

Impact of following antibiotic consensus guidelines for hospitalised pneumonia patients: Is a “bundled” measure better?

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Objective:

To identify if compliance with pneumonia antibiotic consensus guidelines on the appropriate selection of antibiotics and administration time of antibiotics as stipulated in the JCAHO pneumonia core measures impacts hospital length of stay, readmission or mortality

Methods:

Using data from patients discharged from July 2004 through June 2005, a retrospective study was conducted at single hospital system in the United States of 639 randomly chosen patients with a principal diagnosis of community acquired pneumonia or a principal diagnosis of septicemia or respiratory failure with a secondary diagnosis of community acquired pneumonia. Principal diagnosis was determined by ICD-9-CM codes. Sampling was done using JCAHO methodology that was current for the respective time periods. Data was analyzed to determine compliance with three measures: length of time to first dose of any antibiotic, receipt of recommended type of antibiotic, and blood culture before antibiotic administration. The measures were also bundled to determine if receiving all ‘eligible services’ resulted in improved outcomes.

The population is limited to patients 18 years of age and older with a working diagnosis of pneumonia on admission. Patients transferred from another acute care or critical access hospital including another emergency room were excluded. Patients receiving comfort care measures only were also excluded.

Associations between guideline compliance and outcome: length of stay, time to readmission and survival time, were assessed with standard regression models, Kaplan-Meier survival analysis and Cox regression models. Severity of illness was assessed using APR-DRG methodology. Analyses were performed for patients receiving recommended antibiotics as well as patients receiving other antibiotics. Potential covariates in multivariable models included patient demographics, severity of illness, comorbidities and admission source.

Results:

Sixty-eight percent of patients (395) qualified for at least one measure of interest. Sixty-three percent of patients (250) received all the measures for which they were eligible (63%). Receiving recommended antibiotics is significantly associated with decreased length of stay ($p=0.002$) and increased survival ($p < 0.001$). Some association is seen between receiving the recommended antibiotics and increased time to pneumonia-related readmission ($p=0.079$). When independently assessed, there are no associations between blood cultures prior to antibiotics and timing of antibiotics for length of stay, mortality and any readmission. There is no difference between patients admitted through the emergency room versus direct admit for receiving the correct antibiotic and antibiotic timing; but there is a difference for blood cultures prior to antibiotics, 81% vs. 69% ($p=0.019$). When covariates are included in a regression model, receiving recommend antibiotics is still significantly associated with increased survival ($p < 0.001$) and increased time to pneumonia-related readmission ($p= 0.020$). There is also some association with decreased length of stay ($p=0.080$). When assessed as a “bundle” of measures, there is a significant association with increased survival ($p < 0.001$) for patients that receive all measures for which they were eligible. There appears to be a “dose-response” relationship with survival ($p=0.009$) for patients who received more of the three measures. When covariates are included, the associations remain significant with $p= 0.008$ and $p=0.023$, respectively.

Conclusions:

Receiving recommended antibiotics is associated with increased time to pneumonia readmission, increased survival and decreased length of stay whether assessed independently or as part of a bundle of services. Significant association is seen between receiving recommended antibiotics and survival, even after adjusting for relevant covariates.

Following guidelines for recommended antibiotics for pneumonia appears to contribute to improved outcomes.