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Trends in Methicillin-resistant *Staphylococcus aureus* (MRSA) in Illinois based on Hospital Discharge Data, 2016-2019

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 2016-2019, with emphasis on 2019. 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.

ICD-Coding for MRSA

Since 2008, the following ICD-9 diagnosis codes were used to select cases for MRSA infection and colonization:

- 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 diagnosis codes with the following:

- A41.02 – MRSA septicemia
- B95.62, A49.02 – MRSA other infection
- J15.212 – MRSA pneumonia
- Z22.322 – Carrier or suspected carrier of MRSA

For the purposes of this report, ICD9 codes were used for previous years and the first three quarters of 2015. ICD 10 codes were used for fourth quarter 2015 and beyond. For more information on MRSA in Illinois hospitals during 2002-2008, see 2008's report (MRSA in Illinois Hospitals, 2008).

MRSA Trends, 2016 - 2019

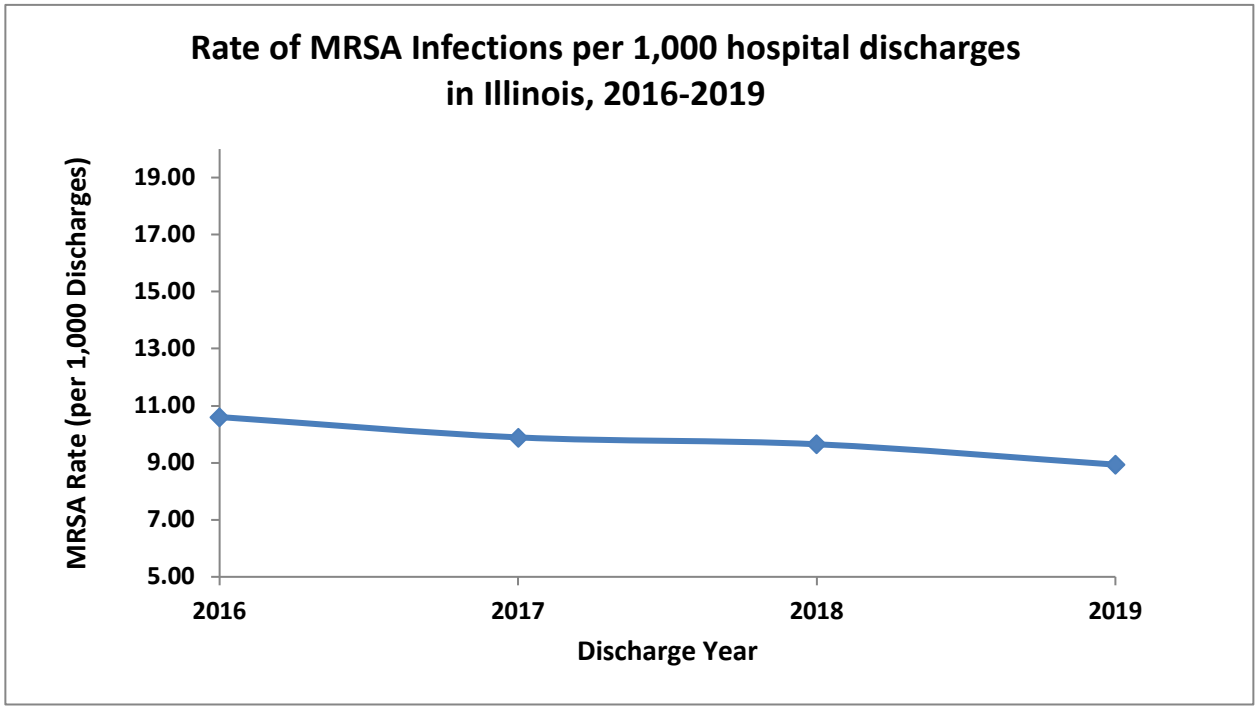
The rate of MRSA infections is calculated by dividing the number of MRSA cases in a given year by the total number of discharges for that year.

Table 1 and Figure 1 show MRSA infections per 1,000 discharges in Illinois for the years 2016 - 2019. Overall, MRSA rates among patients at Illinois hospitals during this time period decreased from 10.60 per 1,000 discharges to 8.93 per 1,000 discharges. During 2019, the most recent complete year of data available for Illinois, there were 12,711 MRSA infections among 1,422,740 discharges; approximately 0.89 percent of all hospital discharges had diagnosis codes indicating MRSA infection.

Table 1. Number of MRSA Infections per 1,000 hospital discharges, 2016 - 2019

Year	Total number of discharges	Total number of *MRSA* discharges	Number of MRSA discharges per 1,000 discharges
2016	1,464,496	15,529	10.60
2017	1,448,298	14,323	9.89
2018	1,439,905	13,893	9.65
2019	1,422,740	12,711	8.93

Figure 1. Rate of MRSA Infections, 2016-2019



Age and sex distribution of MRSA infections

The following Tables and Figures represent the Age group and Sex distributions of MRSA infections for the years 2016 - 2019. 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 2016 -2019, 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, 2016 - 2019

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
2016	409 (2.63)	212 (1.37)	1282 (8.26)	1971 (12.69)	4087 (26.32)	7568 (48.73)
2017	338 (2.36)	208 (1.45)	1163 (8.12)	1792 (12.51)	3755 (26.22)	7067 (49.34)
2018	267 (1.92)	184 (1.32)	1098 (7.90)	1820 (13.10)	3690 (26.56)	6834 (49.19)
2019	256 (2.01)	167 (1.31)	920 (7.24)	1609 (12.66)	3435 (27.02)	6324 (49.75)

Figure 2. Age distribution of MRSA infections among hospitalized patients, 2019

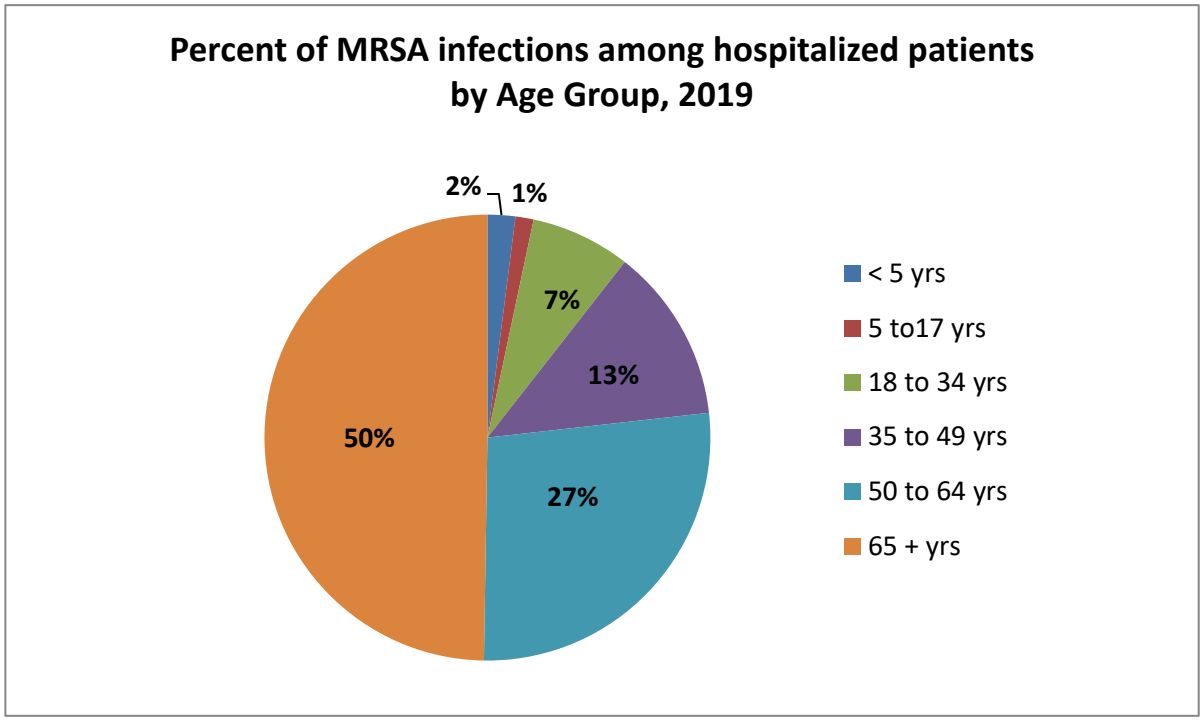


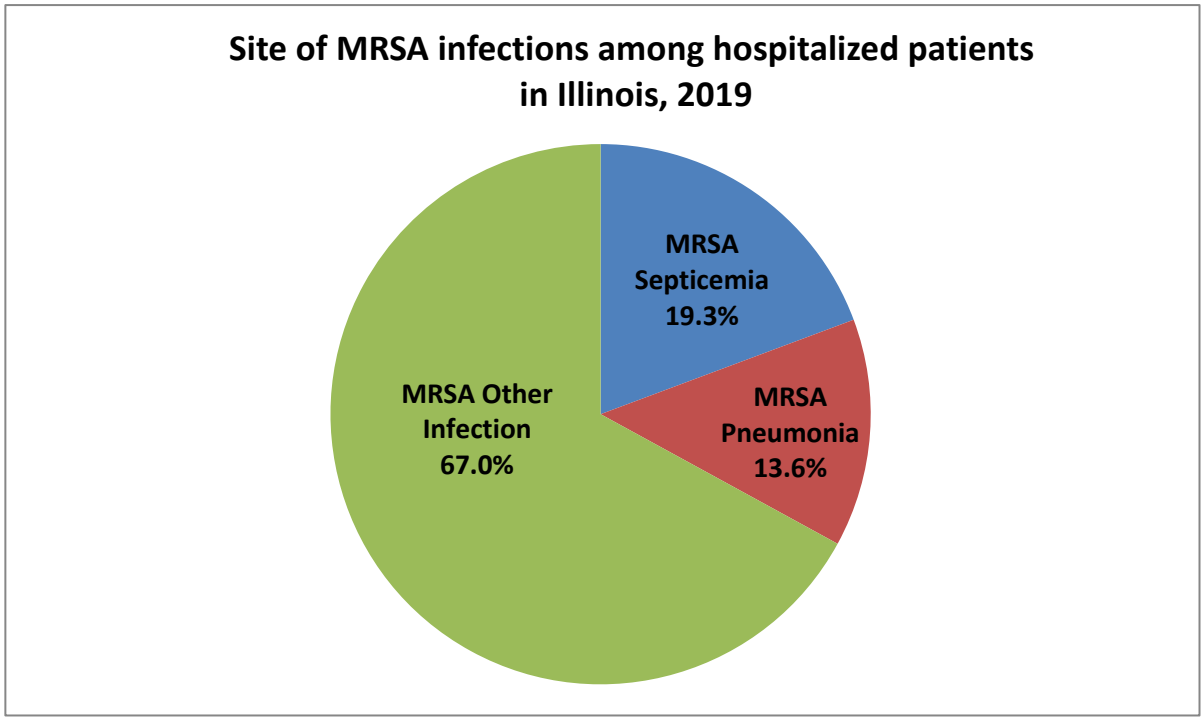
Table 3 shows the sex distribution of patients with hospital discharges coded for MRSA infection in Illinois. The sex distribution of MRSA cases remained relatively stable during this period (2016-2019), with slightly more than half of infections occurring in men.

Table 3. Sex distribution of MRSA infections among hospitalized patients, 2016 - 2019

Discharge Year	Patient Sex Number of Cases (Percent)		
	Male	Female	Unknown
2016	8305 (53.48)	7224 (46.52)	0 (0.00)
2017	7622 (53.22)	6701 (46.78)	0 (0.00)
2018	7527 (54.18)	6362 (45.79)	4 (0.03)
2019	7024 (55.26)	5681 (44.69)	6 (0.05)

Figure 3 shows that the majority of MRSA infections (67.0 percent) were coded as MRSA other infection, while 19.3 percent were coded as MRSA septicemia and 13.6 percent as MRSA pneumonia. Discharges for which carrier or suspected carrier of MRSA are not included in this section.

Figure 3. Site of MRSA infections among hospitalized patients in Illinois, 2019



Conclusions

This report summarizes information about MRSA in Illinois hospitals from 2016 - 2019. The burden of MRSA in Illinois hospitals is substantial. However, the trend of MRSA infection is steadily decreasing over time. 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 2016 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