2208. Development and Evaluation of Predictive Models for Estimating Infection Susceptibility to Empiric Treatment Regimens Among Patients with Pneumonia in Intensive Care Units

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Background. Predictive models for empiric antibiotic prescribing often estimate the probability of infection with multidrug-resistant organisms. In this work, we developed models to predict coverage of specific treatment regimens to better target antibiotics to high- and low-risk patients.

Methods. We established a retrospective cohort of adults admitted to the ICU in a 1,300-bed teaching hospital from November 1, 2011 to June 30, 2016. We included patients with a diagnosis of pneumonia and positive respiratory culture collected during their ICU stay. We collected demographics, comorbidities, and medical history from the electronic health record. We evaluated three penalized regression methods for predicting infection susceptibility to 11 treatment regimens: least absolute selection and shrinkage operator (LASSO), minimax concave penalty (MCP), and smoothly clipped absolute deviation (SCAD). We developed models for susceptibility prediction at two stages of the diagnostic process: for all pathogenic bacteria and for infections with Gram-negative organisms only. We selected final models based on higher area under the receiver operating characteristic (AUROC), acceptable goodness of fit, lower variability of the AUROCs in the cross-validation run, and fewer predictors.

Results. Among 1,917 cases of pneumonia, 54 different pathogens were identified. The most frequently isolated organisms were: *Pseudomonas aeruginosa* (16.6%), methicillin-resistant *Staphylococcus aureus* (16.1%), and *Staphylococcus aureus* (13.5%). Frequently selected variables included age, Elixhauser score, tracheostomy status, recent antimicrobial use, and prior infection with a carbapenem-resistant organism. All final models used MCP or SCAD methods. Point estimates for the AUROCs in the training set ranged from 0.70 to 0.80, and estimates in the internal validation set ranged from 0.64 to 0.77.

Conclusion. MCP and SCAD outperformed LASSO. For some regimens, models predicted infection susceptibility with fair accuracy. These models have potential to help antibiotic stewardship efforts to better target appropriate antibiotic use.

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2209. Charlson Comorbidity Index Scores and In-hospital Prognosis in Severe Acute Respiratory Infections Patients

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Background. Respiratory infections are one of the leading causes of mortality, and comorbid conditions play a significant role in the severity and fatality of these infections. The Charlson Comorbidity index (CCI) is the most used comorbidity index, presenting a few updated versions since its establishment. In the present study, we evaluated the CCI score and possible predictors of mortality in hospitalized patients with Severe Acute Respiratory Infection (SARI), aiming to test whether the CCI is a valid in-hospital prognostic indicator.

Methods. Patients older than 14 years, hospitalized from 2010 to 2016 due to SARI by viral infection, and who were submitted to respiratory virus testing were included. We assessed comorbidity retrospectively through chart review, and calculated 4 variants of the CCI.

Results. Of the 291 patients assessed, 72.8% ($n = 212$) presented comorbidities and 24% died ($n = 70$). The most recurrent comorbidities were Chronic Pulmonary Disease ($n = 76/212$, 36%) and HIV ($n = 50/212$, 23.6%). Respiratory virus testing was positive in 38.1% of patients ($n = 111$), Influenza and Rhinoviruses being the most frequent. The 1994 Age-adjusted CCI predicted in-hospital mortality in SARI patients ($P = 0.04$), and HIV was independently associated with in-hospital mortality ($P = 0.032$).

Conclusion. The comorbidity scores used to assess mortality risk in hospitalized patients with SARI displayed poor results, but HIV infection was considered a marker of severity. However, other factors should be considered in order to compose a scoring system that allows us to specifically assess the risk of mortality in patients with SARI.

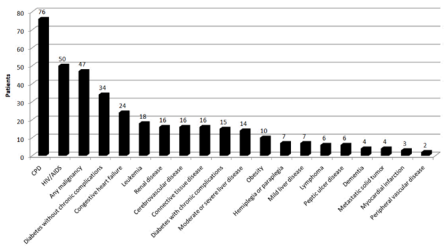
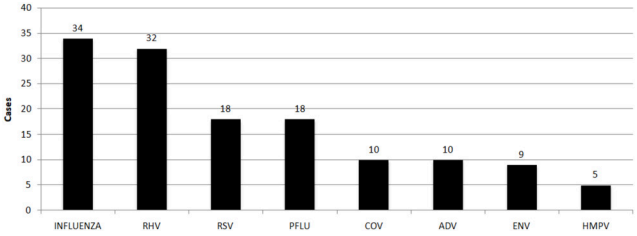


Fig.1 Frequency of comorbidities in the patients assessed



Disclosures. **All authors:** No reported disclosures.

2210. Nasopharyngeal Detection of *Streptococcus pneumoniae* and Clinical Disease Severity in Children with Community-Acquired Pneumonia (CAP)

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Background. *Streptococcus pneumoniae* is the most common pyogenic bacteria associated with CAP in children, but the proportion of cases might be underestimated because of the low sensitivity of current standard diagnostic methods. Nasopharyngeal (NP) carriage of pneumococcus commonly precedes the development of pneumococcal pneumonia, and facilitates pneumococcus interactions with other respiratory pathogens and the host immune response. This study investigated the relationship between pneumococcal carriage and the severity of CAP in children.

Methods. We conducted a prospective, multicenter, observational study for CAP among previously healthy children aged 2 months through 18 years in six children's hospitals in Ohio. Blood, pleural fluid, and NP swabs were collected for pathogen detection by culture and/or polymerase chain reaction (PCR). *S. pneumoniae* was quantified in NP swabs by real-time PCR. Patient management followed the standard of care in each study site.

Results. Among 441 children with radiologically confirmed CAP, 156 (35.4%) had no bacterial or viral pathogens identified as etiologic agents. NP pneumococcal carriage rate in this group was 34.6%. Children with CAP and pneumococcal carriage (53/156) were younger (5.9 vs. 9.6 years, $P < 0.001$) than those with no carriage (103/156). Median neutrophil counts and median procalcitonin concentrations were significantly higher in the pneumococcal carriage group (12,030 vs. 8,370 cells/mm^3 and 1.0 vs. 0.5 mg/dl, respectively; $P < 0.05$ for both) than in the non-carriage group. Children with documented pneumococcal carriage received respiratory support more frequently (50.0% vs. 28.2%, $p = 0.012$) and had a longer duration of hospitalization (3.5 ± 3.8 vs. 2.1 ± 2.0 days, $P = 0.026$) than those without pneumococcal carriage. Age was not associated with any of the variables used to assess clinical disease severity.

Conclusion. Pneumococcal carriage was associated with higher inflammatory markers and greater clinical disease severity in children with CAP in whom no pathogens were identified by standard diagnostics. This suggests that NP carriage of pneumococcus in children with CAP may modulate the host immune response and possibly influence clinical disease severity.

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2211. Impact of Early Fiberoptic Bronchoscopy on Microbiological Diagnostic Rate and Clinical Outcomes of Pneumonia in Acute Leukemia Patients

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Background. Fiberoptic bronchoscopy with BAL (FOB) remains the cornerstone in the diagnosis of pneumonia in immunocompromised patients; however, there is

no uniform agreement on the best timing for FOB, and its impact on microbiological diagnostic rate and clinical outcome has not been established.

Methods. Retrospective study (October 2017–December 2017, July 2018–January 2019) at MD Anderson Cancer Center. The medical records of adult patients with AML, MDS or ALL who developed pneumonia (CAP, HCAP, HAP excluding VAP) and underwent FOB were reviewed. By definition, patients who underwent FOB within 48 hours after the diagnosis of pneumonia were categorized as early FOB group. We compared demographic, clinical, microbiological data, and outcomes between two groups. Data were analyzed via χ^2, Fisher's exact and Wilcoxon rank-sum test and logistic regression.

Results. Of 140 patients included, 33 patients (24%) had early FOB and 107 patients (76%) had late FOB. There was no significant difference between two groups in demographic features, radiological findings, ANC and pneumonia severity index. Microbiological diagnostic rate of FOB did not differ between early FOB and late FOB: identification of pathogenic microorganisms (33.3% vs. 36.5%, p = 0.837), bacteria (6.1% vs. 13.1%, P = 0.36), fungi (18.2% vs. 12.2%, P = 0.39) and respiratory virus (12.1% vs. 16.8%, P = 0.6), respectively (Figures 1 and 2). On univariate analysis, the duration of intravenous antibacterial therapy was shorter in early FOB, with a median duration of 8.5 days (IQR 6.5–12) in early FOB and 11 days (IQR 8–18) in late FOB (P = 0.0047) (Figure 3). Multivariable logistic regression analysis showed that late FOB (OR 3.26, 95% CI 1.41 to 7.53, P = 0.0057) and negative bacterial culture on FOB (OR 3.06, 95% CI 1.01 to 9.22, P = 0.048) were significantly associated with longer duration of intravenous antibacterial therapy (≥10 days). There was no significant difference in ICU admission, 30-day and 60-day mortality and re-admission rate.

Conclusion. Early FOB was associated with shorter duration of intravenous antibacterial therapy for pneumonia in acute leukemia patients, which has an important impact on both optimization of antimicrobial therapy for patients and improvement of antimicrobial stewardship.

Fig. 1 Total number of Fiberoptic Bronchoscopy (FOB) and Diagnostic Rate

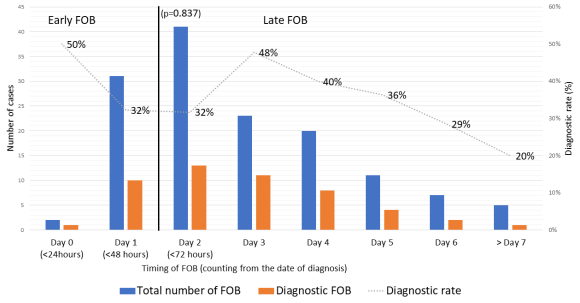
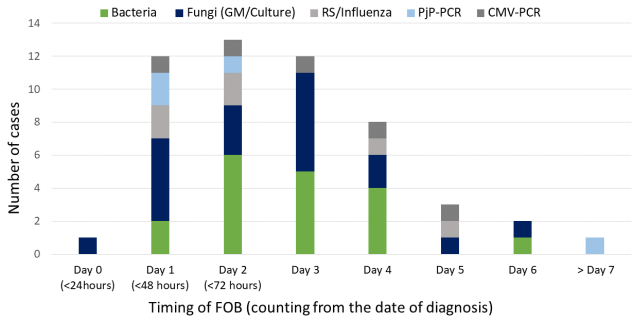
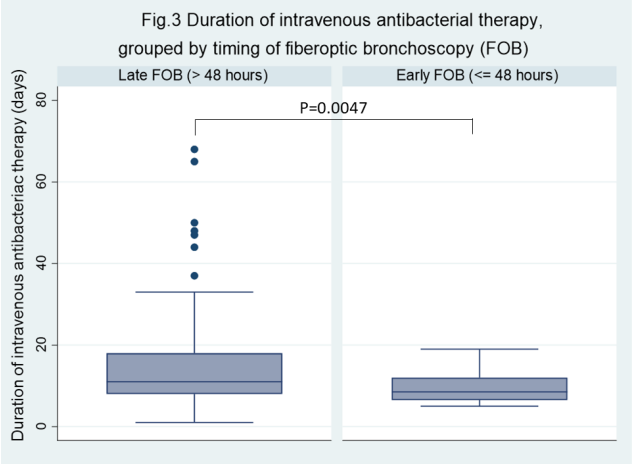


Fig.2 Microorganisms detected by Fiberoptic Bronchoscopy





Disclosures. **All authors:** No reported disclosures.

2212. Burden of Community-Acquired Pneumonia Attributable to Co-morbid Conditions in Adults

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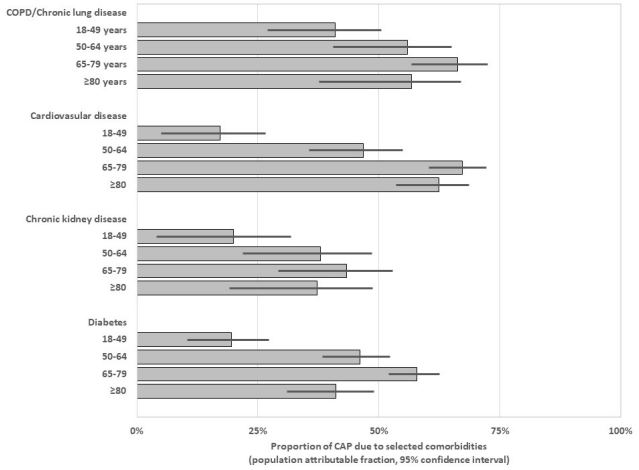
Background. Few studies have quantified the risk of community-acquired pneumonia (CAP) among adults with co-morbidities. Combining data from the population-based, prospective Etiology of Pneumonia in the Community study (EPIC) and the nationwide health-related Behavioral Risk Factor Surveillance System (BRFSS) telephone-survey, we estimated the annual risk of hospitalization for CAP among adults with co-morbidities.

Methods. We identified adults hospitalized with radiographic and clinical CAP at hospitals in Chicago, IL and Nashville, TN from July 2010 to June 2012. Using 2011 BRFSS data, we estimated the prevalence of the population with selected co-morbidities (chronic lung disease [CLD], cardiovascular disease [CVD], chronic kidney disease [CKD], or diabetes) in the EPIC study catchment counties, as well as the population without co-morbidities. We estimated the incidence of hospitalized CAP, age-adjusted relative risk (RR) using Poisson regression, and population attributable fraction for each co-morbidity.

Results. Among 2,061 adult patients enrolled in EPIC, 1,428 (69%) had at least one selected co-morbidity, most commonly CLD (42%) and CVD (35%). Among the adult population in the EPIC catchment area, 17% had ≥1 selected co-morbidity. The overall incidence of hospitalized CAP was 24.8/10,000, 118.7/10,000 among adults with ≥1 co-morbidity, and 11.2/10,000 among adults without a co-morbidity. Compared with patients without co-morbidities, the incidence of hospitalization for CAP was higher among patients with CLD (aRR: 20.7 [95% confidence interval [CI]: 20.0–21.5]), CKD (aRR: 14.5 [CI: 13.8–15.1]), CVD (aRR: 14.0 [CI: 13.5–14.6]), and diabetes (aRR: 6.2 [CI: 5.9–6.4]). While CLD and CVD accounted for high proportions of the incidence of CAP hospitalizations in the study population, the contribution of the selected co-morbidities varied by age groups (figure).

Conclusion. There is an increased risk of hospitalization for CAP among adults with co-morbidities, particularly chronic lung and cardiovascular disease. As a large portion of CAP is attributable to these co-morbidities, targeted public health interventions, such as vaccination and risk communication, need to be reinforced among these high-risk groups.



Disclosures. **All authors:** No reported disclosures.

2213. Etiology of Community-Acquired Pneumonia (CAP) in Hospitalized Native American Adults

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