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PRODUCT REQUIREMENTS DOCUMENT

Dental Intelligence Platform

An AI decision-support and patient-engagement layer for a U.S. dental practice

Document	Product Requirements Document (PRD)
Product	Dental Intelligence Platform — internal working name “Dental-AI Hub”
Version	1.0 — Initial scope, for client review
Status	Draft
Date	December 2025
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Prepared for	U.S.-based general dental practice — single location, ~500 active patients
Regulatory basis	United States — HIPAA (Privacy, Security & Breach Notification Rules)

Confidentiality & portfolio note. This is a de-identified version of a client deliverable, published as a work sample. The client’s identity, brand, staff and any patient-identifying details have been removed. Commercial figures are retained to show the shape of the scope and estimate.

Contents

1 Executive summary

The practice wants to become an "AI-first" clinic without adding headcount or replacing its clinical judgment. This document scopes a single mobile-responsive web platform with two sides: an internal assistant that removes friction from everyday clinical and operational lookups, and a subscription patient companion that answers routine questions around the clock and creates a recurring-revenue channel.

Two design commitments govern everything that follows. First, the product is decision support, not diagnosis: a licensed dentist remains in the loop on every clinical output, and the radiograph feature surfaces findings for a professional to confirm rather than making autonomous calls. Second, the product is built HIPAA-first: protected health information (PHI) stays inside U.S.-region infrastructure, every vendor that can see PHI is under a Business Associate Agreement (BAA), and no PHI is ever sent to a consumer AI endpoint or used to train a third-party model.

The recommendation is a phased, four-month build delivered under product oversight, with an estimated one-time cost of **US$7,500** and ongoing running costs of roughly **US$250 / month** at the practice's current scale. Detail follows in §14–§15.

2 Background & problem statement

A busy general practice loses time in two predictable places. Clinical and front-desk staff repeatedly look up the same information — medication interactions, pre-op protocols for medically complex patients, post-op instructions, the clinic's own scheduling and insurance rules — and each lookup interrupts a chair-side or phone workflow. Separately, patients generate a stream of low-acuity questions ("is this pain an emergency?", "what do I do after an extraction?") that arrive after hours, go unanswered, or convert into avoidable calls.

Neither problem justifies more staff, and both are well-suited to a grounded AI assistant. There is also a commercial gap: today the practice earns only per-visit revenue and has no recurring relationship with patients between appointments. The opportunity is to convert routine questions into a paid, always-available service while reducing the internal lookup burden.

Opportunity in one line

Give staff a grounded "second brain" for clinical and operational questions, and give patients a safe, subscription-based companion — without ever removing the dentist from a clinical decision.

3 Goals & success metrics

Business goals

- **Reduce internal friction —** cut the time staff spend on repetitive clinical and operational lookups.
- **Create recurring revenue —** stand up a subscription patient channel with predictable MRR.
- **Deepen patient relationships —** stay useful between visits and improve retention and recall.

Success metrics (v1 hypotheses to validate)

Targets below are proposed as hypotheses for the first release, to be baselined in week one and revisited after launch — not contractual commitments.

Metric	Definition	v1 target
Time-to-answer	Median time for staff to resolve a protocol/clinical lookup in-app	≤ 30 seconds
Staff adoption	Weekly active clinical staff / total clinical staff	≥ 80% by week 8
Radiograph coverage	Eligible radiographs that receive an AI pre-read before dentist review	≥ 90%
Triage safety	Red-flag / emergency symptoms correctly escalated (design constraint)	~100% recall
Free → paid	Engaged patients converting to a paid subscription	5–8%
Retention	Paid subscribers active at 90 days	≥ 70%
Call deflection	Subscriber questions resolved without a clinic call, escalations preserved	Track & grow

4 Non-goals (out of scope for v1)

- **Autonomous diagnosis or treatment planning —** every clinical output is reviewed by a licensed dentist; the system never finalizes a diagnosis on its own.
- **Insurance claim adjudication or submission —** eligibility/claims automation is a candidate for a later phase, not v1.
- **Deep two-way EHR/PMS integration —** v1 reads a curated knowledge base and clinic SOPs; live bidirectional sync with the practice-management system is a dependency handled later.
- **Native iOS/Android apps —** v1 ships as a responsive web app; native wrappers are deferred.
- **Non-English support —** English only for v1.

5 Users & personas

Persona 1 — Dentist / clinical staff ("Expert" mode)

- **Context —** chair-side or between patients, time-pressured, needs a fast and trustworthy answer.
- **Goals —** confirm protocols for complex cases, get a fast second read on a radiograph, avoid context-switching.
- **Needs from product —** grounded answers with sources, an obvious "dentist decides" framing, and no workflow friction.

Persona 2 — Front desk / practice manager

- **Context —** fields calls and scheduling, applies the clinic's insurance and booking rules.
- **Goals —** answer operational questions consistently, deflect routine patient queries, book the right slot.

Persona 3 — Patient / subscriber ("Companion" mode)

- **Context —** at home, often after hours, anxious about a symptom or unsure about post-op care.

- **Goals —** understand whether something needs urgent attention, get reliable self-care guidance, reach the clinic when needed.
- **Needs from product —** plain-language answers, a clear safety net for emergencies, and an easy path to book.

6 Key use cases

1. **Complex-case protocol.** A dentist asks how to manage an extraction for a patient on anticoagulants; the assistant returns the clinic's protocol with sources, flagged for the dentist to confirm.
2. **Radiograph second read.** A periapical or panoramic image is uploaded; the system highlights regions of interest with a confidence indicator and rationale, which the dentist accepts, edits or overrides.
3. **Operational lookup.** Front desk asks whether a given plan covers a specific procedure; the assistant answers from the clinic's own insurance rules.
4. **Patient triage.** A subscriber describes "sharp pain in a lower molar"; the companion asks a few guided questions and returns an urgency level plus next steps, escalating hard on any red-flag symptom.
5. **Post-op guidance.** A subscriber gets structured aftercare for a recent root canal, with reminders and a clear route back to the clinic.

7 Functional requirements

Requirements are identified and prioritized: **P0** = required for launch, **P1** = fast-follow, **P2** = later phase.

Module A — Clinical staff assistant

ID	Requirement	Priority
A-1	**Grounded clinical Q&A.** Retrieval-augmented answers over the clinic's SOPs and a curated clinical reference set, with visible sources and a "confirm with dentist" framing.	**P0**
A-2	**Radiograph decision support.** Upload periapical/panoramic images; system returns flagged regions of interest, confidence and rationale for dentist review. Non-autonomous; every output is dentist-confirmed. See §9.	**P0**
A-3	**Practice-operations assistant.** Answers on the clinic's scheduling rules and insurance protocols from the clinic's own documented policies.	**P0**
A-4	**Answer history & override log.** Every clinical answer and every dentist accept/override is logged for audit and quality review.	**P1**
A-5	**SOP self-service upload.** Admin can add or update clinic SOPs that immediately ground the assistant.	**P1**

Module B — Patient subscription portal

ID	Requirement	Priority
B-1	**Guided symptom triage.** Structured intake returns an urgency level	**P0**

ID	Requirement	Priority
	(emergency / see dentist 24–48h / self-care) with plain-language next steps. Conservative by design; red-flag symptoms trigger an immediate emergency hard-stop.	
B-2	**Subscription & billing.** Paywall, plan selection, secure card capture via a PCI-compliant processor (e.g. Stripe), self-serve account management and cancellation.	**P0**
B-3	**Oral-health tracking & reminders.** Hygiene tips and reminders based on the patient's stated history and recent care.	**P1**
B-4	**Clinic handoff.** One-tap path from any answer to booking or messaging the clinic; escalations are never suppressed by the paywall.	**P0**
B-5	**Consent & disclaimers.** Explicit consent at sign-up and a persistent, unmissable "informational, not a diagnosis" disclaimer.	**P0**

Platform (cross-cutting)

ID	Requirement	Priority
P-1	**Authentication & roles.** Separate staff and patient auth; role-based access control; MFA required for staff.	**P0**
P-2	**Audit logging.** Immutable access and action logs across PHI touchpoints.	**P0**
P-3	**Admin console.** Manage users, content, subscription plans and usage/cost visibility.	**P1**
P-4	**Clinical safety guardrails.** Both assistants refuse out-of-scope requests, always attach the correct disclaimer, and default to escalation when uncertain.	**P0**

8 Non-functional requirements

Category	Requirement / target
Performance	Conversational answers stream within ~2–4s; radiograph pre-read returned within ~30s.
Availability	≥ 99.5% for the patient portal; graceful degradation if a model provider is unavailable.
Security	TLS in transit; encryption at rest; least-privilege RBAC; MFA for staff; secrets management; regular dependency and access review.
Privacy	PHI minimization; U.S.-region storage; defined retention; no PHI in logs, URLs or analytics; no PHI used for model training.
Scalability	Comfortably supports current volume (~500 patients, daily staff use) with headroom to grow without re-architecture.
Accessibility	WCAG 2.1 AA for patient-facing surfaces.
Observability	Usage, latency, cost-per-feature and error monitoring, with alerting.
Model abstraction	A provider-agnostic layer so a model can be swapped for accuracy, cost or

Category	Requirement / target
	latency without a rebuild.

9 Regulatory, compliance & clinical safety (U.S. / HIPAA)

This is the section most consumer-AI builds get wrong. The requirements below are treated as first-class product constraints, not paperwork.

HIPAA posture

- **Roles —** the practice is the covered entity; every vendor that can access PHI (cloud, model providers, billing) is a business associate and must sign a BAA before any PHI flows.
- **Rules in scope —** Privacy Rule (minimum-necessary use), Security Rule (administrative, physical and technical safeguards) and Breach Notification Rule.
- **Data residency —** all PHI stored and processed in U.S. regions. (The earlier draft's reference to an India cloud region has been corrected — it is incompatible with a U.S. HIPAA deployment.)
- **AI providers —** only HIPAA-eligible, BAA-backed deployments with zero data retention are used — e.g. Azure OpenAI or Google Cloud Vertex AI under their BAAs. PHI is never sent to consumer chat endpoints.

Medical-device / FDA posture

An AI that autonomously detects or diagnoses pathology from radiographs can meet the definition of Software as a Medical Device and may require FDA clearance (e.g. a 510(k)). v1 deliberately stays out of that lane: the radiograph feature is a second read surfaced to a licensed dentist, who makes every determination. Two implications follow:

- **Framing constraint —** the product must not be marketed or built as making independent diagnoses. Any move toward autonomous diagnostic claims triggers a dedicated regulatory workstream and legal review before launch.
- **Buy-vs-build option —** where a validated, already-FDA-cleared dental-radiograph model is available, integrating it is preferable to training a new model — it de-risks both accuracy and regulatory exposure. Flagged as an open decision in §16.

Patient-facing safety

- **Not a diagnosis —** patient triage is informational and educational, with a persistent disclaimer and explicit consent.
- **Emergency hard-stop —** red-flag symptoms (e.g. facial swelling with difficulty breathing/swallowing, uncontrolled bleeding, signs of spreading infection) bypass the normal flow and route the patient to emergency care.
- **Conservative bias —** when uncertain, the system escalates rather than reassures.
- **Legal review —** terms of service, medical disclaimer and consent language to be finalized with the client's counsel before launch.

10 Proposed architecture & AI model strategy

At a high level: a responsive web client talks to an application/API layer, which routes requests through an orchestration layer to the chosen models and data stores. Clinical answers are grounded

by retrieval over the clinic's SOPs and a curated reference set (RAG) so responses cite real sources instead of free-associating. All PHI-bearing components sit in U.S. regions behind RBAC and audit logging.

Model selections below are candidates as of the engagement date, chosen on accuracy, latency, cost and — critically — BAA availability. Final selection is confirmed during Phase 1 evaluation; the model-abstraction layer (§8) keeps the choice reversible.

Component	Candidate	Rationale
Clinical reasoning	GPT-4o class (via Azure OpenAI, BAA)	Strong medical/logical reasoning on a HIPAA-eligible deployment.
Patient chat	GPT-4o-mini class	Markedly cheaper for high-volume, routine patient queries.
Radiograph pre-read	Validated vision model, or an FDA-cleared third-party (see §9)	Vision quality plus a preference for pre-validated, lower-regulatory-risk options.
Data & hosting	U.S.-region cloud under BAA (AWS/Azure)	Keeps PHI in-country with contractual HIPAA coverage.

11 Data & privacy design

- **Classification —** data is classed as PHI vs non-PHI at entry; PHI paths get the strictest controls.
- **Minimization —** only the data needed for a given answer is sent to a model; identifiers are stripped wherever the feature allows.
- **Retention —** explicit retention windows per data type; patient-initiated deletion honored.
- **No training on PHI —** zero-retention model endpoints; PHI is contractually excluded from provider training.
- **Access & audit —** least-privilege access, immutable logs, and no PHI in application logs, URLs or analytics.

12 Assumptions, dependencies & constraints

Assumptions

- Single-location general practice, ~500 active patients, English-speaking, staff on modern devices.
- A licensed dentist is available to review clinical outputs and to support radiograph validation.

Dependencies

- Signed BAAs with all PHI-handling vendors before any PHI flows.
- Client-provided SOPs, insurance rules and (for validation) representative, de-identified radiographs.
- A PCI-compliant payment processor account.
- Clinical SME time for guardrail definition and validation.

Constraints

- Budget and timeline per §14–§15; regulatory posture per §9 is non-negotiable.

13 Risks & mitigations

Risk	Sev.	Mitigation
Clinical inaccuracy / liability	**High**	Dentist-in-the-loop on every output; RAG grounding with sources; validation before launch; conservative guardrails.
Regulatory exposure (FDA / HIPAA)	**High**	Non-device framing; BAAs; U.S. residency; legal review of claims, consent and disclaimers.
Model hallucination	Med	Retrieval grounding; refusal on out-of-scope; visible sources; "confirm with dentist" default.
Patient triage error	**High**	Conservative triage; emergency hard-stops; escalation-by-default; ongoing review sampling.
Low staff adoption	Med	Fit the existing workflow; fast answers; change management in Phase 2.
Vendor lock-in / cost creep	Med	Model-abstraction layer; per-feature cost monitoring and alerts.
Data breach	**High**	Encryption, least privilege, audit logging, and a defined breach-response process.

14 Release plan (four-month build)

Each phase has a clear focus and an explicit exit criterion; the project does not advance until the criterion is met.

Phase 0 — Discovery & compliance foundation (pre-work)

- Confirm scope, sign BAAs, finalize the regulatory posture and success baselines.

Exit criteria: *BAAs in place; data-flow and compliance plan approved.*

Month 1 — Design & compliance

- Finalize UI/UX for both modes.
- Lock the secure data architecture and provider selection (Phase 1 evaluation).

Exit criteria: *approved designs and a signed-off, HIPAA-compliant data flow.*

Month 2 — The clinic brain

- Build the staff assistant with RAG over clinic SOPs.
- Ship operational-lookup and answer-logging.

Exit criteria: *staff can get grounded, sourced answers to real clinic questions.*

Month 3 — Vision integration

- Integrate the radiograph decision-support feature.
- Validate on representative data; tune the dentist review loop.

Exit criteria: *radiograph pre-reads meet the agreed accuracy bar under dentist review.*

Month 4 — Patient launch

- Ship triage, tracking and the subscription paywall.

- Complete safety guardrails, disclaimers and legal sign-off; go live.

Exit criteria: *patients can subscribe and use triage safely, with emergency hard-stops verified.*

15 Cost estimate

Estimates for delivery under product oversight (design, vendor sourcing and quality assurance managed on the client's behalf). Figures are planning estimates, not fixed quotes.

A. One-time build

Item	USD
UI/UX design (mobile-responsive)	$1,500
Backend & AI model integration	$4,500
Patient subscription & billing setup	$1,500
Total build estimate	**$7,500**

B. Monthly running cost (~500 patients, daily staff use)

Item	USD / month
AI usage (tokens, usage-based)	$100
Cloud hosting & database	$150
Total monthly estimate	**$250**

16 Open questions & decisions needed

6. Radiograph model — integrate an existing FDA-cleared model, or build and validate one? (§9)
7. Is any PMS/EHR integration required for v1, or is a curated knowledge base sufficient to start?
8. Subscription pricing and tier structure for the patient portal.
9. Availability of a clinical SME and representative, de-identified data for radiograph validation.
10. Priority of the insurance/claims workflow — later phase, or earlier?

17 Appendix

A. Glossary

Term	Meaning
PHI	Protected Health Information — individually identifiable health data under HIPAA.
HIPAA	U.S. health-data privacy and security law (Privacy, Security & Breach Notification Rules).
BAA	Business Associate Agreement — contract binding a vendor to HIPAA obligations for PHI it handles.
RAG	Retrieval-Augmented Generation — grounding AI answers in specific source

Term	Meaning
	documents.
CDS	Clinical Decision Support — tools that inform, but do not replace, a clinician's judgment.
SaMD / 510(k)	Software as a Medical Device / an FDA clearance pathway that may apply to diagnostic AI.

B. Medical disclaimer

The system is a decision-support tool. It assists licensed dental professionals and provides informational guidance to patients. It does not diagnose, and it does not replace the professional judgment of a licensed dentist. In an emergency, patients are directed to seek immediate in-person care.

C. Version history

Version	Date	Notes
1.0	Dec 2025	Initial scope for client review.