Study Shows Automated Prediction Alert Helps Identify Patients At Risk For 30-Day Readmission

An automated prediction tool which identifies newly admitted patients who are at risk for readmission within 30 days of discharge has been successfully incorporated into the electronic health record of the University of Pennsylvania Health System. The tool, developed by researchers at the Perelman School of Medicine, is the subject of a study published in the December issue of the *Journal of Hospital Medicine*.

The all-Penn team found that having been admitted to the hospital two or more times in the 12 months prior to admission is the best way to predict which patients are at risk for being readmitted in the 30 days after discharge. As a result of this finding, the automated tool is now able to identify patients as being "high risk" for readmission and creates a "flag" in their electronic health record. Upon admission of a high-risk patient, the flag appears next to the patient's name in a column titled "readmission risk." The flag can be double-clicked to display detailed information relevant to discharge planning including inpatient and emergency department visits over the previous 12 months, as well as information about the care teams, lengths of stay, and problem(s) associated with those prior admissions.

"The results we've seen with this tool show that we can predict, with a good deal of accuracy, patients who are at risk of being readmitted within 30 days of discharge," said lead author Charles A. Baillie, MD, an internal medicine specialist and fellow in the Center for Clinical Epidemiology and Biostatistics at Penn Medicine. "With this knowledge, care teams have the ability to target these patients, making sure they receive the most intensive interventions necessary to prevent their readmission."

Interventions proven to help reduce 30-day readmissions include enhanced patient education and medication reconciliation on the day of discharge, increased home services to provide a safe landing, follow up appointments soon after discharge, and follow-up phone calls to ensure an extra level of protection. In the process of medication reconciliation, pharmacists compare a patient's current hospital medication orders to all of the medications that the patient was taking at home prior to their hospital admission. This is done to avoid medication errors such as omissions, duplications, dosing errors, or drug interactions.

In support of the study, the Penn Medicine Center for Evidence-based Practice identified in the published literature a number of variables associated with readmission to the hospital, including: prior admissions, visits to the emergency department, previous 30-day readmissions, and the presence of multiple medical disorders.

Using two years of retrospective data, the team examined these variables using their own local data and found that a single variable – prior admission to the

hospital two or more times within a span of 12 months – was the best predictor of being readmitted in the future. This marker was integrated into the electronic health record and was studied prospectively for the next year. During that time, patients who triggered the readmission alert were subsequently readmitted 31 percent of the time. When an alert was not triggered, patients were readmitted only 11 percent of the time.

"By automating the process of readmission risk prediction, we were able to provide risk assessment quickly and efficiently in real time, enabling all members of the inpatient team to carry out a coordinated approach to discharge planning, with special attention paid to those identified as being at the highest risk for readmission," said Craig A Umscheid, MD, MSCE, assistant professor of Medicine and Epidemiology, director of the Penn Medicine Center for Evidence-based Practice, and senior author on the study.

The risk assessment tool is part of a series of steps taken by Penn Medicine to reduce readmissions.

"Readmission rates should improve over time as the risk flag is used more routinely and the interventions necessary to reduce readmission rates for those identified as high risk are implemented," said Baillie.

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