Evaluating Clinical Decision Support Fire Rates To Guide Activation Decisions in the Production Environment

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Introduction
At Partners Healthcare the Clinical Informatics (CI) team develops and maintains Clinical Decision Support (CDS) interventions utilized within a commercial enterprise Electronic Health Record (EHR). CDS development occurs in ongoing phases from request to implementation, known as the "CDS lifecycle". [1] The CDS Committee provides governance over the release of CDS interventions. These interventions consist of various types of CDS, targeting a variety of intended recipients at different points within the workflow. Over-alerting may increase the risk of alert fatigue and cause providers to ignore important CDS interventions. The behavior of CDS interventions should be evaluated early, even prior to activation when possible, in order to identify and correct potential problems before the end user is exposed to false alerting.[2] The aim of this project was to develop a mechanism to evaluate CDS fire rates to guide decisions for activation in the Production environment. Inherent functionality within the EHR exists, enabling CDS interventions to be set in a "silent" mode, thereby allowing for an analysis of CDS activity prior to full activation.

Process
Clinical Informaticians and Knowledge Engineers were involved in the development and implementation of a pre- and post-activation process for evaluating CDS alert rates and follow-up actions. The process was designed to be an efficient and consistent way to review CDS fire rates to guide go-live decisions. Evaluation of firing rates prior to activation is intended to identify any unusual or unanticipated firing activity thereby allow for an adjustment prior to activation. The process also allows for the documentation and tracking of CDS Committee decisions as well as any required follow-up actions before or after activation.

Tools
To monitor the CDS interventions, alerting data from the EHR system are uploaded to a SQL Server database on a daily basis. The daily extracts from the production environment ensures a review using the most up to date CDS firing activity data. Customized queries aggregate the data from the SQL Server, and are visualized as graphs in a CDS monitoring tool. A link to a CDS specific firing activity graph was added to a separate CDS tracking tool. We use a dashboard within the CDS tracking tool to organize our pre- and post-activation evaluation activities, enabling an efficient weekly review and recommendation to the CDS Committee. Each CDS is evaluated for at least 14 days prior to activation.

Discussion
The pre-activation monitoring process has been implemented and is serving its intended purpose. The ability to monitor the fire rate of CDS interventions prior to activation is extremely valuable to proactively identify inappropriate fire rates. Designing a method to efficiently capture and display fire rates for each CDS intervention was challenging. The team recognizes that this is an iterative process and the recent adoption will guide further stepwise improvements. Further enhancements include visualizing CDS life cycle milestones, visualizing expected fire rates and anticipating user behavior that would facilitate decision making prior to activation.

References
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