Comparing Different Predictive Models

Dean Boyer Chief Technology Officer

❑ Successfully Predicting Results

❑ Understanding Predictive Models

❑ Readmissions - Premise and Imperative

❑ Different Predictive Models for Readmissions

❑ Selecting the right model.

❑ **Predictive Analytics** - Business Intelligence techniques that analyze current and historical facts to make predictions about future outcomes.

❑ **Predictive Modelling** – Statistical techniques that use a defined set of historical and transactional data used to identify risk and opportunities.

❑ **Predictive Modelling Process**:

    ❑ Collect predictors (facts).

    ❑ Formulate statistical models.

    ❑ Validate Predictions.

    ❑ Revise model as additional data becomes available.

Predictive Modelling success is measured by the value of the actionable results generated by the applied predictions.

❑ **Premise** – CMS as well as commercial payers are evaluating the degree to which readmissions for the following conditions are acceptable and/or justified.

 ❑ AMI Acute Myocardial Infractions

 ❑ HF Heart Failure

 ❑ PN Pneumonia

 ❑ COPD Chronic Obstructive Pulmonary Disease

 ❑ THA Total Hip Arthroplasty

 ❑ TKA Total Knee Arthroplasty

❑ **Imperative** – Payer take stand to reduce cost of unnecessary readmissions for the aforementioned list of high cost conditions. Medicare is leading the charge in penalizing hospitals for readmissions within 30 days of discharge for what they deem to be preventable.

In order to reduce exposure to Readmission penalties by CMS and what could amount to all payers hospitals are looking to incorporate predictive modelling techniques.

Predictive Models:
  Generic:
    LACE ==> Tested at 11 Ontario CN Hospitals
    MCH ==> Tested at 6 US Academic Medical Centers
  Commercial:
    PARR ==> Tested NHS England
    HUM ==> Tested NHS England
    CPM ==> Tested NHS England
    ACG® ==> Tested by John Hopkins in Minnesota
    PPR ==> Tested by 3M
    Pra™ ==> Tested in Germany, England Switzerland
    PraPlus™ ==> Tested in Germany, England Switzerland

Generic Model

Model	Population	Predictors			Comments
		Questionnaire	Historical Data	Trans. Data	
LACE	4,812	No	☒	☒	
MCH	10,946	Yes	☒	☒	

Lace Predictors	MCH Predictors
Length of Stay	Insurance Status
Charleston comorbidity index	Marital Status
Acuity of admission	Having Regular Physician
Emergency Room visits in the past 6 mos.	Charleston comorbidity index
	Short form 12 score
	Prior hospital admission with 12 mos.
	Hospital LOS > 2 days

Commercial Predictive Models

Model	Population	Predictors			Comments
		Questionnaire	Historical Data	Trans. Data	
PARR	10% sample from all NHS Hospitals	N/A	☒	☒	PARR 30 – 17 Predictors PARR ++ 250 Predictors
HUM	Not Available	N/A	☒ Secondary Care	N/A	Focus on Stratification of need.
CPM	Not Available	N/A	☒	☒	More enhanced than PARR, involves data mining stratifies populations with risk banding
ACG®	93,588 (MN)	N/A	☒	☒	Used APR-DRG data
PPR	Not Available 3M Test Pop.	N/A	☒	☒	3M Product uses APR-DRG severity of illness
Pra™ & PraPlus™	9,713 people > = 65	Yes	N/A	N/A	Appeals to payer community

- ❑ Causation and Correlation
  - ❑ Cause and Effect (Causality Questionnaire)
  - ❑ Correlation the size and the relation between predictors

- ❑ Behavior vs. Disease
  - ❑ Is readmission a social event of the population?
  - ❑ Is readmission the effect of poor communications?

- ❑ What's Actionable?

- ❑ What's Available?

- ❑ Population Validation!
  - ❑ Why are so many models European?

Thank you

Dean Boyer
Chief Technology Officer