# REDUCING NON VALUE-ADDED ACTIVITIES IN A SPECIALIST OUT-PATIENT CLINIC

**Department of Industrial & Systems Engineering** 

**IE3100R: Systems Design Project** 

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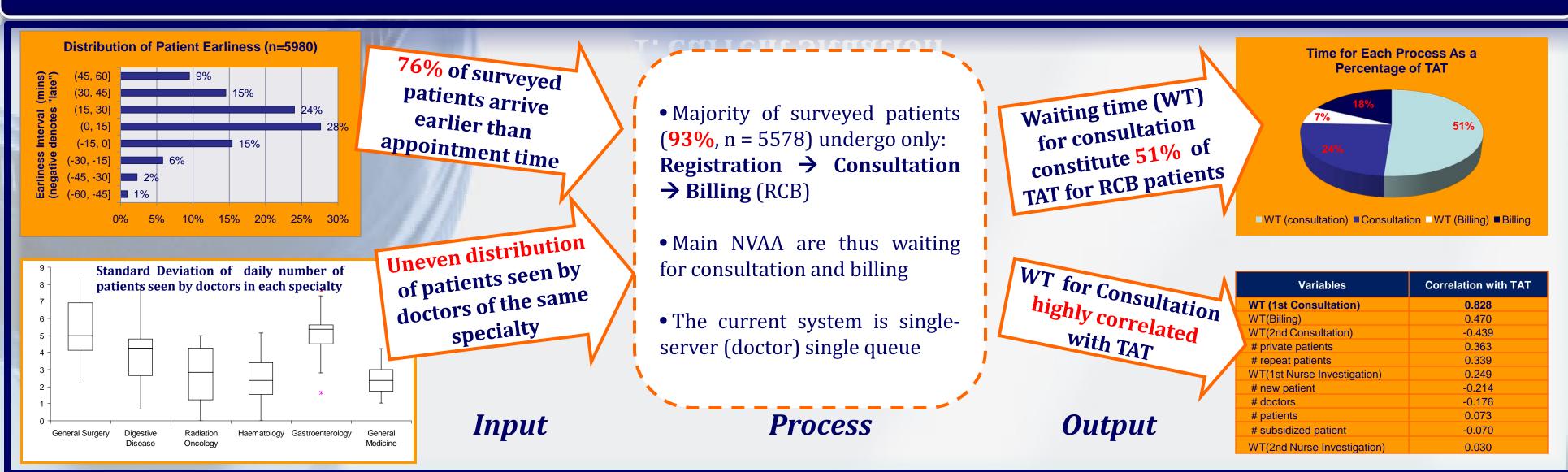
## Background

Tan Tock Seng Hospital (TTSH) is the second largest acute care general hospital in Singapore. Specialist Outpatient Clinic 2A (SOC 2A), one of TTSH busiest clinics, receives up to 500 patients daily, and consists of 6 main specialties. This project focuses on reducing the duration of non value-added activities (NVAA) in SOC 2A to improve its operational efficiency.

## **Objectives**

- Conduct analysis on operational workflow of SOC 2A
- Develop recommendations to reduce the duration of NVAA and therefore decrease the Turn Around Time (TAT) of patients

## 1. Current Situation



## 2. Identify Challenges

#### L. TAT Definition

 Current TAT formula includes earliness of patient which does not reflect the true operational efficiency of SOC 2A.

#### 2. Waiting Time for Consultation

- Reducing this will greatly reduce the TAT.
- 3. Current Queuing Discipline
  - Uneven distribution of patients

#### **Causes of Long TAT** Scheduling Facility **Policies** Appointment TAT Under-Booking Definition utilization of **Doctor** Lack of Consultation Queuing Scheduling **KPI** Discipline Rooms TAT Late for Down Time **Arriving Early for** appointments Appointment High Rollover **Uneven Distribution** Patient-Effect of Patient Arrivals Doctor Ratio Patients Doctors

## 3. Proposed Solutions

## 1. New TAT Formula

- TAT = max (0, end of billing time appointment time or arrival time whichever is later)
- 2. Multiple Server Single Queue
  - Patients will be served once any doctor is free

#### 3. Optimization of Number of Doctor

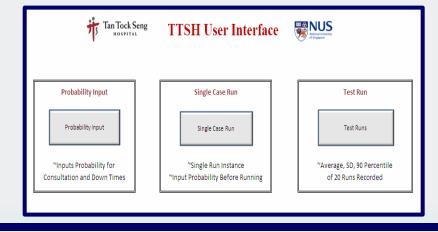
• Determine number of doctors required for each specialty to achieve a certain WT

#### **4.1 Decision Support System**

#### **Purposes:**

- (i) To compare different system designal alternatives
- (ii) To allow TTSH staff to determine required number of doctors for each specialty to achieve a certain waiting time (WT)

#### Platform: Excel



#### **4.1.1 Compare Different System Designs**

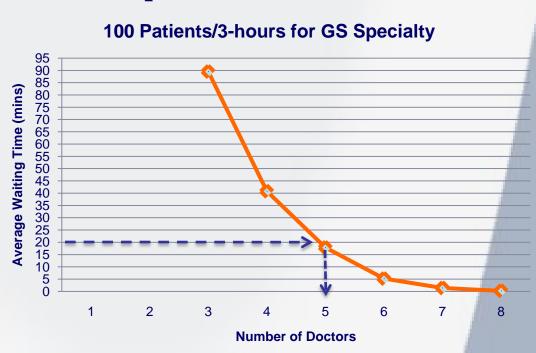
System Design Alternatives	Average Waiting Time for Consultation (mins)					
	Digestive Disease	Gastroent erology	General Surgery	Haematol ogy	General Medicine	Radiation Oncology
Actual	26.24	20.27	21.81	33.84	26.79	14.8
A: Simulation (FCFS)	27.2	22.8	19.6	36.8	26.7	13.6
B: Simulation (FCFS + MSSQ)	5.35	5.11	21.3	5.98	15.8	6.23
C: Simulation (SSSQ + Appointment Based)	23.2	20.9	17.7	32.3	24.1	18.7
D: Simulation (MSSQ + Appointment Based)	3.14	1.06	7.12	5.21	1.72	13.64

FCFS: First-Come First-Serve ; MSSQ: Multi-Server Single-Queue; SSSQ: Single-Server Single-Queue

Alternative D (multi-server single-queue & appointment time based service priority) results in the least average waiting time for consultation

## 4. Simulation

#### 4.1.2 Optimal Number of Doctors



In the above example for *GS Specialty*, 5 doctors is required to achieve a desired average waiting time for consultation of 20minutes when number of patients is 100

### 5. Recommendations

#### To reduce the duration of NVAA and decrease the TAT of patients, here are our recommendations to TTSH:

- ☐ Adopt the new TAT formula
- ☐ Adopt Alternative D (Multiple Server Single Queue & Appointment-time Based Service Priority)
- ☐ Integrate a decision support system to determine required number of doctors for each specialty to achieve a certain waiting time