

Designing Long-Term Peri-implant Health: Prevention, Treatment Sequencing and Supportive Care

A clinical pathway from risk control and maintainable implant design to disease treatment and recurrence prevention



Core message: peri-implant health is designed before implant placement and protected throughout function. Prevention, early detection, sequential treatment and structured supportive care form one continuous clinical pathway.

Educational material for dental students, postgraduate trainees and academic teachers

Prevention begins before implant placement

The most effective opportunity to reduce peri-implant disease risk occurs before the implant enters function. The treatment plan should address patient susceptibility, periodontal stability, self-care capacity, local anatomy and whether the proposed restoration can remain cleanable over time.

Domain	Questions before treatment	Preventive action
Periodontal history	Is periodontitis controlled and is the patient enrolled in supportive care?	Complete periodontal therapy and establish stability before implant placement.
Plaque control	Can the patient clean the proposed site and restoration predictably?	Provide individualized instruction and verify performance before surgery.
Smoking	What is the current exposure and readiness to reduce or stop?	Offer cessation support and discuss the effect on treatment risk.
Glycaemic status	Is diabetes present and adequately controlled?	Coordinate medical care and improve metabolic control where needed.
Anatomy and tissue phenotype	Can the implant be positioned within an adequate hard- and soft-tissue envelope?	Modify the surgical plan, augment tissues or reconsider the restorative option.
Maintenance feasibility	Can the patient attend long-term monitoring and professional care?	Agree on a realistic supportive-care pathway before treatment.

Risk is cumulative rather than binary

A single factor rarely determines outcome. Previous severe periodontitis, poor plaque control and absence of supportive care are among the clearest risk signals. Local and systemic factors should be combined into an individualized risk profile rather than used as automatic contraindications.

Planning principle: implant therapy should not begin with the osteotomy. It begins with control of modifiable risk and confirmation that long-term hygiene and monitoring are feasible.

Surgical and prosthetic design shape future maintainability

Three-dimensional implant position, tissue dimensions and prosthetic contour determine whether biofilm can be disrupted and whether clinicians can probe, instrument and repair the restoration. A technically integrated implant may still be biologically vulnerable if the site cannot be maintained.

Design factor	Protective objective	Potential consequence when compromised
Implant position	Restoratively driven depth and buccolingual/mesiodistal location.	Thin bone, recession, inaccessible surfaces or prosthetic overcontour.
Bone envelope	Adequate supporting bone around the planned position.	Dehiscence, exposed rough surface and reduced structural reserve.
Soft-tissue conditions	Stable mucosal seal and patient-accessible hygiene zone.	Discomfort during brushing, plaque retention and recession.
Emergence profile	Progressive, cleansable transition from implant to crown.	Excess convexity, deep inaccessible margins and probing difficulty.
Retention and cement control	Retrievable design or reliable removal of excess cement.	Foreign material and localized inflammation.
Prosthetic access	Space for interproximal cleaning and professional instrumentation.	Persistent plaque reservoirs and delayed disease detection.

The baseline belongs to the treatment itself

After prosthesis delivery and tissue maturation, record probing depths, bleeding or suppuration, mucosal margin position and an interpretable radiographic bone level. Without baseline data, future change is harder to identify and diagnostic confidence is reduced.

Design test: before finalizing the restoration, verify that the patient can demonstrate effective cleaning and that the clinical team can examine all relevant surfaces.

Supportive peri-implant care is active prevention

Supportive peri-implant care is not a routine polishing appointment. It is a risk-adjusted programme for biofilm control, early diagnosis, reinforcement of self-care and management of prosthetic or behavioral barriers. The EFP guideline recommends enrolment after implant rehabilitation.

Component	What to assess or deliver	Why it matters
Health update	Smoking, diabetes, medications, symptoms and adherence.	Risk and treatment tolerance can change over time.
Clinical examination	Plaque, bleeding/suppuration, probing depths, recession and mobility.	Detects inflammation and dimensional change.
Radiographic review	Compare standardized images when clinical findings or scheduled surveillance justify exposure.	Confirms supporting-bone changes and technical complications.
Self-care review	Observe actual technique and access around the restoration.	Advice without demonstration may not change plaque control.
Professional biofilm removal	Use implant-appropriate instruments and access all maintainable surfaces.	Reduces the microbial challenge while limiting surface damage.
Prosthetic review	Check cleansability, retention, occlusion and component integrity.	Correctable design or technical factors may sustain inflammation.

Intervals should reflect risk and findings

A universal recall interval is not appropriate. Previous periodontitis, current inflammation, plaque control, systemic risk, prosthetic complexity and previous peri-implantitis treatment justify closer monitoring. Stable low-risk patients may require less intensive schedules.

Monitoring rule: compare with the individual baseline. A single deep pocket is less informative than a site showing new bleeding, increased depth or progressive bone loss.

Peri-implant mucositis is the prevention checkpoint

Peri-implant mucositis presents with bleeding and/or suppuration on gentle probing without bone loss beyond initial remodeling. It is primarily biofilm induced and can resolve when the microbial challenge and contributing local factors are controlled.

Treatment element	Clinical action	Re-evaluation question
Diagnosis and disclosure	Record inflammation and explain that disease is present even without progressive bone loss.	Does the patient understand the need for active treatment?
Self-performed plaque control	Tailor brushes, interdental aids and technique to the restoration.	Can all relevant surfaces be reached daily?
Professional debridement	Remove supra- and submarginal biofilm with suitable instrumentation.	Has bleeding and visible plaque decreased?
Local factor correction	Address excess cement, inaccessible contours and plaque-retentive components.	Does the design still prevent effective maintenance?
Risk-factor control	Support smoking cessation and metabolic control where relevant.	Have modifiable exposures improved?
Re-evaluation	Reassess after approximately 2-3 months.	Has peri-implant health been restored or is further investigation needed?

Adjuncts do not replace mechanical control

Antiseptics, local antimicrobials, air polishing, lasers and photodynamic approaches have been investigated, but none compensates for inadequate access, persistent plaque or an uncorrected prosthetic reservoir. Adjunctive use should be justified by evidence, safety and the specific clinical situation.

Prevention of progression: successful mucositis treatment is one of the most important interventions for preventing peri-implantitis.

Peri-implantitis treatment starts with a non-surgical phase

Peri-implantitis requires inflammation together with progressive supporting-bone loss. Initial therapy reduces the inflammatory burden, improves hygiene, controls risk factors and reveals whether the site can be managed without surgery or requires surgical access.

Step	Purpose	Key considerations
Confirm diagnosis	Distinguish progressive disease from initial remodeling and technical complications.	Compare baseline records and exclude fracture, cement and endodontic or adjacent pathology.
Assess prognosis	Decide whether retention offers a maintainable and useful result.	Consider implant position, remaining support, prosthesis, patient risk and willingness.
Control biofilm	Reduce the microbial load and improve daily access.	Modify or remove the prosthesis temporarily if it blocks treatment.
Mechanical instrumentation	Disrupt deposits and biofilm on accessible implant surfaces.	Select instruments that balance efficacy with surface preservation.
Control modifiable factors	Reduce continued inflammatory pressure.	Address smoking, glycaemia, periodontal infection and maintenance adherence.
Re-evaluate	Determine whether inflammation and pocketing remain unacceptable.	Use predefined clinical endpoints and document residual defects.

Non-surgical treatment has anatomical limits

Implant threads, rough surfaces, deep pockets and circumferential defects restrict closed access. Improvement after initial therapy is valuable even when surgery is still required because it reduces inflammation and prepares the patient and site for the next step.

Sequence matters: do not move directly to regenerative materials before controlling plaque, self-care, prosthetic access and general risk factors.

Surgical treatment is selected from defect and site anatomy

Persistent peri-implantitis after initial therapy may require surgery to gain access, reshape an unmaintainable site, reconstruct a contained defect or combine these aims. The technique should follow the defect morphology and long-term maintainability rather than a universal preference.

Approach	Typical objective	Situations and limitations
Access flap	Direct visualization and instrumentation of the implant surface.	Useful when access is the main limitation; does not itself reconstruct lost support.
Resective therapy	Reduce pocket depth and create maintainable architecture.	May increase recession and implant-surface exposure, especially in aesthetic sites.
Implantoplasty	Smooth exposed rough threads in selected non-aesthetic areas.	Generates titanium debris and irreversibly modifies the implant.
Reconstructive therapy	Promote defect fill and possible re-osseointegration.	Best considered for contained intrabony components; outcomes are variable.
Soft-tissue augmentation	Improve tissue volume, stability or comfort for hygiene.	Does not replace control of active peri-implant infection.
Explantation	Remove a hopeless or unmaintainable implant.	Consider severe support loss, unfavorable position, fracture or recurrent uncontrolled disease.

Radiographic fill is not synonymous with disease resolution

Reconstructive procedures may improve radiographic defect fill, but treatment success must also include control of bleeding/suppurative, reduced pocket depth, stability of the marginal bone and a site that the patient and clinician can maintain.

Decision principle: select the least invasive approach capable of producing a stable, cleansable and monitorable result.

Surface decontamination: evidence supports humility

Mechanical, chemical and energy-based decontamination methods have all been studied. Experimental biofilm removal does not automatically translate into superior long-term clinical outcomes. Surface macrogeometry, defect access and tissue safety strongly influence performance.

Method family	Potential role	Evidence boundary or risk
Mechanical curettes/brushes	Physical disruption of deposits and biofilm.	Access is limited by threads and defect anatomy; instruments may alter the surface.
Air-polishing systems	Broad biofilm disruption in accessible areas.	Powder selection, angulation and emphysema risk require attention.
Saline and chemical agents	Irrigation and reduction of residual contamination.	No chemical agent has been established as a universal gold standard.
Laser or photodynamic approaches	Adjunctive surface treatment under selected protocols.	Highly parameter-dependent; clinical superiority is not consistently demonstrated.
Implantoplasty	Removal of contaminated rough surface and thread reduction.	Irreversible, generates particles and may influence implant strength.
Combination protocols	Address deposits through complementary mechanisms.	More steps do not necessarily produce better outcomes and may increase morbidity.

Antimicrobial stewardship applies

Systemic or local antibiotics should not be routine substitutes for access and mechanical biofilm disruption. Their use requires a defined indication, awareness of resistance and consideration of patient-specific benefit and harm.

Calibrated conclusion: no decontamination technique should be presented as universally superior. Use a reproducible protocol that provides access, biofilm disruption, tissue safety and postoperative maintainability.

Treatment endpoints and prevention of recurrence

Treatment does not end when surgery is completed. The outcome must be re-evaluated against predefined clinical and radiographic criteria, and the patient must return to structured supportive care. Residual pockets, bleeding and inaccessible surfaces increase recurrence risk.

Outcome domain	Favorable endpoint	If the endpoint is not achieved
Inflammation	No suppuration and minimal or absent bleeding on gentle probing.	Reassess plaque, access, residual deposits and host factors.
Pocket depth	Reduction to a maintainable depth without progressive recession-related risk.	Identify residual intrabony anatomy or prosthetic obstruction.
Bone level	Stability on comparable radiographs after healing.	Investigate continued disease, overload or technical complications.
Patient access	Demonstrated daily cleaning around all relevant surfaces.	Modify the restoration, aids or professional-care frequency.
Prosthetic function	Stable components, cleansable contour and controlled occlusion.	Repair, redesign or remove the prosthesis when required.
Supportive care	Attendance at a risk-based interval with repeatable records.	Address barriers and explain the recurrence risk.

Secondary prevention is permanent

- Reinforce personalized self-care at every maintenance visit.
- Record probing and inflammatory findings using a reproducible protocol.
- Use radiographs selectively and compare them with the best available baseline.
- Maintain periodontal health and monitor systemic and behavioral risk.
- Correct prosthetic barriers before they generate recurrent inflammation.
- Shorten recall intervals when residual pockets, previous disease or adherence problems persist.

Long-term principle: supportive care is part of treatment, not an optional service after treatment.

An integrated clinical pathway

Phase	Clinical priority	Decision point
Before placement	Control periodontitis, plaque, smoking and relevant systemic risk.	Is implant therapy maintainable and appropriate?
Placement and restoration	Create correct position, tissue support and cleansable contour.	Can the patient and clinician access the site?
Healthy function	Establish baseline records and supportive care.	Are tissues stable compared with baseline?
Mucositis	Improve self-care, debride and correct local factors.	Has health returned after re-evaluation?
Peri-implantitis: initial phase	Confirm diagnosis, reduce inflammation and assess prognosis.	Is surgical access or explantation required?
Peri-implantitis: surgical phase	Match access, resective or reconstructive therapy to anatomy.	Has a stable and maintainable endpoint been achieved?
After treatment	Prevent recurrence through individualized supportive care.	Do findings justify retreatment or a revised prognosis?

Clinical synthesis

- Prevention starts when implant rehabilitation is planned.
- Implant position and prosthetic contour determine future cleansability.
- Peri-implant mucositis should be treated as an early prevention opportunity.
- Peri-implantitis treatment proceeds from initial non-surgical control to anatomy-driven surgery when needed.
- No single decontamination method is universally superior.
- Disease control must be followed by lifelong, risk-adjusted supportive care.

Chairside summary: control risk, design access, establish a baseline, detect inflammation early, treat sequentially, verify endpoints and maintain the result.

Selected references and educational statement

Selected references

1. Herrera D, Berglundh T, Schwarz F, et al. Prevention and treatment of peri-implant diseases - The EFP S3 level clinical practice guideline. *J Clin Periodontol.* 2023;50(Suppl 26):4-76. doi:10.1111/jcpe.13823.
2. Wang HL, Avila-Ortiz G, Monje A, et al. AO/AAP consensus on prevention and management of peri-implant diseases and conditions: Summary report. *J Periodontol.* 2025. doi:10.1002/JPER.25-0270.
3. Rocuzzo M, et al. Surgical treatment of peri-implantitis. *Periodontol* 2000. 2024.
4. Hart I, Wells C, Tsigarida A, Bezerra B. Effectiveness of mechanical and chemical decontamination methods for titanium surfaces affected by peri-implantitis: a systematic review and meta-analysis. *Clin Exp Dent Res.* 2024;10:e839. doi:10.1002/cre2.839.
5. Schwarz F, Derks J, Monje A, Wang HL. Peri-implantitis. *J Clin Periodontol.* 2018;45(Suppl 20):S246-S266. doi:10.1111/jcpe.12954.
6. Heitz-Mayfield LJA, Salvi GE. Peri-implant mucositis. *J Clin Periodontol.* 2018;45(Suppl 20):S237-S245. doi:10.1111/jcpe.12953.
7. Tomasi C, Regidor E, Ortiz-Vigón A, Derks J. Efficacy of reconstructive surgical therapy at peri-implantitis-related bone defects: a systematic review and meta-analysis. *J Clin Periodontol.* 2019;46(Suppl 21):340-356. doi:10.1111/jcpe.13070.
8. Khoury F, Keeve PL, Ramanauskaitė A, et al. Surgical treatment of peri-implantitis - Consensus report of working group 4. *Int Dent J.* 2019;69(Suppl 2):18-22. doi:10.1111/idj.12505.

Educational use and limitations

This material presents an evidence-informed care pathway and does not replace individualized diagnosis, implant-system instructions, surgical training or clinical judgment. Technique selection depends on defect anatomy, implant position, tissue phenotype, prosthetic design, patient risk and clinician competence.

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