

Trends In Avoidable Hospitalizations, 1980–1998

A national indicator of gaps and improvements in access to care.

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ALACK OF TIMELY and effective ambulatory care can result in a greater number of hospitalizations, especially for certain conditions and among vulnerable groups.¹ Communities where people perceived poor access to care had higher rates of hospitalization for certain chronic conditions.² Preventive care was linked to a reduced probability of avoidable hospitalization for children on Medicaid, and continuity of care with a provider decreased hospitalizations for a Medicaid population of children and adults.³ Also, persons living in counties designated as primary care shortage areas were found to have more avoidable hospitalizations.⁴

In its 1993 report, *Access to Health Care in America*, the Institute of Medicine (IOM) recommended that avoidable hospitalizations be used to monitor access to health care services at the national level over time, tracking whether conditions for obtaining care were improving or getting worse, especially for vulnerable population groups.⁵ However, few trend analyses have been undertaken. One exception was a study of hospitalizations in New York City, which showed that admission rates for avoidable conditions were rising in low-income areas from 1982 through 1993.⁶ Other research found increasing rates of avoidable hospitalization for uninsured and Medicaid children in selected states from 1990 to 1995.⁷

Here we undertake the first examination of national trends in avoidable hospitalizations among patients of all ages. We present data

for 1980–1998, during which period sweeping changes took place in the health care system. These trends should provide evidence about how these changes have affected access to care for the population as a whole and for various subgroups.

We examined twelve principal or first-listed diagnoses (see Exhibit 5) identified by Joel Weissman and colleagues as avoidable hospital conditions.⁸ A panel of physicians selected these conditions as indicators that should reflect the adequacy of ambulatory care. Timely and appropriate ambulatory care should prevent these illnesses, control acute episodes, or manage the chronic conditions to prevent them from deteriorating so that hospitalization becomes necessary. Hospitalizations for some of these conditions (for example, immunizable infectious diseases) should be preventable in almost all cases. However, not all hospitalizations for conditions such as asthma and congestive heart failure are likely to be prevented even with timely and appropriate ambulatory care.

Study Methods

Data for this study are from the National Hospital Discharge Survey (NHDS), which has been conducted by the National Center for Health Statistics (NCHS) annually since 1965. The data are collected from a sample of inpatient records obtained from a national probability sample of nonfederal, short-stay hospitals (defined as those with an average length-of-stay of fewer than thirty days).

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Since 1988 all general hospitals and children's general hospitals have been included in the NHDS sampling frame. Federal, military, and Department of Veterans Affairs (VA) hospitals are excluded, as are institutional hospital units such as prison and college infirmaries.

During 1980–1998 an average of 445 hospitals participated in the survey each year; the average response rate was 88 percent. These hospitals provided data on an average of 242,000 discharges per year. Sampled cases were weighted to produce national statistics using multistage estimation procedures. Descriptions of the estimation processes and other aspects of the survey's design and operation have been published elsewhere.⁹

Age-specific rates for avoidable hospital conditions were calculated for each year from 1980 through 1998 by sex, race, and region. Annual age-specific rates for each avoidable condition, and percentages of avoidable conditions by expected principal source of payment, were also computed. Standard errors for these statistics were obtained using SUDAAN software.¹⁰ Trends were tested using a weighted least squares regression method developed for complex data sets.¹¹ Although the exhibits show data only for selected years, estimates for each year from 1980 through 1998 were used in the tests for trends. Differences between rates for selected groups were tested using the two-sided t-test with a critical value of 1.96 (.05 level of significance).

Study Results

The number of hospitalizations for avoidable conditions increased from 2.2 million in 1980 to 3.7 million in 1998—from 5.9 percent to 11.5 percent of all hospitalizations. The rate per 10,000 population was 99.2 in 1980 but reached 133.8 in 1998 (Exhibit 1). In contrast, hospitalizations for other conditions declined during this period. The discharge rate per 10,000 excluding avoidable conditions declined from 1,577.6 in 1980 to 1,031.5 in 1998.

■ **Age and sex.** The rate of avoidable hospitalization did not change significantly for patients under age sixty-five as a group (Exhibit 2). The rate decreased for children under age 15 but increased for the 15–44 and 45–64 age groups.

Rates rose sharply for the group age 65 and older and for the age groups 65–74, 75–84, and 85 and older. The differences between the 1980 and 1998 rates grew larger with age: The 1998 rate was 34 percent higher than the 1980 rate for the 65–74 group, 51 percent higher for the 75–84 group, and 61 percent higher for the group age 85 and older.

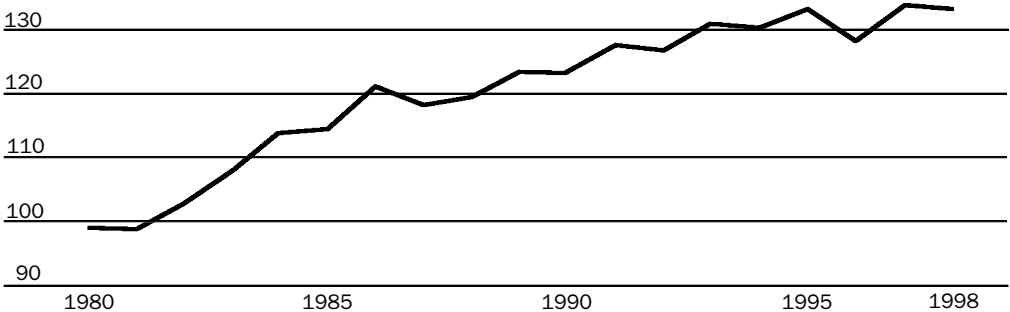
Rates of avoidable hospitalization rose for males and females. Within the groups under age sixty-five and age sixty-five and older, rates were not significantly different for males and females in 1980 or 1998.

■ **Race and geography.** Rates of avoidable hospitalization increased for black and white patients in general and for both racial

EXHIBIT 1

Rates Of Avoidable Hospitalization, 1980–1998

Rate per 10,000 population



SOURCE: National Hospital Discharge Survey, 1980–1998.

EXHIBIT 2**Rates Of Avoidable Hospitalization, By Selected Characteristics, 1980–1998**

Characteristic	Rate of avoidable hospitalization per 10,000 population			Test for trend 1980–1998
	1980	1990	1998	
All ages	99.2	123.3	133.8	+
Male	97.2	116.6	124.6	+
Female	101.0	129.7	142.6	+
White	86.4	100.9	103.3	+
Black	113.1	143.6	149.3	+
Northeast	92.6	126.3	147.3	+
Midwest	103.4	140.3	150.3	+
South	112.3	132.8	141.3	+
West	77.9	86.5	93.4	+
Under age 65	65.0	71.1	71.1	NS
Under age 15	79.4	78.5	72.1	–
15–44	40.5	46.7	44.8	+
45–64	105.9	125.1	126.1	+
Male	65.6	71.1	71.4	+
Female	64.4	71.1	70.7	NS
White	53.8	51.5	49.1	–
Black	92.5	113.1	113.5	+
Northeast	58.1	73.2	79.1	+
Midwest	68.1	79.8	74.9	NS
South	76.2	75.4	76.7	NS
West	49.4	53.0	51.8	NS
Age 65 and older	364.6	496.1	573.5	+
65–74	255.7	312.0	342.6	+
75–84	462.5	644.9	696.9	+
85 and older	778.9	1,096.5	1,255.0	+
Male	397.1	517.6	573.8	+
Female	342.6	481.6	573.3	+
White	325.2	423.8	450.0	+
Black	352.8	502.6	564.0	+
Northeast	335.6	469.0	572.7	+
Midwest	376.7	553.0	662.7	+
South	392.5	542.3	595.7	+
West	331.5	366.8	428.2	+

SOURCE: National Hospital Discharge Survey, 1980–1998.

NOTES: Tests for trends are based on rates for all years 1980 through 1998. A plus indicates an increasing trend; a minus indicates a decreasing trend; and NS indicates that the trend was not statistically significant at the .05 level.

groups age sixty-five and older. In neither 1980 nor 1998 did the rates for the elderly differ significantly by race. In contrast, race differences were seen in the trends for the group under age sixty-five: The rate for white patients decreased, while the rate for black patients rose (Exhibit 3). In 1980 the rate for black patients under age sixty-five was 72

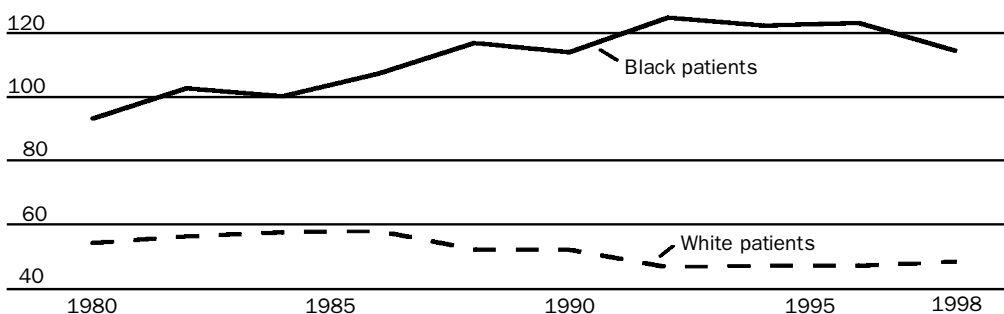
percent higher than the rate for white patients; in 1998 the black rate was 131 percent higher.

In all four geographic regions of the country, avoidable hospitalizations rose among the elderly. For patients under age sixty-five, however, the rate increased only in the Northeast.

■ **Source of payment.** Hospitalizations

EXHIBIT 3**Rates Of Avoidable Hospitalization, By Race, For Patients Under Age Sixty-Five, 1980–1998**

Rate per 10,000 population

**SOURCE:** National Hospital Discharge Survey, 1980–1998.

for avoidable conditions increased across payment categories (Exhibit 4). For patients under age sixty-five, the proportions of hospitalizations for avoidable conditions increased for all payment sources: private insurance, Medicaid, other government, self-pay, and other. Avoidable conditions accounted for increasing proportions of hospitalizations for all Medicare patients age sixty-five and older.

■ **Specific conditions.** Rates increased for pneumonia, congestive heart failure, and cellulitis, three of the four most frequently occurring avoidable conditions (Exhibit 5).¹²

Other conditions with increasing rates were ruptured appendix and hypokalemia (potassium deficiency).

Hospitalization rates decreased for asthma, perforated or bleeding ulcer, and pyelonephritis (inflammation of the kidney). The hospitalization rate did not change overall for diabetes with ketoacidosis or coma or for malignant hypertension. (Trends for immunizable conditions and gangrene could not be tested because of small sample sizes.)

Both the groups under age sixty-five and age sixty-five and older had rising rates of

EXHIBIT 4**Percentage Of Hospitalizations That Were For Avoidable Conditions, By Source Of Payment, 1980–1998**

Payment source	1980	1990	1998	Test for trend 1980–1998
Under age 65				
Medicaid	7.0%	9.4%	9.8%	+
Other government	5.5	8.9	11.4	+
Private insurance	4.1	6.8	7.5	+
Self-pay	5.1	9.4	11.6	+
Other sources	4.2	7.3	7.5	+
Age 65 and older				
All Medicare	9.6	15.0	15.9	+
Medicare and Medicaid	13.3	20.9	20.4	+
Medicare and private insurance	8.3	14.1	15.7	+
Medicare only	9.9	14.7	15.4	+

SOURCE: National Hospital Discharge Survey, 1980–1998.**NOTES:** Tests for trends are based on percentages for all years 1980–1998. A plus indicates an increasing trend, significant at the .05 level.

EXHIBIT 5
Rates Of Hospitalization For Specific Avoidable Hospital Conditions, 1980–1998

	Rate of avoidable hospitalization per 10,000 population			
All patients	1980	1990	1998	Test for trend 1980–1998
Total	99.2	123.3	133.8	+
Pneumonia	33.2	40.4	47.1	+
Congestive heart failure	20.6	30.4	39.0	+
Asthma	18.1	18.9	15.5	–
Cellulitis	8.9	11.4	13.3	+
Perforated or bleeding ulcer	4.9	5.8	4.8	–
Pyelonephritis	5.4	5.1	4.2	–
Diabetes with ketoacidosis or coma	3.3	4.0	4.1	NS
Ruptured appendix	1.9	2.7	3.0	+
Malignant hypertension	1.2	2.4	1.6	NS
Hypokalemia	1.1	1.7	1.3	+
Immunizable conditions	0.3 ^a	0.6	– ^a	^a
Gangrene	0.3 ^a	– ^a	– ^a	^a
Under age 65				
Total	65.0	71.1	71.1	NS
Pneumonia	22.6	21.6	22.2	NS
Congestive heart failure	4.5	7.1	9.4	+
Asthma	16.2	16.9	15.2	NS
Cellulitis	7.4	8.9	9.7	+
Perforated or bleeding ulcer	3.0	3.0	2.1	–
Pyelonephritis	4.6	4.6	3.8	–
Diabetes with ketoacidosis or coma	2.9	3.7	4.0	+
Ruptured appendix	1.9	2.5	3.1	+
Malignant hypertension	0.9	1.5	1.0	NS
Hypokalemia	0.6	0.7	0.8	+
Immunizable conditions	0.3 ^a	0.7	– ^a	^a
Gangrene	– ^a	– ^a	– ^a	^a
Age 65 and older				
Total	364.6	496.1	573.5	+
Pneumonia	115.2	174.9	222.2	+
Congestive heart failure	145.4	196.8	246.5	+
Asthma	32.6	33.1	17.7	–
Cellulitis	20.8	29.6	39.1	+
Perforated or bleeding ulcer	20.1	26.3	23.7	NS
Pyelonephritis	11.7	8.5	7.1	–
Diabetes with ketoacidosis or coma	6.4	5.9	4.8	–
Ruptured appendix	1.9	3.6	2.1	NS
Malignant hypertension	3.6	8.6	5.8	NS
Hypokalemia	5.0	8.4	4.8	NS
Immunizable conditions	– ^a	– ^a	– ^a	^a
Gangrene	– ^a	– ^a	– ^a	^a

SOURCE: National Hospital Discharge Survey, 1980–1998.

NOTES: Conditions are from the *International Classification of Diseases*, Ninth Revision, Clinical Modification; codes are available from the authors by request. Tests for trends are based on rates for all years 1980 through 1998. A plus indicates an increasing trend; a minus indicates a decreasing trend; and NS indicates that the trend was not statistically significant at the .05 level.

^a The estimate was not reliable (if not shown) or should be used with caution (if shown) because of the small sample size or large standard error.

hospitalization for congestive heart failure and cellulitis, decreasing rates for pyelonephritis, and no change in rates for malignant hypertension. The trends for other conditions differed somewhat by age. For example, the hospitalization rate for pneumonia increased for the elderly but did not change for the group under age sixty-five; the asthma rate decreased for the elderly but did not change for those under age sixty-five; and the rate for perforated or bleeding ulcer did not change for the elderly but decreased for the group under age sixty-five.

NHDS measures of the severity of illness presented mixed trends. From 1980 through 1998 the rate of hospital deaths per 100 avoidable discharges decreased for the elderly but not for those under age sixty-five. Average lengths-of-stay declined for patients under age sixty-five and age sixty-five and older with avoidable conditions during this period. However, the proportion of patients with avoidable conditions discharged to long-term care facilities increased, as did the average number of diagnoses per avoidable discharge and the proportion of all patients with selected serious comorbidities.

Discussion And Policy Implications

The increase in avoidable hospitalizations seen here is consistent with the 1982–1993 trend reported for New York City.¹³ The NHDS data show that the rise is a national phenomenon and that it continued into the late 1990s. As in New York City, the national data show increasing disparities, with avoidable hospitalizations growing more rapidly for vulnerable groups. In New York City, disparities were increasing between low-income and higher-income areas for patients under age sixty-five. The national data show a widening gap in avoidable hospitalization rates between black and white populations under

age sixty-five and large increases in such rates for those age sixty-five and older.

■ **Racial differences.** The reasons for the increasing racial disparity in rates of avoidable hospitalization are not clear, although numerous studies have found racial differences in the provision of health care.¹⁴ The lack of significant racial differences in rates of avoidable hospitalization for the elderly, who are almost all covered by Medicare, suggests that insurance coverage should be considered as a possible factor in the differences among younger populations. Researchers need to examine whether racial differences in levels of insurance or the adequacy of coverage are creating barriers to ambulatory care that lead to more avoidable hospitalizations.

Growing proportions of both the black and white populations enrolled in managed care during the past two decades, but further research needs to explore whether their experiences have been the same. The black population is more likely to be covered by Medicaid, which often has mandatory managed care plans, and concerns have been raised about these plans' quality of care for minorities.¹⁵

■ **Elderly.** Avoidable hospitalization trends for the population age sixty-five and older have not been described before. The increases for this group are especially large, indicating that further research should be undertaken to evaluate the factors involved.

One area to study is the effects on access to care of out-of-pocket costs, which have grown more rapidly for the elderly than for younger persons.¹⁶ It is also important to investigate whether a relationship exists between coverage of prescription drugs and avoidable hospitalizations. Elderly patients who lack drug coverage may use less medication and suffer deterioration or complications that lead to hospitalization.

The elderly have enrolled in managed care

“HMOs’ emphasis on prevention and ambulatory care may have resulted in fewer avoidable hospitalizations for younger patients.”

at a slower rate than the younger population has, suggesting that managed care should be examined as a factor in avoidable hospitalizations. The emphasis of health maintenance organizations (HMOs) on prevention and ambulatory care may have resulted in fewer avoidable hospitalizations for younger patients. In addition, older patients may not have benefited from minimal out-of-pocket payments and from drug coverage associated with HMOs, which could improve access to care.

■ **Other factors.** Other factors, such as the level of illness in the population and changes in treatment patterns, should be considered to explain the rise in avoidable hospitalizations. The aging of the U.S. population would be expected to raise the level of chronic health problems. Even with good-quality ambulatory care, it would probably be more difficult for increasingly frail elderly patients to avoid hospitalization. This is consistent with the strong positive relationship observed between aging and rising rates of avoidable hospitalization. The health status of the black population is likely to be lower than that of the white population, but that is probably the case both for the group under age sixty-five, which had significant racial differences in rates of avoidable hospitalization, and for the elderly, which did not.

Possible changes in physician practice patterns also should be examined. For example, physicians could have lowered the threshold for hospitalization for frail elderly or minority patients, especially when there were complicating conditions. However, one would have expected to see not only more avoidable hospitalizations but also more hospitalizations for other conditions as well, and other hospitalizations declined greatly during the past two decades.

The trends for specific avoidable conditions raise questions about whether there have been changes in the severity, incidence, or treatment of some conditions. Like the hospitalization rate, the death rate for pneumonia has been rising for the elderly, suggesting increased difficulty treating this condition.¹⁷

Hospitalizations for congestive heart fail-

ure may have risen because the decrease in deaths from acute myocardial infarction has resulted in a larger population with chronic heart problems.¹⁸ The decline in hospitalizations for perforated or bleeding ulcer for patients under age sixty-five may be related to the adoption of antimicrobial therapy, although the absence of a decline among the elderly needs further investigation.

■ **Children.** The decrease in avoidable hospitalizations for children may indicate progress in improving children's health care. It confirms at the national level the decline in avoidable hospitalizations for children seen in New York City. A study of children in nineteen states also documented fewer avoidable hospitalizations for privately insured children, although not for uninsured and Medicaid children.¹⁹ At the national level, the decrease was mainly due to a decline in children's hospitalizations for pneumonia. Vaccination coverage levels have been increasing, which should have resulted in decreases in illnesses such as measles that can lead to pneumonia.²⁰

■ **Data limitations.** Because this study was based on hospital discharge data, it was limited to information about hospitalizations rather than individual patients. It was not possible to link inpatient episodes directly with ambulatory care to examine relationships between the two. It also was not possible to obtain information about patients who had limited access to inpatient care as well as ambulatory care. Multiple hospitalizations for avoidable conditions by the same patient cannot be separately identified.

The NHDS does not include indicators of socioeconomic status, and race and ethnicity are underreported, which limits the analysis of these important variables. The underreporting of race increased when the survey was redesigned in 1988, and white patients have been found to be underreported to a greater extent than patients of other races.²¹ However, the racial differences in avoidable hospitalizations for the population under age sixty-five were too large to be explained solely by the underreporting of white patients.

DESPITE ITS LIMITATIONS, our study can make an important contribution to monitoring access to health care over time and across social groups. The patterns revealed should help to stimulate debate about the impact of past policy initiatives to control costs and improve health care delivery, which may suggest new approaches to improving health care for underserved groups and the population as a whole.

NOTES

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