

Application of an Automated Surveillance System to Evaluate Outpatient Care of Pneumonia

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Introduction

With economic pressures to shift the care of community-acquired pneumonia (CAP) to the ambulatory setting, there is a need to ensure safety of outpatients with CAP. The use of claims data alone remains the primary strategy for identifying these patients, but billing information often does not match the clinical diagnosis and does not have the ability to find unrecognized cases. In our previous work, an automated pneumonia case detection algorithm (CDA) was able to detect cases of CAP with positive predictive value of 71%.¹ For this study, we begin to illustrate how this type of surveillance system may assist in evaluating the quality of outpatient care for CAP.

Methods

In this single-center, retrospective observational study, the pneumonia CDA was applied to electronic health record (EHR) documentation of all emergency room and outpatient clinic visits at the Baltimore VA Medical Center from 01/01/2004 to 12/31/2011. The pneumonia CDA consists of: 1) a CDA for acute respiratory infection (ARI) that uses ICD-9 codes, free text analysis of EHR notes to find symptoms, and records of cough remedy prescriptions to detect ARI cases with a sensitivity of 99%, and 2) an automated chest imaging classifier that labels reports as non-negative (could possibly support a diagnosis of pneumonia) or negative.¹ A manual chart review was completed for all visits flagged by the pneumonia CDA (detected by ARI CDA and having an associated non-negative chest imaging report). Exclusion criteria included non-initial visit, lack of new symptoms, and inpatient admission. "Nondismissible" pneumonia was defined as having [2 or more pneumonia symptoms AND a non-negative chest imaging report AND (new or increasing chest imaging findings OR no prior chest imaging)].² Treatment was considered "timely" if prescribed prior to discharge from the emergency room or on the same date of the outpatient clinic visit. "Pneumonia in plan" describes the documentation of pneumonia as a possible diagnosis by the prescribing provider. For all visits, provider diagnosis, timeliness of treatment, and antibiotic choice were assessed.

Results

The pneumonia CDA flagged 666 visits over the 8-year study period. Of the 376 included cases, 271 (71.9%) were found to be nondismissible. Providers missed pneumonia as a possible diagnosis in 95 (35%) of 271 nondismissible cases. Nondismissible cases with pneumonia in plan (n = 176) received antibiotics, but in two cases, treatment was not timely. Thirty (11.1%) of the Nondismissible cases had no pneumonia in plan and did not receive timely treatment, while 65 nondismissible cases (24%) had no pneumonia in plan but received antibiotics for non-pneumonia ARI diagnoses. Fluoroquinolones were the most commonly prescribed antibiotic for pneumonia in plan (122 or 61.6% of 198) and for all visits (149 or 61.6% of 376). Macrolide monotherapy and doxycycline, which may be used to treat CAP in healthy patients with no risk for drug-resistant infection,² were prescribed in 51 (25.8%) and 12 (6.1%), respectively, of visits with pneumonia in plan. The CDA also discovered cases where the provider suspected pneumonia, but prescribed trimethoprim/

sulfamethoxazole (n=1) or beta-lactam monotherapy (n=4) despite current treatment guidelines.

Conclusions

An automated CDA is a novel method to identify outpatient cases of CAP and can possibly uncover inadequacies in treatment. Future CAP studies may use CDAs to evaluate guideline adherence, treatment timing, both short-term and long-term outcomes, and overall quality of care.

Antibiotics Prescribed For Visits Flagged By the Pneumonia CDA

Antibiotic prescribed (timely only)	Pneumonia in plan, N (%)	All included visits, N (%)
Respiratory fluoroquinolone	122 (61.6)	149 (61.6)
Beta lactam + macrolide	1 (0.5)	1 (0.3)
Macrolide monotherapy	51 (25.8)	75 (19.9)
Doxycycline	12 (6.1)	38 (10.1)
Beta lactam monotherapy	4 (2.0)	20 (5.3)
Trimethoprim/ sulfamethoxazole	1 (0.5)	16 (4.3)
Other or not specified	5 (2.5)	10 (2.7)
None	2 (1.0)	67 (17.8)
Total	198 (100)	376 (100)

Keywords

Community-acquired pneumonia; Quality of care; Case detection; Surveillance

References

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