

# Medsplain

## AI-Powered Medication Explainer

Understand your medications with trustworthy, on-demand answers.

DEVELOPED BY

 Team Fusion Core



OFFICIAL DATA SOURCE  
Sourced from **OpenFDA**

Disclaimer: Educational information only. Not medical advice.

### PROBLEM STATEMENT

## Medication Info Isn't Working

Critical Healthcare Gap



### Comprehension Gap

Medication leaflets are dense, jargon-filled, and 2-4 pages long—written at a college level but needed by all patients regardless of literacy.



### Patient Behavior

Overwhelmed patients skip reading entirely or rely on Google searches filled with horror stories and unreliable advice.



### The Critical Need

A reliable, on-demand way to access facts grounded in [trustworthy sources](#) like OpenFDA, ensuring medical accuracy.

30–50%

### Medication Non-Adherence

Costing healthcare systems hundreds of billions annually due to mismanagement.

>125,000

### Preventable Deaths / Year

Directly linked to medication mismanagement and lack of understanding.



### The Opportunity

Understanding "how it works" can boost efficacy by 15–20% via the placebo effect—a benefit currently lost in complex jargon.

### OUR SOLUTION

## Medsplain Overview

Translating complex FDA data into personalized, trustworthy explanations with interactive support.



### Trusted Sources Only

Unlike generic chatbots that hallucinate, we strictly use OpenFDA as the immutable system-of-record.

SOURCE: OpenFDA API  
Labels & Enforcement Reports

No Generic Web Scraping



### Concise Explanations

Automatically converts technical inserts into clear summaries grounded strictly in FDA labels, removing jargon without losing accuracy.



### Safety-First Design

Built-in interaction checker for 2-5 medications and automatic escalation for serious warning signs found in label data.



### Interactive Q&A

A conversational interface handles specific questions like "Will this hurt my stomach?" with built-in safety guardrails.



### Mobile-First Accessibility

Web-based interface optimized for older adults—large text, high contrast, and no app store download required.

Pharmacist-Validated Prompts & Protocols

### PROJECT DEFINITION

## Scope & Focus (MVP)

Minimum Viable Product

### In Scope (MVP)

INCLUDED

- ✓ **Top 100 Medications**  
Plain-language generator validated for high-volume prescriptions.
- ✓ **Multi-Interaction Checker**  
Analyzes interactions for 2-5 concurrent drugs using OpenFDA data.
- ✓ **Safety Guardrails**  
Automatic escalation for "Call Doctor" scenarios and serious warnings.
- ✓ **Web-First Interface**  
Optimized for mobile browsers & accessible to older adults (no app download).

### Out of Scope (Deferred)

PHASE 2+

- ✗ Integration with pharmacy systems or EHRs
- ✗ Full medication database (focused only on Top 100)
- ✗ Symptom checking or diagnosis capabilities
- ✗ Medication shopping or insurance pricing features
- ✗ Native mobile apps (iOS/Android) or multi-language

### Strategic Rationale

### USER ANALYSIS

## Target Users: Primary Persona

Adults 40-75 with Chronic Conditions



### "The Anxious Patient"

Managing New Prescriptions

AGE RANGE  
40-75 Years Old

TECH PROFICIENCY  
Smartphone User (Banking/FB)

CONTEXT  
Pharmacy Counter / Home

MARKET SIZE  
4.5 Billion Prescriptions/Year

### Core Needs

- ✓ **Understand Mechanism**  
Need to understand "how it works" and "why take it" without a medical dictionary.
- ✓ **Risk Clarity**  
Distinguish urgent "call 911" side effects from harmless, common ones.
- ✓ **Safety Verification**  
Verify safety with current daily meds (e.g., Lisinopril, Metformin).

### Pain Points & Frustrations

- "I can't understand what 'contraindicated in hepatic impairment' means - is that me?"
- "The insert lists 50 side effects. Which ones should I actually worry about right now?"
- "The pharmacist only had 2 minutes and I forgot my questions once I got to the car."

### EXPANDED REACH

## Secondary Users & Use Cases

Beyond the Patient



### Caregivers (Adult Children)

Managing care for aging parents

- ✓ **Proxy Management:** Consolidate medications across multiple specialists and doctors.
- ✓ **Safety Monitoring:** Proactively check for interactions to prevent adverse events.
- ✓ **Digital Bridge:** Act as the tech-enabled link between the tool and the patient.



### Healthcare Students

Nursing & Pharmacy training

- ✓ **Communication Practice:** Learn how to communicate medical concepts clearly to patients.
- ✓ **Quick Reference:** Study common side effects and safety interactions on the go.

### Shared Goals

- Speed to Insight  
Quick clarity without wading through pages of dense text.
- Actionable Safety  
Knowing exactly when to escalate a symptom vs. when to wait.
- Trusted Authority  
Reliance on official FDA-backed data rather than forums.

UNIFIED VALUE PROPOSITION

### SUCCESS FRAMEWORK

## Metrics: KPIs & Success Criteria

Targeting Outcomes, Not Just Output

### Product Success Metrics (User Impact)



70%+



GOAL



3.8/5



GOAL



80%+

GOAL

### Operational & Technical Targets



3–7 min

SESSION EFFICIENCY

Time from input to exit



20+ users

PILOT ADOPTION

10 unique users with 30+ sessions



### Technical Health

Factual Accuracy

90%+

Response latency

< 1s

### TECHNICAL COMPONENTS

## System Overview

Modular Architecture



REACT.JS + VERCEL

### Mobile-First UI

Responsive, accessible web interface optimized for older adults. Hosted on Vercel for high performance and global edge delivery.



PYDANTIC

### Input Validation

Rigorous schema validation for all user inputs. Ensures medication names and queries are sanitized before processing.



OPENFDA API

### Label Retrieval

System-of-record integration fetching official FDA drug labels. Provides the grounding context for all AI generation.



GEMINI

### Q&A Engine

Advanced LLM that synthesizes complex medical data into clear answers. Strictly grounded in the provided OpenFDA context.



FDA INTERACTIONS

### Interaction Checker

Analyzes 2-5 concurrent medications for contraindications using data sections extracted from FDA labels.



GUARDRAILS

### Safety Protocols

Post-processing logic that detects danger signals. Automatically escalates serious symptoms with "Call Doctor" guidance.

### TECHNICAL FOUNDATION

## Architecture & Tech Stack

3-Tier Architecture

### Frontend Layer

**React.js**  
Component-based UI library for dynamic interactivity.

**Vercel**  
Edge network hosting for high-performance delivery.

**Mobile-First Design**  
Responsive layout optimized for accessibility.

### Backend Layer

**Flask (Python)**  
Lightweight API orchestration and logic handler.

**Pydantic**  
Strict data validation and schema enforcement.

Secure API Gateway

### AI & Data Layer

**Google Gemini**  
Advanced reasoning engine for Q&A generation.

**OpenFDA**  
Immutable system-of-record for drug labels.

Data strictly grounded in OpenFDA.

### PROCESS PIPELINE

## System Flow & AI Logic

Real-time Processing



### User Input

React UI captures medication name & query. Sends to backend.



### API Validation

Flask endpoint receives request. Pydantic validates schema & types.



### OpenFDA Retrieval

Fetch official drug label JSON. Extract relevant sections (e.g. "Warnings").



### Gemini Generation

Prompt constructed with FDA context. Gemini generates plain answer.



### Safety Guardrails

Post-processing checks for danger signals. Appends escalation if needed.



### UI Delivery

Response streamed via SSE to React frontend on Vercel.

**Latency Targets**

Time to First Byte < 1.5s

Full Response < 3.5s

Optimized via aggressive caching (Redis) and token streaming.

### MVP BENCHMARKS

## Technical Performance Targets

Deployment Standards



VERCEL + FLASK

< 3s

Response Latency (p95)

Initial Explanation < 5s  
Follow-up Q&A < 3s  
Optimized via Vercel Edge caching and Flask lightweight routing.



INFRASTRUCTURE

≥ 90%

System Availability

Target uptime during the 4-week pilot period across all regions.  
Vercel Edge Network Redundancy



OPENFDA DATA

90%+

Factual Accuracy

Verified correctness against official FDA labeling text.  
Measured via synthetic evaluation set.



PYDANTIC

< 8%

Error Rate

Aggressive caching of FDA labels via Vercel. Exponential backoff retries for Gemini calls.



GEMINI API

< \$0.25

Cost Efficiency

Per complete user session (Explanation + 3-5 Q&A turns).



ZERO TOLERANCE

ZERO

Safety Incidents

Contradictions of doctor's orders.

### PROJECT RESILIENCE

## Risks, Mitigations & Contingency

Proactive Management

### Technical Risks

#### Gemini Hallucinations

MED

**MITIGATION**  
Strict prompt grounding in OpenFDA text. Temperature set to 0.2. Explicit "I don't know" fallback.

#### API Rate Limits

MED

**MITIGATION**  
Aggressive caching of FDA labels via Vercel. Exponential backoff retries for Gemini calls.

#### Input Malformation

LOW

**MITIGATION**  
Pydantic strict schema validation to reject invalid JSON queries before they reach the LLM.

### Safety & Product Risks

#### User Over-Reliance

HIGH

**MITIGATION**  
Prominent "Educational Only" badges. Hard-coded logic to suggest "Call Doctor" for severe symptoms.

#### Privacy Concerns

MED

**MITIGATION**  
Stateless architecture. No persistent storage of chat logs or PII on Vercel/Flask servers.

#### Scope Creep

MED

**MITIGATION**  
Strict adherence to Top 100 meds MVP. Deferring EHR integration features.

### Contingency Plans

#### Gemini Outage

Immediate switch to cached responses for popular meds. Fallback to static FDA "Warnings" section display if generation fails.

#### Cost Spike

Implement strict per-IP rate limiting (10 req/hour). Increase cache TTL for drug labels to 30 days.

#### Low Tester Count

Pivot to synthetic evaluation using 50 pre-defined test cases validated by a pharmacist review.