Patient Flow Improvement for an Ophthalmic Specialist Outpatient Clinic with Aid of Discrete Event Simulation

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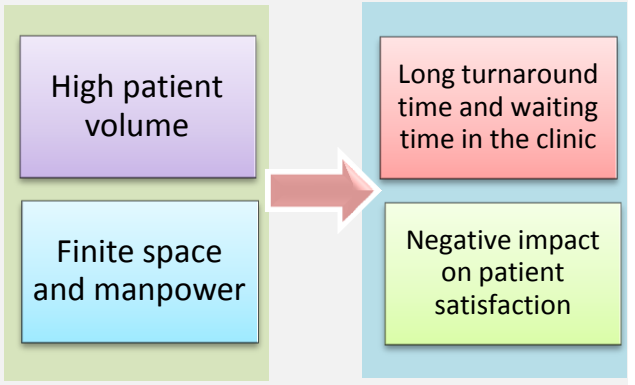
Background



Characteristics of Ophthalmic SOC

- ❑ Variation on services required by patients

  ---- *Complexity in clinical paths*

- ❑ Variation on the duration of one service

  ---- *Invalid analysis result if only single statistic is used*

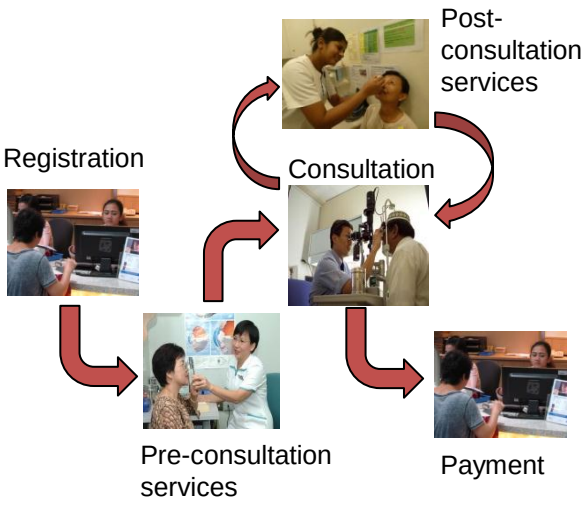


Figure 1, Typical clinical pathway in the Ophthalmic clinic

Objective

- ❑ To shorten average patient average turnaround time in the clinic.
- ❑ Develop a discrete event simulation model that realistically represents current operation of the clinic.
- ❑ Identify the effectiveness of proposed improvement strategies using the discrete event simulation model for decision making

Quick facts of DES

- ➢ A method used to model real world systems, which can be represented as a chronological sequence of events.
- ➢ By setting the attributes of the mathematical/logical model, DES helps to predict system performance

The simulation model

- ❑ Streamline patient flow based on clinical pathway data collected
- ❑ Link patient flow with information flow (case-notes)
- ❑ Input system uncertainties in the model

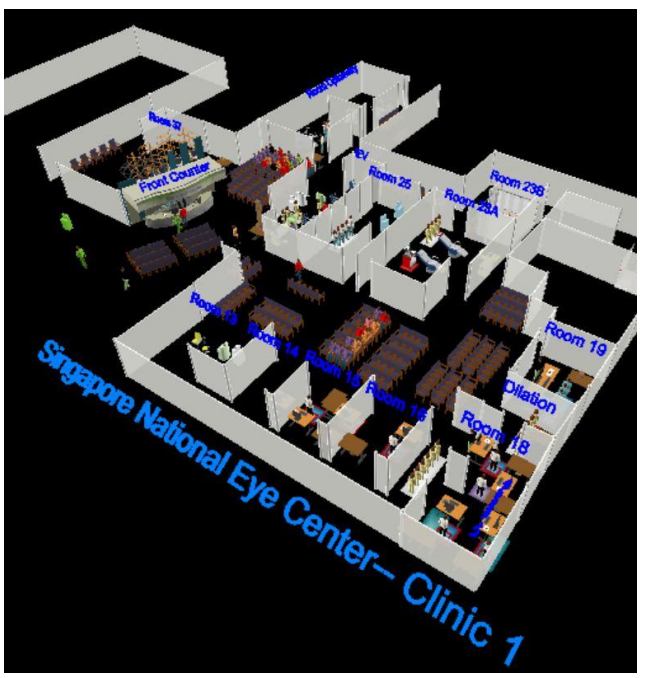


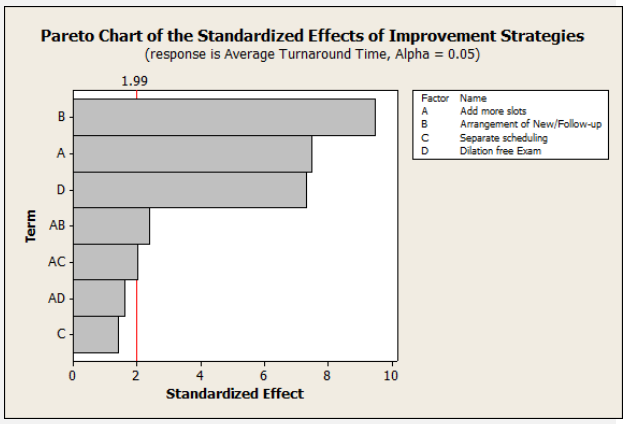
Figure 2, A snapshot of the discrete event simulation model

Improvement strategies

- ❑ (A) Spread out the distribution of appointment slots
- ❑ (B) re-arrange new and follow-up patients' appointment slots
- ❑ (C) separate the scheduling for the sub-classified follow-up patients; and
- ❑ (D) dilation-free examination.

Simulation and implementation results

❑ **Simulation results**:
Among proposed improvement strategies, (A) Spread out the distribution of appointment slots, (B) re-arrange new and follow-up patients' appointment slots, and (D) dilation-free examination were estimated to have a significant impact on patients' turnaround time in the clinic.



❑ **Implementation results**:
Robustness of strategy A was shown in reduction in turnaround time with respect to high patient volume scenario (17.6% reduction and moderate high patient volume scenario (11.7 % reduction).

Test Category and doctor group	Appointment schedule Setting	Patient Load	Number of specialists and medical officers	Average turnaround time	80 percentile of turnaround time	T-test result
High load, doctor group 1	Current schedule	159	9	159	197	T-Value=3.6
	New schedule	182	9	131	157	P-Value=0.000
Moderate-high load, doctor group 2	Current schedule	136	9	171	200	T-Value=2.22
	New schedule	132	9	151	186	P-Value=0.027

Conclusion

- ❑ This project validates that the application of DES and DOE is useful in evaluating the effect of improvement strategies on performance.
- ❑ With the integrated simulation model and actual clinic study, it has been shown that a significant reduction in patient turnaround time and improvement in performance can be achieved by regulating patient arrival pattern through scheduling system change