



MRSA in Pennsylvania Hospitals

As part of PHC4's ongoing efforts to examine issues related to infections, this Research Brief highlights the incidence of Methicillin-resistant *Staphylococcus aureus* (MRSA) in Pennsylvania hospitalizations for 2004. It contains important information for patients and health care workers and raises awareness about the patient safety and economic consequences.

Staphylococcus aureus is a type of bacteria that frequently inhabits the skin or nostrils of healthy people and can cause minor skin infections.¹ These minor infections occur when the bacteria enter through cuts or abrasions in the skin. However, *Staphylococcus aureus* can also have major health consequences, such as pneumonia, infections of the blood, and surgical site infections.

MRSA is a more serious form of bacteria that is resistant to commonly used antibiotics called beta-lactams, including methicillin and oxacillin.² The risk of acquiring a MRSA infection is greatest among people treated in the health care system, but it can be acquired in the community.³ Individuals with community-acquired MRSA have no recent history of hospitalization or surgical procedure. Most community-acquired MRSA infections are skin-related infections and occur in younger, healthier age groups.¹ ***This Research Brief does not distinguish between community-acquired and hospital-acquired MRSA infections.***

Hospitalizations with MRSA

In 2004, there were 13,722 hospitalizations in Pennsylvania in which the patient had a MRSA

infection – a rate of 7.4 per every 1,000 inpatient hospitalizations.

About half (50.9%) of all hospitalizations with MRSA were among patients with respiratory diseases, disorders of the circulatory system, and infectious and parasitic diseases.

Hospitalizations with MRSA by Body System, 2004

Body System	Number of Hospitalizations	Percent of Hospitalizations
Respiratory System	2,698	19.7
Infectious & Parasitic Diseases	2,138	15.6
Circulatory System	2,123	15.5
Skin, Subcutaneous Tissue & Breast	2,075	15.1
Musculoskeletal System	1,362	9.9
Digestive System	711	5.2
Kidney & Urinary System	660	4.8
Nervous System	486	3.5
Endocrine System	422	3.1
Injuries, Poisonings & Toxic Effects of Drugs	244	1.8
Other	803	5.9
Total	13,722	100

Compared to patients without MRSA, patients with MRSA were four times as likely to die, had hospital stays more than two and a half times longer, and were charged three times as much for their hospitalization.

The following tables illustrate characteristics of hospitalizations with MRSA compared to hospitalizations without a MRSA infection.

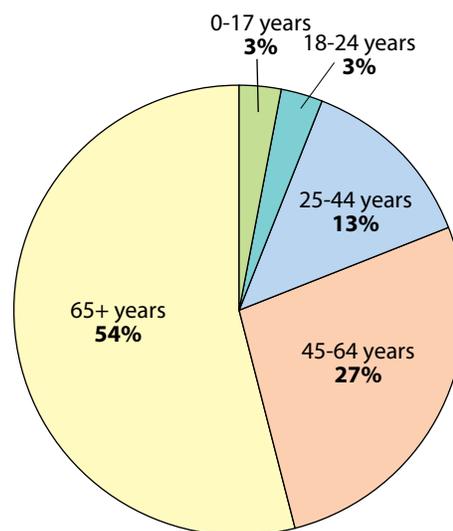
Pennsylvania Hospitalization Summary, 2004

	Number of Hospitalizations	Average Length of Stay in Days	Average Charge	Percent Died
Non-MRSA	1,853,208	4.7	\$28,711	2.1
MRSA	13,722	12.6	\$87,990	8.9

Differences in Age, Geography, and Hospital Size

Most hospitalizations with MRSA in Pennsylvania were for patients age 65 and older (9.7 per 1,000), followed by those in the 45-64 age category (8.7 per 1,000). Age categories 25-44 (5.2 per 1,000), 18-24 (3.8 per 1,000) and 0-17 excluding newborns (4.0 per 1,000) had lower rates.

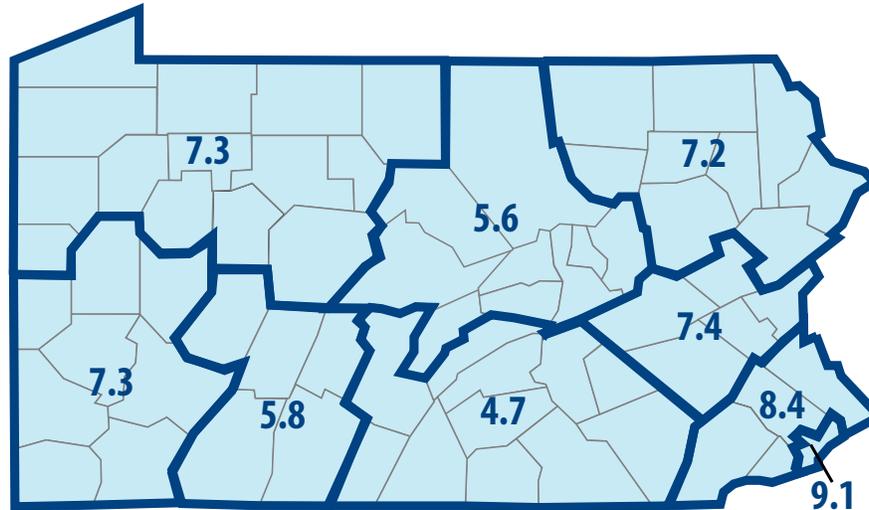
Hospitalizations with MRSA by Age Group, 2004



Pennsylvania Hospitalization Summary by Condition, 2004

	Number of Hospitalizations	Average Length of Stay in Days	Average Charge	Percent Died
Congestive Heart Failure w/ MRSA	300	11.2	\$63,170	12.7
Congestive Heart Failure w/o MRSA	59,902	5.2	\$24,394	3.4
Chronic Obstructive Pulmonary Disease w/ MRSA	168	9.1	\$38,155	6.6
Chronic Obstructive Pulmonary Disease w/o MRSA	24,412	4.7	\$18,623	1.5
Renal Failure w/ MRSA	133	11.1	\$66,265	12.8
Renal Failure w/o MRSA	16,338	6.2	\$30,798	7.2
Pneumonia w/ MRSA	933	10.2	\$43,006	7.2
Pneumonia w/o MRSA	46,606	5.3	\$20,305	3.6
Septicemia w/ MRSA	915	10.8	\$56,761	22.5
Septicemia w/o MRSA	16,610	6.9	\$33,122	18.4
Kidney & Urinary Tract Infections w/ MRSA	317	6.7	\$24,600	1.9
Kidney & Urinary Tract Infections w/o MRSA	21,542	4.4	\$18,386	1.3
Respiratory Failure with Ventilation w/ MRSA	261	15.8	\$126,841	32.2
Respiratory Failure with Ventilation w/o MRSA	4,871	9.6	\$74,665	26.6

MRSA Rate per 1,000 Hospitalizations by Region, 2004



Geographic differences in the rate of MRSA-related hospital discharges have been found, suggesting that some areas may be more likely to have established underlying conditions or risk factors (e.g., smoking, diabetes, and contact with the health care system) for MRSA infection.^{4,5}

The Southeastern Pennsylvania region (Bucks, Chester, Delaware, Montgomery, and Philadelphia Counties) had the highest MRSA infection rate.

The Southcentral Pennsylvania region (Adams, Cumberland, Dauphin, Franklin, Fulton, Huntingdon, Juniata, Lancaster, Lebanon, Perry, and York Counties) had the lowest MRSA infection rate.

In 2004, the MRSA infection rate was similar for hospitals of all sizes.

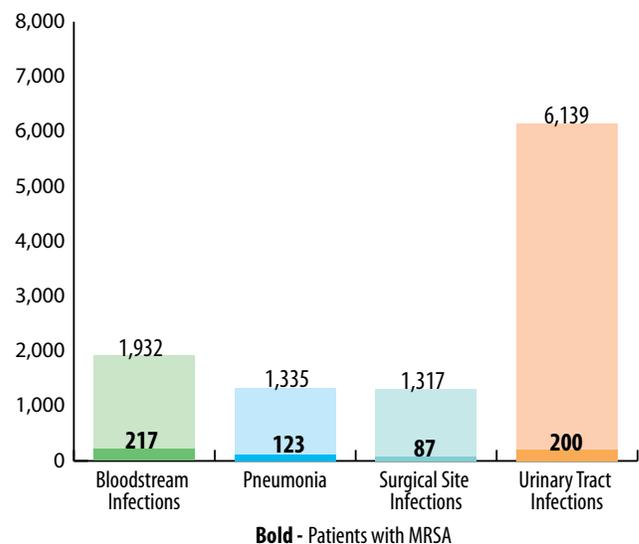
Patients with a Hospital-acquired Infection

Recent PHC4 Research Briefs have highlighted hospital-acquired infections in Pennsylvania. These briefs have focused on four types of hospital-acquired infections (central line-associated bloodstream infections, ventilator-associated pneumonia, surgical site infections, and indwelling catheter-associated urinary tract infections), some of which may be linked to MRSA.

Of the 1,932 patients in 2004 identified by hospitals as having hospital-acquired bloodstream infections, 11.2% (217) had MRSA. Of the 1,335 patients with hospital-acquired pneumonia, 9.2% (123) had MRSA. Of the 1,317 patients with hospital-acquired surgical site infections, 6.6% (87) had MRSA. Finally, of the 6,139 patients with hospital-acquired urinary tract infections, 3.3% (200) had MRSA.

More information about hospital-acquired infections is available at: www.phc4.org

Patients with Hospital-acquired Infections, 2004



References

1. CDC http://www.cdc.gov/ncidod/dhqp/ar_mrsa_ca_clinicians.html Accessed May 23, 2006.
2. Panlilio AL, Culver DH, Gaynes RP et al. Methicillin-resistant *Staphylococcus aureus* in U.S. hospitals, 1975-1991. *Infect Control Hosp Epidemiol.* 1992; 13:582-586.
3. Naimi TS, LeDell KH, Como-Sabetti K, et al. Comparison of Community- and Health Care-Associated Methicillin-Resistant *Staphylococcus aureus* Infection. *JAMA.* 2003; 290(10):2976-2984.
4. Fridkin SK, Hageman JC, Morrison M, Sanza LT, et al. Methicillin-resistant *Staphylococcus aureus* disease in three communities. *NEJM.* 2005; 352(14):1436-1444.
5. Kuehnert MJ, Hill HA, Kupronis BA, et al. Methicillin-resistant-*Staphylococcus aureus* hospitalizations, United States. *Emerging Infectious Diseases.* 2005; 11(6):868-872.



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The Pennsylvania Health Care Cost Containment Council (PHC4) periodically releases *Research Briefs* on health care topics relevant to public policy interest.

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