Requirements Document: AI-Driven Drug Proposal Analysis Agent

1. Introduction

1.1 Purpose

The agent aims to assist healthcare professionals—especially pharmacists and clinicians—by analyzing a proposed drug against a patient's historical medical data (e.g., past diagnoses, medications, allergies, lab results, age, etc.) and generating an AI-powered summary that supports safe prescribing, better decision making and. feed into down stream processing.

1.2 Scope

This Agent will:

- Analyze Doctor notes, proposed medication.
- Generate Gen AI-based summaries that highlight risks, considerations, and alternatives comparing and contrasting the above against patient's history
- Detects high-risk patterns, especially in elderly or polypharmacy patients.

Primary users: Pharmacists, Prescribing Physicians, Clinical Decision Support (CDS) Teams.

---

2. Functional Requirements

2.1 Proposed Drug Analysis Based on Patient History

- **FR1.1:** The Agent shall accept Doctor Notes, prescription details and the patient history as input (in a shared folder)
- **FR1.2:** Patient history will include:
    - Existing medications
    - Allergies

    - Comorbidities
    - Recent lab results
    - Age, gender, weight
    - Prior adverse reactions (if any)

- **FR1.3:** The Agent shall analyze compatibility and highlight potential risks, such as:
    - Known allergies
    - Disease contraindications
    - Unfavorable lab values (e.g., renal or hepatic impairment)

- **FR1.4:** The Agent shall check for therapeutic duplication or potential ineffectiveness based on history and provide a summary

2.2 AI-Generated Clinical Summary for Decision Support

- **FR2.1:** The Agent shall provide a concise Gen AI-powered summary that includes:
    - Key facts from patient history relevant to the prescription
    - Risk assessment
    - Monitoring recommendations (e.g., check blood sugar, LDL, HDL)
    - Suggested alternatives (if relevant)

- **FR2.2:** The summary shall be context-sensitive and generated in under 5 seconds.

- **FR2.3:** Users shall be able to request a “detailed explanation” or “layman’s summary”.

2.3 High-Risk Medication Pattern Detection

- **FR3.1:** The Agent shall flag high-risk profiles (e.g., elderly patients with 5+ medications).

- **FR3.2:** When a new drug is proposed, it shall assess cumulative burden and suggest caution if needed.

- **FR3.3:** It shall alert on risky drug classes (e.g., CNS depressants, anticoagulants) based on existing patient medications and history.

---

3. Non-Functional Requirements

3.1 Performance

- Summarization response time: <5 seconds.
- Daily support for 100,000+ drug analysis requests.

3.2 Usability

- Clear, color-coded risk flags (e.g., Red = major risk, Yellow = moderate).
- Toggle to expand summary for clinical details or recommendations.

3.3 Interoperability

- EHR integration via FHIR/HL7 for real-time patient data access.
- External APIs for drug safety reference (e.g., RxNorm, FDA database).

3.4 Security

- Full HIPAA compliance with role-based access control and data encryption.
- Audit trails for every analysis request and summary generation.

---

4. System Architecture Overview

- **Document Upload** - Shared folder (Patient Record, Doctor Notes, Prescription)
- **OCR/IDP** - Google Tesseract, Azure Document Analyzer etc
- **Output Files** - Document providing the Analysis Result (to be used downstream)
- **Backend:**
    - AI engine (e.g., Azure OpenAI for summarization)

    - Medical rules engine (drug-disease, drug-allergy, drug-lab)
    - Integration service for EHR data access
- **Data Sources:**
    - Patient EHR records
    - Clinical decision support databases (RxNorm, DrugBank, etc.)

Optional

- **Frontend:** Sample front end that can assimilate the output from the Agent
-
