Supplemental Material

Title: Trends in Methicillin-Resistant *Staphylococcus aureus* Bloodstream Infections using Statewide Population-based surveillance and Hospital Discharge data, Connecticut, 2010 – 2018

From our primary analysis, case counts and trends appear to be more similar between methicillin-resistant *Staphylococcus aureus* (MRSA) septicemia coding and blood cultures in later years. To speculate on the direct impact of ICD-10-CM coding transition, we further examined our analysis at a quarterly level, and discerned the trends in the ICD-9-CM and ICD-10-CM eras. The improved case counts and trends begin in 2015, however do not directly align with the ICD-10-CM transition, as shown in the Figure of MRSA BSI case counts plotted quarterly. However, a notable limitation of this analysis is assigning dates to MRSA BSI cases identified using administrative codes. Because codes are assigned at discharge, we assigned them to the quarter in which they were discharged from the hospital, compared to EIP cultures which were assigned to the quarter of their positive blood culture. Thus, at the quarterly level, it is possible that some misclassification occurs for administrative codes.

To quantify the impact of restricting our analysis to the first ten diagnosis codes, we utilized discharge data from the National Inpatient Sample and the Nationwide Inpatient Sample (NIS), Healthcare Cost and Utilization Project (HCUP), Agency for Healthcare Research and Quality to determine what proportion of MRSA septicemia codes were placed after the tenth position[1]. The NIS records up to 30 diagnosis codes per hospitalization. The number of codes reported in the NIS varies by state, with 79% of states reporting an average of 20 or more codes to the NIS from 2010 – 2016[2,3]. In 2014 (ICD-9-CM era) and 2017 (ICD-10-CM era) we found that 1.7-4.3% of MRSA septicemia codes occurred after the 10th position (Table). In order to assess the impact of this, we added the estimated percentage of additional cases to those identified by administrative codes each year. This resulted in

administrative codes identifying 20.7% fewer cases than EIP surveillance data during 2010 – 2017

(compared to the reported 23.1% without additional cases). While it would make certain years more

consistent with culture-based MRSA BSI case counts, these results show that administrative data

consistently underestimate EIP identified MRSA BSI case counts. Additionally, applying these

proportions of additional cases based on NIS data may be inappropriate, since administrative codes may

not be applied in a standardized way across hospitals.[4]

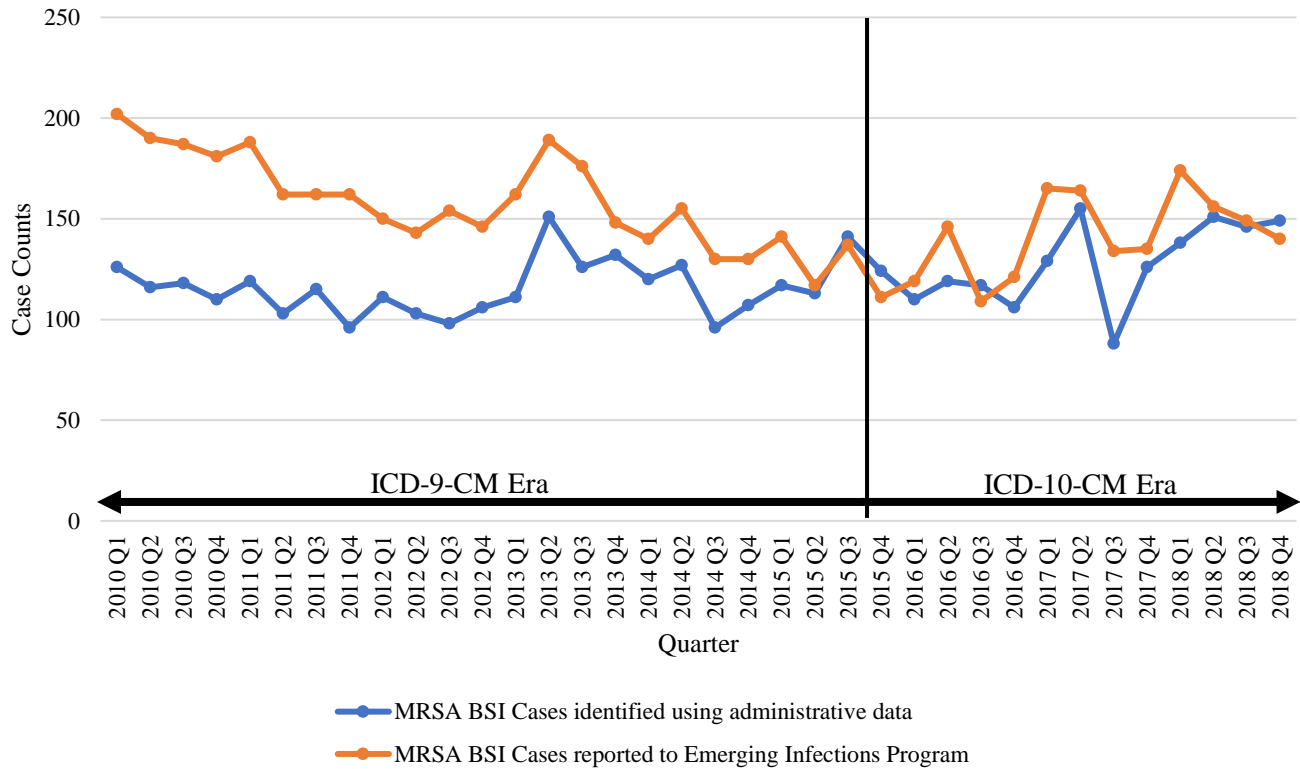Figure. Quarterly number of cases of MRSA BSIs by ICD-CM-9 and ICD-CM-10 coding eras.

Table. Sensitivity analysis using weighted[+] proportions of MRSA septicemia codes appearing after the 10th position among the National (Nationwide) Inpatient Sample, 2010 – 2017.

Year	MRSA septicemia codes occurring after the tenth position among NIS data (%)	MRSA septicemia cases identified by Connecticut discharge data (n)	Percent difference between Connecticut EIP and hospital discharge data (%)	MRSA septicemia case counts adjusted to reflect MRSA septicemia codes occurring after the tenth position (n)	Percent difference between Connecticut EIP and adjusted case counts (%)
2010	3.6	470	38.2	487	35.9
2011	3.8	433	35.8	449	33.4
2012	3.4	418	29.5	432	27.2
2013	3.2	520	23.0	537	20.4
2014	4.3	450	18.9	469	15.5
2015[++]	1.7	495	2.2	503	0.6
2016	2.1	452	8.7	461	6.9
2017	2.9	498	16.7	512	14.4
Overall		3,736	23.1	3,850	20.7

[+]Data were weighted using trend weight (TRENDWT) for years prior to 2012. From 2012 onward, the regular discharge weight (DISCWT) is used.[5]

[++]For 2015, the first three quarters (with ICD-9-CM diagnosis coding) the estimate was 1.72% compared to 1.4% for quarter four (using ICD-10-CM diagnosis coding). Per HCUP recommendations, because there is no apparent discontinuity, we report all four quarters together.[6]

References

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