Resource Requirement and Workflow Modification for Reduction of Patient Waiting Time in KRW Outpatient Retail Pharmacy

Department of Industrial & Systems Engineering
IE3100 Systems Design Project 2007/2008

1. Problem Description

There is a growing need for a good and robust healthcare system in Singapore. With longer life expectancy of Singaporeans, there is an increased demand for healthcare services. The current infrastructure and the current resources available are unlikely to be able to support this increase in demand. Furthermore, in this fast paced society, people generally do not have the patience or the luxury to wait for long periods of time before being served. Long waiting times at the pharmacy can be a source of dissatisfaction among the patients.

2. Objective

Meet stipulated target of having waiting time for 95% of all patients to fall within 20 minutes

3. Preliminary Investigations

Manpower as of February 2008

5 pharmacists (P), 5 pharmacy technicians (PT) and 6 pharmacy assistants (PA)

Peak Periods

Peak Days: Tuesdays and Thursdays

Peak Hours: 1030hrs to 1330hrs and
1600hrs to1800hrs

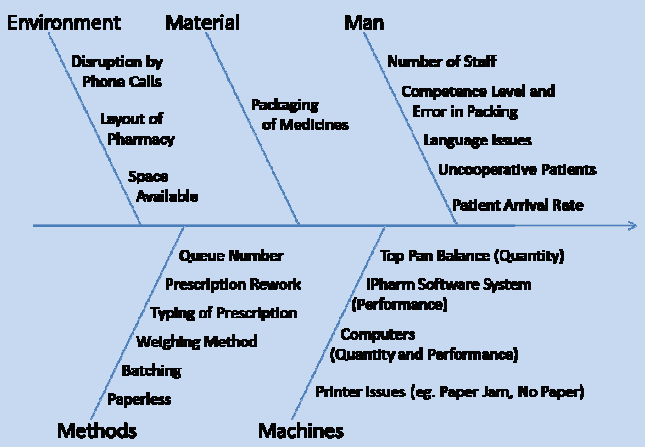
Performance as of October 2007

Average Waiting Time: 16.45 minutes

Percentage of patients with waiting time <20 minutes: 69.72%

Average Daily Prescription Volume: 429

Possible Causes of Long Waiting Time



4. Methodology

Simulation

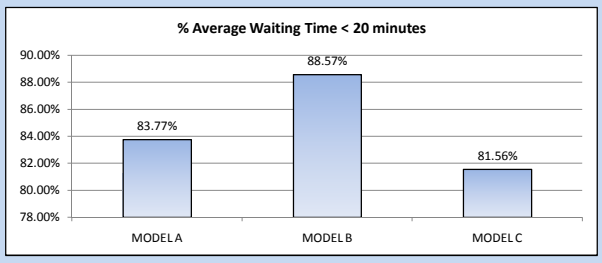
Simulation is an effective way to represent the complex nature of the pharmacy's processes

Feature	Definition
Performance metric	Patient's waiting time
Waiting time	The duration from the time the patient gets the queue number to the time that patient's number is called
Loads	Prescriptions
Resources	P, PT, PA, Dispensing counter

5. Analysis

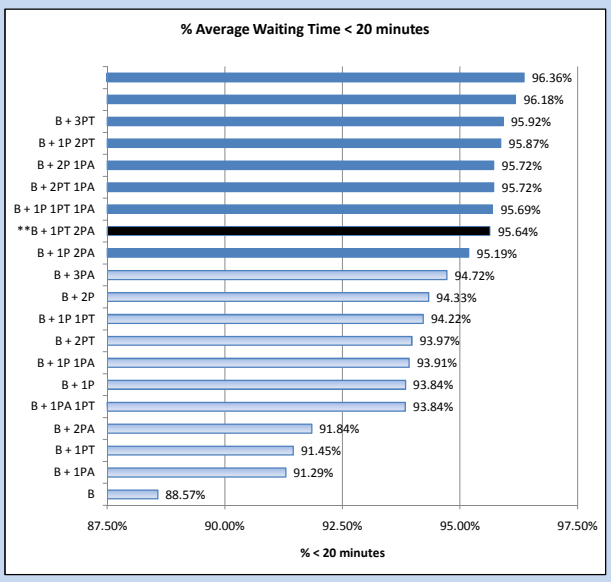
Suggested Models with Workflow Modifications

Model	Description
A	Standard workflow (as of Feb 2008)
B	1 packer is assigned to pre-pack paperless prescriptions
C	2 pharmacists are assigned to check the prescriptions before they are dispensed



Workflow of Model B produces the best result

Model B and its Variants

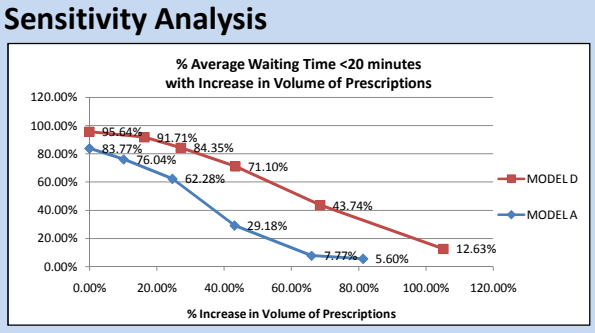


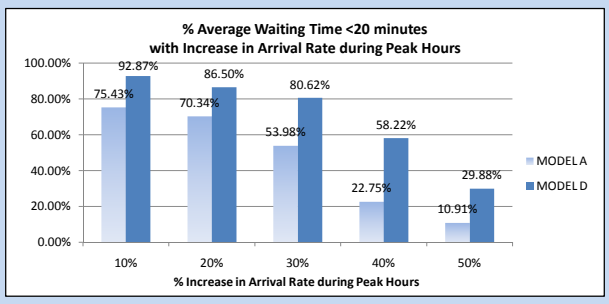
The graph on the left shows the effect of increasing the manpower of Model B.

In general, the results show that a minimum of 3 additional staff is required for the pharmacy to achieve their target, with the exception of adding 3PAs.

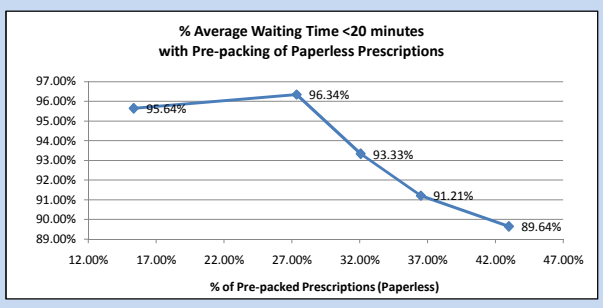
Of all the resource combinations which meet the 95% target, the combination of 1 PT and 2 PAs is the most cost-effective. This model is referred to as Model D thereafter.

Sensitivity Analysis





The two graphs above show how the % of patients with waiting time <20 minutes varies with increase in volume of prescriptions and increase in arrival rate during peak hours respectively.



The first point from the left represents the results of Model D with 1 assigned pre-packer. The next four points represent the results with 2,3,4,5 pre-packers respectively.
From the graph, if 1 or 2 staff are assigned to do pre-packing, the target can be met.

6. Recommendations

Quantitative Recommendations

- Change in workflow:
  - Assign at most 2 staff to perform pre-packing of paperless prescriptions
- Addition of 3 new staff to ensure 95% of all patients with waiting time <20 minutes
  - Recommended combination: 1PT and 2PA

Qualitative Recommendations

- Clinics to inform patients about the specific pharmacy that they are supposed to go to
- Staff stationed at registration counter to be more thorough and meticulous
- Coordination with clinics in the processing of special requests
- Comprehensive training for new and existing staff
- IT system improvement
- Push for full-fledged paperless prescription system adoption

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