## Enhance scheduling of phlebotomy services in Tung Wah Hospital through discrete-event simulation modeling

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## Phlebotomy Service

## Service Flow \& Schedule



## The Number of Leftovers

- The number of leftovers, i.e. requests that cannot be entertained within the same day, was chosen to be the main quantitative performance metric


## Collection Time Distribution



- $80 \%$ of collections are carried out before $12: 30 \mathrm{pm}$

- Both the number and the percentage of leftovers are relatively high on Monday in comparison with other weekdays


## Current State

- Phlebotomists collect most of blood specimens in the morning
- 80\% of collections are carried out before 12:30
- The short scheduled time on Saturday may lead to:
- the occurrence of overcapacity
- Low utilization with large number of leftovers may imply the problem of scheduling
- The large number of leftovers can be caused by non-regular (e.g. by call only) collection schedule in the afternoon in Route A and Route B
- The schedule of courier transport of specimens to QMH laboratories adds constraints on the scheduling of phlebotomist services

The premise of the project is to better manage and schedule phlebotomists to improve the phlebotomist services.

## Simulation Model

## Concept

## Route Schedule



Enter route schedule with phlebotomy service capacity


Demand, process time distributions or historical cases

## Service Cases <br> Taken by Doctors/Nurses

Generate number of arrival based on history
 or historical cases

Scenario Analysis

Manpower

|  | Existing | Addition |
| :--- | :--- | :--- |
|  | Existing <br> Scenario A <br> (Validation) | Scenario B |
| Schedule | Scenario C | Scenario D |
|  |  |  |

## Model Design View



## Model Snapshot



## Conclusions and Recommendations

## Scenario Analysis

| Senario AnalysisSimlation Model for Phlebotomist Service at TWH, 2012 |  |  |  |
| :---: | :---: | :---: | :---: |
| Senario 1 | Senario 2 | Senario 3 | Scenario 4 |
| Schedule one phlebotomist in Route A or Route $B$ following the morning route of A and $B$ to collect specimens at 2:00 pm and 3:00pm as opposed to by page | Schedule phlebotomists in Route $A$ and Route B following their morning route, respectively,collect specimens at 2:00 pm and 3:00pm as opposed to by page | Add one more phlebotomist on Saturday morning | Make both changes in Scenarios 1 and 3 |

## Conclusions and Recommendations

- Schedule phlebotomists in Route A or Route B following their morning routes to collect specimens at 2:00 pm and 3:00pm as opposed to by page
> Reduce the number of leftovers across weekdays
- Reschedule the afternoon shift of one phlebotomist in Route A or Route B to Saturday morning
$>$ Relieve the workload of the shift on Saturday
$>$ Eliminate the occurrence of overcapacity on Saturday
- Add lab resources, including staff and/or equipment, to take more tests locally rather than relying on the specimen transfer to QMH

