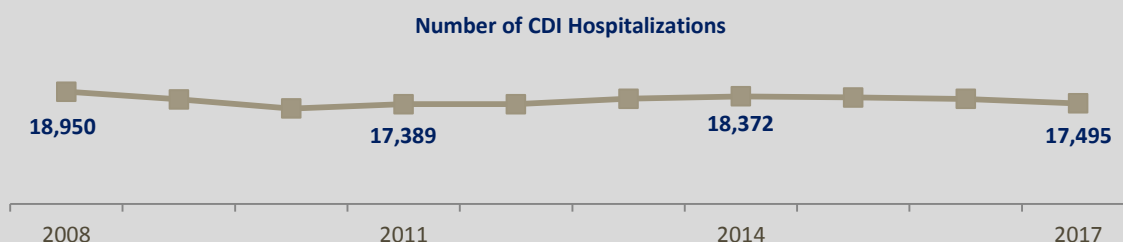




## Clostridium difficile Infections – Hospital Admissions in PA

*Clostridium difficile* (*C. difficile*) infections (or CDI) can cause severe suffering and can be life threatening. They are characterized by watery diarrhea, fever, loss of appetite and abdominal discomfort. Prolonged use of antibiotics, particularly in the elderly as well as those individuals with other illnesses (e.g., cancer), poses an elevated risk for contracting a CDI. This research brief includes patients discharged from Pennsylvania acute care hospitals in FY 2017 (July 1, 2016 through June 30, 2017), with comparisons to FY 2008.

In FY 2017, there were 17,495 hospital admissions for patients with a CDI. That number has remained relatively steady since FY 2008.



Outcomes are often worse when patients hospitalized for common conditions have a CDI.

Patients Admitted for...	Number of Cases	In-Hospital Mortality Rate	30-Day Readmission Rate	Average Length of Stay (in days)	Average Payment
<b>Sepsis</b>					
With CDI	3,805	12.6%	28.6%	7	\$16,855
Without CDI	81,190	8.9%	19.3%	5	\$13,862
<b>Congestive Heart Failure</b>					
With CDI	180	5.6%	33.6%	7	\$13,711
Without CDI	22,812	2.8%	24.2%	4	\$9,380
<b>Pneumonia</b>					
With CDI	239	5.0%	32.0%	7	\$11,290
Without CDI	29,708	2.3%	16.0%	4	\$7,447
<b>Respiratory Failure</b>					
With CDI	249	13.3%	30.3%	11	\$22,543
Without CDI	20,009	8.9%	23.6%	4	\$12,720
<b>Acute Renal Failure</b>					
With CDI	404	5.2%	29.9%	6	\$10,463
Without CDI	25,974	2.2%	20.7%	4	\$6,997
<b>Diabetes</b>					
With CDI	247	1.6%	44.2%	8	\$15,481
Without CDI	27,665	0.5%	22.1%	3	\$8,433

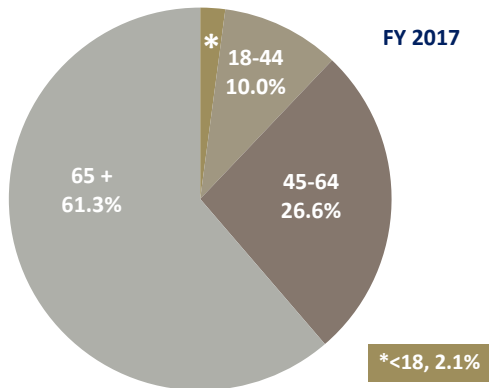
Notes: Readmission rates are for patients age 18 and older. There is no priority to the conditions. Payments were estimated by applying the average Medicare fee-for-service payment (2015 data) to all cases by case mix (MS-DRG).

Outcomes for CDI patients have improved in recent years. The in-hospital mortality rate for patients with a CDI dropped 42% since FY 2008. Other outcomes (readmissions and average length of stay) also improved.

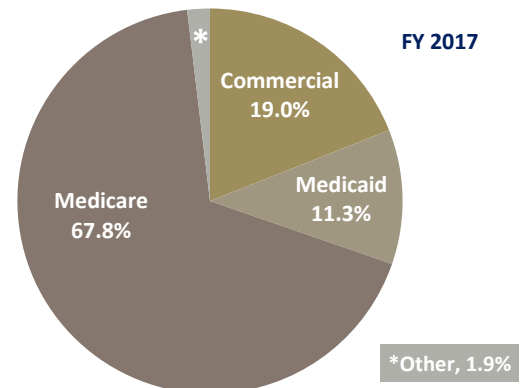
Hospitalized Patients with CDI				All Hospitalizations		
	FY 2008	FY 2017	Percent Decrease	FY 2008	FY 2017	Percent Decrease
In-hospital Mortality	9.7%	5.7%	↓ 42%	2.0%	1.9%	↓ 7%
30-day Readmissions	32.9%	28.2%	↓ 14%	15.3%	14.6%	↓ 4%
Average Length of Stay	8 days	6 days	↓ 25%	3 days	3 days	No change

Note: Readmission rates are for patients age 18 and older.

### CDI Hospitalizations by Age Category



### CDI Hospitalizations by Payer



### Outcomes for Patients with CDI by Age Category

Age Category	Number of CDI Cases	In-Hospital Mortality Rate	30-Day Readmission Rate	Average Length of Stay (in days)
<18	372	1.9%	<i>Not Reported</i>	5
18-44	1,751	2.5%	27.6%	5
45-64	4,654	4.4%	29.0%	6
65+	10,718	6.9%	27.9%	6
Total	17,495	5.7%	28.2%	6

Note: Readmission rates are not available for pediatric patients.

### Of the 17,495 CDI hospital admissions in FY 2017...

- **30%** (5,330 patients) had CDI as their principal diagnosis; that is, CDI was the principal reason the patient was admitted.
- **50%** (8,762 patients) were admitted to the hospital for another condition but also *had a CDI at the time of admission*.
- **20%** (3,403 patients) were admitted to the hospital for another condition but *developed a CDI after being admitted to the hospital*. (See sidebar at right for more information on these patients.)



Hospital stays where CDI was the principal reason for the admission (30% of all CDI cases) amounted to an estimated \$41.6 million in hospital payments in FY 2017.

*Payments were estimated by applying the average Medicare fee-for-service payment (2015 data) to all cases by case mix (MS-DRG).*

### CDI and Sepsis

Recent research suggests that care provided to sepsis patients, including the use of antibiotics, may lead to higher CDI rates.\* The CDI data used for this brief showed...

- About 10.4% of the CDI patients had a previous hospital stay with a sepsis diagnosis (within the previous 90 days).
- About 31.3% of patients with a secondary diagnosis of CDI had sepsis as a principal diagnosis—the most common principal diagnosis among these patients.
- About 4.4% of patients with a CDI were readmitted to the hospital within 30 days specifically for sepsis—the most common reason for readmission.

\* Hiensch R, Poeran J, Saunders-Hao P, et al. Impact of an electronic sepsis initiative on antibiotic use and health care facility-onset *Clostridium difficile* infection rates. *American Journal of Infection Control*. 2017;45(10):1091-1100. [doi.org/10.1016/j.ajic.2017.04.005](https://doi.org/10.1016/j.ajic.2017.04.005)

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*Patients who developed a CDI during their hospital stay had a higher mortality rate (8.5%), stayed in the hospital longer (average of 13 days) and incurred a higher average payment (\$25,709) when compared to patients who had a CDI when they were admitted.*

*Patients who had a CDI when they were admitted had a mortality rate of 5.0%, stayed in the hospital an average of 5 days and incurred an average payment of \$11,061.*

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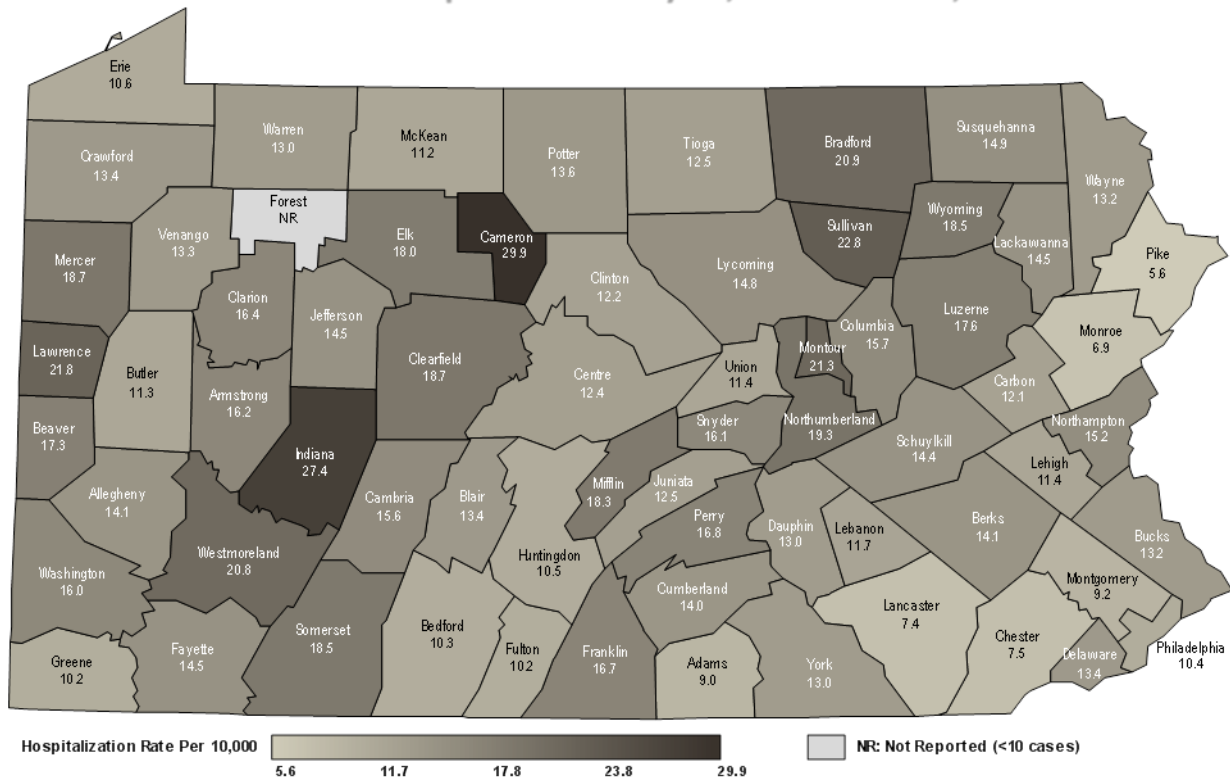
### About PHC4

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. PHC4 is governed by a 25-member board of directors, representing business, labor, consumers, health care providers, insurers and state government.

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## Number of CDI Hospitalizations by 10,000 Residents, FY 2017



### Population-based Rates

Higher rates for some counties might be dependent on larger numbers of residents with high risk characteristics (e.g., factors related to age and gender). County rates were not adjusted for these population differences so that important effects of these patient characteristics were not masked by such adjustment.

**In general, population-based data showed higher rates of CDI hospitalizations among older and female residents:**

- Statewide, there were 13.0 CDI hospital admissions per 10,000 Pennsylvania residents in FY 2017.
- The rate was 46.3 per 10,000 for residents age 65 and older.
- The rate was 14.5 for females and 11.4 for males.
- For white (non-Hispanic) residents, the rate was 14.2 per 10,000. The rates for black (non-Hispanic) and Hispanic residents were 12.5 and 3.7, respectively.

*Rate Calculations.* Rates include Pennsylvania residents of all ages and were calculated using PHC4 hospital admission data and US Census Bureau population estimates.

## CDI Hospitalizations by County, FY 2008 and FY 2017

Between FY 2008 and FY 2017, the statewide rate of CDI hospitalizations decreased from 14.4 to 13.0 per 10,000 Pennsylvania residents. The table below displays the county rates for FY 2008 and FY 2017.

	FY 2008		FY 2017	
	Total Number of CDI Hospitalizations	Hospitalization Rate per 10,000 Residents	Total Number of CDI Hospitalizations	Hospitalization Rate per 10,000 Residents
Adams	87	8.5	92	9.0
Allegheny	3,172	26.0	1,728	14.1
Armstrong	115	16.8	108	16.2
Beaver	252	14.6	290	17.3
Bedford	87	17.5	50	10.3
Berks	418	10.3	583	14.1
Blair	152	12.1	167	13.4
Bradford	90	14.7	127	20.9
Bucks	690	11.1	828	13.2
Butler	299	16.3	212	11.3
Cambria	200	13.8	210	15.6
Cameron	14	26.6	14	29.9
Carbon	64	10.1	77	12.1
Centre	117	8.0	200	12.4
Chester	539	10.9	386	7.5
Clarion	48	12.1	63	16.4
Clearfield	90	10.9	151	18.7
Clinton	36	9.7	48	12.2
Columbia	62	9.5	104	15.7
Crawford	76	8.6	116	13.4
Cumberland	389	16.9	349	14.0
Dauphin	395	15.3	356	13.0
Delaware	961	17.3	756	13.4
Elk	47	14.6	55	18.0
Erie	220	7.9	292	10.6
Fayette	245	17.1	192	14.5
Forest	NR	NR	NR	NR
Franklin	161	11.2	257	16.7
Fulton	13	8.7	15	10.2
Greene	20	5.1	38	10.2
Huntingdon	46	10.1	48	10.5
Indiana	141	16.1	237	27.4

	FY 2008		FY 2017	
	Total Number of CDI Hospitalizations	Hospitalization Rate per 10,000 Residents	Total Number of CDI Hospitalizations	Hospitalization Rate per 10,000 Residents
Jefferson	32	7.1	64	14.5
Juniata	34	14.7	31	12.5
Lackawanna	218	10.4	306	14.5
Lancaster	325	6.5	399	7.4
Lawrence	185	20.4	190	21.8
Lebanon	121	9.4	162	11.7
Lehigh	327	9.6	414	11.4
Luzerne	371	11.9	557	17.6
Lycoming	73	6.3	171	14.8
McKean	32	7.4	47	11.2
Mercer	204	17.5	211	18.7
Mifflin	72	15.7	85	18.3
Monroe	110	6.6	114	6.9
Montgomery	883	11.3	752	9.2
Montour	33	18.6	39	21.3
Northampton	495	16.7	459	15.2
Northumberland	158	17.3	179	19.3
Perry	66	14.6	77	16.8
Philadelphia	2,776	18.0	1,636	10.4
Pike	14	2.3	31	5.6
Potter	12	7.1	23	13.6
Schuylkill	235	16.0	207	14.4
Snyder	38	9.9	65	16.1
Somerset	90	11.6	139	18.5
Sullivan	11	17.9	14	22.8
Susquehanna	38	9.3	61	14.9
Tioga	40	9.8	52	12.5
Union	34	7.8	52	11.4
Venango	99	18.2	70	13.3
Warren	47	11.5	52	13.0
Washington	303	14.7	333	16.0
Wayne	45	8.8	67	13.2
Westmoreland	867	23.9	739	20.8
Wyoming	31	11.1	51	18.5
York	420	9.9	576	13.0

NR: Not Reported. Fewer than 10 hospitalizations.

