

# Designing Mobile App Interfaces for Facilitating Medical Treatment at the Government Hospitals



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## 1 Introduction

Government hospitals are the pillars of public healthcare services in India. They have specialized and expert doctors as well as well-trained nursing staff to treat different ailments. They offer genuine treatment to the patients and provide them at almost free of cost, compared to the private hospitals. Many of these government hospitals are also engaged in research to develop new techniques to improve the quality of treatment [1, 2]. Significant research has also been reported on the use of IT-based innovations to enrich the healthcare systems whether it is seeking remote consultation through Telemedicine, administering glucose using IoT system, managing diabetic or elderly patients or Patient-related information, connecting patients to specialized doctors or using cloud computing and mobile OS to manage hospital system [3–13]. However, not much has been reported on navigating patients or attendants within hospitals and addressing their queries related to the hospital norms in real time. Most of these hospitals are in big towns of every province, and every day, a large number of patients from remote places visit these hospitals for different treatments. But, due to inadequate resources, the hospital administration is unable to meet this ever-increasing demand resulting in shortfalls. Getting all relevant information, at times, is not possible. Lack of proper information at every step leaves many patients confused and puzzled, delaying the treatment process, often, leading to altercations and chaos. Many people with higher purchasing power prefer treatment at private hospitals. However, a large section of the population is, still, completely dependent upon these hospitals exerting huge pressure on their infrastructure. After visiting a few of the government hospitals like *Safdarjung* Hospital New Delhi, AIIMS New

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Delhi, and Patna Medical College hospital, it was observed that the patient treatment gets delayed due to different reasons related to the patients and the hospitals. The study tried to capture all such issues and reflected on them to solve them.

## 2 Method

### 2.1 *Problems from Patients' Perspective*

Talking about the patients' perspective, there are several causes because of which the treatment is delayed. Some of them are as following:

#### **Delays due to issue related to understanding rules, norms, and processes.**

When the patients or attendants arrive at the hospital premises, the first-timers can't directly consult the doctor. They have to undergo procedures starting from registering the patients, followed by the registration slip entry at the concerned department OPD.

Also, for new cases and follow-up cases, there are different registrations. The general process of registering also varies from hospital to hospital. Like for AIIMS Delhi, the first appointment date has to be sought. This is followed by OPD registration on the date of appointment. Whereas in the case of Safdarjung Hospital or Patna Medical College and Hospital, the appointment system is not mandatory. One can directly register and proceed to OPD. Also, there is so much rush everywhere that it is quite possible that a step is skipped and the person gets into the wrong queue. In that case, the person has to return and redo the step before moving forward. Say if the person gets into the queue for registration, mistakenly, and skips the appointment process, he has to start with the appointment seeking process which means standing behind a large queue of people. And, by the time, his turn comes, the appointment for the day is either over, or even if he can get an appointment, a large number of people have already completed the registration process before him. In both cases, the treatment process is delayed. In case of any doubt, if the person wants to enquire at inquiry/reception counter, he finds a big queue there which, eventually, means delay. On the other hand, lack of full acquaintance with the system leads to fair chances that one would miss a process that completely delays the treatment process.

#### **Delay due to difficulty in finding places within the hospital Premises.**

The government hospitals, like Patna Medical College Hospital, are built and spread over a very large area where most of the departments and units are scattered all over the area and also have fixed way and gate. With an inefficient signage system, the Patients find it difficult and lose a lot of time finding the right place. Also, in government hospitals, many passages and doors are blocked. These inconsistencies also add to increasing the time delay.

#### **Delay due to doctors' schedule and timings.**

Unlike private hospitals, even if the patient wants to see a particular doctor, there is no provision to know the weekly schedule of the doctor before reaching the hospital. Moreover, if the patient does not, repeatedly, mention that during the registration, he is often allocated to a

different doctor. Also, each doctor is there for a stipulated time, and then he goes to ward inspection or operation. Finding when the concerned will be available is also a difficult task. As a result, when the patients reach the doctors, they find them unavailable.

**Issues related to availing hospital facilities.** The government hospitals, generally, have the facilities for different tests and diagnoses. But sometimes there are break downs which are not mentioned anywhere and the visitors only come to know about it when they are at the counter after standing in queue for hours. Also, when they require certain assistance, they don't know where to find the concerned person say for stretcher, ambulance, other requirements. Many times, the hospital staffs are not at their seats which makes the situation quite difficult.

## ***2.2 Problem from Hospitals' Perspective***

The government hospitals are running much beyond their handling capacity [14]. The number of patients visiting the hospitals has increased drastically but the infrastructure and resources have not increased that way. Compared to the patient number they are understaffed. In this condition, the administration cannot employ their staff just for guiding and helping the patients. They can hire outsourced people for this work as in the case of AIIMS but that again not possible for all the government hospitals. Also, it is not always possible to monitor all staff if they are doing their duties sincerely. Hence, there is a gap that appears between the requirement of the patients and what is fulfilled by the Government hospitals.

## ***2.3 Consequences***

Due to difficulties and delays in getting proper treatment at the government hospitals, the population, with higher purchasing power, has shifted towards costly private hospitals in recent times. But the larger population that cannot afford costly treatment are still suffering. They have to face delays in treatment which sometimes even becomes fatal for the patients. This sometimes also results in violent exchanges between staff and the attendants.

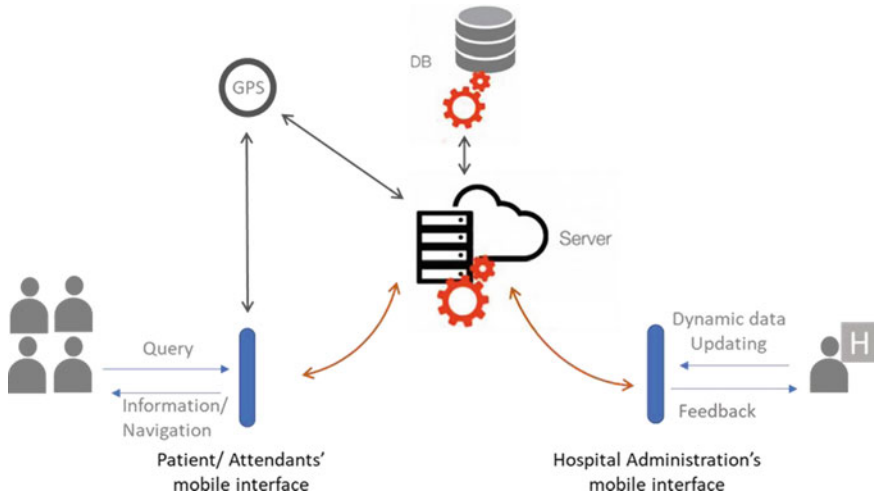
Besides, there are some anti-social elements active in the hospital premises too who try to take advantage of the situation and lure the patients to quacks who not only exploit them financially but also put patient's life at risk. This evades the very mission of the government to ensure public health. Had the patients and attendants been provided the necessary information timely and accurately, the treatment would become easier and faster but also relieve the hospital administration and help to deliver better services. Thus, help in achieving the mission of the government to ensure public health. Besides, it will also prevent innocent people from falling prey to quacks.

### 3 Possible Solutions

The need for the required information to patients and attendants can be solved by different methods. However, the efforts have to be taken to address the issues through system design approach [15, 16]. It can be addressed using proper signage system for guiding patients to their destination [17]. The doctors with their timings and day can be mentioned on a board too. Similarly, the rules and regulations can be printed and given to the patients to guide them. But these solutions have their limitations. Printed signage cannot handle dynamic information. Also printing material will be costly and not very environment-friendly. Also, hardly anybody is interested to read a lot of material when they require just specific information. In this context intervention of Information, Technology can be of great help. In recent times, IT has revolutionized our way of working and provided us with an effective interface that connects two different domains. They have evolved as a platform where relevant information is provided as per users' needs through suitable technology. It has versatile applications. Especially, the use of mobile app for different purposes has changed our lives forever. Apps like UBER have fulfilled the needs of the commuters using the Global Positioning System and IT. Also, the recent studies report a high surge in internet and mobile usage among different strata Indian population irrespective of rural–urban background, age, gender, disparities in income, and education [18]. Hence, a system-supported new mobile app could provide necessary information regarding hospitals to patients.

### 4 The Proposed System Design

The proposed system acts as an interface between the patients/ attendants and the hospital administration. There are two sets of interfaces, one for the patients/ attendant to get information and the other for hospital administration to update information. The patient-related interface provides all the relevant information related to hospital premises surrounding areas to the patients/attendants which would help them get the treatment without delay. This includes stepwise rules and norms of getting treatment at the hospital, location of different departments, counters, wards, blood bank, facilities points (for the ambulance, stretcher, wheelchair, etc.) and contact number of the concerned person, information about break-down of the facility (like an X-ray machine, an Ultrasound Machine, etc.) and tentative time of resumption, availability of different doctors during the week and their consultation timings. Information like availability of beds at any ward is provided to the attendants also guides them as to where to go, whom to meet, and what procedures to follow to get the patient a bed. In addition, it also provides important information regarding the location of interest around the hospital premises like the medicine stores, the general stores, the hotels, the bus stops, etc., that would help the patients during admission. While on the hospital administration's interface, the hospital can update the important dynamic



**Fig. 1** Working of the proposed system design

information like changes in some rules, timings, availability of doctors, availability of beds for admission, temporary shifting of any unit, and similar dynamic information. The hospital’s interface is highly secured and password protected and only an authorized person can do any kind of updating (Fig. 1).

When the app is opened, the GPS gets activated and the phone is connected to the server providing all the relevant information to patients and attendants and navigates them through the different places within the hospital premises wherever they mention to go. The detailed step-wise working of the app has been discussed. In this paper, the working of the patient’s interface has been discussed in detail.

### **4.1 Working of Patients’ Interface of the App**

The proposed system works on android enabled mobile phones. After installing, the app will activate the mobile GPS and shows the position of the mobile whenever it is opened. It would identify the patients’ needs, i.e., if the app users want help for some emergency or have to visit the hospital for a follow-up case. It also establishes if they are new visitors to the particular hospital meeting the doctor for some non-emergency serious ailment like arthritis, cataract, respiratory issues, etc. And it provides the information accordingly.

**During an emergency.** During an emergency, the app asks about the kind of emergency, i.e., road accident, heart attack, delivery issues, some stroke, etc. On selecting a particular option, it reflects all the nearby government hospital emergencies that offer treatment for the same. The hospitals are arranged in the order of their proximity. Once the patients select any hospital, the navigation guides them to the

emergency unit so that they don't have to waste time asking anybody. Along with navigation, in the expandable menu, it provides all the information possibly required by the attendants like information regarding all the chemist shops nearby emergency unit, blood bank, the important telephone numbers of the concerned hospital (Fig. 2).

**For the non-emergency diseases/ailments.** In case of non-emergency diseases like arthritis, cataract, respiratory problems, etc., the app has two options. If the patients know which hospital they want to visit they can directly mention the hospital name. Else, they can mention their ailments and the app suggests the hospitals where they can get the treatment for it. Either way, when the patients select the hospitals, the

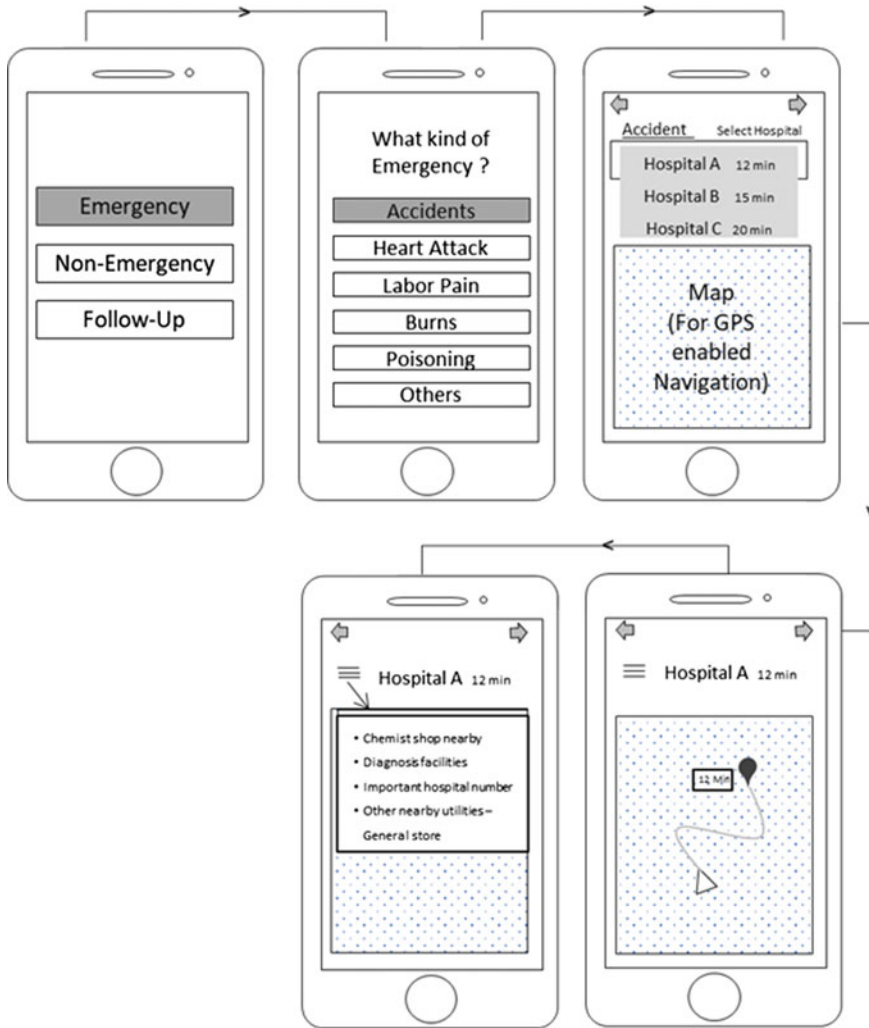
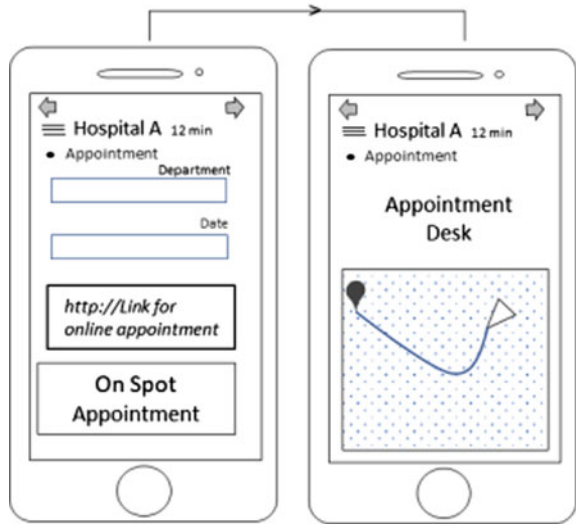


Fig. 2 Wireframes for task performed through app in emergency

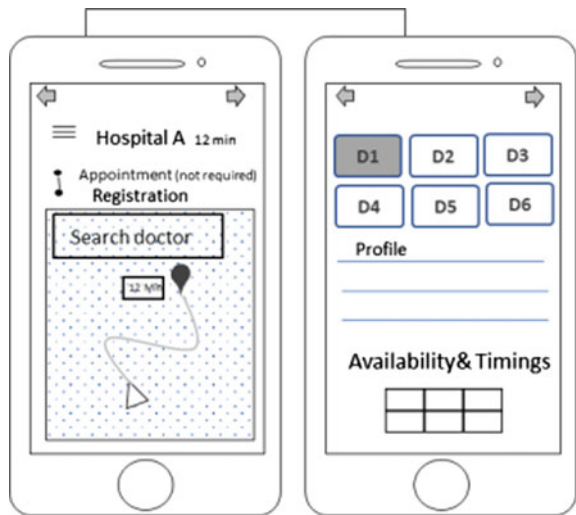
navigation guides them through the processes of that hospital. If the hospital requires an appointment before registration, the patients are shown appointment status for the required day. It also directs them to an online appointment site. If patients want to take an appointment from the counter, the system navigates them to the appointment desk (Fig. 3).

For the hospital without this system, the patients are directly guided to the registration desk. In expandable menu, they are also provided with information regarding doctors' availability on that day and their timings (Fig. 4).

**Fig. 3** Wireframe for seeking appointment through the app



**Fig. 4** Wireframes for searching doctors, their availability, and timings



After OPD registration is done, the patients are guided to the department entry desk as every registration has to be entered with the entry desk. On this interface page, the expandable menu also provides information regarding navigation to different units within department, location of other departments in the case of cross referring (the person is internally referred to the relevant department), information regarding diagnostic facilities of the hospital, etc. (Fig. 5).

**For the old follow-up cases.** Here, the process is similar to the registration process but the department name has to be mentioned just after mentioning the hospital name.

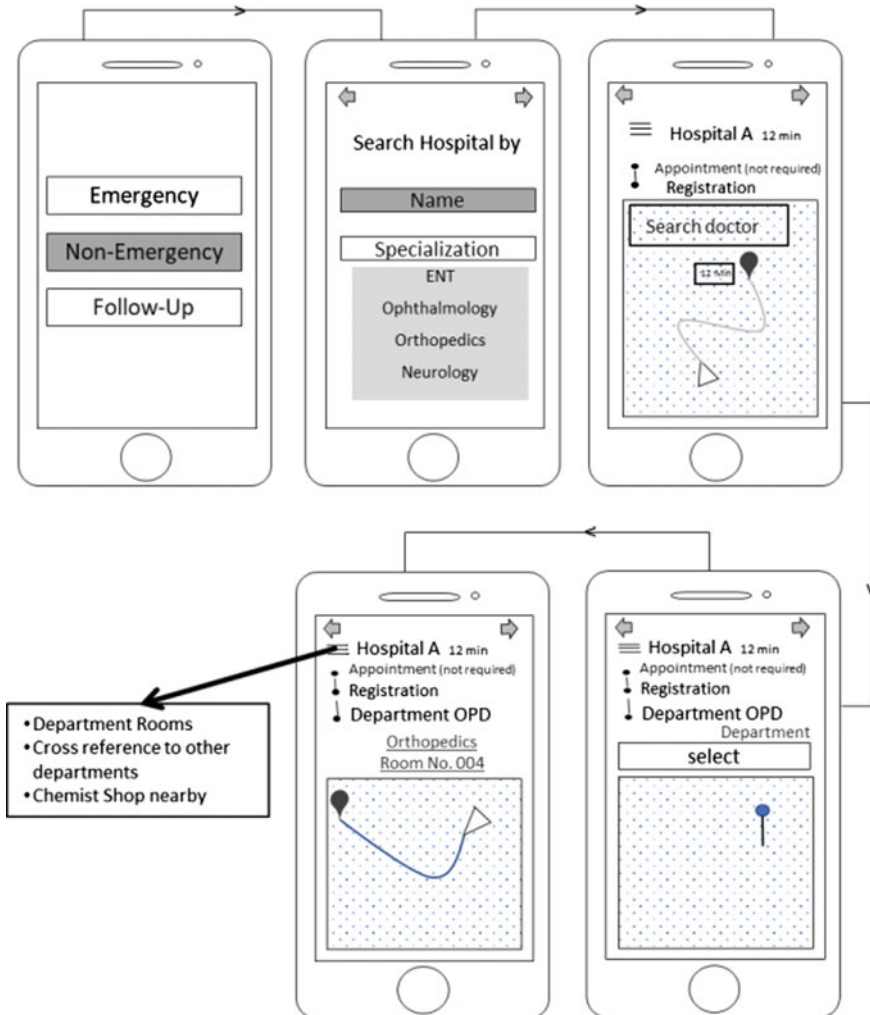


Fig. 5 Wireframes of the overall task performed for non-emergency cases



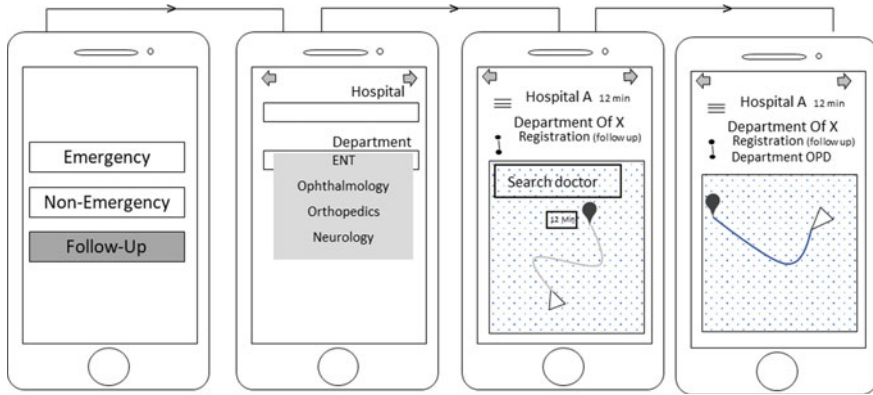


Fig. 6 Wireframes for task performed for follow up cases

The system then navigates patients directly to the registration desk for the old follow-up cases. On the same page, there is a tab to check doctors’ availability. This avoids the wastage of time due to absence of doctor on the day of visit. After registration, they are directed to the department entry desk. The expandable menu other relevant information which the patients might require (Fig. 6).

## 5 Conclusion

Government hospitals are the most important centers of providing inexpensive and reliable treatment to the larger patient population. But, as every hospital does not have the same rules and norms, it takes some time to understand and get acquainted that delays the treatment process. Also, the location of different departments and other units are very haphazard that further adds to delays. Since the inquiry counter, meant to provide reliable information, is limited in number and is always heavily crowded, people get relevant information late. In this paper, the different issues, faced by patients due to the information gaps, were studied. Different aspects of the problems were analyzed through the experiential study of three hospitals, i.e., AIIMS New Delhi, Safdarjung Hospital New Delhi, and Patna Medical college hospital. Based on the experiences, observation, and interactions with patients and doctors at different hospitals, a Mobile-based app was visualized. This mobile app solution could provide all relevant information related to the listed government hospital to the patients and help them navigate inside and around the hospital premises. This type of app finds special relevance in present pandemic situation where every second is critical for saving lives. But this application has some limitations too.

This efficacy of the application is affected by the level of mobile literacy of the user. Also, it can’t work on the old mobile that does not have an android platform. The reliability of this app is also dependent on dynamic information related to

doctor's availability, changing status of hospital's infrastructure (temporary shifting, machinery breakdown, etc.), which has to be updated regularly by hospital authorities. Any problem at the hospitals' end would lead to incorrect information and confusion. The functioning of the app is dependent on the available network signals. In case of connectivity issues, the system will not function properly or stop working. The proposed system only facilitates improving accessibility by providing relevant information from the present system. But it cannot reduce the disparity between the number of patients and doctors. The proposed system would be more effective if the number of doctors is increased to relieve the burden on the existing infrastructure. The app also assumes that doctors and staff are available at the hospital at right time. Any schedule change has to be informed to the concerned authorities and updated. If updates are not regular, the app has no provision to check such discrepancies. The system can be further improved to check such discrepancies through patients' feedback and real-time monitoring of such complaints. Also, integration of the proposed system with the government's initiative of Online Registration System can help in enhancing the experience of the patients by providing hassle-free treatment at government hospitals.

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