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Background. Chronic obstructive pulmonary disease (COPD) exacerbation and community-acquired pneumonia (CAP) are major drivers of antibiotic overuse, primarily due to challenges in pathogen identification. Prolactin is a protein and marker that assists in distinguishing bacterial infection from other causes. The purpose of this study was to determine whether the use of a prolactin (PCT) guided algorithm in patients diagnosed with COPD exacerbation and/or CAP can reduce antibiotic exposure without negatively impacting clinical outcomes.

Methods. This was a quasi-experimental study conducted at Mercy Medical Center in Cantos, Ohio. The patient data for the retrospective cohort (control group) was collected from the months of September 2017 through January 2018. The prospective phase (PCT group) took place during the months of September 2018 through January 2019. Physicians utilized a prolactin guided algorithm to determine appropriate initiation and duration of antibiotic use in patients admitted with a primary diagnosis of COPD exacerbation and/or CAP. The primary outcome was the duration of antibiotic therapy, measured in days. Secondary outcomes included all-cause hospital readmission within 30 days of discharge, respiratory-related hospital readmission within 30 days of discharge, 30-day mortality, hospital length of stay, and adverse events to antibiotics.

Results. A total of 76 patients were included in the study, 43 in the control group and 33 in the PCT group. Baseline characteristics were similar between groups. The use of a PCT algorithm significantly decreased duration of antibiotics by 2.7 days in comparison to the control group (2.6 [n = 43]) vs. 5.3 [n = 43] days; P < 0.001; 95% CI). Secondary safety outcomes between the PCT and control group were similar, including all-cause hospital readmission within 30 days of discharge (30.3% vs. 25.6%; P = 0.648), respiratory-related hospital readmission within 30 days of discharge (80.0% vs. 81.8%; P = 0.731), and 30-day mortality (no incidence in either group).

Conclusion. The use of a PCT algorithm significantly reduced duration of antibiotics by 2.7 days without negatively impacting clinical outcomes in patients being treated for COPD exacerbation and/or CAP.

Disclosures. All authors: No reported disclosures.

1338. Development of a Novel Application for Differential Diagnosis of Tick-Borne Diseases
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Background. Early diagnosis and treatment of tick-borne diseases (TBDs) is critical for mitigating their adverse health outcomes, but the differential diagnosis of TBDs is challenging because many symptoms are nonspecific and commonly used diagnostic assays have significant shortcomings. Furthermore, although the local incidence of TBDs is recognized as an important factor in diagnosis, tools to help clinicians formally consider surveillance data in their decisions are not available. To address these gaps, Gryphon Scientific developed a differential diagnosis application (app) for TBDs that calculates a patient’s likelihood of infection with specific TBDs based on their symptoms, risk factors, and state of suspected tick exposure.

Methods. A differential diagnosis model for TBDs was developed using data on: (1) TBD symptom and risk factor prevalence in TBD patient populations, collected from clinical studies; and (2) human TBD incidence data from notifiable disease surveillance systems and tick infection prevalence data from reports and public databases, which were combined to develop an environmental risk measure. These data were used to build a Bayesian belief network (BN) model that predicts TBD infection probabilities based on a patient’s symptoms, risk factors, and state of suspected tick exposure. Performance of the model was validated using case studies from the biomedical literature. The model was incorporated into an app developed using R-shiny called TBD-DDx (Figures 1 and 3).

Results. A pilot application was developed that includes 10 states (AR, CT, MA, ME, MN, MO, NH, RI, VT, and WI) and the 11 TBDs endemic to those states. The differential diagnosis model identified the patient’s true disease as the top-predicted disease in 56% of cases and within the top three predicted TBD in 84% of cases. The inclusion of incidence factors in the model improved performance (Figure 4).

Conclusion. These results demonstrate that the TBD-DDx app is promising tool for informing clinical diagnoses of TBDs to guide selection of diagnostic testing and treatment. This study represents the first use of a BN modeling approach that incorporates an environmental risk measure and could be adapted for differential diagnosis of other diseases with environmental or other exposure risks.