HEALTHCARE UX/UI AND DIGITAL HEALTH DESIGN

Beyond Appointment Booking: Designing an Integrated Patient-Centric Digital Healthcare Journey for ApolloSAGE Hospitals, Bhopal

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Abstract

Healthcare experiences involve more than medical consultations. Patients and their attendants may need to identify the appropriate specialist, understand hospital services, book appointments, navigate hospital departments, manage diagnostic tests, access reports and arrange follow-up consultations. When these activities require multiple disconnected interactions, patients may experience confusion, uncertainty, additional effort and avoidable delays. Digital technologies offer an opportunity to improve these experiences by connecting information, services and communication through a unified patient-centred platform.

This research paper proposes a human-centred digital healthcare solution for ApolloSAGE Hospitals, Bhopal. The study examines potential opportunities for improving the patient journey through an integrated digital platform incorporating doctor discovery, appointment management, hospital navigation, diagnostic coordination, digital medical records, patient communication and follow-up care. It adopts a user-experience design perspective, combining literature review, patient and attendant interviews, journey mapping, usability evaluation and prototype testing as proposed research methods.

The paper recommends a phased digital transformation strategy that prioritises accessibility, simplicity, privacy, interoperability and support for patients with different levels of digital literacy. The proposed framework is intended to reduce informational barriers and improve continuity across the healthcare journey. As primary patient data and usability results have not yet been presented in this paper, the identified problems are treated as research hypotheses rather than confirmed findings about ApolloSAGE Hospitals. Future empirical evaluation will be required to establish the effectiveness of the proposed solution.

Keywords: digital healthcare; patient experience; UX/UI design; patient journey; healthcare accessibility; human-centred design; ApolloSAGE Hospitals; Bhopal

1 Introduction

Healthcare is an essential service in which the quality of the patient experience depends not only on clinical treatment but also on how easily people can access information, understand available services and navigate the healthcare system. For patients and their families, visiting a hospital can involve several interconnected activities, including searching for a doctor, scheduling a consultation, reaching the appropriate department, completing diagnostic investigations, understanding the next steps and maintaining communication with healthcare providers.

These activities may become challenging when information is difficult to locate, instructions are unclear or patients must repeatedly coordinate with different departments. Such difficulties can be

especially demanding for elderly patients, people with disabilities, first-time visitors and attendants responsible for coordinating care.

Digital healthcare technologies can support more convenient and coordinated experiences. However, simply introducing an app or an online appointment form does not necessarily create a patient-centred system. A useful digital service must address the patient's needs before, during and after a hospital visit.

The World Health Organization emphasises that digital health should support equitable access, appropriate use of technology, patient engagement, privacy and effective health services. Its Global Strategy on Digital Health has been extended through 2027 [1].

ApolloSAGE Hospitals, located in Bawadiya Kalan, Bhopal, provides a relevant context for investigating these opportunities. Its official website includes doctor discovery, appointment booking and information about hospital services [6–8]. This research therefore considers how existing digital touchpoints could be evaluated and potentially connected into a more integrated patient experience.

The central argument of this paper is that digital healthcare design should support the complete patient journey rather than treating appointment booking as an isolated task.

2 Research problem

Patients may encounter informational, navigational and coordination challenges at different stages of a hospital visit. Although digital platforms can make information and services more accessible, fragmented user journeys may require patients to switch between websites, telephone calls, physical counters and separate communication channels.

For the ApolloSAGE Hospitals case study, the following potential problem areas will be investigated:

1. **Doctor and department discovery:** Patients may be uncertain about which specialty to consult or which doctor is appropriate for their needs.
2. **Appointment management:** Patients may need clearer information about booking confirmation, appointment timing, rescheduling and preparation.
3. **Hospital navigation:** First-time visitors may need assistance locating registration counters, consultation rooms, laboratories, radiology services and other departments.
4. **Diagnostic coordination:** Patients may need clear instructions about tests, preparation requirements, report availability and subsequent consultations.
5. **Information continuity:** Patients and attendants may find it difficult to keep appointment details, instructions, reports and follow-up information organised.
6. **Communication and support:** Patients may need an understandable way to contact the appropriate hospital service when questions arise.
7. **Digital accessibility:** Older adults, users with limited digital skills and people with visual, hearing or mobility impairments may require alternative ways to access information.

These are **proposed research questions and hypotheses**, not established evidence that ApolloSAGE currently fails to provide these services. Primary research is necessary to determine which problems actually occur, how frequently they occur and which ones deserve priority.

3 Aim and objectives

3.1 Research aim

The aim of the study is to develop a human-centred digital healthcare framework that can improve the accessibility, usability, coordination and continuity of the patient journey at ApolloSAGE Hospitals, Bhopal.

3.2 Research objectives

- To understand the information and service-related difficulties experienced by patients and patient attendants.
- To examine the existing digital touchpoints available through the hospital website and related services.
- To identify gaps in doctor discovery, appointment management, hospital navigation and follow-up communication.
- To design an integrated digital healthcare concept based on user needs and journey mapping.
- To evaluate the proposed interface through usability testing with representative users.
- To establish measurable indicators for assessing usability, patient effort, accessibility and service coordination.

4 Research questions

The study will address the following questions:

- **RQ1:** What informational and service-coordination difficulties do patients and attendants experience before, during and after visiting ApolloSAGE Hospitals?
- **RQ2:** How can UX/UI design improve the discoverability of doctors, specialties, appointments and hospital services?
- **RQ3:** How might an integrated digital platform reduce unnecessary patient effort and confusion across registration, consultations, diagnostics and follow-up care?
- **RQ4:** Which interface features are most useful for patients with different ages, abilities, language preferences and levels of digital literacy?
- **RQ5:** How can the effectiveness of the proposed platform be evaluated through measurable usability and patient-experience indicators?

5 Literature review

5.1 Digital health and patient-centred services

The World Health Organization's digital health strategy presents digital technologies as tools for strengthening health systems and improving access to appropriate services. It also emphasises equity, governance, privacy and the need to consider the context in which technologies are used.

This perspective is relevant to hospital UX/UI design because a digital interface must support real healthcare activities rather than merely present information. A patient-centred platform should help users understand available services, make informed choices and access appropriate support without creating unnecessary digital barriers.

Relevance to this study: The proposed platform should be evaluated in terms of patient needs, accessibility and practical outcomes rather than the number of digital features it contains.

5.2 Human-centred digital healthcare design

The 2024 study 'Designing digital patient experiences: the digital health design framework' [2] examines how digital health design can be improved through structured design activities and collaboration between designers, healthcare professionals, organisations and end users.

The research highlights the importance of understanding context, identifying problems, developing solutions and implementing them with attention to practical and organisational challenges.

Relevance to this study: Patient and attendant participation should guide the development of the proposed ApolloSAGE digital experience. Interviews, journey maps, prototypes and usability tests can help identify mismatches between organisational assumptions and actual user needs.

5.3 Digital healthcare in the Indian context

Research on India's digital health strategy [3] discusses the development of interconnected health information systems and services, including digital health records, teleconsultation and appointment-related transactions. The Ayushman Bharat Digital Mission ecosystem provides an important context for considering interoperability and continuity of health information.

A digital platform for a multispecialty hospital should therefore consider how authorised patient information might be exchanged securely between relevant services, subject to technical feasibility, applicable standards and informed consent.

Relevance to this study: The proposed solution should consider future interoperability with appropriate digital health systems rather than operating as an isolated interface.

5.4 Telehealth and digital access barriers

A systematic review [4] examined barriers and facilitators affecting healthcare providers' use of telehealth in India. The study demonstrates why digital healthcare adoption must be understood in relation to technical, organisational and contextual factors.

Although telehealth is not identical to hospital navigation or appointment management, this literature supports a broader principle: implementing technology alone does not guarantee successful adoption.

Relevance to this study: The proposed platform should retain telephone and in-person assistance for users who cannot or do not wish to complete every task digitally.

5.5 Research gap

The literature reviewed provides a foundation for human-centred digital health design, Indian digital health infrastructure and the challenges of technology adoption. However, these sources do not establish which specific usability problems are most common among patients at ApolloSAGE Hospitals, Bhopal.

The proposed study addresses this local research gap by focusing on the patient's complete service journey within a particular hospital context. It aims to connect user research with a practical UX/UI intervention and an evaluation framework.

The contribution is therefore a **context-specific design proposal to be tested empirically**, not a claim that a new or previously undocumented patient problem has already been proven.

6 Research methodology

6.1 Research design

The proposed study will use an exploratory, mixed-methods, human-centred design approach. Qualitative research will help identify patient needs and experiences, while quantitative measures will support the evaluation of usability and perceived effort.

The research will progress through five stages:

1. Secondary research and audit of existing digital touchpoints.
2. Interviews and questionnaires with patients and attendants.
3. Thematic analysis, affinity mapping and journey mapping.
4. Prototype development and iterative design.
5. Usability testing and evaluation of the proposed solution.

6.2 Study population

The proposed participants are:

- Adult patients visiting ApolloSAGE Hospitals.
- Patient attendants who assist with hospital-related tasks.
- First-time and repeat visitors.
- Patients or attendants with differing levels of digital literacy.
- Hospital staff involved in registration, appointments or patient information, where permission is granted.

Participants should be recruited through an approved, ethical process. Participation must be voluntary, and personal medical details should not be collected unless genuinely necessary for the research.

6.3 Proposed sample

An initial exploratory study could target approximately 30–50 participants, depending on access, time and institutional approval. For example, the sample could include 15–20 patients, 10–15 attendants and 5–10 relevant staff members. An online questionnaire could be conducted separately if resources permit.

These figures are planning targets, not completed recruitment or a statistically validated sample size. The final sample should reflect the research questions, participant availability and the methods selected. Qualitative interviewing should continue until the research team has sufficient depth and a defensible assessment of thematic saturation.

6.4 Data collection methods

6.4.1 Semi-structured interviews

Interviews will explore the most recent hospital visit, information-search behaviour, doctor selection, appointment experience, navigation, diagnostic coordination and suggestions for improvement.

6.4.2 Online questionnaire

A structured questionnaire may measure how often users encounter difficulties, which channels they use and which digital services they would find useful.

6.4.3 Digital touchpoint audit

The researcher will review the hospital's public-facing digital services, including information architecture, doctor-search pathways, appointment-related information, mobile usability, content clarity and contact options.

6.4.4 Journey mapping

The patient's experience will be mapped across five stages: before the visit, appointment planning, arrival and registration, consultation and diagnostics, and post-visit follow-up.

6.4.5 Prototype usability testing

Participants will be asked to complete representative tasks using a low-fidelity or high-fidelity prototype. Measures may include task completion, errors, time on task, assistance required and user-reported ease of use.

6.5 Data analysis

Interview notes and transcripts will be analysed thematically. Initial codes may include information gaps, navigation difficulty, uncertainty, repeated effort, communication barriers and accessibility needs. These categories will remain provisional until supported by actual data.

Questionnaire responses will be summarised using frequencies, percentages and appropriate descriptive statistics. Prototype performance will be assessed through task completion rates, error patterns and user feedback.

Qualitative and quantitative results will be compared to identify which design priorities have the strongest support.

6.6 Ethical considerations

The research should obtain appropriate institutional and hospital permissions before recruitment. Participants must receive a clear explanation of the study and provide informed consent. Identifiable information should be minimised, stored securely and excluded from public research outputs unless specific permission and an appropriate legal basis exist.

The researcher should not access hospital records without authorisation or present assumptions as verified patient experiences. Any future publication should follow the target journal's ethics, consent, disclosure and data-protection requirements.

7 Proposed digital solution

The study proposes an integrated digital platform, provisionally named the **ApolloSAGE Patient Journey Platform**. This is a research concept and should not be represented as an existing hospital service.

Its purpose is to connect essential patient tasks through a consistent interface while retaining access to human support.

7.1 Smart doctor and department discovery

The platform would provide a searchable directory with clear specialty descriptions, doctor qualifications, available appointment information, consultation details and relevant preparation instructions.

A guided discovery flow could help users navigate specialty information without attempting to diagnose their symptoms. Users uncertain about which department they need should be directed to an appropriate hospital contact or clinical professional rather than relying on automated diagnosis.

Expected benefit: Less uncertainty when searching for a suitable department or specialist.

7.2 Unified appointment management

The proposed appointment section would enable users to:

View available appointment slots, where connected to a verified scheduling system.

Book, confirm, reschedule or cancel appointments according to hospital policy.

Receive reminders and relevant visit instructions.

Review the appointment date, time, doctor and department in one place.

Access telephone assistance when online booking is difficult.

Booking status must be synchronised with the hospital's actual scheduling system. The prototype must not imply that a booking is confirmed when it is only a request.

Expected benefit: Better visibility of appointment details and fewer avoidable misunderstandings.

7.3 Digital hospital navigation

A mobile-friendly hospital guide could show the route from the entrance to registration, the consultation department, diagnostic facilities, pharmacy and other authorised patient-service locations.

The interface could use floor maps, simple icons, bilingual labels, step-by-step directions and clear location names. Where appropriate, staff-assisted navigation and printed alternatives should remain available.

Expected benefit: Reduced uncertainty for first-time visitors and attendants.

7.4 Diagnostic and report coordination

Subject to integration with approved hospital systems, the platform could display diagnostic appointments, preparation instructions, test status and report availability.

Where a report is available digitally, users should be able to access it through secure authentication. Notifications should avoid exposing sensitive medical details on a shared or locked device.

Expected benefit: Improved clarity around diagnostic steps and report access.

7.5 Personal patient dashboard

An authenticated dashboard could bring together relevant information, including:

Upcoming appointments.

Visit instructions.

Available reports and prescriptions.

Follow-up recommendations entered by authorised healthcare professionals.

Contact details for relevant hospital services.

Access should be role-based, and attendants should only see information that the patient has authorised them to access.

Expected benefit: Easier access to important information throughout the care journey.

7.6 Post-visit follow-up

The platform could provide reminders based on clinician-approved instructions, links to arrange follow-up appointments, and contact routes for administrative questions.

It should not replace professional medical judgement, independently change treatment plans or use automated messages to provide unverified clinical advice.

Expected benefit: Better continuity between hospital visits and clearer next steps.

7.7 Multilingual and accessible interface

The proposed interface should use plain language, readable typography, sufficient colour contrast, clear labels, accessible touch targets and predictable navigation.

Hindi and English should be considered during initial user research, with additional language support determined by demonstrated user needs. Screen-reader compatibility and support for users with visual, hearing or motor impairments should be included in accessibility testing.

Expected benefit: A more inclusive experience for people with different abilities and digital skills.

7.8 Human assistance and communication

Digital services should include visible contact options, help information and a way to reach the appropriate staff member. A chatbot, if introduced, should be limited to approved informational tasks and should clearly hand over to a human when a question involves clinical judgement, uncertainty or urgent concerns.

Expected benefit: A balance between digital convenience and human reassurance.

8 Proposed patient journey

The stages of the patient journey, with the potential difficulties to be investigated and the proposed interventions, are summarised in Table 1.

Table 1. Proposed patient journey: potential difficulties and digital interventions.

Patient stage	Potential difficulty to investigate	Proposed digital intervention
Before the visit	Difficulty locating reliable hospital information	Central information hub
Doctor selection	Uncertainty about specialties	Guided doctor and department directory
Appointment planning	Confusion about booking details	Appointment dashboard and reminders
Hospital arrival	Difficulty locating departments	Digital map and step-by-step navigation
Consultation	Uncertainty about next steps	Visit information and clinician-provided instructions
Diagnostics	Difficulty coordinating tests and reports	Diagnostic schedule and secure report access
After the visit	Missed follow-up information	Follow-up reminders and appointment links

The table represents proposed design hypotheses. Research should establish which difficulties are present, which users experience them and whether the proposed interventions improve outcomes.

9 Evaluation framework

The platform should be evaluated using measurable outcomes rather than relying only on visual appeal or participant satisfaction. The suggested evaluation indicators are listed in Table 2.

Table 2. Suggested evaluation indicators.

Evaluation area	Suggested indicator
Usability	Percentage of users completing key tasks successfully
Efficiency	Time taken to find a doctor or complete appointment tasks
Error reduction	Number and type of user errors during testing
Navigation	Percentage of users reaching the correct department in a simulated task
Accessibility	Completion rates across relevant user groups and accessibility checks
User confidence	Post-task rating of clarity and confidence
Information continuity	Percentage of users who can correctly identify their next step
Satisfaction	Standardised usability questionnaire and qualitative feedback

Baseline measurements should be collected before the proposed design is evaluated. Any improvement should be calculated from observed results, with the sample, task conditions and limitations reported transparently.

No numerical improvement is claimed in this paper because usability testing has not been reported.

10 Discussion

The proposed framework treats patient experience as a connected service journey rather than a collection of separate digital functions. This distinction is important because a patient may successfully book an appointment online but still experience difficulty finding the department, understanding diagnostic instructions or arranging follow-up care.

The approach also recognises that digital transformation is partly an organisational challenge. Appointment systems, diagnostic services, medical records and patient communication may be managed by different teams or technical systems. A unified interface will only be effective if the underlying information is accurate, responsibilities are clearly assigned and service processes support the promised experience.

Another important consideration is digital inclusion. A mobile application alone may exclude people who lack smartphones, reliable internet access, confidence with digital technology or the ability to use an inaccessible interface. A responsive website, telephone support and staff-assisted alternatives should therefore form part of the proposed service strategy.

Finally, patient data must be treated as sensitive. Authentication, informed consent, access control, secure integration and appropriate retention practices are essential. The design should collect only the information required for its intended function and should avoid unnecessary disclosure through notifications or shared accounts.

Together, these considerations suggest that successful digital healthcare UX requires collaboration between patients, attendants, designers, hospital administrators, clinicians and technical teams.

11 Implementation roadmap

The proposed implementation can be organised into four phases.

Phase 1 – Discover. Audit existing digital services, conduct interviews, administer questionnaires and map patient journeys. Identify the most frequent and consequential problems supported by evidence.

Phase 2 – Design. Prioritise research findings, develop user flows, create wireframes and build a prototype. Review the proposed design with representative users and relevant hospital stakeholders.

Phase 3 – Test. Conduct usability testing, accessibility checks and iterative improvements. Compare prototype performance with a documented baseline where a valid comparison is possible.

Phase 4 – Pilot and evaluate. If hospital approval and technical resources are available, pilot selected functions with a defined user group. Monitor task completion, errors, patient feedback, staff workload, privacy risks and operational reliability before considering wider implementation.

The hospital should approve any live integration, patient-data processing or clinical workflow changes. The proposed concept alone does not establish that implementation is technically or organisationally feasible.

12 Limitations

This paper is a research and design proposal rather than a completed empirical study. Its limitations include:

1. Primary interview and questionnaire findings have not been included.
2. The prevalence and severity of the proposed patient problems have not been established.
3. Existing digital services have not been assessed through a documented, formal usability audit in this paper.
4. The feasibility of integrating appointments, diagnostics, reports and hospital systems requires technical assessment and institutional approval.
5. The proposed sample is a planning estimate and does not guarantee statistical representativeness.
6. Any future findings will be specific to the study context and should not automatically be generalised to other hospitals.

These limitations should be addressed before the work is presented as an empirical research paper with original patient findings.

13 Conclusion

Digital healthcare can play an important role in making hospital services more understandable, accessible and coordinated. For ApolloSAGE Hospitals, Bhopal, a promising direction is to investigate how existing digital touchpoints can be connected into a patient-centred journey covering doctor discovery, appointment management, hospital navigation, diagnostics, information access and follow-up care.

The proposed ApolloSAGE Patient Journey Platform offers a framework for exploring these opportunities through human-centred design. Its success would depend on whether it addresses genuine patient needs, integrates reliably with authorised hospital systems, protects personal information and remains accessible to people with different levels of digital literacy.

The principal contribution of this study is its emphasis on the complete patient journey rather than appointment booking alone. By combining patient research, journey mapping, accessible interface design and measurable usability evaluation, the project can develop a locally relevant digital healthcare solution grounded in evidence.

The next step is to validate the proposed problems with patients and attendants, test the prototype and report the results transparently.

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