Illinois Department of PUBLIC HEALTH

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Methicillin-resistant *Staphylococcus aureus* (MRSA) in Illinois Hospitals, 2009

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. 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). In 2009, 25 diagnosis codes were available to the Illinois Department of Public Health. We expect that some cases will be missed by this data source, and the analysis will not reflect those cases.

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. This report of 2009 data is the first report of Illinois data to use the new codes listed here:

- 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

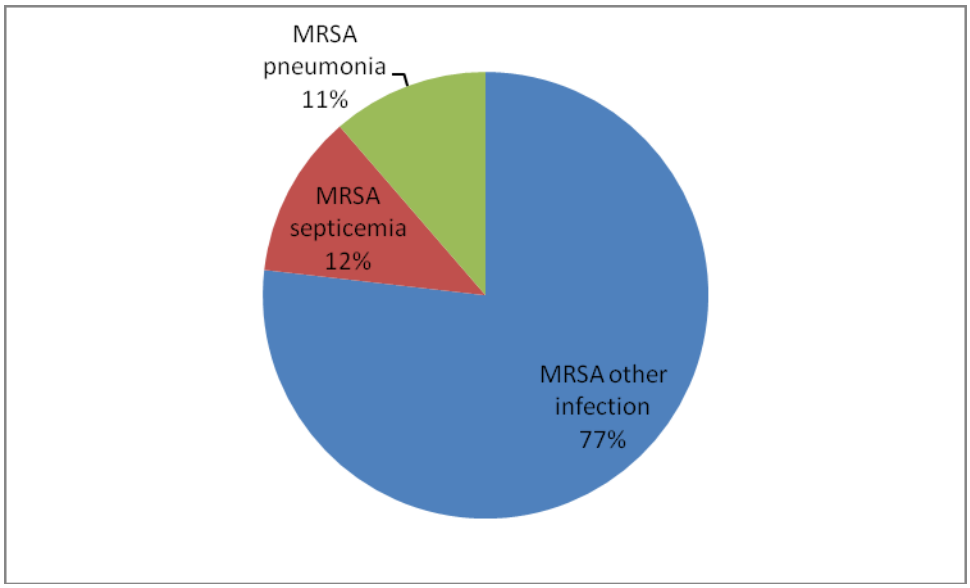
Because of the change in coding, comparisons with previous years are not made in this report. For more information on MRSA in Illinois hospitals during 2002-2008, see last year's report (MRSA in Illinois Hospitals, 2008).

MRSA Infections

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. Discharges for which the carrier code (V02.54) is the only code for MRSA are not included in this section.

During 2009, there were 19,565 MRSA infections among 1,668,396 discharges, or 11.7 MRSA infections per 1,000 discharges; 1.2 percent of all hospital discharges had diagnosis codes indicating MRSA infection. The majority of these infections (77 percent) were coded as MRSA other infection (041.12); 12 percent were coded as MRSA septicemia and 11 percent as MRSA pneumonia (Figure 1).

Figure 1. Site of MRSA infections among hospitalized patients in Illinois, 2009



Tables 1 and 2 show the sex and age distribution of patients with hospital discharges coded for MRSA infection in Illinois in 2009. Slightly more than half of infections occurred in men, and 70 percent of infections occurred in individuals aged 50 years and older.

Table 1. Sex distribution of MRSA infections among hospitalized patients in Illinois, 2009

Sex	N	Percent
Female	9,307	48
Male	10,258	52

Table 2. Age distribution of MRSA infections among hospitalized patients in Illinois, 2009

Age range (years)	N	Percent
0-4	711	4
5-17	471	2
18-34	1819	9
35-49	2916	15
50-64	4546	23
65 and older	9102	47

Beginning in 2008, 25 diagnosis codes were available to IDPH for each discharge. This report uses all 25 codes; reports of data collected before 2008 use only 9 codes.

Also beginning in 2008, a code was included with each diagnosis to indicate whether the condition was present on admission to the hospital. This code, along with the source of the admission (i.e. emergency department, non-health care facility, skilled nursing facility), the dates of previous hospital admissions, and codes indicating exposure to certain medical procedures prior to the current admission, can inform estimates of the proportions of MRSA infections in hospitalized patients that are acquired in healthcare settings.

Table 3 uses the information described above to estimate the proportions of MRSA infections acquired in different settings.

Table 3. Present on admission status and recent health care exposures for MRSA cases, 2009

Present on admission and healthcare exposures	**Frequency**	**Percent**
Infection not present on admission	1,352	6.9
Infection present on admission, with recent health care exposure documented in discharge data*	4,069	20.8
Infection present on admission, with no recent health care exposure documented in discharge data	14,051	71.8
Unavailable	93	0.5
Total	19,565	100.0

* A patient is considered to have had recent health care exposure if a previous admission is documented in the year before the current admission, if evidence of recent surgery or dialysis exists in billing codes, or if the patient was admitted from a different hospital, a skilled nursing or intermediate care facility, a health care facility, an ambulatory surgery center, or hospice, or if the source of admission is same facility, separate claim.

Conclusions

This report summarizes information about MRSA in Illinois hospitals during 2009. Comparisons with previous years were not made due to the change in coding that occurred recently. 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. The mandated use of this code, which indicates whether each diagnosis occurred before or after hospital admission, was part of the Centers for Medicare and Medicaid Services' (CMS) Hospital-Acquired Conditions Initiative, in which CMS would no longer pay hospitals extra when patients developed specified complications after admission.

Because the implementation of the POA code was part of a quality improvement strategy explicitly linking payment with healthcare outcomes, its use in epidemiological studies has not been explored. 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.

Initial analysis of the MRSA infection data for 2008, using the Illinois Hospital Discharge Dataset, revealed trends in POA coding that bring into question the accuracy and usefulness of this variable in differentiating between community-acquired infections and hospital-acquired infections. Attempts were made to refine the POA status using a coding algorithm that incorporated elements from the discharge dataset that identified the source of admission (i.e. emergency department, non-health care facility, skilled nursing facility), the dates of previous hospital admissions, and history of surgery and dialysis, which can serve as a proxy for recent health care exposure. This index is not without its limitations. Possible sources of error could be the inaccurate coding of the POA variable and/or the inaccurate or incomplete coding of the date of previous admission, which would underestimate the percentage of discharges having had an admission within the past year. Also, the source of the majority of admissions was the emergency department; it is not known whether these patients were residents of long-term care facilities prior to their emergency department visits.

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. Further study will be required to validate the POA coding. A personal health care identification number would facilitate linkage of medical records over time and across facilities – both acute and long-term care. This would help identify previous health care exposures and track infections.

A hospital-based infection surveillance program, such as the U.S. Centers for Disease Control and Prevention's National Healthcare Safety Network (NHSN), which is currently being used to track central line-associated bloodstream infections in intensive care units in all hospitals in Illinois, would provide more useful data on health care-associated infections. NHSN has the capacity to monitor MRSA rates using laboratory data.