

AI Voice Appointment Booking & Patient Intake System

An end-to-end AI voice front desk for a dental clinic - handling real-time availability, booking, rescheduling, cancellation, and post-call follow-up intelligence.

Vapi

n8n

Google Calendar

OpenAI / LLM

PostgreSQL

Slack

BUSINESS CHALLENGE

Dental front desks lose time to repetitive appointment calls, availability checks, schedule changes, and callback requests. A useful voice agent must do more than converse - it must safely execute actions, preserve caller details, and know when to involve staff.

SOLUTION

I designed a five-workflow voice operations system that connects Vapi to n8n and Google Calendar for live appointment actions, then analyzes every completed call, stores structured records in PostgreSQL, and routes unresolved cases to Slack for human follow-up.

5

CONNECTED WORKFLOWS

4

LIVE APPOINTMENT ACTIONS

1

POST-CALL INTELLIGENCE
LAYER

CORE OUTCOME

The system demonstrates a practical AI front-desk pattern: automate routine scheduling while keeping destructive actions guarded, preserving context across a call, and escalating only the cases that genuinely need human attention.

From live voice conversation to verified calendar action

The architecture separates conversational AI from business execution. Vapi manages the live caller experience, while n8n performs validation, calendar operations, decision logic, and post-call orchestration.



WORKFLOW BREAKDOWN

Workflow	Purpose	Key logic	Status
WF01 Check Availability	Returns real appointment options for a requested date or period.	Generates candidate slots, checks Google Calendar, filters conflicts, returns only available times.	Complete
WF02 Book Appointment	Creates a new calendar appointment after collecting patient details.	Normalizes and validates data, rechecks slot availability, then creates the event only when safe.	Complete
WF03 Reschedule	Moves an existing appointment without creating a duplicate.	Matches the existing event by caller details, checks the replacement slot, then updates the same event.	Complete
WF04 Cancel	Safely removes a verified appointment.	Requires validated caller details and an exact event match before the delete action is allowed.	Complete
WF05 Call Result Capture	Turns completed calls into structured operational records.	Analyzes transcript, extracts caller/contact context, stores the call, and sends Slack follow-up only when needed.	Complete

Conversation Reliability

The assistant normalizes speech-transcribed phone numbers and emails, retains already-confirmed fields, and asks only for missing or invalid information instead of restarting the conversation.

Action Guardrails

Availability, booking, rescheduling, and cancellation are never verbally confirmed until the corresponding workflow returns a successful result. Cancellation also requires explicit caller confirmation.

A voice agent with a back-office operations layer

What makes the system practical

- 1 Live calendar grounding.** The assistant does not invent availability; appointment times come from Google Calendar checks.
- 2 Safe schedule changes.** Rescheduling updates the matched event, while cancellation is blocked unless one verified appointment is found.
- 3 Human handoff without a live transfer.** If a caller wants staff help, the assistant captures their name, callback number, and reason before the call ends.
- 4 Post-call intelligence.** WF05 extracts caller identity, intent, action, outcome, summary, and follow-up need from the completed transcript.
- 5 Structured audit trail.** PostgreSQL stores call metadata, transcript, recording URL, AI analysis, and follow-up status using the Vapi call ID as the record key.

Validated test scenarios

AVAILABILITY

Returned open afternoon slots from the clinic calendar.

BOOKING

Created a 30-minute dental cleaning appointment with caller details.

RESCHEDULE

Moved the same calendar event to a new available time.

CANCELLATION

Deleted the verified appointment after explicit confirmation.

HUMAN FOLLOW-UP

Captured caller name, callback number, reason, and routed the case to Slack.

CALL LOGGING

Stored structured call results and artifacts in PostgreSQL.

Example staff handoff: A caller asks for help with an existing appointment and prefers a person. The voice agent collects the caller's name, confirms the best callback number, records the reason, ends the call, and WF05 automatically saves the interaction and posts a concise follow-up alert to the clinic Slack channel.

BUSINESS VALUE

Less repetitive front-desk work

Routine availability checks and appointment changes can be handled automatically, reducing the number of simple scheduling conversations staff need to process manually.

Better follow-up visibility

Calls requiring human attention are separated from completed routine calls, giving staff a clear queue with the context needed to act.

FUTURE ROADMAP

PHASE 01

Clinic Notifications

Add confirmation emails or SMS for successful bookings, reschedules, and cancellations.

PHASE 02

CRM / Patient System Sync

Push verified appointment and call records into a clinic CRM or practice-management platform when API access is available.

PHASE 03

Analytics Dashboard

Track call volume, appointment outcomes, follow-up rates, call duration, and AI operating cost over time.

Portfolio note: Brightline Dental Studio is used as a demonstration business scenario. The case study documents the implemented automation architecture and validated test behavior rather than production performance claims from a live clinic deployment.