

# IPD (In-Patient Department) Module Documentation

**Project Title:** Hospital Website Development  
**Module:** In-Patient Department (IPD) Management  
**Technology Stack:** Angular (Frontend), Spring Boot (Backend), MySQL/PostgreSQL (Database)  
**Date:** 08/07/2025

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## 1. Introduction

The In-Patient Department (IPD) module is a central part of a hospital management system that deals with all patients who are admitted to the hospital for treatment and observation. This documentation presents a complete, structured, and professional overview of the IPD module to be developed for a hospital website. It details all core functionalities, technical frameworks, and the benefits of automation and digitization for patient care management.

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## 2. Module Objective

- **Automate the Admission to Discharge Process:** Streamline the flow of admitting a patient, tracking their treatment and care, and handling their final discharge.
  - **Real-Time Bed and Room Availability Tracking:** Help staff to quickly know which beds and rooms are occupied, vacant, or under maintenance.
  - **Enhance Interdepartmental Coordination:** Ensure seamless interaction between nursing, pharmacy, laboratory, and billing departments.
  - **Digitize Patient Records and Improve Accessibility:** Centralize patient data for doctors and nurses to access and update in real-time.
  - **Ensure Accurate Billing and Transparency:** Track all services, treatments, medications, and other charges to ensure proper billing.
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## 3. Stakeholders and Users

User Role	Responsibilities
Admin	Configure settings, manage staff roles, control access, monitor system usage.
Receptionist	Register patients, assign rooms and beds, manage admission and discharge.
Doctors	View patient details, write prescriptions, request tests, track treatment.
Nurses	Update vital signs, medication administration, and care notes.

<b>Lab Technician</b>	Perform diagnostic tests, upload reports, and notify doctors.
<b>Pharmacist</b>	Dispense prescribed medicines and manage inventory.
<b>Billing Officer</b>	Generate bills, apply discounts or insurance, track payment history.

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## **4. Functional Overview**

### **4.1 Admission Process**

- Capture all personal, demographic, and insurance-related information.
- Choose ward, room, and bed based on live bed status.
- Assign a consulting/admitting doctor to the patient.
- Upload documents such as ID proof, insurance card, prior prescriptions.

### **4.2 Bed and Room Management**

- Live display of all beds and rooms with occupancy status.
- Color-coded status: Available, Occupied, Reserved, Maintenance.
- Option to reassign beds or mark for cleaning/repairs.
- Grouped view by room type and ward (e.g., ICU, General, Semi-private).

### **4.3 Doctor Management**

- Dashboard showing admitted patients under each doctor.
- Ability to update diagnosis, prescribe medicines, and request investigations.
- Maintain treatment plans and daily progress updates.
- Provide final review and create discharge instructions.

### **4.4 Nursing Care and Monitoring**

- Interface to log vitals multiple times a day.
- Record observations: appetite, mental status, pain level.
- Document shift-wise care and medication delivery.
- Alert doctors for abnormal vital signs or emergencies.

### **4.5 Lab and Investigation**

- Doctor can select required investigations (e.g., CBC, X-Ray, MRI).
- Lab technician updates sample collection and processing status.
- Reports are uploaded and linked automatically to the patient's record.
- Notifications sent to doctors and nurses when results are ready.

#### **4.6 Pharmacy Integration**

- Doctor prescriptions are sent directly to the pharmacy module.
- Tracks issue and return of medicines.
- Stock quantity updated automatically after each transaction.
- Provides visibility into pending prescriptions.

#### **4.7 Billing and Payments**

- Generates automated bills for room charges, procedures, consultations, lab tests, and pharmacy.
- Facility to accept partial payments during the patient's stay.
- Handles discounts, taxes, insurance reimbursements.
- Produces downloadable invoices with itemized breakdown.

#### **4.8 Discharge Process**

- Doctor finalizes diagnosis and discharge note.
- Final settlement of billing, pending dues, or refunds.
- Generate PDF of discharge summary including treatment, investigations, advice.
- Follow-up appointment scheduling (optional).

#### **4.9 Reports and Dashboards**

- Daily admission and discharge statistics.
- Ward-wise bed availability report.
- Financial summaries: total revenue, outstanding payments.
- Doctor-wise performance and workload insights.

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### **5. Technical Architecture**

#### **Frontend (Angular)**

- Developed using Angular 17+.
- Responsive layout for desktop, tablet, and mobile screens.
- Dynamic user dashboards for each role (e.g., Doctor, Nurse, Admin).
- Secure routing and lazy loading for optimized performance.
- API consumption through HTTP services.

#### **Backend (Spring Boot)**

- Secure RESTful APIs using Spring Boot framework.

- Layered architecture (Controller > Service > Repository).
- Integration with MySQL/PostgreSQL database using JPA.
- Error handling, logging, audit trails.
- JWT-based authentication for secure login sessions.

**Database (MySQL/PostgreSQL)**

- Relational data model with normalization.
  - Use of foreign key constraints for referential integrity.
  - Optimized indexes for search and reporting.
  - Supports backups and data recovery features.
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**6. Security Measures**

- **Secure Access:** JWT-based login with role-based permissions.
  - **Encrypted Data:** Passwords hashed; sensitive info secured.
  - **Audit Trails:** Record of user activity to track modifications.
  - **Input Validation:** Protection from SQL Injection, XSS, and CSRF.
  - **Compliance:** Data privacy inspired by GDPR/HIPAA guidelines.
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**7. Database Schema (High-Level Overview)**

Table Name	Purpose
ipd_patients	Store patient profile and admission details
ipd_beds	Manage bed status, allocation
ipd_rooms	Room and ward information
ipd_vitals	Store periodic vitals of each patient
ipd_treatments	Track treatments and doctor notes
ipd_medicines	Prescribed and issued medicines
ipd_lab_reports	Investigations and lab results
ipd_billing	All charges and payment status
ipd_discharge_summary	Summary and post-discharge advice

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**8. Future Enhancements**

- **Wearable Device Integration:** Auto-capture of vitals via connected devices.
  - **Insurance Portal Integration:** Allow direct claim initiation and tracking.
  - **Doctor-Nurse Chat System:** Secure internal messaging.
  - **Mobile App Version:** For staff access and patient tracking.
  - **Analytics Dashboard:** Predictive analysis of resource usage, occupancy, and revenue.
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## 9. Conclusion

The IPD module is a mission-critical solution for efficient hospital operations. It enhances patient care quality, provides transparency in services and billing, and connects all medical departments digitally. With Angular on the frontend and Spring Boot on the backend, the system ensures scalability, security, and long-term performance reliability.