

Comparison of Presenting Complaint vs Discharge Diagnosis for Identifying “Nonemergency” Emergency Department Visits

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WITH INCREASING MEDICAL care costs, policy-makers have turned to emergency department (ED) utilization as a potential source for cost savings. Although the assumptions driving this policy approach are unproven,¹ recent attempts to reduce ED use have occurred in Medicaid programs.²⁻⁶ If implemented for patients in Medicaid programs, it is likely that such practices may result in similar policies by other payers, potentially affecting access to ED care for other segments of the population.

One approach aimed at reducing ED use has been to deny or limit payment if the patient's diagnosis on discharge from the ED appears to reflect a “non-emergency” condition.^{3,7,8}

Legislatures or regulators in Tennessee, Iowa, New Hampshire, and Illinois have considered or enacted legislation or regulations that would limit payment for nonemergency ED visits by Medicaid enrollees, based on discharge diagnosis. Other states, including Arizona, Oregon, Illinois, Iowa, Nebraska, North Carolina, and New Mexico, have recently implemented or considered implementing some level of copayment requirement for nonemer-

Importance Reduction in emergency department (ED) use is frequently viewed as a potential source for cost savings. One consideration has been to deny payment if the patient's diagnosis upon ED discharge appears to reflect a “nonemergency” condition. This approach does not incorporate other clinical factors such as chief complaint that may inform necessity for ED care.

Objective To determine whether ED presenting complaint and ED discharge diagnosis correspond sufficiently to support use of discharge diagnosis as the basis for policies discouraging ED use.

Design, Setting, and Participants The New York University emergency department algorithm has been commonly used to identify nonemergency ED visits. We applied the algorithm to publicly available ED visit data from the 2009 National Hospital Ambulatory Medical Care Survey (NHAMCS) for the purpose of identifying all “primary care–treatable” visits. The 2009 NHAMCS data set contains 34 942 records, each representing a unique ED visit. For each visit with a discharge diagnosis classified as primary care treatable, we identified the chief complaint. To determine whether these chief complaints correspond to nonemergency ED visits, we then examined all ED visits with this same group of chief complaints to ascertain the ED course, final disposition, and discharge diagnoses.

Main Outcomes and Measures Patient demographics, clinical characteristics, and disposition associated with chief complaints related to nonemergency ED visits.

Results Although only 6.3% (95% CI, 5.8%-6.7%) of visits were determined to have primary care–treatable diagnoses based on discharge diagnosis and our modification of the algorithm, the chief complaints reported for these ED visits with primary care–treatable ED discharge diagnoses were the same chief complaints reported for 88.7% (95% CI, 88.1%-89.4%) of all ED visits. Of these visits, 11.1% (95% CI, 9.3%-13.0%) were identified at ED triage as needing immediate or emergency care; 12.5% (95% CI, 11.8%-14.3%) required hospital admission; and 3.4% (95% CI, 2.5%-4.3%) of admitted patients went directly from the ED to the operating room.

Conclusions and Relevance Among ED visits with the same presenting complaint as those ultimately given a primary care–treatable diagnosis based on ED discharge diagnosis, a substantial proportion required immediate emergency care or hospital admission. The limited concordance between presenting complaints and ED discharge diagnoses suggests that these discharge diagnoses are unable to accurately identify nonemergency ED visits.

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gency use of the ED (Craig Price, MD, American College of Emergency Physicians, written communications, April 13, 2012, and February 11, 2013).

Although criteria for determining nonemergency ED visits vary by state and no systematic review of states' practices is available, Washington state recently drew attention for a proposal in which the payer may make a determination about payment based only on the ED discharge diagnosis and whether the patient is hospitalized during the ED visit, without other clinical information.⁹ Other states appear to have similar practices.

For this approach to be effective at reducing nonemergency ED use without discouraging ED use for more serious conditions, it would be necessary to predict discharge diagnosis based on information available before the patient is seen in the ED—ie, based on presenting symptoms. Many have questioned whether this approach is possible. For example, a 65-year-old patient with diabetes may be discharged with the nonemergency diagnosis of gastroesophageal reflux after presenting with a chief complaint of chest pain; however, that patient still required an emergency evaluation to rule out acute coronary syndrome. In addition, there is concern that this approach of limiting payment based on discharge diagnosis may violate the prudent layperson standard, which establishes the “criteria that insurance coverage is based not on ultimate diagnosis, but on whether a prudent person might anticipate serious impairment to his or her health in an emergency situation.”¹⁰

The purpose of this study was to determine the association between ED presenting complaint and ED discharge diagnosis

METHODS

Study Design and Data Source

This study is a secondary analysis of data collected in the 2009 National Hospital Ambulatory Medical Care Survey (NHAMCS). As described by its developers, “[t]he NHAMCS is an annual, national probability sample of ambu-

latory visits made to non-federal, general, and short-stay U.S. hospitals conducted by the Centers for Disease Control and Prevention, National Center for Health Statistics (NCHS). Although the survey includes visits to selected ambulatory care departments, this analysis focuses solely on the visits to hospital emergency departments (EDs). The multi-staged sample design is comprised of three stages for the ED component: 1) 112 geographic primary sampling units (PSUs); 2) approximately 480 hospitals within PSUs; and 3) patient visits within emergency service areas.”¹¹

According to the NHAMCS protocol, trained hospital staff members abstract ED visit data using a structured data entry form during 4-week data periods randomly assigned for each sampled hospital. The sampled data are extrapolated to national estimates through use of assigned patient visit weights, which account for probability of visit selection, nonresponse, and ratio of sampled hospitals to hospital universe. The study was exempt from review by the institutional review board of the University of California, San Francisco.

Key Variables

ED Visit With “Primary Care–Treatable Diagnosis” Based on ED Discharge Diagnosis. We sought a method for identifying nonemergency ED visits that would maximize the probability of successfully classifying such visits based on the ED discharge diagnosis. Although the process for defining nonemergency diagnoses varies by state and various lists of nonemergency diagnoses have been proposed,^{12,13} many are based at least in part on the emergency department algorithm developed at New York University.^{14,15} Although the algorithm was developed for other purposes and the developers caution that “the algorithm is not intended as a triage tool or as a mechanism to determine whether ED use is appropriate for required reimbursement by a managed care plan,”¹⁵ it has been used by policy makers both to characterize

“overuse” of EDs in several states (eg, Connecticut,¹⁶ Oregon,¹⁷ and Massachusetts¹⁸) and, in modified form, as a basis for denying payment for ED visits in Washington state.^{9,12}

We selected the ED algorithm as the basis for classifying nonemergency ED visits for this study, both because of its use for similar purposes and because its classification system is more evidence based than others that have been proposed. The algorithm was developed with input from emergency physicians and based on ED visit data abstracted from 5700 records. After excluding visits for injuries, mental health, and drug- and alcohol-related conditions, physician reviewers used data including chief complaint, demographic data, duration of symptoms, presenting vital signs, and medical history to classify visits as *emergent*, requiring care in less than 12 hours or *nonemergent*. Emergent cases were then further categorized as *emergency, primary care treatable* or *emergency, ED needed*, based on whether the resources required (including radiology, blood work, etc) are normally available in the outpatient setting, in the judgment of the algorithm's creators. In addition, *ED needed* visits were categorized based on whether they were preventable or avoidable with timely and effective outpatient care.^{15,19}

The final step in the development of the algorithm was designed to allow the algorithm to be applied to administrative data sets. To do so, the above classifications were mapped to the discharge diagnoses for each case in the sample to determine the percentage of sample cases in each of the 4 categories for each diagnosis.¹⁴ As stated elsewhere, “[M]ultiple patients in the sample were discharged with ICD-9 [International Classification of Diseases, Ninth Revision] code 789.00 (abdominal pain, unspecified site). All were deemed to require care within 12 hours and were classified as emergent. Two-thirds of these patients were managed with resources available in primary care settings, while one-third received interventions not available outside the ED. Therefore, the ICD-9 code 789.00

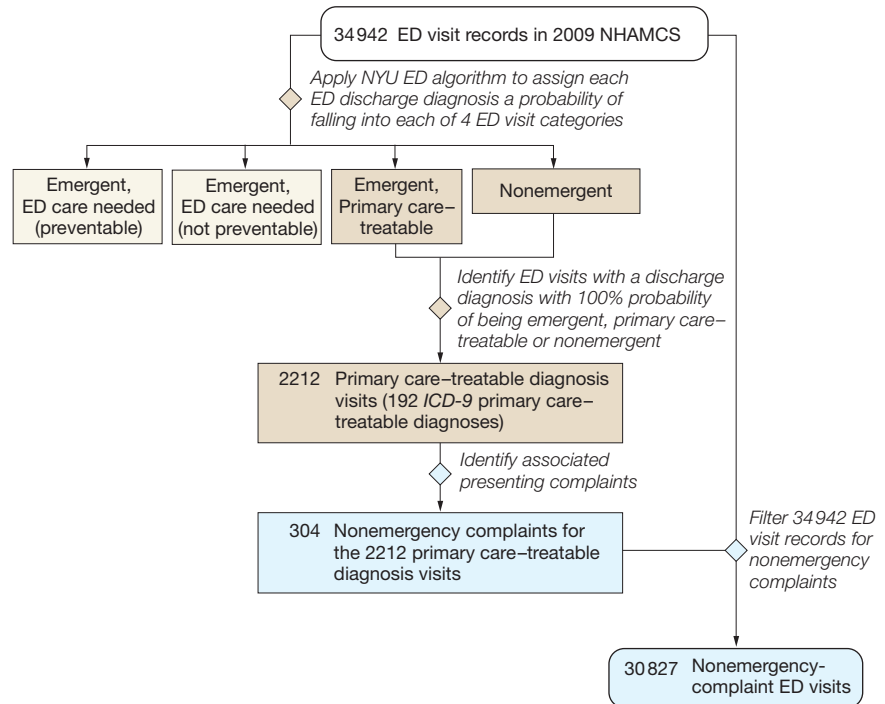
is assigned a 0.67 probability of emergency, primary care–treatable and a 0.33 probability of emergent, ED needed.”²⁰

We used 2 additional strategies to maximize the probability that our classification system would identify only nonemergency ED visits. First, based on the ED discharge diagnosis, we classified a visit as a primary care–treatable diagnosis only if the algorithm predicted a 100% probability that of the diagnosis was primary care treatable (FIGURE). This approach leads to a more limited number of primary care–treatable diagnoses than that used by some other researchers.^{20–22} Second, because some policy makers have proposed only denying payment for visits after which the patient was discharged home, we excluded visits resulting in hospital admission. By eliminating these higher-acuity visits, we eliminated some of the higher-risk chief complaints associated with a diagnosis.

Chief Complaints Associated With Nonemergency ED Visits. Because patients present to the ED with a chief complaint, not with a discharge diagnosis, our next step in identifying nonemergency visits was to determine what chief complaints were associated with the primary care–treatable diagnoses (Figure). The NHAMCS database contains a field for the most important reason for visit, in which the patient’s chief complaint is coded according to a standardized classification system developed by the National Center for Health Statistics (NCHS).^{23,24} Similar to ICD-9-CM coding, it allows conversion of free-text data into a structured system. The reason-for-visit coding for chief complaints has been widely used by NCHS in NHAMCS and other surveys.^{25,26}

At each hospital, triage nurses document the patient’s chief complaint according to hospital protocol. Then, chart abstractors trained by the NCHS review the patient record and record the verbatim text, which is later classified as a chief complaint using reason-for-visit codes by an NCHS contractor. “As part of the quality assurance procedure, a 10 percent quality control sample of Patient Record Forms is independently keyed and coded. Error rates typically range between 0.3 and 0.9 percent for various survey items.”¹¹

Figure. Algorithm for Creation of “Nonemergency-Complaint” Emergency Department Visits Based on New York University Emergency Department Algorithm^a



ICD-9 indicates *International Classification of Diseases, Ninth Revision*.

^aThe algorithm was adapted in part from the emergency department (ED) algorithm developed at New York University (NYU).^{14,15}

Based on the ED discharge diagnoses for all the primary care–treatable diagnosis visits, we generated a list of reasons for the visits. We then identified all ED visits in the data set with reasons for visits that were identical to those on our list. These are referred to as ED visits with non-emergency complaints (Figure). We chose the term, *nonemergency complaint* because, if it were possible to prospectively identify ED visits with diagnoses on the primary care–treatable diagnosis list, the chief complaints resulting in these diagnoses might not require ED care.

Variables Reflecting the Acuity of ED Visits With Nonemergency Complaints. Next, for the group of ED visits with nonemergency complaints, we identified diagnoses, disposition, and other key factors related to the patient’s initial presentation and ED course. Demographic variables included age, sex, race/ethnicity, insurance type, region, and urban or rural

status. We also included triage categories defined, on a scale of 1 to 5, by nursing staff as *immediate*, *emergent*, *urgent*, *semi-urgent*, or *nonurgent*.²⁷ Triage vital signs were classified as normal or abnormal using standards based on published guidelines.^{28,29} Pain scale was by patient self-report on presentation, with a scale from 1 to 10, with 10 being the most severe. We also identified whether patients arrived by ambulance.

We ascertained whether the visit resulted in hospital admission and, if so, whether the patient was admitted to an observation unit, to a standard bed, or to a higher level of care. The NHAMCS does not distinguish between observation unit stays occurring in the ED and those occurring in the inpatient facility. For the purposes of this analysis, we grouped observation unit stays with inpatient admissions, reasoning that an observation unit admission indicated that a patient could not safely be discharged home.

Statistical Analysis

If the presenting complaint corresponded closely with the discharge diagnosis, visits with nonemergency complaints based on the reasons for the visit

would be expected to correspond to visits with primary care–treatable diagnoses. In this situation, the number of visits with nonemergency complaints would be similar to the number of vis-

its with primary care–treatable diagnoses. Conversely, if the presenting complaint corresponded poorly with the discharge diagnosis, multiple chief complaints would be expected to be asso-

Table 1. Demographic Characteristics of Study Population With Original “Primary Care–Treatable” Diagnoses and “Nonemergency Complaint” Emergency Department Visits, NHAMCS 2009

	“Primary Care–Treatable” Diagnoses		“Nonemergency Complaint” ED Visits	
	No. of Unweighted ED Visit Records (n = 2212) ^a	Weighted Proportion (95% CI), %	No. of Unweighted ED Visit Records (n = 30 827)	Weighted Proportion (95% CI), %
Age, y				
<18	467	21.5 (19.0-23.9)	7254	24.7 (22.4-27.0)
18-44	1128	51.5 (48.5-54.2)	12 450	39.6 (38.1-41.1)
45-64	439	19.3 (17.4-21.3)	6655	21.4 (20.5-22.3)
65-79 ^b	111	4.5 (3.4-5.6)	2680	8.6 (8.1-9.2)
≥80 ^b	67	3.1 (2.3-4.0)	1788	5.6 (5.2-6.1)
Sex				
Female	1337	62.8 (59.9-65.7)	17 223	55.9 (54.9-56.8)
Male	875	37.2 (34.3-40.1)	13 604	44.1 (43.2-45.1)
Race/ethnicity				
Non-Hispanic white	1199	56.3 (52.0-60.6)	17 777	59.1 (55.2-63.0)
Non-Hispanic black	606	28.1 (23.5-32.6)	7151	22.8 (19.1-26.4)
Hispanic	96	3.1 (2.1-4.2)	1293	3.7 (2.4-5.0)
Other	311	12.5 (9.9-15.2)	4606	14.4 (11.5-17.3)
Insurance				
Private	726	33.2 (29.7-36.8)	11 947	39.0 (36.5-41.5)
Medicare	153	6.7 (5.4-8.0)	3319	10.5 (9.6-11.3)
Medicaid	689	32.2 (29.0-35.4)	7908	25.3 (23.0-27.6)
Uninsured/self-pay	423	18.8 (16.2-21.5)	4701	15.6 (13.9-17.3)
Other	56	2.3 (1.5-3.2)	964	2.9 (2.3-3.5)
Missing/unknown	165	6.7 (4.2-9.3)	1988	6.7 (4.5-9.0)
Triage category				
Immediate	20 ^c	1.4 (0.5-2.2)	529	1.8 (1.1-2.5)
Emergent ^b	119	5.2 (3.7-6.8)	2926	9.3 (8.2-10.5)
Urgent ^b	755	34.5 (31.0-38.0)	12 836	41.7 (39.6-43.8)
Semiurgent	900	42.2 (38.5-45.8)	10 552	35.7 (33.5-38.0)
Nonurgent ^b	314	13.2 (10.7-15.8)	2500	7.9 (6.9-9.0)
Triage not conducted	104	3.5 (1.1-5.9)	1484	3.5 (1.3-5.8)
Region				
Northeast	559	17.2 (13.5-20.9)	7856	18.0 (14.1-21.9)
Midwest	521	26.7 (18.9-34.4)	6664	23.2 (16.9-29.6)
South	773	39.1 (32.0-46.3)	10 902	39.7 (33.3-46.1)
West	359	17.0 (11.9-22.1)	5405	19.1 (14.3-23.8)
Metropolitan statistical area				
Urban	1848	80.2 (69.6-90.8)	26 245	82.0 (72.3-91.6)
Rural	364	19.8 (9.2-30.4)	4582	18.0 (8.4-27.7)
Seen within last 72 h				
Yes	79	3.3 (2.4-4.3)	1151	3.7 (3.4-4.1)
No	1801	77.8 (70.9-84.8)	24 990	79.9 (75.1-84.7)
Unknown	332	18.9 (11.7-26.0)	4686	16.4 (11.6-21.2)
Discharged from hospital within last 7 d				
Yes	33	1.3 (0.7-2.0)	720	2.1 (1.7-2.5)
No	1327	58.7 (51.5-65.8)	18 243	59.0 (52.7-65.2)
Unknown	852	40.0 (32.7-47.3)	11 864	39.0 (32.7-45.3)

Abbreviations: NHAMCS, National Hospital Ambulatory Medical Care Survey; ED, emergency department.

^aNumber of records in the data set for each type of category (unweighted). Proportions, however, are calculated using survey weights.

^bIndicates significant difference (nonoverlapping 95% CI) between visits with primary care–treatable diagnoses and nonemergency-complaint ED visits.

^cFewer than 30 records is considered an imprecise record by the National Center for Health Statistics.

ciated with each diagnosis and multiple diagnoses would be associated with each complaint. In this situation, the number of visits with nonemergency complaints would exceed the number of visits with primary care–treatable diagnoses. Therefore, we compared the proportion of ED visits with primary care–treatable diagnoses based on the ED discharge diagnosis to the proportion of ED visits with nonemergency complaints based on the reason for the visit. In addition, we calculated descriptive statistics for nonemergency-complaint ED visits, presenting frequencies, and proportions.

We report actual ED visits from the hospitals included in the NHAMCS sample, national estimates based on the survey visit weights, and 95% confidence intervals based on standard errors provided by NHAMCS. The analyses follow recommendations on the NHAMCS website for using the survey weights in the dataset to extrapolate from the dataset to all ED visits in the United States.¹¹ Confidence intervals were calculated using standard methods for survey data collected with stratified sampling, based on weights provided by NHAMCS.³⁰

All estimates conform to NCHS standards.¹¹ Unweighted estimates based on fewer than 30 records are considered unreliable by NCHS and are marked with a footnote. Estimates were sufficiently precise with a single year of data to avoid the need to combine multiple years of NHAMCS data, which would have added complexity to the analyses given the changes in variable definitions (eg, triage category) over time. All analyses were performed using SAS statistical software version 9.2 (SAS Institute Inc) and SUDAAN version 10.0 (RTI International).

RESULTS

The 2009 NHAMCS data set contains 34 942 records, each representing a unique ED visit. Of these visits, an estimated 6.3% (95% CI, 5.8%-6.7%) had primary care–treatable diagnoses based on the ED discharge diagnosis and on our modification of the algorithm. How-

ever, the presenting complaints associated with the ED visits (ie, nonemergency complaints) were also the presenting complaints for 88.7% (95% CI, 88.1%-89.4%) of all ED visits, reflecting poor correspondence between ED discharge diagnosis and chief complaint.

These findings were similar for age-stratified subgroups. For children younger than 18 years, 5.5% (95% CI, 4.7%-6.3%) had primary care–treatable diagnoses and 90.0% (95% CI, 88.6%-91.1%) had nonemergency complaints. For adults 65 years or older, 3.2% (95% CI, 2.8%-3.8%) had pri-

Table 2. Severity of Illness Characteristics Associated With Original “Primary Care–Treatable” Diagnoses and “Nonemergency Complaint” ED Visits, NHAMCS 2009

Vital Signs ^b	“Primary Care–Treatable” Diagnoses		“Nonemergency Complaint” ED Visits	
	No. of Unweighted ED Visit Records (n = 2212) ^a	Weighted Proportion (95% CI), %	No. of Unweighted ED Visit Records (n = 30 827) ^a	Weighted Proportion (95% CI), %
Respiratory rate				
Normal	787	36.1 (32.8-39.4)	10 038	33.5 (31.7-35.3)
Abnormal	1336	60.1 (56.8-63.4)	19 307	61.8 (59.9-63.8)
Missing	89	3.8 (2.6-5.0)	1482	4.7 (3.2-6.1)
Heart rate				
Normal ^b	1741	77.7 (74.7-80.6)	22 378	71.9 (69.9-74.0)
Abnormal ^b	343	16.1 (14.0-18.3)	6605	21.8 (20.8-22.8)
Missing	128	6.2 (3.3-9.0)	1844	6.2 (3.8-8.7)
Blood pressure				
Normal ^b	1303	58.9 (55.5-62.4)	16 665	52.7 (51.2-54.1)
Abnormal ^b	642	28.5 (25.6-31.5)	10 302	34.2 (32.7-35.8)
Missing	267	12.6 (10.3-14.8)	3858	13.1 (11.3-14.9)
Pulse oximetry				
Normal	1769	78.8 (74.5-83.2)	24 337	77.5 (74.1-81.1)
Abnormal	76	3.7 (1.9-5.5)	1904	6.6 (5.3-7.9)
Missing	367	17.5 (13.3-21.7)	4586	15.9 (12.5-19.3)
Temperature				
Normal	2086	93.9 (92.1-95.6)	27 530	88.4 (86.9-89.9)
Abnormal ^c	47	2.0 (1.3-2.6)	1745	6.1 (5.5-6.7)
Missing	79	4.2 (2.4-6.0)	1552	5.5 (4.0-7.0)
All vital signs				
All normal	285	12.6 (10.5-14.7)	3265	10.4 (9.5-11.2)
Any abnormal	1689	76.8 (74.5-79.2)	24 612	79.7 (78.2-81.3)
All missing	238	10.6 (9.0-12.1)	2950	9.9 (8.3-11.5)
Mode of arrival				
Ambulance ^b	116	5.8 (4.3-7.2)	4289	13.8 (12.8-14.8)
Other ^b	1975	88.5 (86.2-90.8)	25 000	81.2 (80.0-82.5)
Missing/unknown	121	5.8 (4.3-7.2)	1538	5.0 (3.8-6.2)
Pain scale				
0-5	802	34.8 (30.7-38.8)	11 906	38.0 (35.7-40.3)
6-10	899	41.3 (37.6-45.0)	11 623	38.0 (35.9-40.1)
Missing	511	23.9 (19.6-28.2)	7298	24.0 (20.6-27.4)

Abbreviations: NHAMCS, National Hospital Ambulatory Medical Care Survey; ED, emergency department.

^aNumber of records in the data set for each type of category (unweighted). Proportions, however, are calculated using survey weights.

^bThe range of normal for breaths per minute is 30 to 60 for those younger than 1 year, 24 to 40 for those aged 1 to 2 years; 22 to 34 for those older than 2 to 5 years, 18-30 for those older than 6 to 12 years, and 12-16 for adults. The range of normal for heart beats per minute is 100-160 for those younger than 1 year, 90 to 150 for aged 1 year to 2, 80 to 140 for those older than 2 to 5 years, 70 to 120 for those older than 6 to 12 years, and 60 to 100 for adults. The range of normal systolic blood pressure is 60 mm Hg for neonates up to 28 days, 70 to 90 mm Hg for infants 1 month to 1 year, 70 to 95 mm Hg for children 1 to 8 years, and 60 to 90 mm Hg for adults. Values that fell outside (above or below) these ranges were considered abnormal. Abnormal temperature was defined as a recorded temperature above 38°C/100.4°F.

^cIndicates significant difference between the visits with primary care–treatable diagnoses and nonemergency-complaint ED visits.

primary care–treatable diagnoses and 86.9% (95% CI, 85.8%-88.1%) had nonemergency complaints. (See eTables 1 and 2 for additional age-stratified results, which are available at <http://www.jama.com>.)

Of the ED visits for chief complaints that were identical to chief complaints generated by the group of ED visits with primary care–treatable diagnoses, 11.1% (95% CI, 9.3%-13.0%) had been triaged as needing im-

mediate or emergency care; 3.7% (95% CI, 3.4%-4.1%) of patients had been seen in the same ED within the last 72 hours; and 2.1% (95% CI, 1.7%-2.5%) had been discharged from a hospital within the past 7 days (TABLE 1). In addition, 79.7% patients (95% CI, 78.2%-81.3%) had at least 1 abnormal triage vital sign recorded. Although the most common vital sign abnormalities were respiratory rate (61.8%, 95% CI, 59.9%-63.8%) and blood pressure (34.2%, 95% CI, 32.7%-35.8%), patients presented with abnormal heart rates at 21.8% (95% CI, 20.8%-22.8%) of visits, were hypoxic at 6.6% (95% CI, 5.3%-7.9%) of visits, and were either hypothermic or hyperthermic at 6.1% (95% CI, 5.5-6.7) of visits. The mode of arrival to the ED for 13.8% (95% CI, 12.8%-14.8%) of patients with nonemergency complaints was by ambulance, and 38% (95% CI, 35.9%-40.1%) reported pain scales of 6 or higher (TABLE 2).

Regarding disposition of patients with nonemergency-complaint ED visits, 12.5% (95% CI, 11.8%-14.3%) were admitted to the hospital. Of admitted patients, 11.2% (95% CI, 9.5%-12.9%) were admitted to a critical care unit, 22.9% (95% CI, 18.4%-27.4%) required step-down or telemetry monitoring, 3.4% (95% CI, 2.5%-4.3%) required the operating room, and 7.0% (95% CI, 5.7%-8.4%) were admitted to an observation unit (TABLE 3).

There were 192 different primary care–treatable diagnoses (eTable 3) and 304 nonemergency complaints (eTable 4) represented. “Unspecified disorder of the teeth and gums” was the most common primary care–treatable diagnosis and accounted for 11.6% of ED visits with primary care–treatable diagnoses. The 3 most common non-emergency complaints (TABLE 4) were toothache (10.05%); skin rash (5.99%); and abdominal pain, cramps, or spasms (5.03%); other nonemergency chief complaints were as variable as skin itching, insect bite, ingrown nail, foreign body to eye, migraine headache, blood in stool, and symptoms of labor. For patients with nonemergency-complaint ED visits, the 3 most common diagno-

Table 3. Disposition and Admitted Patients Location for “Nonemergency-Complaint” Emergency Department Visits, NHAMCS 2009

	“Nonemergency-Complaint” ED Visits	
	No. of Unweighted ED Visit Records (n = 30 087) ^a	Weighted Proportion (95% CI), %
Disposition		
Admitted to hospital or observation unit	4027	12.5 (11.8-14.3)
Discharged	25 190	82.4 (81.1-83.7)
Left against medical advice	261	0.7 (0.6-0.9)
No answer	423	1.4 (1.2-1.6)
Transfer	461	1.3 (1.0-1.6)
Left before or after medical screening examination	441	1.5 (1.2-1.9)
DOA/died in ED ^b	24	
Admitted patients location		
Critical care unit	413	11.2 (9.5-12.9)
Stepdown/telemetry unit	894	22.9 (18.4-27.4)
Operating room	158	3.4 (2.5-4.3)
Mental health/substance use detoxification	103	1.8 (1.1-2.6)
Cardiac catheterization laboratory ^b	26	
Other bed/unit	1677	40.5 (36.8-44.3)
Observation unit	325	7.0 (5.7-8.4)
Location unknown	431	12.5 (9.1-16.0)

Abbreviations: ED, emergency department; NHAMCS, National Hospital Ambulatory Medical Care Survey.
^aNumber of records in the data set for each type of category (unweighted). Proportions, however, are calculated using survey weights.

^bFewer than 30 records is considered an imprecise record by the National Center for Health Statistics.

Table 4. Ten Most Common Reasons for Visit for “Nonemergency Complaints” Associated With “Primary Care–Treatable” Diagnoses, NHAMCS 2009

Reason for Visit	No. of Unweighted ED Visit Records (n = 2212) ^a	Weighted Proportion (95% CI), %
Toothache	202	10.05 (7.92-12.18)
Skin rash	139	5.99 (4.67-7.31)
Abdominal pain, cramps, spasms, not otherwise specified	102	5.03 (3.77-6.29)
Earache, pain	103	4.27 (3.46-5.08)
Fever	47	2.24 (1.46-3.02)
Uterine and vaginal bleeding	47	2.23 (1.33-3.13)
Hip pain, ache, soreness, discomfort	37	2.04 (1.16-2.92)
Diarrhea	49	1.93 (1.19-2.67)
Chest pain	34	1.75 (0.86-2.64)
Other diseases of the skin	29 ^b	1.51 (0.90-2.12)
Other	1423	62.96 (60.28-65.62)
Total	2212	100

Abbreviations: ED, emergency department; NHAMCS, National Hospital Ambulatory Medical Care Survey.
^aNumber of records in the data set for each type of category (unweighted). Proportions, however, are calculated using survey weights.

^bFewer than 30 records is considered an imprecise record by the National Center for Health Statistics.

ses identified were abdominal pain or unspecified site, acute respiratory infection, and chest pain, unspecified (TABLE 5).

Because our analysis was conducted in aggregate, it was possible that a subset of primary care–treatable diagnoses might be concordant with chief complaints and thus appropriate targets for discouraging ED use. Therefore, we used the same techniques described above to analyze some of the most common primary care–treatable diagnoses individually (unspecified disorder of the teeth and supporting structures, diarrhea, and esophageal reflux). Each of these common diagnoses was associated with 20 or more nonemergency complaints. In turn, these nonemergency-complaint visits were associated with 29 to more than 300 distinct discharge diagnoses with a wide range of clinical severity, consistent with our overall study findings.

COMMENT

Patients present to the ED with chief complaints, symptoms, and signs, but not with discharge diagnoses. For a list of ED discharge diagnoses to be considered a nonemergency, the ED discharge diagnoses must be predictable based on chief complaint information available at triage. Our study illustrates the challenges of mapping from discharge diagnosis to chief complaint. Although only 6.3% of ED visits had primary care–treatable discharge diagnoses, the chief complaints reported for these visits encompassed 88.7% of all ED visits. If a triage nurse were to redirect patients away from the ED based on nonemergency complaints, 93% of the redirected ED visits would not have had primary care–treatable diagnoses. Adding vital signs to the decision rule would add little discriminatory power because 79.7% of ED visits with nonemergency complaints had abnormal vital signs, including 76.8% of ED visits with primary care–treatable diagnoses and 80.0% with other diagnoses.

These results highlight the flaws of a conceptual framework that fails to dis-

tinguish between information available at arrival in the ED and information available at discharge from the ED. The results call into question reimbursement policies that deny or limit payment based on discharge diagnosis. Attempting to discourage patients from using the ED based on the likelihood that they would have nonemergency diagnoses risks sending away patients who require emergency care.³¹⁻³⁶ The majority of Medicaid patients, who stand to be disproportionately affected by such policies, visit the ED for urgent or more serious problems.³⁷

Our results are in keeping with the original intention of the ED algorithm, which does not classify specific

diagnoses as nonemergency or as primary care treatable in the way that policy makers have attempted to do.⁶ Instead, as the developers of the algorithm acknowledge, “few diagnostic categories are clear cut in all cases.”¹⁵ A discharge diagnosis related to a given ED visit can be in each of multiple categories (based on the initial complaint, vital signs, resources used in the ED that have been mapped to the discharge diagnosis),¹⁹ highlighting the complexity of the issue.

A limitation of this study is the choice of the algorithm as the basis for classifying ED visits as nonemergency. In theory, a different list of nonemergency diagnoses might correspond bet-

Table 5. Twenty-five Most Common Discharge Diagnoses Associated With “Nonemergency-Complaint” ED Visits, NHAMCS 2009^a

Diagnosis	No. of Unweighted ED Visit Records (n = 30 827) ^a	Weighted Proportion (95% CI), %
Abdominal pain, unspecified site	1068	3.60 (3.23-3.97)
Acute upper respiratory infections	842	2.87 (2.51-3.23)
Chest pain, unspecified	862	2.75 (2.41-3.09)
Sprains and strains, unspecified	733	2.35 (2.07-2.63)
Fever, unspecified	535	2.04 (1.65-2.43)
Left before seen/walked out/not seen	594	1.99 (1.60-2.38)
Urinary tract infection, unspecified	535	1.71 (1.52-1.90)
Unspecified otitis media	500	1.67 (1.37-1.97)
Headache	468	1.53 (1.33-1.73)
Missing	258	1.49 (0.19-2.79)
Other unknown and unspecified cause of morbidity and mortality	433	1.46 (1.24-1.68)
Pneumonia, organism unspecified	396	1.37 (1.17-1.57)
Acute pharyngitis	405	1.34 (1.18-1.50)
Backache, unspecified	341	1.14 (0.94-1.34)
Bronchitis, not specified as acute or chronic	286	1.02 (0.81-1.23)
Head injury, unspecified	297	1.00 (0.81-1.19)
Other and unspecified noninfectious gastroenteritis and colitis	319	0.99 (0.82-1.16)
Lumbago	303	0.98 (0.82-1.14)
Syncope and collapse	297	0.95 (0.79-1.11)
Vomiting alone	278	0.94 (0.80-1.08)
Acute bronchitis	290	0.92 (0.73-1.11)
Influenza with other respiratory manifestations	254	0.91 (0.64-1.18)
Other cellulitis and abscess	245	0.9 (0.71-1.09)
Migraine, unspecified	257	0.84 (0.56-1.12)
Unspecified disorder of the teeth and supporting structures	249	0.82 (0.65-0.99)
Asthma, unspecified with acute exacerbation	251	0.81
Open wound of fingers	247	0.82

Abbreviations: ED, emergency department; NHAMCS, National Hospital Ambulatory Medical Care Survey.

^aNumber of records in the data set for each type of category (unweighted). Proportions, however, are calculated using survey weights.

ter with chief complaints. We chose to use the ED algorithm because—despite the intent of the algorithm's developers—the algorithm has been modified for this purpose and had been developed more rigorously than other proposed nonemergency diagnosis lists.

We used 2 methodological strategies to try to optimize the classification system. First, in selecting ED visits with nonemergency diagnoses based on the ED discharge diagnosis, we also limited the visits to those that did not result in hospital admission. Second, in using the algorithm, we selected only diagnoses that, in the algorithm classification system, had 100% probability of not requiring care in the ED. Had we chosen to classify visits less conservatively as other authors have—for example by including visits with low probability (but not 0 probability) of needing ED care in our sample—it is likely that our results would reflect final diagnoses and ED visit characteristics of even greater severity. A list of nonemergency diagnoses such as the one recently proposed in Washington state,^{10,12} which includes some diagnoses that the algorithm classifies as having substantial risk of requiring ED care, is likely to have worse performance than the approach we tested.

A second potential limitation of our study is that the only triage information we used was the patient's chief complaint. It is possible that a combination of chief complaint and vital signs could map to diagnoses in a more helpful manner. However, previous attempts at developing triage decision rules based on chief complaint and vital signs have not succeeded.^{31,32} In addition, the majority of current state proposals to deny or limit Medicaid payments for ED visits use discharge diagnosis alone and do not incorporate other patient characteristics such as vital signs. A payment system that used vital signs as well as diagnosis would require more complex billing data sets and information technology than currently exist. Given the lack of alternative approaches, we anticipate that there will be further attempts to discourage

ED use through retroactive denial for nonemergency diagnoses.

A complex interplay of community, patient, and health system factors influence ED use.³⁸⁻⁴⁰ Strategies aimed narrowly at reducing such use are unlikely to improve population health or to reduce health system costs.^{41,42} Instead, a more innovative and sustainable path forward is through policies that allow for the creation of integrated systems of health and community care through which risk is shared and resources are allocated rationally. It is possible that other diagnosis lists may correspond better with chief complaints that do not occur in true emergencies. Policymakers who are considering such approaches that involve lists of diagnoses may wish to use our rather simple methods to evaluate the proposed lists prior to implementation.

In conclusion, among ED visits with the same presenting complaint as those ultimately given a primary care-treatable diagnosis based on ED discharge diagnosis, a substantial proportion required immediate emergency care or hospital admission. The limited correspondence between presenting complaint and ED discharge diagnoses suggests that these discharge diagnoses are unable to accurately identify nonemergency ED visits.

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Study concept and design: Raven, Lowe, Hsia.

Acquisition of data: Maselli, Hsia.

Analysis and interpretation of data: All authors.

Drafting of the manuscript: Raven, Hsia.

Critical revision of the manuscript for important intellectual content: All authors.

Statistical analysis: Maselli, Hsia.

Obtained funding: Raven, Lowe, Hsia.

Administrative, technical, or material support: Hsia.

Study supervision: Hsia.

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Online-Only Material: eTables 1 through 4 are available at <http://www.jama.com>.

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