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TELEPERIODONTICS : A NOVEL APPROACH TO OVERCOMING CHALLENGES IN PERIODONTAL THERAPY

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Abstracts: Teleperiodontics—the application of teledentistry to the prevention, diagnosis, and longitudinal management of periodontal and peri implant diseases—has accelerated from an experimental idea to a service model with real clinical and public health value. Leveraging synchronous (real time) video, asynchronous store and forward exchange, mobile health (mHealth), and remote digital monitoring, teleperiodontics can improve access, enhance behavior change, reduce unnecessary travel, and support continuity of care between in person visits. This narrative review synthesizes the current evidence and policy context; proposes practical workflows, triage algorithms, and minimum datasets; and describes a technology stack appropriate for low resource settings. We summarize clinical use cases—from screening and risk assessment to postoperative reviews and supportive periodontal therapy—highlighting where the evidence is promising (e.g., improved plaque/gingival indices via app based reminders and remote feedback) and where uncertainties remain (e.g., replacing tactile probing and definitive diagnosis). Ethical, legal, and data protection frameworks are discussed with emphasis on the Indian context, including the Telemedicine Practice Guidelines (2020) and Digital Personal Data Protection Act (2023). Two schematic diagrams and a flowchart are provided to facilitate local implementation. We conclude with a 90 day implementation roadmap and a research agenda focused on clinical outcomes, equity, and cost effectiveness.

Keywords: Teleperiodontics, teledentistry, periodontitis, periimplant disease, mHealth, remote monitoring, digital health, India, DPDP Act, Telemedicine Practice Guidelines

1. INTRODUCTION

Periodontal diseases remain among the most prevalent chronic inflammatory conditions

worldwide and are a leading cause of tooth loss in adults. Barriers such as geography, cost, mobility limitations, and clinic capacity compromise timely

diagnosis and the continuity essential for long-term stability. The COVID-19 pandemic further disrupted face-to-face dental care while catalyzing rapid adoption of telehealth models across medicine and dentistry.

Within this context, **teleperiodontics** emerges as a targeted sub-domain of teledentistry that uses telecommunications and digital tools to support periodontal care across the continuum—from prevention and screening through nonsurgical therapy, maintenance, and postoperative monitoring.

While remote technologies cannot replace tactile periodontal probing, radiography, or therapeutic instrumentation, they can **extend** clinical reach, orchestrate behavioral interventions, and coordinate interprofessional care (e.g., with diabetologists or obstetricians). Evidence synthesized in recent reviews points to improved oral hygiene behaviors, reductions in plaque and gingival indices, and high patient/provider satisfaction when remote elements complement chairside care. Importantly, the regulatory environment in many countries—including India—now explicitly recognizes teleconsultation, creating a pathway for compliant, safe deployment.

This article reviews definitions and models, delineates use-cases specific to periodontics, presents implementation tools (workflow diagrams, a triage flowchart, minimum data sets), and discusses safety, ethics, and data protection. The focus is pragmatic: how to use teleperiodontics as a **new remedy** to solve **challenging maladies**—i.e., those clinical and logistical problems that undermine periodontal health at scale.¹

2. DEFINITIONS AND SERVICE MODELS

Teledentistry is the remote provision of dental care and education using information and communication technologies. **Teleperiodontics** applies this specifically to periodontal and peri-implant health. Key modalities include:

- **Synchronous(real-time)**:live video/audio consults for assessment, counseling, and decision-making.
- **Asynchronous (store-and-forward)**: secure transfer of intraoral photos/videos, radiographs, periodontal charts, and narratives for later review.

- **Remote patient monitoring (RPM)**: scheduled capture of home-based data (e.g., standardized smartphone photographs, app-based plaque disclosure images, adherence logs, pain/swelling scores).
- **mHealth**: mobile apps and messaging that deliver tailored oral-hygiene instruction (OHI), reminders, and educational content.
- **Hybrid**: integrates telehealth between periodic in-person visits (e.g., remote coaching during supportive periodontal therapy [SPT]).²

Scope and limits: Teleperiodontics can triage, reinforce behavior change, monitor healing, and coordinate care. It cannot perform periodontal probing, scaling/root planing, surgical therapy, or replace radiographic assessment. Remote findings should therefore be framed as **preliminary** or **supportive** to clinical diagnosis and treatment.

3. WHY PERIODONTICS IS RIPE FOR TELE - ENABLEMENT

1. **Chronicity and behavior dependence**: Outcomes hinge on meticulous plaque control and sustained adherence—areas where frequent, low-friction remote touchpoints and automated nudges are effective.
2. **High burden and inequities**: Rural populations, older adults, people with disabilities, and medically complex patients often under-utilize periodontal care; tele-interventions can bridge access and follow-up gaps.
3. **Interdisciplinary links**: Periodontal status interacts with systemic conditions (e.g., diabetes, adverse pregnancy outcomes). Teleperiodontics supports bidirectional referral and monitoring with medical teams.
4. **Post-operative oversight**: Soft-tissue grafts, regenerative procedures, and implant surgeries benefit from early detection of complications using photo-based check-ins.
5. **Policytailwinds**: Telemedicine guidelines in multiple jurisdictions now define consent, identification, documentation, and prescription norms for remote care, enabling compliant deployment.³

4. CLINICAL USE-CASES AND PROTOCOLS

4.1 Screening and Triage

- **Target groups:** adults with bleeding gums, halitosis, tooth mobility, peri-implant discomfort; high-risk cohorts (smokers, diabetics, pregnant patients).
- **Remote intake:** structured questionnaire (bleeding while brushing? tooth mobility? halitosis? denture/implant issues? pain/swelling?) plus six standardized smartphone photos (frontal smile, right/left buccal in occlusion, maxillary and mandibular occlusal, and close-ups of concern areas).
- **Decision:** categorize into (a) **Emergency** (e.g., spreading cellulitis, uncontrolled bleeding) → same-day in-person; (b) **Urgent** (acute pain, abscess, necrotizing gingivitis, pericoronitis) → prompt in-person; (c) **Elective/Preventive** → tele-counseling and routine appointment scheduling.⁴

4.2 Risk Assessment and Counseling

- Collect systemic history (diabetes control, smoking, medications such as anti-resorptives), oral hygiene habits, and previous periodontal therapy.
- Use validated risk calculators when available; document provisional risk category (low/moderate/high) **without** assigning a definitive diagnosis remotely.
- Deliver **motivational interviewing** and individualized OHI (toothbrushing technique, interdental aids, tongue cleaning), supported by videos/infographics.

4.3 Nonsurgical Phase Support (before/after SRP)

- **Pre-treatment:** set expectations, explain transient sensitivity, demonstrate plaque disclosure technique, and initiate app-based reminders.
- **Between sessions:** weekly asynchronous photo submissions with disclosed-plaque images; provide annotated feedback highlighting missed areas.
- **Post-treatment:** check pain, bleeding on brushing, and hot/cold sensitivity via short forms; escalate if red flags appear.

4.4 Supportive Periodontal Therapy (SPT) and Long-Term Maintenance

- Monthly or bi-monthly RPM with disclosed-plaque photos, self-reported bleeding points, and floss frequency.
- Automated **nudges** (text/app notifications) and micro-learning snippets (30–60 seconds) to maintain skills.
- Annual or semiannual in-person clinical assessments remain mandatory for probing, radiographs, and calculus removal.

4.5 Implant and Mucogingival Procedures—Remote Follow-up

- Day-3 and week-1 wound checks via photos and symptom scales.
- Early identification of flap dehiscence, graft sloughing, suture issues, or peri-implant mucositis prompts expedited clinic review.
- Patient education on gentle plaque control around surgical sites via soft brushes and chlorhexidine as indicated.

4.6 Interprofessional Care Pathways

- Tele-liaisons with diabetology/obstetrics to coordinate periodontal status updates, especially when glycemic control or pregnancy complications intersect with periodontal health.⁵

Minimum dataset for a teleperiodontics consult (asynchronous):

- Patient identifiers, consent status, and identity verification method
- Chief complaint and duration; pain scale (0–10)
- Medical/dental history highlights (diabetes control measure if known, smoking status)
- Six standard photographs + site-specific close-ups
- Oral hygiene routine (tools, frequency)
- Self-reported bleeding on brushing (yes/no, sites if known)
- Recent dental treatment and medications
- Provisional risk category and disposition (emergency/urgent/elective).⁶

5. IMPLEMENTATION DIAGRAMS

Figure 1. End-to-End Teleperiodontics Technology Stack (schematic)

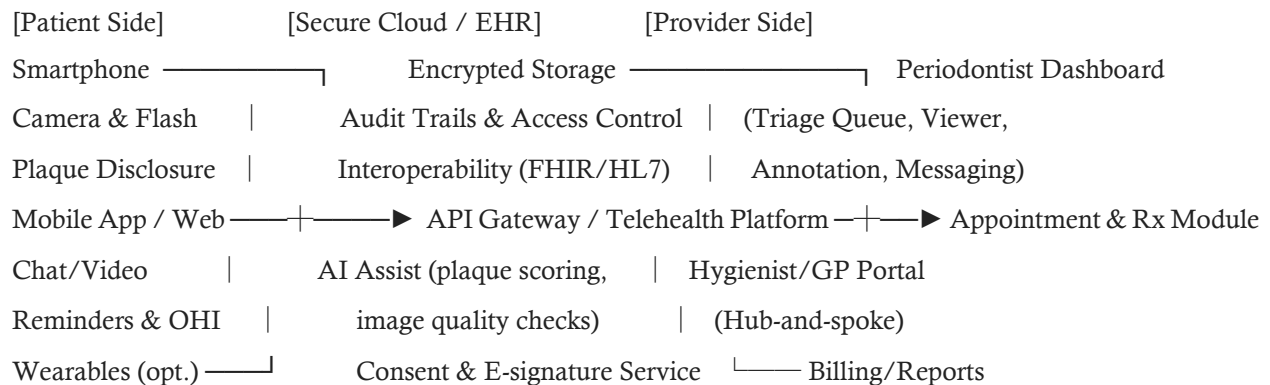


Figure 2. Remote Periodontal Care Cycle (behavioral loop)

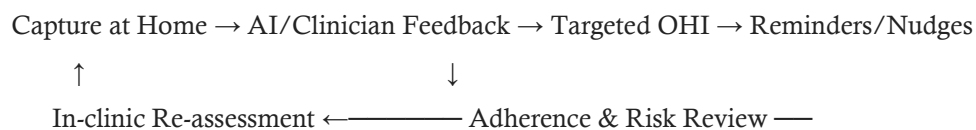
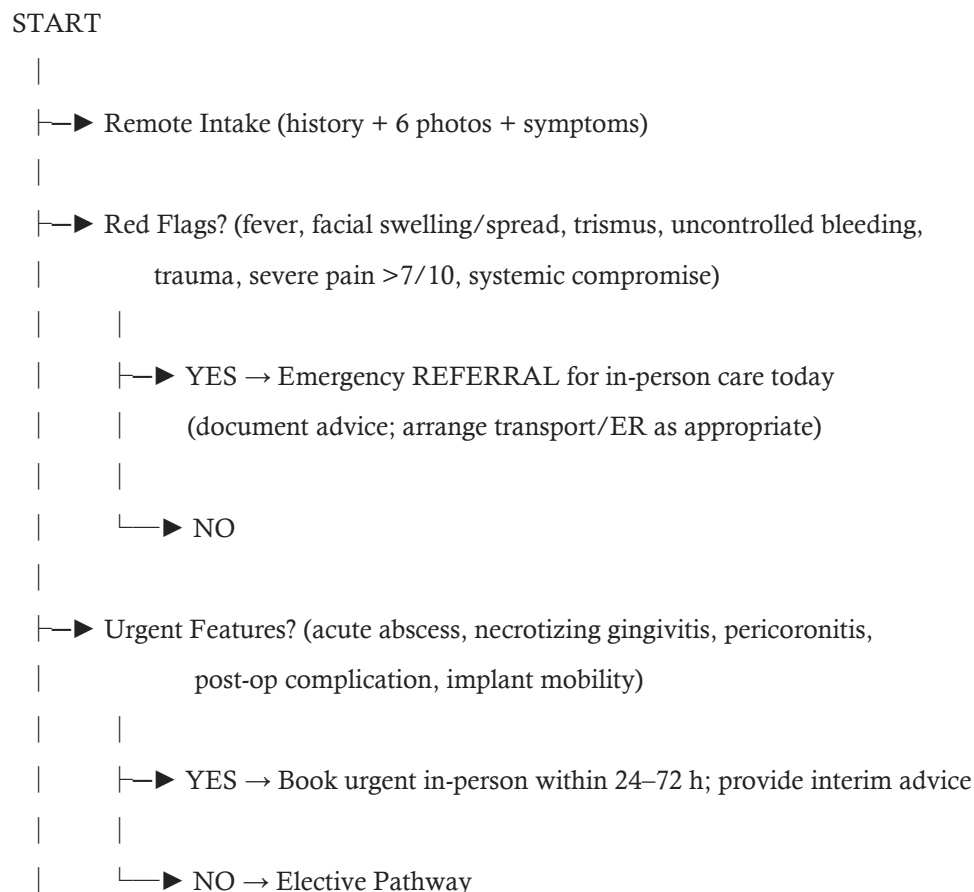


Figure 3. Teleperiodontics Triage Flowchart (text-based)



└─► Elective Pathway: Risk assessment + OHI + RPM enrollment

└─► Hybrid Care Plan: schedule in-person exam/scaling; set remote checkpoints

└─► Document consent, identity verification, and all communications → END. ⁷

6. QUALITY AND SAFETY: CONSENT, IDENTITY, DOCUMENTATION, AND DATA PROTECTION

Consent and identity: At the start of each tele-encounter, verify identity (two identifiers) and obtain explicit consent (recorded verbal consent for video; written/e-signature for asynchronous programs), including limits of remote assessment and potential need for in-person evaluation.

Documentation: Record platform used, date/time, participants, history, images received, advice given, prescriptions (if any), and safety-netting instructions. Use standardized templates to ensure completeness.

Data protection: Teleperiodontics must comply with information-security norms and health-data laws applicable to your jurisdiction. In India, programs should align with the **Telemedicine Practice Guidelines (2020)** for Registered Medical Practitioners and with the **Digital Personal Data Protection Act (2023)** for lawful processing, consent, purpose limitation, data minimization, and breach response, in addition to professional codes (Dentists Act regulations) and the IT Act/Rules. Use encrypted platforms, role-based access, and audit logs; avoid consumer messaging apps unless they meet security and consent requirements.

Clinical Governance: Define inclusion/exclusion criteria for remote follow-up; train staff on image-capture protocols; implement incident reporting; and audit outcomes (e.g., time-to-care, avoidable visits, plaque/gingival scores).⁸

7. EVIDENCE SNAPSHOT (WHAT WE KNOW AND DON'T)

Access and acceptability: Surveys in multiple countries—including India—show high awareness and interest among dental professionals, with perceived utility in triage and counseling. Patients report convenience and reduced travel costs.

Behavioral & clinical indices: Randomized and quasi-experimental studies of mobile-app/OHI interventions demonstrate improvements in plaque index and gingival index in many (though not all) cohorts, particularly when reminders and personalized feedback are used. Some meta-analyses report significant short-term gains, while individual RCTs in periodontitis populations show mixed results—underscoring the need for standardized protocols and longer follow-up.

Remote Digital Monitoring (RDM): AI-assisted analysis of disclosed-plaque images and intraoral photographs can quantify biofilm and highlight missed areas, supporting tailored coaching. Reported diagnostic accuracies for plaque detection are high in controlled datasets; accuracy for diagnosing gingivitis or periodontal disease from photos alone is lower, reinforcing that RDM augments but does not substitute clinical probing/radiography.⁹

Accuracy for Referral/decision-making: Systematic reviews across disciplines indicate that asynchronous image-based consults can be comparable to in-person assessment for triage and referral quality when evaluators are similarly trained; however, direct evidence in periodontology remains limited.

Older adults and special populations: Tele-approaches can identify needs and provide caregiver training in long-term care settings, but digital literacy and access must be addressed.

Gaps: Few trials report hard periodontal outcomes (probing depth reduction, clinical attachment gain) attributable to tele-components; cost-effectiveness and equity impacts require rigorous study.¹⁰

8. PRACTICAL TOOLKIT

8.1 Standardized Home-Photo Protocol (patient handout)

- Brush, then use a disclosing tablet; rinse lightly to leave plaque coloration.

- Use a clean spoon as cheek retractor if needed.
- Stand facing a bright window or use the phone's rear camera with flash.
- Capture: (1) frontal smile; (2) right buccal; (3) left buccal; (4) upper occlusal; (5) lower occlusal; (6) close-up of concern. Keep 10–15 cm from teeth; ensure focus.
- Upload via the clinic app/portal; avoid sending images over unsecured social media.¹¹

8.2 Image Quality Checklist (clinician)

- Focused with visible marginal gingiva
- Even illumination; minimal shadowing
- Color fidelity adequate to visualize disclosed plaque and erythema
- No motion blur; enough depth of field.¹²

8.3 Remote OHI Script (3 minutes)

- Acknowledge progress; highlight 1–2 “missed zones.”
- Demonstrate 45° modified Bass technique and interdental cleaning (floss or interdental brushes tailored to embrasure size).
- Set a micro-goal (e.g., “clean distal of upper molars nightly”).
- Arrange follow-up in 7–14 days with photos.¹³

8.4 Tele-SPT Schedule (example)

- **Month 0(in-person):** full charting, radiographs, debridement, risk stratification.
- **Week 2(video):** review technique; troubleshoot sensitivity.
- **Month 1(asynchronous):** disclosed-plaque photos with AI/clinician feedback.
- **Month 3 (video):** behavior review; adjust aids (e.g., interdental brush sizes).
- **Month 6(in-person):** re-chart; debridement as needed.

8.5 Minimum Equipment List (clinic)

- Telehealth software (encrypted, consent capture, store-and-forward, audit logs)
- High-resolution monitors; intraoral camera for hub-and-spoke programs

- Secure cloud/EHR integration (prefer FHIR/HL7 interoperability)
- Patient-facing app or web portal with reminders and resource library.¹⁴

9. ETHICAL, LEGAL, AND REGULATORY CONSIDERATIONS (INDIA FOCUS)

- **Telemedicine Practice Guidelines (2020):** define modes, consent, identification of the Registered Medical Practitioner (RMP), documentation, and general prescription norms for teleconsultation. Dental practitioners should harmonize practice with these principles and their dental regulatory obligations.
- **Digital Personal Data Protection Act (2023):** establishes consent requirements, lawful purposes, data-principal rights, and duties of data fiduciaries/processors for digital personal data. Clinics must implement consent management, purpose limitation, security safeguards, and breach notification processes.
- **Professional standards:** maintain records, obtain valid consent, protect patient information, communicate effectively, and ensure referral pathways for in-person care.
- **Equity and inclusion:** design services for low-bandwidth environments, multilingual content, and accessibility features; provide alternatives for patients without smartphones.¹⁵

10. LIMITATIONS AND RISK MITIGATION

- **Diagnostic limits:** No remote probing → avoid definitive staging/grading; use tele-encounters for triage, education, and monitoring only.
- **Image bias/quality:** Standardize capture protocols; incorporate AI quality checks and clinician validation.
- **Privacy & security:** Use enterprise-grade platforms; maintain audit trails; train staff; minimize data retention to what is clinically necessary.
- **Digital divide:** Offer phone-based counseling; partner with community health workers equipped with intraoral cameras.¹⁶

90-DAY- IMPLEMENTATION ROADMAP (FOR A PERIODONTAL PRACTICE)

Days 1–15

- Choose platform (video + store-and-forward + consent + EHR integration)
- Draft SOPs: consent, identity verification, documentation, prescriptions, escalation
- Create patient handouts (photo protocol, OHI library); train staff

Days 16–45

- Pilot with 30–50 patients in SPT; collect baseline plaque/gingival indices
- Establish triage metrics (response times, emergency routing)
- Set up AI-assisted plaque feedback (optional)

Days 46–90

- Expand to postoperative reviews and high-risk diabetics
- Audit outcomes: plaque/gingival indices, unplanned visits, patient satisfaction
- Refine workflows; plan for formal evaluation and publication.^{17,18,19}

RESEARCH AGENDA

- RCTs measuring probing-depth/attachment outcomes with hybrid tele-enhanced SPT vs. standard care
- Validation of AI plaque/gingivitis scoring in real-world, diverse populations
- Cost-effectiveness analyses from payer and societal perspectives
- Equity impact studies (rural vs. urban, older adults, persons with disabilities)
- Data-protection implementation science in small practice.^{20,21,22}

CONCLUSION

Teleperiodontics is not a substitute for hands-on periodontal therapy, but it is a potent **adjunct** that addresses perennial challenges—access, adherence, and continuity. By combining structured triage, remote behavioral reinforcement, and targeted follow-up within a clear legal and ethical framework, periodontists can extend care beyond clinic walls, improve patient experience, and

potentially enhance clinical outcomes. The time is ripe to adopt, evaluate, and refine this **new modality for challenging remedies** in everyday periodontal practice.^{23,24}

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