Diabetes Hospitalization Report

2004 Data

PHC4

Pennsylvania Health Care Cost Containment Council

November 2005

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.

Key Findings

- The number of hospitalizations where diabetes was the principal diagnosis rose by almost 8.6 percent between 2000 and 2004 – growing from 21,842 to 23,725 hospitalizations. The *rate* of increase has slowed over the past two years, with increases of less than one percent between 2002 and 2003 and between 2003 and 2004, compared to increases of three and four percent in previous years.
- In 2004 alone, the hospitalizations where diabetes was the principal diagnosis accounted for over 131,800 hospital days and incurred over $673 million in hospital charges.
- While the number and rate of hospitalizations for type 1 diabetes have *decreased* from 2000 to 2004, the number and rate of hospitalizations for type 2 diabetes have *increased* steadily during this period.
- Between 2000 and 2004, hospitalization rates for diabetes increased with age. The most pronounced increase was in the 20-39 age group, where admission rates jumped 26.0 percent.
- African Americans continued to have the highest rates of hospitalization for diabetes, as well as the highest rates of lower extremity amputations and hospitalizations for end-stage renal disease.
- Medicare was the primary payor for 49.0 percent of the hospitalizations for diabetes as a principal diagnosis. Private insurers had the next highest percentage at 25.3 percent.
- Multiple hospitalizations for diabetes are common and costly. Some 15.4 percent of patients with diabetes were hospitalized two or more times in 2004. Certain populations, including Medicaid and Medicare recipients, were more likely to have recurrent hospitalizations.

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 2004 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) were 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 estimates 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 risk for other adverse health outcomes, such as heart disease and stroke.

The number of hospital admissions for diabetes increased by almost 8.6 percent between 2000 and 2004; however, during this period, the annual rate of increase has slowed from a high of 4.3 percent to about 0.5 percent for the past two years.

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 2004, there were 23,725 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 $673 million in hospital charges and almost 132,000 hospital days in 2004. Totals for the past five years reach more than $2.6 billion in hospital charges and over 649,000 days in the hospital.

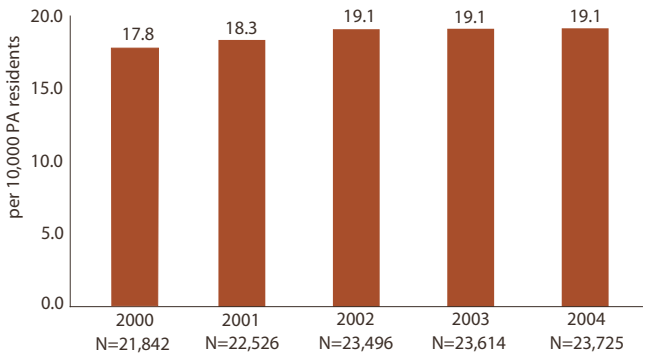
Table 1. Hospital Admissions for Diabetes, Principal Diagnosis, 2000-2004

	Number of Hospital Admissions	Days		Hospital Charges	
		Average Days	Total Days	Average Charge	Total Charges
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
2004	23,725	5.6	131,827	$28,395	$673,663,573
Total	115,203	5.6	649,409	$22,908	$2,639,037,085

Although the rate of hospital admissions for diabetes increased 7.3 percent between 2000 and 2004, this rate has leveled off since 2002.

In 2004, there were 19.1 hospital admissions for diabetes for every 10,000 Pennsylvania residents. This represents a 7.3 percent increase from the rate of 17.8 in 2000.

Figure 1. Hospital Admission Rates for Diabetes, Principal Diagnosis, 2000-2004



Hospital admission rates for type 2 diabetes continued to increase (29 percent between 2000 and 2004); however, admission rates for type 1 diabetes continued to decrease (18 percent between 2000 and 2004).

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 2004.

Figure 2. Hospital Admission Rates for Type 1 Diabetes, Principal Diagnosis, 2000-2004

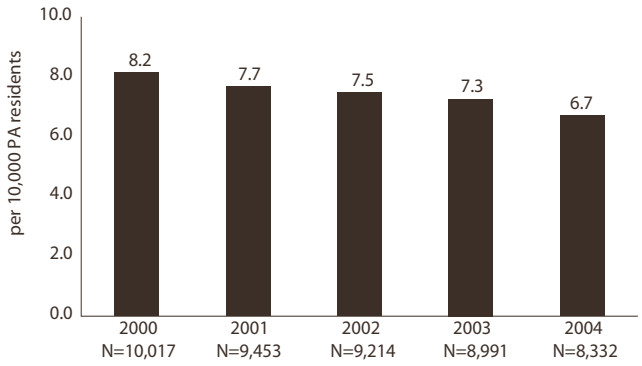
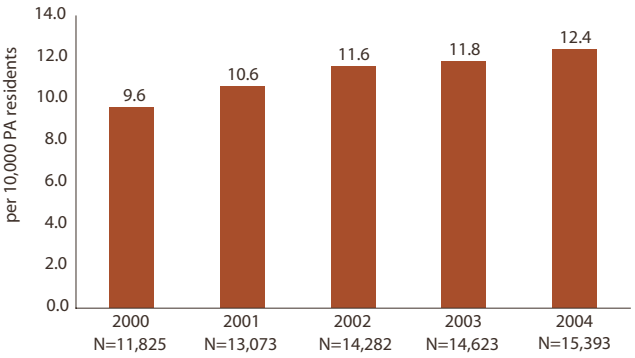


Figure 3. Hospital Admission Rates for Type 2 Diabetes, Principal Diagnosis, 2000-2004



Hospital admission rates for diabetes vary by age and race.

Hospital admission rates for diabetes increased with age; however, the most pronounced change between 2000 and 2004 – as seen in previous years – was in the 20-39 age category, where admission rates jumped 26.0 percent.

Table 2. Hospital Admissions, Hospital Admission Rates, Hospital Days, and Charges for Diabetes, by Age, 2004

Age Category	Hospital Admissions		Hospital Admission Rates (per 10,000 population in PA)		Hospital Days		Hospital Charges	
	Number	Percent	2000	2004	Average Length of Stay	Total Number of Days	Average Charge	Total Charges
0 - 19	1,634	6.9%	5.1	5.1	2.7	4,478	$11,957	$19,537,535
20 - 39	3,663	15.4%	9.2	11.6	3.7	13,577	$22,146	$81,122,559
40 - 59	7,409	31.2%	19.1	20.7	5.6	41,297	$31,826	$235,796,078
60 - 79	7,911	33.3%	42.3	42.4	6.7	53,210	$32,843	$259,821,535
80 and over	3,108	13.1%	51.7	51.0	6.2	19,265	$24,899	$77,385,866
Total	23,725	100.0%	17.8	19.1	5.6	131,827	$28,395	$673,663,573

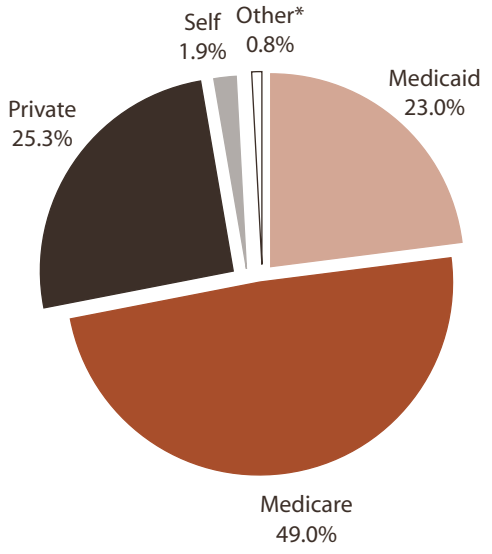
At a rate of 46.1 per 10,000, non-Hispanic African American residents had hospital admission rates for diabetes three times that of non-Hispanic whites (16.1 per 10,000). According to the Centers for Disease Control and Prevention, on average, non-Hispanic African Americans are 1.6 times as likely to have diabetes than non-Hispanic whites of similar age.

Overall, males and females had similar hospital admission rates for diabetes in 2004, 20.2 and 18.1 per 10,000 respectively.

Hospital admissions vary by payor type.

Medicare was the primary payor for almost half (49.0%) of the hospitalizations for diabetes as a principal diagnosis. Private insurers had the next highest percentage at 25.3 percent.

Figure 4. Hospital Admissions for Diabetes by Payor Type, 2004



* Includes other government payors and hospitalizations where the payor was unknown or designation was invalid.

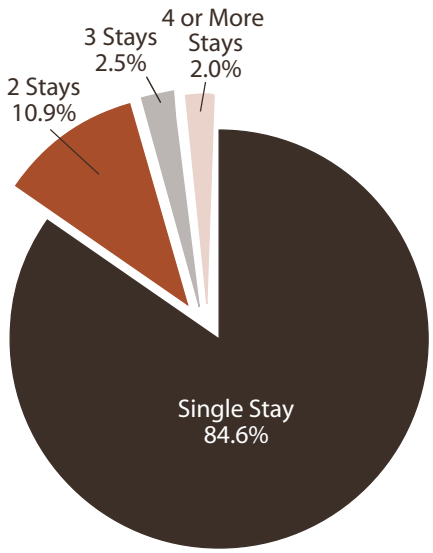
Multiple hospitalizations for diabetes are common.

In 2004, 15.4 percent of patients with diabetes were hospitalized two or more times. Certain populations, including Medicaid and Medicare recipients, were more likely to have recurrent hospitalizations.

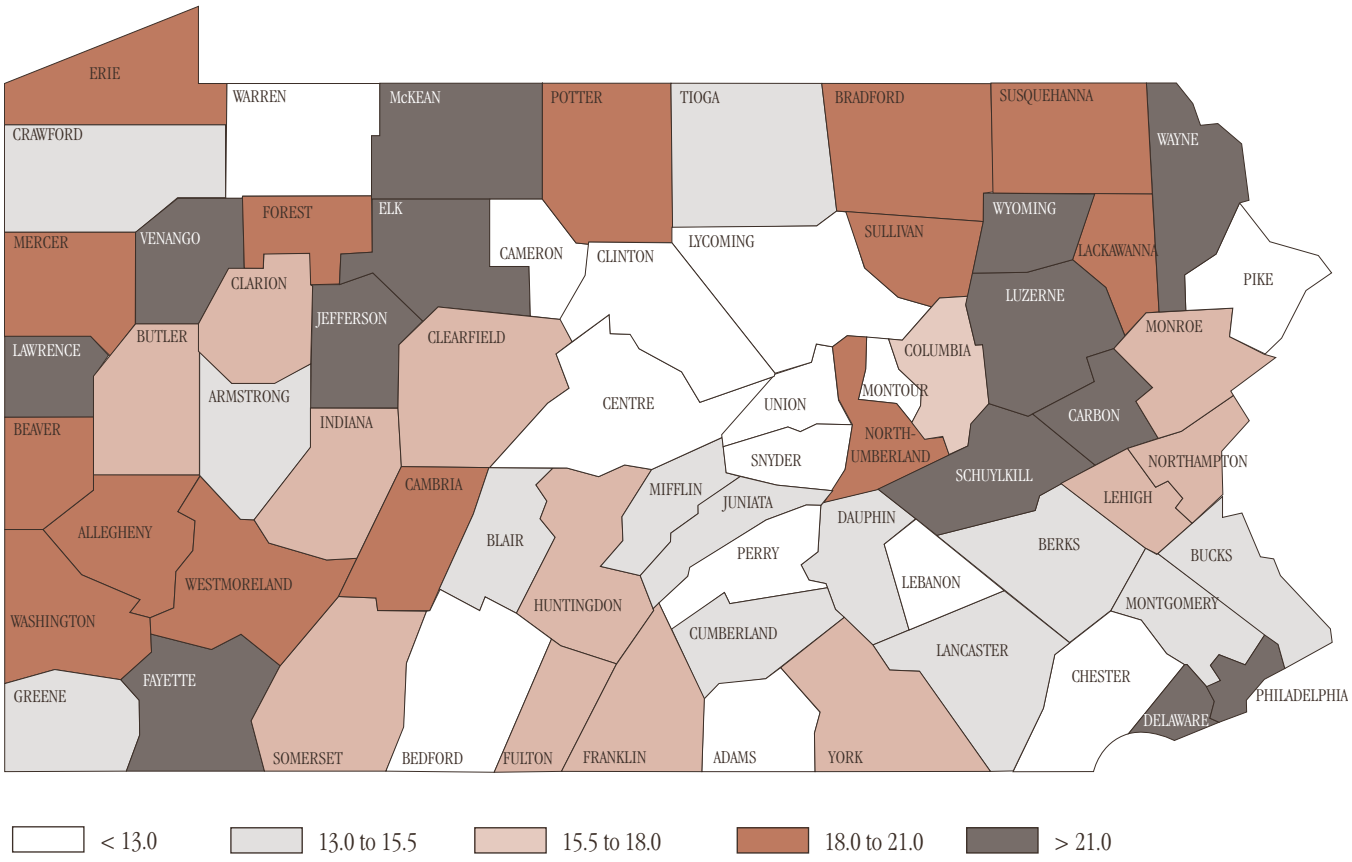
Hospital admission rates vary by county.

In 2004, the lowest rate of hospital admissions for diabetes was 6.7 hospitalizations per 10,000 residents in Union County. Philadelphia had the highest hospital admission rate in Pennsylvania at 37.7 per 10,000 residents.

Figure 5. Multiple Hospitalizations for Patients with Diabetes, 2004



Map 1. Hospital Admission Rates for Diabetes, by County, 2004 (per 10,000 residents)†



† Rates are adjusted for age and sex differences among county populations. Source: PHC4 inpatient data and U.S. Census 2004 data.

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 declined slightly since 2001.

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 11 percent between 2000 and 2002, then declined slightly in 2003 and 2004.

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 slightly each year from 2000 to 2004.

Figure 6. Hospital Admission Rates for Uncontrolled Diabetes, Principal Diagnosis, 2000-2004

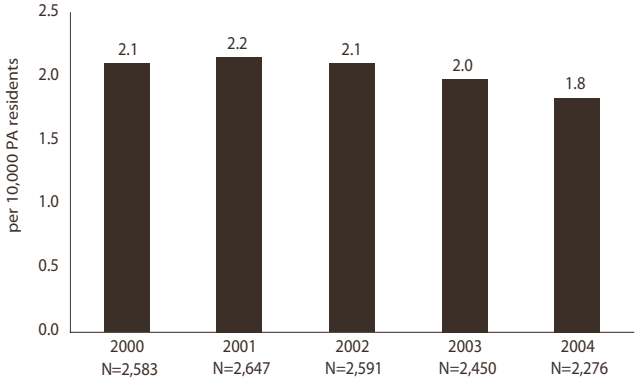


Figure 7. Hospital Admission Rates for Short-Term Complications of Diabetes, Principal Diagnosis, 2000-2004

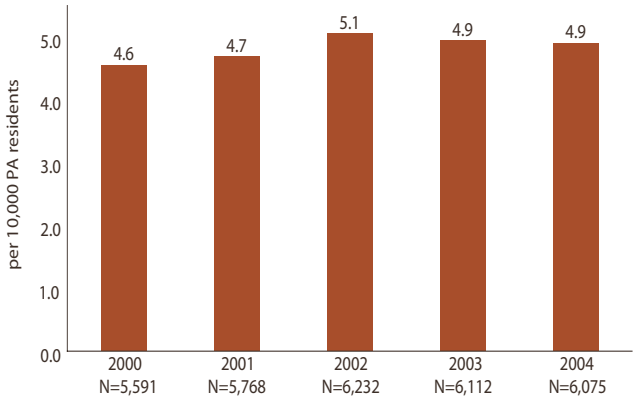
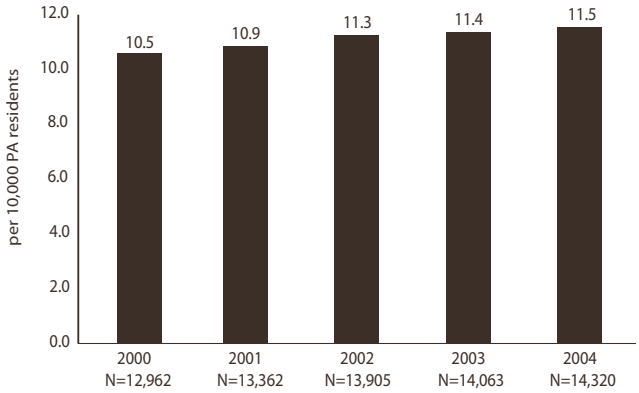


Figure 8. Hospital Admission Rates for Long-Term Complications of Diabetes, Principal Diagnosis, 2000-2004



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.

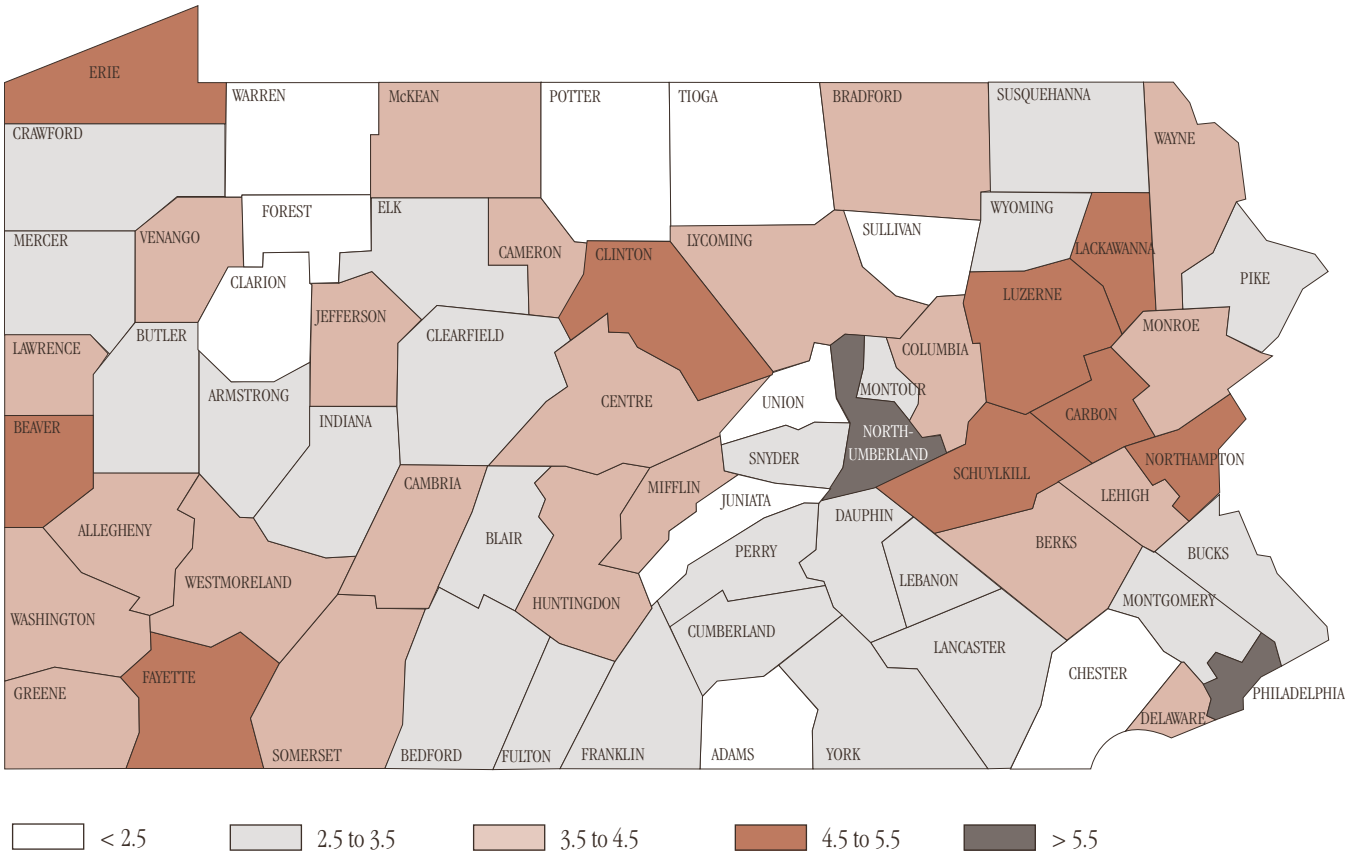
In 2004, there were 3.9 hospital admissions for a lower extremity amputation (with either a principal or secondary diagnosis of diabetes) for every 10,000 Pennsylvanians. The hospital admission rate for lower extremity amputation has decreased slightly over the past five years from a rate of 4.3 per 10,000 in 2000.

Hospital admission rates for lower extremity amputation varied by county from a low of zero hospitalizations per 10,000 residents in Forest County to a high of 6.3 in Philadelphia County.

At a rate of 6.4 per 10,000, non-Hispanic African American residents had a lower extremity amputation rate 73 percent higher than that of non-Hispanic whites (3.7 per 10,000) in 2004. 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 5.1 per 10,000, and females had a rate of 2.7 per 10,000. The rate for males was approximately 88 percent higher than the rate for females.

Map 2. Lower Extremity Amputation Rates, by County, 2004 (per 10,000 residents) †



† Rates are adjusted for age and sex differences among county populations. Source: PHC4 inpatient data and U.S. Census 2004 data.

Diabetes is the leading cause of treated end-stage renal disease, accounting for 43 percent of new cases.

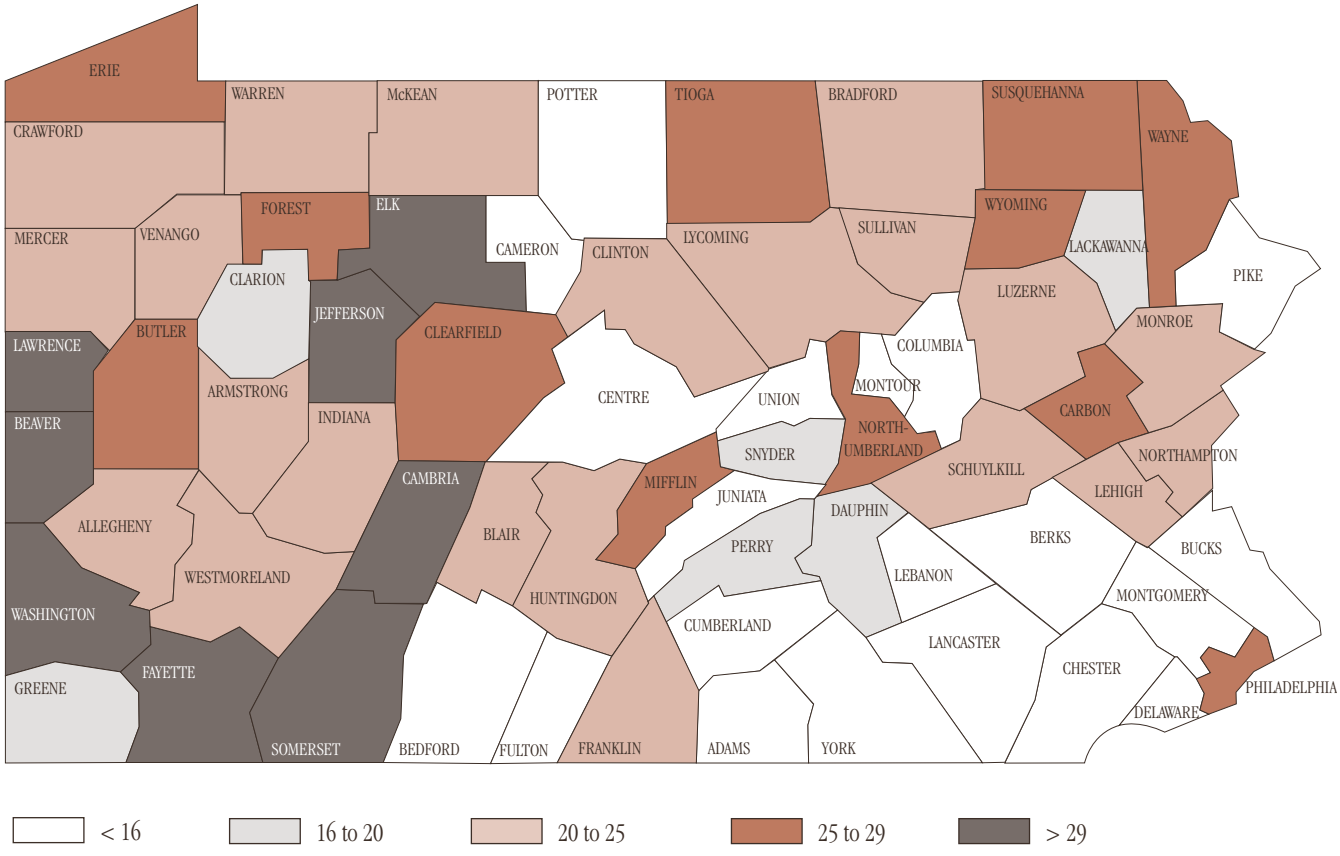
According to the Centers for Disease Control and Prevention, detection and treatment of early diabetic kidney disease by lowering blood pressure can reduce decline in kidney function.

In 2004, there were 20.8 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 decreased 6.9 percent from 22.3 percent in 2000 to 20.8 percent in 2004.

Hospital admission rates for end-stage renal disease varied by county from a low of 9.9 hospital admissions per 10,000 residents in Chester County to a high of 37.8 in Fayette County.

At a rate of 37.0 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 (19.4 per 10,000) in 2004. According to the American Diabetes Association, African Americans with diabetes are 2.6 to 5.6 times more likely to suffer from kidney disease.

Map 3. Hospital Admission Rates Involving End-Stage Renal Disease, by County, 2004 (per 10,000 residents) †



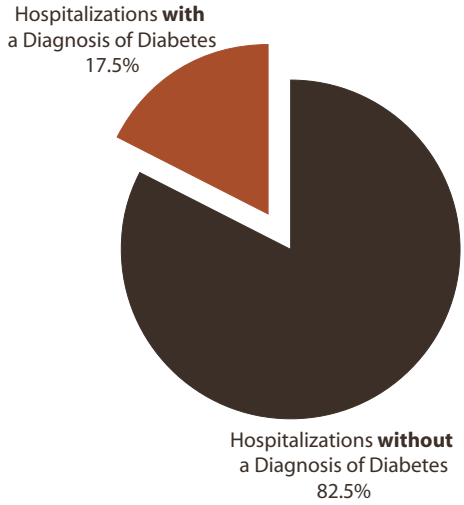
† Rates are adjusted for age and sex differences among county populations. Source: PHC4 inpatient data and U.S. Census 2004 data.

Conclusion

Diabetes has an enormous impact not only on individuals, but also on the cost and quality of health care. While hospitalizations with a principal diagnosis of diabetes are the main focus of this analysis, the number of hospitalizations where diabetes was either the principal or secondary diagnosis provides an important look at the overall picture.

In 2004, there were 327,370 hospitalizations with a principal or secondary diagnosis of diabetes, compared to 286,297 in 2000. Diabetes was the principal or secondary diagnosis in 17.5 percent of all hospitalizations for Pennsylvania residents in 2004 – up from 16 percent in 2000. Therefore, continued efforts are needed to better diagnose, prevent and manage diabetes.

Figure 9. Hospitalizations with and without Diabetes Diagnosis, 2004



	Number	Percent
Hospitalizations **with** a Diagnosis of Diabetes	327,370	17.5%
Hospitalizations **without** a Diagnosis of Diabetes	1,543,255	82.5%
Total	1,870,625	100%

Data Notes

This report examines hospitalizations where the discharge occurred between January 1 and December 31, 2004.

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 or 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 and y=0,2 indicates type 2 diabetes.

Hospitalization rates for 2000, 2001, 2002, 2003 and 2004 were calculated using U.S. Census Bureau population estimates for the corresponding year.

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