



Singapore Healthcare
Management 2021

Gazing the Crystal Ball – Optimizing Bed Utilisation Through Accurate Prediction of Bed Availability

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Introduction

Despite the long wait list for its beds, SCH was not able to maximise bed utilization due to the high drop-outs on admission day and unplanned discharges. To understand the phenomena, the team studied the factors that affect supply and demand variations in SCH beds and developed a predictive model and establish stacking admission tool to better forecast bed availability and address potential admission day drop-outs with replacement admissions.

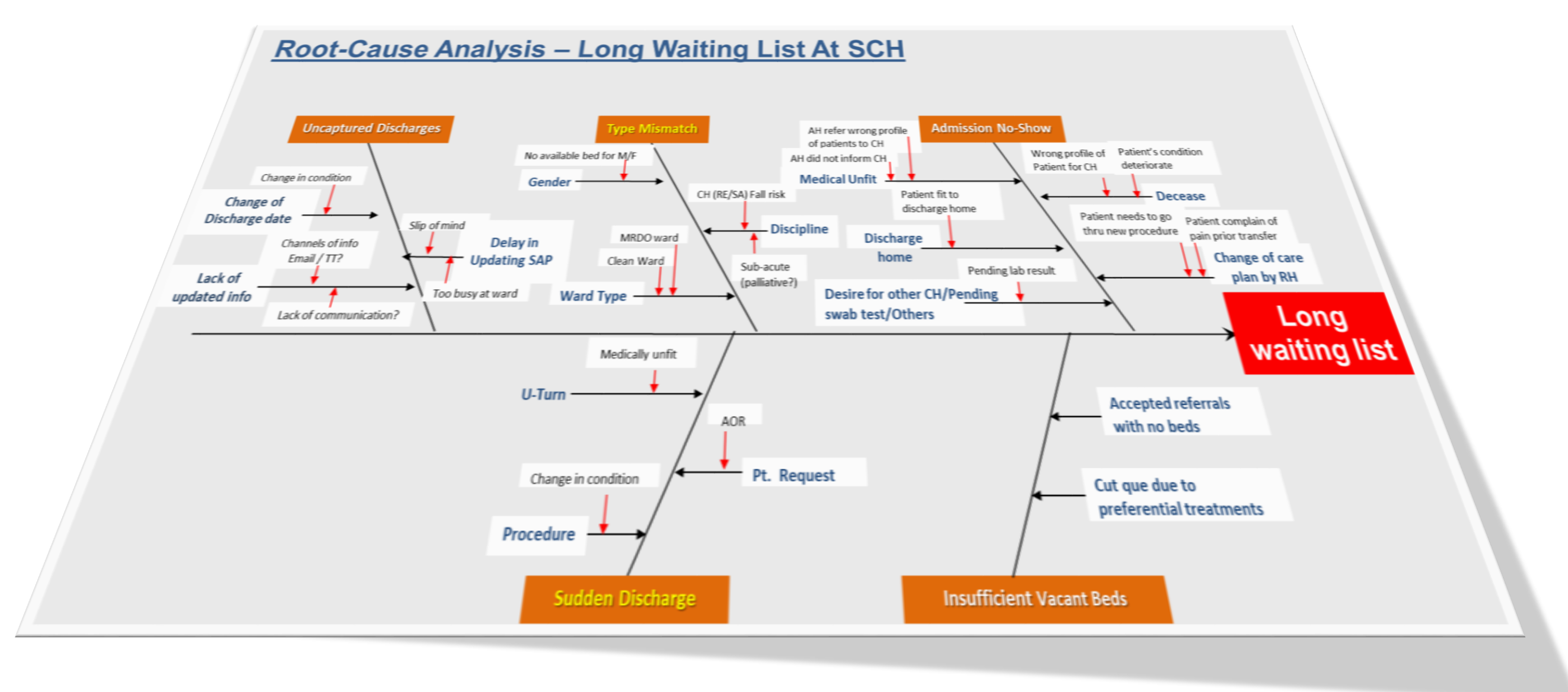
Objectives

1. Establish a mathematical relationship of supply and demand for beds in order to predict bed availability more accurately.
2. With better predictive capability, to stack admission (above the reported beds available) that will enable quick replacement due to changes in planned admissions and discharges.
3. Improve BOR through optimal bed utilization.

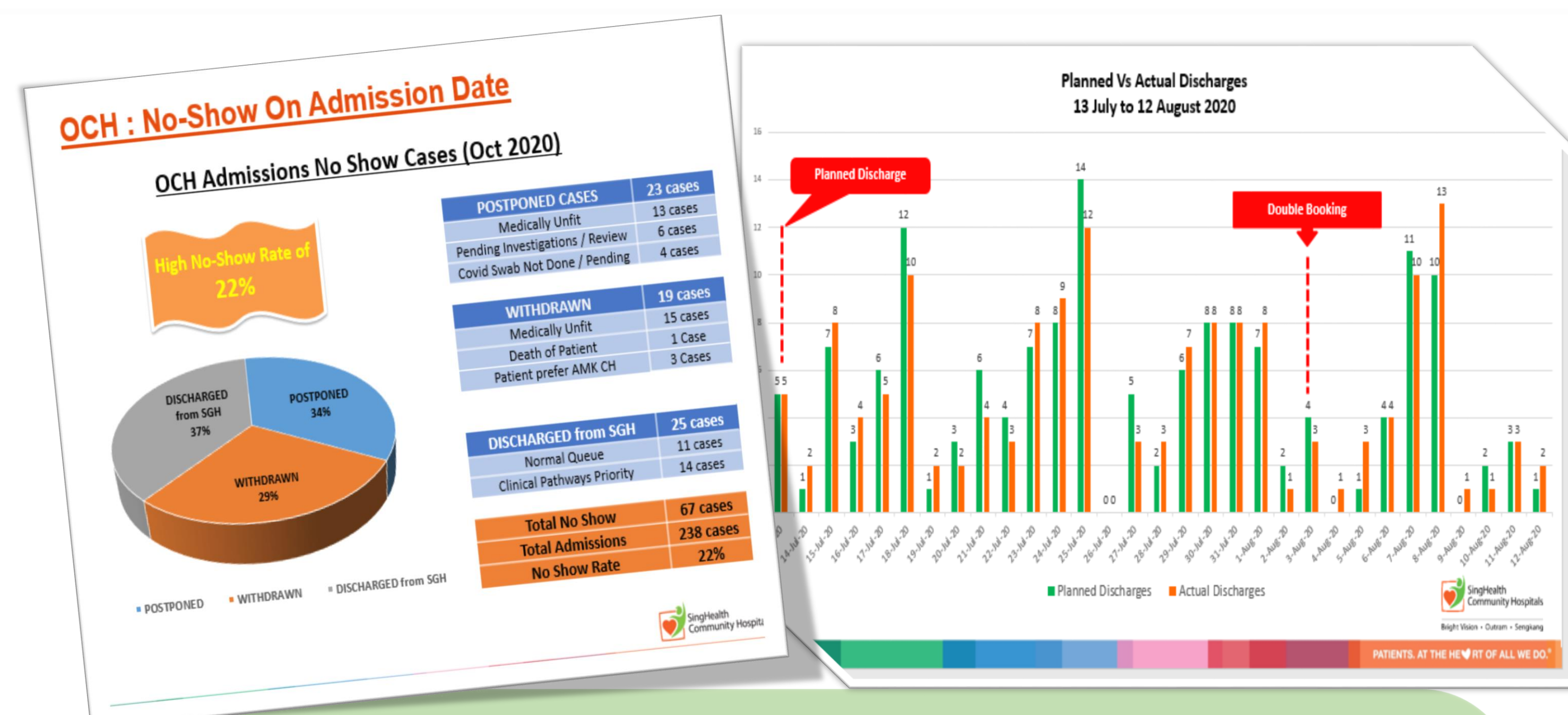
Method

A group of Finance staff from the Business Liaison Office (BLO) came together to;

- Conduct a **fish bone analysis** of the factors that affect the long wait lists at OCH and the lack of beds thereof.
- **Identify causal-relationship** between those factors & the reasons that they occur, the scenarios, contingencies and options available to us.



- **Collate historical data** to support our hypothesis.
- **Analyse the extent** to which the factors contribute to demand and supply variations of beds.
- **Spot trends** and mathematical consistencies.
- Establish findings into a **mathematical relationship**. Using historical rate, create a mathematical relationship to estimate the bed availability.
- **Estimate the variables** (dropout rates) using historical data and trend.
- **Test formula** to check variation & predictive power by varying the dropout rates to mitigate risk of under and over estimation.
- **Stacking admission** - with better predictive power, plan for more admissions taking into accounts potential dropout rates along the way for each of the factors



Mathematical Relationship

Bed Available

=

$$\text{Empty Beds} + \text{Plan Discharges} \times (1 - D_{dr}) - \text{Plan Admission} (1 - A_{dr}) - \text{Ringfenced Beds}$$

where

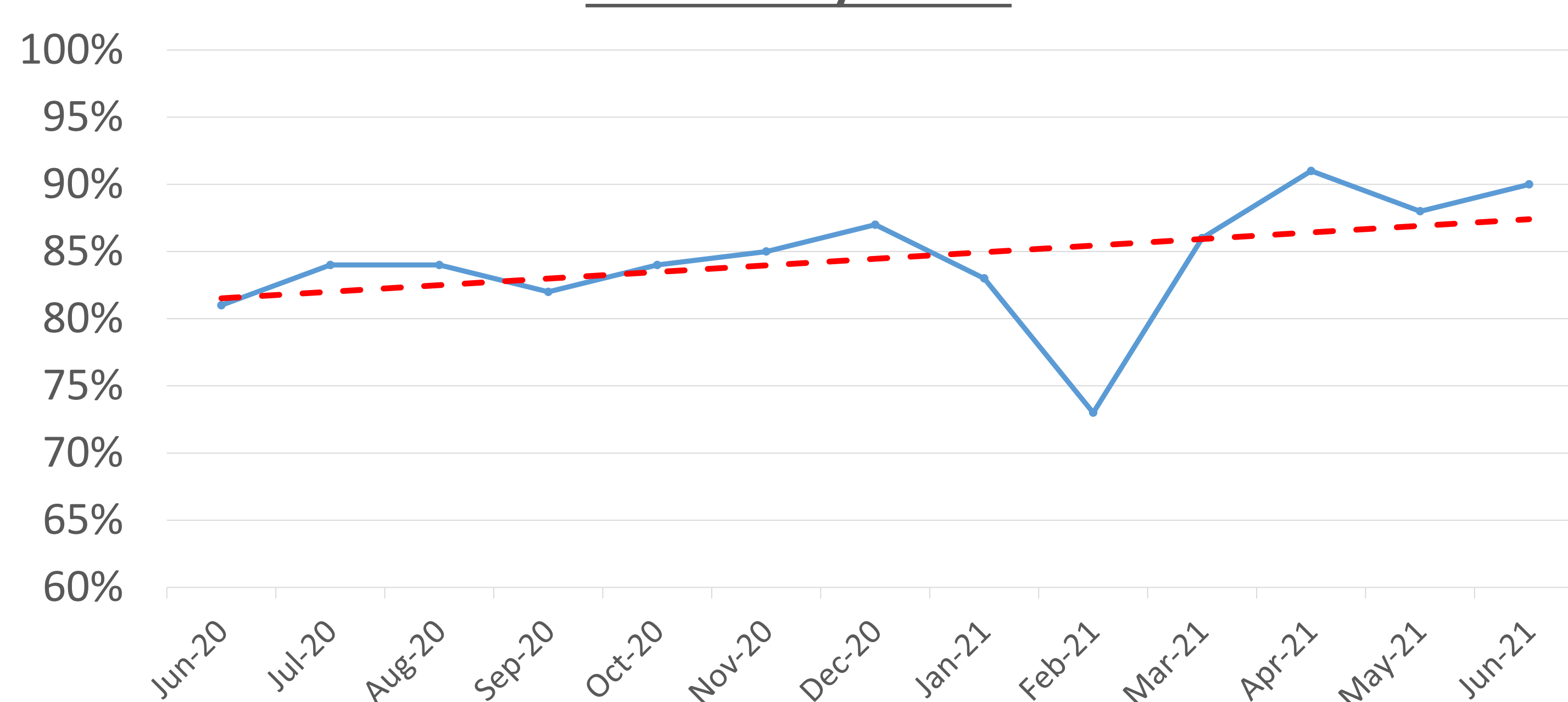
D_{dr} = Discharge Dropout Rate in %

A_{dr} = Admission Dropout Rate in %

Result

- Bed Occupancy Rate (BOR) increased significantly due to better prediction of the bed availability.

OCH BOR by month



- SCH is able to maximize its beds to ease the bed crunch at its co-located Acute Hospital partners.

Conclusion

Today, with adequate demand for its beds, SCH is able to consistently achieved over 90% BOR to assist their co-located Acute Hospitals during their bed crunch situations.

