Supplemental Method Example 1: Method of SAAR calculation, identifying a hospital's local Risk-adjustment with application of the negative binomial regression equation.

Note: All parameter estimates used (1).

Consumption Metrics for Antimicrobials Used for Community-Acquired Infections in Adult Wards for January 2014:

AD = 127

Predicted AD = 177.67

Number Days Present = 1330

SAAR = 0.715

Negative Binomial Regression Equation:

Log(Y) = Intercept + B1(Factor 1) + B2(Factor 2) + B3(Factor 3)

Simplified:

Y = exp((Intercept + B1(Factor 1) + B2(Factor2) + B3(Factor3))

Factors and Estimates in the Model:

Facility Level: HTS, Hospital bedsize, ICU bedsize

B1 estimate = -0.376

B2 estimate = 0.122

B3 estimate = -0.202

Intercept estimate = -1.759

Factor 1 = HTS (yes/no)

Factor 2 = ICU Location (yes/no)

Factor 3 = Pediatric Location (yes/no)

Note: yes = 1, no = 0

Y = Risk-adjustment

Application:

Log(Y) = Intercept + B1(Teaching Status) + B2(ICU Location) + B3(Pediatric Location)

Simplified:

Y = exp(Intercept) x exp(B1(Teaching Status)) x exp(B2(ICU Location)) x exp(B3(Pediatric Location))

Y = exp(-1.759) x exp(-0.376(1) x exp(0.122(1) x exp(-0.202(0) = 0.1722 x 0.6866 x 1.129 x 1 = **0.133587**

Or Y = exp((-.1759 + -0.376(1) + 0.122(1) + -0.202(0)) = 0.133587

The calculated Risk-adjustment is then multiplied by the institution's DP for that month (= 1330)

Thus,

0.133587 x 1330 = 177.67= predicted AD

SAAR = observed AD / predicted AD = 127/177.67 = 0.7148 ⟶ 0.715

Abbreviations: NMH = Northwestern Memorial Hospital, AD = antimicrobial days, DP = days present, SAAR = Standardized Antimicrobial Administration Ratio, ICU = intensive care unit, HTS = hospital teaching status

Supplemental Method Example 2: Simplified calculation for antimicrobials used for community-acquired infections in adult ICU for hospitals A, B and C (corresponds to calculations for Tables 2 and 3).

Simplified Risk-adjustment equation:

Risk-adjustment = exp((-.1759 + -0.376(Teaching Status) + 0.122(ICU Location) + -0.202(Pediatric Location))

How Risk-adjustment was Calculated

Hospital A (NMH): A teaching hospital with an ICU and no pediatric location.

Risk-adjustment = exp((-1.759) x exp(B1(1)) x exp(B2(1)) x exp(B3(0))
Risk-adjustment = exp((-1.759 + -0.376(1) + 0.122(1) + -0.202(0)) = **0.134**

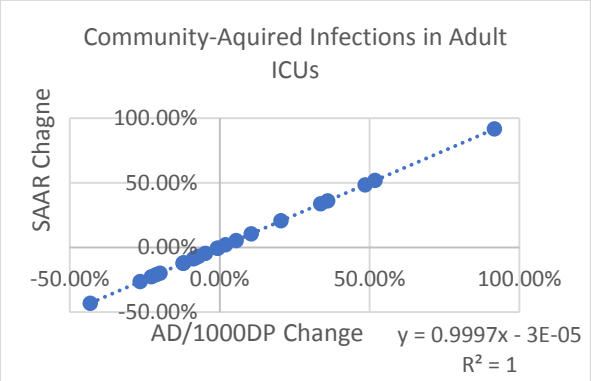
Hospital B: A non-teaching hospital with an ICU and pediatric location

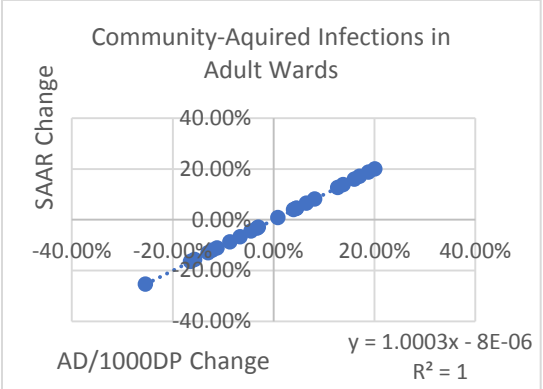
Risk-adjustment = exp((-1.759) x exp(B1(0)) x exp(B2(1)) x exp(B3(1))
Risk-adjustment = exp((-1.759 + -0.376(0) + 0.122(1) + -0.202(1)) = **0.159**

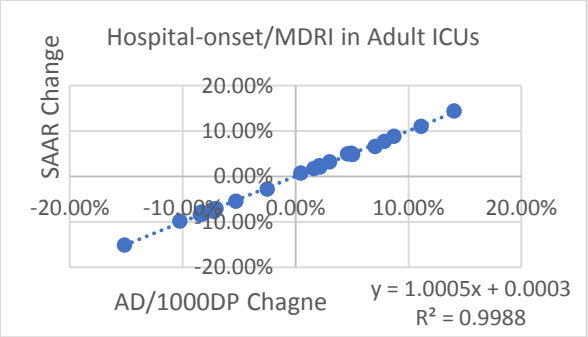
Hospital C: A non-teaching hospital with an ICU and no pediatric location

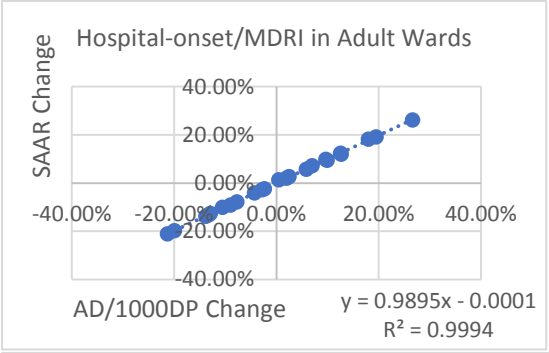
Risk-adjustment = exp((-1.759) x exp(B1(0)) x exp(B2(1)) x exp(B3(0))
Risk-adjustment = exp((-1.759 + -0.376(0) + 0.122(1) + -0.202(0)) = **0.195**

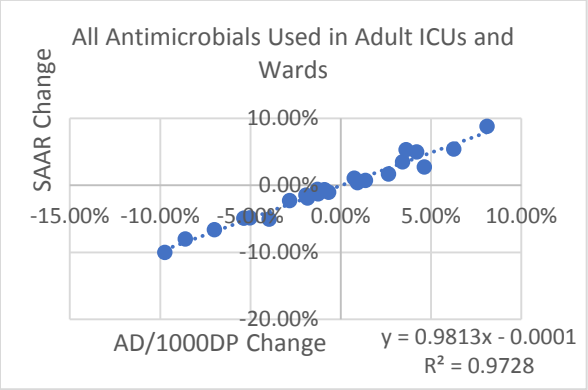
Supplemental Figure 1: The matched-month percent change between AD/1000DP and the SAAR from 2014 to 2016

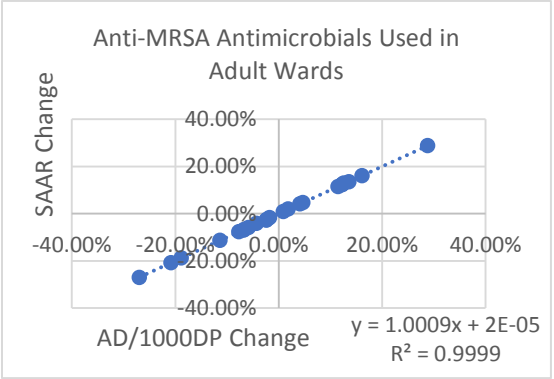


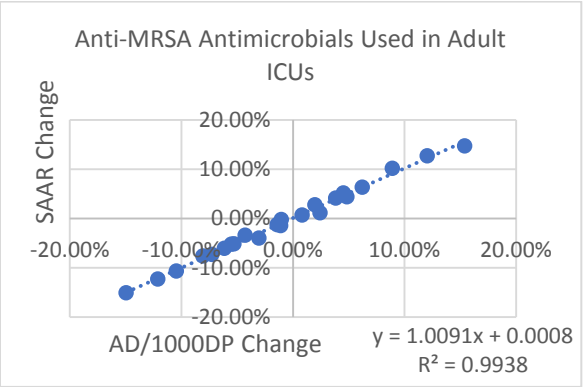


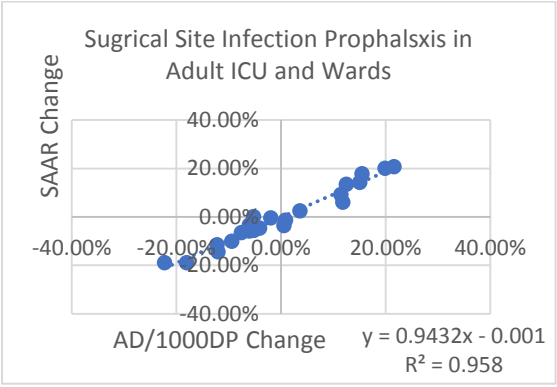












Abbreviations: AD/1000DP = Antimicrobial days per 1000 days present, SAAR = Standardized Antimicrobial Administration Ratio, MRSA = methicillin resistant staphylococcus aureus, ICU = intensive

References:

1. **van Santen KL, Edwards JR, Webb AK, Pollack LA, O'Leary E, Neuhauser MM, Srinivasan A, Pollock DA.** 2018. The Standardized Antimicrobial Administration Ratio: A New Metric for Measuring and Comparing Antibiotic Use. Clin Infect Dis doi:10.1093/cid/ciy075.