PaRFom: patient real-time flow monitoring system in specialist out-patient clinics

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Abstract

In major cancer centers, heavy patients load and multiple registration stations could cause significant wait time, and can be result in patient complains. Real-time patient journey data and visual display are useful tools in hospital patient queue management. This paper demonstrates how we capture patient queue data without deploying any tracing devices; and how to convert data into useful patient journey information to understand where interventions are likely to be most effective. During our system development, remarkable effort has been spent on resolving data discrepancy and balancing between accuracy and system performances. A web-based dashboard to display real-time information and a framework for data analysis were also developed to facilitate our clinics' operation. Result shows our system could eliminate more than 95% of data capturing errors and has improved patient wait time data accuracy since it was deployed.

Keywords:

Information Management, Appointments and schedules, Database Management Systems, Hospital-Patient Relations

Introduction *:*

The acquisition of real-time patient journey information will enable hospitals to operate as lean and agile enterprises, by increasing efficiency of clinic utilization and reducing patient wait time. In busy clinics, where wait time management is always a challenge, such real-time data is even more valuable for the management team. RFID or wireless local area (WLAN) based technologies have been implemented to track patient location and reported that it could significantly improve efficiency [1, 2]. However, both RFID and WLAN require deploying expensive hardware; and they would inevitably alter existing workflow. In this project, we proposed an alternative approach, which is to consolidate patients' activity data from various sources into one centralized database.

Methods*:*

In this study, we started by charting the entire clinic workflow and determining the sources of data resides in legacy systems. Time points which are relevant to operation and performance were identified; and they were attached to respective points of time captured in the workflow chart. After this, we studied and removed discrepancies when transferring data from their sources to the centralized database. During this process, we mapped data in various formats, including MS EXCEL, MS ACCESS, MS SQL SERVER 2008, and flat files (written in HL7 standard or XML web services) etc. In many situations, data discrepancy is easy to correct but difficult to identify; thus we also built a rule-based classifier to detect exceptional events and send out email alert automatically. Business rules stated by domain experts and stakeholders were curated and stored in a knowledge base for future reference. After data collection, a web-based dashboard was developed using ASP.NET framework.

Results*:*

This system has been deployed in the specialist out-patient clinics (SOC) of National Cancer Centre of Singapore. Before this project, the clinics did not have any effective tools to visualize individual patient activities. Furthermore because various ADT systems were isolated, building integral reports on the entire clinic process required enormous effort and involved many systems experts. Now all pertinent data is pushed into a centralized database and mapped to the clinic workflow. Figure 1 demonstrates how the centralized database helped us to visualized clinic operation prospectively and retrospectively.

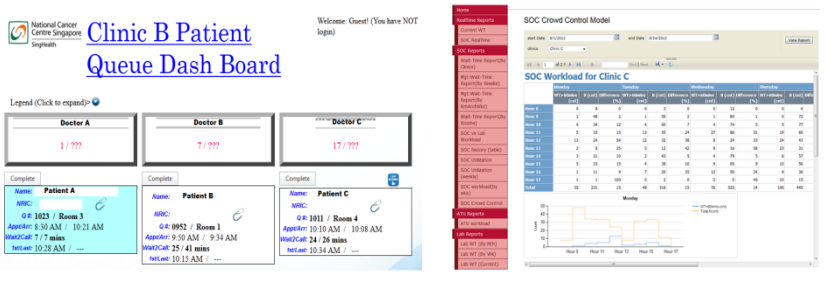

Figure 1: Patient queue information is visualized based on our centralized database.

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