Clinically Inconsequential Alerts: The Characteristics of Opioid Drug Alerts and Their Utility in Preventing Adverse Drug Events in the Emergency Department

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Study objective: We examine the characteristics of clinical decision support alerts triggered when opioids are prescribed, including alert type, override rates, adverse drug events associated with opioids, and preventable adverse drug events.

Methods: This was a retrospective chart review study assessing adverse drug event occurrences for emergency department (ED) visits in a large urban academic medical center using a commercial electronic health record system with clinical decision support. Participants include those aged 18 to 89 years who arrived to the ED every fifth day between September 2012 and January 2013. The main outcome was characteristics of opioid drug alerts, including alert type, override rates, opioid-related adverse drug events, and adverse drug event preventability by clinical decision support.

Results: Opioid drug alerts were more likely to be overridden than nonopioid alerts (relative risk 1.35; 95% confidence interval [CI] 1.21 to 1.50). Opioid drug-allergy alerts were twice as likely to be overridden (relative risk 2.24; 95% CI 1.74 to 2.89). Opioid duplicate therapy alerts were 1.57 times as likely to be overridden (95% CI 1.30 to 1.89). Fourteen of 4,581 patients experienced an adverse drug event (0.31%; 95% CI 0.15% to 0.47%), and 8 were due to opioids (57.1%). None of the adverse drug events were preventable by clinical decision support. However, 46 alerts were accepted for 38 patients that averted a potential adverse drug event. Overall, 98.9% of opioid alerts did not result in an actual or averted adverse drug event, and 96.3% of opioid alerts were overridden.

Conclusion: Overridden opioid alerts did not result in adverse drug events. Clinical decision support successfully prevented adverse drug events at the expense of generating a large volume of inconsequential alerts. To prevent 1 adverse drug event, providers dealt with more than 123 unnecessary alerts. It is essential to refine clinical decision support alerting systems to eliminate inconsequential alerts to prevent alert fatigue and maintain patient safety. [Ann Emerg Med. 2016;67:240-248.]

Please see page 241 for the Editor's Capsule Summary of this article.

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INTRODUCTION

Background

Computerized provider order entry and clinical decision support systems are important tools developed to prevent drug errors. Clinical decision support intervenes at prescribing by generating alerts warning of potential adverse drug events and has been shown to decrease errors compared with traditional paper-based ordering.[1-3] Along with government incentives, this supports the broad transition to electronic health records and electronic prescribing in clinical practice. However, ensuring that these new electronic processes fit into clinician workflow has become a paradoxic issue because electronic health record vendors are reluctant to modify or turn off medication alerts for fear of exposing themselves to increased liability, resulting in physicians' being faced with navigating warnings that are too frequent and of minimal clinical significance. This causes providers to repeatedly override these warnings and disregard the alert message.[4-7] This "alert fatigue" inherently increases patient risk of adverse drug events.[8,9]

High alert override rates have been observed since clinical decision support systems were first implemented in the early 2000s. Override rates of most drug alerts have remained stable, at 75% to 95% of total alerts from 2006

Editor's Capsule Summary

What is already known on this topic

Electronic ordering systems allow real-time alerts to help improve safety during emergency care, but these alerts are often overridden.

What question this study addressed

Do electronically triggered drug dosing alerts during emergency department (ED) care improve care as assessed by adverse drug events recorded, particularly for alerts about opioids?

What this study adds to our knowledge

Using a retrospective assessment of 4,581 patients during 5 months at 1 site, the authors saw opioid alerts overridden much more than those for other agents, but without an increase in reported adverse events. Some opioids alerts appeared to help avoid potential adverse events.

How this is relevant to clinical practice

Further honing of ED drug warnings, especially those for opioids, is warranted.

to 2011.[10-13] Although those numbers seem alarming, the majority of the alert overrides do not result in an adverse drug event, defined as "an injury resulting from medical intervention related to a drug."[14]

Although not all adverse drug events can be avoided by implementing clinical decision support systems, *preventable* adverse drug events should be intercepted and eliminated by an effectively integrated computerized provider order entry and clinical decision support system. A preventable adverse drug event is an injury that results from an error at any stage of drug use.[15] These compose 20% to 30% of all adverse drug events.[14] Generating alerts to avert preventable adverse drug events is the main objective of clinical decision support systems. Unfortunately, familiar and frequently prescribed drugs generate a large number of alerts and contribute to alert fatigue.[16,17]

Importance

One of the most frequently prescribed and most alerted drug classes in the emergency department (ED) are opioids.[16,18-22] Despite the high frequency of alerts, opioids have twice the rate of adverse drug events compared with nonopioid analgesics,[23-26] and override rates for opioid drug allergy alerts have increased from 50% to 90% in the last 20 years.[27] The Joint Commission and the US Department of Health and Human Services have highlighted the need for comprehensive treatment plans to prevent opioid adverse drug events.[28,29] Additionally, opioids are on the Institute for Safe Drug Practices list of high-alert drugs that have the potential of causing significant patient harm in acute care settings.[30] Therefore, opioids need an effective alert system that limits alert fatigue and improves patient safety.

Goals of This Investigation

The primary objective of this study is to determine characteristics of opioid drug alerts in the ED. Our secondary objectives are to measure how frequently adverse drug events occur and determine whether clinical decision support system alerts are successful at preventing opioid-related adverse drug events.

MATERIALS AND METHODS

Study Design and Setting

This was a retrospective chart review study performed in an urban academic ED with approximately 70,000 annual visits. The Epic electronic health record and computerized provider order entry system (Epic Systems Corporation, Verona, WI) was implemented in 2011 with the First Databank drug information plug-in (First Databank, Inc., San Francisco, CA). Drug orders are directly entered into the electronic health record by physicians, residents, physician assistants, or registered nurses. This study was approved by the local institutional review board.

Selection of Participants

Data were gathered from September 2012 through January 2013. We sampled a 24-hour period every fifth day from midnight to 11:59 PM (index days) during the study period. According to previous research, adverse drug event occurrence ranges from 0.16% to 6.0% in the ED.[31] Using this range, 5,000 chart reviews were expected to capture between 6 and 300 adverse drug events, resulting in a manageable number of chart reviews across all days of the week while maintaining enough volume to capture adverse drug events. In adherence with the Health Insurance Portability and Accountability Act (HIPAA) regulations and local institutional review board requirements, all ED visits for patients aged 18 to 89 years were included. Charts generated for these visits were reviewed on the day of service and 30 days postdischarge. The purpose of the second chart review was to determine whether any drugs administered during the initial visit resulted in a return visit because of an adverse drug event. Data sources included patient data through manual chart review and electronic health record reports, which included patient safety