

15-21 Economic Analyses

62 MRSA blood stream infections-at what costs?

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Introduction: Many studies determined costs of MRSA infections on the basis of different cost calculation models and local reimbursement systems.

Objective: We present cost data of MRSA blood stream infections (BSI) in a German university hospital.

Material and Methods: We conducted a cohort study comparing MRSA BSI's with methicillin sensitive *S. aureus* (MSSA) BSI's. In a second analysis we included nosocomial MRSA BSI's with patients without any infection due to multidrug resistant organisms (MDRO) in a matched case control study. Patients were matched by DRG, Charlson comorbidity index, time of risk and age. Patients admitted between 2004 to 2005 were included. Costs were calculated based on hospital case based unit-accounting data. Data were analysed using multivariate analysis.

Results: *Cohort study*: 64 MSSA and 48 MRSA cases of BSI were included.

all patients	MRSA BSI (n=48)	MSSA BSI (n=64)	p value
mortality	35.4%	12.3%	0.005
length of stay (LOS)	31.5 d	21 d	0.016
surviving patients	MRSA BSI (n=31)	MSSA BSI (n=57)	p value
LOS	35 d	21 d	0.002
LOS before diagnosis of sepsis	10 d	3 d	0.008
secondary BSI	61.3%,	33.3%	0.014
median overall costs	9.288 Euro	7.041Euro	0.113

2.247 Euro were attributable to MRSA resistance. Methicillin resistance increased costs by a factor of 1.7 ($p=0.014$), as did nosocomial BSI compared to community acquired BSI, and ICU-stay (1.78, $p=0.005$ and 3.22, $p=0.004$) in multivariate regression analysis of surviving patients.

Case control study: 25 nosocomial MRSA BSI's and 46 patients without infection due to MDRO were included. MRSA patients were more likely to die (32% vs. 0%, $p<0.001$) and were longer hospitalised (39 vs. 26 d, $p=0.016$). In surviving patients (17 MRSA and 31 controls), mean LOS was significantly longer in MRSA patients (35 vs. 24 days, $p=0.016$). Median overall costs in surviving patients were 20.556 Euro for MRSA patients and 11.756 Euro for controls ($p=0.337$), resulting in 8.800 EURO attributable to MRSA BSI. After adjustment for confounders, nosocomial MRSA BSI increased costs in multivariate regression analysis by a factor of 1.66 ($p=0.038$).

Conclusion: Our results are concordant with the findings of other hospital-wide studies on MRSA BSI. Infections due to MRSA are considerably more expensive. Since these type of infections are not very well reflected within the DRG reimbursement system, our results demonstrated very well the economical burden of MRSA BSI in our hospital.

63 Economic Impact of Screening for *S. aureus* to U.S. Hospitals

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Background: *Staphylococcus aureus* (*S. aureus*) infections present a considerable economic burden for U.S. hospitals. Screening for nasal *S. aureus* carriage and subsequent colonization suppression of carriers can reduce the prevalence of *S. aureus* infections in hospitals.

Objective: The objective of this study was to evaluate the economic impact of adding rapid pre-admission testing (PAT) to all elective surgical admissions and subsequent colonization suppression for patients found to be positive for *S. aureus* carriage.

Methods: A budget impact model was developed using probabilistic sensitivity analysis to account for the uncertainties in the input variables. Data sources for the input variables included analysis of the 2003 Nationwide Inpatient Sample data and the published literature. Primary input variables included the marginal effect of *S. aureus* infection on expenditures, patient demographic characteristics, prevalence of nasal *S. aureus* carriage, sensitivity and specificity of the rapid *S. aureus* screening device, efficacy of nasal *S. aureus* colonization suppression and cost data.

Results: In 2003, there were an estimated 7,181,484 elective surgical admissions to hospitals in the U.S. Among these admissions, the mean cost of screening for *S. aureus* was estimated at \$214,889,100 (95% Uncertainty Interval (UI): \$139 million - \$293 million) while the cost of colonization suppression was estimated at \$201,229,400 (95% UI: \$71 million - \$375 million). As a result of PAT and subsequent colonization suppression for *S. aureus* positive patients, the mean annual cost savings to U.S. hospitals was estimated at \$519,174,600 (95% UI: \$(300) million - \$2.3 billion). Sensitivity analysis results indicated a 77% probability that there would be cost savings to U.S. hospitals as a result of PAT and subsequent colonization suppression.

Conclusions: Addition of PAT and colonization suppression to usual care of elective surgical admissions is likely to result in significant cost savings to U.S. hospitals, even after accounting for the variations in the model input values.

64 Trends in Economic Burden of *S. aureus* Infections in U.S. Hospitals, 1998 to 2003

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Background: *Staphylococcus aureus* (*S. aureus*) causes a wide range of infectious diseases which result in significant patient impact and healthcare costs. Information on historical trends in the *S. aureus*-related economic burden in U.S. hospital is lacking.

Objective: To evaluate historical trends in economic burden of *S. aureus* infections in U.S. hospitals from 1998 through 2003.

Methods: The Nationwide Inpatient Sample (NIS) data for the six-year period from 1998 through 2003 were analyzed. For each year of the NIS data, all the hospital discharges were classified as either a *S. aureus*-related infection stay or a non-*S. aureus*-related infection stay using a combination of several International Classification of Diseases (ICD)-9 diagnosis codes. The incremental marginal effects of *S. aureus* infection on hospital charges were estimated using multivariate regression models. The regression models adjusted for hospital fixed effects and patient variables including age, gender, race,

payer, diagnosis related grouping (DRG), as well as patient concomitant conditions including diabetes, dialysis and lung disease. All charges for each of the years were converted to 2004 U.S. dollars.

Results: Over the six-year study period, a total of approximately 45 million hospital discharge records were analyzed. *S. aureus* infection stays were associated with a mean incremental charge of \$33,596 among all inpatient stays (95% CI: \$31,198 - \$35,995) in 1998 that increased to \$37,251 (95% CI: \$34,678 - \$39,823) in 2003. Among all inpatient stays in the U.S, this represented a total *S. aureus*-related economic burden of \$8.7 billion in 1998 that increased to \$14.5 billion in 2003, at an annual rate of increase of 11.9% ($p < 0.001$). From 1998 to 2003, the total economic burden related to *S. aureus* infections also increased significantly for surgical stays at an annual rate of 11.4% (\$7.6 billion to \$12.3 billion, $p < 0.001$), for invasive cardiovascular stays at 12.4% (\$1.1 billion to \$1.9 billion, $p < 0.001$) and for invasive neurosurgical stays at 13.5% (\$311 million to \$619 million, $p = 0.046$). For invasive orthopedic surgical stays, the total economic burden related to *S. aureus* infections increased at an annual rate of 9.2% from 1998 to 2000 (\$802 million to \$925 million, $p = 0.03$) and at an annual rate of 17.9% from 2000 to 2003 (\$925 million to \$1.5 billion, $p = 0.008$).

Conclusions: Patients with *S. aureus* infections present a considerable economic burden to U.S. hospitals and the rate continues to increase. Efforts to reduce *S. aureus* infection can improve patient outcomes and decrease economic burden associated with this pathogen.