

Healthcare Care Coordination Agent

October 01, 2025

Executive Summary

An autonomous agent analyzes patient reports, drafts findings and recommendations for clinician approval, and upon sign-off sends the patient an appointment email with self-serve rescheduling.

Bullet version

- Autonomous agent ingests and analyzes patient reports
- Drafts findings and recommended actions for clinician review
- Clinician can modify and approve
- On approval, agent emails the patient with an appointment link
- Patient can reschedule independently

Closes care gaps by turning lab results into coordinated action. Baseline ~35% missed first follow-up; target ≤15% within 12 weeks; median Time-to-Outreach ≤2 hours.

Impact Breakdown (estimated)

Dimension	Impact %	Explanation
Improved Patient Screening & Follow-up Adherence	30%	automated reminders increase patient engagement and reduce no-shows.
Operational Efficiency (Clinician & Admin Time Saved)	20%	Autonomous agent auto-reads reports, drafts findings, and handles approvals → reduces manual processing.
Data Transparency & Auditability	15%	Mirror Node provide immutable audit trails for adherence events.
Cost Savings in Communication & Scheduling	10%	Automated SES mailers + patient self-rescheduling lower call-center and admin overhead.

Dimension	Impact %	Explanation
Security & Compliance Posture	10%	KMS encryption, Secrets Manager, IAM least-privilege → high assurance in data security and regulatory compliance.
Research & Analytics Value	8%	eHIE integration + structured appointment data improves health analytics.

Net Value Delivered

- **Patient-Centric Impact** → 30% (behavioral change, adherence)
- **System / Process Efficiency** → 30% (agent automation + comms savings)
- **Trust / Compliance / Analytics** → 33% (auditability, governance, research insights)

This system can **improve patient adherence by ~30%, cut admin workload by ~20%, and strengthen auditability by ~15%**, while delivering **secure, low-carbon on-chain accountability**

Tech Stack

Core Runtime

- **Python 3.11** (AWS Lambda runtime)
- **boto3** (AWS SDK for Python)

AI / Decisioning

- **Amazon Bedrock**
 - **Bedrock Runtime** (LLM calls; foundation model ID is parameterized)
 - **Bedrock Agent & Agent Alias** (tool-using autonomous agent)

API & Orchestration

- **Amazon API Gateway v2 (HTTP APIs)** – patient webhook/callbacks & admin endpoints
- **AWS Step Functions** – care-coordination / reward workflows

- **Amazon EventBridge (Rules)** – scheduled/triggered runs
- **Amazon SQS (+ DLQ)** – async notifications & retries

Data & Storage

- **Amazon DynamoDB** – Memory store & Runs/Approvals tables (server-side encrypted with KMS)
- **Amazon S3** – Patient data bucket / reports / artifacts (SSE-KMS)

Messaging & Comms

- **Amazon SES** – patient appointment emails
- **Discord Webhook** (via **AWS Secrets Manager** for the URL) – approval previews/alerts

Security / Secrets / Keys

- **AWS KMS (CMK + Alias)** – envelope encryption & signing where needed
- **AWS IAM** – fine-grained roles for Lambdas, Step Functions, DynamoDB, S3, Bedrock
- **AWS Secrets Manager** – Discord webhook, other app secrets

Observability

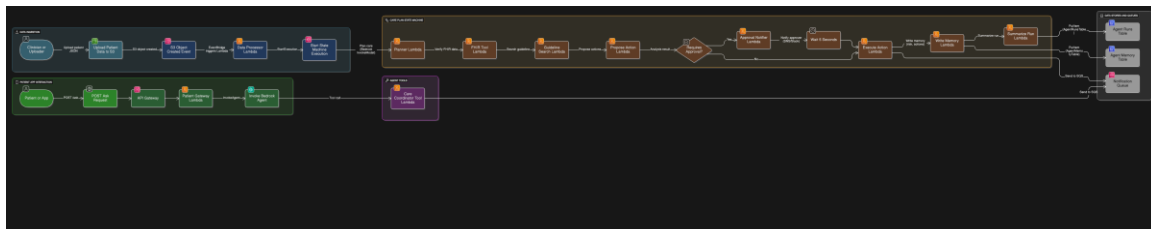
- **Amazon CloudWatch Logs & Metrics** – Lambda, API Gateway, Step Functions

DevOps / IaC

- **AWS CloudFormation** – full stack provisioning

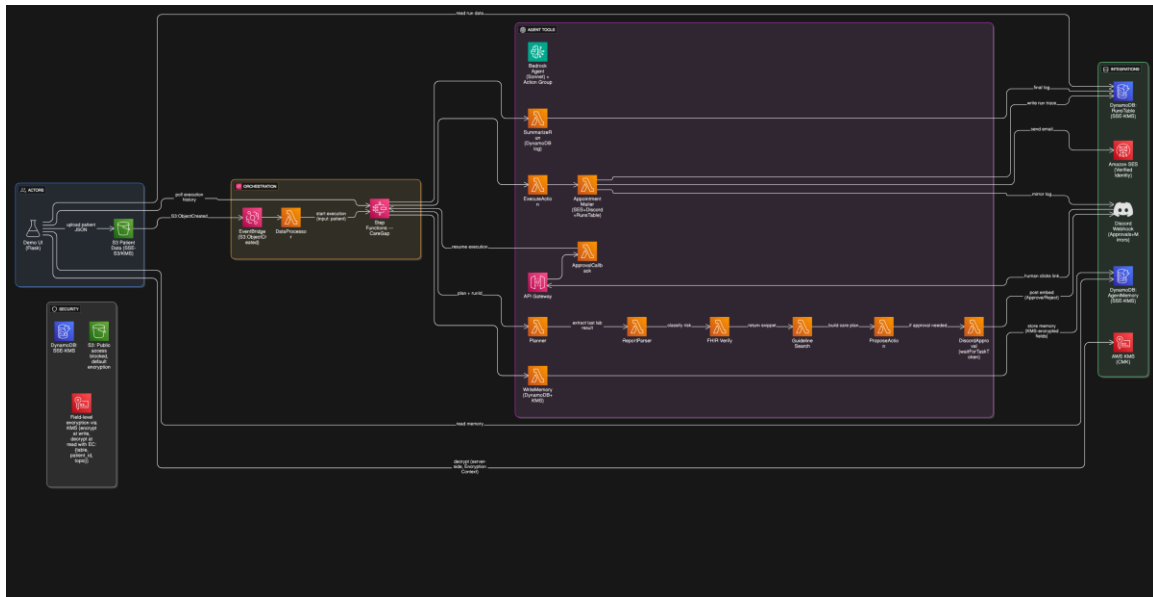
Process Flow

End-to-end orchestration with human-in-the-loop approval.



Architecture

Core AWS components and trust boundaries.



- OPP: TTA/approval/deliverability/success/cost control charts; special-cause detection.
- QPM: SLOs — TTA $P50 \leq 5m$ / $P95 \leq 10m$, approval $P50 \leq 30m$ / $P95 \leq 4h$, success $\geq 92\%$.
- OID: Deterministic plan fallback; Discord approvals; adaptive email A/B testing.
- CAR: KMS/SES/Discord defects with preventative actions and SOP updates.

Security & Compliance

KMS on S3/DDB/SQS; Secrets Manager; IAM least-privilege; SES DMARC/SPF; PII minimized with SHA-256 and encrypted mirrors; audit logs in RunsTable.

Deployment & Runbook

Blue/Green via NameSuffix; generator for smoke tests; Discord approval; SES confirmation; Dynamo memory write; rollback by swapping suffix and redeploying previous template.

Impact & KPIs

Missed follow-up 35%→≤15%; TTA 36h→≤2h; deliverability ≥98%; open rate ≥55% (high risk).

Future ML Integrations

Risk models on de-identified labs; imaging endpoints for X-ray/CT; FHIR/NLP mapping; active learning from approvals.

Screenshots Gallery

Healthcare Care Coordinator — Live Demo

ENV dev REGION us-west-2 SUFFIX red

Upload a patient JSON, watch orchestration in real time, preview the follow-up card, and visualize risk factors.

Choose File

3bea7e04-34a0-...7160fd02190.json

Start Run

Patient: 114589 | Email: ramnalawade1986@gmail.com

Execution: arn:aws:statesus-west-2:663800986524:execution:healthcare-caregap-dev-red:32ffbbc1-3fe4-4010-98f9-6613ef18b076

1) Live Execution Timeline

2025-10-01T18:04:07.187000+00:00

ExecutionStarted

ExecutionStarted

2025-10-01T18:04:07.222000+00:00

Plan

TaskStateEntered

2025-10-01T18:04:07.222000+00:00

LambdaFunctionScheduled

LambdaFunctionScheduled

2025-10-01T18:04:07.300000+00:00

LambdaFunctionStarted

LambdaFunctionStarted

2025-10-01T18:04:08.126000+00:00

LambdaFunctionSucceeded

LambdaFunctionSucceeded

2025-10-01T18:04:08.146000+00:00

Plan

TaskStateExited

2025-10-01T18:04:08.146000+00:00

ParseReport

TaskStateEntered

2025-10-01T18:04:08.146000+00:00

LambdaFunctionScheduled

LambdaFunctionScheduled

2025-10-01T18:04:08.214000+00:00

LambdaFunctionStarted

LambdaFunctionStarted

2025-10-01T18:04:08.512000+00:00

LambdaFunctionSucceeded

LambdaFunctionSucceeded

2025-10-01T18:04:08.535000+00:00

ParseReport

TaskStateExited

2025-10-01T18:04:08.535000+00:00

VerifyFHIR

TaskStateEntered

2025-10-01T18:04:08.535000+00:00

LambdaFunctionScheduled

LambdaFunctionScheduled

2025-10-01T18:04:08.603000+00:00

LambdaFunctionStarted

LambdaFunctionStarted

2025-10-01T18:04:08.894000+00:00

LambdaFunctionSucceeded

LambdaFunctionSucceeded

2025-10-01T18:04:08.921000+00:00

VerifyFHIR

TaskStateExited

2025-10-01T18:04:08.921000+00:00

SearchGuideline

TaskStateEntered

2025-10-01T18:04:08.921000+00:00

LambdaFunctionScheduled

LambdaFunctionScheduled

2025-10-01T18:04:08.984000+00:00

LambdaFunctionStarted

LambdaFunctionStarted

2025-10-01T18:04:09.291000+00:00

LambdaFunctionSucceeded

LambdaFunctionSucceeded

2025-10-01T18:04:09.311000+00:00

SearchGuideline

TaskStateExited

2025-10-01T18:04:09.311000+00:00

ProposeAction

TaskStateEntered

2025-10-01T18:04:09.311000+00:00

LambdaFunctionScheduled

LambdaFunctionScheduled

2025-10-01T18:04:09.390000+00:00

LambdaFunctionStarted

LambdaFunctionStarted

2025-10-01T18:04:09.694000+00:00

LambdaFunctionSucceeded

LambdaFunctionSucceeded

2025-10-01T18:04:09.737000+00:00

ProposeAction

TaskStateEntered

Follow-up Suggestion (email preview)

Auto-fills from uploaded patient data — mirrors your email card style.

Department

Primary Care

Risk

High

Key results

- HbA1c (NGSP) : 12.2 (critical)

Guideline

Follow-up per clinician judgment based on abnormal results.

Next steps

• Notify care team

• Schedule follow-up

Suggested appointment

Provider: Assigned PCP (PCP / NP)

Mode: Clinic or telehealth, 20 minutes

Window: Routine, in 4–12 weeks

Proposed slot: 10/8/2025, 10:00:00 AM

If symptoms such as nausea, vomiting, abdominal pain, or confusion occur, seek urgent care.

Symptom → Disease (demo)

Comma-separated symptoms (e.g., fever, cough, sore throat):

patient.symptoms.

Sample data for normal symptoms :- runny nose, sore throat, cough

Sample data for high symptoms :- high fever, sore throat, abdominal pain, persistent cough

Discord

HealthApproval (#general, Text Channels)

Approval needed for **Ram Nalawade**

Live demo — orchestration + follow-up preview

2) Detailed Steps (inputs / outputs)

[Refresh](#)

LambdaFunctionScheduled	LambdaFunctionStarted	LambdaFunctionSucceeded
2025-10-01T18:04:08.984000+00:00		
2025-10-01T18:04:09.291000+00:00		
LambdaFunctionSucceeded	SearchGuideline TaskStateExited	
2025-10-01T18:04:09.311000+00:00	ProposeAction TaskStateEntered	
2025-10-01T18:04:09.311000+00:00	LambdaFunctionScheduled	
LambdaFunctionsScheduled		
2025-10-01T18:04:09.390000+00:00	LambdaFunctionStarted	LambdaFunctionStarted
2025-10-01T18:04:09.694000+00:00	LambdaFunctionSucceeded	
LambdaFunctionSucceeded		
2025-10-01T18:04:09.717000+00:00	ProposeAction TaskStateExited	
2025-10-01T18:04:09.717000+00:00	ApprovalChoice ChoiceStateEntered	
2025-10-01T18:04:09.717000+00:00	ApprovalChoice ChoiceStateExited	
2025-10-01T18:04:09.717000+00:00	DiscordApproval TaskStateEntered	
2025-10-01T18:04:09.717000+00:00	TaskScheduled TaskScheduled	
2025-10-01T18:04:09.785000+00:00	TaskStarted TaskStarted	
2025-10-01T18:04:11.037000+00:00	invoke.waitForTaskToken TaskSubmitted	

Symptom — Disease (demo)

Comma-separated symptoms (e.g., fever, cough, sore throat). Falls back to patient.symptoms.

Sample data for normal symptoms :- runny nose, mild cough, sneezing
Sample data for high symptoms :- high fever, shortness of breath, chest pain, persistent cough

[Run Demo](#)

3) Discord Logs

Pulled from RunsTable for this run

[Refresh](#)

-

Stroke Risk (quick score demo)

Auto-fills from patient.JSON; edit to explore impacts. Pie chart shows factor contributions.

Sample data for normal risk :-

- Age: 35
- Hypertension: 0
- Heart disease: 0
- Avg glucose: 95
- BMI: 22
- Smoking status: never

Sample data for high risk :-

- Age: 40
- Hypertension: 1
- Heart disease: 1
- Avg glucose: 150
- BMI: 34
- Smoking status: smokes

4) Dynamo Table (latest)

[Refresh](#)

-

5) Dynamo Table (all)

[Refresh](#)

-

Timeline + symptom triage panel

2) Detailed Steps (inputs / outputs)

Refresh

▼ RUN Plan [Task] — RUNNING (924 ms)

Input

```
{
  "patient": {
    "patient_id": "114589",
    "patient_name": "Ram Nalawade",
    "patient_email": "ramnalawade1986@gmail.com",
    "last_lab_result": {
      "test_name": "HbA1c (NGSP)",
      "result_value": 12.2,
      "unit": "%",
      "is_critical": true,
      "flag": "HIGH",
      "comment": "Consistent with poorly controlled diabetes (estimated average glucose ≈ 320 mg/dL)."
    }
  }
}
```

Output

```
{
  "patient": {
    "patient_id": "114589",
    "patient_name": "Ram Nalawade",
    "patient_email": "ramnalawade1986@gmail.com",
    "last_lab_result": {
      "test_name": "HbA1c (NGSP)",
      "result_value": 12.2,
      "unit": "%",
      "is_critical": true,
      "flag": "HIGH",
      "comment": "Consistent with poorly controlled diabetes (estimated average glucose ≈ 320 mg/dL)."
    }
  },
  "planOut": {
    "plan": {
      "steps": [
        "ParseReport",
        "VerifyFHIR",
        "SearchGuideline",
        "ProposeAction",
        "DiscordApproval",

```

-

Stroke Risk (quick score demo)

Auto-fills from patient JSON; edit to explore impacts. Pie chart shows factor contributions.

Sample data for normal risk :-

- Age: 35
- Hypertension: 0
- Heart disease: 0
- Avg glucose: 95
- BMI: 22
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Sample data for high risk :-

- Age: 40
- Hypertension: 1
- Heart disease: 1
- Avg glucose: 150
- BMI: 34
- Smoking status: smokes

Age

Hypertension (0/1)

Heart disease (0/1)

Avg glucose (mg/dL)

BMI

Detailed Steps — Plan (I/O)

2025-10-01T18:04:09.717000+00:00

ProposeAction

TaskStateExited

2025-10-01T18:04:09.717000+00:00

ApprovalChoice

ChoiceStateEntered

2025-10-01T18:04:09.717000+00:00

ApprovalChoice

ChoiceStateExited

2025-10-01T18:04:09.717000+00:00

DiscordApproval

TaskStateEntered

2025-10-01T18:04:09.717000+00:00

TaskScheduled

TaskScheduled

2025-10-01T18:04:09.785000+00:00

TaskStarted

TaskStarted

2025-10-01T18:04:11.037000+00:00

invoke.waitForTaskToken

TaskSubmitted

2) Detailed Steps (inputs / outputs)

Refresh

▶ RUN Plan [Task] — RUNNING (924 ms)

▶ RUN ParseReport [Task] — RUNNING (389 ms)

▶ RUN VerifyFHIR [Task] — RUNNING (386 ms)

▶ RUN SearchGuideline [Task] — RUNNING (390 ms)

▶ RUN ProposeAction [Task] — RUNNING (406 ms)

▶ RUN ApprovalChoice [Choice] — RUNNING (0 ms)

▶ RUN DiscordApproval [Task] — RUNNING (-)

3) Discord Logs

Pulled from RunsTable for this run

Refresh

-

4) Dynamo Table (latest)

Refresh

-

5) Dynamo Table (all)

fever, cough, sore throat

Run Demo

-

Stroke Risk (quick score demo)

Auto-fills from patient JSON; edit to explore impacts. Pie chart shows factor contributions.

Sample data for normal risk :-

• Age: 35

• Hypertension: 0

• Heart disease: 0

• Avg glucose: 95

• BMI: 22

• Smoking status: never

Sample data for high risk :-

• Age: 40

• Hypertension: 1

• Heart disease: 1

• Avg glucose: 150

• BMI: 34

• Smoking status: smokes

Age

Hypertension (0/1)

Heart disease (0/1)

Avg glucose (mg/dL)

Expanded step list — running states Plan, parsereport, VerifyFHIR, SearchGuidelines

3) Discord Logs

Pulled from RunsTable for this run

Refresh

2025-10-01T18:06:12.000Z discord:email SENT {"appt":{"dept":"Primary Care","iso":"2025-10-08T10:00:00Z","provider":"Assigned PCP","role":"PCP / NP","when":"Wednesday, Oct 08, 2025 10:00 AM Asia/Kolkata"},"subject":"Citycare Diagnostic and Health Care Centre: Follow-up suggested for Ram Nalawade - Primary Care","to":"ramnalawade1986@gmail.com"}

4) Dynamo Table (latest)

Refresh

```
{
  "Items": [
    {
      "patient_email_enc": {
        "S": "{\\alg\\": \"BASE64-DEMO\\", \\data_b64\\":
        \\cmFtbmFsYXdhZGUxOTg2Q6dtYmlsLmNvbQ==\\}"
      },
      "actions_enc": {
        "S": "{\\alg\\": \"BASE64-DEMO\\", \\data_b64\\":
        \\WyJ0b3RpZnkgY2FyZS80ZWftIiwuU2NoZWRR1bGUgZm9sbG93LXVwI10=\\}"
      },
      "ts": {
        "N": "1759341973"
      },
      "risk": {
        "S": "high"
      },
      "mode": {
        "S": "DEMO_FALLBACK:ClientError"
      },
      "patient_email_sha256": {
        "S": "3264df53e655c86173337ffe11f67c55f97436e15e8e18be4edf44c8a8547ba1"
      },
      "sk": {
        "S": "caregap@latest"
      },
      "followup": {
        "S": "{\\department\\": \"Primary Care\\", \\provider_role\\": \"PCP / NP\\",
        \\provider_name\\": \"Assigned PCP\\", \\visit_type\\": \"Clinic or telehealth\\",
        \\duration_min\\": 20, \\urgency\\": \"Routine\\", \\window\\": \\in 4\\u201312
        \\u20132025\\u201310-08T10:00:00Z\\}"
      }
    }
  ]
}
```

Smoking status

never

Compute Risk

Risk: -

-

Discord log sample — email sent

6) Dynamo Table (raw)

Refresh

```
{
  "count": 1,
  "items": [
    {
      "ts": 1759341972,
      "step": "discord:email",
      "detail": "{\\"to\\": \\"ramnalawade1986@gmail.com\\", \\"subject\\": \\"Citycare Diagnostic and Health Care Centre: Follow-up suggested for Ram Nalawade \\"u2014 Primary Care\\", \\"appt\\": {\\"dept\\": \\"Primary Care\\", \\"provider\\": \\"Assigned PCP\\", \\"role\\": \\"PCP / NP\\", \\"when\\": \\"Wednesday, Oct 08, 2025 10:00 AM Asia/Kolkata\\", \\"iso\\": \\"2025-10-08T10:00:00Z\\\"}}",
      "runId": "9a041a07-3779-4af6-a1cf-f1aea2fb716f",
      "status": "SENT"
    }
  ]
}
```

7) Security (KMS/SSE quick view)

Refresh

```
{
  "region": "us-west-2",
  "bucket": "healthcare-patient-data-next-new-dev-663800986524-red",
  "memoryTable": "healthcare-agent-memory-dev-red",
  "runsTable": "healthcare-agent-runs-dev-red",
  "kmsKeyArn": "arn:aws:kms:us-west-2:663800986524:key/2960c625-9c6b-4200-9897-2f871f525cc0",
  "s3_encryption": {
    "algorithm": "aws:kms",
    "kms_key": "9bf49118-7cde-4966-9c6a-8634fe707f59"
  },
  "ddb_memory_sse": {
    "enabled": false,
    "type": "KMS",
    "kms_key": "arn:aws:kms:us-west-2:663800986524:key/9bf49118-7cde-4966-9c6a-8634fe707f59"
  },
  "ddb_runs_sse": {
    "enabled": false,
    "type": "KMS",
    "kms_key": "arn:aws:kms:us-west-2:663800986524:key/9bf49118-7cde-4966-9c6a-8634fe707f59"
  }
}
```

Dynamo — latest item

Encrypted view

Refresh

```
{
  "count": 1,
  "items": [
    {
      "partitionKey": "patient#114589",
      "sortKey": "caregap#latest",
      "timestamp": "1759341973",
      "risk": "high",
      "patient_email_sha256":
"3264df53e655c86173337ffe11f67c55f97436e15e8e18be4edf44c8a8547ba1",
      "patient_email_enc": "{\"alg\": \"BASE64-DEMO\", \"data_b64\":
\\\"cmFtbmFsYXdhZGUxOTg2QGdtYWlsLmNvbQ==\\\"}",
      "patient_email_decrypted": "<cannot decrypt: 'ciphertext_b64'>",
      "actions_enc": "{\"alg\": \"BASE64-DEMO\", \"data_b64\":
\\\"WyJ0b3RpZnkgY2FyZSB0ZWZtIiwuU2NoZWRR1bGUgZm9sbG93LXVwIl0=\\\"}",
      "actions_decrypted": "<cannot decrypt: 'ciphertext_b64'>"
    }
  ],
  "patientId": "114589"
}
```

Decrypted view

Refresh

```
{
  "count": 1,
  "patientId": "114589",
  "items": [
    {
      "pk": "patient#114589",
      "sk": "caregap#latest",
      "ts": "1759341973",
      "risk": "high",
      "actions_plaintext": [
        "Notify care team",
        "Schedule follow-up"
      ],
      "patient_email_sha256":
"3264df53e655c86173337ffe11f67c55f97436e15e8e18be4edf44c8a8547ba1",
      "patient_email_enc": "{\"alg\": \"BASE64-DEMO\", \"data_b64\":
\\\"cmFtbmFsYXdhZGUxOTg2QGdtYWlsLmNvbQ==\\\"}",
      "actions_enc": "{\"alg\": \"BASE64-DEMO\", \"data_b64\":
\\\"WyJ0b3RpZnkgY2FyZSB0ZWZtIiwuU2NoZWRR1bGUgZm9sbG93LXVwIl0=\\\"}",
      "patient_email_decrypted": "rammalawade1986@gmail.com",

```

Dynamo encrypted / decrypted view

Symptom → Disease (demo)

Comma-separated symptoms (e.g., fever, cough, sore throat). Falls back to patient.symptoms.

Sample data for normal symptoms :- runny nose, mild cough, sneezing

Sample data for high symptoms :- high fever, shortness of breath, chest pain, persistent cough

high fever, shortness of breath, chest pain, persistent cough

Run Demo

```
{
  "input_symptoms": [
    "chest pain",
    "high fever",
    "persistent cough",
    "shortness of breath"
  ],
  "hypotheses": [
    {
      "disease": "Pneumonia",
      "confidence": 0.5,
      "matched_symptoms": [
        "shortness of breath"
      ],
      "missing_key_symptoms": [
        "chills",
        "cough",
        "fever",
        "pleuritic chest pain"
      ]
    }
  ],
  "note": "This is a deterministic demo (not a diagnostic tool).  
Consult a clinician for medical advice."
}
```

Symptoms Diseases Demo Script

Stroke Risk (quick score demo)

Auto-fills from patient JSON; edit to explore impacts. Pie chart shows factor contributions.

Sample data for normal risk :-

- Age: 35
- Hypertension: 0
- Heart disease: 0
- Avg glucose: 95
- BMI: 22
- Smoking status: never

Sample data for high risk :-

- Age: 40
- Hypertension: 1
- Heart disease: 1
- Avg glucose: 150
- BMI: 34
- Smoking status: smokes

Age

Hypertension (0/1)

Heart disease (0/1)

Avg glucose (mg/dL)

BMI

Smoking status



Compute Risk

Risk: LOW

```
{
  "inputs": {
    "age": 35.0,
```

Stroke Risk Demo view

Compute Risk

Risk: LOW

```
{
  "inputs": {
    "age": 35.0,
    "hypertension": 0,
    "heart_disease": 0,
    "avg_glucose_level": 95.0,
    "bmi": 22.0,
    "smoking_status": "never"
  },
  "contributions": [
    {
      "factor": "age<45",
      "points": 0.0
    },
    {
      "factor": "hypertension",
      "points": 0.0
    },
    {
      "factor": "heart_disease",
      "points": 0.0
    },
    {
      "factor": "avg_glucose<140",
      "points": 0.0
    },
    {
      "factor": "bmi<30",
      "points": 0.0
    },
    {
      "factor": "smoking_status=never",
      "points": 0.0
    },
    {
      "factor": "HbA1c<6.5 or not present",
      "points": 0.0
    }
  ],
  "score": 0.0,
  "risk_bucket": "low",
  "note": "Deterministic demo score for demo purposes; not a clinical tool."
}
```

Risk demo — LOW bucket contributions