Simulation Model Approach of Mobile Computing for Outpatient Department

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***Abstract*- Outpatient Department (OPD) is very important wing of the hospital system. The patient are facing numbers of significant problems during the OPD related to appointment, registration, searching OPD location and waiting for doctor checkup. Researcher analyzes the various processes and find out various number of factors which are significantly related to the researcher study with the help of mobile computing. Researcher studied the number of literature and research articles related to the outpatient department problems and issues. Researcher given a proposed simulation model to develop mobile computing which optimized OPD services in the hospital.**

***Keywords* - Location tracking, mobile computing, OPD, optimization, patient flow, waiting time.**

I. INTRODUCTION

OPD is considered as the window to hospital services and a patient's impression of the hospital begins at the OPD. This impression often influences the patient's sensitivity to the hospital and therefore it is essential to ensure that OPD services provide an excellent experience for patients.

In OPD section of hospital system ensuring efficient and reliable patient flow is regular problem. The overcrowding had become a routine problem in the OPD. Normally, we see patients coming to the hospital and filling out registration forms and waiting to be called. Sometimes patient calls in for getting appointment and waits for the response to an agreed date. It is most frustrating parts of the OPD section.

Typically, in government hospital patient have to pay OPD consultancy fees and get a receipt of the payment, for that patient have to stand in a long waiting queue. After getting a receipt patient will go for registration to fill preliminary details on another counter again in queue. Then patient will wait for his turn for getting a doctor consultancy. That waiting may be an hour depends on number of patients will be in queue earlier. Once a patient name announce he go for actual consultancy by the doctor. Till that time patient suffered with many standing queues with an hour of waiting time for getting a treatment.

Another problem here is that getting an OPD schedule patient has to personally visit to hospital. Sometimes that visit will be fail if required OPD is not scheduled on the same day.

To search an actual OPD location from the main entrance of a hospital is very difficult and time consuming to patient and their relatives.

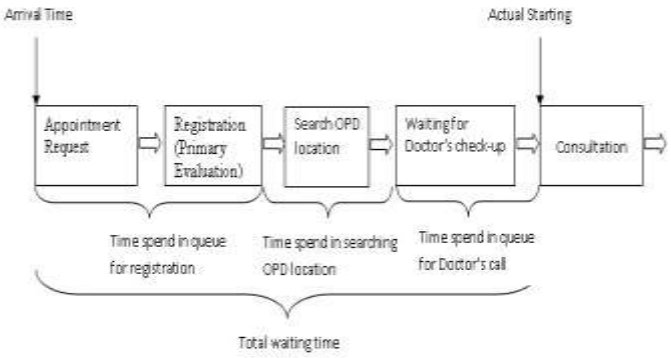

Fig.1 Present patient flow

The figure describes the general patient flow from requesting the appointment up to final consultation.

Factors Affecting Patient Flow

- Number of patients visiting OPD on daily basis
- Types of patients seen as per their health issues
- Hospital policies on frequency of the patient visits
- Size and composition of staffing models

Reasons for Delay in Patient Flow

- Waiting in queue for appointment and registration
- Waiting for a doctor
- Waiting for preliminary test result
- Waiting for investigations performed outside or for a specialist from outside.
- Waiting to find a hospital bed or to go to a hospital bed
- Waiting for patients attendants for patient admission

II. LITERATURE REVIEW

The different problem of total hip or knee replacement patients analyze by Johanna Hirvonen (2007). Diwakar Gupta (2007) summarized key issues in designing and managing patient appointment systems for health services. Zhu Z. C. (2009) study the appointment scheduling systems in outpatient clinics to determine the optimal number of appointments to be schedule in one session with criteria of different performance indicators and consult room configurations. C. Kavitha (2012) create the embedded based device to assist patients to easily

locate the doctor's cabin. The device displays the patient's name and token number outside of the consultant's room. Out patients who wish to consult a particular doctor finds it very difficult to locate their respective doctor's cabin. G. Mageshwari (2012) describes the challenges of patient scheduling and patient scheduling techniques. They provide an option of patient scheduling with Multi-agent System; Distributed Computing; Coordination.

III. RESEARCH PROBLEM

OPD is one of the significant research issue and its services in the real world to the patient and some cases to the doctors. In this research paper, researcher try to optimize their OPD research problem with the help of proposed and simulation model towards the enhancement.

IV. CONCEPTUAL FRAME WORK

To overcome this problem, by using mobile mechanism a system can be develop which will remotely handle the patient flow to reduce a waiting time of a patient in this flow.

A system will display a complete OPD schedule with proper information such as OPD days, timing and OPD specialist details. According to this patient will schedule for OPD appointment.

With this system first patient have to fill up basic information such as name and age. A system will generate e-token for an OPD appointment. This e-token displays date and approximate time of an appointment of patient. Because of this a patient's waiting time in a long queue of appointment and registration will be reduced.

With this e-token patient directly come for Doctor Consultancy. Now patient has to wait only for earlier patient consultancy delay. Whole procedure is described in diagram.

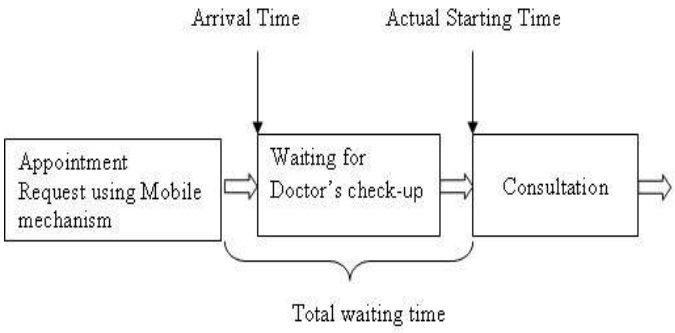

Fig.2 Patient's flow with mobile computational model

To search an actual OPD location from the main entrance of a hospital is very difficult and time consuming to patient and their relatives, for this problem system provide the map to easily get an actual location of OPD in hospital.

This system also provides other different help for a patient such as a travelling route map from main places in city to hospital. Availability of different transport system with its fare is display.

Some patients and their relatives need to stay more than a one day for further treatment. System gives the information about the nearby charitable trust for the patient.

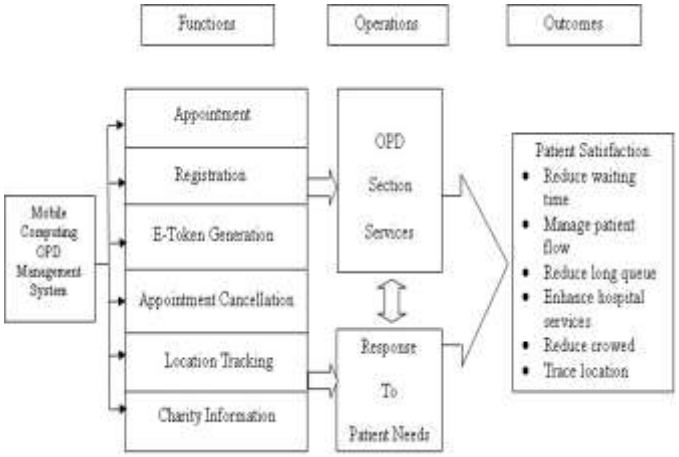

Fig.3 Conceptual framework for mobile computing simulation system

Ways to Improve the Patient Flow

- Clearly indicate the actual location of OPD so searching time will be minimized.
- Avoid the bottleneck at the time of appointment and registration. Know your staff capacities and schedule accordingly. Keep multiple counters for appointment and registration with short time procedure.
- Very often a patient checks in, sits in a waiting room, and then must wait for his name announcement to enter in an exam room. Plan to give approximate examination time to the patient to reduce his waiting time and handle heavy patient flow in the OPD.
- Provide touch-down device where staff can write notes after a patient visit examination room. One practice prefers devices for doctors, nurses to provide necessary medical assistants to the patient. These stand-up device stations keep doctors in the center of the flow, enable them to complete notes quickly, view records, and then move on.

V. RESEARCH DESIGN AND METHODOLOGY

A. Algorithm

Patient OPD Appointment and Registration

Step 1: Start
Step 2: Patient select time slot for OPD checkup
Step 3: Check availability of time slot for appointment
Step 4: if time slot is available then
Step I: Patient fix up the appointment
Step II: Patient enter registration detail
Step III: Patient generate E-token

Step IV: Download and save E-Token
Step 5: else
Step I: Patient select another time slot for OPD checkup
Step II: goto step 3
Step 6: stop

Patient Set Reminder for OPD Appointment
Step 1: Start
Step 2: Patient select registered OPD appointment slot
Step 3: Set the reminder alarm time
Step 4: Stop

Patient Cancel OPD Appointment
Step 1: Start
Step 2: Patient select registered OPD appointment slot
Step 3: Cancel appointment slot
Step 4: Stop

Patient OPD Location Tracking
Step 1: Start
Step 2: Patient select OPD type
Step 3: Display OPD location
Step 4: Stop

Patient Search Charity Trust Information
Step 1: Start
Step 2: Patient select Charity Name
Step 3: Display Charity Trust Information
Step 4: Stop

B. Proposed Design

Proposed mobile mechanism reduces the waiting time of the patient in OPD section of hospital. A system develop with this mechanism manage the flow of patient in OPD section.

A patient gets an appointment by generating e-token by registering basic information like name and age by using this system. Patient knows his appointment date and approximate time from this e-token. This will reduce the waiting time of patient in a long queue of appointment and registration. This mechanism also shows the route from main entrance of hospital up to the OPD section. It reduces patient time to search an OPD section in hospital.

Another facility provided is that it shows the transport facilities and fare from the main places of city to the hospital.

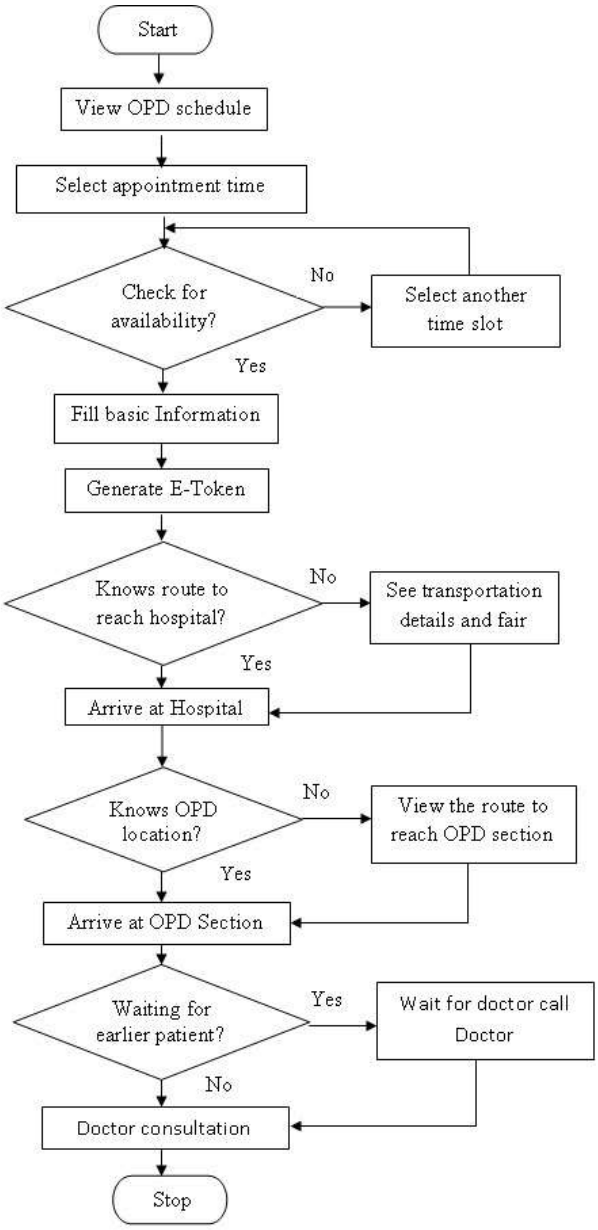

Fig.4 Flow chart for mobile computing simulation system

C. Significance of Research

The system is easily accessible by patient, staff as well as doctors.
This research reduces the waiting time.
This system improves the work efficiency of hospital services.
This system provides flexibility, reliability and operability for patient, staff as well as doctors.

V. CONCLUSION

In this research study the working procedure of OPD section gets faster, more efficient and helpful to patient. This research solve the problem of patient's arise in OPD. It minimizes hospital resources used in OPD management. It minimizes the doctor and supportive staff problems face in OPD

management. It provides support for hospital enhancement with advance technology.

REFERENCES

[1] C. Kavitha, A. Venkat Ramana, S. Sushma Raj (2012), Embedded Management System for Out Patient Department, International Journal of Embedded Systems and Applications (IJESA), 2, 47-56, DOI : 10.5121/ijesa.2012.2305

[2] Diwakar Gupta, Brian Denton (2007), Appointment Scheduling in Health Care: Challenges and Opportunities, IIE Transactions, 40, 800-819, 0740-817X

[3] G.Mageshwari, E.Grace Mary Kanaga (2012), Literature Review on Patient Scheduling Techniques, International Journal on Computer Science and Engineering (IJCSE), 4, 397-401, 0975-3397.

[4] Priyanka Patil, Sruthi Kunhiraman, Rohini Temkar (2013), Functional Description of Online Medical Management System Using Modern Technology, International Journal of Engineering Science and Innovative Technology (IJESIT) ,2, 432-437, 2319-5967

[5] Sreekala P, Arpita Dan, Elizabeth M Varghese (2015): Patient Waiting Time in Emergency Department, International Journal of Scientific and Research Publications, 5, 1-3 , 2250-3153

[6] Zhu Z. C.,Heng B.H.,Tewok K.L.(2009), Simulation Study of the Optimal Appointment Number for Outpatient Clinics, International Journal of Simulation Modeling, 3,156-165,1726-4529.

