

Development of an Electronic Health Record Generated Alert for Prophylaxis Against *Pneumocystis jiroveci* pneumonia in the Setting of High-Dose Steroids

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Abstract

Background: *Pneumocystis jiroveci pneumonia* (PJP) is an opportunistic infection associated with high-dose steroid use in non-HIV patients. Many patients on high-dose steroids, (>20mg prednisone equivalents for 28 days or longer), developed PJP within a month of steroid use. This study aims to develop an electronic alert for providers to consider PJP prophylaxis for patients discharged on high-dose steroids.

Methods: Cases were obtained from the University of Utah Enterprise Data Warehouse between October 2014-September 2017. A retrospective, manual chart review evaluated adults 18 years of age or older, with an inpatient PJP diagnosis made via direct fluorescent antibody or PCR. Patients with PJP due to HIV were excluded. Steroid dose and duration one month prior to diagnosis of PJP were evaluated. After retrospective analysis, via a multidisciplinary team, a best practice advisory (BPA) alert was created to flag providers to consider PJP prophylaxis at discharge, with consideration of creatinine levels and allergy profile to guide drug choices. The alert was trialed in a silent mode from January-April 2018 without provider notification so it could be modified to prevent inappropriate firing. The alert was approved for live use by the Clinical Decision Support Committee and is now active in the University of Utah Epic system as of April 10, 2018.

Results: In retrospective analysis, of ninety four non-HIV patients diagnosed with PJP, 31/94 (33%) cases were in the setting of high-dose steroids. 7/31 (23%) cases were exclusively with high-dose steroids, while 24/31 (77%) cases were in combination with chemotherapy or other immune modulating agents. BPA data showed that of 78 alerts fired from April 2018 to August 2018, 69 were appropriate recommendations to alert a provider to consider PJP prophylaxis. Of all eligible cases, 15 total were discharged with prophylaxis via the alert.

Conclusion: Chart review identified high-dose steroids as a target for a quality improvement intervention, which led to development of a BPA. Data indicate room for improvement on discharge with prophylaxis. Goals include reducing morbidity, mortality and cost associated with PJP, as well as educating providers regarding the need for prophylaxis.

Introduction

- Pneumocystis jiroveci pneumonia* (PJP), is an opportunistic infection that affects both HIV and immunosuppressed, non-HIV patients.
- PJP in HIV patients is associated with declining CD4 counts.
- In non-HIV patients, pathophysiology is less well characterized, though ultimately immunosuppression results in higher risk of infection and higher mortality compared to HIV patients.
- Corticosteroids have been a noted risk factor as immunosuppression contributing to PJP development.
- There are absolute and relative indications for PJP prophylaxis: high-dose steroids (prednisone 20mg for 4 weeks, or prednisone equivalents), is a relative indication.
- Data suggest that prophylaxis against PJP reduces incidence significantly compared to the potential for adverse reactions from prophylaxis itself.

Methods

Part I: Retrospective chart review on non-HIV PJP cases over a year:

- Inclusion criteria: PJP diagnosis from documentation, PCR, or DFA
- Age >18
- Inpatient hospitalization

Part II: Creating a best practice advisory (BPA) alert in EPIC for providers to consider PJP prophylaxis for those discharged on prednisone \geq 20mg, or prednisone equivalents, for 28 days. Pharmacy informatics created a smart alert accounting for CrCl and allergy profile, generating a recommended option for prophylaxis.

Part III: Evaluating the alert in "silent mode" in which the alert did not fire to the public, but the research team was able to see under what influence it would have, making modifications for efficacy.

Part IV: Turned alert to active mode to evaluate how providers are utilizing recommendations for PJP prophylaxis, as well as reasons for declining.

Figure 1 (top): BPA alert notification providing options for PJP prophylaxis
Photo courtesy of University of Utah via Pharmacy Informatics

Figure 2 (bottom): Generated prescription for discharge given alert selection
Photo courtesy of University of Utah via Pharmacy Informatics

Results

Table 1: Results of retrospective analysis and alert

Total PJP cases in non HIV adults	94
Total number on high-dose steroids diagnosed with PJP, in non HIV patients	31
Number of times BPA appropriately fired on discharge	69
Number of patients prescribed prophylaxis when BPA fired	15

- 31/94 (33%) cases of PJP in non-HIV patients were found to be on high-dose steroids within the last month prior to diagnosis.
- 15/69 (22%) cases in which a BPA alert fired recommending prophylaxis were actually discharged on prophylaxis.

Discussion

- PJP is an illness associated with high-dose steroids as a risk factor.
- PJP is highly preventable as a studies have shown up to 90% reduction in contraction, with prophylaxis.
- PJP workup and management comes at a high health care cost, while prophylaxis is in relation significantly cheaper.
- This was a multidisciplinary effort to standardize care for patients discharged on high-dose steroids.
- The aim is for this BPA alert to be a relatively unobtrusive, effective way for provider to engage in high value care.
- There is room for improvement at our institution for providers to engage with and utilize this custom created alert.
- Lack of utilization may be secondary to newness of alert and education of issue.

References

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