

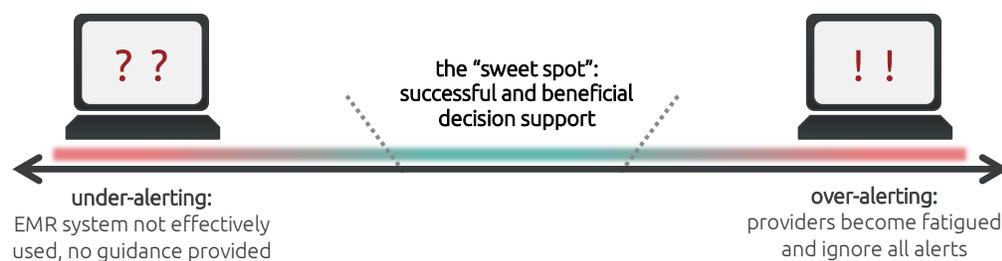
The CDS Challenge: Providing Robust Clinical Decision Support without Fatiguing Providers

Many healthcare organizations would like to increase the amount of decision support provided to their users, but are rightfully concerned about causing alert fatigue by interfering too much in the clinical workflow. How many alerts is the “right” number of alerts to have in an electronic medical record system? How many is too many? The good news is, there is no “right” number – the key to avoiding alert fatigue is careful development, management and maintenance of decision support tools.

What Is Alert Fatigue?

Alert fatigue has set in when interventions are no longer effective due to providers closing or overriding alerts automatically, without considering the information presented.

The power of electronic medical records to support robust decision support is one of the most compelling aspects of implementing such systems. However, when providers are no longer reviewing, evaluating or considering the recommendations provided to them, the advantage of having electronic clinical decision support available is lost:



Sometimes “alert fatigue” is used to describe a situation in which users are upset about alerts or disagree with the recommendations being presented. Although this situation is of concern, this can be considered a “pre-fatigue” phase: the users are still reviewing and comprehending the recommendations made by the alerts.

Consequences of Fatigue

The phenomenon of alert fatigue is very real – providers become desensitized to alerts and reminders to the point that they no longer even register seeing them. In one study, providers reporting that they received alerts “never”, “almost never”, “rarely” or “a few times per month”, in fact viewed an average of 2.84, 8.68, 3.41 and 5.55 alerts per half-day practice session respectively.ⁱ

In some scenarios, the consequences of alert fatigue can be dire. In the June 2013 issue of *Pediatrics*, C. William Carspecken and colleagues describe a scenario in which a patient in the PICU experienced significant complications “as a result of a series of non-evidence based alerts in the electronic health record.” In this scenario, in the month prior to an adverse event, clinical staff had appropriately overridden more than 100 extraneous alerts for the patient and missed a crucial alert. The threat of missing a rare event must be balanced with the dangers of burdening clinicians with unnecessary alerts, Carspecken et al concluded.ⁱⁱ

Root Causes of Fatigue

Most studies on provider response to clinical decision support do not indicate that the sheer number of alerts or volume of interventions are responsible for causing alert fatigue. Rather, there are a variety of factors which can create conditions ripe for over-alerting. Multiple studies^{iii,iv} have reviewed key traits of alerts which are commonly overridden or ignored. Interventions which contribute to alert fatigue are frequently:

- **Not relevant to the patient or clinical scenario**

Decision support which takes into account patient-specific information, such as recent lab values or vital signs, allows for highly targeted interactions with providers. When alerts are introduced that do not evaluate other factors, providers can become frustrated by the interventions.

- **Displayed at the wrong time in the workflow**

Understanding the clinical workflow is crucial to providing meaningful decision support. Alerts or reminders that are presented too late or too early are unlikely to have the intended effect and may interfere with patient care. Decision support should be presented at a time when the clinician is able to consider the recommendation being offered and adjust care if appropriate.

- **Not evidence-based**

Many organizations choose to create their own decision support based on the recommendations of a single clinician or small group of clinicians. Providers may be less likely to follow recommendations that do not cite a clear source of evidence. In one study of alert efficacy, physician reviewers noted that “more than one-third of all alerts [in the studied practices] lacked an adequate scientific basis or were not clinically useful.”^v

- **Targeted to the incorrect provider**

When providers are consistently presented with alerts regarding recommendations that are irrelevant to their treatment focus or scope of practice, alert fatigue may set in as providers assume that none of the alerts displayed are applicable to them.

- **Contradictory to other decision support**

As more decision support gets deployed in EMRs, the possibility of conflicting recommendations increases, especially for complex patients with multiple comorbidities. Providers can be irritated by interventions offering incompatible recommendations.

- **Poorly updated or maintained**

As recommendations change with new research, it is important to update decision support to reflect current best practices. As organizations introduce more decision support, the volume of maintenance becomes increasingly burdensome. Many organizations do not have effective protocols in place for evaluating and updating decision support.



“Understanding clinician workflow, particularly when designing applications for the outpatient setting, is critical... Success with alerts, guidelines, and algorithms depends substantially on integrating suggestions with practice.”ⁱⁱⁱ

Fatigue Can Be Prevented and Overcome

With careful planning and execution, alert fatigue can be avoided when deploying clinical decision support. Even when fatigue has already set in, conscientious maintenance of decision support tools and recommendations can result in restored efficacy.

Consider the following steps to reduce fatigue and provide users with beneficial decision support:

- ✓ Keep the “Five Rights” of clinical decision support to the forefront when implementing new recommendations: the right information, to the right person, in the right intervention format, through the right channel, at the right time in workflow. (See “Additional Resources” for more information about the “Five Rights”.)
- ✓ Create a plan for monitoring decision support to ensure it is functioning appropriately. This plan should not only include initial monitoring when content is first deployed, but ongoing monitoring to allow for analysis of trends and outcomes.
- ✓ Be proactive in disabling or removing interventions which are not functioning as designed, and plan for an iterative process to improve effectiveness.
- ✓ Plan to devote resources to maintaining and updating existing content, in addition to creating new content. Create a schedule for regular clinical reviews of deployed interventions to ensure they are up-to-date with current recommendations.
- ✓ Seek feedback from providers regarding implemented decision support, and make updates as appropriate based on input from providers.
- ✓ Supplement electronic interventions with education and other interactions to reinforce best practices.



“...a systematic, proactive approach to knowledge management will help organizations avoid a tangled, inconsistent mass of interventions, and potentially save significant time and energy as the program grows and matures.”^{vi}

About Stanson Health

Stanson Health provides point-of-care decision support embedded into the electronic medical record. Evidence-based, physician-designed logic drives Stanson alerts, ensuring that an alert will only fire when the patient meets a specific profile and will offer recommendations relevant to the physician's decision. Physicians do not need to alter their workflow to access pertinent recommendations because the system ensures that the alert will fire when appropriate.

In addition to the extensive clinical review process used to create Stanson alerts, all content is extensively vetted in a large, academic community hospital through a standardized process of implementation, testing, optimization, and redeployment. The logic and structure of each intervention is monitored, evaluated, and improved upon based on daily use by practicing physicians.

Additional Resources:

Ten Commandments for Effective Decision Support: In an effort to share lessons learned regarding the creation of effective clinical decision support, clinicians from Brigham and Women's Hospital, Partners Healthcare System, and Harvard Medical School offer their best practices.

Grand Challenges in Clinical Decision Support: A 2008 article in the Journal of Biomedical Informatics identifies a ranked list of the top 10 challenges in creating and implementing effective decision support. Although electronic-based decision support has progressed significantly since the article was first published, nearly all the challenges presented are still relevant today.

The Five "Rights" of Clinical Decision Support: Foundational recommendations for the design and implementation of electronic CDS.

References used:

ⁱ Feblowitz J, Henkin S, Pang J, Ramelson H et al. Provider Use of and Attitudes Towards an Active Clinical Alert: A Case Study in Decision Support. *Appl Clin Inform*. 2013; 4(1): 144–152. Published online Mar 27, 2013. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3644821/>, accessed 7/16/14

ⁱⁱ Carspecken CW, Sharek PJ, Longhurst C, Pagelar NM. A Clinical Case of Electronic Health Record Drug Alert Fatigue: Consequences for Patient Outcome. *Pediatrics*. peds.2012-3252; published ahead of print May 27, 2013, doi:10.1542/peds.2012-3252. <http://pediatrics.aappublications.org/content/early/2013/05/22/peds.2012-3252.full.pdf+html>, accessed 7/16/14

ⁱⁱⁱ Bates DW, Kuperman GJ, Wang S, Gandhi T, Kittler A, Volk L. et al. Ten Commandments for Effective Clinical Decision Support: Making the Practice of Evidence-Based Medicine a Reality. *J Am Med Inform Assoc*. 2003;10(6):523–530. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC264429/>, accessed 7/16/14

^{iv} Hayward H, Thomson F, Milne H et al. 'Too much, too late': mixed methods multi-channel video recording study of computerized decision support systems and GP prescribing. *J Am Med Inform Assoc*. 2013;20:e1 e76-e84 Published Online First: 7 March 2013 doi:10.1136/amiajnl-2012-001484 <http://jamia.bmj.com/content/20/e1/e76.full>, accessed 8/1/14

^v Isaac T, Weissman JS, Davis RB et al. Overrides of Medication Alerts in Ambulatory Care. *Arch Intern Med*. 2009;169(3):305-311. doi:10.1001/archinternmed.2008.551. <http://archinte.jamanetwork.com/article.aspx?articleid=414786>, accessed 7/16/14

^{vi} Sirajuddin AM, Osheroff JA, Sittig DF, Chuo J, Velasco F, Collins DA. et al. Implementation Pearls from a New Guidebook on Improving Medication Use and Outcomes with Clinical Decision Support. *J Healthc Inf Manag*. 2009;23(4):38–45. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3316472/>, accessed 8/1/14

Osheroff JA, Pifer EA, Teich JM, et al. *Improving Outcomes with Clinical Decision Support: An Implementer's Guide*. HIMSS; Chicago: 2005

Sittig D, Wright A, Osheroff J, Middleton B, Teich J, Ash A, Campbell E, Bates D. Grand challenges in clinical decision support. *J Bio Inform*. 2008;41:387–392. <http://www.sciencedirect.com/science/article/pii/S1532046407001049>, accessed 7/16/14