

Trends in Methicillin-resistant *Staphylococcus aureus* (MRSA) in Illinois based on Hospital Discharge Data, 2009-2015

Methicillin-resistant *Staphylococcus aureus* (MRSA) is a type of bacteria that is resistant to certain antibiotics. MRSA usually causes infections of the skin, but also can occur in other tissues and organs of the body, with serious complications. The bacteria can spread among people through direct contact with a person's infected area, sharing of towels or razors that have come in contact with an infection, or from touching surfaces that have been contaminated by an infection. The infection can be difficult to treat due to its resistance to certain antibiotics.

This section presents information about MRSA from the Illinois Hospital Discharge Dataset for 2009-2015, with emphasis on 2015. The Hospital Discharge Dataset identifies hospitalized patients with MRSA infections that are acquired in the community, as well as infections acquired during hospitalization. The primary utility of the dataset is to follow overall trends in the burden of MRSA in Illinois hospitals. These data are routinely collected and provided to the Illinois Department of Public Health for all acute care hospitals in Illinois. The unit of analysis is the hospital discharge, not the person or patient.

The data presented in this section should be interpreted with caution. Hospital discharge data are collected for billing, rather than disease surveillance. A 2007 study in an Illinois hospital found that only 31 percent of confirmed MRSA cases were identified using the first nine diagnosis codes from the Hospital Discharge Dataset (Schaefer, SHEA Annual Scientific Meeting, 2008). Through 2007, only the first nine diagnosis codes were available to the Illinois Department of Public Health. Beginning in 2008, the Department had access to 25 diagnosis codes.

In previous years, the ICD-9 diagnosis code V09.0 (Infection with microorganisms resistant to penicillins) was used to select cases for the Department's annual MRSA report. However, in 2008, new codes were added for MRSA infection and colonization. The following ICD-9 diagnosis codes, appearing anywhere in the list of discharge diagnoses, were used to select cases for this report:

- 038.12 – MRSA septicemia
- 041.12 – MRSA in conditions classified elsewhere and of unspecified site (MRSA other infection)
- 482.42 – Pneumonia due to MRSA (MRSA pneumonia)
- V02.54 – Carrier or suspected carrier of MRSA

In the fourth quarter of 2015 the International Classification of Diseases 10th Revision (ICD 10) was implemented, replacing ICD 9 and changing coding once again. For the purposes of this report, for the first 3 quarters of 2015 ICD9 codes (03812, 48242, 04112, V0254) were used. For fourth quarter 2015 ICD 10 codes (J15212, Z22322, A4102, A4902, B9562) were used.

Because of the change in coding, only comparisons from 2009 are made in this report. For more information on MRSA in Illinois hospitals during 2002-2008, see 2008's report ([MRSA in Illinois Hospitals, 2008](#)).

MRSA Trends, 2009 - 2015

The rate of MRSA infections is calculated by dividing the number of MRSA cases in a given year by the total number of discharges for that year.

Table 1 shows MRSA infections per 1,000 discharges in Illinois for the years 2009 - 2015. Overall, MRSA rates among patients at Illinois hospitals during this time period decreased from 16.27 per 1,000 discharges to 11.82 per 1,000 discharges. During 2015, the last year for which data are available for Illinois, there were 17,578 MRSA infections among 1,487,676 discharges; approximately 1.18 percent of all hospital discharges had diagnosis codes indicating MRSA infection.

Table 1. Number of MRSA Infections per 1,000 hospital discharges, 2009 - 2015

Year	Total number of discharges	Total number of MRSA discharges	Number of MRSA discharges per 1,000 discharges
2009	1,668,396	27,153	16.27
2010	1,644,072	25,687	15.62
2011	1,610,588	24,480	15.20
2012	1,571,693	22,301	14.19
2013	1,500,708	19,881	13.25
2014	1,489,391	18,860	12.66
2015	1,487,676	17,578	11.82

Figure 1. Number of MRSA Infections per 1,000 hospital discharges in Illinois, 2009 - 2015

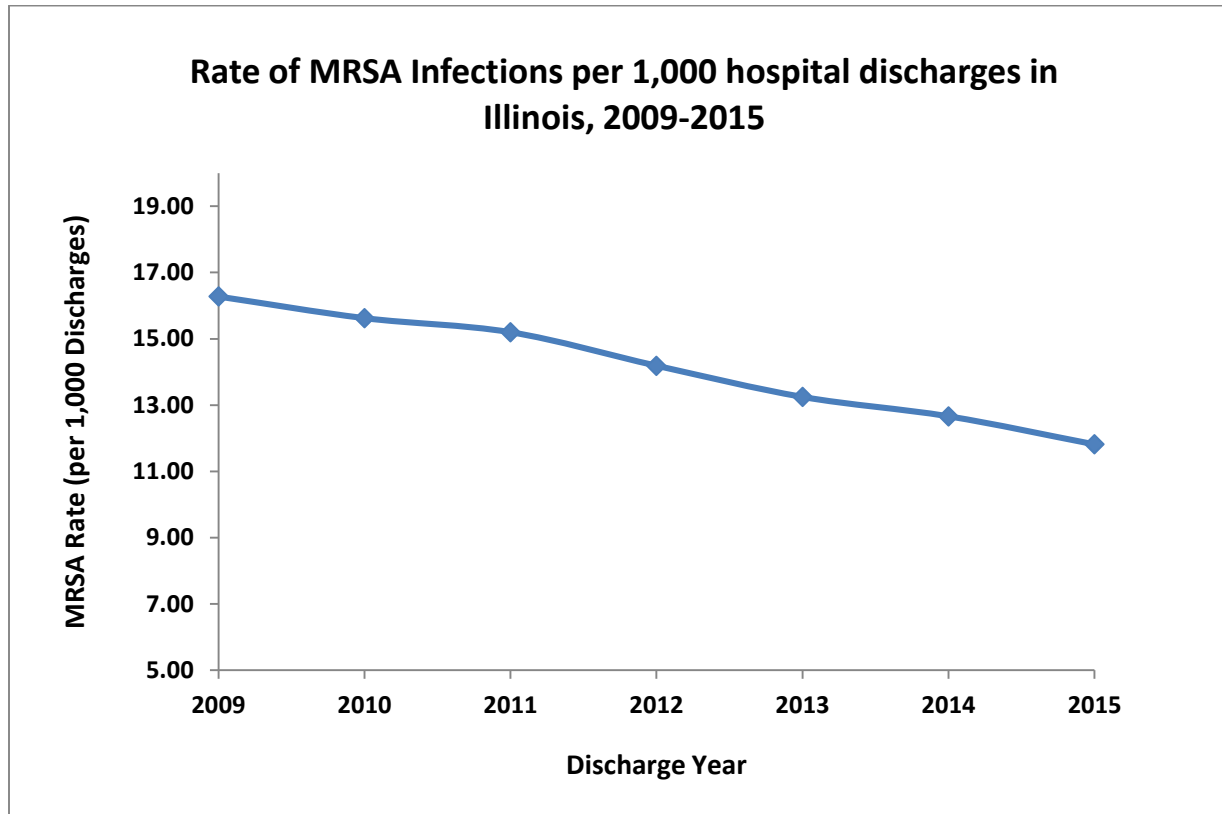


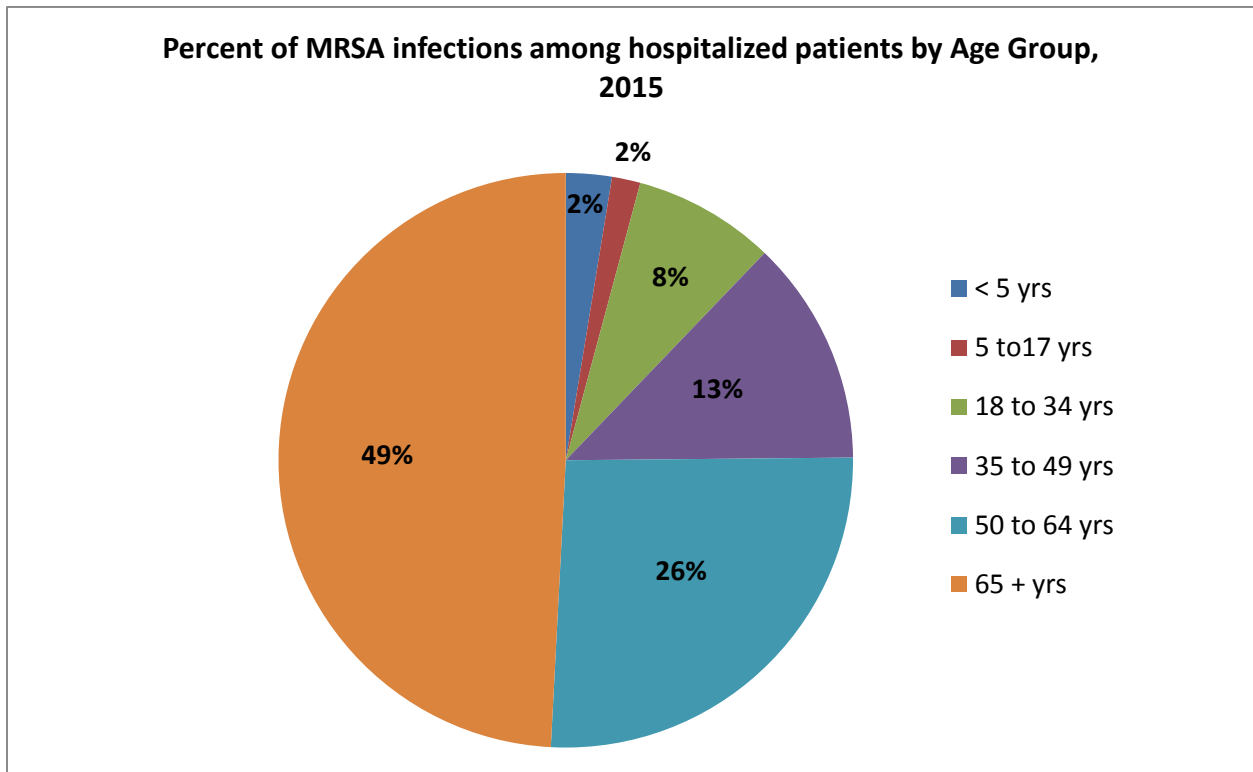
Figure 1 shows the annual MRSA rates (per 1,000 hospital discharges) between 2009 and 2015, and illustrates the steady decrease in MRSA rates from 2009 through 2015.

The following Tables and Figures represent the Age group and Sex distributions of MRSA infections for the years 2009 - 2015. Table 2 shows the number and proportion (percent) of MRSA infections stratified by age group. The distribution of MRSA discharges across the age categories remained stable over time. Children and teens under 18 years of age had the lowest burden of MRSA infections among hospitalized patients, and the greatest burden of MRSA infections occurred among older individuals, especially those older than 65. Throughout 2009 -2015, approximately half of all MRSA infections occurred among individuals aged 65 and older. This information is highlighted in Table 2 and Figure 2.

Table 2. Age distribution of MRSA infections among hospitalized patients, 2009 - 2015

Discharge Year	Age group Number of MRSA cases (Percent)					
	0-4 years	5-17 years	18-34 years	35-49 years	50-64 years	65 years and older
2009	882 (3.2)	577 (2.1)	2,252 (8.3)	3,712 (13.7)	5,973 (22.0)	13,757 (50.7)
2010	800 (3.1)	467 (1.8)	2,173 (8.5)	3,475 (13.5)	5,946 (23.1)	12,826 (49.9)
2011	723 (3.0)	414 (1.7)	2,031 (8.3)	3,183 (13.0)	5,824 (23.8)	12,305 (50.3)
2012	693 (3.1)	321 (1.4)	1,829 (8.2)	2,819 (12.6)	5,385 (24.1)	11,254 (50.5)
2013	660 (3.3)	325 (1.6)	1,656 (8.3)	2,496 (12.6)	4,936 (24.8)	9,808 (49.3)
2014	555 (2.9)	317 (1.7)	1,517 (8.0)	2,372 (12.6)	4,767 (25.3)	9,332 (49.5)
2015	453 (2.58)	282 (1.6)	1,404 (7.99)	2,229 (12.68)	4,567 (25.98)	8,643 (49.17)

Figure 2. Age distribution of MRSA infections among hospitalized patients, 2015



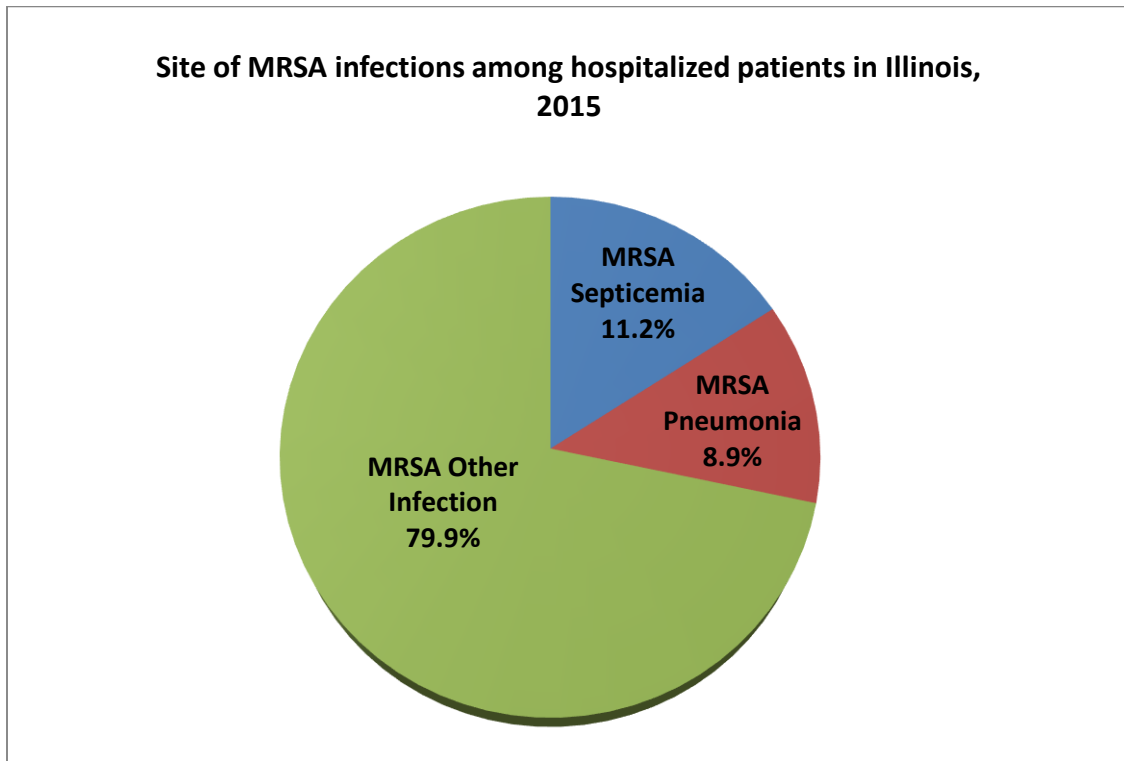
Tables 3 shows the sex distribution of patients with hospital discharges coded for MRSA infection in Illinois. The sex distribution of MRSA cases remained relatively stable during this period (2009-2015), with slightly more than half of infections occurring in men.

Table 3. Sex distribution of MRSA infections among hospitalized patients, 2009 - 2015

Discharge Year	Patient Sex Number of Cases (Percent)	
	Male	Female
2009	13,674 (50.4)	13,479 (49.6)
2010	13,243 (51.6)	12,442 (48.4)
2011	12,559 (51.3)	11,921 (48.7)
2012	11,564 (51.9)	10,736 (48.1)
2013	10,248 (51.5)	9,632 (48.4)
2014	9,827 (52.1)	9,033 (47.9)
2015	9131 (51.95)	8447 (48.05)

Figure 3 shows that the majority of these infections (79.9 percent) were coded as MRSA other infection (041.12), while 11.2 percent were coded as MRSA septicemia and 8.9 percent as MRSA pneumonia. Discharges for which the carrier code (V02.54) is the only code for MRSA are not included in this section.

Figure 3. Site of MRSA infections among hospitalized patients in Illinois, 2015



Conclusions

This report summarizes information about MRSA in Illinois hospitals from 2009 - 2015. The burden of MRSA in Illinois hospitals is substantial. While data generated from the Illinois Hospital Discharge Dataset should be interpreted with caution, these findings highlight the importance of devoting resources to infection control and prevention activities aimed at decreasing transmission of MRSA in hospitals.

To have a better understanding of the burden of MRSA in Illinois hospitals, it is necessary to distinguish between health care-facility onset and community-onset cases. Historically, discharge data have not been able to discern where a disease or condition was acquired. Beginning in 2008, hospitals were required to include a present on admission (POA) code with each diagnostic code. However, no published studies have evaluated the validity of the POA variable in hospital discharge data with respect to health care-associated infections such as *C. difficile* and MRSA.

Reliance on administrative databases, such as the Illinois Hospital Discharge Dataset, to assess trends in health care-associated infections, detect outbreaks, and provide inter-facility comparisons is not ideal. The Centers for Medicare and Medicaid Services has mandated hospital surveillance of MRSA using the Centers for Disease Control and Prevention National Healthcare Safety Network (NHSN) surveillance system as part of the hospital inpatient quality reporting initiative.

As of January 2012, Illinois hospitals began reporting MRSA using NHSN. This system gathers data that is based on laboratory data rather than diagnosis code. It distinguishes between health care-facility onset, health care facility-associated and community onset MRSA cases, based on when a positive laboratory result occurs in relation to when a patient receives care in a given reporting facility. This more specific information can be used to help prioritize targeted infection prevention and hospital quality improvement programs.

More information on the MRSA NHSN Surveillance Report for 2015 may be found at the Illinois Hospital Report Card website, State Reports of Current Interest:

http://www.healthcarereportcard.illinois.gov/contents/view/State_Reports_of_Current_Interest