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A Predictive Score Model for Diagnosis of Influenza Infection in Adults

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Background: Predicting influenza infection based on clinical characteristics has been a great challenge for clinicians and researchers. A score model to predict influenza infection may compensate for the unreliable clinical diagnosis.

Methods: We used clinical information from 442 adult medically attended acute respiratory illness patients primarily collected for a study of influenza vaccine effectiveness during the 2004-05 influenza season. We constructed a score model based on logistic regression analysis of clinical information, epidemiological context and viral culture results that predicts adults likely to have influenza infection. Sensitivity and specificity at various cutoff points of the sum of the score were analyzed by using receiver operating characteristics (ROC). The accuracy of the CDC's ILI definition was also computed to compare with that of the score model.

Results: Of the 442 adult patients included, 114 (26%) were culture confirmed influenza infections. Our final logistic regression model had the following statistically significant correlates: cough, muscle pain, ≥ 65 years old with high risk medical condition, interval between symptom onset and first medical encounter, and middle 4-week of 12-week influenza season. The scoring system attributing 0-60 points (sum of the regression coefficient $\times 10$ for each of the variable) generated high and low risk groups (high ≥ 40 and low 0-39) for influenza infection. The sensitivity, specificity, positive and negative predictive value at the score ≥ 40 were 69%, 73%, 48% and 87% respectively. Whereas the respective figures for CDC's ILI definition (fever, sore throat or cough) were 99%, 2%, 26% and 83%. The area under the ROC curve for the score model was 0.76 (95% confidence interval, 0.71-0.81).

Conclusion: Influenza infection can be predicted with moderate accuracy based on the demographic, clinical and epidemic information in a given season. Prospective validation of this prediction rule at different settings is important before its implementation as a decision aid.