

# Alert Fatigue and Patient Risk: An Effective Drug Decision Support System Could Eliminate Both

## Introduction

The magnitude of clinical alerts generated by electronic health records (EHRs) in both inpatient and outpatient settings—some hospitals average 20,000 physician alerts a month—leaves little doubt about why clinicians quickly experience alert fatigue.<sup>1</sup> The overwhelming number of clinical warnings compels stakeholders to ignore or override alerts—which may lead to suboptimal therapy or unintended patient harm.

In one study of 2,321 Massachusetts ambulatory care clinicians who used an e-prescribing system during a six-month period, 402 adverse drug events were likely prevented from 279,476 alerted prescriptions because clinicians acted on warnings.<sup>2</sup> The study, however, also calculated that it took 331 alerts to prevent a single adverse drug event, and that more than 90% of alerts were overridden.

While physicians agree that medication alerts could save patients from dangerous drug interactions, duplications, and inappropriate use, they also claim they are plagued by too many alerts. Some alerts are likely to be disregarded because physicians prefer to see warnings for higher risk situations, such as drugs that are new to the patient.

Disregarding or missing important alerts, however, leaves the physician more susceptible to medical errors.

Serious, preventable medication errors occur in 3.8 million inpatient admissions and 3.3 million outpatient visits each year.<sup>3</sup> Inpatient preventable medication errors cost approximately \$16.4 billion annually; outpatient preventable errors have been tallied at \$4.2 billion annually.<sup>3</sup>

## The Override Conundrum

Ramifications of alert fatigue for clinicians range—from patient safety risks, interrupted workflow and reduced productivity, to user dissatisfaction. The most critical is the effect on patient safety.

Too many alerts could lead to overrides, clinician refusal to use the EHR medication management system, or unanticipated outcomes—such as an increased number of errors or adverse events.

When the volume of clinically irrelevant alerts decreases, clinicians pay more attention to the remaining alerts.<sup>4</sup>

In one study, primary care physicians affiliated with a teaching hospital overrode 91.2% of drug allergy alerts and 89.4% of high-severity drug interaction alerts. Physicians determined that 36.5% of the alerts were inappropriate.<sup>5</sup>

Studies that found high rates of alert overrides indicated that medical records were often out-of-date. For example, changes in a patient's medication profile, medical conditions, or physiologic parameters were not reflected in the medical record.

Some overrides have resulted in medication errors. As reported in a study published by the

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Pennsylvania Patient Safety Authority, most of these errors occurred when healthcare providers were allowed to bypass a warning without encountering other safeguards to spot a resulting error.<sup>6</sup>

If clinicians override most medication alerts, these alerts may be an inadequate tool for ensuring patient safety.

Part of the problem lies in clinical decision support (CDS) systems—designed to assist physicians, nurses, pharmacists and other clinicians in making decisions about treatment and medication for their patients. Many of these systems lack flexibility, specificity, and adaptability. On the other hand, when these systems work effectively to improve patient safety by alerting clinicians to potentially dangerous uses of medications, they are seemingly invaluable.

### Clinical Drug Decision Support: Improving Patient Safety

Applying appropriate CDS interventions throughout the medication management cycle optimizes medication safety and improves outcomes. CDS systems that follow the CDS Five Rights Model improve outcomes and prevent errors and adverse events by assisting the care team in making timely, informed decisions:

1. Right Information: evidence-based clinical data guide suitable action.
2. Right Person: considers all members of the care team, including clinicians, patients, and their caregivers.
3. Right CDS Intervention Format: answers a clinical question.
4. Right Channel: use of the right communication channels (e.g., EHR, personal health record, Internet, mobile device).
5. Right Time in Workflow: information delivered when needed at the point of care.<sup>7</sup>

When developed with these elements in mind, CDS systems can improve safety, reduce costs associated with unneeded treatment, help clinicians recognize and react to potentially dangerous situations, and guide clinicians toward safe and effective use of medications optimized for each patient.

In addition, effective systems provide current evidence-based clinical and drug information and easy access to reference materials, which facilitates appropriate overall medical treatment and drug therapy.

Meta-analyses of studies of alerts and reminders for decision support have been fairly consistent in showing that they can alter clinicians' decision-making and actions, reduce medication errors, and promote preventive screening and use of evidence-based recommendations for medication prescriptions.

Guidelines for effective CDS systems (incorporating a combination of EHR capabilities and drug database content) include:

- Real-time and asynchronous warnings that can be tailored to a specific patient situation using available patient information.
- Medication order-specific information.
- Ability for all practice settings to customize how alerts look, configure the information displayed in warnings, create rules for bypassing alerts, and ensure there are response options based on the severity of potential harm.
- Ability for users to take action from the synchronous alert presentation window.
- An EHR system that can handle logic rules that determine how an alert can be transmitted to a clinician, as well as specifying individuals and/or groups that should receive an alert.<sup>8</sup>

### Current Technology Needs Upgrading

Alert fatigue stems from a combination of EHR and drug compendia factors: inflexibility; inability to provide relevant, clear, sufficient and up-to-date information; disruption of workflow; failure to deliver alerts at the right time based on severity and urgency of conditions; and failure to tailor rules (such as type and frequency of information) to user preferences.

A 2015 Leapfrog Hospital Survey showed that even when hospitals had a computerized physician order entry system, 39% of potentially harmful drug orders were not flagged and therefore failed to warn staff of potential errors. In addition, 13% of potentially fatal orders did not trigger an alert.<sup>9</sup>

There are two types of CDS systems—passive and active. Passive CDS is not patient-specific and is delivered to users unobtrusively, for example, as order sets and drop-down lists. It is generally based on clinical practice or evidence-based guidelines.

Active CDS, on the other hand, is patient-specific and uses at least two pieces of patient data to trigger an alert. It can be interruptive or non-interruptive; the latter makes the notification available for resolution at a time convenient to clinicians. Interruptive CDS, which is data-driven or rule-based, provides real-time alerts and requires users to take action to respond to the alert. The most effective active CDS systems should be able to adapt to accommodate different channels, formats and the right timing in the workflow.<sup>8</sup>

Clinical relevancy of the alerts may be jeopardized by discrepancies in care populations, patient care recommendations, inadequate electronic patient data, inaccurate content, unreliable messages and messages that do not prompt action.<sup>10</sup>

One of the biggest arguments against eliminating or even decreasing the number of alerts is fear of liability among EHR vendors, drug compendia vendors, and healthcare organizations if patients are harmed. To minimize liability, CDS systems could create rules with only the most important warnings or tailor alerts to a specific clinical environment, user group, or population of patients.<sup>11</sup>

CDS systems are most effective with careful oversight. An interdisciplinary team should be responsible for evaluating problems, deciding which rules to include, and creating an override monitoring plan.

### Keeping Drug Decision Support Systems on Track

An effective override monitoring plan should be reviewed monthly by the CDS governance team and incorporate the following:

1. Distinction between highly clinically significant warnings and clinically irrelevant warnings.
2. Fewer, more appropriate alerts relevant to various medical conditions, different populations (demographics) and care settings.
3. Clear, concise, and actionable alerts with rationales understood by users.
4. Elimination or blocking of unnecessary alerts.
5. Appropriate level of alerts based on severity and immediacy.
6. Ability of users to tailor alerts to prevent excessive alerts.
7. Acceptable number of drugs from different therapeutic categories to treat a specific condition factored into duplicate therapy screening.
8. Route of administration and systemic absorption factored into drug interaction screening (e.g., an oral drug in combination with a topical, non-systemic drug should not trigger an alert).
9. Suppression of alerts for drugs the patient no longer takes or that are already part of an ongoing effective medication regimen (i.e., alert for new drugs and modified drug regimens only). However, there is a need to check a discontinued drug for some period of time (based on the drug's half-life) in case it still has a physiological effect.
10. Determination of when alerts should trigger for substances including prescription drugs, vitamins, supplements and other over-the-counter drugs.
11. Avoidance of repetitive alerts.
12. Screening for all active and inactive ingredients in multi-ingredient products and all known allergens (including food allergies) to prevent negative warnings.
13. Options to prevent workflow interruption (e.g., using non-interruptive CDS when appropriate).
14. Tracking all alerts triggered and action taken for retrospective analysis. Use data to identify alerts of questionable value, fine-tune alerts, and identify individual clinicians who will benefit from peer-to-peer education.
15. Users should also be encouraged to report irrelevant and overused/misused alerts to avoid noisy clutter.

### A Solution at Hand

As in many aspects of healthcare—treatment plans, benefits, medications, and communications—a one-size-fits-all approach is not the answer for developing an effective CDS system. Instead, it is critical for healthcare organizations, EHR vendors, and drug compendia vendors to evaluate the use and appropriateness of alerts in the system and determine which notifications clinicians find to be important and necessary for their patient population.

Successful drug decision support systems should provide easy access to the information that supports an alert, including on and off-label indications, dosing, administration, and adverse reaction information.

Healthcare organizations, EHR vendors, and drug compendia vendors should also ensure that drug information is continually updated, evidence-based, and that it fully considers the impact on patients. The key to success for any drug decision support system is ensuring clinicians can choose the amount of information they need to make evidence-based decisions.

### Elsevier's Drug Compendia

Elsevier's Gold Standard Drug Database is an integrated drug database and decision support engine that evaluates the patient's complete drug regimen for potential problems. When problems are identified, Elsevier's Drug Database presents accurate, concise, relevant notifications to help clinicians make informed drug therapy decisions. With smart alert tools, Elsevier's Drug Database helps reduce alert fatigue by filtering "noise" and advising clinicians of relevant issues, enabling them to make informed decisions in less time.

Outdated drug data could lead to medication errors and increased costs, putting clinicians at a disadvantage when treating patients. That's why Elsevier exclusively provides clinical information to support alerts through TRUE Daily Updates™. Every day, including weekends and holidays, Elsevier updates its drug information—product, clinical and patient safety data, drug pricing and images—encompassing all content. When a new drug launches or an important change is announced, clinicians can access all pertinent information that same day to enable sound evidence-based decisions at the point of care.

#### For more information:

Visit: [www.elsevier.com/drug-information](http://www.elsevier.com/drug-information)

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