

# Historical Data Dependency Analysis to Guide CDS Implementation Readiness

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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). These interventions leverage a variety of clinical data captured within the EHR. Some clinical data were formerly captured and stored in Partners' legacy EHRs. In preparation for the vendor EHR implementation in 2015, some of that historical data were converted to the new system. Prior to implementation, 58 CDS interventions were identified as depending upon historical data that was not converted or was not captured in the legacy system. There was concern that a lack of this historical data would generate over-alerting (false positive firing). Over-alerting may increase the risk of alert fatigue and cause providers to ignore important CDS alerts.<sup>1</sup> To curtail false positive firing, any intervention determined to have a historical dependency constraint was temporarily deferred from release. Historical data dependencies could also result in under-alerting (false negative firing), but this was deemed to be a less compelling reason to defer implementation of the intervention. The aim of this project was to perform a post implementation analysis of historical data constraints for the 58 deferred interventions and to provide readiness recommendations for implementation.

## Methods

A review of each of the 58 interventions that had been deferred was completed with each tagged with the type of historical data dependency constraint: a) procedures, b) surgical history, c) appointment or referral, and d) other. Each dependency type was then assessed to determine if, when, and how the historical data had been converted. Additionally, each intervention was analyzed to determine how far back in time it depended on the historical data. This look back assessment was done to establish if the dependency was still relevant or if ample time had passed since implementation. A historical data constraint risk was then determined for each intervention based on the existing constraint type categories and the CDS criteria look back time interval: 1) no risk, 2) false negative alert risk and 3) false positive alert risk. A readiness recommendation for implementation was done for each intervention based on the associated risk.

## Results

The breakdown of historical data dependencies by type is as follows: a) procedure =42, b) surgical history=17, c) appointment or referral=15 and d) other=2. Twenty-one interventions were tagged with more than one data dependency. Fifty percent (N=29) of interventions depended upon historical data that had since been converted, whereas 45% (N=26) relied on data that had not been converted or had not been captured in the legacy system. Of those 26 interventions, 11 relied on historical data with a time interval look back of one year or less. The other 15 interventions had a time interval greater than one year. Taking into consideration the data conversion results and the look back time intervals, 55% (N=32) of interventions no longer had a historical data constraint risk, 41% (N=24) of interventions were determined to have a risk of false positive alerting, and 3% (N=2) of interventions were determined to have both a false positive and false negative alert risk. As a result of this analysis we concluded that the 32 interventions with no historical data constraints were ready for implementation whereas the 26 interventions with remaining constraints were not ready for implementation without additional safeguards.

## Discussion

Upon discussion with CDS leadership, it was decided that the interventions without historical data risk would move through the typical CDS lifecycle, which includes a period of routine monitoring. The interventions with remaining historical data dependency constraints would move through the CDS lifecycle however would undergo stringent alert activity monitoring prior to implementation. Additionally, whereas many months had passed, all 58 interventions, regardless of risk, would first be reevaluated for relevancy as well as alignment with EHR configuration.

## References

1. Beelera P., Bates D., Huye B., (2014). Clinical decision support systems. *Swiss Medical Weekly*. 2014;144:w14073: 3-7.