

Case Study: Smart Pre-Visit Reports: Elevating Care with AI

Provide the clinician with a concise and trustworthy snapshot before the visit, allowing them to focus on the right questions more efficiently.

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The Challenge

Doctors spend too much time prepping before visits, manually skimming forms, labs, and notes—easy to miss important details, and it drains time and energy. Typical cases range from vague complaints (“tired, stressed”) to complex chronic patients where staff spend 15–20 minutes digging through years of records.

Case 1: A new patient with vague complaints like “feeling tired and stressed” provides limited details, forcing the physician to play detective, which may leave the patient feeling unheard.

Case 2: For a patient with diabetes, hypertension, and heart disease, staff spend 15–20 minutes combing through years of records across specialists. This manual process risks overlooking critical updates, missing data points leaving the physician without a clear, actionable summary.

Proposed Solution

Scope: The project aims to develop an AI-powered system that collects patient information through conversational assistants and dynamic questionnaires, integrates it with EHR data, and generates a consolidated pre-visit dashboard that highlights key trends, concerns, and insights for physicians.

Requirements: The patient engages with a conversational AI assistant via chatbot or audio bot to share details about lifestyle, sleep, diet, and stress. The bot asks intelligent follow-ups (e.g., probing sleep habits when fatigue is mentioned). AI then analyzes this unstructured dialogue with Natural Language Understanding(NLU), extracting key medical entities and summarizing them into a concise report for the physician.

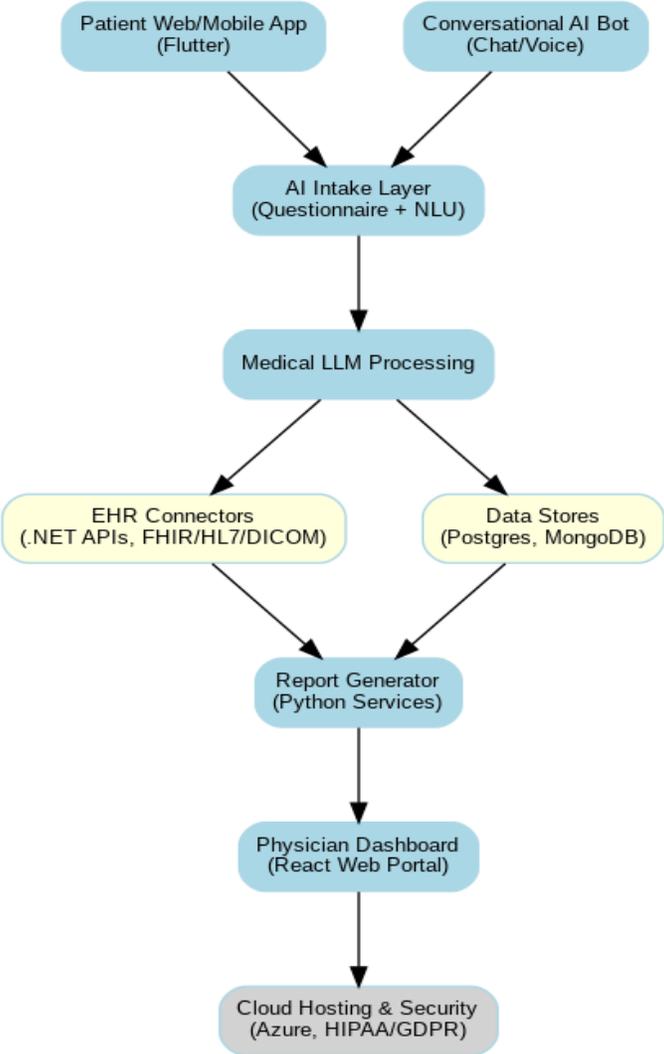
Next, the patient completes an AI-guided questionnaire on a secure portal or app, adding real-time symptoms and concerns. This data is merged with the Electronic Health Record(EHR), including labs, vitals, and notes. A medical Large Language Model(LLM) synthesizes everything into a pre-visit dashboard, highlighting trends, inconsistencies, and critical insights in a clear, consolidated view.

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| Functional | <ul style="list-style-type: none"> • Conversational AI chatbot/audio bot to collect patient data • Intelligent follow-up questioning using Natural Language Processing • AI-guided questionnaire via secure portal/mobile app • EHR integration to pull labs, vitals, notes, diagnoses • Medical LLM to synthesize patient + EHR data • Generate pre-visit summary/dashboard for physicians |
| Non-Functional | <ul style="list-style-type: none"> • HIPAA/GDPR compliance and strong security |

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| | <ul style="list-style-type: none">• End-to-end encryption for data in transit and storage• High performance with low-latency report generation• Scalability for large patient volumes• User-friendly, accessible interfaces (patients & doctors)• Interoperability with HL7/FHIR standards• Detailed audit trails and logging for traceability |
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Architecture

High-Level Design: Workflow includes different applications like Web/mobile front end, LLM processing, Report generator, etc.



Impact Of the Solution

Before the visit: The doctor gets a one-page AI summary that shows the key problems and trends.

What it highlights: Possible links between stress and fatigue, a note about shortness of breath, and important changes like a BP spike, ankle swelling, or a higher A1C.

Why it helps: The doctor can start a focused, personal conversation, trust the data, and act faster—prep drops from ~15–20 minutes to under a minute.

What to do next: It suggests practical steps (stress management, a sleep-apnea check, possible med tweaks, and follow-up tests) to guide care.

Tech Background

Tech Stack

- Core AI & NLP: Medical Large Language Model (LLM)
- Python (for AI pipeline)
- PyTorch (for model fine-tuning and inference)
- Hugging Face Transformers (for LLM integration)

Data Handling:

- FHIR (Fast Healthcare Interoperability Resources) for clinical data exchange
- HL7 v2 for legacy EHR integration
- DICOM for imaging references

Report Generation Application

- Python (AI services, data processing)
- C# (.NET Core for healthcare APIs and EHR connectors)
- PostgreSQL
- MongoDB (unstructured notes and AI outputs)
- React.js
- Flutter (cross-platform mobile app for Android & iOS)

Cloud Platform:

- Microsoft Azure