Issue Brief

From The University of Memphis
Methodist Le Bonheur Center for Healthcare Economics

March 8, 2010

Trends in Potentially Avoidable Hospitalizations among Adults in Tennessee, 1998 - 2006

Cyril F. Chang and Jennifer L. Troyer

Background

Researchers have recently focused on hospitalizations that can potentially be avoided as a source of information to measure and track health care access to ambulatory care,.[1,2,3] These hospitalizations are inpatient admissions for certain conditions, called Ambulatory Care Sensitive Conditions (ACSCs), that can potentially be prevented when clinicians deliver timely and effective outpatient treatment to individuals who actively participate in their own care, follow a healthy lifestyle, and engage in responsible personal behavior.[4]

Nationally, 4.4 million inpatient admissions to U.S. hospitals in 2004 involved treatment for one or more of these ACSCs, resulting in a total cost of more than $29 billion – one out of every 10 dollars of total hospital expenditures.[5] High rates of hospitalizations for these conditions are important to clinicians and health care decision makers because they suggest resources wasted as well as opportunities for improving health system efficiency by delivering timely and effective primary care in the ambulatory setting. Changes in the rates of ACSC hospitalizations over time may signal an improvement or deterioration in the quality and effectiveness of ambulatory care. These long-term trends may also suggest changes in the underlying factors such as life style choices and dietary practices of individuals and families that shape the health status of the general population or specific population segments.

This Issue Brief presents data from the Tennessee Hospital Discharge Datasets on changes in ACSC hospitalizations as a percent of all hospitalizations for 1998-2006. It used the revised definitions of ACSCs released by the Agency for Healthcare Research and Quality (AHRQ) in 2007 to develop hospitalization rates for selected chronic and acute ACSC conditions for adults ages 18 and over.[6] This updated version of ACSC definitions as described in the AHRQ's new Prevention Quality Indicators (PQIs) has moved two pediatric conditions, pediatric asthma and pediatric gastroenteritis, to a new and separate set of quality indicators for the pediatric

Summary of Findings

- In 2006, Tennessee hospitals admitted approximately 110,000 adults for ambulatory care sensitive conditions (ACSC) at a total cost of more than $624 million.
- Between 1998 and 2006, total ACSC hospitalizations in Tennessee increased by 4.2%, while the total costs for ACSC hospitalizations in constant 2006 dollars decreased by 1.8%.
- In comparison, total admissions for all conditions increased by 15% during 1998 - 2006 while total hospital costs for all conditions increased by 21%.
- Both men and women experienced steady declines in ACSC hospitalizations as a % of total hospitalizations during 1998- 2006, with declines by women outpacing declines by men.
- White patients experienced the most decline in ACSC hospitalizations, followed by Hispanics and those in the "Other" racial/ethnic category. Black patients, in contrast, experienced an increase in ACSC hospitalizations as a % of Black patients' total hospitalizations.
- Medicare and Commercial patients experienced substantial declines in ACSC hospitalizations during 1998 - 2006, with Medicare patients experiencing more impressive declines than Commercial patients. TennCare/ Medicaid patients saw a slight decline in ACSC hospitalizations in early 2000s but the decline had slowed to a halt in more recent years.
- Managed care plans did not deliver more impressive declines in ACSC hospitalizations as a percent of all hospitalizations to live up to the expectation of a better managed form of health care delivery.
- ACSC patients admitted through an emergency department outnumbered their counterparts who were not admitted through an emergency department by a factor of more than 2 throughout 1998 - 2006.

population. This issue brief does not consider the pediatric population. The 12 PQIs for adult populations considered in this brief include:

Label (PQI No.)
Chronic PQI
Diabetes
Diabetes, short-term complications (PQI 1)
Diabetes, long-term complications (PQI 3)
Uncontrolled diabetes (PQI 14)
Lower extremity amputations among patients with diabetes (PQI 16)
Circulatory Diseases
Hypertension (PQI 7)
Congestive heart failure (PQI 8)
Angina without procedure (PQI 13)
Chronic Respiratory Diseases
Chronic obstructive pulmonary disease (PQI 5)
Adult asthma (PQI 15)
Acute PQI
Dehydration (PQI 10)
Bacterial pneumonia (PQI 11)
Urinary infections (PQI 12)

PQI = Prevention Quality Indicator

Source: AHRQ Quality Indicators, March 2007. Agency for Healthcare Research and Quality, Rockville, MD. http://www.qualityindicators.ahrq.gov/pqi_download.htm

The study population in this Issue Brief is restricted to adult patients (ages 18 and over) discharged from non-federal short-stay hospitals licensed in Tennessee, including general medical and surgical hospitals, women's or OB/GYN hospitals, and pediatric hospitals. Excluded are patients discharged from long-term, rehabilitation, psychiatric, and alcoholism and chemical dependency hospitals. Also excluded, following the guidelines for using the AHRQ Quality Indicators, are patients with a major diagnostic code of pregnancy, childbirth, or puerperium.

Findings

In 2006, approximately 110,000 ambulatory care sensitive condition (ACSC) hospitalizations were made by Tennesseans. These hospitalizations, so called because they are sensitive to the provision of effective primary care, resulted in more than $624 million in hospital costs. (These costs were converted from hospital charges reported in the hospital discharge records using a calculated cost-to-charge ratio.) Over time, total ACSC hospitalizations in Tennessee increased by 4.2% between 1998 and 2006, from 105,431 admissions to 109,852 admissions. Total costs for ACSC hospitalizations in 2006 constant dollars decreased by 1.8% during the same period, from $639 million to $624 million. In comparison, total admissions for all conditions increased by 15% between 1998 and 2006 in Tennessee while total hospital costs for all admitting conditions increased by 21%. The slower growth of ACSC hospitalizations has over time resulted in a declining trend in ACSC hospitalizations as a percent of all admissions in Tennessee, falling from 17.5% in 1998 to 15.9% in 2006, a decrease of 1.6 points (or an almost 10 percent decline) in 8 years (Figure 1).

Table 1 shows that chronic ACSC hospitalizations as a percent of all hospitalizations fell by 1.1 percentage points (or a 10 percent decline) between 1998 and 2006 while the percentage of

acute ACSC hospitalizations fell less, by 0.6 percentage points (an 8 percent decline) during the same period.

A closer examination of the individual categories of ACSC conditions in Table 1 shows a pattern of disturbing trends. For example, ACSC hospitalizations for diabetes as a percent of all hospitalizations did not decrease; it actually increased by 0.1 percentage points from 1.7% in 1998 to 1.8% in 2006 (a 4 percent and statistically significant increase). Similarly, ACSC hospitalizations for hypertension and adult asthma also experienced steady increases, causing the proportion of potentially preventable hospitalizations for hypertension and adult asthma to all hospitalizations to increase between 1998 and 2006. ACSC hospitalizations for urinary track infection, an acute condition, also experienced similar increases.

Gender differences in ACSC hospitalizations as a percent of total hospitalizations

Both men and women experienced steady declines in non-maternal ACSC hospitalizations as a percent of total hospitalizations between 1998 and 2006 (Figure 2), with declines by women outpacing declines by men. Women consistently had higher ACSC hospitalizations rates than men during 1998 – 2006, and the gap remained relative stable over time.

Table 2 shows women experienced a faster decline in the percentage of ACSC hospitalizations than men for circulatory diseases while men experienced a faster decline in hospitalizations for chronic respiratory and acute conditions such as dehydration, bacterial pneumonia, and urinary track infection. Alarmingly, men experienced a nearly 9 percent increase in the percentage of ACSC hospitalizations for diabetes during 1998 - 2006. This increase explains why while men had a declining trend in more categories of ACSC conditions than women while at the same time experiencing a smaller decline in the overall percentage of ACSC hospitalizations for all conditions.

Racial variations in the trends of ACSC hospitalizations

Among the major racial and ethnic groups, as shown in Figure 3, White patients experienced the most decline in ACSC hospitalizations as a percent of all hospitalizations (a decline of 2.4 percentage points from 17.8% in 1998 to 15.4% in 2006, or a 13% decline over time), followed by Hispanic patients (a decline of 1.3 percentage points or a 12% decline) and those in the "Other' racial/ethnic group (1.2 percentage points or a decline of 10%). Black patients, in contrast, experienced an increase in the percent of ACSC hospitalizations, rising from 18.9% in 1998 to 19.4% in 2006 (a statistically significant increase of 2.92%).

Table 3 shows detailed racial and ethnic variations in the changes in ACSC hospitalizations as a percent of all hospitalizations, with breakdowns into chronic and acute conditions. White patients, for example, saw a slight increase in the percentage of ACSC hospitalizations for diabetes between 1998 and 2006 while their ACSC hospitalizations as a percent all hospitalizations for all other conditions declined in the same period. Black patients, in comparison, experienced persistent increases in two of the three chronic conditions, diabetes and circulatory diseases. Their ACSC hospitalizations for chronic respiratory diseases decreased, albeit at a slower rate than White patients' decline, but Black patients' ACSC hospitalizations for acute conditions declined substantially more than White patients from 1998 to 2006. Hispanics consistently experienced lower levels of ACSC hospitalizations as a percent of all hospitalizations than both Black and White patients in general. But Hispanics' ACSC hospitalization rates for diabetes were consistently higher than Whites and those in the "Other" racial category. Over time, however, Hispanics' ACSC hospitalizations as a percent of all hospitalizations increased the most among the four racial/ethnic groups.

Changes in ACSC hospitalizations as a percent of all hospitalization by insurance category

Among the four major third-party payers, Medicare patients consistently led in ACSC hospitalizations as a percent of all hospitalizations while those insured by Commercial health plans (BCBS commercial plans included) had consistently the lowest percentages (Figure 4). Between 1998 and 2006, both Medicare and Commercial patients experienced declines in the percentage of ACSC hospitalizations, with Medicare patients experiencing more impressive declines than Commercial patients. TennCare/Medicaid patients saw a slight decline in the percentage of ACSC hospitalizations in early 2000s but the decline had slowed to a halt in more recent years. Self Pay/Uninsured patients followed a similar pattern up to 2003, but the ACSC hospitalizations as a percent of all hospitalizations for this group of patients who have no insurance coverage had experienced an uptick since 2003.

Table 4 shows detailed variations in the percentages of ACSC hospitalizations as compared to all hospitalizations, with breakdowns into insurance categories. Commercial and Medicare patients, for example, enjoyed broad-based declines in the proportions of ACSC hospitalizations across almost all disease categories between 1998 and 2006. TennCare/Medicaid patients, in comparison, experienced decreases in some of the disease categories while increases in other disease categories. With the exception of acute conditions, Self-Pay/Uninsured patients experienced increases in the percent of ACSC hospitalizations over time in most chronic disease categories. The increases in hospitalizations for chronic conditions experienced by this group are likely to be very closely tied to the lack of primary care received, and this trend is likely to continue as the percentage of the population that is uninsured continues to grow.

The influence of managed care on ACSC hospitalizations

Both managed care patients and non-managed care patients experienced a modest decline in ACSC hospitalizations relative to all hospitalizations (Figure 5). For the period 1998 - 2006, managed care patients consistently experienced lower percentages of ACSC hospitalizations than non-managed care patients. It is worth noting that managed care plans did not deliver more impressive declines in ACSC hospitalizations as a percent of all hospitalizations to live up to the expectation of a better managed form of health care delivery.

Among the different disease categories, as shown in Table 5, managed care did deliver better outcomes as measured by the numbers of ACSC hospitalizations as a percent of all hospitalizations for diabetes, a major chronic condition, and chronic respiratory diseases, but it did not outperform non-managed care plans in other disease categories.

Changes in the proportion of ACSC hospitalizations for ER admitted and not ER admitted

Some of the ACSC hospitalizations are planned, or scheduled, hospitalizations while others were admitted through an emergency department and, by implication, unplanned. Figure 6 compares the ACSC hospitalizations as a percent of all hospitalizations of those who were admitted through a hospital emergency department with those not admitted through an emergency department.

The patterns of change of the two groups of ACSC patients differed in two significant ways for the period 1998 to 2006. First, ACSC patients admitted through an emergency department outnumbered their counterparts who were not admitted through an emergency department by a factor of more than 2 throughout 1998 - 2006. Second, the gap between the two groups grew larger, with those admitted through an ER experiencing a slight rising trend while those not admitted through an ER a pronounced declining trend.

Tables 6 and 7 show detailed differences between patients admitted through an ER and those who were not in terms of ACSC hospitalizations as a proportion of all other hospitalizations and the two groups exhibited considerable differences in the pattern of change over time. For example, planned ACSC hospitalizations not admitted through an ER tended to have broad-based declines in ACSC hospitalizations relative to all hospitalizations. Unplanned ACSC hospitalizations, in contrast, exhibited increases in some disease categories and decreases in other categories, and the increases and decreases did not concentrate in either chronic or acute conditions.

Data Source

The data used in this Issue Brief are based on two broad-based data sets from Tennessee Department of Health. (1) *The Hospital Discharge Dataset (HDDS)* receives information from UB-04 forms on all inpatient discharges and other selected patient visits from Tennessee hospitals. Each form contains information on patient diagnoses, procedures performed on the patient, charges for services provided, and selected patient demographics. HDDS data can be used to learn about hospitalizations from hundreds of causes. Patterns of hospitalization can be compared in different parts of the State and among different segments of the population. (2) The *Joint Annual Report of Hospitals* (JAR-H) are individual hospital data reports completed each year by licensed hospitals in Tennessee and returned to the Division of Health Statistics in Tennessee Department of Health for compilation and review. The definitions of data and data layouts of both datasets can be access at: http://health.state.tn.us/PublicJARS/Default.aspx.

Definitions

Unit of analysis
The unit of analysis for HDDS data is the hospital discharge (i.e., an episode of hospital stay), not a person or patient. This means that a patient who is admitted to the hospital multiple times in one year will be counted each time as a separate "inpatient admission" or "discharge" from the hospital.

Costs and charges
The HDDS data contain information on hospital charges but not costs. In this Issue Brief, total hospital charges were converted into costs using cost-to-charge ratios based on hospital financial data reported annually to Tennessee Department of Health. Hospital charges reflect the dollar amount the hospital bills a third-party payer or the patient for the entire hospital stay, and they do not include professional (MD) fees. The cost-to-charge ratio of a particular year was estimated by dividing the grand total of hospital expenses for all community hospitals in that year by these hospitals' grand total of gross charges. The data for calculating the cost-to-charge ratios came from the *Joint Annual Report of Hospitals* datasets for 1998-2006 maintained by Tennessee Department of Health (Available online at: http://health.state.tn.us/statistics/jar.htm).

Payers
- Commercial: Commercial health plans including all non-public health plans sponsored by Blue Cross Blue Shield Tennessee.

- Medicare: Medicare Part A and Medicare Advantage.
- TennCare/Medicaid: TennCare, which is Tennessee Medicaid managed care, and Medicaid coverage from other states.
- Self Pay/Uninsured: Self-pay, self insurance, self administered, and medically indigent/free.
- Other: Federal, Champus (military), Division of Health Services (Voc. Rehab.), Workers/State Compensation, Other, and Unknown.

Race and Ethnicity

- White includes White and either not Hispanic or Hispanic origin unknown.
- Black includes Black and either not Hispanic or Hispanic origin unknown.
- Hispanic includes Hispanic White and Black.
- Other includes Asian or Pacific Islander, American Indian/Alaskan native, race/ethnicity unknown, and other.

Figures

Figure 1 - ACSC Hospitalizations as a Percent of All Hospitalizations in Tennessee, 1998-2006

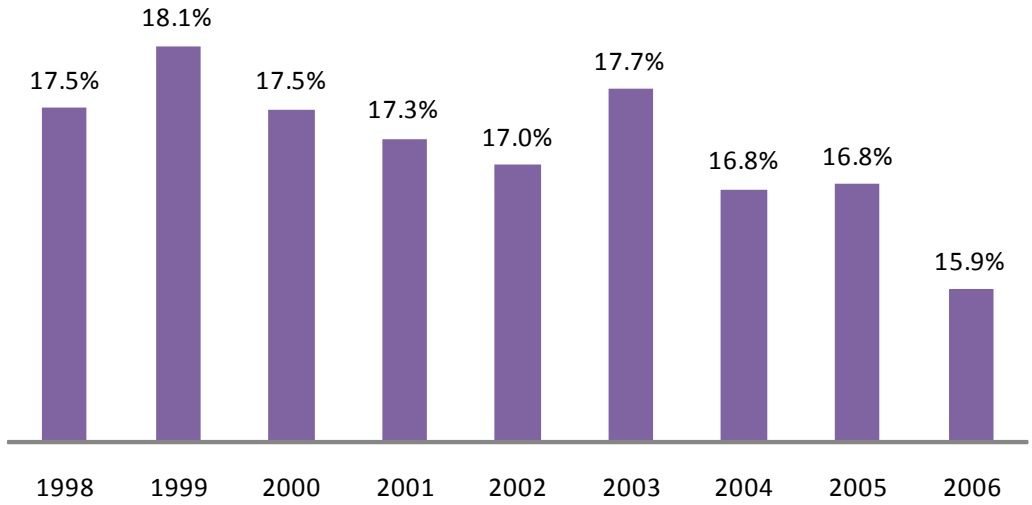
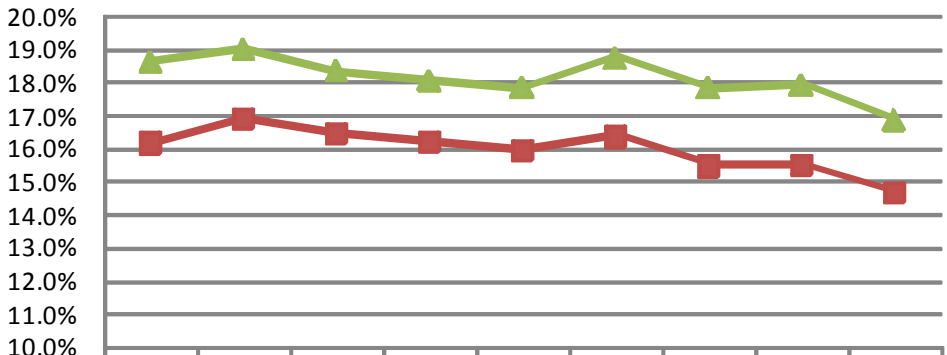
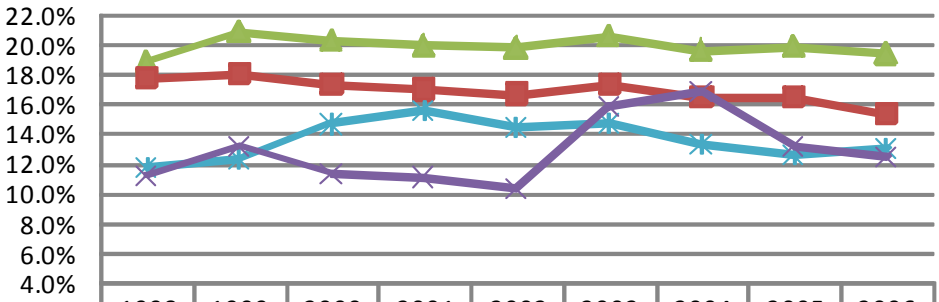


Figure 2 - ACSC Hospitalizations as a Percent of All Hospitalizations for Men and Women, 1998-2006



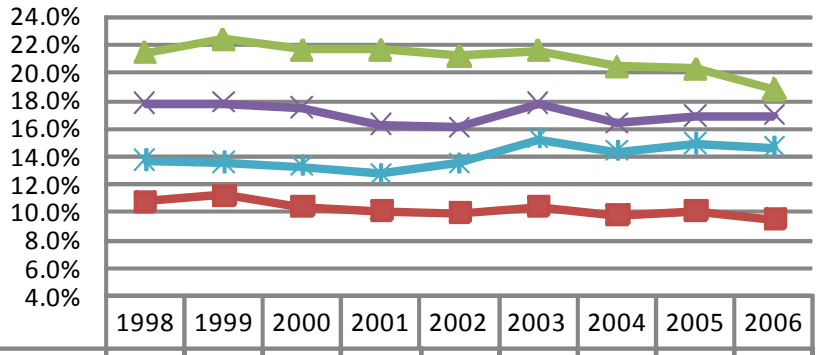
	1998	1999	2000	2001	2002	2003	2004	2005	2006
Women	18.6%	19.0%	18.3%	18.0%	17.8%	18.7%	17.8%	17.9%	16.8%
Men	16.2%	16.9%	16.5%	16.2%	16.0%	16.4%	15.5%	15.5%	14.7%

Figure 3 - ACSC Hospitalizations as a Percent of All Hospitalizations by Race, 1998-2006



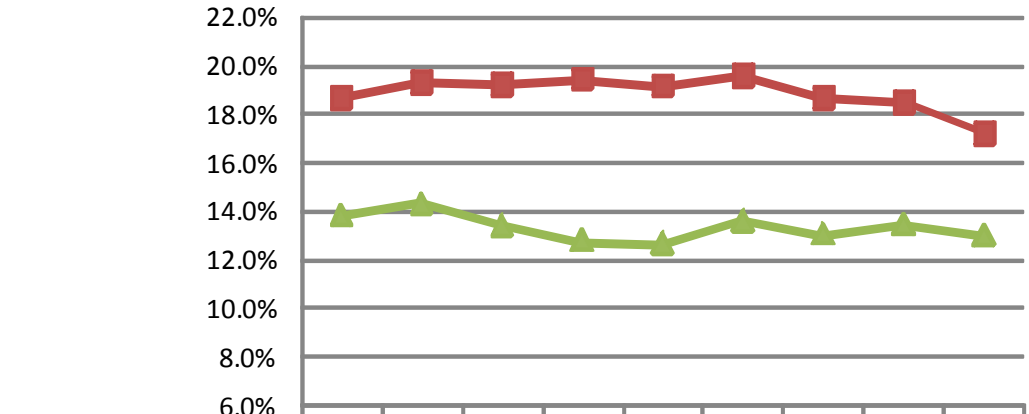
	1998	1999	2000	2001	2002	2003	2004	2005	2006
Black	18.9%	20.9%	20.3%	20.0%	19.8%	20.6%	19.7%	19.9%	19.4%
White	17.8%	18.0%	17.3%	17.0%	16.7%	17.3%	16.5%	16.5%	15.4%
Other	11.8%	12.4%	14.7%	15.6%	14.4%	14.8%	13.3%	12.6%	13.0%
Hispanic	11.2%	13.2%	11.4%	11.2%	10.4%	15.9%	16.8%	13.2%	12.5%

Figure 4 - ACSC Hospitalizations as a Percent of All Hospitalizations by Insurance, 1998-2006



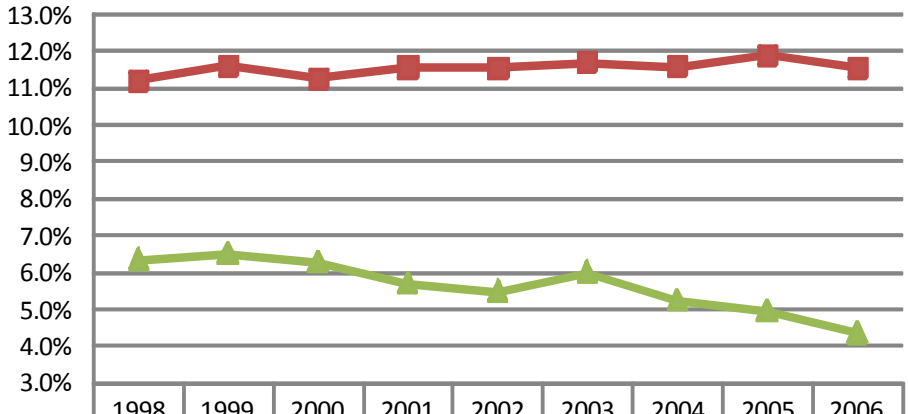
	1998	1999	2000	2001	2002	2003	2004	2005	2006
Medicare	21.4%	22.4%	21.5%	21.6%	21.2%	21.5%	20.4%	20.2%	18.8%
Self Pay/Uninsured	13.7%	13.6%	13.3%	12.8%	13.5%	15.2%	14.4%	14.9%	14.7%
TennCare/Medicaid	17.8%	17.8%	17.5%	16.3%	16.1%	17.8%	16.4%	16.9%	16.9%
Commercial	10.8%	11.2%	10.4%	10.1%	10.0%	10.4%	9.9%	10.1%	9.5%

Figure 5 - ACSC Hospitalizations as a Percent of All Hospitalizations by Managed Care Payer, 1998-2006



	1998	1999	2000	2001	2002	2003	2004	2005	2006
Managed Care	13.8%	14.3%	13.4%	12.8%	12.6%	13.6%	13.0%	13.4%	13.0%
Not Managed Care	18.6%	19.3%	19.2%	19.4%	19.1%	19.6%	18.7%	18.5%	17.2%

Figure 6 - ACSC Hospitalizations as a Percent of All Hospitalizations, Through ER vs. Not Through ER, 1998-2006



	1998	1999	2000	2001	2002	2003	2004	2005	2006
Through ER	11.2%	11.6%	11.3%	11.6%	11.5%	11.7%	11.6%	11.9%	11.5%
Not Through ER	6.3%	6.5%	6.3%	5.7%	5.5%	6.0%	5.2%	5.0%	4.3%

Tables

Table 1 – ACS Hospitalizations as a Percent of All Hospitalizations, 1998-2006

PQI Label	1998	1999	2000	2001	2002	2003	2004	2005	2006	Δ 98-06	p-value*
Chronic PQI											
Diabetes	1.7%	1.7%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	0.1%	0.003
Diabetes, short-term complications (PQI 1)	0.4%	0.4%	0.4%	0.4%	0.5%	0.5%	0.5%	0.5%	0.5%	0.1%	<.001
Diabetes, long-term complications (PQI 3)	0.9%	0.8%	0.9%	0.9%	0.9%	0.9%	1.0%	1.0%	0.9%	0.1%	<.001
Uncontrolled diabetes (PQI 14)	0.3%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	-0.1%	<.001
Lower extremity amputations among patients with diabetes (PQI 16)	0.4%	0.3%	0.4%	0.4%	0.4%	0.4%	0.3%	0.3%	0.3%	-0.1%	<.001
Circulatory Diseases	5.2%	5.1%	5.0%	5.0%	4.7%	5.0%	4.8%	4.7%	4.6%	-0.5%	<.001
Hypertension (PQI 7)	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.1%	<.001
Congestive heart failure (PQI 8)	4.3%	4.3%	4.2%	4.2%	4.0%	4.3%	4.1%	4.1%	4.0%	-0.3%	<.001
Angina without procedure (PQI 13)	0.5%	0.4%	0.4%	0.4%	0.3%	0.3%	0.2%	0.2%	0.2%	-0.3%	<.001
Chronic Respiratory Diseases	3.6%	3.8%	3.6%	3.5%	3.4%	3.6%	3.3%	3.3%	3.0%	-0.6%	<.001
Chronic obstructive pulmonary disease (PQI 5)	2.9%	3.1%	2.9%	2.8%	2.7%	2.8%	2.5%	2.3%	2.1%	-0.7%	<.001
Adult asthma (PQI 15)	0.7%	0.8%	0.7%	0.8%	0.7%	0.9%	0.8%	0.9%	0.9%	0.1%	<.001
Any Chronic PQI	10.5%	10.6%	10.3%	10.3%	10.0%	10.4%	9.9%	9.8%	9.4%	-1.1%	<.001
Acute PQI											
Dehydration (PQI 10)	1.1%	1.2%	1.1%	1.2%	1.3%	1.2%	1.1%	1.0%	0.9%	-0.3%	<.001
Bacterial pneumonia (PQI 11)	4.4%	4.7%	4.5%	4.2%	4.3%	4.5%	4.1%	4.4%	4.0%	-0.4%	<.001
Urinary infections (PQI 12)	1.5%	1.6%	1.6%	1.6%	1.5%	1.6%	1.6%	1.6%	1.7%	0.1%	<.001
Any Acute PQI	7.1%	7.5%	7.2%	7.0%	7.1%	7.3%	6.9%	7.1%	6.5%	-0.6%	<.001
Any Chronic or Acute PQI	17.5%	18.1%	17.5%	17.3%	17.0%	17.7%	16.8%	16.8%	15.9%	-1.6%	<.001

* p-value is for a test of whether the difference between the 1998 and 2006 values is statistically significant.

Table 2 - ACS Hospitalizations as a Percent of All Hospitalizations for Men and Women, 1998-2006

PQI Label[1]	1998	1999	2000	2001	2002	2003	2004	2005	2006	Δ 98-06	p-value*
Diabetes (PQI 1, 3, 14, 16) - Chronic											
Men[2]	1.8%	1.9%	1.9%	1.9%	2.0%	2.0%	2.0%	2.0%	2.0%	0.2%	<.001
Women	1.6%	1.6%	1.7%	1.7%	1.6%	1.6%	1.7%	1.7%	1.6%	0.0%	0.797
Circulatory Diseases (PQI 7, 8, 13) - Chronic											
Men	5.0%	4.9%	4.9%	4.8%	4.5%	4.9%	4.6%	4.6%	4.6%	-0.4%	<.001
Women	5.3%	5.2%	5.1%	5.1%	4.9%	5.1%	4.9%	4.7%	4.7%	-0.7%	<.001
Chronic Respiratory Diseases (PQI 5, 15) - Chronic											
Men	3.2%	3.5%	3.3%	3.2%	3.1%	3.2%	2.8%	2.8%	2.6%	-0.7%	<.001
Women	3.9%	4.1%	3.8%	3.8%	3.7%	4.0%	3.7%	3.7%	3.3%	-0.6%	<.001
Any Chronic PQI											
Men	10.0%	10.3%	10.0%	9.9%	9.6%	10.0%	9.5%	9.4%	9.1%	-0.9%	<.001
Women	10.8%	10.9%	10.6%	10.6%	10.2%	10.8%	10.2%	10.1%	9.6%	-1.2%	<.001
Any Acute Conditions (PQI 10, 11, 12)											
Men	6.1%	6.6%	6.5%	6.3%	6.3%	6.4%	6.0%	6.1%	5.6%	-0.6%	<.001
Women	7.8%	8.1%	7.8%	7.5%	7.6%	8.0%	7.6%	7.8%	7.3%	-0.6%	<.001
Overall Any PQI											
Men	16.2%	16.9%	16.5%	16.2%	16.0%	16.4%	15.5%	15.5%	14.7%	-1.5%	<.001
Women	18.6%	19.0%	18.3%	18.0%	17.8%	18.7%	17.8%	17.9%	16.8%	-1.8%	<.001

* p-value is for a test of whether the difference between the 1998 and 2006 values is statistically significant.

[1]Diabetes includes uncontrolled diabetes without complications, short-term diabetes complications, long-term diabetes complications, and diabetes-related lower extremity amputations. Circulatory dieases include angina without procedure, congestive heart failure, and hypertension. Chronic respiratory diseases include asthma and chronic obstructive pulmonary disease. Acute conditions include bacterial pneumonia, dehydration, and urinary tract infection.

[2]The denominator for each gender category is hopsitalizations for that gender category.

Table 4 - ACS Hospitalizations as a Percent of All Hospitalizations by Insurance Type, 1998-2006

PQI Label[1]	1998	1999	2000	2001	2002	2003	2004	2005	2006	Δ 98-06	p-value*
Diabetes (PQI 1, 3, 14, 16) - Chronic											
Commercial[2]	1.4%	1.5%	1.4%	1.4%	1.4%	1.4%	1.5%	1.4%	1.4%	0.0%	0.48
Medicare	1.6%	1.6%	1.6%	1.7%	1.7%	1.7%	1.7%	1.6%	1.5%	-0.1%	<.001
TennCare/Medicaid	2.7%	2.8%	2.8%	2.7%	2.9%	2.9%	3.0%	3.1%	3.0%	0.3%	0.003
Self Pay/Uninsured	2.2%	2.2%	2.4%	2.1%	2.8%	3.0%	3.0%	3.5%	3.7%	1.4%	<.001
Other	1.4%	1.2%	1.4%	1.3%	1.1%	1.2%	1.5%	1.4%	1.6%	0.2%	0.05
Circulatory Diseases (PQI 7, 8, 13) - Chronic											
Commercial	2.6%	2.6%	2.4%	2.5%	2.3%	2.4%	2.3%	2.3%	2.2%	-0.4%	<.001
Medicare	6.9%	6.9%	6.8%	6.8%	6.4%	6.6%	6.4%	6.2%	6.0%	-1.0%	<.001
TennCare/Medicaid	4.0%	3.8%	3.9%	3.7%	3.4%	3.8%	3.3%	3.4%	3.8%	-0.2%	0.091
Self Pay/Uninsured	3.7%	3.3%	3.1%	3.0%	3.2%	3.9%	4.1%	3.8%	4.0%	0.2%	0.154
Other	3.6%	3.9%	3.9%	2.8%	2.2%	2.5%	2.6%	2.9%	3.7%	0.2%	0.36
Chronic Respiratory Diseases (PQI 5, 15) - Chronic											
Commercial	2.3%	2.4%	2.2%	2.1%	2.0%	2.2%	1.9%	2.0%	1.8%	-0.5%	<.001
Medicare	4.1%	4.5%	4.2%	4.2%	4.1%	4.2%	3.9%	3.7%	3.4%	-0.7%	<.001
TennCare/Medicaid	4.7%	4.7%	4.3%	4.1%	4.1%	4.6%	4.0%	4.2%	4.2%	-0.5%	<.001
Self Pay/Uninsured	2.3%	2.4%	2.2%	2.3%	2.5%	2.6%	2.4%	2.6%	2.4%	0.1%	0.538
Other	3.1%	3.3%	2.8%	2.5%	1.8%	2.0%	1.9%	1.8%	2.5%	-0.6%	<.001
Any Chronic PQI											
Commercial	6.3%	6.5%	6.1%	6.0%	5.7%	6.1%	5.6%	5.7%	5.4%	-0.9%	<.001
Medicare	12.7%	12.9%	12.6%	12.7%	12.2%	12.5%	11.9%	11.5%	10.8%	-1.8%	<.001
TennCare/Medicaid	11.4%	11.3%	11.0%	10.4%	10.4%	11.3%	10.4%	10.6%	11.0%	-0.4%	0.009
Self Pay/Uninsured	8.3%	8.0%	7.8%	7.4%	8.5%	9.5%	9.4%	9.9%	10.1%	1.8%	<.001
Other	8.1%	8.4%	8.1%	6.6%	5.1%	5.8%	5.9%	6.1%	7.8%	-0.3%	0.232
Any Acute Conditions (PQI 10, 11, 12)											
Commercial	4.5%	4.8%	4.3%	4.1%	4.3%	4.4%	4.2%	4.4%	4.2%	-0.3%	<.001
Medicare	8.7%	9.4%	9.0%	8.9%	9.0%	9.0%	8.5%	8.7%	7.9%	-0.8%	<.001
TennCare/Medicaid	6.4%	6.5%	6.5%	5.9%	5.7%	6.6%	5.9%	6.3%	6.0%	-0.4%	0.001
Self Pay/Uninsured	5.4%	5.6%	5.5%	5.3%	5.0%	5.7%	5.0%	5.0%	4.6%	-0.8%	<.001
Other	5.7%	5.5%	5.9%	4.9%	3.4%	3.9%	3.4%	3.6%	4.9%	-0.8%	<.001
Overall Any PQI											
Commercial	10.8%	11.2%	10.4%	10.1%	10.0%	10.4%	9.9%	10.1%	9.5%	-1.2%	<.001
Medicare	21.4%	22.4%	21.5%	21.6%	21.2%	21.5%	20.4%	20.2%	18.8%	-2.6%	<.001
TennCare/Medicaid	17.8%	17.8%	17.5%	16.3%	16.1%	17.8%	16.4%	16.9%	16.9%	-0.9%	<.001
Self Pay/Uninsured	13.7%	13.6%	13.3%	12.8%	13.5%	15.2%	14.4%	14.9%	14.7%	1.0%	0.002
Other	13.8%	13.9%	14.1%	11.6%	8.5%	9.6%	9.3%	9.7%	12.7%	-1.1%	<.001

* p-value is for a test of whether the difference between the 1998 and 2006 values is statistically significant.

[1]Diabetes includes uncontrolled diabetes without complications, short-term diabetes complications, long-term diabetes complications, and diabetes-related lower extremity amputations. Circulatory dieases include angina without procedure, congestive heart failure, and hypertension. Chronic respiratory diseases include asthma and chronic obstructive pulmonary disease. Acute conditions include bacterial pneumonia, dehydration, and urinary tract infection.

[2]The denominator for each insurance category is hopsitalizations for that insurance category. Insurance status is for primary payer. Commercial includes private insurance, including Blue Cross/Blue Shield and Commerical Insurance. Medicare includes all Medicare. TennCare/Medicaid includes TennCare and Medicaid coverage from other states. Self Pay/Uninsured includes self-pay, self insurance, self administered, and medically indigent/free. Other includes Federal, Champus (military), Division of Health Services (Voc. Rehab.), Workers/State Compensation, Other, and Unknown.

Table 5 - ACS Hospitalizations as a Percent of All Hospitalizations by Managed Care Payer, 1998-2006

PQI Label[1]	1998	1999	2000	2001	2002	2003	2004	2005	2006	Δ 98-06	p-value*
Diabetes (PQI 1, 3, 14, 16) - Chronic											
Manged Care Payer[2]	2.0%	2.1%	2.0%	1.9%	2.0%	2.0%	2.1%	2.0%	1.9%	-0.1%	0.007
Not Managed Care	1.6%	1.6%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	0.1%	<.001
Circulatory Diseases (PQI 7, 8, 13) - Chronic											
Managed Care Payer	3.2%	3.1%	3.2%	3.1%	2.9%	3.1%	2.9%	3.0%	3.2%	0.1%	0.231
Not Managed Care	5.8%	5.7%	5.8%	5.9%	5.6%	5.9%	5.7%	5.5%	5.3%	-0.5%	<.001
Chronic Respiratory Diseases (PQI 5, 15) - Chronic											
Manged Care Payer	3.4%	3.5%	3.1%	2.9%	2.9%	3.2%	2.9%	3.0%	2.8%	-0.6%	<.001
Not Managed Care	3.6%	3.9%	3.8%	3.8%	3.7%	3.9%	3.5%	3.4%	3.1%	-0.6%	<.001
Any Chronic PQI											
Manged Care Payer	8.6%	8.7%	8.2%	7.9%	7.7%	8.3%	7.9%	8.0%	7.9%	-0.7%	<.001
Not Managed Care	11.0%	11.2%	11.2%	11.4%	11.0%	11.4%	10.9%	10.6%	10.0%	-1.0%	<.001
Any Acute Conditions (PQI 10, 11, 12)											
Manged Care Payer	5.3%	5.6%	5.2%	4.9%	4.9%	5.3%	5.1%	5.4%	5.1%	-0.2%	0.034
Not Managed Care	7.6%	8.1%	8.0%	8.0%	8.1%	8.2%	7.8%	7.9%	7.1%	-0.5%	<.001
Overall Any PQI											
Manged Care Payer	13.8%	14.3%	13.4%	12.8%	12.6%	13.6%	13.0%	13.4%	13.0%	-0.8%	<.001
Not Managed Care	18.6%	19.3%	19.2%	19.4%	19.1%	19.6%	18.7%	18.5%	17.2%	-1.4%	<.001

* p-value is for a test of whether the difference between the 1998 and 2006 values is statistically significant.

[1]Diabetes includes uncontrolled diabetes without complications, short-term diabetes complications, long-term diabetes complications, and diabetes-related lower extremity amputations. Circulatory dieases include angina without procedure, hypertension and congestive heart failure.

[2]The denominator for each managed care category is hopsitalizations for that managed care category. Managed Care Payer includes TennCare, Blue Cross Managed Care - HMO/PPO/Other Managed Care, Commercial Managed Care - HMO/PPO/Other Managed Care, and Medicare (HMO/PSO). Not Managed Care includes all other payers, including commerical providers that are not managed care, Medicaid from other states, and all payers from the "Other" and "Self Pay/Uninsured" categories in Table 4.

Table 6 – ACS Hospitalization Admitted Through ER as a Percent of All Hospitalizations, 1998-2006

PQI Label	1998	1999	2000	2001	2002	2003	2004	2005	2006	Δ 98-06	p-value*
Chronic PQI											
Diabetes	0.9%	0.9%	1.0%	1.0%	1.1%	1.1%	1.2%	1.2%	1.2%	0.3%	<.001
Diabetes, short-term complications (PQI 1)	0.3%	0.3%	0.3%	0.4%	0.4%	0.4%	0.4%	0.4%	0.5%	0.1%	<.001
Diabetes, long-term complications (PQI 3)	0.4%	0.4%	0.4%	0.5%	0.5%	0.5%	0.6%	0.6%	0.6%	0.2%	<.001
Uncontrolled diabetes (PQI 14)	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.0%	0.550
Lower extremity amputations among patients with diabetes (PQI 16)	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.0%	0.372
Circulatory Diseases	3.5%	3.4%	3.3%	3.4%	3.3%	3.4%	3.4%	3.5%	3.5%	0.1%	<.001
Hypertension (PQI 7)	0.2%	0.2%	0.2%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.1%	<.001
Congestive heart failure (PQI 8)	2.9%	2.8%	2.8%	2.9%	2.8%	2.9%	3.0%	3.1%	3.1%	0.2%	<.001
Angina without procedure (PQI 13)	0.4%	0.3%	0.3%	0.3%	0.2%	0.2%	0.2%	0.1%	0.1%	-0.2%	<.001
Chronic Respiratory Diseases	2.2%	2.4%	2.2%	2.3%	2.2%	2.3%	2.2%	2.2%	2.0%	-0.2%	<.001
Chronic obstructive pulmonary disease (PQI 5)	1.8%	1.9%	1.7%	1.8%	1.8%	1.8%	1.6%	1.6%	1.4%	-0.3%	<.001
Adult asthma (PQI 15)	0.5%	0.5%	0.4%	0.5%	0.5%	0.6%	0.5%	0.6%	0.6%	0.1%	<.001
Any Chronic PQI	6.6%	6.7%	6.5%	6.7%	6.6%	6.8%	6.8%	6.9%	6.8%	0.2%	<.001
Acute PQI											
Dehydration (PQI 10)	0.7%	0.7%	0.7%	0.8%	0.8%	0.7%	0.7%	0.6%	0.6%	-0.1%	<.001
Bacterial pneumonia (PQI 11)	2.9%	3.1%	3.0%	2.9%	3.0%	3.1%	2.9%	3.2%	2.9%	0.1%	<.001
Urinary infections (PQI 12)	1.1%	1.1%	1.1%	1.1%	1.1%	1.2%	1.2%	1.2%	1.3%	0.2%	0.097
Any Acute PQI	4.6%	4.9%	4.8%	4.8%	4.9%	4.9%	4.8%	5.0%	4.8%	0.2%	<.001
Any Chronic or Acute PQI	11.2%	11.6%	11.3%	11.6%	11.5%	11.7%	11.6%	11.9%	11.5%	0.3%	<.001

* p-value is for a test of whether the difference between the 1998 and 2006 values is statistically significant.

Table 7 – ACS Hospitalization Not Admitted Through ER as a Percent of All Hospitalizations, 1998-2006

PQI Label	1998	1999	2000	2001	2002	2003	2004	2005	2006	Δ 98-06	p-value*
Chronic PQI											
Diabetes	0.8%	0.8%	0.8%	0.7%	0.7%	0.7%	0.7%	0.6%	0.5%	-0.3%	<.001
Diabetes, short-term complications (PQI 1)	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.0%	0.117
Diabetes, long-term complications (PQI 3)	0.5%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.3%	-0.1%	<.001
Uncontrolled diabetes (PQI 14)	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	-0.1%	<.001
Lower extremity amputations among patients with diabetes (PQI 16)	0.2%	0.2%	0.3%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	-0.1%	<.001
Circulatory Diseases	1.7%	1.7%	1.7%	1.6%	1.4%	1.6%	1.4%	1.2%	1.1%	-0.6%	<.001
Hypertension (PQI 7)	0.2%	0.2%	0.1%	0.1%	0.1%	0.2%	0.1%	0.1%	0.1%	0.0%	0.007
Congestive heart failure (PQI 8)	1.4%	1.4%	1.4%	1.3%	1.2%	1.4%	1.2%	1.1%	1.0%	-0.5%	<.001
Angina without procedure (PQI 13)	0.2%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.0%	0.0%	-0.1%	<.001
Chronic Respiratory Diseases	1.4%	1.5%	1.4%	1.3%	1.2%	1.3%	1.1%	1.1%	0.9%	-0.4%	<.001
Chronic obstructive pulmonary disease (PQI 5)	1.1%	1.2%	1.1%	1.0%	0.9%	1.0%	0.8%	0.8%	0.7%	-0.4%	<.001
Adult asthma (PQI 15)								0.3%	0.3%	0.3%	<.001
Any Chronic PQI	3.9%	3.9%	3.9%	3.5%	3.3%	3.7%	3.1%	2.9%	2.6%	-1.3%	<.001
Acute PQI											
Dehydration (PQI 10)	0.5%	0.5%	0.4%	0.5%	0.5%	0.5%	0.4%	0.4%	0.3%	-0.2%	<.001
Bacterial pneumonia (PQI 11)	1.5%	1.6%	1.5%	1.3%	1.3%	1.4%	1.2%	1.3%	1.0%	-0.5%	<.001
Urinary infections (PQI 12)	0.5%	0.5%	0.5%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	-0.1%	<.001
Any Acute PQI	2.5%	2.6%	2.4%	2.2%	2.1%	2.3%	2.1%	2.0%	1.8%	-0.7%	<.001
Any Chronic or Acute PQI	6.3%	6.5%	6.3%	5.7%	5.5%	6.0%	5.2%	5.0%	4.3%	-2.0%	<.001

* p-value is for a test of whether the difference between the 1998 and 2006 values is statistically significant.

References

[1] Billings, J., L. Zeitel., and J. Lukomnik et al. 1993. Impact of socioeconomic status on hospital use in New York City. *Health Affairs* 12(1):162-173.

[2] Pappas, G., W. C. Hadden, L. J. Kozak and G. F. Fisher. 1997. Potentially avoidable hospitalizations: Inequalities in rates between U.S. socioeconomic groups. *American Journal of Public Health* 87: 811-816.

[3] Blustein, J. K. Hanson and S. Shea. 1998. Preventable hospitalizations and socioeconomic status. *Health Affairs* 17: 177-189.

[4] Agency for Healthcare Research and Quality. 2004. *AHRQ Quality Indicators—Guide to Prevention Quality Indicators: Hospital Admission for Ambulatory Care Sensitive Conditions. Rockville, MD: Agency for Healthcare Research and Quality*. Revision 3. AHRQ Pub. No. 02-RO203. Revision 4 (November 24, 2004).

[5] Russo, C. A. (Thomson Healthcare), Jiang, H. J. (AHRQ) and Barrett, M. (Thomson Healthcare). *Trends in Potentially Preventable Hospitalizations among Adults and Children, 1997-2004.* HCUP Statistical Brief #36. August 2007. Agency for Healthcare Research and Quality, Rockville, MD. http://www.hcup-us.ahrq.gov/reports/statbriefs/sb36.pdf.

[6] Agency for Healthcare Research and Quality. 2007. *AHRQ Quality Indicators—Guide to Prevention Quality Indicators: Hospital Admission for Ambulatory Care Sensitive Conditions. Rockville, MD: Agency for Healthcare Research and Quality*. Revision 3.1 (March 12, 2007).

Suggested Citation:

Chang, Cyril F. and Jennifer L. Troyer. Trends in Potentially Avoidable Hospitalizations among Adults in Tennessee, 1998 – 2006. Memphis, Tennessee: Methodist Le Bonheur Center for Healthcare Economics, the University of Memphis, March 8, 2010.

Cyril F. Chang is Professor of Economics and the Director of Methodist Le Bonheur Center for Healthcare Economics at the University of Memphis, Memphis, Tennessee. Jennifer L. Troyer is Associate Professor of Economics and an Adjunct Professor of in the Department of Public Health Sciences at University of North Carolina, Charlotte.

About the Methodist Le Bonheur Center for Healthcare Economics:

The Methodist Le Bonheur Center for Healthcare Economics was established in March 2003 with a grant from Methodist Healthcare and Le Bonheur Systems, Inc. to address complex healthcare issues, focusing on emerging issues that affect Memphis, Shelby County, and the State of Tennessee. It is located in the Fogelman College of Business and Economics at the University of Memphis. For additional Tennessee Hospital Discharge Statistics, visit the Web site of the Methodist Le Bonheur Center for Healthcare Economics at: http://healthecon.memphis.edu/

* * *

For more information about this report and other research projects, contact:
Dr. Cyril F. Chang
Professor of Economics and Director
Methodist Le Bonheur Center for Healthcare Economics
Fogelman College of Business and Economics
The University of Memphis
Memphis, Tennessee 38152
Phone: 901-678-3565
Fax: 901-678-2685
E-mail: cchang@memphis.edu
http://healthecon.memphis.edu/