GDE Analytics: A Journey into Data Science

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Our Data Science Journey

• Why data science?
• Recruitment & creating the team
• Examples of work
• The challenges
• What’s next?
Why Data Science?
GDE & Data Science

A Global Digital Exemplar is an internationally recognised NHS provider delivering exceptional care, efficiently, through the use of world-class digital technology and information. Exemplars will share their learning and experiences to enable other trusts to follow in their footsteps as quickly and effectively as possible.
Exemplary Analytics?

Funding agreed for a Data Science team!

GDE Allocation

£10m

- Technology-Focused
- Data Science
Recruitment

- 22 Applicants
- 8 Short-listed
- 8 Interviewed (!)

- 3 Appointed from Interview

- 1 Appointed Internally
Data Science Approach

Team Contribution
Programme of Work

- Unwarranted variation
- Patient Flow
- Patient Deterioration
- Preventing Readmissions
- Preventing Admissions
- Risk Stratification
Renal Patients
Prediction of Deterioration in Patients

- Build a prediction model that can predict patients who are likely to deteriorate within the time frame of dialysis during their visit.

Managing the patient journey

Patient Visit

Pre measurement of Physiological parameters

Patient Assessment

Dialysis

Predictive model

Patient Outcome?
Input data: sources: Two years (2016 - 2017)

Records: 38684 and columns: 23

- c_Pre_Dialysis_BP_Systolic
- c_Pre_Dialysis_BP_Diastolic
- c_Pre_Dialysis_Pulse_Rate
- c_Pre_Dialysis_Weight
- c_Pre_Dialysis_Temperature
- c_Pre_Dialysis_Blood_Sugar
- c_Pre_Dialysis_Respiratory_Rate
- c_Time_commenced_dialysis_hr
- c_Time_commenced_dialysis_min
- Interdialytic_Weight_Gain
- Weekly_Schedule
- Age
- previous_c_Post_Dialysis_BP_Systolic
- previous_c_Post_Dialysis_BP_Diastolic
- previous_c_Post_Dialysis_Pulse_Rate
- previous_c_Post_Dialysis_Weight
- previous_c_Post_Dialysis_Temperature
- previous_c_Post_Dialysis_Blood_Sugar
- previous_c_Post_Dialysis_Respiratory_Rate
- previous_c_Actual_time_on_dialysis_mins
- Weightloss
- BloodFlow
- c_Site

Sample of the R code

```r
#Training the model
library("rpart")
Rp_model <- rpart(DeteriorationFlag ~ ., data = training_set, method = 'class')

#Testing the trained model
pred.rp <- predict(Rp_model, test_set,type = 'class')[
```
Results from model testing

01/01/2018 - 20/04/2018

Total No of Visit : 6050
Number of Patient : 295
No of correct prediction : 5939
No of Incorrect prediction : 111
Risk Stratification predictive model
Overview

• Risk Stratification is a tool to assist in the identification of people who are at most risk of (re)admission to hospital.

• Creating an algorithm which segments the Salford population into risk categories:
  – High (76-100%)
  – Moderate B (51-75 %)
  – Moderate A (30-50 %)
  – Low (0-29%)
Data – Salford Integrated Record (SIR)

- Demographic
  - Age, sex, IMD based on postcode

- Inpatient
  1. Clinical findings – Cerebral palsy, circulatory, digestive, UTI, alcohol
  2. Inpatient utilisation – Emergency admission in past 12 months, non-emergency admission in past 24 months

- GP
  1. Diagnosis
  2. Drugs
  3. Long term conditions
  4. Frailty indicators

- Outpatient
  1. OP visit following an emergency admission
  2. OP visit with referral from a GP
  3. OP visit with outcome 'Another appointment given'

- Outcome variable – An emergency admission in the next 12 months
Model output

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Challenges

- Managing Expectations
- Research & Development Approach
- Clinical Engagement & Value
- Understanding & Knowledge
- Operationalisation
Next Steps

• Collaboration is key
• Wider engagement – internal & external
• More “wicked problems”
Any Questions?

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