

Prevention Quality Indicators

Tennessee Has Too Many Potentially Avoidable Hospitalizations

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INTRODUCTION

Physicians play a critical role in prevention.¹ They can help patients stay healthy and avoid diseases.² When physicians deliver prevention-focused care to patients who actively participate in their own care, the joint effort results in better patient outcomes, lower cost, and less utilization of inpatient resources. Conversely, when primary care physicians fail to adhere to practice guidelines and/or to prescribe appropriate treatment, patients are admitted more often to hospitals.³ Thus high rates of unnecessary inpatient hospitalizations in a geographic area or among individuals in a particular population group can suggest ineffective delivery and use of primary care.

High rates of potentially avoidable hospitalizations also present opportunities for improving health system effectiveness and efficiency. A recent study by the Agency for Healthcare Research and Quality (AHRQ) estimated that nearly five million inpatient admissions to U.S. hospitals in 2000 could have been prevented, resulting in more than \$26.5 billion in extra costs.⁴ These admissions involved treatment for conditions such as diabetes, hypertension, pneumonia, perforated appendix, congestive heart failure, and urinary tract infection, which are amenable to earlier treatment by primary care physicians. Many states such as Connecticut, Michigan, Missouri, North Carolina and Utah have begun to track potentially avoidable hospitalizations for monitoring the quality of community health services. To our knowledge, no such analysis has been conducted

for Tennessee, a state facing a wide range of health care issues and challenges.

This report is the first to analyze Tennessee hospital discharge records for hospitalizations that are potentially avoidable. It also introduces an indicator developed by the Agency of Healthcare Research and Quality (AHRQ) that reflects a set of medical conditions used commonly by health services researchers for identifying avoidable hospitalizations.⁵ Most significant, this report presents the results of our analysis of potentially avoidable hospitalizations in Tennessee for 2002 using this new indicator.

WHAT IS A POTENTIALLY AVOIDABLE HOSPITALIZATION?

Research has suggested inpatient admissions for certain conditions can be avoided by delivering timely and effective primary care in the community settings.^{6,7} These conditions are commonly known as ambulatory-care sensitive conditions (ACSCs). The Agency for Healthcare Research and Quality (AHRQ) has recently conducted a systematic review of the ACSC literature and released a set of medical conditions that formed the basis of a quality indicator for identifying hospitalizations for ACSCs.³ Specifically, the indicator defines a set of 16 ACSCs in three broad categories:

- (1) *Chronic conditions* such as diabetes (including uncontrolled diabetes, short-term diabetes complications, long-term diabetes complications, and

lower-extremity amputations among patients with diabetes), circulatory diseases (congestive heart failure, hypertension, and angina without procedure), and respiratory diseases (adult asthma, pediatric asthma, and chronic obstructive pulmonary disease);

- (2) *Acute conditions* including dehydration, bacterial pneumonia, urinary tract infection, perforated appendix, and pediatric gastroenteritis; and
- (3) *Birth outcomes* including low birth weight birth.

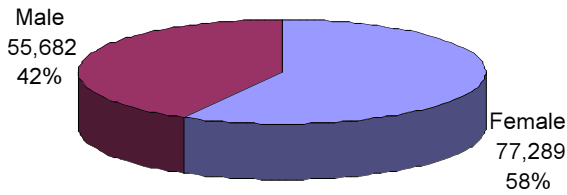
The detailed ACSC definitions, their relevant ICD-9-CM codes, and other inclusion and exclusion criteria are summarized in an appendix table. The results presented in this report are based on an application of AHRQ's definitions of ACSCs to Tennessee hospital discharge data.

METHOD

Tennessee law (Tennessee Code Annotated (TCA), Section 68-1-108) requires that every licensed hospital report all claims data found on the UB-92 Form to the Tennessee Department of Health. The Division of Health Statistics in the Office of Policy Planning and Assessment of the Department of Health has established a Hospital Discharge Data System (HDDS) to collect, compile, and disseminate patient-level discharge information since 1997.

The data presented in this report contain excerpts from the 2002 HDDS dataset. For better comparability, the data used are

Chart 1. Avoidable Hospitalizations in Tennessee, 2002



only from acute-care general hospitals, including general medical and surgical hospitals, women's or OB/GYN hospitals, and pediatric hospitals. Excluded are long-term care hospitals, psychiatric hospitals, rehabilitation hospitals, and other specialty hospitals. The data cover the period from January 1, 2002, through December 31, 2002. The data analysis was performed using [SAS/STAT] software, Version [9.1] of SAS Institute Inc., Cary, NC.

For this report, we combined the four individual diabetes-related ACSCs categories ("uncontrolled diabetes," "short-term diabetes complications," "long-term diabetes complications," and "lower-extremity amputations among patients with diabetes") into a single condition, diabetes, thus reducing the number of ACSCs from AHRQ's 16 to 13. The specific definitions of the ACSCs and their corresponding ICD-9 CM Codes, and the supporting empirical evidence, can be found in AHRQ Publication, *AHRQ Quality Indicators - Guide to Prevention Quality Indicators: Hospital Admission for Ambulatory Care Sensitive Conditions*, Pub. No. 02-RO203, Nov. 24, 2004.

RESULTS

In 2002, a total of 132,973 ACSC hospitalizations occurred in Tennessee, representing 15.8 percent of all inpatient discharges at non-

federal short-stay hospitals. As shown in Chart 1, males represent 55,682 (42 percent) of the total potentially avoidable hospitalizations while females accounted for 77,289 (58 percent) of the total. This male-to-female ratio for potentially avoidable hospitalizations is similar to that of the overall hospitalizations of 338,881 (40 percent of total) for males and 504,982 (60 percent of total) for females in the same calendar year.

Table 1 presents the numbers of potentially avoidable hospitalizations by individual ACSC and the percentage of each to total. The leading ACSC was bacterial pneumonia, accounting for 31,722 (23.9 percent of total) ACSC hospitalizations, followed by congestive heart failure (25,969 or 19.5 percent of total), chronic obstructive pulmonary disease (18,353 or 13.8 percent of total), and diabetes (11,486 or 8.6 percent of total).

To compare how prevalent these hospitalizations are with the U.S. rates, we converted the total numbers of hospital discharges shown in Table 1 into population-based prevalence rates. For COPD, dehydration, bacterial pneumonia, and urinary tract infection, the prevalence rates are per 100,000 population of all Tennessee residents. For diabetes, CHF, hypertension, angina and adult

asthma, the rate is measured per 100,000 population 18 years and older. For pediatric conditions, the rate is expressed per 100,000 children 0 through 17 years. Finally, the rate for perforated appendix is calculated per 100 admissions for appendicitis, and the rate for low birth weight birth (less than 2,500 grams) is calculated per 100 live births. The U.S. rates are from *AHRQ Publication, AHRQ Quality Indicators - Guide to Prevention Quality Indicators: Hospital Admission for Ambulatory Care Sensitive Conditions*, Pub. No. 02-RO203, Revision 4, Nov. 24, 2004.

Across most ACSCs, as shown in Chart 2, Tennesseans experienced a higher rate of avoidable hospitalizations than did the U.S., with Tennessee exceeding the U.S. by a large margin in congestive heart failure, hypertension, bacterial pneumonia, perforated appendix, pediatric gastroenteritis, and low birth weight birth.

Table 2 summarizes ACSC hospitalizations by race. Out of 843,882 of total inpatient discharges for all conditions in 2002, black patients represented 16 percent while white patients represented 77 percent. These percentages are consistent with the relative population proportions of 17 percent and 80 percent, respectively, for the two major racial groups. For ACSC hospitalizations as a percentage of total hospitalizations, black patients had a similar rate (17.6 percent) as white patients (15.7 percent), while Hispanics and

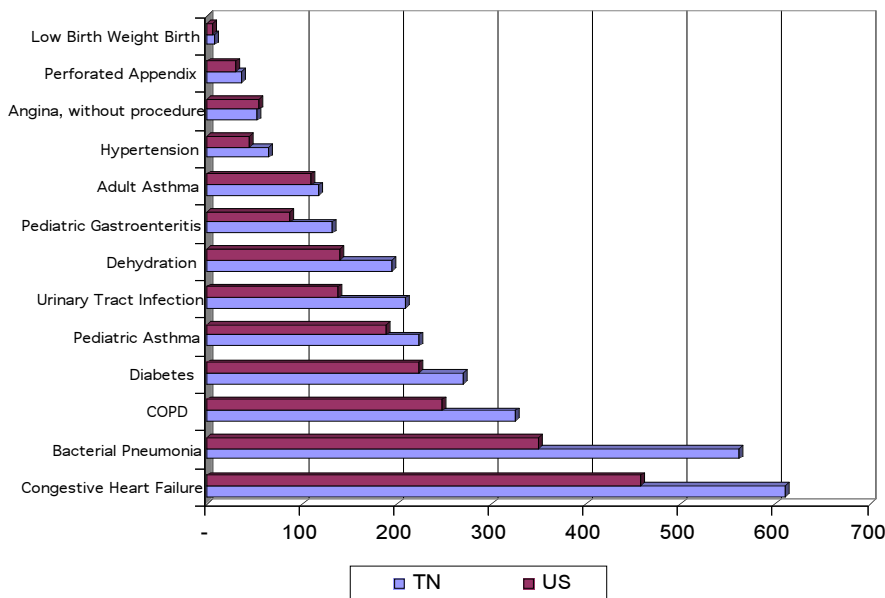
other small racial groups, such as Asians, Native Americans, and Pacific Islanders, exhibited much lower rates than either the white or black population subgroup.

Table 3 reports ACSC hospitalizations by major payer group. There appeared to be substantial inter-

Table 1. Potentially Avoidable Hospitalizations in Tennessee, 2002.

Primary Diagnosis	Total No. of Discharges	Percent of Total
Bacterial Pneumonia	31,722	23.9%
Congestive Heart Failure	25,969	19.5%
Chronic Obstructive Pulmonary Disease	18,353	13.8%
Urinary Tract Infection	11,832	8.9%
Diabetes	11,486	8.6%
Dehydration	11,012	8.3%
Low Birth Weight Birth	6,023	4.5%
Adult Asthma	4,987	3.8%
Pediatric Asthma	3,123	2.3%
Hypertension	2,753	2.1%
Angina, without procedure	2,291	1.7%
Pediatric Gastroenteritis	1,846	1.4%
Perforated Appendix	1,576	1.2%
Total	132,973	100.0%

**Chart 2. Discharge Rates by Primary Diagnosis, 2002
Tennessee vs. U.S.**



group differences. Medicare led the proportion of ACSC hospitalizations, with 22.3 percent of its inpatient discharges being potentially preventable in 2002. In comparison, only 13.3 percent of hospitalizations paid by TennCare (Tennessee’s managed-care Medicaid program) were for ACSCs while the same percentage for commercial and BlueCross/BlueShield plans were only 9.8 percent.

The Self Insured/Self Pay category includes mostly patients who reported they had no insurance coverage on admission and, therefore, can be considered as uninsured. About 12.8 percent of Self Insured/Self Pay patients’ hospitalizations were for ACSCs. Finally, the “Other” category, which includes Champus (military) and Workers Compensation, reported a rate of hospitalizations for ACSC conditions of 10.2 percent, lower than the state average of about 16 percent.

DISCUSSION

In Tennessee, admissions for ACSC conditions comprised 15.8 percent of hospitalizations for all conditions in 2002. There was little gender difference in the proportion of ACSC hospitalizations relative to total admissions. The proportions of ACSC hospitalizations for

black and white patients are also similar. Medicare patients exhibited a much higher proportion of ACSC hospitalizations (22.3 percent) than the state average of 15.8 percent, while TennCare patients accounted for a proportionately smaller share of ACSCs (13.3 percent). The other insurance categories reported still lower percentages of ACSCs than the two major public-sector insurance programs. Compared to the U.S., Tennessee has higher

prevalence rates of avoidable hospitalizations in most of the ACSCs.

Hospitalizations for ACSCs have been referred to as potentially avoidable hospitalizations. They are believed to be a reliable indicator of the access to and quality of the ambulatory care system that serves the general population.³⁻⁷ Many of these hospitalizations were undoubtedly medically necessary when patients’ symptoms had become evident at the point of admission. However, millions of dollars of hospitalization costs could potentially have been saved, and many years of life gained, if just a fraction of the excessive hospitalizations were eliminated by treating patients earlier in the ambulatory setting. Thus, the higher prevalence of ACSCs in Tennessee adds urgency for improving the adequacy and quality of the primary care system that serves the general population.

Many previous studies have shown the 65-and-older population tends to have a higher prevalence of ACSC hospitalizations, likely because of greater morbidity and differences in insurance coverage. For example, the researchers in a Singapore study found a tenfold difference in the prevalence of avoidable hospitalizations between the over-65 population and the under-65 population. This was

Table 2. Discharges for ACSCs by Race, 2002.

Race	All Discharges	ACSC Discharges	Percent ACSC of Total
White	650,576	102,432	15.7%
Black	133,064	23,421	17.6%
Hispanic	7,505	615	8.2%
Other	12,929	1,966	15.2%
Unknown	39,808	4,539	11.4%
Total	843,882	132,973	15.8%

Table 3. Discharges for ACSCs by Payer Group, 2002.

Payer	All Discharges	ACSC Discharges	Percent ACSC of Total
Medicare	346,601	77,402	22.3%
TennCare	172,353	22,904	13.3%
Commercial and BC/BS	262,829	25,671	9.8%
Self Insured/Self Pay	26,169	3,353	12.8%
Other	21,337	2,168	10.2%
Unknown	14,593	1,475	10.1%
Total	843,882	132,973	15.8%

Appendix Table - Ambulatory Care Sensitive Admissions and Corresponding ICD-9-CM Codes

Primary Diagnosis	ICD-9-CM Diagnosis Codes Included
Chronic conditions	
Short-term diabetes complications	25010-25013, 25020-25023, 25030-25033; Age 18 years and older
Uncontrolled diabetes	25002, 25003; Age 18 years and older
Long-term diabetes complications	25040-25043, 25050-25053, 25060-25063, 25070-25073, 25080-25083, 25090-25093; Age 18 years and older
Lower-extremity amputations among patients with diabetes	25000-25003, 25010-25013, 25020-25023, 25030-25033, 25040-25043, 25050-25053, 25060-25063, 25070-25073, 25080-25083, 25090-25093; Age 18 years and older
Congestive heart failure	39891, 40201, 40211, 40291, 40401, 40403, 40411, 40413, 40491, 40493, 4280, 4281, 42820-42823, 42830-42833, 42840-42843, 4289; Age 18 years and older; Exclude any patient with a cardiac procedure
Hypertension	4010, 4019, 40200, 40210, 40290, 40300, 40310, 40390, 40400, 40410, 40490; Age 18 years and older; Exclude any patient with a cardiac procedure
Angina without procedure	4111, 41181, 41189, 4130, 4131, 4139; Age 18 years and older; Exclude any patient with a surgical procedure in any field (01.0-86.99)
Adult asthma	49300-49302, 49310-49312, 49320-49322, 49381, 49382, 49390-49392; Age 18 years and older
Pediatric asthma	49300-49302, 49310-49312, 49320-49322, 49381-49382, 49390-49392; Under age 18
Chronic obstructive pulmonary disease	490, 4660, 4910, 4911, 49120, 49121, 4918-4920, 4928, 494, 4940, 4941, 496; Age 18 years and older
Acute conditions	
Dehydration	2765
Bacterial pneumonia	481, 4822, 48230-48232, 48239, 481, 4822, 4829-4831, 4838, 485-486, 4829-4830; Exclude any hospitalization with a diagnosis code for sickle cell anemia or HB-S disease (28260-2826, 28269) and patients less than 8 weeks of age
Urinary tract infection	59000, 59001, 59010, 59011, 5902-5903, 59080, 59081, 5909, 5950, 5959, 5990
Perforated appendix	5400, 5401, 5409, 541
Pediatric gastroenteritis	00861-00867, 00869, 0088, 0090-0093, 5589; Under age 18
Birth outcomes	
Low birth weight birth	76400-76408, 76410-76418, 76420-76428, 76490-76498, 76500-76508, 76510-76518

Source: AHRQ Guide to Prevention Quality Indicators: Hospital Admission for Ambulatory Care Sensitive Conditions, AHRQ Pub. No. 02-RO203, Revision 4, November 24, 2004, Appendix A

attributed to the absence of a Medicare-like insurance program for the elderly population in Singapore.⁹ In the U.S., higher ACSC rates have also been noted in patients eligible for Medicaid plus Medicare patients versus Medicare alone.¹⁰ These differences have led some researchers to adjust the relative rates of ACSC hospitalizations of different population groups by the overall hospitalization patterns for all conditions to produce a more realistic comparison of the prevalence rate of one population group against that of another group.^{9,10} Other researchers have studied geographic and racial/ethnic variations among

populations changes in the relative rates of ACSC hospitalizations among the different population subgroups.

Much work lies ahead in improving our understanding of the prevalence of avoidable hospitalizations in Tennessee and its underlying causes. Further analyses on the variations in the relative prevalence rates across socioeconomic groups and geographic regions are needed in generating useful public health information. Also needed are health system changes that reward the delivery of effective primary care to manage patients' chronic conditions such as hypertension, diabetes

and asthma to avoid the more expensive inpatient hospitalizations. Introducing useful tools such as the Prevention Quality Indicators of AHRQ (<http://www.qualityindicators.abrq.gov/>) will not work unless physicians are encouraged to use them for self-examination. ■

References:

1. U.S. Preventive Services Task Force: Guide to Clinical Preventive Services: Report of the U.S. Preventive Services Task Force, 2nd edition. Baltimore, MD: Williams & Wilkins, 1996.
2. U.S. Preventive Services Task Force: Put Prevention into Practice, A Step-by-Step Guide to Delivering Clinical

Preventive Services: A Systematic Approach. Rockville, MD: Agency for Healthcare Research and Quality. AHRQ Publication No. APP1P01-0001, Revised May 2002.

3. Agency for Healthcare Research and Quality: 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, Nov. 24, 2004.

4. Kruzikas DT, Jiang HJ, Remus D, Barrett ML, Coffey RM, Andrews R: Preventable Hospitalizations: A Window into Primary and Preventive Care, 2000. Rockville, MD: Agency for Healthcare Research and Quality. HCUP Fact Book No. 5; AHRQ Pub. No. 04-0056, Sept. 2004.

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

6. Pappas G, Hadden WC, Kozak LJ, Fisher GF: Potentially avoidable hospitalizations: Inequalities in rates between U.S. socioeconomic groups. *Am J Pub Health* 87:811-816, 1997.

7. Blustein J, Hanson K, Shea S: Preventable hospitalizations and socioeconomic status. *Health Aff* 17:177-189, 1998.

8. Tennessee Department of Health: Tennessee Hospital Discharge Data System. Nashville, Tennessee:

Tennessee Department of Health, Health Statistics and Research, November 2002. Available at: <http://www2.state.tn.us/health/statistics/PdfFiles/HDDS.pdf>.

9. U.S. Census Bureau, American FactFinder. Tennessee: General Demographic Characteristics, 2004. Available at: <http://factfinder.census.gov/>.

10. Niti M, Ng TP: Avoidable hospitalisation rates in Singapore, 1991-1998: assessing trends and inequities of quality in primary care. *J Epidemiol Community Health* 57(1):17-22, 2003.

11. Laditka JN, Laditka SB: Insurance status and access to primary health care: disparate outcomes for potentially preventable hospitalization. *J Health Soc Policy* 19(2):81-100, 2004.

12. Laditka JN, Laditka SB, Mastanduno MP: Hospitalization utilization for ambulatory care sensitive conditions: health outcome disparities associated with race and ethnicity. *Soc Sci & Med* 57:1429-1441, 2003.

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