
Emergency department usage by uninsured patients in Galveston County, Texas

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The number of uninsured Texas residents who rely on the medical emergency department as their primary health care provider continues to increase. Unfortunately, little information about the characteristics of this group of emergency department users is available. Using an administrative billing database, we conducted a descriptive study to examine the demographic and clinical features of 17,110 consecutive patients without medical insurance who presented to the emergency department of the University of Texas Medical Branch in Galveston over a 12-month period. We also analyzed the risk of multiple emergency department visits or hospitalization according to demographic characteristics. Twenty percent of the study population made two or more emergency department visits during the study period; 19% of the population was admitted to the hospital via the emergency department. The risk of multiple emergency department visits was significantly elevated among African Americans and increased in a stepwise fashion according to age. The risk of being hospitalized was significantly reduced among females, African Americans, and Hispanics. There was an age-related monotonic increase in the risk of hospitalization. Abdominal pain, cellulitis, and spinal disorders were the most common primary diagnoses in patients who made multiple emergency department visits. Hospitalization occurred most frequently in patients with a primary diagnosis of chest pain, nonischemic heart disease, or an affective disorder. Additional studies of emergency department usage by uninsured patients from other regions of Texas are warranted. Such data may prove helpful in developing effective community-based alternatives to the emergency department for this growing segment of our population. Local policymakers who are responsible for the development of safety net programs throughout the state should find this information particularly useful.

Since the US Census Bureau began providing state-level estimates of health insurance coverage in 1987, the state of Texas has consistently had one of the highest rates of uninsured residents in the nation (1). Current estimates, based on 3-year averages for 2004–2006, show that 24.1% of the Texas population (5.5 million residents) has no medical insurance (2). Several reports indicate that an increasing number of uninsured persons are using hospital emergency departments in metropolitan areas of Texas as their primary source of health care (3, 4). A recent analysis of emergency department usage patterns of 25 Houston metropolitan-area hospitals showed that

nearly 54% of all visits were related to primary care and that 33% of the primary care–related visits were made by uninsured patients (5). Such reliance on hospital emergency departments for basic health care contributes to the growing problem of emergency room overcrowding and is responsible for millions of dollars in uncompensated costs (6).

Developing effective statewide strategies to address the rising use of the emergency department by the uninsured requires a sound understanding of the general profile of this population. Unfortunately, little is known about the characteristics of uninsured emergency department users in Texas. This study was undertaken to ascertain the demographic and clinical features of a large population of uninsured patients who visited the emergency department of an academic medical center in Galveston, Texas, over a 12-month period. A second objective was to analyze the risk of frequent emergency department visits and hospitalization via the emergency department according to demographic characteristics.

METHODS

This was a retrospective cohort study of 17,110 consecutive patients without medical insurance who presented to the Emergency Room and Trauma Center of the University of Texas Medical Branch (UTMB) in Galveston, Texas, between September 1, 2005, and August 31, 2006. The UTMB emergency department serves as a regional level 1 trauma center for a nine-county area in southeast Texas and provides emergency care for the vast majority of indigent patients in Galveston County. The study was reviewed and approved by the UTMB institutional review board.

Data collection

The data source for our study was an administrative database maintained by the UTMB Department of Finance. We

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Table 1. Demographic characteristics of 17,110 consecutive uninsured patients treated in the emergency department (ED) over a 12-month period (Galveston, Texas, 2005–2006)

Characteristic	All patients No. (%)	Patients who were hospitalized		Patients with ≥ 2 ED visits	
		No. (%)	OR (95% CI)*	No. (%)	OR (95% CI)*
Total population	17,110 (100%)	3341 (100%)	—	3405 (100%)	—
Males	8356 (48.8%)	1814 (54.3%)	1.0 (referent)	1584 (46.5%)	1.0 (referent)
Females	8754 (51.2%)	1527 (45.7%)	0.7 (0.6–0.8)	1821 (53.5%)	1.1 (1.0–1.2)
Age group, years					
0–17	1438 (8.4%)	97 (2.9%)	1.0 (referent)	151 (4.5%)	1.0 (referent)
18–49	12,289 (71.8%)	2048 (61.3%)	2.7 (2.2–3.3)	2505 (73.5%)	2.2 (1.8–2.6)
≥ 50	3383 (19.8%)	1196 (35.9%)	7.3 (5.9–9.1)	749 (22.4%)	2.4 (2.0–2.9)
Race/ethnicity					
Non-Hispanic Caucasian	8845 (51.7%)	1959 (58.6%)	1.0 (referent)	1721 (50.5%)	1.0 (referent)
African American	3389 (19.8%)	652 (19.5%)	0.8 (0.7–0.9)	836 (24.6%)	1.4 (1.3–1.5)
Hispanic	4876 (28.5%)	730 (22.0%)	0.7 (0.6–0.8)	848 (24.9%)	0.9 (0.8–1.0)

*Odds ratios (OR) and 95% confidence intervals (CI) calculated using logistic regression. All odds ratios are adjusted for age, gender, and race/ethnicity.

used this database to determine each patient's primary diagnosis and demographic characteristics (age, gender, and ethnicity/race) and to identify those patients who made return visits to the emergency department during the study period as well as those who were admitted to the hospital directly from the emergency department. Patients insured by public programs (i.e., Medicaid or Medicare) were not included in the study. Each patient's primary diagnosis was established at the time of the emergency department visit and classified according to the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) (7). The individual ICD-9-CM codes were then grouped into the broader primary diagnosis categories used in the National Hospital Ambulatory Medical Care Survey (8).

Statistical analysis

Statistical analyses were conducted using SAS software, version 8.2 (SAS Institute, Cary, NC). Descriptive statistics, including percentages, were used to assess variation in the distribution of primary diagnoses, return emergency department visits, and hospitalizations according to gender, age, and race/ethnicity. Logistic regression analysis was used to assess the association of demographic factors with the risk of multiple emergency department visits or hospitalization and to calculate adjusted prevalence odds ratios (OR) and corresponding 95% confidence intervals (CI). Both logistic regression models were adjusted for gender, age, and race/ethnicity.

RESULTS

Demographic characteristics

Of the 57,892 patients who visited the UTMB emergency department during the 12-month study period, 29.5% (N = 17,110) did not have medical insurance. *Table 1* shows the demographic characteristics of the uninsured study population. The proportion of emergency department visits did not vary

significantly by gender (48.8% males vs 51.2% females). Nearly three quarters of emergency department visits (71.8%) were made by patients who were 18 to 49 years of age. Racial/ethnic groups with the highest proportion of visits were non-Hispanic Caucasians (51.7%) and Hispanics (28.5%). Two or more emergency department visits were made by 19.9% of the patients (n = 3405) during the study period. The risk of multiple visits was significantly elevated

among African Americans (OR, 1.4; 95% CI, 1.3–1.5) and increased in a stepwise fashion according to age (*Table 1*). Similarly, 19.5% of the patients (n = 3341) were hospitalized directly from the emergency department. The risk of hospitalization was significantly reduced among females (OR, 0.7; 95% CI, 0.6–0.8), African Americans (OR, 0.8; 95% CI, 0.7–0.9), and Hispanics (OR, 0.7; 95% CI, 0.6–0.8) and increased in a stepwise fashion according to age (*Table 1*).

Primary diagnoses

Table 2 lists the 10 most common primary diagnosis categories for all emergency department visits made by the total study population. Infections (cellulitis, urinary tract infection, and acute upper respiratory infection) accounted for three of the top 10 primary diagnosis groups, pain-related conditions (abdominal pain and chest pain) accounted for two groups, and injuries (fractures and open wounds) accounted for another two. The remaining categories included spinal disorders, affective disorders, and arthritis. The five categories that most frequently resulted in hospitalization were chest pain, nonischemic heart disease, affective disorders, cellulitis, and fractures. The five primary diagnosis categories most frequently associated with return emergency department visits for the total study population were cellulitis, abdominal pain, chest pain, spinal disorders, and nonischemic heart disease (*Table 2*).

Gender. With only a few exceptions, there was little gender variability in the distribution of the 10 most common primary diagnosis categories (*Table 2*). Cellulitis ranked first among males but only fourth among females. Abdominal pain ranked first among females but only fourth among males. The open wounds category ranked fifth among males but was not among the top 10 categories for females. The five primary diagnosis categories that most frequently resulted in hospitalization were identical for males and females, although there were relatively minor variations in their order of frequency. A comparison

Table 2. Percent distribution, according to gender, of leading primary diagnosis categories among uninsured patients for all emergency department (ED) visits, ED visits resulting in hospitalization, and return ED visits for same condition*

Total population		Males		Females	
All ED visits					
n = 22,670		n = 10,936		n = 11,734	
1. Abdominal pain	6.2%	1. Cellulitis	6.6%	1. Abdominal pain	8.0%
2. Cellulitis	5.2%	2. Spinal disorders	5.3%	2. Chest pain	5.2%
3. Chest pain	5.1%	3. Chest pain	5.1%	3. Spinal disorders	4.9%
4. Spinal disorders	5.1%	4. Abdominal pain	4.2%	4. Cellulitis	3.9%
5. Arthritis, excluding back	3.1%	5. Open wound, excluding head	3.8%	5. Urinary tract infection	3.4%
6. Fractures, excluding lower limb	2.6%	6. Fractures, excluding lower limb	3.5%	6. Arthritis, excluding back	3.2%
7. Open wound, excluding head	2.4%	7. Arthritis, excluding back	3.0%	7. Acute upper respiratory infection, excluding pharyngitis	2.0%
8. Urinary tract infection	2.0%	8. Alcohol/substance abuse	2.4%	8. Affective disorders	2.0%
9. Affective disorders	1.9%	9. Affective disorders	1.9%	9. Fractures, excluding lower limb	1.7%
10. Acute upper respiratory infection, excluding pharyngitis	1.8%	10. Contusion with intact skin surface	1.7%	10. Contusion with intact skin surface	1.1%
ED visits resulting in hospitalization					
n = 4006		n = 2147		n = 1859	
1. Chest pain	15.6%	1. Chest pain	12.7%	1. Chest pain	18.9%
2. Heart disease, excluding ischemic	5.0%	2. Heart disease, excluding ischemic	5.3%	2. Heart disease, excluding ischemic	4.7%
3. Affective disorders	3.9%	3. Cellulitis	4.2%	3. Affective disorders	4.0%
4. Cellulitis	3.5%	4. Fractures, excluding lower limb	3.8%	4. Cellulitis	2.6%
5. Fractures, excluding lower limb	2.8%	5. Affective disorders	3.7%	5. Fractures, excluding lower limb	1.7%
Return ED visits for same condition					
n = 1706		n = 869		n = 837	
1. Cellulitis	9.6%	1. Cellulitis	12.2%	1. Abdominal pain	9.1%
2. Abdominal pain	7.9%	2. Abdominal pain	6.7%	2. Cellulitis	6.9%
3. Chest pain	6.4%	3. Chest pain	6.7%	3. Chest pain	6.2%
4. Spinal disorders	4.7%	4. Spinal disorders	6.0%	4. Urinary tract infection	5.3%
5. Heart disease, excluding ischemic	3.6%	5. Alcohol/substance abuse	5.2%	5. Spinal disorders	3.3%

*Results based on total number of ED visits during study period, including ≥2 visits by 3405 patients.

of the five diagnoses most commonly associated with return emergency department visits also showed only minor gender variability. Alcohol/substance abuse was among the top five categories for return visits among males but not for females, whereas urinary tract infection was among the top five categories for females but not for males.

Age. As expected, there were a number of differences in the distribution of the primary diagnosis categories according to age (Table 3). Acute respiratory infection and otitis media

were the highest-ranking diagnostic categories in patients younger than 18 years but were not among the top 10 primary diagnosis categories for older age groups. Abdominal pain ranked first among patients aged 18 to 49 years and second among patients ≥50 years of age, but ranked only ninth among the pediatric population. Of the five diagnostic categories that most frequently resulted in hospitalization, the most noteworthy differences across age groups were the presence of asthma exclusively in patients aged 0 to 17 years and the presence of pneumonia only in patients ≥50 years of age. Of the five categories most frequently associated with return visits to the emergency department, otitis media and asthma were observed only in the youngest age group, whereas alcohol/substance abuse was observed only in the group aged 18 to 49 years.

Race/ethnicity. Analysis of the distribution of the 10 most common primary diagnosis categories according to race/ethnicity showed that cellulitis ranked highest among non-Hispanic Caucasians but only ranked third among Hispanics and African Americans (Table 4). Several mental health conditions (affective disorders and alcohol/substance abuse disorders) were among the leading diagnostic categories in non-Hispanic Caucasians but not among Hispanics or African Americans. Psychiatric conditions (i.e., affective disorders and psychotic disorders) accounted for two of the five diagnostic categories that most frequently resulted in hospitalization in African Americans and one of the categories (i.e., affective disorders) in non-Hispanic Caucasians. Of the five categories most frequently associated with return visits to the emergency department, alcohol/substance abuse was observed exclusively among non-Hispanic Caucasians, urinary tract infection and nonischemic heart disease among Hispanics, and asthma among African Americans.

Table 3. Percent distribution, according to age group, of leading primary diagnosis categories among uninsured patients for all emergency department (ED) visits, ED visits resulting in hospitalization, and return ED visits for same condition*

Age 0–17 years		Age 18–49 years		Age ≥50 years	
All ED visits					
n = 1616		n = 16,399		n = 4655	
1. Acute upper respiratory infection, excluding pharyngitis	6.6%	1. Abdominal pain	6.8%	1. Chest pain	8.2%
2. Otitis media	6.6%	2. Cellulitis	5.6%	2. Abdominal pain	5.0%
3. Cellulitis	4.5%	3. Spinal disorders	5.5%	3. Spinal disorders	4.7%
4. Fractures, excluding lower limb	4.5%	4. Chest pain	4.7%	4. Cellulitis	4.1%
5. Open wound, excluding head	4.1%	5. Arthritis, excluding back	3.0%	5. Arthritis, excluding back	3.8%
6. Contusion with intact skin surface	3.5%	6. Fractures, excluding lower limb	2.6%	6. Heart disease, excluding ischemic	3.2%
7. Pyrexia, unknown origin	2.8%	7. Open wound, excluding head	2.5%	7. Urinary tract infection	2.0%
8. Open wound, head	2.8%	8. Affective disorders	2.2%	8. Fractures, excluding lower limb	1.7%
9. Abdominal pain	2.7%	9. Urinary tract infection	2.1%	9. Pneumonia	1.5%
10. Superficial injury	2.4%	10. Alcohol/substance abuse	1.9%	10. Affective disorders	1.4%
ED visits resulting in hospitalization					
n = 100		n = 2410		n = 1496	
1. Cellulitis	13.0%	1. Chest pain	14.1%	1. Chest pain	19.1%
2. Affective disorders	11.0%	2. Affective disorders	4.9%	2. Heart disease, excluding ischemic	7.6%
3. Alcohol/substance abuse	6.0%	3. Cellulitis	3.9%	3. Pneumonia	3.4%
4. Fractures, excluding lower limb	4.0%	4. Fractures, excluding lower limb	3.9%	4. Cellulitis	2.1%
5. Asthma	4.0%	5. Heart disease, excluding ischemic	3.6%	5. Affective disorders	1.8%
Return ED visits for same condition					
n = 58		n = 1253		n = 395	
1. Otitis media	20.7%	1. Cellulitis	10.7%	1. Chest pain	9.6%
2. Cellulitis	10.3%	2. Abdominal pain	8.5%	2. Heart disease, excluding ischemic	8.6%
3. Asthma	6.9%	3. Chest pain	5.7%	3. Abdominal pain	7.1%
4. Open wound, excluding head	6.9%	4. Spinal disorders	5.0%	4. Cellulitis	6.1%
5. Acute upper respiratory infection, excluding pharyngitis	6.9%	5. Alcohol/substance abuse	3.3%	5. Spinal disorders	4.3%

*Results based on total number of ED visits during study period, including ≥2 visits by 3405 patients.

DISCUSSION

Understanding the association between patient characteristics and emergency department use is essential to developing policies and allocating resources to effectively alleviate emergency room overcrowding while improving access to alternative sources of health care. Surprisingly, descriptive studies of

uninsured emergency department users are sparse and have typically focused on subgroups, such as patients who make multiple visits (9, 10) or are seeking nonurgent primary care (11, 12). Our analysis of more than 17,000 consecutive patients who made over 22,000 emergency department visits during a 12-month period provides a detailed demographic and clinical profile of uninsured emergency department users in the Gulf Coast region of southeast Texas.

The typical uninsured emergency department user in our cohort was a non-Hispanic Caucasian aged 18 to 49 years. Males and females were equally likely to utilize emergency department services. It should be noted that some variation in the demographic makeup of uninsured emergency department users in other areas of Texas is likely because of regional population differences and other local factors. Substantial variation in patient demographics has been reported even among hospital emergency departments located within a 50-mile radius of one another (13, 14).

All but three of the 10 leading primary diagnosis categories in our cohort were also among the top 10 categories observed in the most recent national survey of visits to US emergency departments (8). The three leading primary diagnostic categories observed in our cohort but not in the 2005 National Hospital Ambulatory Medical Care Survey report included arthritis (excluding back), urinary tract infection, and affective disorders, whereas the three leading categories observed in the national survey but not in our population were contusion with intact skin surface, sprains and strains (excluding ankle and back), and sprains and strains of neck and back. These observations suggest that the uninsured visit emergency departments for treatment of many of the same medical conditions as the general US population.

Table 4. Percent distribution, according to race/ethnicity, of leading primary diagnosis categories among uninsured patients for all emergency department (ED) visits, ED visits resulting in hospitalization, and return ED visits for same condition*

Non-Hispanic Caucasian		Hispanic		African American	
All ED visits					
n = 11,718		n = 6126		n = 4826	
1. Cellulitis	5.8%	1. Abdominal pain	8.5%	1. Chest pain	5.7%
2. Abdominal pain	5.7%	2. Chest pain	4.5%	2. Spinal disorders	5.3%
3. Spinal disorders	5.6%	3. Cellulitis	4.3%	3. Cellulitis	5.0%
4. Chest pain	5.2%	4. Spinal disorders	3.9%	4. Abdominal pain	4.4%
5. Fractures, excluding lower limb	3.1%	5. Arthritis, excluding back	2.8%	5. Arthritis, excluding back	3.8%
6. Arthritis, excluding back	3.0%	6. Urinary tract infection	2.8%	6. Acute upper respiratory infection, excluding pharyngitis	2.7%
7. Affective disorders	2.9%	7. Open wound, excluding head	2.4%	7. Open wound, excluding head	2.5%
8. Alcohol/substance abuse	2.6%	8. Fractures, excluding lower limb	2.4%	8. Pneumonia	2.3%
9. Open wound, excluding head	2.3%	9. Pneumonia	2.0%	9. Urinary tract infection	2.1%
10. Urinary tract infection	1.6%	10. Acute upper respiratory infection, excluding pharyngitis	1.9%	10. Asthma	1.9%
ED visits resulting in hospitalization					
n = 2334		n = 841		n = 831	
1. Chest pain	14.1%	1. Chest pain	16.5%	1. Chest pain	18.7%
2. Affective disorders	5.1%	2. Heart disease, excluding ischemic	4.2%	2. Heart disease, excluding ischemic	7.6%
3. Heart disease, excluding ischemic	4.4%	3. Cellulitis	3.3%	3. Cellulitis	2.8%
4. Cellulitis	3.8%	4. Fractures, excluding lower limb	2.6%	4. Affective disorders	2.6%
5. Fractures, excluding lower limb	3.2%	5. Abdominal pain	1.8%	5. Psychotic disorders	2.6%
Return ED visits for same condition					
n = 922		n = 347		n = 437	
1. Cellulitis	11.5%	1. Abdominal pain	11.0%	1. Chest pain	7.8%
2. Abdominal pain	7.7%	2. Cellulitis	7.8%	2. Cellulitis	7.1%
3. Chest pain	6.3%	3. Urinary tract infection	6.1%	3. Asthma	5.9%
4. Spinal disorders	5.0%	4. Chest pain	5.2%	4. Abdominal pain	5.7%
5. Alcohol/substance abuse	4.9%	5. Heart disease, excluding ischemic	3.5%	5. Spinal disorders	5.5%

*Results based on total number of ED visits during study period, including ≥2 visits by 3405 patients.

well as uninsured emergency department users (9, 10, 16, 17). An analysis of emergency department use at a public teaching hospital in San Francisco showed that the relative risk of frequent use was also high among Native Americans and low among Asian Americans and Hispanics (9). A study of pediatric emergency department use in the Hawaiian Islands found that the risk of frequent use was significantly elevated among Polynesian ethnic groups (19). Although the reasons for these racial/ethnic variations in the risk of frequent emergency department use are unknown, socioeconomic as well as cultural differences may be contributing factors (9, 19). Racial/ethnic differences in the distribution of chronic diseases may also be a factor, but analyses of disease distribution in our cohort provided little evidence to support that hypothesis.

While some studies have found that men are far more likely to be frequent emergency department users (9, 15), other investigations—including our own—have observed a slightly higher likelihood of frequent use among women (16, 18, 20). Several studies have observed that frequent users are more likely to be older than infrequent users (18, 21). Our study showed a progressive increase in the risk of repeat visits according to age, with the highest risk (OR, 2.4) in patients ≥50 years of age. In contrast, Mandelberg et al found the highest risk of frequent use in patients 30 to 59

years of age and a much lower risk in pediatric and geriatric patients (9). The conflicting results from these studies suggest that neither gender nor age is a reliable predictor of frequent emergency department use.

Other variables reported as being associated with frequent emergency department visits include homelessness, poverty, poor physical health, and poor mental health (9, 17, 18, 20, 22).

Although our administrative database did not permit us to identify the subgroup of our cohort who were homeless, Mandelberg et al found homelessness to be the demographic feature most predictive of frequent use, with a relative risk of 4.5 (9). Several studies have found a strong correlation between mental and substance abuse disorders and frequent use (15, 18, 20). In a separate analysis of our cohort, we found that uninsured patients with psychiatric disorders—especially those with bipolar disorder or a psychotic disorder—had a significantly higher risk of multiple emergency department visits than patients without mental health problems (22). Although there is a widely held belief that persons without health insurance are more likely to be frequent users than those with insurance, the results of most published studies do not support this notion (9, 16–18, 20, 21). In fact, several studies have found that publicly insured patients are far more likely to make multiple visits than uninsured or privately insured patients (9, 16, 17). It remains to be determined whether this finding holds true for Texas, with its very high rate of uninsured residents.

Our finding of a progressive, age-related increase in the risk of being admitted to the hospital from the emergency room is consistent with the results of several earlier studies (23, 24). Other variables that increased the likelihood of admission included male gender and non-Hispanic Caucasian racial classification. In light of recent reports that uninsured patients who present to emergency departments are less likely to be hospitalized than insured patients (23–26), further investigations to identify more precise predictors of admission are warranted.

Our study had several important limitations. As with any investigation that relies on an administrative database, we were unable to examine some of our cohort's behavioral and socioeconomic characteristics—such as homelessness—that may have affected the observed demographic disparities in disease distribution, repeat emergency department visits, and hospitalizations. Additionally, the billing database that we used did not permit us to incorporate the potential effects of comorbid conditions into our analyses. Because our study was limited to a population of uninsured emergency department users from a single institution serving a relatively small area of Texas, it is unclear if our findings can be generalized to other parts of the state.

This analysis suggests that demographic factors may be of value in predicting emergency department usage patterns and disposition in patients without medical insurance. Local policymakers who are responsible for the development of safety net programs throughout the state should find this information particularly useful. Access to more precise information on the demographic characteristics and diseases that are associated with emergency department use by the uninsured will ultimately permit more efficient planning of preventive services within the community. Our hope is that additional descriptive studies of uninsured emergency department users from other regions of Texas will be conducted. Such collective efforts have the potential to increase

our understanding of the complex factors associated with the use of emergency department services by this growing segment of our population.

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