Asian Journal of Periodontics and Orthodontics
2026, Volume 6, Issue 2, Page No: 50-60
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Available online at: www.tsdp.net

ISSN: 3062-3499

Original Article

Prosthetic Cleansability as a Design Requirement in Implant Therapy: A Conceptual Framework Linking Restoration Contours, Patient Dexterity, and Access for Professional Supportive Care

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Received: 24 July 2026; **Revised:** 27 August 2026; **Accepted:** 31August 2026

ABSTRACT

Long-term implant therapy depends not only on osseointegration, restorative strength, and esthetic integration, but also on whether the definitive prosthesis remains practically maintainable throughout its service life. Prosthetic contours that satisfy structural or esthetic objectives may create restricted access for plaque control, while an apparently accessible restoration may still exceed an individual patient's functional ability or impede professional debridement and prosthetic servicing. This article develops a non-empirical design and prevention framework in which cleansability is considered prospectively rather than being evaluated only after inflammation or maintenance difficulty has emerged. The framework separates three interacting dimensions: biological and geometric conditions at the implant–restoration interface, patient-dependent ability to reach and use available cleaning spaces, and professional access for supportive instrumentation and retrievability. Available evidence indicates that emergence configuration, restoration contour, abutment dimensions, tissue characteristics, and maintenance procedures can influence peri-implant conditions, although no single geometric parameter has been validated as a universal measure of cleansability. Patient capability likewise cannot be represented by dexterity alone, and professional serviceability should not be confused with demonstrated biological superiority of a particular retention design. Cleansability is therefore conceptualized as a conditional property of the patient–prosthesis–care relationship rather than an intrinsic attribute of the restoration. Designing for maintainability requires preservation of biologically compatible contours while ensuring usable access for both self-care and professional supportive care. Prospective validation should determine whether this design-oriented construct improves maintenance feasibility and clinically meaningful peri-implant outcomes.

Keywords: Implant prosthodontics, Peri-implant maintainability, Restoration contour, Emergence profile, Oral hygiene access, Supportive peri-implant care

How to Cite This Article: de Vries S, Jansen P, Bakker M, van Leeuwen J. Prosthetic Cleansability as a Design Requirement in Implant Therapy: A Conceptual Framework Linking Restoration Contours, Patient Dexterity, and Access for Professional Supportive Care. Asian J Periodont Orthodont. 2026;6(2):50-60. https://doi.org/10.51847/Z7CI0GWNVA

Introduction

Implant-supported restorations are commonly planned around biological integration, mechanical stability, esthetics, phonetics, and functional loading. More recently, restorative planning has increasingly been framed as a biologically integrated process in which prosthetic decisions should remain compatible with the long-term conditions required for peri-implant tissue stability [1]. Within that broader view, prosthetic design variables have been identified as potential predisposing or precipitating contributors to peri-implant disease, including characteristics that may influence hygiene access, tissue morphology, plaque

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accumulation, and the feasibility of maintenance [2]. These observations make maintenance access relevant before definitive restoration, rather than only after inflammation, patient difficulty, or professional instrumentation problems become evident.

The biological endpoint, however, must not be reduced to a prosthetic-design problem. Contemporary classifications distinguish peri-implant health, peri-implant mucositis, and peri-implantitis according to established clinical criteria, while preventive and therapeutic guidance emphasizes the interaction of patient, site, implant, prosthetic, behavioral, and maintenance factors [3–5]. Prosthetic cleansability therefore cannot be equated with peri-implant health, nor can an inaccessible restoration be assumed to cause disease independently of other determinants.

Peri-implantitis is a plaque-associated inflammatory condition involving supporting-tissue destruction, but its onset and progression are influenced by multiple host, local, behavioral, and treatment-related factors [6]. The relevance of cleansability lies in this multifactorial context. If restoration geometry makes plaque-control procedures difficult, the prosthesis may increase the practical burden required to maintain a favorable local environment. Yet biological plausibility alone does not prove that one contour, angle, or prosthetic architecture will predict disease in every patient.

This article therefore treats prosthetic cleansability as a prospective design requirement rather than as a retrospectively assigned property. The central proposition is that a restoration should be evaluated not merely according to whether a cleaning device can theoretically pass beneath or around it, but according to whether its geometry remains usable by the actual patient and accessible during professional supportive care. The analysis first separates biological and geometric determinants from patient-dependent functional requirements and professional access constraints. These dimensions are then used to construct, in the subsequent section of the manuscript, an integrated design framework without converting associations, surrogate outcomes, or study-specific geometric categories into universal clinical thresholds.

Biological and geometric foundations of peri-implant maintainability

Restorative geometry provides the physical environment within which both peri-implant tissues and maintenance procedures must operate. Clinical observational evidence has associated restoration contour, emergence characteristics, and other prosthetic features with peri-implant inflammatory or bone-related outcomes [7–9]. These observations justify careful consideration of geometry during design, but they do not establish that a single contour characteristic is independently causal. Implant position, tissue anatomy, restorative material, abutment dimensions, patient-level risk, and maintenance behavior can all influence the same clinical endpoints.

The emergence region is especially important because it links the implant–abutment complex to the external crown contour and determines how rapidly the restoration transitions from the implant platform toward the definitive cervical form. Clinical investigation of peri-implant mucosal dimensions suggests that emergence geometry should be interpreted in relation to the available tissue configuration rather than as an isolated prosthetic measurement [10]. This has direct implications for cleansability. A contour that is acceptable in one tissue-volume and implant-position configuration may generate an unnecessarily bulky or under-accessible profile in another.

Systematic evaluation of emergence angle and profile has nevertheless shown that the underlying evidence remains heterogeneous and methodologically limited [11]. Studies have used different geometric definitions, imaging methods, implant positions, restoration types, follow-up periods, and disease endpoints. Consequently, a numerical category used in one study should not automatically be converted into a universal clinical cutoff. Meta-analytic evidence indicates that emergence angle and contour can be associated with marginal bone-level differences, but the available evidence is insufficient to transform such associations into an independently validated measure of prosthetic cleansability [12].

A more defensible interpretation is that emergence geometry is one component of a broader restorative configuration. Contemporary synthesis of prosthetic-design factors indicates that peri-implant bone response may vary across several design characteristics rather than according to one isolated dimension [13]. Clinical evidence also suggests that emergence angle may interact with abutment height, demonstrating why a particular geometric parameter cannot be interpreted without considering the vertical space through which the restoration develops [14]. These interactions are relevant to maintenance because a steep transition occurring across a short vertical distance may create a different access condition from the same apparent coronal width distributed through a greater restorative height.

Prospective randomized evidence further illustrates the importance of profile configuration. Differences

between convex and concave emergence profiles can alter peri-implant soft-tissue behavior over time, although the magnitude and clinical meaning of these changes remain dependent on treatment site, baseline conditions, and the outcome being measured [15]. Such evidence strengthens the proposition that restoration shape is biologically relevant while simultaneously cautioning against treating one profile as universally superior.

The soft-tissue environment modifies these geometric relationships. Meta-analytic evidence indicates that tissue thickness can influence marginal bone-level responses around implants [16]. Tissue dimensions therefore form a biological boundary within which prosthetic contour is expressed. A restoration cannot be classified as maintainable solely by inspection of its external contour if the available mucosal height or thickness changes the manner in which that contour emerges from the implant platform.

Abutment height provides another example of this interaction. Systematic review evidence links abutment height with marginal bone remodeling [17], while synthesis of randomized trials indicates that the direction of benefit may favor greater vertical abutment dimensions in some configurations but remains subject to uncertainty and limitations in cumulative information [18]. For the present framework, these findings are not interpreted as instructions to prescribe a specific abutment height. They instead demonstrate that geometric maintainability must be considered within a vertically constrained biological space.

Material selection introduces a separate biological dimension. Network meta-analysis has compared peri-implant tissue responses associated with different abutment materials and found that some outcomes may vary across materials [19]. However, systematic review evidence also indicates broadly comparable biological performance in important titanium-versus-zirconia comparisons [20]. Material should therefore not be used as a proxy for cleansability. Surface composition, contour, tissue adaptation, restoration finish, and access geometry may interact, but the ability to clean a prosthesis cannot be inferred merely from the abutment material.

The resulting design principle is not that one emergence angle, contour, height, or material produces a universally cleanable restoration. Instead, biological maintainability depends on whether the combined restorative configuration preserves a geometry that can be accessed without violating tissue requirements or creating unnecessarily sheltered plaque-retentive spaces. This distinction is summarized in **Table 1**.

Table 1. Restoration characteristics that determine the biological and geometric conditions for prosthetic cleansability

Restoration characteristic	Relevant peri-implant relationship	Cleansability-oriented interpretation	Required design caution
Cervical restoration contour	Determines the external surface presented to peri-implant tissues and maintenance devices	Contour should avoid unnecessary bulk that narrows usable cleaning access	Association with disease does not establish an independent causal contour rule
Emergence angle	Describes the rate of transition from implant/abutment platform toward the restoration	Greater angular transition may increase access difficulty when combined with limited vertical space	Study-specific angle categories must not be treated as universal clinical thresholds
Emergence profile shape	Alters the three-dimensional cervical relationship between restoration and peri-implant mucosa	Convexity or concavity should be evaluated in relation to tissue support and access rather than esthetics alone	Profile effects are site- and outcome-dependent
Abutment height	Establishes vertical space available for restorative emergence and tissue adaptation	Greater or lesser height changes how rapidly the prosthesis must expand coronally	Bone-response evidence does not directly measure hygiene access
Peri-implant soft-tissue dimensions	Modify the biological environment surrounding the restoration	The same prosthetic geometry may have different implications in different tissue configurations	Tissue phenotype must not be interpreted as a direct measure of cleansability
Abutment/restorative material	Influences surface and tissue interaction independently of contour	Material selection should be compatible with biological and maintenance objectives	No material can be assumed to be inherently “self-cleansing” or biologically superior
Implant position relative to intended crown form	Constrains the emergence pathway available to the definitive restoration	Prosthetic contour should compensate only within biologically and mechanically defensible limits	Severe positional constraints may not be correctable through contour modification alone

Table 1 emphasizes that geometric design variables are interdependent. A clinically acceptable restoration therefore cannot be defined by optimizing one parameter while ignoring the tissue and spatial conditions that determine how that parameter is expressed.

Patient-dependent cleansability requirements

A restoration may offer geometrically visible access yet remain functionally inaccessible to the person responsible for daily plaque control. For this reason, patient-dependent cleansability should be treated as a separate design dimension rather than assumed from prosthetic morphology alone. Functional capacity includes more than whether a patient can hold a toothbrush or interdental device. It also includes the ability to position the device accurately, reach the restoration, control its movement around irregular surfaces, reproduce the technique consistently, and tolerate the device within the available prosthetic space.

Evidence from older adults illustrates why this distinction matters. Evaluation of visual acuity, manual dexterity, grip strength, and oral or denture hygiene ability did not support a simple one-to-one assumption that reduced performance in an isolated physical measure necessarily predicts poor hygiene capability [21]. The direct population studied was non-frail, which limits extrapolation to patients with advanced functional impairment, but the finding remains conceptually important: patient capability is multidimensional. A design framework that classifies a restoration as cleanable solely because interdental access exists geometrically may therefore overestimate real-world usability.

Maintenance protocols for implant-supported prostheses are similarly heterogeneous. A scoping review found considerable variation in home-care and professional maintenance approaches and did not establish a single standardized protocol suitable for all prosthetic configurations [22]. This variability supports individualized assessment. The restoration should be considered together with the cleaning devices the patient can actually use, the direction from which those devices must approach the prosthesis, and whether routine access is realistically reproducible.

Adjunctive measures may improve selected outcomes in peri-implant mucositis management, but their effects are procedure- and device-specific [23]. They should not be treated as substitutes for accessible prosthetic geometry. A patient who requires increasingly complex devices simply to reach the cervical prosthesis may face a higher maintenance burden even when those devices are theoretically effective under controlled conditions.

The distinction between theoretical and usable access is reinforced by randomized clinical evidence showing that repeated professional instrumentation added to oral-hygiene reinforcement did not automatically produce a universal additional clinical benefit in peri-implant mucositis management [24]. This finding cautions against a simple escalation model in which increasingly intensive mechanical intervention compensates for any maintenance limitation. Effective maintenance depends on matching intervention to the actual cause and context of the problem.

A patient-centered prosthetic design should therefore assess whether the intended access route is compatible with the patient's functional profile before the restoration is finalized. The objective is not to classify patients according to an arbitrary dexterity score. Rather, the design question is whether the proposed prosthesis provides a usable margin of access under the patient's anticipated self-care conditions.

Patient-dependent access requirements are summarized in **Table 2**.

Table 2. Patient-dependent accessibility requirements for implant-prosthesis maintenance

Patient-access dimension	Functional requirement	Prosthetic implication	Practical interpretation
Manual control of hygiene devices	Ability to stabilize, orient, and move a selected device around the restoration	Spaces that are technically open may still be unusable if precise device manipulation is required	Assess actual device use rather than assuming access from geometry
Visual targeting	Ability to identify the cleaning pathway or reproduce it using tactile guidance	Complex or hidden access paths increase dependence on instruction and learned technique	Design should minimize unnecessary access complexity where possible
Posterior or lingual reach	Ability to introduce the device from a realistic intraoral direction	A passage may exist but remain inaccessible because of approach angle or surrounding anatomy	Evaluate approach trajectory, not merely interproximal width

Device compatibility	Availability of a brush, flossing aid, irrigating device, or other method that can reach the intended surface	Prosthetic form should permit practical use of at least one sustainable cleaning strategy	Adjunctive technology should complement, not rescue, inaccessible design
Reproducibility of technique	Ability to perform the procedure consistently outside supervised care	Highly technique-sensitive access increases long-term maintenance burden	Prefer access that remains usable under ordinary daily conditions
Functional change over time	Capacity may change with aging, illness, injury, vision, or motor function	A restoration designed at the limit of present capability may become difficult to maintain later	Include reasonable tolerance for future reduction in patient capability
Response to instruction and reinforcement	Ability to translate professional guidance into sustainable self-care	Complex maintenance requirements may demand repeated training	Education cannot fully compensate for severe geometric inaccessibility

The patient-related requirement is thus relational: cleansability exists only when prosthetic access and the patient's usable method coincide. This principle also prevents the framework from classifying functional limitation as a patient failure when the prosthetic design itself creates avoidable access demands.

Professional access and supportive care constraints

Patient self-care represents only one component of long-term implant maintenance. Implant-supported restorations must also remain accessible to clinicians who provide supportive peri-implant care, reassessment, debridement, repair, and, where necessary, prosthetic removal. Professional cleansability therefore differs from patient cleansability in both purpose and technique.

Evidence evaluating supportive care after peri-implantitis treatment indicates that continued professional maintenance is clinically important, while the available literature remains insufficient to establish one universally optimal frequency or protocol [25]. This uncertainty strengthens rather than weakens the argument for design accessibility. When future supportive-care needs cannot be predicted precisely, restoration geometry should avoid unnecessarily restricting the range of clinically reasonable maintenance procedures.

Professional instrumentation itself is also technique dependent. Randomized evidence evaluating an air-polishing protocol after surgical treatment of peri-implantitis shows that specific instrumentation approaches can influence clinical, microbiological, or biochemical maintenance outcomes [26]. Such findings should not be translated into a universal preference for one device. Their relevance to design lies in demonstrating that future supportive care may involve instruments with distinct spatial requirements. A prosthesis that allows only one narrowly defined access route may therefore be less adaptable to changing clinical needs.

Retrievability adds a further dimension. A scoping review identified multiple methods for retrieving or locating access pathways in cement-retained implant-supported prostheses [27]. This literature demonstrates that prosthetic serviceability can be deliberately engineered rather than left to chance. Nevertheless, retrievability should remain analytically separate from disease prevention. A prosthesis that is easy to retrieve is not automatically more biologically successful, and a screw-access pathway does not itself demonstrate improved plaque control.

The same distinction is important when comparing cement- and screw-retained prostheses. Meta-analytic evidence from randomized studies did not demonstrate clear superiority of one retention mode for peri-implant mucositis or peri-implantitis incidence [28]. Consequently, the present framework does not classify screw retention as inherently more biologically favorable. The relevant design question is narrower: can the selected retention strategy permit necessary professional inspection, debridement, repair, removal, or modification without imposing disproportionate procedural difficulty or biological risk?

Long-term outcomes following peri-implantitis treatment further show why professional access should be treated as an enduring design concern rather than a one-time technical convenience [29]. Patients may require repeated reassessment and supportive care over years. Prosthetic design should therefore anticipate not only initial delivery but also the possibility that peri-implant tissues, patient ability, cleaning methods, and treatment needs will change.

These considerations support a professional-access concept composed of three related but distinct properties: instrument access to clinically relevant surfaces, prosthesis serviceability when more direct access is required, and compatibility with repeated supportive-care procedures. **Table 3** organizes these properties without assuming that any one retention mode or maintenance device is universally superior.

Table 3. Cleansability-oriented professional access criteria for implant prosthetic design

Professional-care requirement	Prosthetic feature affecting access	Desired design property	Boundary on interpretation
Routine peri-implant inspection	Cervical contour and visibility of clinically relevant surfaces	Clinical examination should not be unnecessarily obstructed by restorative bulk	Visibility alone does not establish biological health
Mechanical debridement	Surface approach angle, emergence contour, interproximal access, instrument clearance	Clinically relevant surfaces should remain reachable by appropriate professional instruments	No single instrument or debridement method is universally preferred
Access during supportive peri-implant care	Restoration position relative to tissue and adjacent prostheses	Design should allow repeated maintenance without excessive trauma or procedural complexity	Optimal supportive-care interval remains patient- and disease-specific
Prosthesis retrievability	Retention strategy and availability/localization of access pathway	Removal should be feasible when biological, mechanical, or diagnostic indications arise	Retrievability does not itself reduce disease incidence
Management of cement-related or subprosthetic complications	Margin location, restoration contour, serviceability	Design should permit detection and correction when clinically indicated	Retention mode should not be reduced to a simple biological hierarchy
Repair or modification after functional change	Component accessibility and restorative architecture	Prosthesis should permit reasonable adaptation when patient or tissue conditions change	Not every design can accommodate all future contingencies
Re-entry for complex treatment	Relationship between superstructure and peri-implant region	Professional access should remain possible if direct intervention becomes necessary	Severe implant-position or tissue constraints may remain upstream limitations

The three evidence layers developed so far—restoration geometry, patient usability, and professional access—should not be collapsed into a single label. Their relationships are better represented as a constrained multilevel system. **Figure 1** therefore depicts how a proposed prosthetic configuration can remain biologically acceptable yet become functionally difficult to maintain when patient or professional access is restricted.

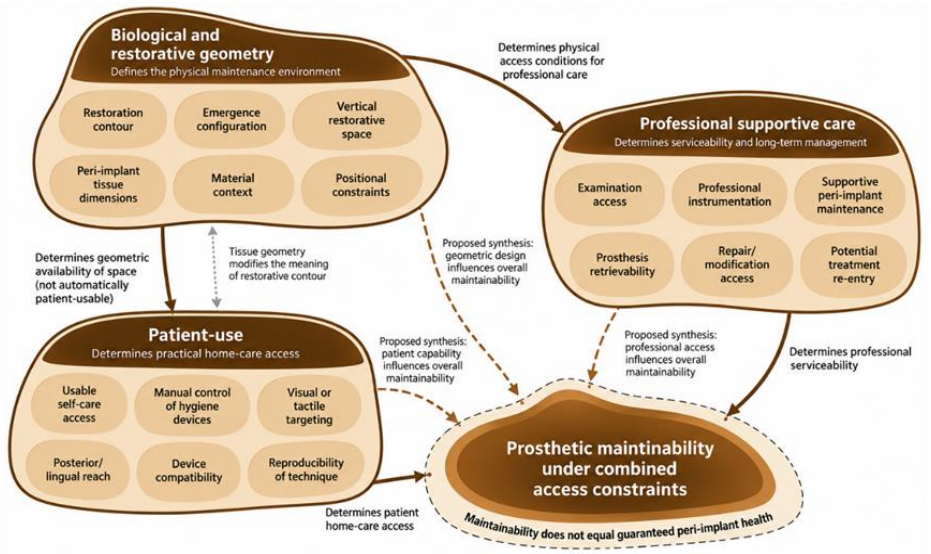

Figure 1. Maintenance access across restorative geometry, patient capability, and professional care constraints

An integrated cleansability-oriented design framework

The evidence developed in the preceding sections indicates that cleansability cannot be assigned to a prosthesis by inspecting restoration contour alone. Prosthetic design establishes the physical opportunity for access, but usable maintenance depends on whether

that opportunity survives interaction with peri-implant anatomy, patient capability, available hygiene devices, and the requirements of professional supportive care. This distinction is consistent with broader restorative planning approaches that seek biological compatibility across the life of an implant restoration rather than concentrating exclusively on the conditions present at delivery [1].

The proposed framework therefore treats cleansability as a conditional relationship among three access domains. The first is prosthetic access geometry: the combination of emergence configuration, cervical contour, vertical restorative space, tissue relationship, implant position, and other structural features that creates or restricts physical access. Evidence associating prosthetic features with peri-implant outcomes justifies including this domain, but does not justify assigning a universal numerical geometry to a "cleanable" restoration [2]. Even measurements with clinically relevant associations require interpretation within the surrounding tissue and restorative configuration [10].

The second domain is patient-usable access. A physical pathway has practical value only when a patient can repeatedly reach it with an appropriate device and technique. This domain is intentionally broader than manual dexterity. Functional capacity can involve visual or tactile orientation, posterior reach, device manipulation, learning, consistency, and changes in physical capability over time. Evidence from older adults cautions against assuming that isolated measurements of dexterity or grip strength map directly onto oral-hygiene performance [21]. Maintenance planning should therefore consider the fit between a prosthetic access route and the patient's realistic method of self-care rather than treating patient capability as a fixed binary characteristic.

The third domain is professional serviceability. Periodic supportive care may require inspection, instrumentation, subgingival or subprosthetic access, repair, modification, or removal. Systematic evidence supports the importance of supportive care while leaving substantial uncertainty regarding a single optimal protocol [25]. The restoration should consequently preserve sufficient professional access for more than one narrowly defined maintenance procedure. Retrievability can contribute to this serviceability, although the ability to retrieve a prosthesis should not be presented as evidence that a particular retention strategy prevents peri-implant disease [27].

These domains do not behave as interchangeable contributors that can simply be added together. A favorable condition in one domain may not compensate for a severe constraint in another. An emergence profile may be biologically acceptable yet practically inaccessible to a patient. Conversely, a patient may manage the prosthesis adequately while professional instrumentation remains restricted. A restoration may also appear accessible at delivery but become more difficult to maintain after changes in tissue architecture, functional capacity, or treatment requirements. The framework therefore conceptualizes cleansability as a joint adequacy condition, not as a score.

This formulation also separates cleansability from peri-implant diagnosis. Contemporary implant outcome frameworks recognize biological, prosthetic, patient-reported, and care-related domains that should be evaluated independently rather than collapsed into a single outcome [30]. Likewise, peri-implant health and disease require established clinical diagnostic criteria [31]. A prosthesis may therefore be judged difficult to maintain while surrounding tissues remain clinically healthy at a particular examination, or may appear readily accessible while disease develops through other pathways. Cleansability should influence preventive design and maintenance planning without being mistaken for a diagnostic category.

The practical value of the framework lies in making design reasoning explicit before definitive prosthesis delivery. Instead of asking whether a contour conforms to a preferred geometric template, the clinician asks whether the selected configuration provides defensible biological space, whether the patient can use the resulting access route, and whether professional supportive care remains feasible. These relationships are integrated in **Figure 2**.

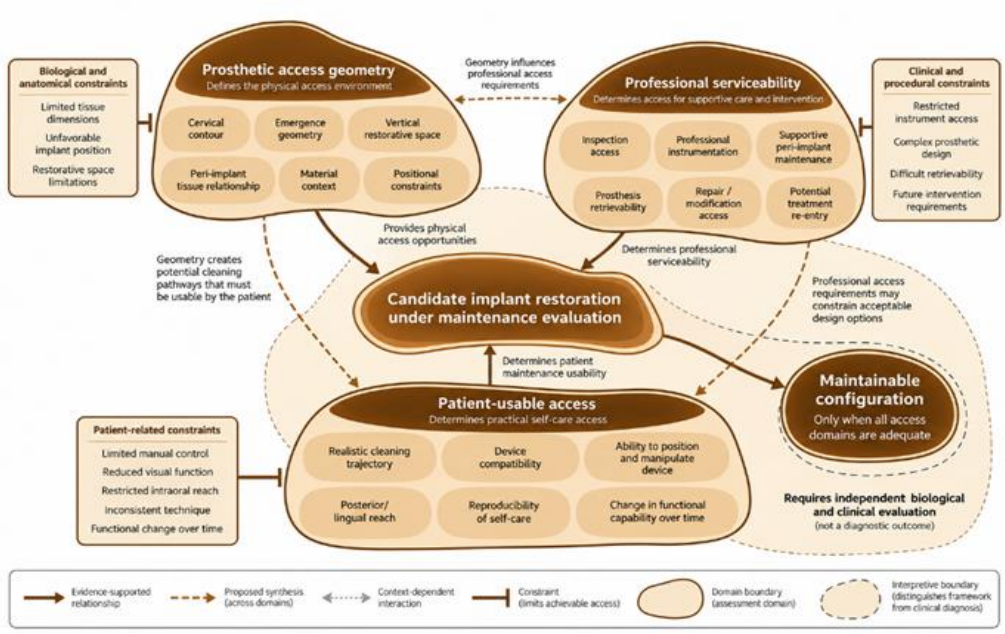

Figure 2. Conditional maintainability across the patient–prosthesis–professional care interface

Application to prosthetic design, limitations, and evaluation

Application of the framework begins during treatment planning, because definitive prosthetic contour is partly constrained by implant position, surrounding anatomy, restorative space, and the relationship between the implant platform and intended crown form. Systematic evidence regarding surgical- and implant-related factors shows that peri-implant disease risk and treatment context may be influenced by upstream variables that cannot always be corrected after integration [32]. A prosthetic cleansability framework should therefore distinguish between modifiable restorative access problems and structurally constrained access problems.

Where implant position and tissue architecture permit several restorative solutions, cleansability can function as an additional design criterion alongside mechanical, esthetic, phonetic, and biological objectives. The framework does not require choosing the least contoured restoration indiscriminately. Excessive reduction of cervical support may compromise other clinical objectives, while an unnecessarily bulky profile may restrict cleaning access. The relevant design task is to identify a configuration that satisfies biological and restorative requirements without creating avoidable maintenance demands.

Evaluation should consequently occur at more than one stage. Before definitive delivery, clinicians can assess whether the expected cleaning trajectory is physically present and whether the intended patient can reproduce it with realistic devices. At delivery and follow-up, the assessment can be revised according to actual self-care performance, tissue response, and professional access. This longitudinal interpretation is important because patient capability is not static and because peri-implant tissue conditions may change.

The framework also has limits. Much of the evidence connecting prosthetic configuration with peri-implant outcomes remains observational or uses endpoints such as marginal bone level, bleeding, recession, or disease prevalence rather than direct measurement of cleansability. These outcomes are clinically important but cannot be treated as interchangeable with access itself. Similarly, study-specific emergence-angle or abutment-height categories should not be converted into universal prescriptions. The available evidence supports careful geometric reasoning, not an invariant threshold.

A second limitation concerns patient evidence. The functional variables required for implant-specific self-care are incompletely characterized, and available studies do not establish a validated implant cleansability assessment combining dexterity, visual function, device use, reach, and adherence. The patient-access component of the framework therefore remains a proposed synthesis requiring prospective validation.

Professional-access evidence is also heterogeneous. Supportive-care protocols, instrumentation methods, prosthetic designs, and treatment histories differ substantially. Neither retrievability nor retention mode should be interpreted as a surrogate for biological success. The framework instead uses professional access as a serviceability property that can be evaluated independently from disease incidence.

Future validation should therefore test the framework prospectively rather than merely correlate individual geometric parameters with retrospective disease status. Appropriate evaluation would determine whether candidate prosthetic designs differ in directly observed patient access, professional instrumentation feasibility, maintenance burden, need for modification, biological outcomes, and patient-reported experience. Established core outcome principles can guide selection of relevant implant outcomes [30], while recognized case definitions should remain the basis for diagnosing peri-implant disease [31].

The strongest claim justified at present is accordingly preventive and design-oriented: implant restorations should be evaluated for maintainability before delivery, and that evaluation should integrate restoration geometry, actual patient usability, and professional serviceability. Whether such prospective assessment reduces peri-implant complications or improves long-term outcomes remains a question for independent clinical testing.

Conclusion

Prosthetic cleansability is best understood as a conditional design property rather than as a fixed geometric characteristic of an implant restoration. Restoration contour and emergence configuration determine physical opportunities for maintenance, but these opportunities acquire clinical meaning only when they can be used by the patient and remain accessible during professional supportive care. No single emergence angle, abutment dimension, material, retention mode, or hygiene device currently provides a validated universal definition of a cleanable implant prosthesis.

A defensible preventive approach is therefore to evaluate implant restorations prospectively across three distinct dimensions: biologically compatible access geometry, patient-usable access, and professional serviceability. These dimensions should remain separate from peri-implant diagnosis and should not be converted into an unsupported numerical score. The proposed framework provides a structured basis for treatment planning and future validation while recognizing that biological outcomes are multifactorial and that some maintenance limitations originate upstream from prosthetic design.

Acknowledgments: None

Conflict of Interest: None

Financial Support: None

Ethics Statement: None

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