



Enhancing outpatient clinics management software by reducing patients' waiting time



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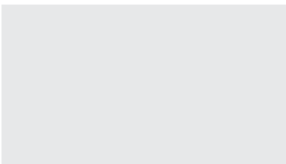
KEYWORDS

Patient flow;
Outpatient clinics;
Waiting time;
Outpatient
Management Software
(OMS);
Quality of service;
Health care

Summary The Kingdom of Saudi Arabia (KSA) gives great attention to improving the quality of services provided by health care sectors including outpatient clinics. One of the main drawbacks in outpatient clinics is long waiting time for patients—which affects the level of patient satisfaction and the quality of services. This article addresses this problem by studying the Outpatient Management Software (OMS) and proposing solutions to reduce waiting times. Many hospitals around the world apply solutions to overcome the problem of long waiting times in outpatient clinics such as hospitals in the USA, China, Sri Lanka, and Taiwan. These clinics have succeeded in reducing wait times by 15%, 78%, 60% and 50%, respectively. Such solutions depend mainly on adding more human resources or changing some business or management policies. The solutions presented in this article reduce waiting times by enhancing the software used to manage outpatient clinics services. Both quantitative and qualitative methods have been used to understand current OMS and examine level of patient's satisfaction. Five main problems that may cause high or unmeasured waiting time have been identified: appointment type, ticket numbering, doctor late arrival, early arriving patient and patients' distribution list. These problems have been mapped to the corresponding OMS components. Solutions to the above problems have been introduced and evaluated analytically or by simulation experiments. Evaluation of the results shows a reduction in patient waiting time. When late doctor arrival issues are solved, this can reduce the clinic service time by up to 20%. However, solutions for early arriving patients reduces 53.3% of vital time, 20% of the clinic time and overall 30.3% of the total waiting time. Finally, well patient-distribution lists make improvements by 54.2%. Improvements introduced to the

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patients' waiting time will consequently affect patients' satisfaction and improve the quality of health care services.

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Introduction

Patient flow is the most critical factor within the outpatient clinical settings, as it directly affects the patients' health and their satisfaction level. Outpatient clinics and their staff members are involved in a variety of activities, where information management, accurate use of data, appropriate allocation of resources, and timely execution of processes are all necessary to maintain the patient flow within the clinic [1,2].

The main motivation of this article is to integrate health care management systems within outpatient clinical settings in Saudi Arabia to assess their effects on improving patient flow and to address the potential challenges facing outpatient clinics. The Saudi government, through the Ministry of Health (MOH), aims to provide the best level of health care services based on modern information systems by allocating a large annual budget. According to Arab News, the MOH allocated 54.35 billion Saudi Riyal in 2013 budget –15.45% more than committed in 2011 [7]. However, one significant drawback exists in hospitals – the long waiting time of patients in their clinics – which in turn affects the level of patient satisfaction as well as the quality of the provided services. Since patients' health conditions may not be stable, extra waiting time could harm them. Previous studies confirmed that, beyond the quality of medical services, the satisfaction level of patients in outpatient services is related to waiting time [3–6].

This article has concentrated mainly on investigating current Outpatient Management Software (OMS) by studying its architecture and examining for issues affecting the waiting time. Defects have been identified in the application of the health-care electronic software systems related to both requirement and design phases. Five main problems that may cause high or unmeasured waiting time have been identified: appointment type, ticket numbering, doctor late arrival, early patient arrival and patients' distribution list. Solutions to these problems have been developed then substantiated,

analytically or by simulation, to reduce patients' waiting time and eventually raise the level of satisfaction.

The scope of this research includes the workflow inside the clinic, starting from patient arrival and then moving on to vital assessment, clinical or physical examination and then discharge. All internal procedures like vaccination and pulmonary tests and external ones like pharmacy and laboratory services are out of scope.

The rest of this article is organized as follows: Section "Related work" presents related studies. Section "Methodology" outlines the research methodology: a public Saudi Hospital chosen as a case study. Section "Case study: discussion, implementation and analysis" is focused on understanding OMS, addressing the problems, proposing solutions, and evaluation. Section "Conclusions and Future work" concludes the article and draws connections for future work.

Related work

Many hospitals around the world have proposed solutions to overcome the long waiting time problem in outpatient clinics such as hospitals in Chicago, China, Sri Lanka, and Taiwan. The following paragraphs will explain their solutions and the progress of their improvements.

A simulation study of an Ears, Nose and Throat (ENT) clinic at the University of Illinois Medical Center, Chicago, USA was conducted [8]. Two scenarios were proposed. In the first scenario, one resident doctor has been added to the system to serve all patients' types. This solution achieves 5.29% reduction in waiting time. The second scenario has changed the appointment policy which succeeded to attain a 15% improvement.

In the sample Chinese Hospital [9], three models were presented to demonstrate how different strategies can be used to improve the performance of the outpatient patient flow. In Model A, "doctors

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