

## CONFERENCE ABSTRACT

# Big data combined with clinical insight: identification of patients at-risk for 30-day readmission to be included in prevention interventions

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**Introduction:** Increasingly, big-data electronic health record (EHR) warehouses are used for targeted readmission prevention programs (RPPs). However, the ability of EHR tools to accurately detect the "appropriate" patients for RPP according to personal and clinical characteristics (termed "care-sensitivity") is not known. We aimed to examine the ability of a previously validated EHR 30-day readmission prediction risk tool (the Preadmission Readmission Prediction Model [PREADM](1) to detect care-sensitive patients for inclusion in RPPs.

**Methods:** Physicians and nurses from internal medicine wards of 3 general hospitals in Israel's Clalit Health Services were asked to complete a questionnaire on the personal and clinical characteristics of discharged patients. We examined the degree of concordance between the PREADM (prediction score > 40, 60% of the sample) and the clinicians' classification of high-risk patients, and the likelihood for readmission according to each. Decision trees applying CART were used on PREADM high-risk patients, to classify the patients by whether they are likely to be readmitted, using the questionnaire responses.

**Results:** A total of 817 questionnaires on 375 patients (discharged to their home) were completed by physicians and nurses. Ninety-one patients (24.3%) had a 30-day readmission. There was concordance between high-risk PREADM classification and the nurses' and physicians' assessments in about two-thirds of patients. Lack of concordance was found in: (a): 23% of patients with a high PREADM score and a low-risk assessment by the nurses, in which the actual readmission rate was 20% ; and (b) 12% of patients with a low PREADM-score and a high-risk assessment by the nurses, which had a 33% readmission rate. Conversely, physicians' classification had poorer detection than the PREADM.

Decision tree models showed that the following questions were useful in identifying high-risk patients: does the patient receive a new drug that requires follow-up (risk for readmission 38% if yes vs 24% if no); and does the patient need special equipment at home (risk of readmission 61% if yes vs 23% if no).

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**Discussions:** Among about a third of patients, the nurses' assessment was more accurate than the PREADM model, when a high-risk score cutoff of >40 was used, while the physicians' assessment was worse than that of the model. The clinical data from nurses about new drugs and special equipment needed at home helped differentiate a higher-risk population from those at lower risk of readmissions.

**Conclusions:** Combining EHR data with insight from hospital nurses regarding patients' clinical and personal characteristics provides more "care-sensitive" information, which can allow better adaptability and synchronization across different healthcare providers and better selection of patients for inclusion in RPPs.

**Lessons learned:** While the EHR predictive algorithms can identify most patients at very high risk of readmissions, the nurses are able to target additional patients who are suitable for inclusion in RPPs with a few simple questions during the hospital stay.

**Limitations:** A convenience sample of patients.

**Suggestions for future research:** Whether a combined "care-sensitive" model is able to better classify readmission risk remains to be tested to improve the predictive tools.

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**Keywords:** readmission prediction; electronic health records; care-sensitivity

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