PA Health Care Cost Containment Council

PHC4 Research Briefs

Mechanical Ventilation in PA Hospitals—Pre-COVID-19

The COVID-19 pandemic has highlighted the important role mechanical ventilators play in the management of severe respiratory illness. A mechanical ventilator is a machine that does the work of breathing for a patient by delivering oxygen into the lungs and helping to remove carbon dioxide. Mechanical ventilators may be used to treat critical illnesses such as acute respiratory failure, sepsis and severe pneumonia or in conditions where a patient can no longer safely breathe independently (e.g., drug overdose). PHC4 examined this important life-saving treatment modality to serve as a baseline for future analyses on hospitalizations involving the novel coronavirus responsible for the infectious respiratory illness seen during the COVID-19 pandemic. This brief includes hospitalizations involving a mechanical ventilator for patients discharged from Pennsylvania general acute care hospitals in fiscal year (FY) 2019: July 1, 2018 through June 30, 2019.

- There were **46,257** hospitalizations involving mechanical ventilation in FY 2019 (**nearly 3%** of all hospitalizations that year).

- Hospitalizations involving mechanical ventilation occur most often for adult patients with critical illnesses such as acute respiratory failure, sepsis and severe pneumonia. For patients less than age 18, mechanical ventilation is used most often to treat premature or low birth weight newborns.

Hospitalization Rates Involving Mechanical Ventilation per 10,000 Pennsylvania Residents
Statewide Rate: 33.4

In general, population-based data showed higher hospitalization rates* involving mechanical ventilation among older residents, black (non-Hispanic) residents, residents living in higher poverty areas and male residents. These characteristics are similar to those believed to be at higher risk of developing serious illness from COVID-19.

Age

Age less than 18 .... 14.2
Age 18-44 .... 13.6
Age 45-64 .... 39.2
Age 65-84 .... 82.0
Age 85 and older 91.1

Race/Ethnicity

Black (non-Hispanic) 53.2
White (non-Hispanic) 31.7
Hispanic 16.8

Poverty[†]

High Poverty.................... 49.6
Low Poverty 26.8

Female/Male

Male 37.5
Female 29.4

* Rates are based on Pennsylvania residents only (42,760 hospitalizations or 92% of all mechanical ventilation cases) and US Census Bureau data.

[†] High Poverty: Residents living in areas where 25% or more of the population lives in poverty. Low Poverty: Residents living in areas with <10% of the population living in poverty (2018 US Census Bureau estimates at the zip code level).

- Patients on mechanical ventilation stayed in the hospital an average of **12.6 days** compared to an average of **4.6 days** for all other patients.

- The in-hospital mortality rate for patients on mechanical ventilation was **25.9%** compared to the rate of **1.1%** for all other patients.

- **34.1%** of patients on mechanical ventilation were transferred to skilled nursing, rehab, long-term care, or other acute care facilities after discharge from the hospital compared to **16.7%** for all other patients.

Mechanical Ventilation and Infectious Pneumonia

Approximately **23.7%** of the adult patients on mechanical ventilation had, at the time of admission, a diagnosis of infectious pneumonia—an infection of one or both lungs caused by organisms such as bacteria and viruses. The novel coronavirus responsible for COVID-19 can also infect the lungs and cause pneumonia and acute respiratory disease. Future analysis comparing the rates of mechanical ventilator use for patients with *infectious pneumonia* versus those with *COVID-19 related pneumonia* can provide insight into the severity of illness associated with each type of pneumonia.

- **93.9%** of adult patients on mechanical ventilation with a diagnosis of infectious pneumonia had at least one serious underlying condition (e.g., heart failure, compromised immune system, chronic lung diseases, etc.) with **73.9%** of these patients having more than one serious underlying condition—information that will be important in future COVID-19 analysis as patients with these conditions are thought to be at greater risk of developing a more severe case of COVID-19 related pneumonia.

- **26.7%** of adult patients on mechanical ventilation with a diagnosis of infectious pneumonia died in the hospital.

- **12.5** days was the average length of stay for these hospitalizations.

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 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

Hospitalizations Involving Mechanical Ventilation by County, FY 2019

Rates are based on Pennsylvania residents only (42,760 hospitalizations or 92% of all mechanical ventilation cases).

	FY 2019			FY 2019	
	Total Number of Hospitalizations	Rate per 10,000 Residents		Total Number of Hospitalizations	Rate per 10,000 Residents
Statewide	42,760	33.4	Juniata	63	25.5
Adams	272	26.5	Lackawanna	828	39.3
Allegheny	3,821	31.4	Lancaster	1,214	22.3
Armstrong	212	32.5	Lawrence	353	41.0
Beaver	675	41.0	Lebanon	438	31.0
Bedford	163	33.8	Lehigh	920	25.0
Berks	1,039	24.7	Luzerne	1,429	45.0
Blair	542	44.2	Lycoming	364	32.0
Bradford	163	26.8	McKean	106	25.9
Bucks	1,971	31.4	Mercer	429	38.8
Butler	434	23.1	Mifflin	143	30.9
Cambria	630	47.8	Monroe	572	33.7
Cameron	35	77.9	Montgomery	2,521	30.4
Carbon	249	38.8	Montour	63	34.5
Centre	252	15.5	Northampton	912	29.9
Chester	959	18.4	Northumberland	326	35.8
Clarion	122	31.5	Perry	139	30.1
Clearfield	315	39.7	Philadelphia	7,564	47.7
Clinton	96	24.8	Pike	109	19.5
Columbia	238	36.4	Potter	53	31.9
Crawford	319	37.5	Schuylkill	614	43.2
Cumberland	743	29.6	Snyder	131	32.3
Dauphin	907	32.7	Somerset	245	33.1
Delaware	1,919	34.0	Sullivan	28	46.1
Elk	108	35.8	Susquehanna	75	18.5
Erie	1,071	39.4	Tioga	111	27.2
Fayette	579	44.4	Union	88	19.6
Forest	17	23.4	Venango	187	36.5
Franklin	496	32.0	Warren	118	29.9
Fulton	48	33.1	Washington	681	32.8
Greene	78	21.4	Wayne	154	30.0
Huntingdon	105	23.2	Westmoreland	1,431	40.8
Indiana	299	35.4	Wyoming	108	39.9
Jefferson	178	40.8	York	1,188	26.5