



Diabetes Hospitalization Report



Pennsylvania Health Care Cost Containment Council
November 2002
2001 Data

Key Findings

- The number of hospitalizations where diabetes was either the principal or a secondary diagnosis rose by 16.8 percent between 1997 and 2001, increasing from 255,858 to 298,941 hospitalizations. In 2001, these hospitalizations represented 16.5 percent of all inpatient hospitalizations – up from 14.7 percent in 1997.
- In 2001, there were 243 hospitalizations with a principal or secondary diagnosis of diabetes for every 10,000 Pennsylvania residents – up from 213 in 1997.
- Of the 298,941 hospitalizations involving diabetes, 7.5 percent – 22,526 hospitalizations – were a direct result of diabetes (i.e., diabetes was the principal diagnosis of the hospital admission). In 2001 alone, these hospitalizations accounted for over 127,000 hospital days and incurred over \$424 million in hospital charges.
- The rate of hospitalizations that were a direct result of diabetes increased by 10.2 percent between 1997 and 2001. Over the past 5 years, these hospitalizations accounted for over 614,000 hospital days and incurred almost \$1.6 billion in hospital charges. This is substantial given that some of these hospitalizations may be preventable if appropriate care is provided on an outpatient basis.
- While the number and rate of hospitalizations for Type 1 diabetes has decreased over the past few years, the number and rate of hospitalizations for Type 2 diabetes has increased steadily.
- Between 1997 and 2001, the hospitalization rate for diabetes increased across all age groups. The largest increases were amongst the 30-39 and 40-49 age groups where the hospitalization rates increased by 26.1 percent and 18.4 percent respectively.
- African Americans continued to have the highest rates of hospitalization for diabetes, as well as the highest rates of lower extremity amputations and hospitalization for end-stage renal disease.
- In general, counties in Western and Northeastern Pennsylvania tended to have rates of hospitalization for end-stage renal disease that were higher than the statewide average, while counties in Southeast Pennsylvania generally had rates below the statewide average.
- Counties in Northeastern Pennsylvania tended to have rates of lower-extremity amputation that were higher than the statewide average.

What is diabetes?

Diabetes is a chronic disease in which the body does not produce enough or properly use insulin – a hormone needed to convert blood sugar into energy. There are two main types of diabetes.

Type 1 diabetes usually appears in children or young adults and accounts for 5% to 10% 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 is the most common form of diabetes, estimated to account for about 90% to 95% 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, the Centers for Disease Control and Prevention (CDC) estimates that 40% of people with Type 2 diabetes require insulin injections.

There is a third type of diabetes known as gestational diabetes. This develops in 2% to 5% of all pregnancies but the diabetes usually disappears when the pregnancy is over. In rare instances, other specific types of diabetes may also result from specific genetic syndromes, surgery, drugs, and other illnesses.

Foreword

Diabetes is a widespread, chronic disease caused by the inability of the body to produce or properly use insulin – a hormone needed to convert blood sugar into energy. It is a costly condition associated with significant levels of morbidity and mortality. Diabetes predisposes people to numerous 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. Without question, diabetes is a serious and growing health concern.

Diabetes in Pennsylvania

According to the Behavioral Risk Factor Surveillance Survey conducted in 2001 by the Pennsylvania Department of Health in conjunction with the CDC, 6.7 percent of residents 18 years of age and older were told by a doctor that they had diabetes. The national median was 6.6 percent.

Diabetes cases on the rise

The prevalence of diabetes nationally is widespread and increasing across age groups. According to the CDC, there was a 33% increase in the prevalence of diabetes among adults

during the 1990s. While part of the increase can be attributed to an aging population, it is also associated with the increase in obesity among Americans. Among people aged 30 to 39, the CDC found a 70% increase in diabetes between 1990 and 1998 – more than twice the rate of increase in the general population. Because the potential for long-term complications increases the longer people live with the disease, this trend has significant implications for the quality of life for those with diabetes as well as for health care costs.

The prevalence of Type 2 diabetes – which may be prevented or delayed if those at high-risk make recommended lifestyle changes – is increasing at an alarming rate. For example, Type 2 diabetes is now appearing in children and adolescents; this was uncommon until recently. The increase in Type 2 diabetes among younger age groups should focus additional attention on this condition.

It appears as if the individual and societal burdens imposed by this disease will only continue to grow. Recent announcements by the U.S. Department of Health and Human Services suggest that nearly 16 million Americans have a condition known as “pre-diabetes” and are likely to develop diabetes within a decade unless they make changes in diet and exercise. 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.

Why look at hospitalizations for diabetes?

Diabetes is often considered an ambulatory care sensitive condition – one in which timely and effective primary care will likely reduce hospitalizations. For this reason, hospitalization rates – particularly for complications of diabetes – may indicate failures in diabetes management including access to health care, inadequate care by health care providers, and poor patient adherence to needed lifestyle and behavior changes. While some hospitalizations for diabetes are expected, appropriate preventive care can reduce the need for many of these hospitalizations.

Act 98 – Steps to improve and monitor care

In order to help provide access to appropriate medical supplies as well as education for managing diabetes, Pennsylvania’s General Assembly enacted Act 98 in October of 1998. This law mandates that private and group health insurance plans cover the cost of diabetic supplies such as insulin, blood glucose monitors, and testing strips used by people with diabetes to monitor and treat their disease. It also requires coverage for self-management training and nutritional counseling so that people with diabetes have the appropriate information to help them manage their disease. At the time Act 98 was enacted, the Pennsylvania Health Care Cost Containment Council (PHC4) noted the law’s potential to reduce hospitalizations for diabetes if more people complied with appropriate diabetes protocols as a result.

This report represents a commitment by PHC4 to track hospitalizations for diabetes after the enactment of Act 98 and is the first PHC4 report to include data after Act 98 became fully effective. For the most part, it examines hospitalizations where diabetes is the principal diagnosis, focusing on admissions that are a direct result of diabetes. These hospitalizations are the main component of this analysis because they are more likely to reflect changes in diabetes care and management that have occurred since Act 98 took effect. It may be viewed in conjunction with prior reports to identify trends before and after enactment of the mandate.

It should be recognized that Act 98 does not exist in a vacuum. Over the past several years, the Pennsylvania Department of Health, the American Diabetes Association (ADA), individual Health Maintenance Organizations, hospitals, and physicians have made continuous efforts to educate people with diabetes about their disease and assist them with monitoring and treatment of their diabetes. The federally funded Medicare program has expanded the benefits it offers to people with diabetes. The development of new medications has advanced the treatment of diabetes. All this has occurred during a time when the prevalence of diabetes has been rising. Therefore, while this report presents hospitalization data both before and after the enactment of the mandate, it is not possible to directly attribute any changes in hospitalizations for diabetes to Act 98.

Who should be interested in this report?

Employers: This report can help employers better understand the impact that diabetes has upon their workforce. Diabetes involves substantial direct and indirect costs to employers that include:

- **Direct medical costs.** In 1997 alone, the direct medical and treatment costs for diabetes in the United States was estimated to be \$44 billion. The ADA further estimated that in 1997, the per capita costs of health care for people with diabetes amounted to \$10,071, while health care costs for people without diabetes amounted to \$2,699.
- **Indirect costs.** While the indirect costs of diabetes are difficult to quantify, they are nevertheless substantial. In addition to the direct medical cost of diabetes, the ADA attributed another \$37 billion in disability costs to diabetes in the United States in 1997 alone.
- **Lost productivity.** The ADA estimated that, nationally, over 14 million lost days from work outside the home were attributable to diabetes in 1997. According to the ADA, people with diabetes, age 18-64, lost 8.3 days from work, while people without diabetes lost only 1.7 days from work. The ADA further reported that nearly 75,000 workers nationwide are disabled because of diabetes.

Employers interested in learning more about diabetes can visit the following Web site, www.diabetesatwork.org, which includes an online diabetes and health resource kit to help businesses assess the impact of diabetes in the workplace. It also provides easy-to-understand information for employers to help their employees manage their diabetes and take steps toward reducing the risk for diabetes-related complications such as heart disease.

Physicians: Physicians may be aided by recognition of the widespread and costly impact of diabetes and seek to adopt proven methods of improving diabetes outcomes. They may, in turn, support initiatives in their communities and their individual

practices to improve the delivery of care, thereby empowering their patients to improve self-management.

Managed Care Plans: Managed care plans can use this report to evaluate the ways in which their plans and their network physicians might improve diagnosis, management and treatment of diabetes.

Policy Makers: This report can provide policy makers and the public with information on a serious and growing health problem, underscoring the importance of prevention, earlier diagnosis and improved diabetes care and outcomes in Pennsylvania.

Preventive care means better results

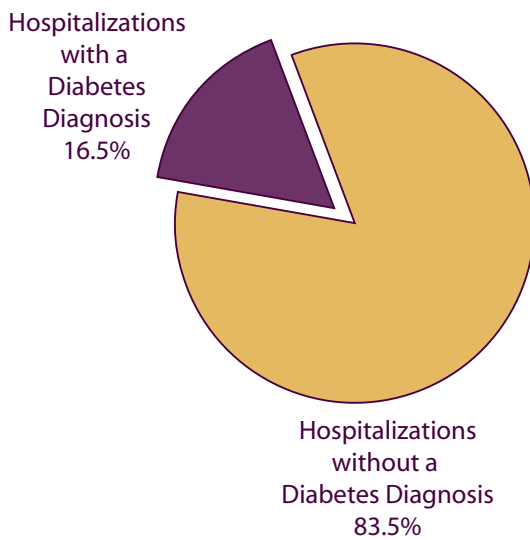
For people with diabetes, the key to a healthy life is to follow prescribed treatment plans involving nutrition, exercise, and medication. It has been shown that appropriate preventive care can minimize hospitalizations and complications, thereby improving one's health and quality of life. PHC4's recent report entitled *Measuring the Quality of Pennsylvania's Commercial HMOs* showed a statistically significant correlation between well-controlled Hemoglobin A1c levels (which represent the average amount of blood sugar over several months) and a lower number of hospitalizations for diabetes.

In addition, the Diabetes Control and Complications Trial (DCCT), the largest, most comprehensive diabetes study ever conducted, showed that keeping blood glucose levels as close to normal as possible slows the onset and progression of eye, kidney, and nerve diseases caused by diabetes.

How many hospitalizations involve diabetes?

- Diabetes was the principal or secondary diagnosis in 16.5% of hospitalizations for Pennsylvania residents in 2001, up from 14.7% in 1997.

- In 2001, there were almost 300,000 hospitalizations with a diagnosis of diabetes. This represents approximately 1 out of every 6 hospitalizations for Pennsylvania residents in 2001.



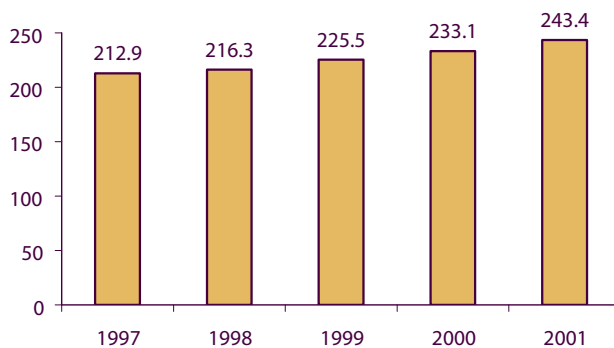
	Number	Percent
Hospitalizations <i>with</i> a Diabetes Diagnosis	298,941	16.5%
Hospitalizations <i>without</i> a Diabetes Diagnosis	1,513,957	83.5%
Total	1,812,898	100.0%

How many hospitalizations involve diabetes?

- The number of hospitalizations involving diabetes (where diabetes was either the principal or a secondary diagnosis of the hospital admission) rose by 16.8% between 1997 and 2001, increasing from 255,858 to 298,941 hospitalizations.

- In 2001, there were approximately 243 hospitalizations with a diagnosis of diabetes (either as a principal or secondary diagnosis) for every 10,000 Pennsylvania residents – up from approximately 213 in 1997.
- Overall, the hospitalization rate has increased by 14.3% since 1997.

Hospitalization Rate for Diabetes - Principal or Secondary Diagnosis
(per 10,000 PA residents)

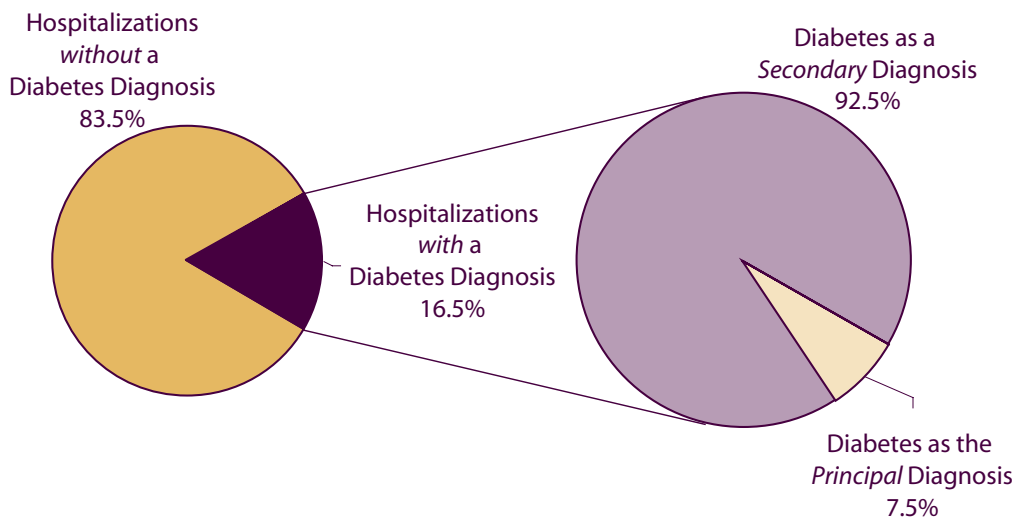


Hospitalizations for Diabetes - Principal or Secondary Diagnosis

Year	Number of Hospitalizations	Average Age
1997	255,858	67.3
1998	259,604	67.3
1999	270,474	67.3
2000	286,297	67.3
2001	298,941	67.2

Hospitalizations for diabetes: principal vs. secondary diagnosis

- Of the 298,941 hospitalizations with a diabetes diagnosis, 7.5% had diabetes listed as the principal diagnosis, suggesting that the reason for the hospital admission was a direct result of diabetes. These hospitalizations are the main focus of this analysis because they are likely to be more immediately affected by changes in diabetes care and management.
- The remaining hospitalizations with a diabetes diagnosis had diabetes listed as a secondary diagnosis (92.5%). In these cases, the principal reason for the hospital admission may or may not be a direct result of diabetes. Such hospitalizations include those with long-term complications of diabetes (such as heart disease and renal failure).

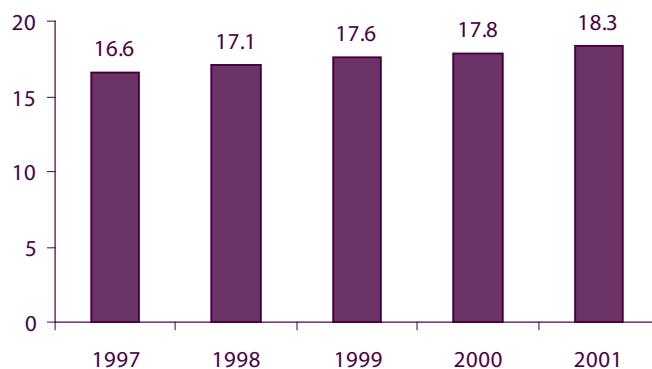


Hospitalizations with ...	Hospital Admissions		Hospital Days		Hospital Charges		Average Age
	Number	Percent	Average Length of Stay	Total Days	Average Charge	Total Charges	
Diabetes as Principal Diagnosis	22,526	7.5	5.7	127,892	\$18,832	\$424,230,192	56.5
Diabetes as Secondary Diagnosis	276,415	92.5	5.9	1,619,808	\$20,972	\$5,797,261,175	68.1
Total	298,941	100.0	5.8	1,747,700	\$20,811	\$6,221,491,367	67.2

How have hospitalizations for diabetes changed over the past few years?

- Hospitalizations with a principal diagnosis of diabetes may be preventable because appropriate care can generally be provided on an outpatient basis. If patients reach the point where they must be hospitalized for diabetes, a breakdown in diabetes care (or access to care) may have already occurred.
- The rate of hospitalization where diabetes was the principal diagnosis increased steadily from 1997 to 2001. The overall change from 16.6 hospitalizations per 10,000 Pennsylvania residents in 1997 to 18.3 in 2001 represents an increase of 10.2%.
- Hospitalizations where diabetes was the principal diagnosis accounted for over 127,000 hospital days and incurred over \$424 million in hospital charges in 2001.
- Over the past 5 years, these hospitalizations accounted for over 614,000 hospital days and incurred almost \$1.6 billion in hospital charges.

Hospitalization Rate for Diabetes - Principal Diagnosis
(per 10,000 PA residents)



Hospitalizations for Diabetes - Principal Diagnosis

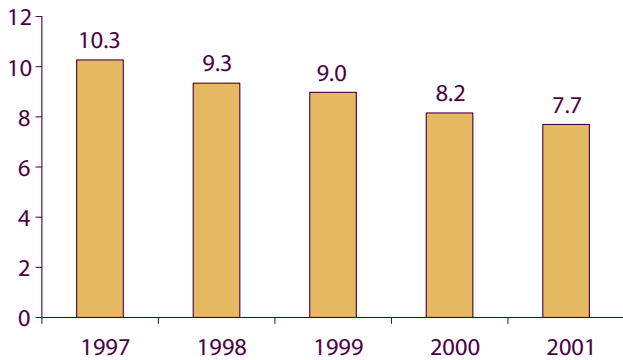
Year	Number of Hospitalizations	Average Age
1997	19,924	56.8
1998	20,552	56.5
1999	21,149	55.9
2000	21,842	56.3
2001	22,526	56.5

Hospitalizations for Diabetes - Principal Diagnosis

	Number of Hospitalizations	Days		Charges	
		Average Days	Total Days	Average Charges	Total Charges
1997	19,924	6.1	122,429	\$12,938	\$243,435,971
1998	20,552	5.8	119,955	\$13,593	\$267,760,341
1999	21,149	5.7	120,269	\$14,631	\$309,445,684
2000	21,842	5.7	123,737	\$16,124	\$352,201,624
2001	22,526	5.7	127,892	\$18,832	\$424,230,192
Total	105,993	5.8	614,282	\$15,106	\$1,597,073,812

- Hospitalization rates for Type 1 diabetes as the principal diagnosis decreased by 25.2% between 1997 and 2001.

Hospitalization Rate for Type 1 Diabetes - Principal Diagnosis
(per 10,000 PA residents)

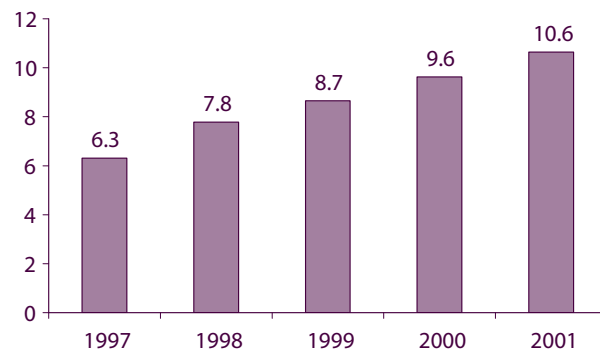


Hospitalizations for Type 1 Diabetes - Principal Diagnosis

Year	Number of Hospitalizations	Average Age
1997	12,340	51.0
1998	11,215	48.9
1999	10,769	47.2
2000	10,017	46.1
2001	9,453	45.0

- Hospitalization rates for Type 2 diabetes as the principal diagnosis increased by 68.3% between 1997 and 2001. This reflects the increase in the prevalence of Type 2 diabetes over the past several years.

Hospitalization Rate for Type 2 Diabetes - Principal Diagnosis
(per 10,000 PA residents)



Hospitalizations for Type 2 Diabetes - Principal Diagnosis

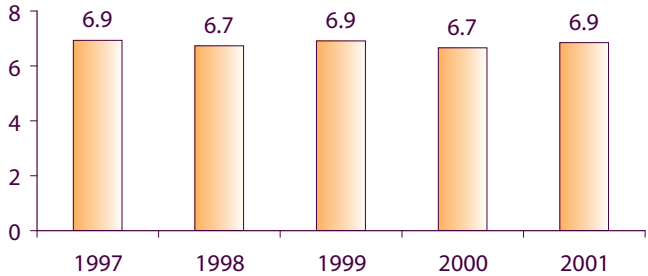
Year	Number of Hospitalizations	Average Age
1997	7,584	66.3
1998	9,337	65.5
1999	10,380	65.1
2000	11,825	65.0
2001	13,073	64.8

Note: 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. Any interpretation of the data in regard to differences between Type 1 and Type 2 diabetes must be made with this in mind.

How have hospitalizations for diabetes changed over the past few years?

- Short-term complications of diabetes include acute, life-threatening events such as diabetic ketoacidosis and diabetic coma. Hospitalizations for these events might be an immediate reflection of how well patients are managing their diabetes. The hospitalization rate for these complications has remained relatively constant since 1997.

Hospitalization Rate for Short-Term Complications of Diabetes - Principal Diagnosis
(per 10,000 PA residents)



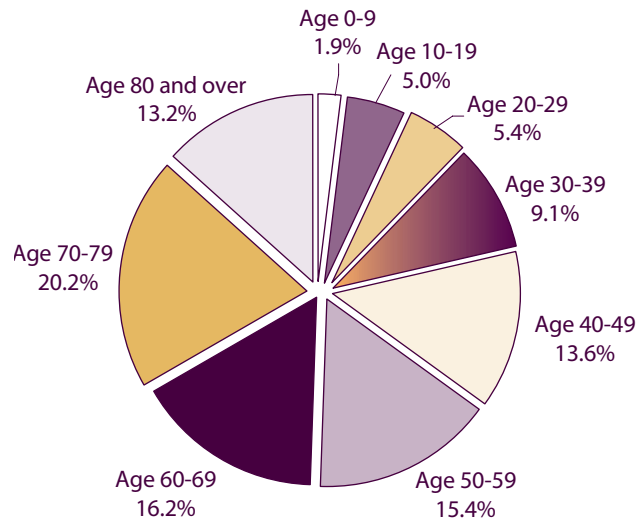
Hospitalizations for Short-Term Complications of Diabetes - Principal Diagnosis

Year	Number of Hospitalizations	Average Age
1997	8,327	48.8
1998	8,075	47.3
1999	8,293	46.4
2000	8,174	46.3
2001	8,415	46.0

How do hospitalizations for diabetes differ by age group?

- In 2001, patients age 60 and over accounted for almost half (49.6%) of hospitalizations for diabetes.
- The hospitalization rate for diabetes increased with age. In addition to having higher rates of hospitalization, older patients tended to have longer average lengths of stay than their younger counterparts. In general, the average charges also tend to increase among older age groups.
- Patients age 60 and over accounted for a disproportionate share of hospital days and charges. While these patients accounted for just under half of all hospitalizations with a principal diagnosis of diabetes, they accounted for 58.3% of days and 52.7% of charges.

Hospitalizations for Diabetes, by Age



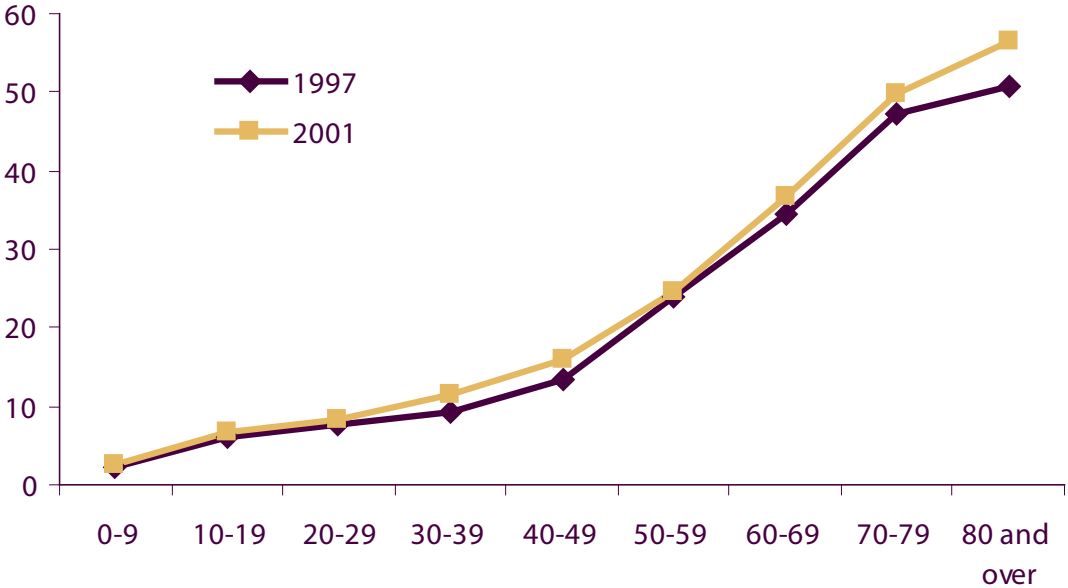
Age Category	Hospital Admissions		Hospitalization Rates (per 10,000 population in PA)		Hospital Days		Hospital Charges	
	Number	Percent	1997	2001	Average Length of Stay	Total Number of Days	Average Charge	Total Charges
0-9	420	1.9	2.4	2.7	2.8	1,163	\$7,699	\$3,233,739
10-19	1,123	5.0	5.9	6.5	2.5	2,824	\$7,649	\$8,589,461
20 - 29	1,221	5.4	7.6	8.3	3.1	3,819	\$11,162	\$13,629,012
30 - 39	2,061	9.1	9.2	11.6	3.9	8,084	\$17,114	\$35,271,874
40 - 49	3,066	13.6	13.6	16.1	5.1	15,725	\$20,454	\$62,712,621
50 - 59	3,470	15.4	24.1	24.5	6.3	21,750	\$22,271	\$77,279,001
60 - 69	3,644	16.2	34.6	36.7	6.8	24,600	\$22,505	\$82,009,297
70 - 79	4,540	20.2	47.4	49.8	6.8	30,703	\$19,672	\$89,325,444
80 and over	2,981	13.2	50.8	56.5	6.4	19,224	\$17,504	\$52,179,743
Total	22,526	100.0	16.6	18.3	5.7	127,892	\$18,832	\$424,230,192

Note: Diabetes was the principal diagnosis of these hospitalizations.

How do hospitalizations for diabetes differ by age group?

- Between 1997 and 2001, the hospitalization rate for diabetes increased across all age groups. The largest increases were amongst the 30-39 and 40-49 age groups where the hospitalization rates increased by 26.1% and 18.4% respectively.

**Hospitalization Rate for Diabetes, by Age
Comparison between 1997 and 2001**
(per 10,000 population in PA)



Note: Diabetes was the principal diagnosis of these hospitalizations.

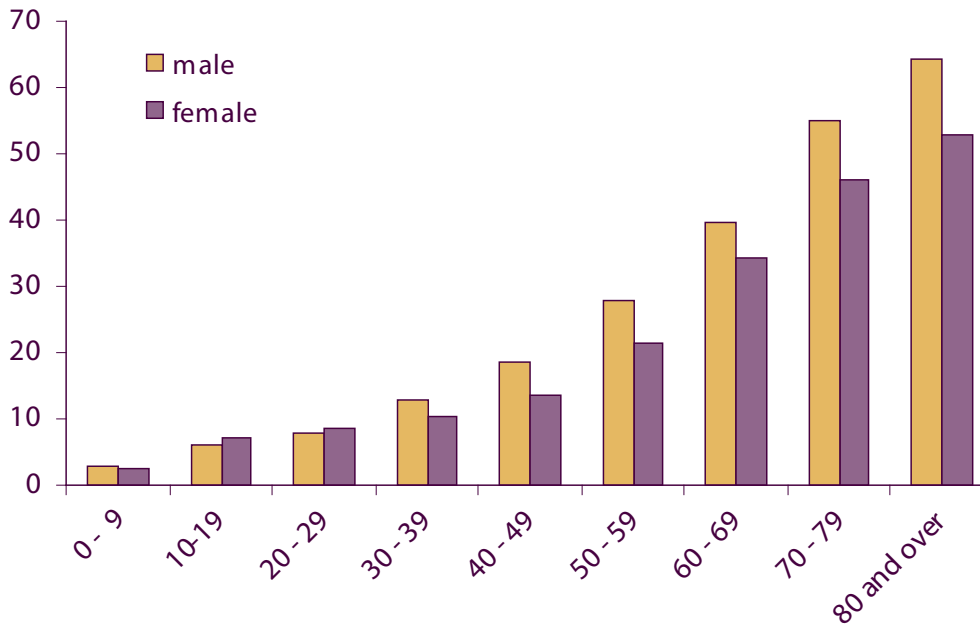
How do hospitalizations for diabetes differ by gender and age?

- Males and females had similar hospitalization rates for diabetes.
- There was, however, variation across age categories. Males had higher rates beginning at age 30.

Hospitalization Rate for Diabetes, by Gender
(per 10,000 population in PA)



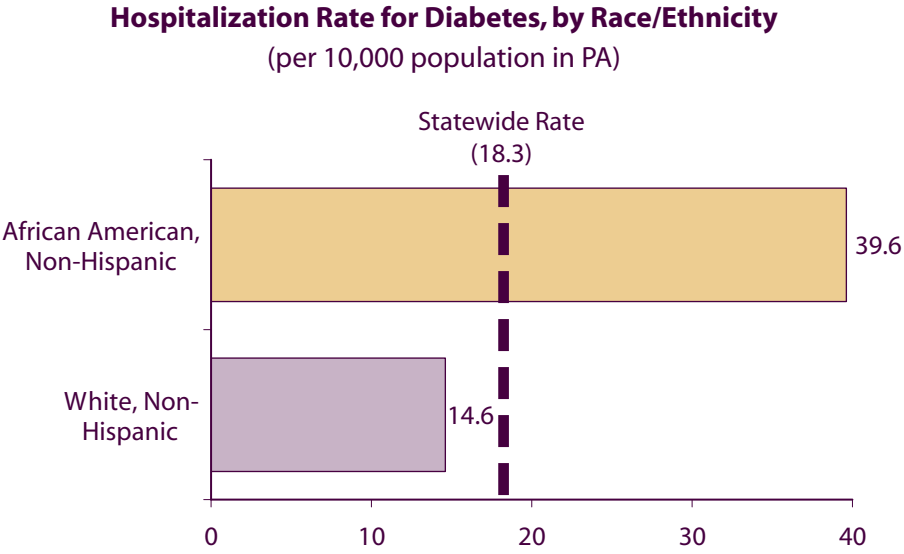
Hospitalization Rate for Diabetes, by Gender and Age
(per 10,000 population in PA)



Note: Diabetes was the principal diagnosis of these hospitalizations.

How do hospitalizations for diabetes differ by race/ethnicity?

- The hospitalization rate for non-Hispanic African Americans in Pennsylvania was nearly three times that of whites in 2001. According to national figures from the CDC, non-Hispanic African Americans are 2.0 times more likely to have diabetes than non-Hispanic whites of similar age.



Note: Diabetes was the principal diagnosis of these hospitalizations.

How do hospitalizations for diabetes differ by payor type?

- Hospitals indicated that Medicare was the primary payor for over half (50.3%) of the hospitalizations for diabetes as a principal diagnosis. Private insurers had the next highest percentage at 26.7%.

Payor	Hospital Admissions		Hospital Days		Hospital Charges	
	Number	Percent	Average Length of Stay	Total Number of Days	Average Charge	Total Charges
Medicare	11,321	50.3%	6.7	75,662	\$20,703	\$234,395,355
Private Insurers	6,016	26.7%	4.8	28,587	\$17,072	\$102,706,418
Medicaid	4,081	18.1%	4.7	19,220	\$18,276	\$74,582,577
Self	630	2.8%	3.2	1,997	\$9,308	\$5,864,062
Other *	478	2.1%	5.1	2,426	\$13,979	\$6,681,780
Total	22,526	100.0%	5.7	127,892	\$18,832	\$424,230,192

Payor	Average Age	Percent with End-Stage Renal Disease	Percent with Amputation**
Medicare	70.4	17.7%	13.3%
Private Insurers	43.9	12.9%	9.1%
Medicaid	40.6	9.2%	6.2%
Self	38.4	2.4%	4.4%
Other *	46.0	11.7%	10.0%
Total	56.5	14.3%	10.6%

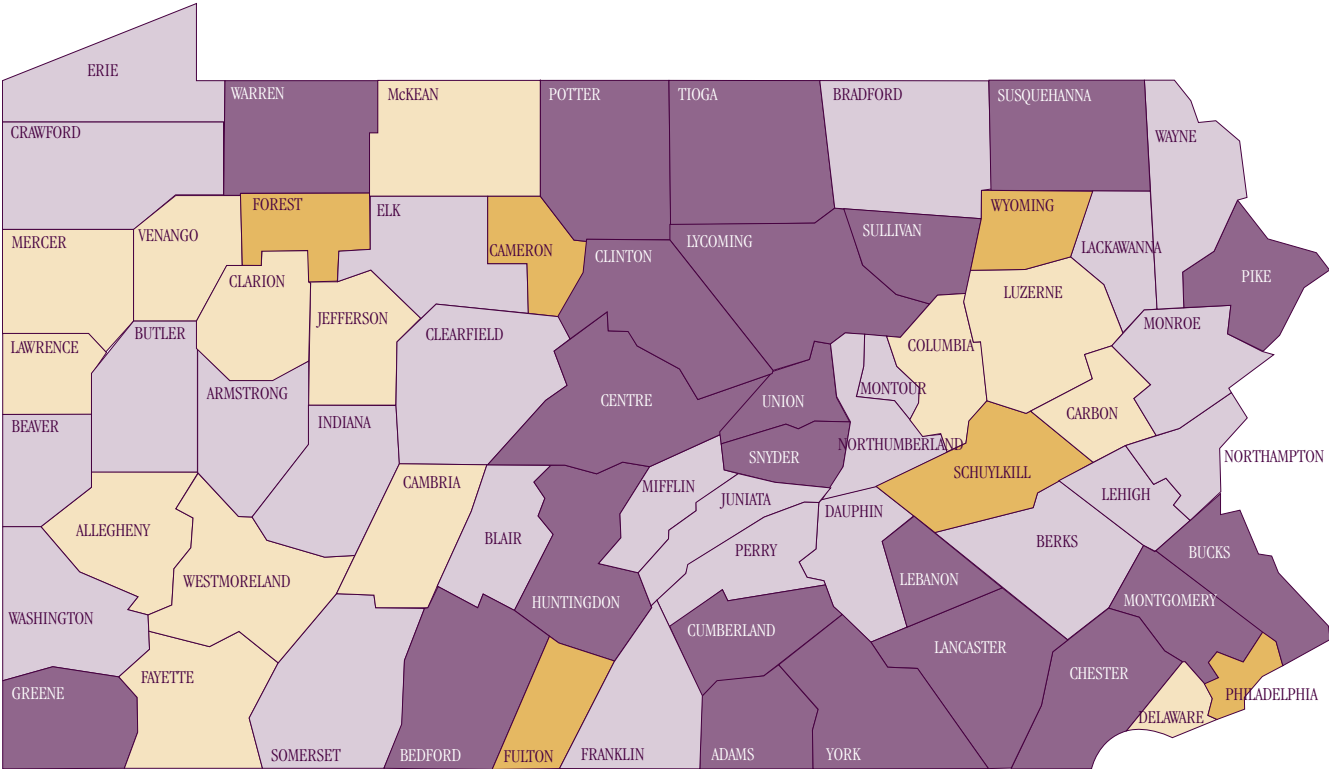
Note: Diabetes was the principal diagnosis of these hospitalizations.

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

** Percent undergoing amputation during the hospitalizations included in this analysis.

How do hospitalizations for diabetes differ by county?

Percent Difference in Diabetes Hospitalization Rates



County rate is below the statewide rate	County rate is above the statewide rate
 0% to 25% below	 0% to 25% above
 More than 25% below	 More than 25% above

Note: Diabetes was the principal diagnosis of these hospitalizations.
 Rates are adjusted for age and sex differences among county populations.
 Source: PHC4 inpatient data and U.S. Census Bureau, Census 2000 data.

Patient County of Residence	% Difference from Statewide Hospitalization Rate
Adams	34.6% below
Allegheny	14.1% above
Armstrong	22.6% below
Beaver	9.2% below
Bedford	39.0% below
Berks	18.6% below
Blair	23.0% below
Bradford	22.3% below
Bucks	25.8% below
Butler	17.1% below
Cambria	17.7% above
Cameron	39.6% above
Carbon	24.3% above
Centre	50.8% below
Chester	30.6% below
Clarion	15.2% above
Clearfield	3.7% below
Clinton	34.0% below
Columbia	3.7% above
Crawford	12.7% below
Cumberland	30.6% below
Dauphin	4.1% below
Delaware	0.1% above
Elk	14.0% below
Erie	15.2% below
Fayette	23.8% above
Forest	51.2% above
Franklin	15.2% below
Fulton	34.3% above
Greene	27.9% below
Huntingdon	30.5% below
Indiana	13.8% below
Jefferson	16.0% above
Juniata	13.8% below

Patient County of Residence	% Difference from Statewide Hospitalization Rate
Lackawanna	2.3% below
Lancaster	27.9% below
Lawrence	7.3% above
Lebanon	42.4% below
Lehigh	22.0% below
Luzerne	17.1% above
Lycoming	46.6% below
McKean	19.6% above
Mercer	19.4% above
Mifflin	16.3% below
Monroe	20.5% below
Montgomery	30.4% below
Montour	17.0% below
Northampton	2.6% below
Northumberland	6.5% below
Perry	19.9% below
Philadelphia	79.6% above
Pike	52.0% below
Potter	44.5% below
Schuylkill	27.8% above
Snyder	47.4% below
Somerset	11.1% below
Sullivan	29.9% below
Susquehanna	39.3% below
Tioga	31.5% below
Union	38.5% below
Venango	13.7% above
Warren	44.4% below
Washington	6.0% below
Wayne	8.1% below
Westmoreland	2.8% above
Wyoming	25.1% above
York	27.2% below

Diabetes-Related Hospitalizations

While not the focus of this analysis, hospitalizations with diabetes as a secondary diagnosis are important because they provide an overall picture of hospital admissions that involve diabetes. This information may help to provide an indication of the magnitude of diabetes in Pennsylvania. Patients with diabetes as a secondary diagnosis are hospitalized for a wide variety

of reasons, but some of the major reasons for admission include the long-term complications of diabetes (for example, diseases of the circulatory system which include heart disease). The following chart shows, by “body system,” why these people were admitted to the hospital. Only the ten body systems with the highest number of admissions are individually displayed.

Hospitalizations where Diabetes was a Secondary Diagnosis

Hospitalizations relating to the ...	Hospital Admissions		Hospital Days		Hospital Charges	
	Number	Percent	Average Length of Stay	Total Number of Days	Average Charge	Total Charges
Circulatory System	96,675	35.0%	4.9	477,743	\$23,369	\$2,259,194,345
Respiratory System	31,075	11.2%	6.6	204,378	\$20,486	\$636,607,704
Musculoskeletal System	25,007	9.0%	6.3	157,439	\$21,955	\$549,044,599
Digestive System	22,996	8.3%	5.4	125,238	\$18,577	\$427,216,999
Nervous System	22,535	8.2%	6.5	147,072	\$20,749	\$467,579,954
Kidney & Urinary System	13,067	4.7%	5.4	71,209	\$18,868	\$246,754,105
Skin, Subcutaneous Tissue & Breast	9,393	3.4%	5.8	54,475	\$15,076	\$141,609,737
Mental Diseases & Disorders	8,365	3.0%	10.9	91,151	\$16,227	\$135,740,153
Hepatobiliary System & Pancreas	8,160	3.0%	6.0	48,844	\$23,525	\$191,962,694
Endocrine System	7,711	2.8%	4.6	35,769	\$16,203	\$124,943,929
All other body systems	31,431	11.4%	6.7	206,490	\$19,617	\$616,606,956
Total	276,415	100.0%	5.9	1,619,808	\$20,972	\$5,797,261,175

Long-Term Complications of Diabetes

Complications associated with diabetes are often severe and can be life-threatening. The long-term complications of diabetes include chronic problems such as heart disease, stroke, blindness, amputation and kidney disease that develop over a period of years or even decades.

While most of this report focuses on hospitalizations where diabetes was the principal diagnosis, the following pages include

hospitalizations where diabetes was either the principal or a secondary diagnosis. Because diabetes is often listed as a secondary diagnosis in cases of long-term complications, including both principal and secondary diagnoses in this analysis allows for a complete counting of diabetes-related complications. For this analysis, patients with multiple complications are counted in each appropriate category.

Complications	Hospital Admissions	Hospital Days		Hospital Charges		% In-Hospital Mortality	Average Age	Average Severity*
		Average Length of Stay	Total Number of Days	Average Charge	Total Charges			
Lower Extremity Amputation	5,142	11.4	58,856	\$41,123	\$211,455,841	3.1	67.1	1.6
End-Stage Renal Disease	26,785	7.4	198,926	\$27,954	\$748,746,618	4.9	64.7	1.8
Eye Disease	11,967	6.3	75,801	\$22,601	\$270,463,152	2.1	62.3	1.6
Neurologic Complications	28,659	6.9	198,899	\$21,397	\$613,215,431	1.9	64.8	1.5
Heart Disease	158,587	5.8	920,238	\$22,208	\$3,521,959,695	3.4	71.0	1.7
Stroke	14,580	7.3	106,225	\$22,333	\$325,609,077	5.8	72.2	1.8
Other Vascular Disease	32,326	7.4	239,840	\$26,174	\$846,100,716	3.3	69.7	1.7

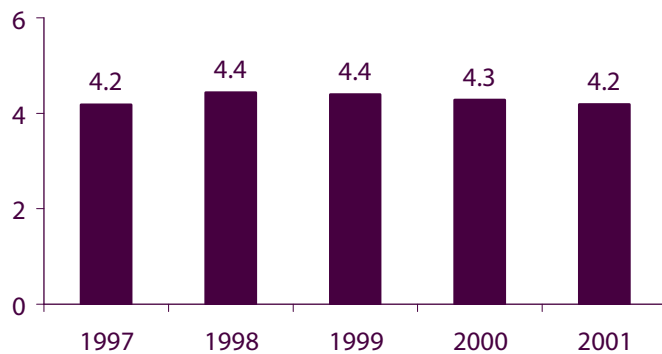
To provide a picture of diabetes and its complications, the following pages display in-depth information about hospitalizations for non-traumatic lower extremity amputation and end-stage renal disease (also known as kidney failure). These specific complications were selected for further analyses since diabetes is the leading cause of both conditions.

* As defined by MediQual® Atlas Outcomes®, which refers to a patient's level of illness upon admission to the hospital. These scores range from minimally sick (severity score = 0) to maximum probability of death (severity score = 4).

Lower Extremity Amputations

In 2001, there were 4.2 hospitalizations for a lower extremity amputation (with either a principal or secondary diagnosis of diabetes) for every 10,000 Pennsylvanians – a rate that has remained steady over the past five years.

Hospitalization Rate for Lower Extremity Amputations, by Year
(per 10,000 PA residents)

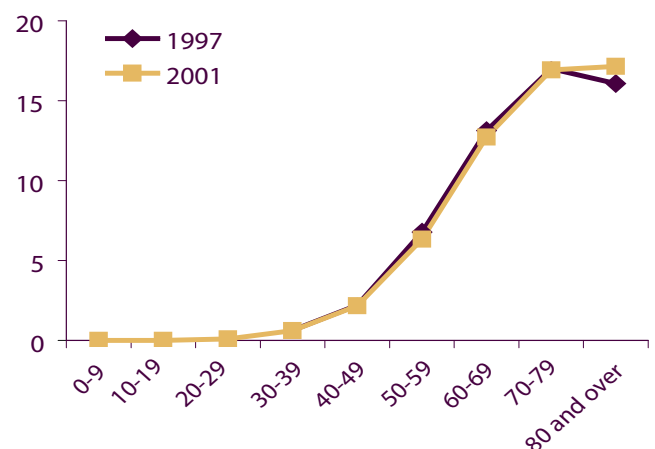


Hospitalizations for Lower Extremity Amputations, by Year

Year	Number of Hospitalizations	Average Age
1997	5,019	66.7
1998	5,318	67.2
1999	5,271	66.6
2000	5,255	66.9
2001	5,142	67.1

- The rate of lower extremity amputation with a diagnosis of diabetes increased with age. Age-specific rates have remained relatively constant since 1997. The rate for residents age 80 and over showed a slight increase during that time.

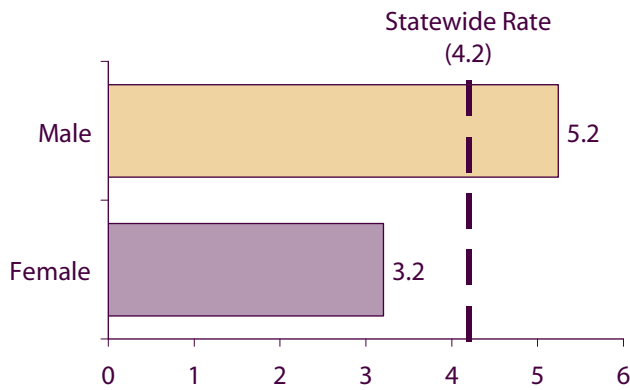
Hospitalization Rate for Lower Extremity Amputations, by Age Comparison between 1997 and 2001
(per 10,000 population in PA)



Diabetes is the leading cause of non-traumatic lower extremity amputations in the United States. According to the CDC, foot care programs that include regular examinations and patient education could prevent up to 85% of these amputations.

**Hospitalization Rate
for Lower Extremity Amputations,
by Gender**

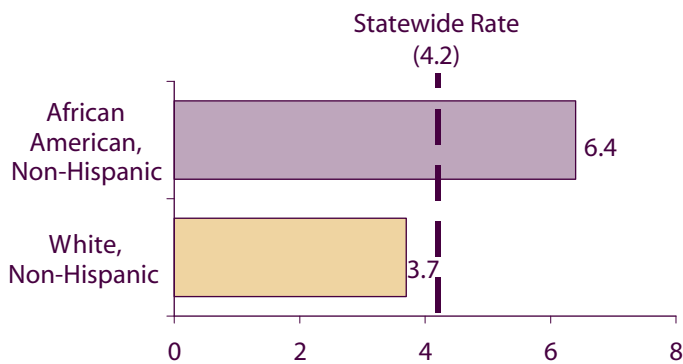
(per 10,000 population in PA)



- The amputation rate was higher among men than women.

**Hospitalization Rate
for Lower Extremity Amputations,
by Race/Ethnicity**

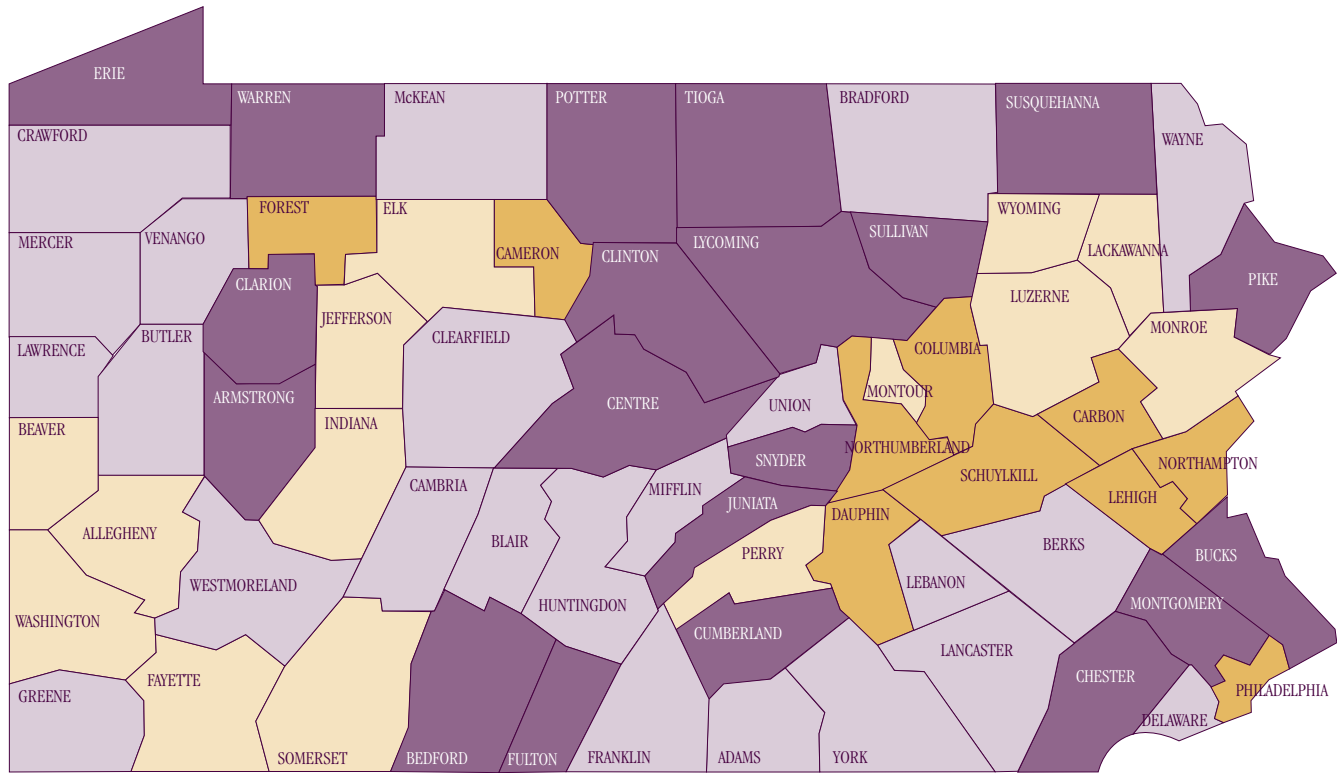
(per 10,000 population in PA)



- The highest amputation rate was among non-Hispanic African Americans. These figures support findings from the ADA suggesting that this population is 1.5 to 2.5 times more likely to undergo lower limb amputations.

Lower Extremity Amputations

Percent Difference in Lower Extremity Amputation Rates



County rate is **below** the statewide rate

- 0% to 25% below
- More than 25% below

County rate is **above** the statewide rate

- 0% to 25% above
- More than 25% above

Rates are adjusted for age and sex differences among county populations.

Source: PHC4 inpatient data and U.S. Census Bureau, Census 2000 data

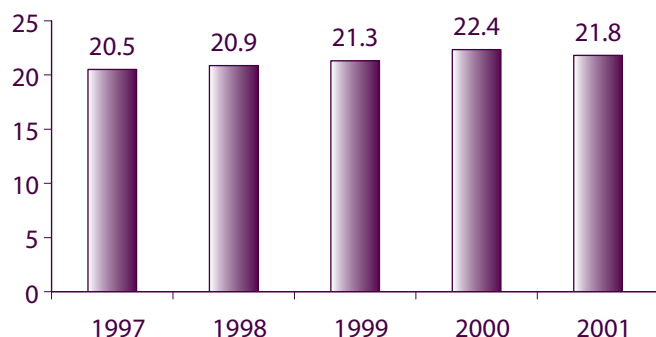
Patient County of Residence	% Difference from Statewide Hospitalization Rate
Adams	13.8% below
Allegheny	7.4% above
Armstrong	47.2% below
Beaver	17.6% above
Bedford	33.7% below
Berks	3.2% below
Blair	14.1% below
Bradford	16.2% below
Bucks	26.7% below
Butler	13.5% below
Cambria	5.0% below
Cameron	33.0% above
Carbon	60.5% above
Centre	61.4% below
Chester	35.9% below
Clarion	30.7% below
Clearfield	17.8% below
Clinton	34.3% below
Columbia	73.0% above
Crawford	9.0% below
Cumberland	27.2% below
Dauphin	27.1% above
Delaware	5.8% below
Elk	6.3% above
Erie	36.1% below
Fayette	18.7% above
Forest	117.8% above
Franklin	3.8% below
Fulton	34.2% below
Greene	17.8% below
Huntingdon	16.1% below
Indiana	7.4% above
Jefferson	2.5% above
Juniata	48.4% below

Patient County of Residence	% Difference from Statewide Hospitalization Rate
Lackawanna	4.6% above
Lancaster	14.4% below
Lawrence	20.7% below
Lebanon	14.4% below
Lehigh	31.7% above
Luzerne	7.8% above
Lycoming	26.1% below
McKean	11.8% below
Mercer	15.7% below
Mifflin	23.3% below
Monroe	4.4% above
Montgomery	36.2% below
Montour	22.6% above
Northampton	40.5% above
Northumberland	52.7% above
Perry	9.1% above
Philadelphia	44.8% above
Pike	55.9% below
Potter	38.9% below
Schuylkill	33.3% above
Snyder	26.6% below
Somerset	14.0% above
Sullivan	46.2% below
Susquehanna	78.6% below
Tioga	29.2% below
Union	0.4% below
Venango	15.5% below
Warren	25.6% below
Washington	8.2% above
Wayne	16.5% below
Westmoreland	5.8% below
Wyoming	8.0% above
York	4.0% below

End-Stage Renal Disease

In 2001, there were 21.8 hospitalizations for end-stage renal disease (with either a principal or secondary diagnosis of diabetes) for every 10,000 Pennsylvanians. While this rate had been increasing, the rate decreased slightly between 2000 and 2001.

Hospitalization Rate for End-Stage Renal Disease, by Year
(per 10,000 PA residents)

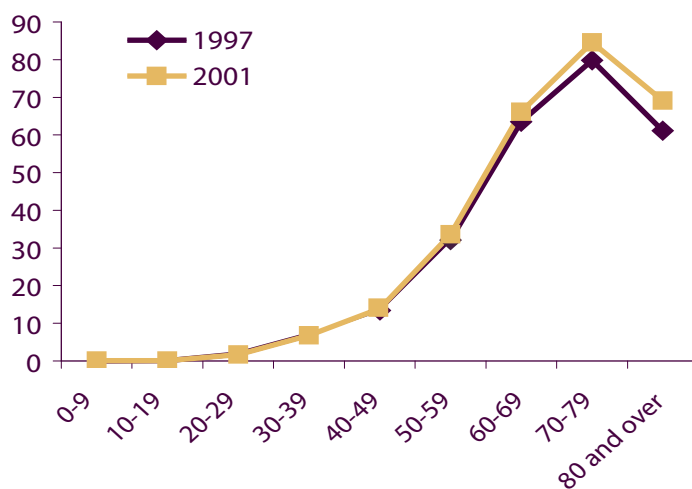


Hospitalizations for End-Stage Renal Disease, by Year

Year	Number of Hospitalizations	Average Age
1997	24,641	64.3
1998	25,063	64.4
1999	25,550	64.4
2000	27,455	64.8
2001	26,785	64.7

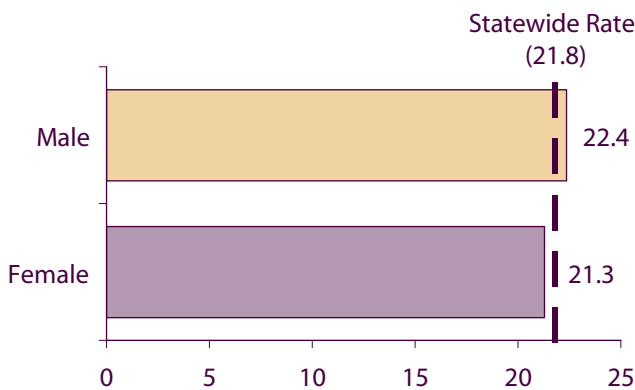
- In general, the rate of hospitalization involving end-stage renal disease with a diagnosis of diabetes increases with age. For residents age 40 and over, the rate was higher in 2001 than it was in 1997. For residents under age 40, the rate remained steady from 1997 to 2001.

Hospitalization Rate for End-Stage Renal Disease, by Age Comparison between 1997 and 2001
(per 10,000 population in PA)



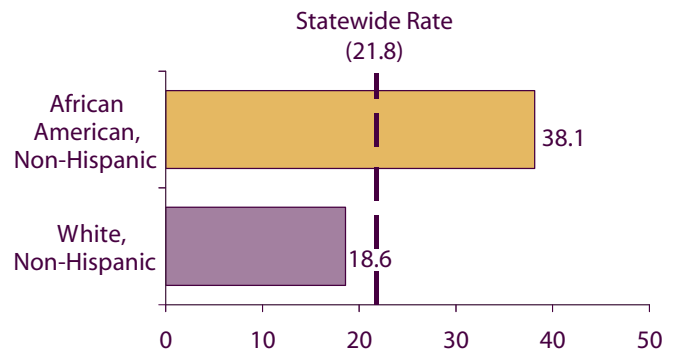
According to the ADA, diabetes is the leading cause of treated end-stage renal disease, accounting for 43% of new cases. In Pennsylvania, it is estimated that over 2,000 new cases of renal disease related to diabetes are diagnosed each year. The CDC suggests that treatment to better control blood pressure and blood glucose levels could reduce diabetes-related kidney failure by about 50%.

Hospitalization Rate for End-Stage Renal Disease, by Gender
(per 10,000 population in PA)



- Men had a slightly higher rate of hospitalization involving diabetes and end-stage renal disease than did women.

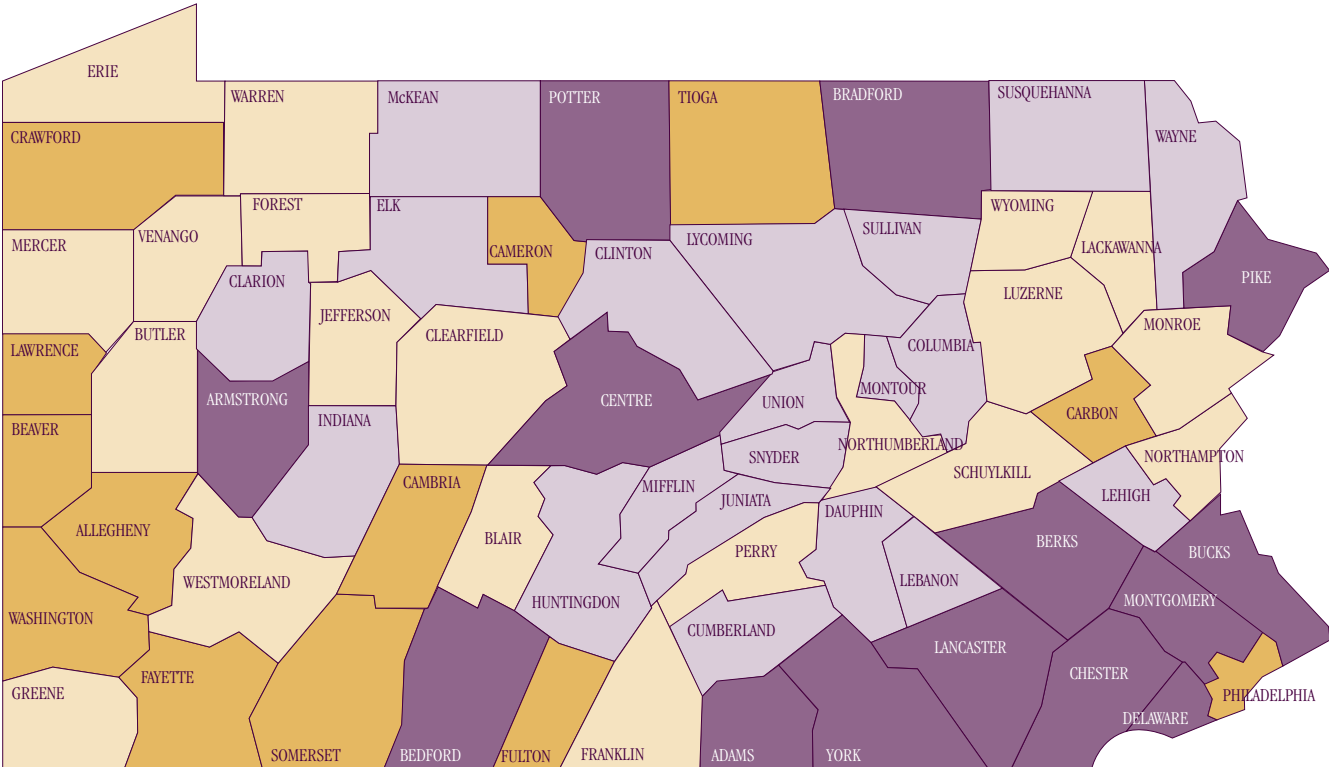
Hospitalization Rate for End-Stage Renal Disease, by Race/Ethnicity
(per 10,000 population in PA)



- The rate of hospitalization involving end-stage renal disease for non-Hispanic African American residents was more than twice the rate for non-Hispanic white residents. These figures support findings from the ADA suggesting that this population is 2.6 to 5.6 times more likely to suffer from kidney disease.

End-Stage Renal Disease

Percent Difference in Hospitalization Rates involving End-Stage Renal Disease



County rate is **below** the statewide rate

- 0% to 25% below
- More than 25% below

County rate is **above** the statewide rate

- 0% to 25% above
- More than 25% above

Rates are adjusted for age and sex differences among county populations.

Source: PHC4 inpatient data and U.S. Census Bureau, Census 2000 data

Patient County of Residence	% Difference from Statewide Hospitalization Rate
Adams	53.6% below
Allegheny	28.1% above
Armstrong	34.5% below
Beaver	25.2% above
Bedford	32.5% below
Berks	36.1% below
Blair	15.1% above
Bradford	29.4% below
Bucks	28.1% below
Butler	9.4% above
Cambria	33.0% above
Cameron	82.8% above
Carbon	28.8% above
Centre	42.2% below
Chester	36.4% below
Clarion	2.8% below
Clearfield	6.5% above
Clinton	22.4% below
Columbia	12.6% below
Crawford	29.3% above
Cumberland	19.4% below
Dauphin	7.4% below
Delaware	33.9% below
Elk	11.4% below
Erie	4.2% above
Fayette	64.3% above
Forest	22.5% above
Franklin	12.2% above
Fulton	106.1% above
Greene	19.2% above
Huntingdon	17.1% below
Indiana	7.1% below
Jefferson	13.5% above
Juniata	0.1% below

Patient County of Residence	% Difference from Statewide Hospitalization Rate
Lackawanna	1.3% above
Lancaster	37.2% below
Lawrence	35.1% above
Lebanon	11.2% below
Lehigh	11.7% below
Luzerne	1.0% above
Lycoming	14.8% below
McKean	2.8% below
Mercer	21.5% above
Mifflin	9.2% below
Monroe	5.2% above
Montgomery	45.1% below
Montour	19.4% below
Northampton	16.0% above
Northumberland	14.1% above
Perry	12.8% above
Philadelphia	32.9% above
Pike	47.8% below
Potter	49.9% below
Schuylkill	9.7% above
Snyder	18.2% below
Somerset	44.1% above
Sullivan	13.4% below
Susquehanna	0.0% below
Tioga	71.1% above
Union	16.6% below
Venango	23.1% above
Warren	9.6% above
Washington	43.8% above
Wayne	8.0% below
Westmoreland	15.1% above
Wyoming	1.7% above
York	37.8% below

Data Notes

This report examines hospitalizations where the discharge occurred between January 1 and December 31, 2001.

Pennsylvania residents admitted to Pennsylvania hospitals are included in the analysis. Out-of-state residents hospitalized in Pennsylvania are excluded because their care was not likely impacted by the passage of Act 98. Pennsylvania residents hospitalized in another state are not included because PHC4 does not have access to that information.

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, if an individual was hospitalized on two separate occasions during this time period, they were counted twice.

Some sections of this analysis are broken down by principal diagnosis and secondary diagnosis. PHC4 collects one principal diagnosis and eight secondary diagnoses for each medical record (this is consistent with the federal UB-92 data collection). If a diabetes code appears in any of the eight secondary diagnosis positions, it is counted as a hospitalization with a secondary diagnosis of diabetes.

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 short-term complications of diabetes: 250.02, 250.03 and 250.xy; where, x=1,2,3 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).

ICD.9.CM codes were used to differentiate between Type 1 and Type 2 diabetes. The fifth digit of the ICD.9.CM code (i.e., y in 250.xy) classifies the type of diabetes. The following specifies the definition of the fifth-digit subclassification. Note that this classification is based on the definition of “insulin dependent” and not “insulin using.”

Fifth-digit 0 subclassifies the diagnosis as Type 2 [non-insulin dependent type] [adult-onset type] or unspecified type, not stated as uncontrolled.

Fifth-digit 1 subclassifies the diagnosis as Type 1 [insulin dependent type] [juvenile type], not stated as uncontrolled.

Fifth-digit 2 subclassifies the diagnosis as Type 2 [non-insulin dependent type] [adult-onset type] or unspecified type, uncontrolled.

Fifth-digit 3 subclassifies the diagnosis as Type 1 [insulin dependent type] [juvenile type], uncontrolled.

Hospitalization rates for 1997, 1998, and 1999 were calculated using U.S. Census Bureau population estimates. Hospitalization rates for 2000 and 2001 were calculated using U.S. Census Bureau, Census 2000 data.



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