Rutgers Center for State Health Policy

The Institute for Health, Health Care Policy and Aging Research

Potentially Avoidable Use of Hospital Emergency Departments in New Jersey

Derek DeLia, Ph.D.

A Report to the New Jersey Department of Health and Senior Services

July 2006

THE STATE UNIVERSITY OF NEW JERSEY
RUTGERS

Acknowledgements

The author gratefully acknowledges helpful comments and contributions received from a number of officials and staff within the Department of Health and Senior Services including Marilyn Dahl, Eddy Bresnitz, Barbara Montana, Vince Yarmlak, and John Hazel. The report also benefited from comments and conversations with Bruce Siegel at George Washington University. Finally, important contributions were made by Cecilia Huang, Joel Cantor, and Jeff Abramo at the Rutgers Center for State Health Policy.

Table of Contents

Potentially Avoidable Use of Hospital Emergency Departments in New Jersey

Derek DeLia, Ph.D.

Executive Summary

In line with national trends, New Jersey has experienced rapid growth in the volume of service provided by hospital emergency departments (ED's) in recent years. This trend has raised concern about the use of the ED for problems that are non-emergent or potentially preventable with access to primary care. Concern has also been raised about the effects of growing ED volume on hospital surge capacity that would be required to treat casualties from a natural or man-made disaster.

In response to these issues, the New Jersey Department of Health and Senior Services (NJDHSS) has commissioned the study "Emergency Department Utilization and Surge Capacity in New Jersey" to be conducted by the Rutgers Center for State Health Policy (CSHP). This document is the second of three project reports. The first report documented trends in ED utilization and hospital bed capacity using data from hospital cost reports, quarterly utilization reports, and Uniform Billing (UB) records containing information about inpatient admissions through the ED.

In 2004, the UB system began collecting data for non-admitted ED patients in addition to those admitted as inpatients from the ED. This report is based on the new UB data. It documents statewide volume of outpatient ED visits (i.e., ED visits by patients not admitted for inpatient care) overall, by expected payer, and by patient demographics. The report also documents the prevalence of outpatient ED visits for conditions that are either avoidable or treatable in primary care settings, using a classification algorithm developed at New York University. The frequency and population-based rates of ED use for these conditions are analyzed further by expected

payer, patient demographics, geographic region, and time of arrival at the ED. To provide a comprehensive picture of potentially avoidable ED utilization, the analysis also describes the prevalence and rate of inpatient admissions through the ED for ambulatory care sensitive (ACS) conditions, which are typically preventable when patients have access to timely and effective primary care. To better understand how source of payment affects patterns of ED use, the analysis also includes patterns of ED utilization in hospital charity care claims data.

The largest share (over 40%) of ED utilization without admission is attributable to privately insured patients followed by patients classified as self-pay/uninsured (greater than 20%). Approximately half of ED utilization leading to inpatient admission is attributable to Medicare patients. Patients who are privately insured account for the next largest share (approximately 30%) of inpatient ED volume. In both cases, the volume of ED care received by Medicaid patients may be understated because Medicaid managed care patients are often classified as having private insurance in Uniform Billing records. Similarly, Medicare managed care patients may also be classified as having private insurance. As a result, the volume of privately insured patients may be overstated.

The ED was the source of admission for 56% of all inpatient volume in New Jersey in 2004, a percentage that has been trending upward since 1998. As a result, a growing proportion of hospital admissions are unscheduled, making it more difficult to plan and prepare for incoming patient volume.

According to the NYU algorithm, almost one half (47%) of all ED visits without admission are potentially avoidable with improved access to primary care (i.e., these visits are classified as non-emergent, emergent but primary care treatable, or emergent/ED care needed/preventable-avoidable). ED patients most likely to have their visits (without admission) classified as potentially avoidable include children ages 4 and under and traditionally underserved populations – i.e., charity care, self-pay, Medicaid, non-Hispanic blacks, and Hispanics. Nevertheless, these patient groups do not account for the majority of potentially avoidable ED

visits. Because they account for a larger share of hospital utilization overall, patients who are adults, privately insured, and non-Hispanic white account for the largest shares of potentially avoidable ED visits without admission.

Approximately half of all non-admitted ED patients in New Jersey arrive for treatment between 8:00 AM and 5:00 PM, times that coincide with most physician offices' and health centers' hours of operation. This finding is consistent with data in other parts of the nation. In New Jersey, this pattern exists for most conditions treated in the ED including those that are sensitive to primary care access. Two exceptions are ED treatment for conditions related to alcohol or drug use where a larger percentage of visits occur in the evening or overnight. For visits occurring from 8 to 5, the true marginal costs (i.e., costs that are likely reducible with reduced utilization) of ED care for non-emergent conditions may be fairly high, since ED clinicians are likely to face competing demands for their attention. For the remaining visits that occur in the evening or overnight, the marginal costs may be lower.

The implications of potentially avoidable ED use on hospital surge capacity are somewhat mixed. Approximately 500,000 potentially avoidable ED visits are classified as non-emergent. Since critically ill or injured patients must be given priority, patients with non-emergent conditions are expected to wait for services (subject to state requirements that ED patients be seen by a physician within four hours of arrival). Patients with non-emergent conditions may also be referred elsewhere for care. However, large volumes of patients with non-emergent conditions could physically clog ED space and place strain on triage resources used to prioritize patients during a mass casualty event. Moreover, hospital staff must also take time to register these patients and gather information needed for medical and billing records.

In addition, approximately 650,000 ED visits are classified as potentially avoidable but emergent. While these visits may have been avoided with better access to primary care, once these patients arrive in the ED, their conditions have progressed to the point that they need care promptly. This care may require intensive use of clinical resources, in the ED and other areas.

These cases, although avoidable, may place a strain on emergency surge capacity if they were to occur during a major disaster. These visits add to the 241,000 ED visits that are classified as emergent and not avoidable. In addition, almost 786,000 ED visits without admission are classified as injuries. It is likely that some, though not all, of these visits would place immediate stress on surge capacity as injuries can vary by level of urgency.

ED visits that result in inpatient admission may have a greater effect on surge capacity than ED visits without admission. National studies of ED overcrowding have suggested that the lack of available beds, especially in critical and intensive care units, is among the most important factors that lead hospitals to divert ambulances en route to their ED. In New Jersey, one third of admissions through the ED are for ambulatory care sensitive (ACS) conditions, which are typically preventable when patients have access to timely and effective primary care. Among all patients admitted through the ED, children ages 4 and under are the most likely to have an ACS condition. These conditions are also very common in the elderly/Medicare population. Moreover, Medicare patients account for more than half of total ACS admissions through the ED.

Very high rates of potentially avoidable hospital use (i.e., primary care treatable ED visits without admission and ACS admissions) in New Jersey are concentrated in a fairly small set of zip codes. An important exception is the rate of ACS admissions among the elderly where high use rates are dispersed across many areas of the state. Overall, zip codes with high rates of potentially avoidable hospital use are disproportionately located in the most urban parts of the state. However, the set of all high-use zip codes includes many areas of the state that are located outside of inner cities.

Because they are set up for other purposes, hospital ED's are usually considered less than optimal for the delivery of high quality primary care. Despite this, non-emergent and primary care preventable conditions account for a large percentage of total ED volume, which suggests many patients experience primary care access barriers or dissatisfaction with primary care providers. Although use of the ED for these conditions is more common among certain populations and

geographic areas, the total volume of these conditions spans a wide variety of payer classes and patient demographics.

Often care for non-emergent cases can be delayed (within limits) to make room for more urgent care in the ED. However, patients with non-emergent conditions still need to be triaged and registered, which can divert hospital resources at a time of extreme scarcity. In addition, much of the care classified as potentially avoidable is considered emergent and may require intensive use of resources as in the case of inpatient admissions that should have been preventable. These cases, although avoidable, may place a strain on emergency surge capacity if they were to occur during a major disaster. Whether such a strain would actually occur depends on the volume of these cases in relation to the available capacity to treat patients on ambulatory and inpatient bases.

Potentially Avoidable Use of Hospital Emergency Departments in New Jersey

Derek DeLia, Ph.D.

Introduction

Emergency department (ED) utilization has grown rapidly in the United States in recent years, overall and relative to population growth (McCaig and Burt, 2004; Cunningham and May, 2003). Much of this growth is associated with ED visits for conditions that are either non-emergent or treatable in primary care settings (Cunningham and May, 2003). Therefore, rising ED use may be a sign of problems or dissatisfaction with the performance and accessibility of local primary care delivery systems (Billings, Parikh, and Mijanovich, 2000-a).

In addition, rising ED volume has created concern about hospital surge capacity to respond to mass casualty emergencies. Although patients seeking non-emergent care can be triaged to give priority to critically ill or injured patients, non-emergent patient volume still places demands on ED resources.

Moreover, in New Jersey, there are clearly defined limits to how long ED patients with non-emergent conditions can be asked to wait for care. Specifically, state regulations require hospitals to conduct a medical screening examination of all ED patients within four hours of arrival to determine whether an emergency medical condition exists. According to the regulations, when the patient first presents, a registered nurse or other qualified medical personnel must assign the patient a clinical priority, and treatment for life-threatening emergencies must be initiated immediately. For all patients with emergency medical conditions, the patient must be evaluated by a physician and provided medical treatment necessary to stabilize the patient's condition. If the screening examination shows there is no emergency

medical condition, the hospital must either treat the patient in the ED, or refer the patient to an appropriate provider (which might include a clinic at the hospital). A medical record must be created for every patient seen in the ED, and upon discharge following the medical screening and/or treatment, each patient must be given both written and oral instructions.

In response to these issues, the New Jersey Department of Health and Senior Services (NJDHSS) has commissioned the study "Emergency Department Utilization and Surge Capacity in New Jersey" to be conducted by the Rutgers Center for State Health Policy (CSHP). This document is the second of three project reports. The first report documented trends in ED utilization and hospital bed capacity using data from hospital cost reports, quarterly utilization reports, and Uniform Billing (UB-92) records containing information about inpatient admissions through the ED (DeLia, 2005).

In 2004, the NJDHSS expanded the UB system to collect data for non-admitted ED patients in addition to those admitted from the ED. This report is based on the new UB data. It documents statewide volume of outpatient ED visits (i.e., ED visits by non-admitted patients) overall, by expected payer, and by patient demographics. The report also documents the prevalence of outpatient ED visits for conditions that are either avoidable or treatable in primary care settings, using a classification algorithm developed at New York University (described below). The frequency and population-based rates of ED use for these conditions are analyzed further by expected payer, patient demographics, geographic region, and time of arrival at the ED. To provide a comprehensive picture of potentially avoidable ED utilization, the analysis also describes the prevalence and rate of inpatient admissions through the ED for ambulatory care sensitive (ACS) conditions, which are typically preventable when patients have access to timely and effective primary care (Billings et at., 1993; DeLia, 2004). To better understand how source of payment affects patterns of ED use, the analysis also includes patterns of ED utilization reflected in hospital charity care claims data.

Methodology

The complete set of UB-92 records is used to document all ED utilization in NJ in 2004. This utilization includes ED visits by non-admitted patients and inpatient admissions through the ED.[1] Because some patients may use the ED several times during the year, these numbers do not provide a count of individuals who have used the ED. All ED utilization is broken down by expected payer and patient demographic variables that are recorded in the billing records – i.e., age, gender, and race/ethnicity.

The second part of the analysis documents use of the ED for potentially avoidable conditions. These include non-emergent or primary care treatable outpatient ED visits and inpatient admissions for Ambulatory Care Sensitive (ACS) admissions as defined below.

Non-admitted ED visits are classified by clinical characteristics using the ED Use Profiling Algorithm developed by John Billings and colleagues at New York University (NYU Center for Health and Public Service Research, not dated). The algorithm was developed with an expert panel of ED and primary care physicians and was based on detailed medical records for 6,000 cases (Billings, Parikh, and Mijanovich, 2000-b). Since detailed medical records are not available for most analyses, the algorithm classifies ED visits according to discharge diagnosis (i.e., ICD-9 code), which is routinely available in billing data. Specifically, the algorithm places ED visits that do not result in admission into nine categories, which are described below:

1. Non-emergent – The patient's initial complaint, presenting symptoms, vital signs, medical history, and age indicated that immediate medical care was not required within 12 hours.
2. Emergent/Primary Care Treatable – Based on information in the record, treatment was required within 12 hours, but care could have been provided effectively and safely in a primary care setting. The complaint did not require continuous observation, and no procedures were performed or resources used that are not available in a primary care setting (e.g., CAT scan or certain lab tests).
3. Emergent, ED Care Needed , Preventable/Avoidable – Emergency department care was required based on the complaint or procedures performed/resources used, but the emergent nature of the condition was potentially preventable/avoidable if timely and effective ambulatory care had been received during the episode of illness (e.g., flare-ups of asthma, diabetes, congestive heart failure, etc.).

4. Emergent, ED Care Needed, Not Preventable/Avoidable – Emergency department care was required and ambulatory care treatment could not have prevented the condition (e.g., trauma, appendicitis, myocardial infarction, etc.).
5. Injury – injury principal diagnosis.
6. Mental Health – mental health principal diagnosis.
7. Alcohol Related – alcohol-related principal diagnosis.
8. Drug Related – drug-related principal diagnosis.
9. Unclassified – conditions that could not be classified due to insufficient sample sizes available to the expert panel.

ED visits falling into categories 1 through 3 serve as an indicator of problems with access to primary care within a patient subgroup or in a local area. ED visits falling into categories 4 and 5 are the least likely to be prevented with access to primary care or other medical interventions.

The classification of visits into categories 5 through 8 is straightforward. However, information available in billing records is often not sufficient to place visits directly into categories 1 through 4. Therefore, the algorithm uses percentage values to map diagnosis codes into classification categories.

For example, the most common diagnosis in New Jersey's ED billing records is "acute upper respiratory infections of multiple or unspecified sites" (ICD-9 code 465.9). The expert panel used to create the algorithm determined that 82% of patients with this diagnosis have conditions that are emergent and primary care treatable, while 18% have conditions that are emergent, ED care needed, and not preventable/avoidable. Therefore, the algorithm counts this diagnosis as 0.82 of an emergent primary care treatable visit and 0.18 of an emergent ED care needed not preventable/avoidable visit. In contrast, patients diagnosed with an open finger wound (ICD-9 code 883.0) have their visits classified unambiguously as an injury.

ACS admissions through the ED are used as a measure of potentially preventable ED utilization leading to inpatient admission. ACS admissions are defined as admissions for conditions that are typically avoidable when patients have access to timely and effective primary care (Billings et al., 1993; DeLia, 2004). Examples include hospital admissions for ear infections,

congestive heart failure, and asthma. Some researchers have raised the issue that ACS conditions may progress differently among the elderly and concluded that pneumonia should be excluded from these conditions when calculated for this age group (Blustein, Hanson, and Shea, 1998). Therefore, this exclusion is made for ACS admissions among patients ages 65 and over.

Potentially avoidable outpatient ED visits and ACS admissions are broken out by expected payer and patient demographics. Since this utilization is often associated with barriers to primary care at the local level, population-based rates of potentially avoidable ED visits and ACS admissions per 1,000 individuals are calculated and analyzed at the zip code level. ACS admissions are age-sex adjusted for children (ages 18 and under), non-elderly adults (ages 19 to 64), and elderly adults (ages 65 and over).[2] Age-sex adjustment is not possible for potentially avoidable ED visits rates, since the algorithm used to generate these rates uses the probability that a visit is avoidable instead of an actual count of avoidable visits.

To better understand the relationship between insurance status and use of the ED, data on outpatient ED use from charity care claim records for 2004 are added to the analysis. These records reflect the provision of hospital-based services to low-income patients who are uninsured and have been determined by the hospital to have documented their eligibility for the state's charity care subsidy program. The records do not include all self-pay patients. In the large majority of cases, charity care patients are non-elderly adults with income at or below 200% of the Federal Poverty Level.

Finally, this report examines how the use of ED care varies by time of day. This analysis provides an indication of how ED visit volume may affect emergency surge capacity. Specifically, it describes the times when ED's are under added stress from a large number of ambulatory care patients requiring the attention of clinicians and other hospital resources.

Total ED Utilization

ED Visits Without Inpatient Admission

There were approximately 2.46 million ED visits without admission in New Jersey hospitals in 2004 (Table 1). Before the new UB data elements were available, the only source of data for these visits (used in the first project report) was the Acute Care Hospital (ACH) Annual Cost Report. The 2004 cost reports show a total of 2.57 million outpatient ED visits, which is 4.6% higher than the UB count. As a result, the total number of ED visits tabulated in the first project report may overstate the true number by a few percentage points.

Almost half (48%) of all outpatient ED visits list private insurance as the expected payer. However, this percentage may be overstated, since patients in Medicaid or Medicare HMO's can be classified as privately insured in the UB data. In the ACH Cost Report, private insurance accounts for only 42% of these visits with higher shares for Medicaid (17% versus 11%) and Medicare (15% versus 12%). Nevertheless, both data sources show private insurance as the most common expected payer followed by the self-pay/uninsured category. In addition, the total number of charity care ED visits without admission, as recorded in charity care claims data (193,126), amounts to 8% of the total outpatient ED visits in the UB records.

Table 1: Total ED Volume by Expected Payer and Patient Characteristics, New Jersey 2004[a]

	ED visits without inpatient admission	Inpatient admissions through the ED
Total volume	2,456,551	576,962
Percentage of volume by expected payer		
Private insurance[b]	48%	31%
Medicaid[c]	9%	6%
Medicare[c]	12%	49%
Self-pay	23%	11%
Other[d]	7%	3%
Charity Care[e]	8%	9%
Percentage of volume by patient age		
0 to 4	11%	3%
5 to 18	17%	4%
19 to 39	34%	14%
40 to 64	27%	32%
65 & older	11%	47%
Percentage of volume by patient race		
Non-Hispanic Black	19%	16%
Non-Hispanic White	45%	57%
Hispanic	18%	12%
Other Non-Hispanic	18%	14%
Percentage of volume by patient gender		
Female	53%	54%
Male	47%	46%

[a] Except for the line referring to charity care, the source of data for this table is the NJ Uniform Billing (UB-92) Records. For charity care, the data source is the NJ Charity Care Claim Records.
[b] Private insurance includes HMO's, commercial indemnity plans, and Blue Cross Blue Shield Plans.
[c] Patients in Medicaid and Medicare HMO's may be classified as private insurance.
[d] Other insurance is a residual category that includes most frequently worker's Compensation and No Fault Insurance as well as government programs such as CHAMPUS and Veteran's Administration Health Coverage.
[e]The calculation for charity care is based on NJ Hospital Charity Care Claims data in the numerator and UB-92 data in the denominator.

ED visits without admission are fairly dispersed across age categories (Table 1). The largest share of these visits is accounted for by patients ages 19 to 39. Nevertheless, the majority of these visits are provided to patients falling in other age categories. In addition, outpatient ED visits are slightly more likely to involve females than males.

Almost half of outpatient ED visits are provided to patients who are classified as non-Hispanic white (Table 1). The remaining visits are approximately evenly split among patients classified as non-Hispanic black, Hispanic, and all other race/ethnic subgroups.

Inpatients Admitted through the ED

Almost 577,000 ED visits in New Jersey led to an inpatient admission in 2004 (Table 1). The expected payer mix for these admissions differs from that observed for ED visits without admission. The most salient difference occurs among Medicare patients who account for 49% of ED admissions but only 12% of ED visits without admission. Most other payer groups, particularly privately insured and self-pay, account for smaller shares of ED admissions than ED visits without admission. The only exception is among charity care patients who account for a slightly larger share of statewide ED admissions (i.e., 51,263 out of 576,962) than ED visits without admission.

The age distribution of ED admissions also differs from the corresponding distribution of ED visits without admission. The share of total ED admissions rises with patient age. The share

of these admissions accounted for by patients ages 65 and older reflects the predominance of Medicare as the most prevalent payer for ED admissions.

White non-Hispanic patients account for a higher percentage of ED admissions than ED visits without admission. Patients in other race/ethnicity categories account for somewhat smaller shares of ED admissions. In contrast, the distribution of ED admissions by patient gender is similar to the corresponding distribution of ED visits without admission.

Table 2: Inpatient Admissions through the ED as a Percentage of All Inpatient Admissions by Expected Payer and Patient Characteristics, New Jersey 2004[a]

Payer/patient characteristics	ED admissions as a percentage of total admissions
Overall	56%
Expected payer	
Private insurance[b]	45%
Medicaid[c]	53%
Medicare[c]	66%
Self-pay	64%
Other[d]	51%
Charity Care	67%
Patient age	
0 to 4	60%
5 to 18	53%
19 to 39	36%
40 to 64	59%
65 & older	66%
Patient race	
Non-Hispanic Black	65%
Non-Hispanic White	58%
Hispanic	56%
Other Non-Hispanic	44%

Patient gender	
Female	52%
Male	63%

[a] Except for the line referring to charity care, the source of data for this table is the NJ Uniform Billing (UB-92) Records. For charity care, the data source is the NJ Charity Care Claim Records.

[b] Private insurance includes HMO's, commercial indemnity plans, and Blue Cross Blue Shield Plans.

[c] Patients in Medicaid and Medicare HMO's may be classified as private insurance.

[d] Other insurance is a residual category that includes most frequently worker's Compensation and No Fault Insurance as well as government programs such as CHAMPUS and Veteran's Administration Health Coverage.

More than half of all inpatient admissions in New Jersey in 2004 originated in the ED (Table 2). This finding is consistent across most, but not all, patient subgroups. The only subgroups (not mutually exclusive) for which the majority of inpatient admissions did not originate in the ED are privately insured, young adults (ages 19-39), and patients not classified as white, black, or Hispanic.

Potentially Preventable ED Utilization

Classification of ED visits without Admission

Table 3 shows how the ED Use Profiling Algorithm classifies the 20 most common principal diagnoses in the UB records for ED visits without admission. These diagnoses account for 27.5% of all outpatient ED visits. Seven out of the top 20 are unrelated to injuries or conditions that are emergent, ED care needed, and preventable/avoidable. Five of the top 20 are classified as injuries and eight of the top 20 may or may not be avoidable depending on the probabilities assigned by the algorithm.

Table 3: 20 Most Common ED Visits without Admission in NJ, 2004

ICD-9 code	Description	Number of Visits	Percentage of total ED visits without admission	Classification[a]
465.9	Acute upper respiratory infections of unspecified site	51,705	2.1%	0.82 Type 1 0.18 Type 3
789.00	Abdominal pain, unspecified site	47,491	1.9%	0.67 Type 2 0.33 Type 4
883.0	Open wound of finger(s), without mention of complication	41,978	1.7%	Injury
558.9	Other and unspecified noninfectious gastroenteritis and colitis	41,499	1.7%	0.46 Type 1 0.37 Type 2 0.16 Type 3
382.9	Unspecified otitis media	39,123	1.6%	0.37 Type 1 0.59 Type 2 0.04 Type 3
845.00	Unspecified site of ankle sprain and strain	37,715	1.5%	Injury
599.0	Urinary tract infection, site not specified	37,371	1.5%	0.46 Type 1 0.30 Type 2 0.24 Type 3
462	Acute pharyngitis	36,057	1.5%	0.66 Type 1 0.28 Type 2 0.06 Type 3
847.0	Neck sprain and strain	35,182	1.4%	Injury
784.0	Headache	33,677	1.4%	0.78 Type 1 0.09 Type 2 0.13 Type 4
786.59	Other chest pain	31,603	1.3%	0.61 Type 2 0.39 Type 4
786.50	Unspecified chest pain	30,232	1.2%	0.32 Type 2 0.68 Type 4

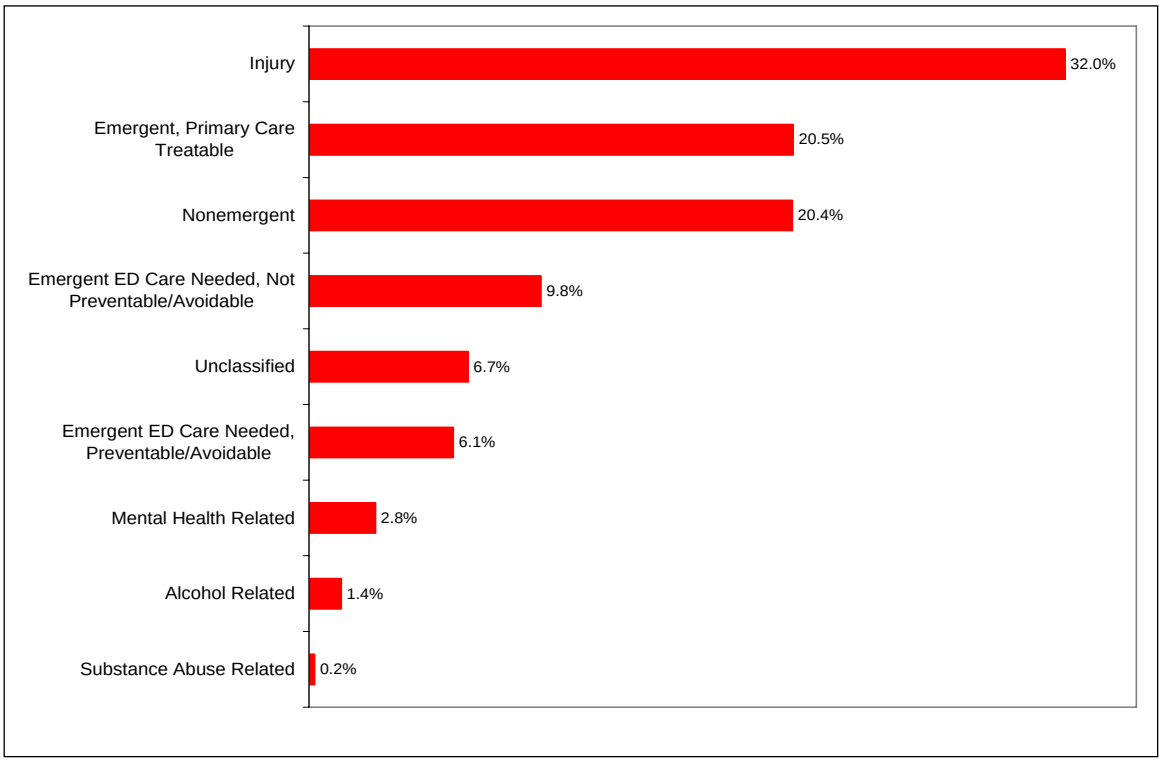
079.99	Unspecified viral infection, in conditions classified elsewhere and of unspecified site	29,650	1.2%	0.46 Type 1 0.44 Type 2 0.10 Type 4
920	Contusion of face, scalp, and neck except eye(s)	29,469	1.2%	Injury
493.92	Asthma, unspecified, with (acute) exacerbation	29,340	1.2%	0.02 Type 2 0.98 Type 3
724.2	Lumbago	27,198	1.1%	0.74 Type 1 0.15 Type 2 0.11 Type 4
780.6	Fever	26,980	1.1%	0.43 Type 1 0.37 Type 2 0.20 Type 4
959.01	Head injury, unspecified	24,837	1.0%	Injury
466.0	Acute bronchitis	22,929	0.9%	0.82 Type 2 0.18 Type 3
V58.3	Attention to surgical dressings and sutures	21,487	0.9%	0.89 Type 1 0.05 Type 2 0.05 Type 4

Source: NJ Uniform Billing (UB-92) Records, 2004

[a]Type 1: Nonemergent. Type 2: Emergent, primary care treatable. Type 3: Emergent, ED care needed, preventable/avoidable. Type 4: Emergent, ED care needed, not preventable/avoidable.

When all ED visits without admission are tabulated, injury is the most common classification (Figure 1). Because of this, it is useful to describe which diagnoses are most prevalent within this category. Table 4 lists the 20 most common diagnoses classified as injuries. These diagnoses account for 46.3% of all injuries treated on an outpatient basis in hospital ED's in New Jersey in 2004. The 20 most common injuries cover a range of diagnoses including open wounds, broken bones, and contusions. Although many injuries require immediate medical attention, the urgency of treatment required for particular patients cannot be determined from information available on the UB records.

Figure 1: Classification of ED Visits without Admission, 2004



Source: NJ Uniform Billing (UB-92) Records

Visits classified as emergent/primary care treatable and non-emergent – together accounting for 41% of outpatient ED volume – are also very common. Altogether visits that are potentially avoidable (i.e., non-emergent, preventable/avoidable, or primary care treatable) account for almost half (47.0%) of all outpatient ED visits. Visits most likely to be considered "appropriate" for the ED – namely, injuries and emergent, ED care needed, not preventable/avoidable – accounted for a smaller percentage (41.6%).

Table 4: 20 Most Common Diagnoses Classified as Injuries among ED visits without Admission in NJ, 2004

ICD-9 code	Description	Visits	Percentage of total injuries treated in the ED without admission
883.0	Open wound of finger(s), without mention of complication	41,978	5.3%
845.00	Unspecified site of ankle sprain and strain	37,715	4.8%
847.0	Neck sprain and strain	35,182	4.5%
920	Contusion of face, scalp, and neck except eye(s)	29,469	3.8%
959.01	Head injury, unspecified	24,837	3.2%
873.42	Open wound of forehead, without mention of complication	19,833	2.5%
844.9	Sprain and strain of unspecified site of knee and leg	18,362	2.3%
882.0	Open wound of hand except finger(s) alone, without mention of complication	16,634	2.1%
873.0	Open wound of scalp, without mention of complication	16,284	2.1%
847.2	Lumbar sprain and strain	14,788	1.9%
922.1	Contusion of chest wall	14,679	1.9%
995.3	Allergy, unspecified not elsewhere classified	13,146	1.7%
924.11	Contusion of knee	11,300	1.4%
842.00	Sprain and strain of unspecified site of wrist	11,163	1.4%
891.0	Open wound of knee, leg (except thigh), and ankle, without mention of complication	10,792	1.4%
918.1	Superficial injury of cornea	10,119	1.3%
840.9	Sprain and strain of unspecified site of shoulder and upper arm	9,866	1.3%
873.43	Open wound of lip, without mention of complication	9,416	1.2%
923.20	Contusion of hand(s)	9,358	1.2%
842.10	Sprain and strain of unspecified site of hand	9,210	1.2%

Source: NJ Uniform Billing (UB-92) Records, 2004

The remaining 4.4% of visits fall into a variety of categories including mental health, alcohol related, and drug related diagnoses. A fairly large percentage (6.7%) of outpatient ED visits involve conditions that cannot be classified by the algorithm.

The classification of ED visits varies by expected payer (Table 5). Among charity care, self-pay, and Medicaid, at least 50% of ED visits without admission are potentially avoidable (54% for charity care, 50% for self-pay, and 56% for Medicaid). In contrast, potentially avoidable visits account for only 47% of outpatient ED volume among the privately insured, 45% among Medicare patients, and 24% among patients with other insurance. Almost 2/3 of ED visits without admission among patients in the "other" category, which includes No Fault Auto Insurance and Worker's Compensation, are classified as injuries.

Because they account for almost half of all ED visits without admission overall, patients with private insurance also account for nearly half of all outpatient ED visits that are potentially avoidable (Table 6). Much smaller shares of potentially avoidable outpatient ED visits are attributable to charity care, self-pay, and Medicaid patients (Table 6). As described above, however, the share of visits associated with the privately insured may be overstated due to the difficulties in classifying patients enrolled in Medicaid and Medicare managed care plans in the UB data.

Self-pay patients are disproportionately overrepresented and the privately insured are underrepresented among outpatient ED visits involving alcohol and drug problems (Table 6). Calculations with charity care claims data show that charity care patients are also disproportionately represented among visits in these two categories. Specifically, charity care patients account for 8% of outpatient ED visits overall but they account for 20% of alcohol-related visits and 17% of drug-related visits.

Table 5: Likelihood of Various Categories of ED Visits without Admission by Expected Payer[a]

	Charity Care[b]	Self-pay[c]	Medicaid[c]	Private[c]	Medicare[c]	Other[c]
Injury	13%	26%	19%	34%	27%	64%
Emergent, primary care treatable	25%	21%	26%	21%	20%	9%
Non-emergent	21%	23%	24%	20%	18%	13%
Emergent, ED care needed, not preventable/avoidable	16%	9%	8%	10%	13%	5%
Unclassified	9%	7%	8%	6%	11%	6%
Emergent, ED care needed, preventable/avoidable	8%	6%	9%	6%	7%	2%
Mental health	4%	3%	4%	2%	4%	1%
Alcohol related	4%	4%	1%	1%	1%	<1%
Drug related	1%	1%	<1%	<1%	<1%	<1%

[a]All columns sum to 100%

[b]Source: NJ Charity Care Claim Records

[c]Source: NJ Uniform Billing (UB-92) Records

For ED visits involving mental health diagnoses, Medicare, Medicaid, and self-pay patients are somewhat overrepresented in this category relative to their share of total ED visits without admission (Table 6). Privately insured patients are somewhat underrepresented.

Table 6: Composition of Various Categories of ED Visits without Admission by Expected Payer[a]

	Self-pay	Medicaid	Private	Medicare	Other
Total	23%	9%	48%	12%	7%
Injury	19%	6%	51%	10%	15%
Emergent, primary care treatable	23%	12%	50%	12%	3%
Non-emergent	26%	11%	47%	10%	5%
Emergent, ED care needed, not preventable/avoidable	22%	8%	50%	16%	4%
Unclassified	23%	11%	40%	19%	6%
Emergent, ED care needed, preventable/avoidable	23%	13%	47%	14%	3%
Mental health	26%	14%	40%	18%	2%
Alcohol related	59%	8%	23%	8%	2%
Drug related	57%	11%	24%	7%	2%

Source: NJ Uniform Billing (UB-92) Records

[a]All rows sum to 100%

Patterns of ED use vary by patient age (Table 7). Among all non-admitted ED patients, children ages 4 and under are by far the most likely to be treated for a potentially avoidable ED episode (i.e., 64% of visits for this age group is classified as potentially avoidable). In contrast, ED patients ages 5 to 18 are the least likely to visit the ED for potentially avoidable conditions (i.e., only 38% of visits among this age group are potentially avoidable). Instead 47% of outpatient ED visits in this age group involve treatment for injuries. Moreover, almost one-half (49%) of outpatient ED visits by patients ages 19 to 39 are potentially avoidable. This percentage is somewhat higher than the corresponding percentages for patients ages 40 to 64 and ages 65 and over (45% and 42%, respectively).

Table 7: Likelihood of Various Categories of ED Visits without Admission by Patient Age[a]

	Ages 0-4	Age 5-18	Ages 19-39	Ages 40-64	Ages 65 and over
Injury	24%	47%	30%	30%	30%
Emergent, primary care treatable	31%	16%	21%	19%	19%
Non-emergent	24%	16%	23%	20%	17%
Emergent, ED care needed, not preventable/avoidable	6%	6%	10%	12%	14%
Unclassified	6%	5%	6%	7%	11%
Emergent, ED care needed, preventable/avoidable	9%	6%	5%	6%	6%
Mental health	0%	4%	3%	3%	2%
Alcohol related	0%	1%	1%	2%	0%
Drug related	0%	0%	0%	0%	0%

[a]All columns sum to 100%

Source: NJ Uniform Billing (UB-92) Records

In terms of total volume, patients ages 19 to 39 account for the largest share of outpatient ED visits across all visit categories (Table 8). For most visit categories, patients who are very young (ages 4 and under) or elderly (ages 65 and over) account for the smallest shares of outpatient ED utilization.

Table 8: Composition of Various Categories of ED Visits without Admission by Patient Age[a]

	Ages 0-4	Age 5-18	Ages 19-39	Ages 40-64	Ages 65 and over
Total	11%	17%	34%	27%	11%
Injury	8%	25%	32%	25%	10%
Emergent, primary care treatable	17%	13%	35%	25%	10%
Non-emergent	13%	13%	38%	27%	9%
Emergent, ED care needed, not preventable/avoidable	7%	10%	36%	33%	15%
Unclassified	10%	13%	31%	28%	18%
Emergent, ED care needed, preventable/avoidable	17%	15%	30%	26%	11%
Mental health	0%	21%	39%	32%	8%
Alcohol related	1%	9%	37%	49%	4%
Drug related	0%	7%	59%	33%	1%

Source: NJ Uniform Billing (UB-92) Records

[a]All rows sum to 100%

Patient race and ethnicity are also related to ED utilization patterns. Non-Hispanic black and Hispanic ED users are more likely to arrive at the ED with potentially avoidable conditions than non-Hispanic whites (Table 9). In contrast, non-Hispanic whites are more likely to come to the ED for injuries or conditions that are emergent, ED care needed, and not preventable/avoidable. Other non-Hispanics (including Asians and Native Americans) lie somewhere in-between non-Hispanic whites and the two other race/ethnicity groups in terms of ED utilization patterns. Because they are the majority population in the state, non-Hispanic whites account for the largest share of ED utilization without admission across all visit categories (Table 10).

Table 9: Likelihood of Various Categories of ED Visits without Admission by Patient Race/Ethnicity[a]

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Other Non-Hispanic
Injury	38%	24%	25%	32%
Emergent, primary care treatable	18%	23%	25%	20%
Non-emergent	18%	24%	24%	21%
Emergent, ED care needed, not preventable/avoidable	10%	9%	10%	10%
Unclassified	7%	7%	6%	7%
Emergent, ED care needed, preventable/avoidable	5%	8%	7%	6%
Mental health	3%	2%	2%	3%
Alcohol related	2%	1%	2%	1%
Drug related	0%	0%	0%	0%

[a]All columns sum to 100%

Source: NJ Uniform Billing (UB-92) Records

Non-Hispanic whites account for the largest share of all ED utilization although they have a lower share of potentially avoidable ED use (Table 10). Blacks and Hispanics are disproportionate users of preventable services. Other non-Hispanic patients use all services approximately proportionately.

Table 10: Composition of Various Categories of ED Visits without Admission by Patient Race/Ethnicity[a]

	Non-Hispanic White	Non-Hispanic Black	Hispanic	Other Non-Hispanic
Total	45%	19%	18%	18%
Injury	54%	14%	14%	18%
Emergent, primary care treatable	39%	21%	22%	18%
Non-emergent	39%	22%	21%	18%
Emergent, ED care needed, not preventable/avoidable	46%	18%	18%	18%
Unclassified	45%	21%	17%	18%
Emergent, ED care needed, preventable/avoidable	37%	25%	20%	18%
Mental health	50%	15%	15%	19%
Alcohol related	50%	14%	20%	16%
Drug related	46%	21%	14%	18%

Source: NJ Uniform Billing (UB-92) Records

[a]All rows sum to 100%

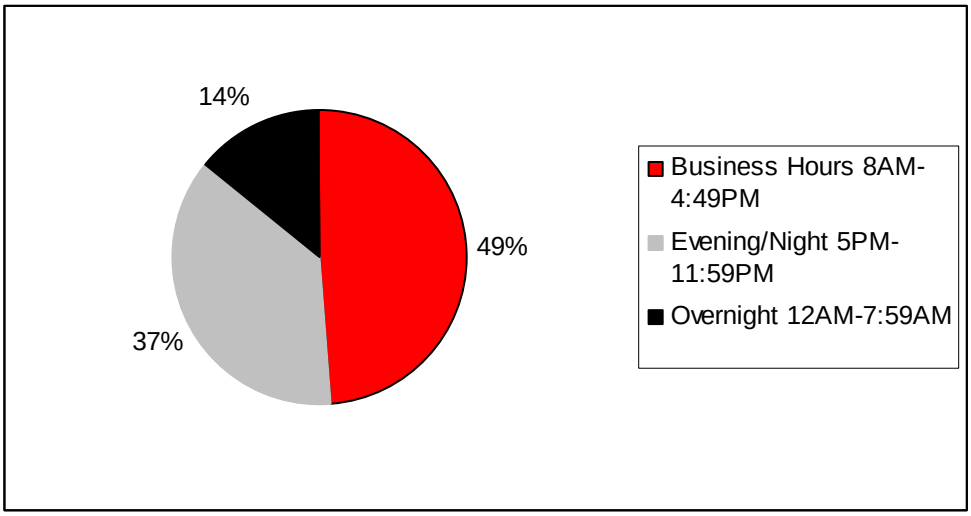
Some differences appear between male and female users of the ED. Male ED users account for a larger percentage of injuries (54% versus 46% of visits), alcohol treatment (74% versus 26%), and drug treatment (61% versus 39%). Females account for the majority of all other categories of ED visits without admission.

ED visits by time of day

Approximately one-half of all ED visits not leading to admission are initiated during normal business hours, defined in this report as 8:00AM until 5:00PM (Figure 2). A little over one-

third are initiated during evening hours (beginning at 5:00PM and ending at midnight). The remaining 14% occur during the overnight hours from midnight to 8:00AM.

Figure 2: Distribution of ED Visits without Admission by Time of Day



Source: NJ Uniform Billing (UB-92) Records

There is little variation in the time of ED visits by visit category (Table 11). For most categories (including non-emergent and primary care treatable), half of the visits occur during normal business hours for doctors' offices and health centers. Treatment for alcohol-related conditions stands out as an exception, with more than 70% occurring outside of normal business hours. Treatment for these conditions is most likely to occur during the evening hours and also more likely than other conditions to take place overnight. Treatments for drug-related conditions are also more likely than other treatments to occur overnight.

Table 11: Distribution of ED Visits without Admission by Time of Day and Type of Visit

	Business Hours 8AM-4:49PM	Evening/Night 5PM-11:59PM	Overnight 12AM-7:59AM
Injury	49%	41%	10%
Emergent, primary care treatable	48%	36%	16%
Non-emergent	50%	35%	15%
Emergent, ED care needed, not preventable/avoidable	49%	33%	18%
Unclassified	51%	35%	14%
Emergent, ED care needed, preventable/avoidable	47%	36%	17%
Mental health	48%	36%	16%
Alcohol related	29%	43%	28%
Drug related	44%	35%	21%

Source: NJ Uniform Billing (UB-92) Records

Ambulatory Care Sensitive (ACS) Inpatient Admissions through the ED

In 2004, 178,978 admissions through the ED were for ACS conditions, which are often avoidable if problems are diagnosed at an earlier stage of illness. These conditions accounted for 31% of all ED admissions in that year (Table 12). Young children (ages 4 and under) and the elderly (ages 65 and over) stand out for having a high percentage of ED admissions for ACS conditions. Because the elderly (and Medicare patients) are heavy users of inpatient care overall, they account for more than half of all ACS admissions through the ED. Overall, the distribution of ACS admissions through the ED by expected payer and patient demographics roughly matches the distribution of all ED admissions (as shown in Table 1).

Table 12: Likelihood and distribution of ACS Admissions through the ED by Expected Payer and Patient Demographics

	Percentage of admissions through the ED for ACS conditions	Distribution of ACS admissions through the ED
Overall	31%	100%
Insurance Status		
Private Insurance	26%	27%
Medicaid	30%	6%
Medicare	37%	57%
Self-pay	24%	9%
Other	16%	1%
Age		
4 or less	61%	6%
5 to 18	30%	3%
19 to 39	19%	9%
40 to 64	25%	26%
65 and above	37%	56%
Race		
Non-Hispanic Black	33%	17%
Non-Hispanic White	31%	58%
Hispanic	30%	12%
Other Non-Hispanic	29%	14%
Gender		
Female	32%	56%
Male	30%	44%

Sources: NJ Uniform Billing (UB-92) Records, U.S. Census Bureau

Population-Based Rates of Potentially Avoidable ED Use

Rates of potentially avoidable ED visits without admission vary by patient age and residential zip code (Table 13). These rates are generally lower for elderly residents but similar for children and non-elderly adults. For all age groups, potentially avoidable ED use rates are skewed to the right – i.e., a small percentage of zip codes have rates that are much higher than the statewide average (Figure 3).

Table 13: Potentially Avoidable Hospital Utilization Rates per 1,000 by New Jersey Zip Codes in 2004

	Children (Ages 18 and under)		Non-elderly adults (Ages 19-64)		Elderly adults (Ages 65 and over)	
	Outpatient[a]	Inpatient[b]	Outpatient[a]	Inpatient[b]	Outpatient[a]	Inpatient[b]
Mean	129.6	11.4	129.8	15.0	93.3	90.1
10th Percentile	43.5	2.9	41.2	4.4	38.2	36.0
25th Percentile	65.2	6.4	56.0	6.9	55.6	53.7
50th Percentile (Median)	94.4	9.5	88.5	10.1	71.9	74.4
75th Percentile	145.0	14.5	143.9	15.8	102.1	106.6
90th Percentile	244.1	20.7	240.4	25.7	148.1	143.9

Source: NJ Emergency Department Uniform Billing Records, U.S. Census Bureau

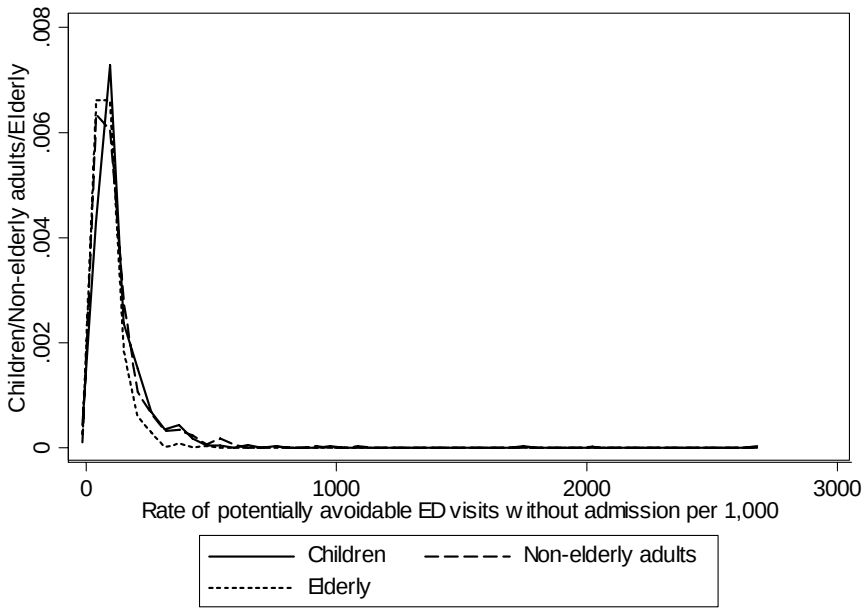
[a]Rate of potentially avoidable ED visits without admission per 1,000 individuals.

[b]Rate of ambulatory care sensitive (ACS) admissions per 1,000 individuals.

Zip codes in areas classified as urban tend to have higher potentially avoidable ED use rates than zip codes classified as non-urban (Table 14).[3] Moreover, zip codes ranking in the top 10% by potentially avoidable ED visit rates (without admission) are disproportionately urban zip

codes. Specifically, urban zip codes account for 10% of zip codes statewide but they account for 55% of high ED use zip codes for children, 45% for non-elderly adults, and 32% for the elderly. The list of municipalities appearing in the top 10% according to potentially avoidable ED use rates appears in the Appendix.

Figure 3: Distribution of Potentially Avoidable ED Visits without Admission per 1,000 Residents at the Zip Code Level



Source: NJ Emergency Department Uniform Billing Records, U.S. Census Bureau

Rates of ACS admissions are distributed differently than rates of potentially avoidable ED visits without admission. Specifically, ACS admission rates tend to be much higher for elderly residents than for children or non-elderly adults (Table 13). In addition, ACS admission rates for the elderly are widely dispersed across a wide range of possible values (Figure 4). In contrast, ACS admission rates for younger age groups are highly concentrated at lower values, with only a small number of zip codes experiencing very high rates.

Table 14: Potentially Avoidable Hospital Utilization Rates per 1,000 in Urban and Non-urban Areas

	Children (Ages 18 and under)		Non-elderly adults (Ages 19-64)		Elderly adults (Ages 65 and over)	
	Outpatient[a]	Inpatient[b]	Outpatient[a]	Inpatient[b]	Outpatient[a]	Inpatient[b]
Urban[c]	263.3	19.6	235.1	25.8	139.5	118.8
Non-urban	114.2	10.5	117.7	13.7	88.0	86.8

Source: NJ Emergency Department Uniform Billing Records, U.S. Census Bureau

[a]Rate of potentially avoidable ED visits without admission per 1,000 individuals.

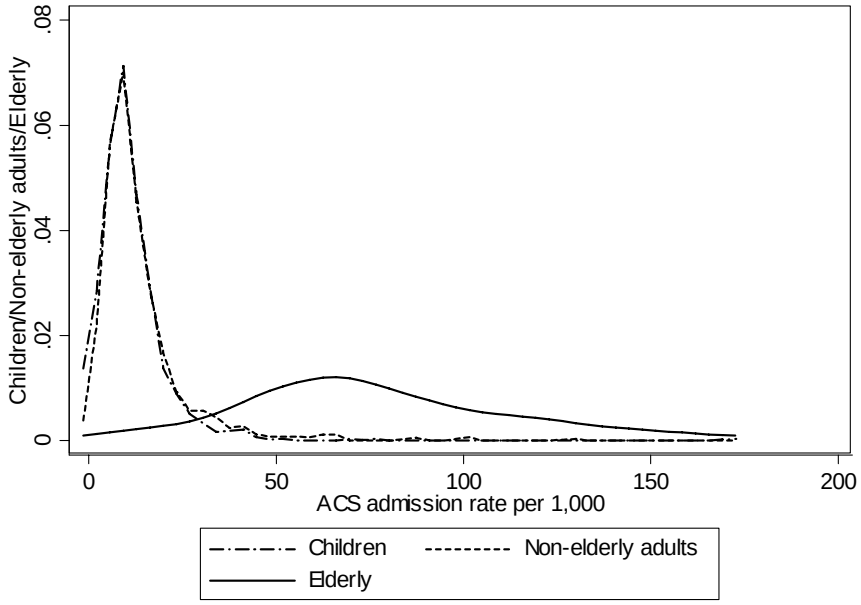
[b]Rate of ambulatory care sensitive (ACS) admissions per 1,000 individuals.

[c]Urban areas are defined as zip codes in municipalities with at least 30,000 residents and at least 9,000 resident per square mile. All other zip codes are classified as non-urban.

For all age groups, ACS admission rates are higher in urban versus non-urban areas. Also, zip codes ranking in the top 10% by ACS admission rates are disproportionately urban zip codes. Specifically, urban zip codes account for 33% of the zip codes with ACS admission rates for children, 35% for non-elderly adults, and 23% for the elderly compared to 10% of all zip codes statewide. The list of municipalities appearing in the top 10% according to ACS admission rates appears in the Appendix.

For non-elderly adults, there is a substantial amount of overlap between zip codes with high rates of potentially avoidable outpatient ED visits and zip codes with high ACS admission rates. The correlation coefficient between these measures is 0.87, which means that variation in one rate is associated with 76% of the variation in the other rate.[4] For children and the elderly, these two rates are also related but the strength of the association is not as strong. For children, the correlation coefficient is 0.60 – i.e., 36% of the variation in one rate is associated with variation in the other. For the elderly, the correlation coefficient is 0.54 – i.e., 29% of the variation in one rate is associated with variation in the other.

Figure 4: Distribution of Ambulatory Care Sensitive (ACS) Admission Rates per 1,000 Residents at the Zip Code Level



Discussion

This report documents the provision of 2.46 million ED visits without admission and approximately 577,000 inpatient admissions through the ED in New Jersey hospitals in 2004. Patients with private insurance account for the largest share of ED visits without admission, while Medicare patients account for the largest share of admissions through the ED. In both cases, the uninsured (measured as self-pay and charity care patients) account for much smaller shares of total ED utilization. The finding is consistent with analysis at the national level (Cunningham and May, 2003).

Medicaid patients appear to account for only a small percentage of ED use. However, Medicaid patients are likely underrepresented in the billing data used for this analysis. Medicaid patients enrolled in managed care plans are often coded as having private HMO coverage. Similar coding often occurs for patients in Medicare managed care plans. As a result, use of the ED is

somewhat overstated for privately insured patients and understated for Medicaid and Medicare patients.

The ED is a major point of entry for all inpatient admissions. For some patient groups, such as charity care recipients, non-Hispanic blacks, and Medicare beneficiaries almost 2/3 of all admissions originate in the ED. Inpatients with private insurance and all inpatients ages 19 to 39 make up the groups least likely to be admitted through the ED. The first project report documented a rising trend in the percentage of admissions originating in the ED from 50% in 1998 to 55% in 2002 and 2003 (DeLia, 2005). Data from 2004 show a slight continuation of the upward trend to 56%. As a result, a growing proportion of hospital admissions are unscheduled, making it more difficult to plan and prepare for incoming patient volume. Conversely, the shrinking proportion of planned admissions reduces the relative number of previously scheduled elective procedures that could be cancelled in an effort to immediately add surge capacity.

Based on the ED Use Profiling Algorithm developed at New York University (NYU Center for Health and Public Service Research, not dated), approximately 1.16 million (47%) of ED visits without admission are classified as potentially avoidable. Specifically, the patient's condition in these cases is considered non-emergent, treatable in primary care settings, or could have been prevented with earlier primary care intervention. This percentage, which is consistent with findings outside of New Jersey (Massachusetts Division of Health Care Finance and Policy, 2004; Regenstein et al., 2004), shows the extent to which New Jersey residents use the ED as a substitute for primary care.

Analysis of patient focus groups across the United States suggests a number of reasons why patients may prefer to receive primary care from an ED instead of a doctor's office or health center (Regenstein et al., 2004). In many neighborhoods, the hospital ED is perceived as a provider of advanced high quality medical care and is known for its requirement to serve all patients regardless of ability to pay. Some patients find the ED convenient, since appointments are not required and the ED is open 24 hours a day. Others view the ED as the only access point

for specialty and behavioral health services, which are often unavailable or prohibitively expensive in other settings. Nevertheless, hospital ED's are not staffed and equipped to specialize in primary care. To the contrary, patients receiving primary care in the ED are not likely to maintain an ongoing relationship with a usual provider or receive continuing education about how to manage chronic conditions.

Outpatient ED use is more likely to be classified as potentially avoidable for some patients than for others. ED users ages 4 and under have the highest rates of potentially avoidable visits. This finding is consistent with prior findings at the national level, which suggested that parents of young children go straight to the ED when their child's primary care physician is not available, particularly outside of regular office hours (Cunningham et al., 1995). Potentially avoidable ED visits are also more common among traditionally underserved populations including charity care, self-pay, Medicaid, non-Hispanic blacks, and Hispanics. However, these patient groups do not account for the majority of potentially avoidable ED visits. Because they account for a larger share of hospital utilization overall, patients who are adults, privately insured, and non-Hispanic whites account for the largest shares of potentially avoidable ED visits without admission.

Differences in ED use also appear between males and females. Females account for the majority of ED visits without admission overall and within most categories, including those associated with barriers to primary care. However, there are three categories of ED visits where males account for the majority – injuries, alcohol treatment, and drug treatment.

Primary care received in the ED is sometimes viewed as source of excess cost, since hospital charges include mark-ups to cover a variety of overhead expenses. But in terms of actual resources used, the marginal costs of ED care can be fairly low (Williams, 1996). This would be the case in situations where patients come to the ED for non-emergent care during off-peak hours when clinical personnel do not face competing demands for their attention. Alternatively,

if the care provided is more complex or occurs during periods of high demand, then primary care treatable conditions seen in the ED can be much more costly.

This report finds that approximately half of all non-admitted ED patients in New Jersey arrive for treatment between 8:00 AM and 5:00 PM, times that coincide with most physician offices' and health centers' hours of operation. This finding is consistent with data in other parts of the nation (Regenstein et al., 2004). In New Jersey, this pattern exists for most conditions treated in the ED, including those that are sensitive to primary care access. Two exceptions are ED treatment for conditions related to alcohol or drug use where a larger percentage of visits occur in the evening or overnight. For visits occurring from 8 to 5, the true marginal costs of ED care for non-emergent conditions may be fairly high, since ED clinicians are likely to face competing demands for their attention. For the remaining visits that occur in the evening or overnight, the marginal costs may be lower.

The implications of potentially avoidable ED use for hospital surge capacity are somewhat mixed. Approximately 500,000 potentially avoidable ED visits are classified as non-emergent. Since critically ill or injured patients must be given priority, patients with non-emergent conditions are expected to wait for services (subject to state requirements that ED patients be seen by a physician within four hours of arrival). Patients with non-emergent conditions may also be referred elsewhere for care. However, large volumes of patients with non-emergent conditions could physically clog ED space and place strain on triage resources used to prioritize patients during a mass casualty event. Moreover, hospital staff must also take time to register these patients and gather information needed for medical and billing records.

In addition, approximately 650,000 ED visits are classified as potentially avoidable but emergent. While these visits may have been avoided with better access to primary care, once these patients arrive in the ED, their conditions have progressed to the point that they need care promptly. This care may require intensive use of clinical resources, in the ED and other areas. These cases, although avoidable, may place a strain on emergency surge capacity if they were to

occur during a major disaster. These visits add to the 241,000 ED visits that are classified as emergent and not avoidable. In addition, almost 786,000 ED visits without admission are classified as injuries. It is likely that some, though not all, of these visits would place immediate stress on surge capacity as injuries can vary by level of urgency.

The first project report documented a rising trend in ED visits without admission (DeLia, 2005). If the percentage of outpatient ED visits considered emergent remains constant (or grows) over time, then the trend would suggest that the number of outpatient ED visits with the potential to limit surge capacity is also rising. While non-admitted patients would not occupy inpatient beds, a large number of ED patients requiring emergent outpatient care could place an additional strain on available examination rooms, observation areas, and ambulatory care staff during a mass casualty crisis. Since this report does not measure hospital outpatient capacity, it cannot be determined whether current levels of this capacity across the state are adequate for large-scale emergencies.

Inpatient admissions, whether originating in the ED or elsewhere, may have a greater impact on surge capacity available for mass casualty events or pandemics. National studies have found that the lack of staffed and available hospital beds (especially in intensive care and critical care units) is an important contributor to ED overcrowding and ambulance diversion (Bazzoli, 2003; Derlet and Richards, 2000; Joint Commission on Accreditation of Healthcare Organizations, 2004; The Lewin Group, 2002; U.S. General Accounting Office, 2003).[5,6] While hospitals may have a substantial number of empty beds throughout the year, they may also go through brief periods when occupancy rates are very high and surge capacity is temporarily limited (DeLia, 2006).

Inpatient admissions for ambulatory care sensitive (ACS) conditions represent a source of potential strain on surge capacity that might be alleviated through better access to primary care. In 2004, New Jersey hospitals reported approximately 179,000 admissions through the ED for ACS conditions. This figure represents 31% of all inpatient admissions through the ED and 77% of all ACS admissions regardless of admission source. Admitted children ages 4 and under

have the highest percentage of ED admissions for ACS conditions (61%) compared to other patient groups. Since they are heavy users of inpatient care overall, Medicare patients, and the elderly in general, account for the largest share of total ED admissions for ACS conditions (57% and 56%, respectively).

The prevention of ACS admissions through improved access to primary care appears to be a direct way of minimizing potential stress on hospital surge capacity while providing clear benefits to patients in the form of treatment at an earlier stage of illness. Nevertheless, it is not clear how these admissions could be prevented. Given their predominance among patients admitted for ACS conditions, a focus on the elderly would generate the greatest benefit in terms of total admissions that could be avoided. This may be difficult, however, as recent cuts in Medicare payments to physicians have raised concern that access to primary care by the elderly may be negatively impacted in the near future (Glendinning, 2005). From a broader health system perspective, inpatient care is often an important source of revenue for hospitals and physicians, which may create a disincentive for providers to prevent ACS admissions.

Very high rates of potentially avoidable hospital use in New Jersey are concentrated in a fairly small set of zip codes. Residents of these zip codes (listed in the Appendix) appear to have the most to gain from efforts aimed at improving access to primary care. However, a major exception is the rate of ACS admissions among the elderly where high use rates are widely dispersed across the state. Overall, zip codes with high rates of potentially avoidable hospital use are disproportionately located in the most urbanized areas of the state. However, the set of all high-use zip codes includes many areas of the state that are located outside of inner cities.

The expansion of Federally Qualified Health Centers (FQHC's) is sometimes advocated as a means of reducing ED utilization by expanding access to primary care, particularly in Medically Underserved Areas (MUA's). Nevertheless, the majority of primary care related ED use is attributable to privately insured and Medicare patients who typically live outside of officially designated MUA's. In addition, a study of safety net providers in St. Louis found that even when

uninsured and underinsured patients have access to primary care providers, their rates of non-urgent ED use still exceed those of the general population (Cummings et al., 2005).

Despite these difficulties, some primary care practices have been relatively successful at limiting potentially avoidable use of the ED by their patients. A recent study of primary care practices serving Medicaid patients in Philadelphia identified a number of practice characteristics that influence ED use (Lowe et al., 2005). Potentially avoidable ED use tends to be lower in practices with expanded practice hours in the evenings and weekends and the availability of specialized equipment for management of asthma (e.g., nebulizers, peak flow meters). Avoidable ED use tends to be higher in practices with a high percentage of Medicaid patients, high clinician workload, and clinicians who are nurse practitioners or physician assistants. It remains unknown, however, whether the avoided ED visits would generate sufficient savings to the Medicaid program for it to pay for these practice enhancements. Moreover, additional research is needed to determine the factors that influence ED utilization by Medicare and privately insured patients who account for the largest volume of potentially avoidable ED use overall.

The need for surge capacity combined with the prevalence of potentially avoidable ED use raises questions about the optimal level of total hospital capacity. This capacity is the sum of capacity for usual patient flow and capacity for unexpected surges in demand that stem from epidemics or mass casualty disasters. Capacity for usual patient flow is determined by factors within the health sector including the medical needs of patients and the willingness of third party payers to cover the costs of creating and maintaining that capacity.

In contrast, the need for surge capacity is determined by factors outside of the health sector, such as the probability of a disaster and the potential number of casualties. Because of this, public and private reimbursement policies do not contain explicit mechanisms encouraging hospitals to maintain adequate surge capacity. With the purpose of minimizing the costs of care actually provided, tight reimbursement policies can actually provide a disincentive for hospitals

to maintain surge capacity. As a result, the availability of hospital surge capacity may require more explicit regulatory or financing mechanisms with considerable input from disaster planning and other specialists not usually connected with healthcare finance and organization policy.

Initiatives that discourage the substitution of ED use for primary care can be beneficial to patients by providing care in more appropriate setting and at an earlier stage of illness. In addition, the reduction of non-emergent and preventable ED use would free up total capacity required for hospitals to perform their needed functions. This raises the question of what should be done with the newly created capacity. If left to the market, this added capacity would eventually disappear since payers would be unwilling to cover the costs. If, before the reduction in preventable ED use, surge capacity was deemed adequate for likely threats, then the market response would be appropriate and also beneficial to the extent that the reduced capacity saves costs without harming patients. Alternatively, if surge capacity was considered inadequate, the reduction in preventable ED use would provide a mechanism for expanding surge capacity without major investments in new hospital infrastructure. As mentioned above, support for keeping unused capacity in reserve, with or without a reduction in preventable ED use, will likely require explicit mechanisms for doing so.

Conclusion

Because they are set up for other purposes, hospital ED's are usually considered less than optimal for the delivery of high quality primary care. Despite this, non-emergent and primary care preventable conditions account for a large percentage of total ED volume, which suggests many patients experience access barriers or dissatisfaction with primary care providers. Although use of the ED for these conditions is more common among certain populations and geographic areas, the total volume of these conditions spans a wide variety of payer classes and patient demographics.

Often care for non-emergent cases can be delayed (within limits) to make room for more urgent care in the ED. However, patients with non-emergent conditions still need to be triaged and registered, which can divert hospital resources at a time of extreme scarcity. In addition, much of the care classified as potentially avoidable is considered emergent and may require intensive use of resources as in the case of inpatient admissions that should have been preventable. These cases, although avoidable, may place a strain on emergency surge capacity if they were to occur during a major disaster. Whether such a strain would actually occur depends on the volume of these cases in relation to the available capacity to treat patients on ambulatory and inpatient bases.

Appendix: Zip Codes with High Rates of Potentially Avoidable Hospital Utilization in New Jersey, 2004

Table A-1: Municipalities with High Rates of Potentially Avoidable ED Visits without Admission per 1,000 Children ages 18 and under

Zip Code	Municipality
07017	East Orange
07018	East Orange
07050	Orange
07055	Passaic
07060	Watchung
07102	Newark
07103	Newark
07103	Newark
07105	Newark
07106	Newark
07107	Newark
07108	Newark
07109	Newark
07111	Newark
07111	Newark
07114	Newark
07201	Elizabeth
07202	Elizabeth
07206	Elizabeth
07208	Elizabeth
07501	Paterson
07502	Paterson
07503	Paterson
07505	Paterson
07601	Hackensack
07712	Ocean
07721	Cliffwood
07740	West End

07801	Dover
07852	Ledgewood
07939	Lyons
08019	Chatsworth
08032	Grenloch
08036	Hainesport
08041	Jobstown
08048	Lumberton
08061	Mount Royal
08102	Camden
08103	Camden
08104	Camden
08105	Camden
08232	Pleasantville
08252	Whitesboro
08260	Wildwood
08302	Seabrook
08314	Delmont
08324	Heislerville
08327	Leesburg
08346	Newtonville
08350	Richland
08360	Vineland
08401	Atlantic City
08528	Kingston
08608	Trenton
08609	Trenton
08611	Trenton
08618	Trenton
08629	Trenton
08638	Trenton
08701	Lakewood
08751	Seaside Height
08759	Whiting
08805	Bound Brook
08861	Perrineville

08901	New Brunswick

Sources: NJ Uniform Billing (UB-92) records, U.S. Census Bureau

Table A-2: Municipalities with High Rates of Potentially Avoidable ED Visits without Admission per 1,000 Adults ages 19 to 64

Zip code	Municipality
07017	East Orange
07018	East Orange
07050	Orange
07102	Newark
07103	Newark
07103	Newark
07106	Newark
07107	Newark
07108	Newark
07111	Newark
07111	Newark
07114	Newark
07201	Elizabeth
07202	Elizabeth
07206	Elizabeth
07305	Jersey City
07501	Paterson
07505	Paterson
07608	Teterboro
07712	Ocean
07721	Cliffwood
07740	West End
07801	Dover
07852	Ledgewood
08019	Chatsworth
08023	Deepwater
08032	Grenloch
08036	Hainesport
08041	Jobstown
08048	Lumberton
08061	Mount Royal
08064	New Lisbon
08073	Rancocas

08079	Salem
08095	Winslow
08102	Camden
08103	Camden
08104	Camden
08105	Camden
08224	New Gretna
08232	Pleasantville
08252	Whitesboro
08302	Seabrook
08311	Cedarville
08314	Delmont
08327	Leesburg
08346	Newtonville
08350	Richland
08360	Vineland
08401	Atlantic City
08526	Imlaystown
08528	Kingston
08608	Trenton
08609	Trenton
08611	Trenton
08618	Trenton
08629	Trenton
08701	Lakewood
08740	Ocean Gate
08751	Seaside Height
08759	Whiting
08861	Perrineville
08888	Whitehouse
08901	New Brunswick

Sources: NJ Uniform Billing (UB-92) records, U.S. Census Bureau

Table A-3: Municipalities with High Rates of Potentially Avoidable ED Visits without Admission per 1,000 Elderly Adults ages 65 and over

Zip code	Municipality
07017	East Orange
07050	Orange
07055	Passaic
07088	Vauxhall
07102	Newark
07103	Newark
07103	Newark
07107	Newark
07108	Newark
07111	Newark
07114	Newark
07419	Hamburg
07501	Paterson
07505	Paterson
07522	Paterson
07608	Teterboro
07721	Cliffwood
07753	Neptune
07801	Dover
07837	Glasser
07852	Ledgewood
07856	Mount Arlingto
08005	Barnegat
08006	Barnegat Light
08019	Chatsworth
08032	Grenloch
08036	Hainesport
08041	Jobstown
08045	Lawnside
08046	Willingboro
08048	Lumberton
08050	Manahawkin
08064	New Lisbon

08073	Rancocas
08086	Thorofare
08091	West Berlin
08092	West Creek
08095	Winslow
08102	Camden
08103	Camden
08104	Camden
08105	Camden
08224	New Gretna
08232	Pleasantville
08248	Strathmere
08314	Delmont
08323	Greenwich
08324	Heislerville
08327	Leesburg
08328	Malaga
08341	Minotola
08342	Mizpah
08346	Newtonville
08350	Richland
08360	Vineland
08401	Atlantic City
08515	Crosswicks
08528	Kingston
08550	Princeton Junc
08608	Trenton
08609	Trenton
08611	Trenton
08618	Trenton
08831	Jamesburg
08887	Three Bridges

Sources: NJ Uniform Billing (UB-92) records, U.S. Census Bureau

Table A-4: Municipalities with High Rates of Ambulatory Care Sensitive (ACS) Admissions per 1,000 Children ages 18 and under

Zip code	Municipality
07002	Bayonne
07008	Carteret
07017	East Orange
07018	East Orange
07022	Fairview
07029	Harrison
07030	Hoboken
07032	Kearny
07047	North Middleto
07050	Orange
07052	West Orange
07060	Watchung
07067	Rahway
07068	Roseland
07087	Weehawken
07093	West New York
07094	Secaucus
07102	Newark
07103	Newark
07103	Newark
07105	Newark
07106	Newark
07107	Newark
07108	Newark
07109	Newark
07111	Newark
07114	Newark
07304	Jersey City
07305	Jersey City
07306	Jersey City
07307	Jersey City
07310	Jersey City
07420	Haskell

07435	Newfoundland
07442	Pompton Lakes
07465	Wanaque
07501	Paterson
07502	Paterson
07505	Paterson
07608	Teterboro
07846	Johnsonburg
07848	Lafayette
07852	Ledgewood
07855	Middleville
07877	Swartswood
07970	Mount Freedom
07976	New Vernon
07977	Peapack
07978	Pluckemin
08011	Birmingham
08019	Chatsworth
08032	Grenloch
08036	Hainesport
08039	Harrisonville
08048	Lumberton
08061	Mount Royal
08095	Winslow
08219	Green Creek
08220	Leeds Point
08224	New Gretna
08248	Strathmere
08252	Whitesboro
08315	Dividing Creek
08327	Leesburg
08350	Richland
08401	Atlantic City
08504	Blawenburg
08515	Crosswicks
08526	Imlaystown

08528	Kingston
08535	Perrineville
08544	Princeton
08553	Rocky Hill
08556	Rosemont
08557	Sergeantsville
08561	Windsor
08618	Trenton
08738	Mantoloking
08739	Normandy Beach
08751	Seaside Height
08759	Whiting
08831	Jamesburg
08834	Little York
08861	Perrineville
08868	Quakertown
08885	Stanton
08901	New Brunswick

Sources: NJ Uniform Billing (UB-92) records, U.S. Census Bureau

Table A-5: Municipalities with High Rates of Ambulatory Care Sensitive (ACS) Admissions per 1,000 Adults ages 19 to 64

Zip code	Municipality
07017	East Orange
07018	East Orange
07050	Orange
07102	Newark
07103	Newark
07103	Newark
07106	Newark
07107	Newark
07108	Newark
07111	Newark
07111	Newark
07114	Newark
07304	Jersey City
07305	Jersey City
07306	Jersey City
07501	Paterson
07505	Paterson
07514	Paterson
07522	Paterson
07608	Teterboro
07734	Keansburg
07846	Johnsonburg
07855	Middleville
07863	Oxford
07970	Mount Freedom
07978	Pluckemin
08018	Cedar Brook
08019	Chatsworth
08023	Deepwater
08032	Grenloch
08036	Hainesport
08039	Harrisonville
08041	Jobstown

08048	Lumberton
08061	Mount Royal
08064	New Lisbon
08069	Penns Grove
08073	Rancocas
08079	Salem
08086	Thorofare
08091	West Berlin
08095	Winslow
08102	Camden
08103	Camden
08104	Camden
08105	Camden
08110	Camden
08217	Elwood
08232	Pleasantville
08248	Strathmere
08251	Villas
08252	Whitesboro
08260	Wildwood
08270	Woodbine
08311	Cedarville
08314	Delmont
08324	Heislerville
08327	Leesburg
08342	Mizpah
08346	Newtonville
08349	Port Norris
08350	Richland
08401	Atlantic City
08504	Blawenburg
08515	Crosswicks
08526	Imlaystown
08528	Kingston
08544	Princeton
08556	Rosemont

08557	Sergeantsville
08608	Trenton
08609	Trenton
08611	Trenton
08618	Trenton
08638	Trenton
08739	Normandy Beach
08751	Seaside Height
08759	Whiting
08834	Little York
08861	Perrineville
08868	Quakertown
08885	Stanton

Sources: NJ Uniform Billing (UB-92) records, U.S. Census Bureau

Table A-6: Municipalities with High Rates of Ambulatory Care Sensitive (ACS) Admissions per 1,000 Elderly Adults ages 65 and over

Zip code	Municipality
07017	East Orange
07018	East Orange
07020	Edgewater
07035	Lincoln Park
07050	Orange
07088	Vauxhall
07102	Newark
07103	Newark
07103	Newark
07108	Newark
07114	Newark
07305	Jersey City
07420	Haskell
07501	Paterson
07721	Cliffwood
07724	Tinton Falls
07738	Lincroft
07752	Navesink
07821	Andover
07829	Buttzville
07844	Hope
07852	Ledgewood
07856	Mount Arlingto
07863	Oxford
07879	Tranquility
07939	Lyons
08018	Cedar Brook
08019	Chatsworth
08032	Grenloch
08036	Hainesport
08043	Voorhees
08048	Lumberton
08061	Mount Royal

08064	New Lisbon
08073	Rancocas
08080	Sewell
08086	Thorofare
08095	Winslow
08103	Camden
08105	Camden
08110	Camden
08210	Cape May Court
08219	Green Creek
08224	New Gretna
08232	Pleasantville
08319	Estell Manor
08324	Heislerville
08327	Leesburg
08328	Malaga
08350	Richland
08360	Vineland
08515	Crosswicks
08526	Imlaystown
08528	Kingston
08535	Perrineville
08544	Princeton
08550	Princeton Junc
08556	Rosemont
08608	Trenton
08609	Trenton
08611	Trenton
08690	Trenton
08720	Allenwood
08739	Normandy Beach
08826	Glen Gardner
08831	Jamesburg
08857	Old Bridge
08868	Quakertown
08887	Three Bridges

08888	Whitehouse

Sources: NJ Uniform Billing (UB-92) records, U.S. Census Bureau

Endnotes

1. To avoid double-counting, analysis of inpatient admissions excludes newborns who generate separate billing records from their mothers at discharge.

2. Age-sex adjusted ACS admission rates are highly correlated with non-adjusted ACS admission rates for all three age groups.

3. The definition of an urban zip code is based on a classification system developed for analysis of uninsured rates in New Jersey's inner cities (DeLia and Belloff, 2005). Specifically, an area is considered urban if it has a population of at least 25,000 and a population density of at least 9,000 people per square mile.

4. The correlation coefficient measures the degree of linear association between two variables. A coefficient of 1 denotes a perfect positive association, -1 denotes a perfect negative association, and 0 denotes no association at all. The square of the correlation coefficient gives the percentage association between two variables – e.g., if the correlation coefficient is 0.87, then variation in one variable is associated with 76% of the variation in the other variable (since $0.87^2 = 0.76$).

5. The American College of Emergency Physicians (2002) defines ED overcrowding as follows: "A situation in which the identified need for emergency services outstrips available resources in the ED. This situation occurs in hospital emergency departments when there are more patients than staffed ED treatment beds and wait times exceed a reasonable period. Crowding typically involves patients being monitored in nontreatment areas (such as hallways) and awaiting ED treatment beds or inpatient beds. Crowding may also involve an inability to appropriately triage patients, with large numbers of patients in the ED waiting area of any triage assessment category."

6. The U.S. General Accounting Office (2003) defines ambulance diversion as follows: "Under certain circumstances where a hospital lacks staffing or facilities to accept additional emergency patients, the hospital may place itself on 'diversionary status' and direct en route ambulances to divert to another hospital. In general, hospitals ask EMS providers to divert ambulances to other medical facilities because their emergency department staff are occupied and unable to promptly care for new arrivals or specific services within the hospitals, such as the intensive care units, are filled and unable to accommodate the

specialized needs of new ambulance arrivals. While on diversion, hospitals must still treat any patients who arrive by ambulance, and in some cases, local community protocols allow ambulances to go to a hospital that is on diversion when the patient asks to go to that hospital or if the patient needs immediate medical treatment. In addition, even while on diversion, the emergency department is still required to screen and treat nonambulance patients—those patients who walk in or otherwise arrive at the hospital—and these patients make up the vast majority of visits to the emergency department."

References

American College of Emergency Physicians. *Responding to Emergency Department Crowding: A Guidebook for Chapters. A Report of the Crowding Resoucres Taskforce*. August, 2002

Bazzoli G., Brewster L, Liu G and Kuo S. "Does U.S. Hospital Capacity Need To Be Expanded?" *Health Affairs*, 22(6): 40-54, 2003.

Billings, J. N. Parikh, and T. Mijanovich. *Emergency Department Use in New York City: A Substitute for Primary Care?* The Commonwealth Fund. Issue Brief. November 2000-a.

Billings, J. N. Parikh, and T. Mijanovich. *Emergency Room Use: The New York Story.* The Commonwealth Fund. Issue Brief. November 2000-b.

Blustein B, Hanson K, Shea S. Preventable hospitalizations and socioeconomic status. *Health Affairs* 17(2):177-189, 1998.

Cummings, S., G. Banet, S. Boxerman, P. Asaro, and L. Lewis. "Increased Primary Care Access: Can It Reduce Emergency Department Overcrowding?" *Academic Emergency Medicine* 12(5): 151-a, 2005.

Cunningham, P. and J. May. *Insured Americans Drive Surge in Emergency Department Visits*. Center for Studying Health System Change, Issue Brief. October 2003: No.70.

Cunningham P, Clancey C, Cohen J and Wilets M. "The Use of Hospital Emergency Departments for Nonurgent Health Problems: A National Perspective." *Medical Care Research and Review*, 52(4): 453-474, 1995.

DeLia, D. "Annual Bed Statistics Give a Misleading Picture of Hospital Surge Capacity". *Annals of Emergency Medicine*. Forthcoming.

DeLia, D. *Emergency Department Utilization and Surge Capacity in New Jersey, 1998-2003*. Report to the New Jersey Department of Health and Senior Services, March, 2005.

DeLia, D. "Distributional Issues in the Analysis of Preventable Hospitalizations". *Health Services Research* 38(6): 1761-1779, 2003.

DeLia, D. and D. Belloff. *Disparity in Health Insurance Coverage: Urban versus Non-urban Areas of New Jersey*. Report to the New Jersey Department of Human Services, November, 2005.

Derlet, R. and Richards J. "Overcrowding in the Nation's Emergency Departments: Complex Causes and Disturbing Effects." *Annals of Emergency Medicine*, 35(1): 63-68, 2000.

Emergency Medical Treatment and Active Labor Act (EMTALA), 42 US C Sec 1395dd. 1990.

Glendinning, D., "Medicare Payment Cuts Threaten More Strain on Overloaded EDs," *American Medical News (AMNews)*: June 20, 2005.

Holmes, C. *Expanding Primary Health Care in New Jersey through Centers for Primary Health Care*. New Jersey Department of Health and Senior Services, April 2005.

Joint Commission on Accreditation of Healthcare Organizations. *Managing Patient Flow: Stretegies and Solutions for Addressing Hospital Overcrowding*. 2004.

The Lewin Group. Emergency Department Overload: A Growing Crisis. The results of the AHA Survey of Emergency Department (ED) and Hospital Capacity. Falls Church, VA: The Lewin Group, 2002.

Lowe, R.A., A.R. Localio, D.F. Schwartz, et al. "Association between Primary Care Practice Characteristics and Emergency Department Use in a Medicaid Managed Care Organization". *Medical Care* 43: 792-800, August 2005.

Massachusetts Division of Health Care Finance and Policy. *Non-emergent and Preventable ED Visits*. Analysis Brief, Number 7. June 2004.

McCaig L. and Burt C. *National Hospital Ambulatory Medical Care Survey: 2002 Emergency Department Summary*. Washington, DC: U.S. Department of Health & Human Services, Center for Disease Control & Prevention; National Center for Health Statistics,No. 340, 2004.

NYU Center for Health and Public Service Research, "NYU ED Algorithm: Background," http://www.nyu.edu/wagner/chpsr/index.html?p=61 (Last accessed 8/29/05).

Regenstein, M., L. Nolan, M. Wilson, H. Mead, and B. Siegel. *Walking a Tightrope: The State of the Safety Net in Ten U.S. Communities*. Urgent Matters. May, 2004.

U. S. General Accounting Office. *Hospital Emergency Departments. Crowded Conditions Vary among Hospitals and Communities*. Report to the Ranking Minority Member, Committee on Finance, U.S. Senate. March 2003.

Williams, R., "The Costs of Visits to Emergency Departments." *New England Journal of Medicine* 334(10): 642-646, March 7, 1996.