



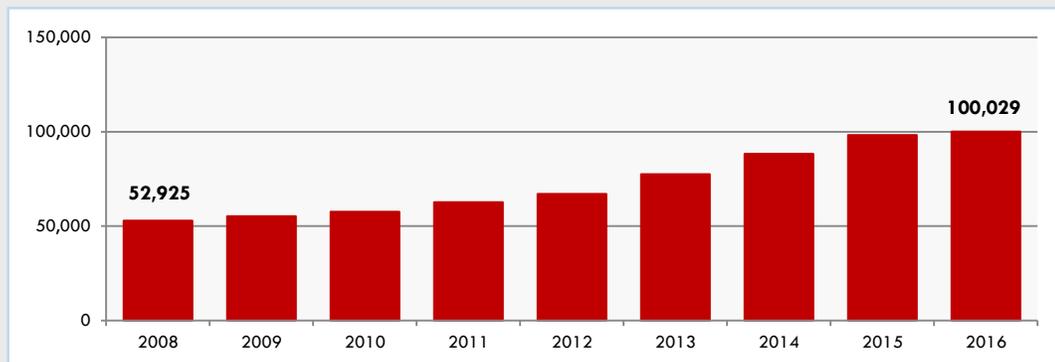
## Sepsis Hospitalizations in Pennsylvania

*This research brief focuses on inpatient hospitalizations for patients who develop sepsis, either prior to being hospitalized or during the hospitalization itself. Sepsis is a system-wide inflammatory response to infection that can worsen and include life-threatening acute organ dysfunction. This analysis is based on 2016 data with comparisons going back to 2008. It includes Pennsylvania residents, age 18 and older, who were admitted to a Pennsylvania general acute care hospital (excludes pregnancy-related and rehabilitation cases). Additional information for newborn sepsis-related hospitalizations is also included.*

### Sepsis Hospitalizations – Adults (18 and Older)

 **89%**

The number of hospital admissions related to sepsis increased 89% between 2008 and 2016, from 52,925 admissions to 100,029.



### *For patients hospitalized with sepsis....*

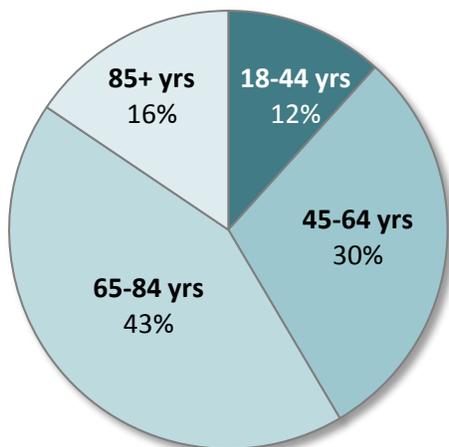
- The in-hospital mortality rate was 10.5% in 2016—a decrease of 47% since 2008 when the rate was 19.8%.
- The 30-day readmission rate was 19.9% in 2016—a decrease of 22% since 2008 when the rate was 25.4%.
- The average length of stay was 8.2 days in 2016—a decrease of 28% since 2008 when the average length of stay was 11.4 days.

# \$ 1.69 billion

In 2016, all sepsis-related admissions amounted to an estimated \$1.69 billion<sup>1</sup> in hospital payments.

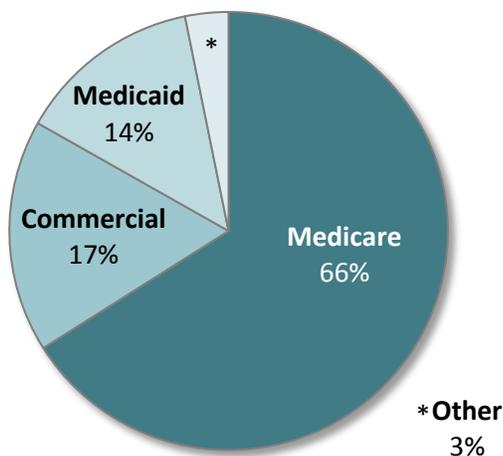
<sup>1</sup>Calculated by applying the average Medicaid payment (2013 data) to Medicaid cases and the average Medicare fee-for-service payment (2015 data) to Medicare, other insurers and uninsured cases, by case mix (MS-DRG).

## 2016 Sepsis Cases by Age<sup>2</sup>



<sup>2</sup> Figures may not add exactly to 100% due to rounding

## 2016 Sepsis Cases by Payer



- Sepsis was the principal reason for the hospital stay in about 80% of the 2016 sepsis cases. In the remaining 20%, the patients had a sepsis diagnosis, but it was not listed as the principal reason for the hospital stay.

## Sepsis Hospitalizations – Neonates (Age 28 days or less)

- There were 1,909 sepsis-related hospital stays for neonates in 2016.
- The in-hospital mortality rate for these cases was 4.6%.
- Four out of every five (79.5%) neonatal sepsis cases occurred during a birth admission; for these cases, the newborn stayed in the hospital 22 days, on average. The average length of stay for a newborn birth admission without complications was two days.

Additional details for individual hospitals' treatment of patients with sepsis (and other common conditions) can be found in PHC4's annual *Hospital Performance Report*. Visit PHC4's website at [www.phc4.org](http://www.phc4.org) and click on the **Reports** and **Hospital Performance** tabs. The report includes treatment outcomes for all Pennsylvania general acute care hospitals.

## Sepsis Present on Admission or Developed During the Hospital Stay

- In 7.9% (7,874) of the sepsis cases in 2016, sepsis was not present at the time the patient was admitted to the hospital; that is, sepsis developed during the hospital stay. In general, outcomes for these patients were worse compared to those who were admitted with sepsis.
- Cases with sepsis at the time of admission had an in-hospital mortality rate of 8.9%, stayed in the hospital, on average, 7.3 days, and were readmitted within 30 days at a rate of 19.5%.
- In comparison, cases in which sepsis developed during the hospital stay had an in-hospital mortality rate of 28.4%, stayed in the hospital, on average, 21.0 days, and were readmitted within 30 days at a rate of 27.5%.
- This pattern of worse outcomes for the cases in which sepsis developed during the hospital stay is consistent regardless of the patient's age.

### Sepsis Diagnosed at the Time of Admission – By Age Category (2016 Data)

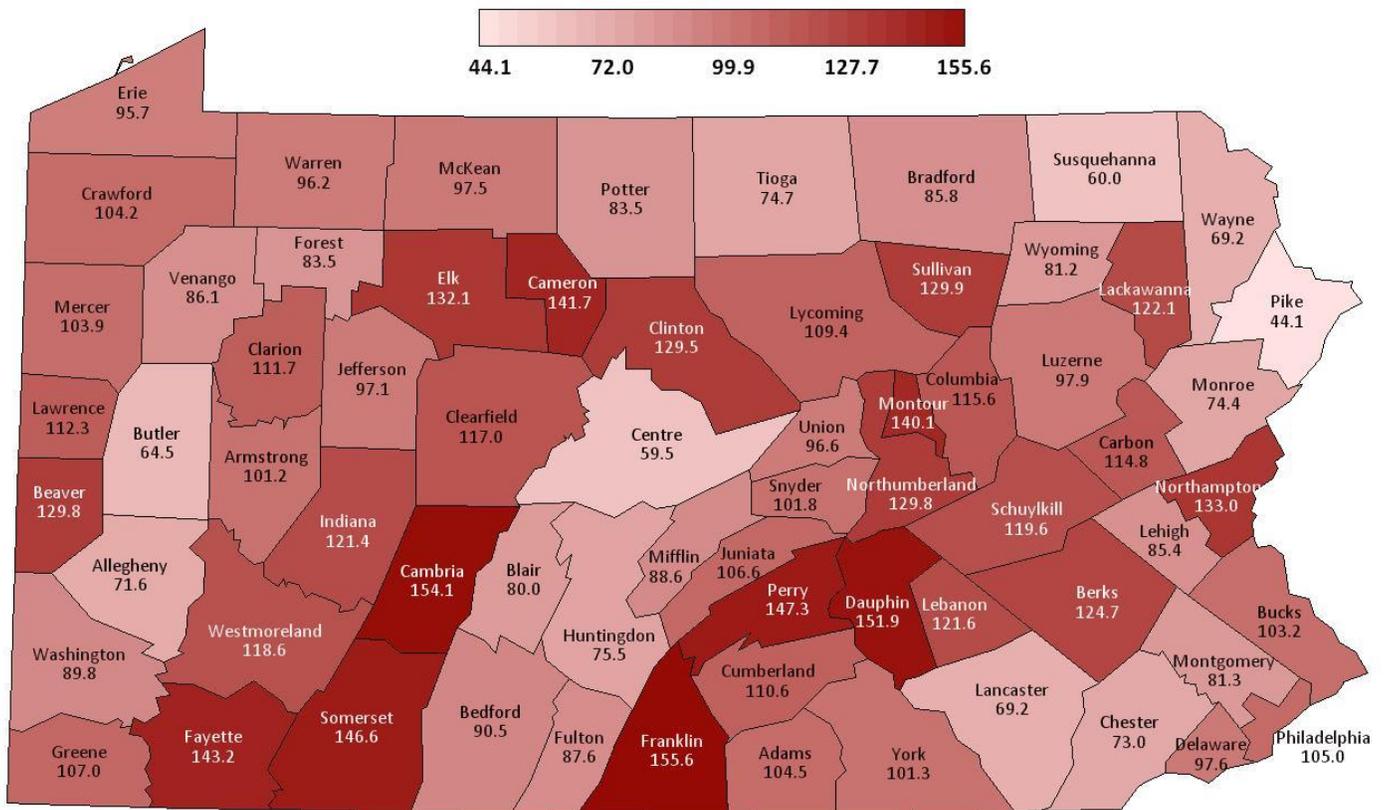
Age Category (in years)	Number of Cases	Mortality Rate	Average Length of Stay (in days)	Readmission Rate
18-44	10,995	3.1%	6.8	15.4%
45-64	27,283	7.0%	8.0	20.2%
65-84	39,281	10.3%	7.3	20.8%
85 and older	14,596	13.2%	6.4	18.0%
<b>Total</b>	<b>92,155</b>	<b>8.9%</b>	<b>7.3</b>	<b>19.5%</b>

### Sepsis Developed During the Hospitalization – By Age Category (2016 Data)

Age Category (in years)	Number of Cases	Mortality Rate	Average Length of Stay (in days)	Readmission Rate
18-44	698	17.5%	24.9	27.7%
45-64	2,537	25.2%	23.9	27.2%
65-84	3,686	31.5%	20.0	29.0%
85 and older	953	32.9%	12.9	21.9%
<b>Total</b>	<b>7,874</b>	<b>28.4%</b>	<b>21.0</b>	<b>27.5%</b>

## Geographic Differences in Sepsis Hospitalizations

### Number of Sepsis Hospitalizations per 10,000 Adult Residents, 2016



**Population-based Rates.** Statewide, there were 99.1 hospital admissions related to sepsis per 10,000 adult, Pennsylvania residents in 2016—up from a rate of 54.3 per 10,000 in 2008. Higher rates for some counties might be dependent on larger numbers of residents with certain characteristics (e.g., factors related to age, income, race/ethnicity) that may increase their risk for developing sepsis. County rates were not adjusted for these population differences so that important effects of these patient characteristics were not masked by such adjustment.

- For residents aged 65 and older, the rate was 263.1 per 10,000.
- For lower income residents, the rate was 124.3 per 10,000.
- For black (non-Hispanic) residents, the rate was 120.0 per 10,000.

*Rates include residents age 18 years and older and were calculated using PHC4 hospital admission data and US Census Bureau data. Rates by county, age, and race/ethnicity were based on 2016 Census population numbers; rates by income were based on 2015 Census median household income estimates at the patient zip code level. Lower income residents were defined as those living in areas where the median household income was less than \$30,000 per year.*

## Sepsis Hospitalizations by County, 2008 and 2016

County	2008		2016	
	Total Number of Hospitalizations	Hospitalization Rate per 10,000 Residents	Total Number of Hospitalizations	Hospitalization Rate per 10,000 Residents
<b>Statewide</b>	<b>52,925</b>	<b>54.3</b>	<b>100,029</b>	<b>99.1</b>
Adams	373	47.6	849	104.5
Allegheny	6,591	68.0	7,095	71.6
Armstrong	393	72.2	545	101.2
Beaver	888	64.8	1,750	129.8
Bedford	226	57.7	352	90.5
Berks	1,379	45.0	3,995	124.7
Blair	694	70.1	792	80.0
Bradford	244	51.7	409	85.8
Bucks	1,449	30.1	5,131	103.2
Butler	950	67.0	958	64.5
Cambria	973	84.3	1,671	154.1
Cameron	34	80.7	55	141.7
Carbon	316	62.7	591	114.8
Centre	250	21.4	784	59.5
Chester	1,093	29.5	2,896	73.0
Clarion	134	42.7	346	111.7
Clearfield	350	52.9	771	117.0
Clinton	110	38.0	398	129.5
Columbia	382	74.5	616	115.6
Crawford	331	48.5	706	104.2
Cumberland	1,222	67.3	2,175	110.6
Dauphin	1,234	61.9	3,235	151.9
Delaware	1,927	45.5	4,261	97.6
Elk	162	63.4	326	132.1
Erie	1,157	53.9	2,059	95.7
Fayette	695	60.8	1,538	143.2
Forest	34	58.5	58	83.5
Franklin	561	50.7	1,863	155.6
Fulton	42	36.3	102	87.6
Greene	92	29.3	320	107.0
Huntingdon	145	39.8	278	75.5
Indiana	499	72.0	838	121.4
Jefferson	176	49.8	338	97.1

## Sepsis Hospitalizations by County, 2008 and 2016

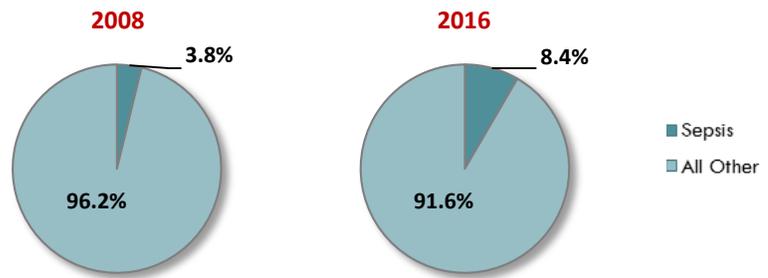
County	2008		2016	
	Total Number of Hospitalizations	Hospitalization Rate per 10,000 Residents	Total Number of Hospitalizations	Hospitalization Rate per 10,000 Residents
Juniata	95	53.5	207	106.6
Lackawanna	1,464	88.7	2,053	122.1
Lancaster	1,115	29.5	2,837	69.2
Lawrence	898	126.1	783	112.3
Lebanon	409	41.0	1,302	121.6
Lehigh	1,252	48.1	2,398	85.4
Luzerne	1,400	56.4	2,488	97.9
Lycoming	223	24.3	998	109.4
McKean	262	77.0	327	97.5
Mercer	816	89.6	939	103.9
Mifflin	170	48.0	321	88.6
Monroe	558	44.5	981	74.4
Montgomery	2,258	37.6	5,242	81.3
Montour	126	90.9	206	140.1
Northampton	2,063	89.6	3,195	133.0
Northumberland	662	90.9	967	129.8
Perry	262	75.4	531	147.3
Philadelphia	5,678	48.5	12,770	105.0
Pike	108	23.2	200	44.1
Potter	55	41.8	112	83.5
Schuylkill	678	57.3	1,388	119.6
Snyder	202	68.2	319	101.8
Somerset	447	71.7	904	146.6
Sullivan	31	61.5	70	129.9
Susquehanna	151	47.3	199	60.0
Tioga	122	37.9	247	74.7
Union	208	59.6	356	96.6
Venango	282	65.9	364	86.1
Warren	156	48.3	311	96.2
Washington	1,048	64.1	1,499	89.8
Wayne	237	58.2	292	69.2
Westmoreland	2,664	91.7	3,439	118.6
Wyoming	157	72.8	179	81.2
York	1,562	47.7	3,504	101.3

## How sepsis compares to all other...

### Hospitalizations

Sepsis was diagnosed in 3.8% of all hospitalizations in 2008 compared to 8.4% in 2016, an increase of 121%.

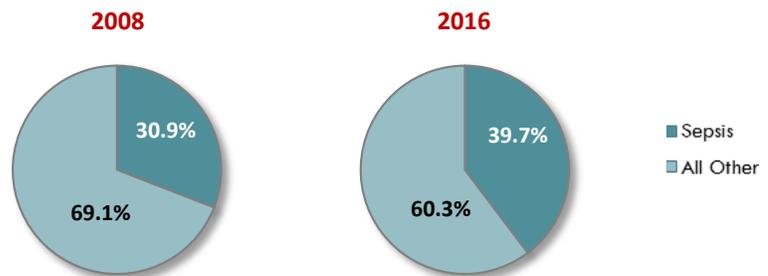
### All Hospitalizations in PA



### Hospital Deaths

Sepsis was diagnosed in 30.9% of all in-hospital deaths in 2008 compared to 39.7% in 2016, an increase of 28%.

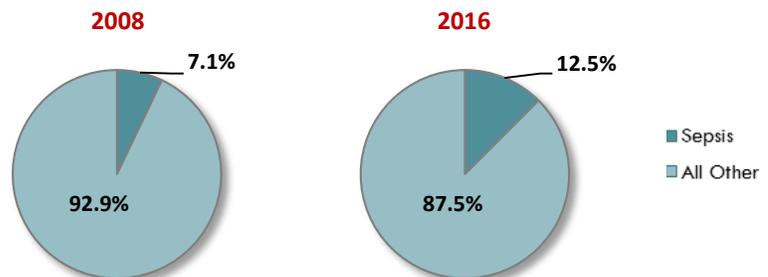
### All In-hospital Deaths in PA



### Readmissions

Sepsis was diagnosed in 7.1% of all 30-day readmissions in 2008 compared to 12.5% in 2016, an increase of 76%.

### All Readmissions in PA



### About PHC4

Created by the PA General Assembly in 1986, the PA Health Care Cost Containment Council (PHC4) is an independent state agency charged with collecting, analyzing and reporting information that can be used to improve the quality and restrain the cost of health care in the state. Today, PHC4 is a recognized national leader in public health care reporting. More than 840,000 public reports on patient treatment results are downloaded from the PHC4 website each year, and nearly 100 organizations and individuals annually utilize PHC4's special requests process to access and use data. PHC4 is governed by a 25-member board of directors, representing business, labor, consumers, health care providers, insurers and state government.

Joe Martin, Executive Director  
225 Market Street, Suite 400, Harrisburg, PA 17101  
717-232-6787

[www.phc4.org](http://www.phc4.org)

