Diabetes Hospitalization Report

Pennsylvania Health Care Cost Containment Council

November 2004

2003 Data

The Pennsylvania Health Care Cost Containment Council (PHC4) is an independent state agency responsible for addressing the problem of escalating health costs and ensuring the quality of health care in Pennsylvania. PHC4 fosters competition in the health care market through the collection, analysis, and dissemination of quality health care information.

Diabetes is a widespread, chronic disease caused by the inability of the body to produce or properly use insulin. It is characterized by high blood sugar levels. Diabetes predisposes people to costly complications, including heart disease, hypertension and stroke. It is the leading cause of new cases of blindness, end stage renal failure, and non-traumatic lower extremity amputation.

The increasing number of older Americans, coupled with increasing rates of obesity and the trend toward more sedentary lifestyles, suggests that diabetes will continue to remain a serious and growing health concern well into the future. Given the enormous impact of this disease on the cost and quality of health care, it remains essential to continue to make the diagnosis and treatment of people with diabetes a high priority.

The Behavioral Risk Factor Surveillance Survey conducted in 2003 by the Pennsylvania Department of Health in conjunction with the Centers for Disease Control and Prevention (CDC), indicates an estimated 8 percent of Pennsylvania residents 18 years of age and older were told by a doctor that they had diabetes. The U.S. estimated percentage was 7 percent.

Since 1991, the number of American adults with diabetes, including women with gestational diabetes, has increased 61 percent – and is projected to more than double by 2050.

Diabetes is a costly disease.

A study commissioned by the American Diabetes Association (ADA) estimated that in 2002:

- The direct medical costs attributable to diabetes reached $92 billion. On average, people with diabetes incurred approximately $13,243 in health care expenditures in 2002, while people without diabetes incurred approximately $2,560 in expenditures.
- Another $40 billion in indirect costs (i.e., disability, work loss, and premature mortality) was attributed to diabetes in the United States.
- Men with diabetes have 3.1 more lost workdays and 7.9 more bed days per year, on average, than men without diabetes. Women with diabetes had 0.6 more lost workdays and 8.1 more bed days, on average, than women without diabetes. The ADA study further estimated that more than 176,000 cases of permanent disability in 2002 were attributable to diabetes.

Prediabetes is a term used to distinguish people who are at increased risk of developing diabetes. People with prediabetes have blood sugar levels which are higher than normal, but not high enough for a diagnosis of type 2 diabetes. While people with prediabetes are at an increased risk of developing type 2 diabetes, progression to diabetes among those with prediabetes is not inevitable. Studies suggest that weight loss and increased physical activity among people with prediabetes may prevent or delay diabetes and may return blood sugar levels to normal. In addition to the 18.2 million Americans with diabetes, the Centers for Disease Control and Prevention estimate that an additional 41 million Americans, ages 40 to 74, may have prediabetes. Research has shown that, despite not having diabetes, people with prediabetes are already at increased risk for other adverse health outcomes such as heart disease and stroke.

Table 1. Hospital Admissions for Diabetes, Principal Diagnosis, 1999–2003

	Number of Hospital Admissions	Days		Hospital Charges	
		Average Days	Total Days	Average Charges	Total Charges
1999	21,149	5.7	120,269	$14,632	$309,453,511
2000	21,842	5.7	123,737	$16,210	$354,062,503
2001	22,526	5.7	127,892	$18,883	$425,357,579
2002	23,496	5.6	132,038	$23,182	$544,686,623
2003	23,614	5.7	133,915	$27,156	$641,267,081
Total	112,627	5.7	637,851	$20,198	$2,274,829,879

Figure 1. Hospital Admission Rates for Diabetes, Principal Diagnosis, 1999–2003

The number of hospital admissions for diabetes increased by almost 12 percent between 1999 and 2003.

One way to monitor the cost and quality of care received by Pennsylvanians with diabetes is to look at the number of hospital admissions for diabetes. Such admissions add to the high cost of this disease and suggest that people with diabetes might not have sufficient access to appropriate care.

In 2003, there were 23,614 hospital admissions for diabetes in Pennsylvania. These hospital admissions include those in which diabetes was the principal diagnosis, thereby suggesting that the reason for the admission was a direct result of diabetes. Hospital admissions for diabetes may be preventable because appropriate care can generally be provided in a physician's office or on an outpatient basis. If a patient reaches the point where he or she must be hospitalized for diabetes, a breakdown in diabetes care (or access to care) may have already occurred.

Hospital admissions for diabetes accounted for more than $641 million in hospital charges and almost 134,000 hospital days in 2003. Totals for the past five years reach more than $2.2 billion in hospital charges and over 637,000 days in the hospital.

The rate of hospital admissions for diabetes increased 11 percent between 1999 and 2003.

In 2003, there were 19.1 hospital admissions for diabetes for every 10,000 Pennsylvania residents. This represents an 11 percent increase from the rate of 17.2 in 1999.

Hospital admission rates for type 1 diabetes decreased by 17 percent, but admission rates for type 2 diabetes increased by 40 percent between 1999 and 2003.

There are two main types of diabetes: type 1 and type 2 diabetes. Type 1 diabetes usually appears in children or young adults and accounts for 5 percent to 10 percent of all diagnosed cases of diabetes. With type 1 diabetes, the body does not produce enough insulin, so people with type 1 diabetes must receive daily insulin injections.

Type 2 diabetes, the most common form of diabetes, is estimated to account for about 90 percent to 95 percent of all diagnosed cases of diabetes. With type 2 diabetes, the body is resistant to insulin and cannot use it properly. While most people with type 2 diabetes control their disease through oral medications, diet, and exercise, some people with type 2 diabetes may also need to take daily insulin injections.

There has been a dramatic increase in type 2 diabetes in recent years. Not only is type 2 diabetes appearing more frequently in adults, but – alarmingly – children and adolescents are also being diagnosed with type 2 diabetes. Because type 2 diabetes may be prevented or delayed if those at high-risk make recommended lifestyle changes, this increase is cause for concern. While part of the increase may be attributed to an aging population, it is largely a consequence of the dramatic increase in obesity. In Pennsylvania, the percentage of obese adults increased from 19 percent to 24 percent between 1998 and 2002.

Figure 2. Hospital Admissions Rates for Type 1 Diabetes †, Principal Diagnosis, 2003

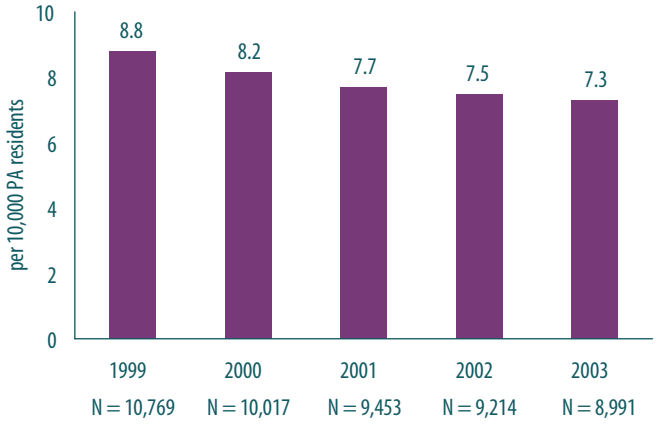
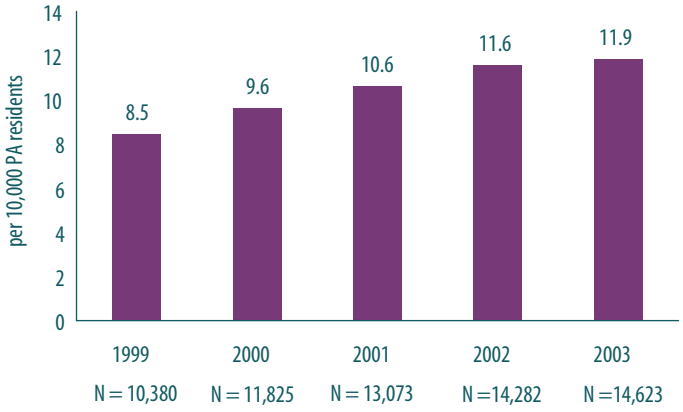


Figure 3. Hospital Admission Rates for Type 2 Diabetes †, Principal Diagnosis, 2003



† ICD.9.CM codes were used to differentiate between type 1 and type 2 diabetes. These codes define type 1 as "insulin dependent" and type 2 as "non-insulin dependent." Because people with type 2 diabetes may use insulin, there could be variation among hospitals with regard to how these cases are coded. Interpretation of the data in regard to differences between type 1 and type 2 diabetes must be made with this in mind.

Hospital admission rates for diabetes vary by age and race.

Hospital admission rates for diabetes increased with age; however, the most pronounced change between 1999 and 2003 was in the 20-39 age category, where admission rates jumped 15.8 percent.

Table 2. Hospital Admissions, Hospital Admission Rates, Hospital Days, and Charges for Diabetes, by Age, 2003

	Hospital Admissions		Hospital Admission Rates (per 10,000 population in PA)		Hospital Days		Hospital Charges	
Age Category	Number	Percent	1999	2003	Average Length of Stay	Total Number of Days	Average Charge	Total Charges
0-19	1,667	7.1	4.7	5.2	2.8	4,704	$11,481	$19,138,457
20-39	3,545	15.0	9.5	11.0	3.7	13,135	$20,693	$73,357,324
40-59	7,227	30.6	18.8	20.8	5.7	41,387	$30,929	$223,524,467
60-79	8,087	34.2	40.6	43.1	6.8	54,986	$31,188	$252,217,849
80 and over	3,088	13.1	49.2	54.3	6.4	19,703	$23,649	$73,028,984
Total	**23,614**	**100.0**	**17.2**	**19.1**	**5.7**	**133,915**	**$27,156**	**$641,267,081**

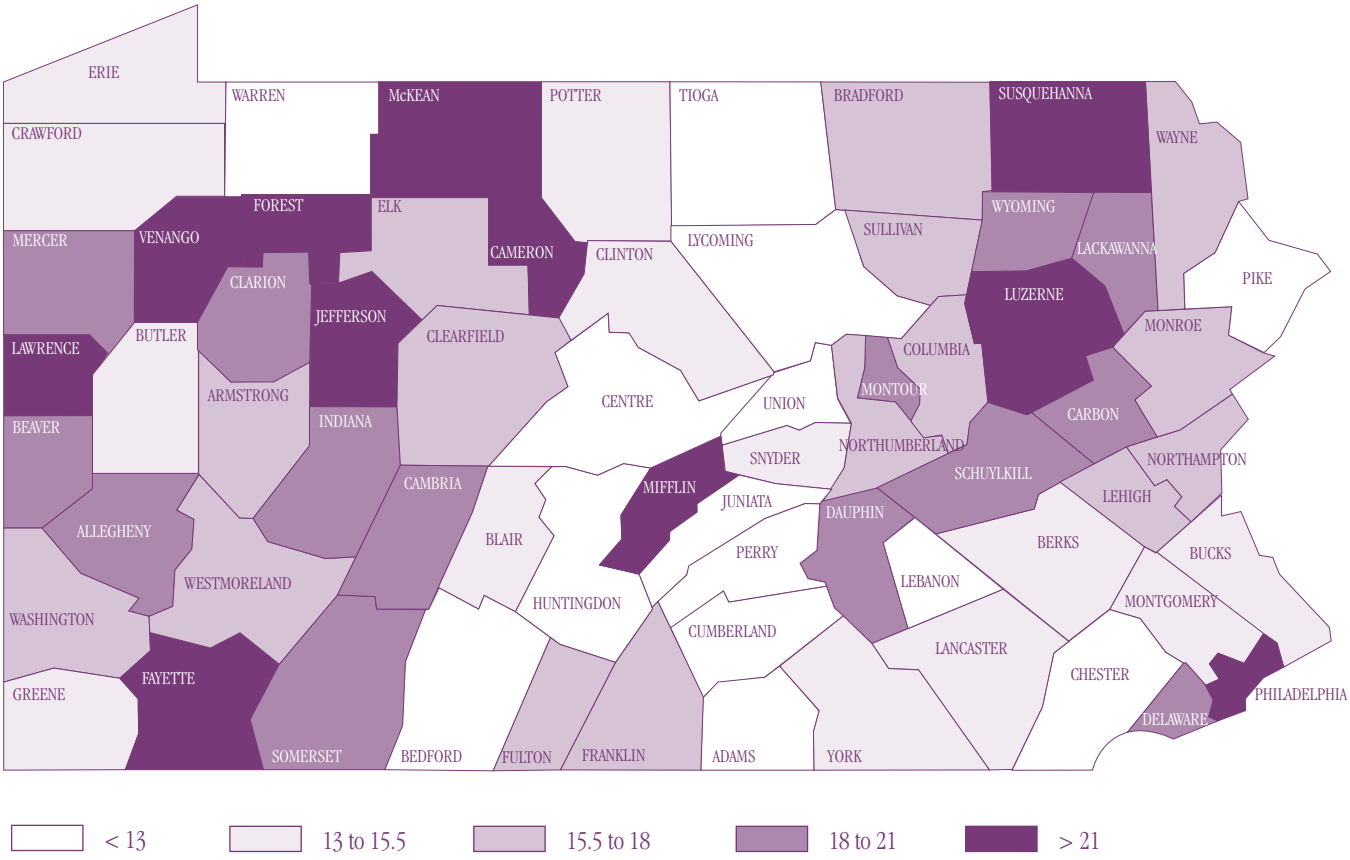
At a rate of 46.4 per 10,000, non-Hispanic African American residents had hospital admission rates for diabetes three times that of non-Hispanic whites (16.1 per 10,000). According to the Centers for Disease Control and Prevention, on average, non-Hispanic African Americans are 1.6 times as likely to have diabetes than non-Hispanic whites of similar age.

Overall, males and females had similar hospital admission rates for diabetes in 2003, 20.1 and 18.3 per 10,000 respectively.

Hospital admission rates vary by county.

The lowest rate of hospital admissions for diabetes was 8.8 hospitalizations per 10,000 residents in Union County. Philadelphia had the highest hospital admission rate in Pennsylvania at 38.0 per 10,000 residents.

Map 1. Hospital Admission Rates for Diabetes, by County, 2003 (per 10,000 residents) †



† Rates are adjusted for age and sex differences among county populations. Source: PHC4 inpatient data and U.S. Census 2002 estimates.

Figure 4. Hospital Admission Rates for Uncontrolled Diabetes, Principal Diagnosis, 1999–2003

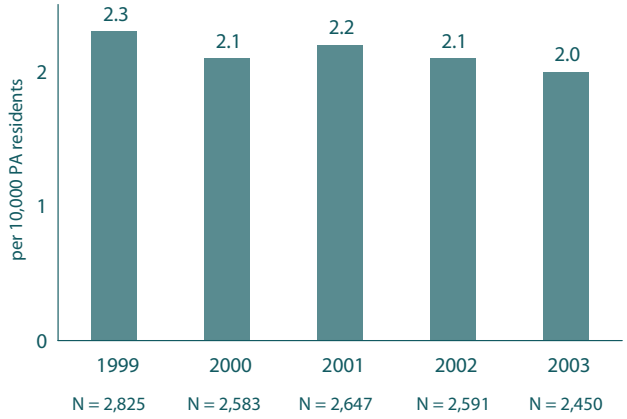


Figure 5. Hospital Admission Rates for Short-Term Complications of Diabetes, Principal Diagnosis, 1999–2003

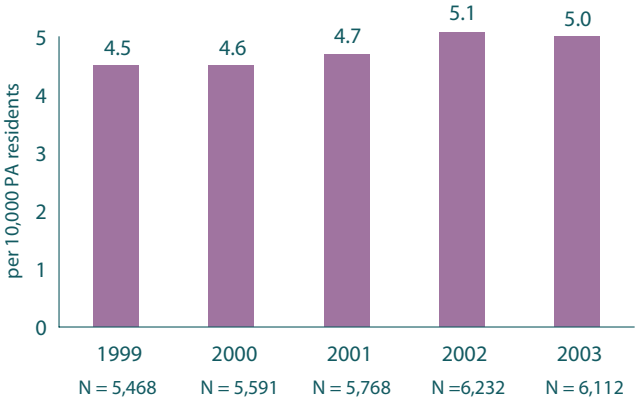
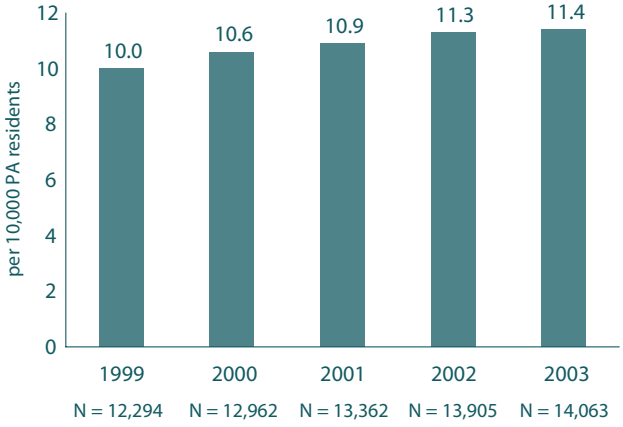


Figure 6. Hospital Admission Rates for Long-Term Complications of Diabetes, Principal Diagnosis, 1999–2003



Complications associated with diabetes are often severe and can be life-threatening.

For people with diabetes, the key to a healthy life is to follow prescribed treatment plans involving nutrition, exercise, and medication. It has been shown that appropriate preventive care can minimize hospitalizations and complications, thereby improving one's health and quality of life.

Hospital admissions for uncontrolled diabetes reflect on the quality of outpatient and other health care, and should be of interest to comprehensive health care delivery systems. The hospital admission rate for uncontrolled diabetes has varied slightly since 1999.

Short-term complications of diabetes include acute, life-threatening events such as diabetic ketoacidosis and diabetic coma. Hospitalizations for these events may be an immediate reflection of how well patients are managing their diabetes. The hospital admission rate for short-term complications of diabetes increased by 13 percent between 1999 and 2002, before declining slightly in 2003.

The long-term complications of diabetes include chronic problems such as heart disease, stroke, amputation, kidney disease, neurologic complications, vascular disease, and eye disease that develop over a period of years or even decades. Hospitalizations for these events may be a reflection of how well patients are managing their diabetes over a long period of time. The hospital admission rate for long-term complications of diabetes increased steadily between 1999 and 2003.

Diabetes is the leading cause of non-traumatic lower extremity amputations in the United States.

According to the Centers for Disease Control and Prevention, comprehensive foot care programs that include regular examinations and patient education could reduce amputation rates by 45 percent to 85 percent.

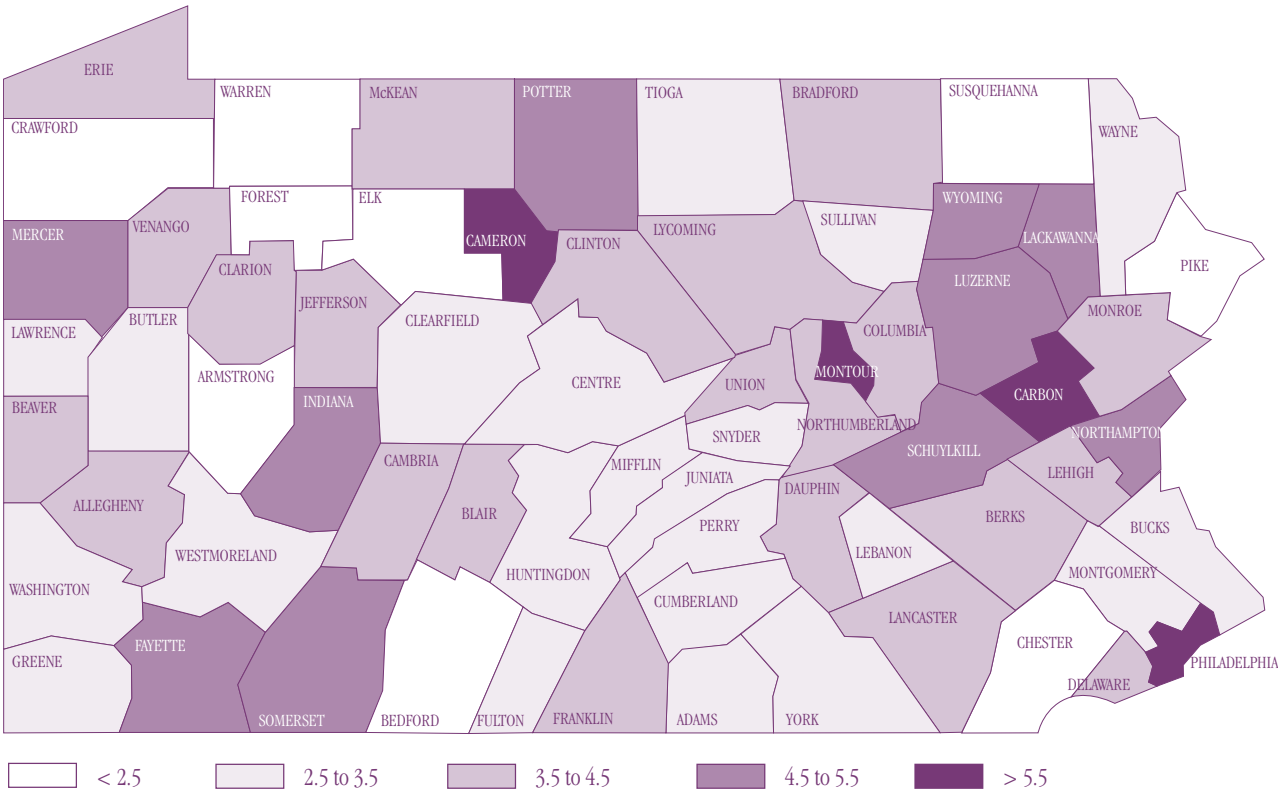
In 2003, there were 4.0 hospital admissions for a lower extremity amputation (with either a principal or secondary diagnosis of diabetes) for every 10,000 Pennsylvanians. The hospital admission rate for lower-extremity amputation has decreased slightly over the past five years.

Hospital admission rates for lower extremity amputation varied by county from a low of 1.3 hospitalizations per 10,000 residents in Susquehanna County to a high of 8.6 in Cameron County.

At a rate of 6.8 per 10,000, non-Hispanic African American residents had a lower extremity amputation rate nearly twice that of non-Hispanic whites (3.7 per 10,000) in 2003. According to the American Diabetes Association, among people with diabetes, African Americans are 1.5 to 2.5 times more likely to suffer from lower limb amputations.

Overall, males had a lower extremity amputation rate of 5.2 per 10,000, and females had a rate of 2.9 per 10,000. The rate for males was approximately 80 percent higher than the rate for females.

Map 2. Lower Extremity Amputation Rates, by County, 2003 (per 10,000 residents) †



† Rates are adjusted for age and sex differences among county populations. Source: PHC4 inpatient data and U.S. Census 2002 estimates.

Diabetes is the leading cause of treated end-stage renal disease, accounting for 44 percent of new cases.

The Centers for Disease Control and Prevention suggest that treatment to better control blood pressure and blood sugar levels could reduce the decline in kidney function by 30 percent to 70 percent.

In 2003, there were 21.4 hospital admissions for end-stage renal disease (with either a principal or secondary diagnosis of diabetes) for every 10,000 Pennsylvanians. The hospital admission rate for end-stage renal disease remained relatively constant between 1999 and 2003.

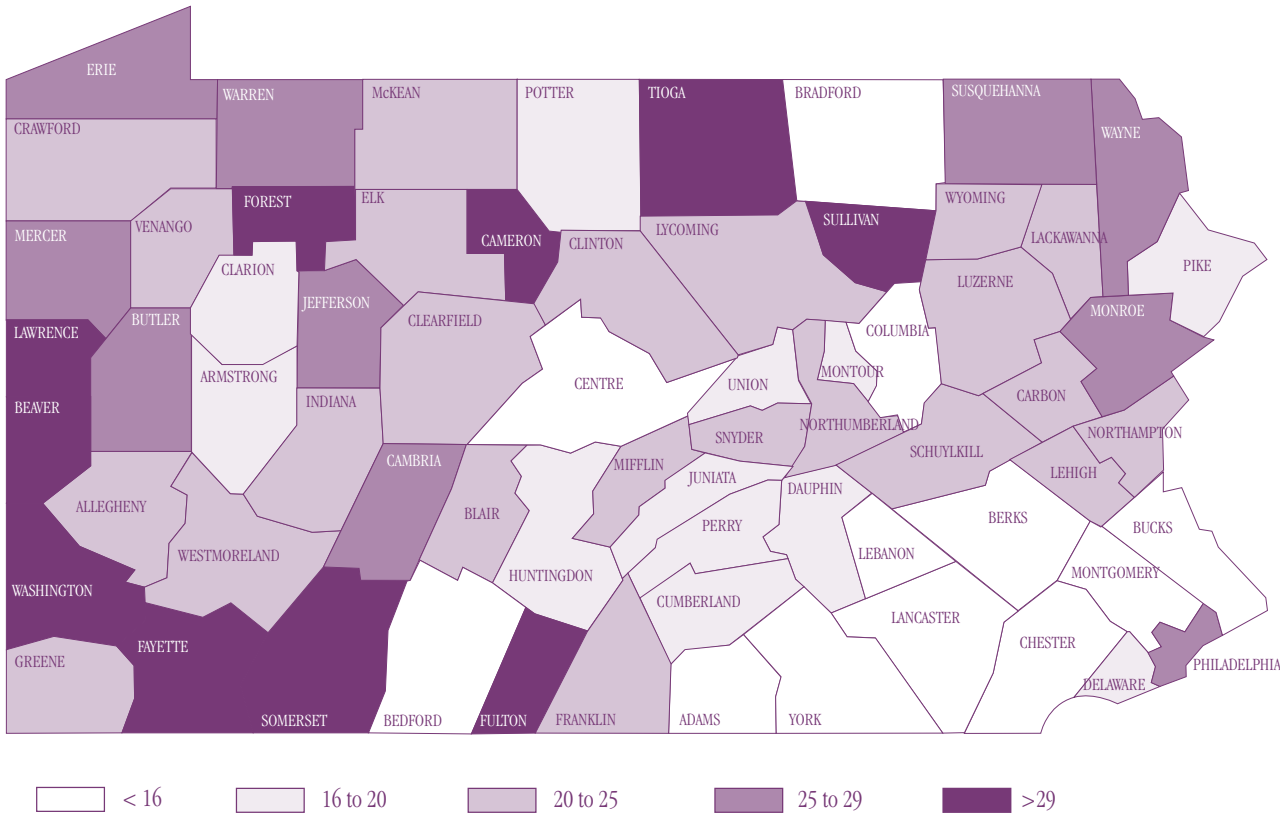
Hospital admission rates for end-stage renal disease varied by county from a low of 10.4 hospital admissions per 10,000 residents in Chester County to a high of 40.0 in Forest County.

At a rate of 38.8 per 10,000, non-Hispanic African American residents had a hospital admission rate for end-stage renal disease nearly twice that of non-Hispanic whites (19.8 per 10,000) in 2003. According to the American Diabetes Association, African Americans with diabetes are 2.6 to 5.6 times more likely to suffer from kidney disease.

Conclusion

Diabetes has an enormous impact not only on individuals, but also on the cost and quality of health care. As a result, it remains essential to continue to make the diagnosis and treatment of people with diabetes a high priority.

Map 3. Hospital Admission Rates involving End-Stage Renal Disease, by County, 2003 (per 10,000 residents) †



† Rates are adjusted for age and sex differences among county populations. Source: PHC4 inpatient data and U.S. Census 2002 estimates.

Data Notes

This report examines hospitalizations where the discharge occurred between January 1 and December 31, 2003.

The analysis includes Pennsylvania residents who were admitted to Pennsylvania hospitals. Out-of-state residents hospitalized in Pennsylvania were excluded, as were Pennsylvania residents hospitalized in another state.

This analysis does not include data on patients treated in the physician's office, in an outpatient setting, or patients treated in the emergency department and then released. Further, these figures reflect hospitalizations, not persons. For example, an individual hospitalized on two separate occasions during this time period was counted twice.

Unless otherwise specified, the analysis is based on hospital admissions with a principal diagnosis of diabetes. PHC4 collects one principal diagnosis and eight secondary diagnoses for each medical record.

The data were reported as submitted to PHC4 by the hospitals. If a hospital did not provide complete information, the number of hospitalizations would be undercounted.

The hospital charges reported are charges associated with the entire hospitalization (not just the treatment associated with diabetes) and do not include physician fees. Further, while charges are a standard way of reporting data, they do not reflect the actual costs of the treatment, nor do they reflect the payment that the hospital may have actually received.

The following ICD.9.CM codes (International Classification of Diseases, Ninth Revision, Clinical Modification) were used to identify hospitalizations with a diagnosis of diabetes: 250.xy; where, x=0,1,2,3,4,5,6,7,8,9 and y=0,1,2,3.

The following ICD.9.CM codes were used to identify uncontrolled diabetes: 250.02, 250.03.

The following ICD.9.CM codes were used to identify short-term complications of diabetes: 250.xy; where, x=1,2,3 and y=0,1,2,3.

The following ICD.9.CM codes were used to identify long-term complications of diabetes: 250.xy; where, x=4,5,6,7,8,9 and y=0,1,2,3.

The following ICD.9.CM codes were used to identify lower-extremity amputations: 84.1y where, y=0,1,2,3,4,5,6,7 (and a diabetes code was in the record). Records including codes for a traumatic amputation (895.0, 895.1, 896.0, 896.1, 896.2, 896.3, and 897.x where, x=0,1,2,3,4,5,6,7) were excluded.

The following ICD.9.CM codes were used to identify end-stage renal disease: 250.40 – 250.43, 585, 586, V420, V560, V568, 996.62, 996.73, and 996.81 (and a diabetes code was in the record).

The following ICD.9.CM codes were used to differentiate between type 1 and type 2 diabetes: 250.xy in which y=1,3 indicates type 1 diabetes [insulin dependent type] and y=0,2 indicates type 2 diabetes [non-insulin dependent type]. Note that this classification is based on the definition of "insulin dependent" and not "insulin using."

Hospitalization rates for 1999, 2000, 2001, and 2002 were calculated using U.S. Census Bureau population estimates for the corresponding year. Hospitalization rates for 2003 were calculated using U.S. Census Bureau population estimates for 2002.

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