SMU
SINGAPORE MANAGEMENT UNIVERSITY

School of
Information Systems

ANLY482 - Analytics Practicum

Project Proposal

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Table of Contents

1. Version

Version	Change Description	Author	Date
1.0	**Initial Draft**	**Trecia, Luqman**	**24/01/2015**

2. Background

Length of stay (LOS) in hospital for inpatient treatment is a measure of crucial recovery time and is often used as a measure of hospital performance and a proxy of hospital resource consumption.

LOS is an indicator that will help JHS predict the LOS of patient based on history or diagnosis for previous emergency or hospital admissions. JHS has identified factors affecting LOS. These factors are diagnosis, discharge planning, functional history of patient, medical history and social history/causes. Based on these factors it is crucial for JHS to plan their management as consumption of hospital resources such as bed occupancy rates might not be sufficient or given to patients who need it more. By predicting the LOS, they will be able to react earlier when faced with such a problem, which will improve the health care policies and health services. Another crucial factor for JHS in analysing LOS is for JHS to perform capacity planning for the new Ng Teng Fong General Hospital slated to be in operations in 2015.

On the other hand, from the patient's point of view, LOS might be a variable to determine the quality of life. There are factors such like functional history (home-bound or bed-bound) or social issues that lengthen the average length of stay (ALOS) in hospital. This is particularly an issue that affects the family members; if care is not available this will result in longer LOS and in some instances patient might be referred to intermediate and long-term care center (ILTS). Besides, this gives an opportunity for cooperation between JHS and family members to resources in the community to better provide care for patient not only in terms of medical support but also support after they have been discharged through the integrated care pathway (ICP) programme.

Currently JHS is using logistic regression to predict if a patient will stay longer than 7 days and is 70% accurate. To make it easily understandable by clinicians, factors for LOS are given a risk score. However, it does not take into account the trends of LOS to address contributing factors towards longer LOS. Currently there have been no studies or detailed information on the analysis of factors contributing to longer LOS, clinicians predict LOS based on experience and judgement.

This paper attempts to study various model and methods to analyze the trends of LOS using mixed model, decision trees or simple regression analysis. We also aim to improve the rate of accuracy through factoring more variables into the prediction model. Through the analysis, we hope to gain insights from the data and address the contributing factors towards longer LOS.

3. Objective

- Business objective: to identify the contributing and confounding factors that affects LOS and give recommendations to better help in hospital manage its resources and improve its treatment for patient.
- Technical objective: To use data analytics techniques such like exploratory data analysis (EDA), and statistical methods to study and gain insights from the data to identify patterns that aid business objective. We will explore the use of data mining if there is time.

4. Scope

- Perform data cleaning on the data set received to consolidate the important fields that are required for analysis.
- Perform EDA to identify patterns that will help in the study of LOS.
- Explore the various methods (mixed model, decision trees, simple regression analysis) to improve the prediction for LOS.

5. Data Required

For the project, the data sets are provided by Jurong Health Services (JHS).

6. Deliverables

- A detailed report to explain the study and recommendations to improve LOS
- A detailed description and interpretation of the analysis procedures that has been used in various models.

7. Dependency

Dependency	Description
People	JHS team schedule and availability
Data	Data will only be given in February. No dates given by JHS on when the data will be available.
Technical Skills	No dependencies

8. Stakeholders

a. Project Supervisor

Prof Kam Tin Seong, Associate Professor of Information Systems; Senior Advisor, SIS Programmes in Analytics

b. Project Members

i. Koh Ying Ying Trecia

ii. Luqman Haqim Bin Ab Rahman

c. Project Sponsor

Christine XU and FU Yue, Medical Affairs, Jurong Health Services

9. Schedule

	Weeks/ Date	Task	Milestone
Midterm	Week 1 05/01/2015	Source and analyse projects available	
	Week 2 12/01/2015	Finalized on project topic	
	Week 3 19/01/2015	Readings related to project Proposal development Update proposal + wiki	
	Week 4 26/01/2015	Research on various model for analysis Data gathering: ● Collect data from JHS	Proposal + Wiki Due Date: 26/01/2015
	Week 5 02/02/2015	Data exploration and cleaning EDA Process Explore Model 1 - Simple regression model (Linear/Logistic) Observe and record findings	
	Week 6 09/02/2015	Test data and Refine Model 1 Analysis & Reporting of Model 1 Prepare for Midterm Update relevant document, wiki and project progress	Mid-term Presentation Progress Report + Wiki Due Date: TBC
	Week 7 16/02/2015	Study on mix model and decision trees	
	Week 8 23/02/2015	Explore Model 2 - Decision Trees Observe and record findings for model 2 Test data and Refine Model 2	
	Week 9 02/03/2015	Analysis & Reporting of Model 2 Update relevant document, wiki and project progress	

Finals	Week 10 09/03/2015	Explore Model 3 - Mix model Observe and record findings for model 3 Test data and Refine Model 3	
	Week 11 16/03/2015	Analysis & Reporting of Model 3 Update relevant document, wiki and project progress	
	Week 12 23/03/2015	Study all research and analysis findings Interpreting and comparing models Record findings and documentation	
	Week 13 30/03/2015	Finalized analysis result Final Research Paper write up Update relevant document, wiki and project progress	
	Week 14 06/04/2015	Submission of Final Report, Poster	Final Presentation Final Report,Poster, Wiki Due Date: TBC