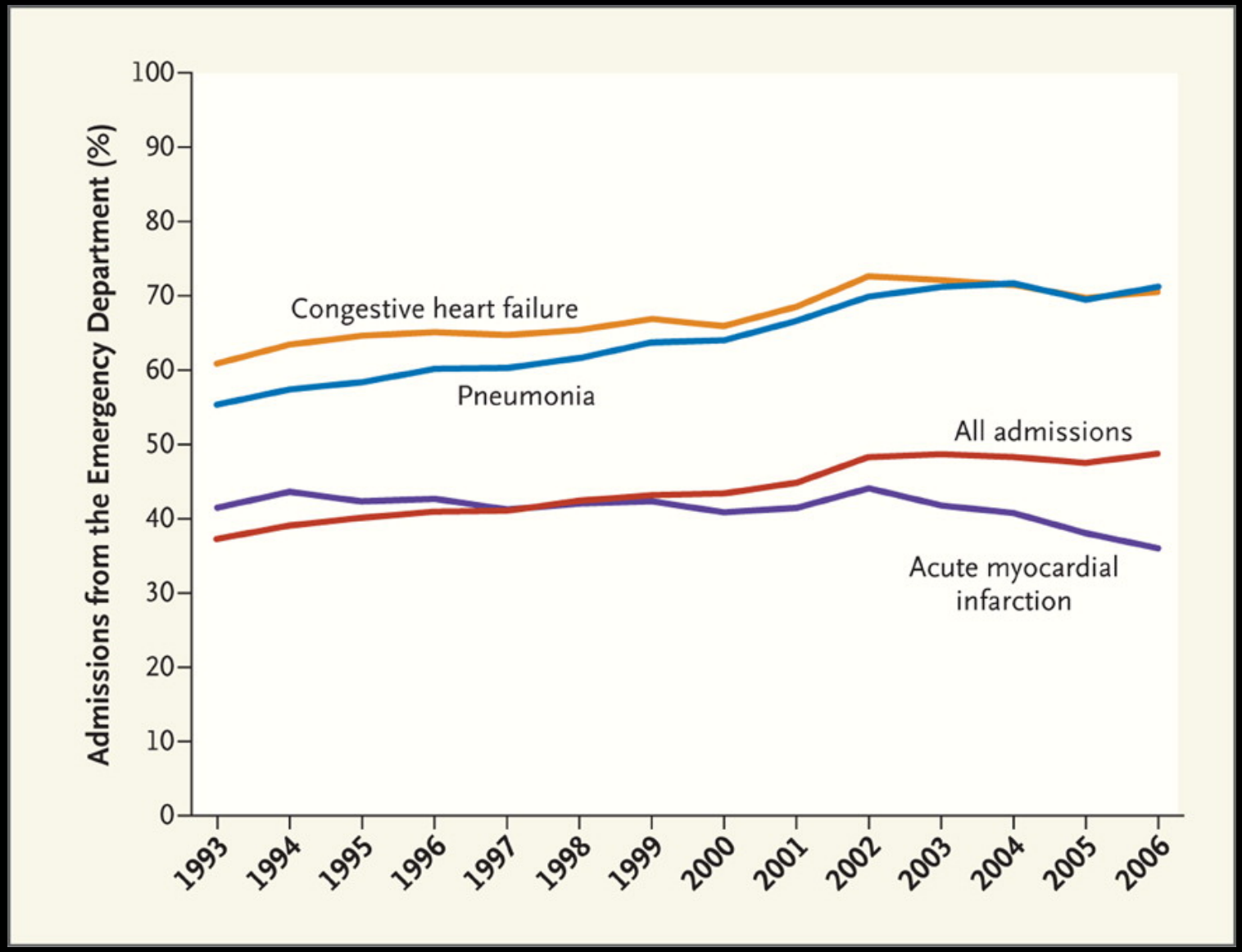
Diagnosis (CCS Code*)	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	%Change, 1993-2006†
Pneumonia (122)	1,169,032, (55.3%)	1,188,561, (57.3%)	1,247,609, (58.3%)	1,210,418, (60.0%)	1,231,551, (60.2%)	1,298,546, (61.5%)	1,371,689, (63.7%)	1,250,124, (64.0%)	1,222,021, (66.6%)	1,275,079, (69.9%)	1,314,590, (71.2%)	1,213,468, (71.7%)	1,355,377, (69.5%)	1,218,467, (71.2%)	28.8%
Congestive heart failure (108)	935,223, (60.8%)	932,063, (63.4%)	926,965, (64.5%)	971,498, (65.0%)	991,296, (64.6%)	1,008,600, (65.3%)	990,699, (66.7%)	1,025,295, (65.8%)	1,049,818, (68.4%)	1,057,673, (72.7%)	1,119,934, (72.1%)	1,104,365, (71.4%)	1,090,197, (69.8%)	1,098,573, (70.5%)	16.0%
Coronary atherosclerosis (101)	1,393,322, (41.3%)	1,366,104, (43.4%)	1,370,033, (42.1%)	1,394,005, (42.4%)	1,406,997, (41.0%)	1,313,892, (41.8%)	1,248,183, (42.1%)	1,360,507, (40.6%)	1,400,082, (41.2%)	1,292,533, (43.8%)	1,256,548, (41.5%)	1,192,392, (40.5%)	1,109,648, (37.7%)	1,198,274, (35.7%)	-13.5%
Septicemia (002)	329,354, (60.4%)	347,623, (61.7%)	372,180, (63.1%)	411,346, (64.0%)	413,097, (64.4%)	399,434, (65.0%)	365,086, (66.8%)	337,126, (67.6%)	342,632, (69.3%)	349,544, (74.3%)	388,160, (74.8%)	451,806, (75.1%)	537,717, (74.1%)	611,422, (74.9%)	24.0%
Cardiac dysrhythmias (106)	542,895, (51.1%)	549,343, (52.9%)	545,770, (53.4%)	563,967, (54.2%)	572,323, (53.5%)	588,354, (55.3%)	602,280, (56.0%)	652,008, (55.1%)	704,478, (56.6%)	712,821, (60.8%)	708,041, (60.2%)	693,687, (61.1%)	696,551, (60.3%)	749,182, (60.3%)	17.9%
COPD and bronchiectasis (127)	454,303, (58.4%)	461,076, (61.0%)	505,340, (60.9%)	534,784, (62.4%)	551,230, (62.3%)	605,064, (63.8%)	643,527, (65.6%)	618,957, (64.6%)	603,352, (67.4%)	619,309, (71.8%)	621,152, (71.7%)	555,504, (70.8%)	630,061, (69.9%)	597,519, (71.1%)	21.8%
Nonspecific chest pain (102)	512,396, (67.1%)	499,714, (70.0%)	494,747, (71.3%)	506,423, (72.0%)	537,558, (72.5%)	625,059, (73.2%)	674,859, (75.3%)	793,725, (75.6%)	875,196, (78.3%)	884,996, (81.6%)	862,117, (81.5%)	845,707, (81.3%)	824,694, (80.2%)	856,948, (80.1%)	19.4%
Complications of Device, Grant of Implant (237)	394,738, (21.2%)	427,948, (21.9%)	452,786, (24.6%)	462,616, (25.8%)	491,478, (26.4%)	473,797, (27.7%)	499,508, (29.0%)	527,347, (29.1%)	577,783, (29.9%)	589,077, (33.1%)	597,070, (33.7%)	601,183, (34.9%)	615,920, (34.6%)	634,173, (36.6%)	72.6%
Acute myocardial infarction (100)	675,672, (59.8%)	691,122, (61.5%)	710,444, (61.7%)	731,100, (62.3%)	732,212, (60.3%)	752,911, (62.3%)	730,326, (63.4%)	768,495, (62.3%)	773,871, (62.9%)	764,133, (65.4%)	750,719, (64.7%)	695,062, (64.2%)	662,345, (63.4%)	675,121, (61.3%)	2.5%
Skin and subcutaneous infection (197)	324,286, (47.3%)	344,980, (48.9%)	335,471, (49.7%)	319,569, (49.4%)	329,771, (50.0%)	349,314, (51.2%)	347,378, (52.9%)	377,848, (54.4%)	391,087, (55.9%)	427,234, (61.0%)	466,689, (62.4%)	505,431, (63.0%)	582,170, (62.0%)	596,573, (63.7%)	34.8%
Urinary tract infection (159)	382,387, (57.4%)	392,606, (59.5%)	393,648, (60.2%)	396,870, (61.0%)	406,219, (62.4%)	425,200, (63.9%)	428,847, (66.6%)	436,743, (66.7%)	445,763, (69.3%)	455,624, (73.5%)	488,732, (74.1%)	506,230, (74.2%)	528,874, (73.2%)	531,793, (74.8%)	30.2%
Acute cerebrovascular disease (109)	544,821, (65.9%)	586,087, (67.0%)	600,069, (67.1%)	633,360, (68.8%)	615,798, (69.2%)	619,087, (70.7%)	588,109, (72.0%)	580,054, (72.1%)	576,477, (74.9%)	564,129, (79.0%)	559,655, (77.9%)	545,986, (77.8%)	526,147, (76.0%)	536,658, (76.0%)	15.3%
Fluid and electrolyte disorders (55)	430,500, (51.9%)	449,793, (52.1%)	473,429, (52.7%)	483,656, (53.6%)	468,165, (54.9%)	468,035, (56.2%)	508,051, (57.7%)	512,456, (58.1%)	569,117, (60.8%)	592,033, (66.3%)	580,743, (64.8%)	554,564, (65.7%)	573,822, (64.1%)	521,570, (66.4%)	27.9%

The following conditions (CCS) were excluded due to low ED admission rates: Osteoarthritis (203), Spondylosis, intervertebral disc disorders, other back problems (205); or obstetric conditions: Liveborn (218), Trauma to perineum or vulva (193), Other complications to birth (195), Other Complications of Pregnancy (181); or changing CCS codes: Affective disorders(69).

* CCS: Clinical Classification Software.

† % Change refers to the relative change in percent of all hospital admissions from the ED; all P <0.0001

Proportion of U.S. Hospitalizations in Which Patient Was Admitted through the Emergency Department, 1993–2006.



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