

Medication Burden, Oral Complications, and Functional Decline in Older Adults Receiving Long-Term Palliative Care

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Abstract

Older adults receiving long-term palliative care commonly live with multimorbidity, substantial medication exposure, progressive loss of physiological reserve, and oral problems that can interfere with comfort, eating, swallowing, and everyday function. These problems often coexist, yet their relationships are easily oversimplified. This conceptual article develops a medication–oral–function mechanism framework that separates medication-related oral pathways from direct medication effects on function and from disease- and frailty-related processes that can independently affect both oral status and functional capacity. The framework distinguishes xerostomia from objectively impaired salivary function, separates swallowing and mucosal problems from dry-mouth pathways, and positions oral intake and nutritional consequences as possible intermediates rather than assumed mediators. Frailty is treated as both a vulnerability condition and a competing explanation for observed oral–functional associations. The resulting model proposes several conditional routes: medication burden may contribute to oral dysfunction that subsequently influences intake, nutrition, or function; medication effects may influence function without oral mediation; underlying disease and frailty may generate both oral and functional deterioration; and reciprocal relationships may emerge as declining function reduces capacity for oral self-care and medication management. The clinical implication is not that medication review or oral intervention will universally reverse functional decline, but that pathway-specific assessment may identify modifiable contributors in selected patients. The framework therefore supports coordinated nursing surveillance, medication review, oral-care assessment, and research designs capable of distinguishing mediation from common-cause and direct-effect explanations.

Keywords: Polypharmacy, Xerostomia, Oral frailty, Palliative care, Dysphagia, Functional decline, Medication review

Introduction

Medication burden is a central problem in the care of many older adults because the clinical meaning of multiple medicines depends on indication, cumulative adverse effects, treatment goals, prognosis, time to benefit, and the person's capacity to sustain treatment. Deprescribing literature increasingly emphasizes that the relevant question is not simply how many medicines are prescribed, but whether the current regimen remains proportionate to expected benefit, harm, burden, and patient priorities [1, 2]. These considerations become especially important in long-term palliative care, where multimorbidity, progressive frailty, changing goals, and limited physiological reserve may alter the consequences of both continuing and discontinuing treatment.

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Received: 20 September 2025; **Revised:** 04 December 2025;

Accepted: 20 December 2025

How to Cite This Article: Weber T, Rossi E, Boateng K, Chen L. Medication Burden, Oral Complications, and Functional Decline in Older Adults Receiving Long-Term Palliative Care. *J Integr Nurs Palliat Care*. 2025;6(2):361-70. <https://doi.org/10.51847/OvyJzHwfQU>

Oral health adds a second layer of complexity. Palliative-care practitioners encounter dry mouth, oral discomfort, mucosal problems, swallowing difficulty, and other oral concerns, while the integration of oral assessment and management into routine palliative practice remains uneven [3-5]. These conditions matter because they may affect comfort, communication, swallowing, appetite, food choice, oral intake, and the feasibility of medication administration. However, co-occurrence does not establish a single causal chain. Oral problems may arise from medicines, disease, treatment, dehydration, infection, reduced self-care, functional dependence, or combinations of these factors. Functional decline may likewise result from disease progression, frailty, direct medication effects, malnutrition, reduced activity, or other systemic processes.

The unresolved issue is therefore mechanistic rather than merely descriptive. When medication burden, oral complications, poor intake, frailty, and functional decline appear together, which relationships are sufficiently supported to inform clinical interpretation, and which remain proposed? The purpose is to identify where medication-related oral pathways are plausible, where direct medication or disease pathways remain better explanations, and which observations would help distinguish among them in long-term palliative care.

Conceptual approach

The analytical starting point is that medication burden, oral dysfunction, nutritional compromise, frailty, and functional decline occupy different positions within a possible causal system and should not be treated as interchangeable markers of general deterioration. Polypharmacy and deprescribing research shows that medication burden is shaped by indication, expected benefit, adverse effects, competing disease priorities, treatment complexity, and patient goals [6]. At the same time, umbrella-level evidence linking oral-health domains with frailty is heterogeneous across definitions, measurements, populations, and oral outcomes [7, 8].

This separation is essential because the same clinical observation can support different explanations. The framework consequently treats mediation, direct effects, common causes, and feedback as distinct hypotheses whose plausibility depends on timing, measurement, disease context, and response to intervention.

Table 1. Differentiating the principal constructs that organize medication–oral–function interpretation

Analytical unit	What the construct represents in this article	What it does not establish by itself	Key interpretive question
Medication burden	Combined clinical and practical consequences of a medication regimen, including indication, adverse-effect potential, treatment complexity, and changing benefit–burden balance	That the regimen is inappropriate or harmful	Which medicines remain justified, and which may contribute to modifiable burden?
Multimorbidity	Coexisting diseases that generate treatment needs, competing priorities, and overlapping symptoms	That medication number alone explains vulnerability	Which disease processes independently influence oral or functional status?
Oral complication	A clinically relevant oral or swallowing problem such as dryness, salivary dysfunction, mucosal disorder, candidiasis, or dysphagia	That the problem is medication-caused	What etiologies remain plausible for this specific oral problem?
Nutritional consequence	Change in food form, appetite, oral intake, or nutritional status associated with oral or systemic constraints	That oral dysfunction is the sole cause	Is impaired intake plausibly downstream of the oral problem, systemic illness, or both?
Frailty / reduced reserve	Systemic vulnerability and reduced capacity to withstand stressors	That oral frailty and physical frailty are identical constructs	Is frailty an outcome, a modifier, or a competing common cause?
Functional decline	Loss or worsening of physical ability, independence, mobility, or activity-related capacity	That decline is mediated through oral health	Which direct medication, nutritional, disease, or frailty pathways remain viable?
Proposed feedback	A reciprocal relationship in which deterioration in one domain can reinforce another	That reciprocity has been empirically demonstrated	What repeated observations would be required to show direction over time?

Multimorbidity and medication burden

Multimorbidity creates the prescribing environment from which medication burden emerges. Frail nursing-home residents frequently have opportunities for medication reassessment, but those opportunities differ across settings and prescribing systems [9, 10]. The presence of potentially unnecessary or burdensome treatment does not mean that every medicine should be stopped. In palliative and end-of-life care, deprescribing decisions are influenced by prognosis, continuity, communication, professional roles, patient priorities, and the extent to which treatment remains aligned with current goals [11, 12].

Medication burden in this article therefore refers to more than numerical polypharmacy. It includes the possibility that the regimen creates adverse effects, administration difficulties, cognitive or physical workload, and treatment demands that have become disproportionate to benefit. This section establishes exposure and context only. It does

not yet assume that the medication regimen is responsible for any oral finding. That attribution requires evidence about specific medication-related pathways.

Medication-related oral pathways

Among the more defensible medication–oral links is the association between medication exposure and dry-mouth or reduced-salivary-function outcomes in older people. Systematic evidence indicates that several medication classes and greater medication exposure can be associated with xerostomia or hyposalivation [13, 14]. Pharmacological reviews likewise describe plausible mechanisms through which drugs can reduce salivary secretion or alter the subjective experience of oral dryness [15, 16].

Yet this pathway is probabilistic. Older adults with multimorbidity may also experience dry mouth because of dehydration, mouth breathing, local oral disease, cancer treatment, neurological disease, or reduced fluid intake. Medication review is therefore most informative when it asks whether the timing, pharmacology, cumulative xerogenic potential, and alternative causes support a medication contribution rather than assuming causation from co-prescription alone.

Xerostomia and salivary dysfunction

Xerostomia and salivary dysfunction require separate interpretation. Xerostomia is a subjective experience of oral dryness, whereas hyposalivation refers to objectively reduced salivary output. The two overlap but are not synonymous. In acutely ill older adults, xerogenic medication exposure, frailty, subjective dry-mouth measures, salivary measurements, and clinical oral findings can be associated without behaving as one interchangeable construct [17]. This distinction matters because the pathway from medication exposure to patient burden may depend more strongly on the experienced symptom in one person and on objectively impaired salivary function in another.

For patients with advanced disease, dry mouth is clinically meaningful because it can interfere with comfort and everyday oral function [18, 19]. Its importance is therefore not limited to whether a salivary-flow threshold is crossed. Assessment needs to consider the person's experience, oral condition, fluid intake, swallowing, dentition, ability to perform oral care, and the practical effects of dryness on eating or medicine administration.

The treatment evidence also cautions against treating dry mouth as a simple pharmacological problem. Clinical-practice guidance for xerostomia in palliative care varies in scope and recommendation strength [20], reflecting limited or heterogeneous evidence for many interventions. Individualized treatment may nevertheless be appropriate. A pilot N-of-1 study of orally dissolving pilocarpine in advanced cancer illustrates that patient-specific response can be examined experimentally, while remaining insufficient to establish population-wide effectiveness [21]. For the present framework, xerostomia is therefore a potentially medication-sensitive oral phenotype whose clinical significance and responsiveness must be established at the individual level.

Dysphagia, candidiasis, and mucosal problems

Dry mouth is only one oral pathway. Advanced illness may involve mucosal disease, candidiasis, pain, ulceration, infection, denture problems, altered oral intake, and swallowing difficulty arising from disease, treatment, debility, or medication-related factors. Evidence-based expert guidance for advanced cancer emphasizes that such oral problems are multifactorial and require problem-specific assessment rather than a single explanatory model [22]. Dysphagia deserves particular separation because it can directly restrict oral intake and is itself associated with frailty in older populations [23]. The association may be reciprocal or confounded by underlying disease. Neurological impairment, sarcopenia, advanced dementia, cancer, acute illness, and generalized weakness can affect both swallowing and physical reserve. Dysphagia therefore cannot automatically be positioned downstream of xerostomia or medication exposure, even when all three are present.

Oral intake and nutritional consequences

The clinically important transition from oral dysfunction to systemic consequences occurs when oral problems alter eating, food texture, appetite, swallowing efficiency, or the amount of nutrition that can be consumed comfortably and safely. In rehabilitation populations, nutritional status has been associated with oral health, appetite, food form, swallowing-related measures, and functional variables. Hospital data similarly show that poor oral status can coexist with frailty, malnutrition risk, and functional impairment [24, 25].

These findings make an oral-to-nutrition pathway plausible, but they do not demonstrate serial mediation. Poor appetite may arise from advanced disease, inflammation, gastrointestinal symptoms, depression, fatigue, or medication effects even when oral function is preserved. Functional dependence may also reduce access to food or the ability to eat independently. The framework therefore treats oral intake and nutritional status as potential intermediates whose contribution must be assessed alongside systemic illness.

Frailty and functional reserve

Frailty represents reduced capacity to withstand stressors and recover from physiological disruption. Oral frailty has emerged as a related construct, but systematic evidence demonstrates substantial variation in how it is defined and measured [26]. Some instruments combine swallowing, chewing, dentition, oral dryness, tongue function, or self-reported difficulty, whereas others emphasize different combinations of oral capabilities.

Screening tools can nevertheless make otherwise diffuse oral vulnerability more observable. A community-based oral-frailty screening instrument has shown that multidimensional oral vulnerability can be operationalized for older adults [27], and subsequent instrument-development work has further formalized oral-frailty assessment across several dimensions [28]. These tools should not be interpreted as interchangeable with global frailty measures. Oral frailty may identify a domain of vulnerability that overlaps with physical frailty while preserving distinct clinical meaning.

Within the proposed framework, frailty has three possible roles. It may increase susceptibility to the consequences of relatively modest oral or medication-related stressors; it may develop or progress alongside nutritional and functional deterioration; and it may act as a common cause that creates both oral impairment and functional decline without either being directly downstream of the other.

Pathways from oral dysfunction to functional decline

Population-based studies show associations between oral-health indicators and frailty among older adults [29]. Similar concerns are clinically relevant in long-term-care residents, where oral problems and frailty commonly coexist [30]. These cross-sectional findings establish overlap but cannot determine whether oral dysfunction precedes frailty, frailty impairs oral health, or both reflect shared disease and social determinants.

Longitudinal evidence provides stronger temporal plausibility. In two older-adult cohorts, baseline oral-health characteristics were related to subsequent progression of physical frailty [31]. Meta-analytic evidence likewise indicates that several dimensions of oral status—including tooth loss, chewing difficulty, swallowing impairment, dry mouth, and self-rated oral health—are associated with physical frailty across community-based populations [29, 31, 32]. Convergence across study designs strengthens the case that oral health and physical vulnerability are meaningfully related, but it does not establish a universal causal mechanism.

A medication–oral–functional pathway is most plausible when temporality is coherent: medication exposure precedes a relevant oral problem, the oral problem alters intake or function, competing explanations are less convincing, and modification of the relevant exposure or oral problem changes the downstream condition. Most existing studies do not test that complete sequence. The framework therefore grades this route as plausible and potentially modifiable, rather than proven.

Direct medication effects on function

Oral mediation is unnecessary for medication burden to influence function. Sedation, dizziness, orthostatic symptoms, cognitive effects, weakness, treatment complexity, and other medication-related burdens can impair daily function through routes that do not involve oral health [33]. Contemporary deprescribing frameworks emphasize precisely this need to reconsider whether treatment burden and adverse effects remain proportionate to benefit in vulnerable older adults [1].

This direct pathway is analytically important because failure to include it would exaggerate the role of oral health. If function worsens while oral status remains stable, or if functional improvement follows medication change without corresponding oral improvement, a direct medication-related explanation may be more plausible than oral mediation.

Table 2. Interaction matrix for oral intake, nutritional vulnerability, medication effects, and functional consequences

Clinical pattern	Plausible contributing mechanism	Competing explanation that must remain open	Observation most useful for discrimination	Interpretation within this article
Dry mouth with reduced eating	Oral discomfort or impaired lubrication makes eating less comfortable	Disease-related anorexia, dehydration, fatigue, depression	Whether intake changes with the severity or treatment of dryness	Possible oral-mediated nutritional route
Dysphagia with altered food texture	Swallowing impairment restricts safe or acceptable intake	Neurological disease, advanced dementia, sarcopenia	Temporal relation between swallowing change and diet modification	Swallowing-mediated route, not necessarily medication-mediated
Poor oral status with malnutrition risk	Pain, chewing difficulty, swallowing problems, or reduced oral capacity limit intake	Systemic catabolism or illness-related anorexia	Repeated oral, dietary, weight/nutrition, and disease-status measures	Association requiring temporal clarification
High medication burden with functional	Direct adverse effects or treatment burden influence	Disease progression or frailty	Functional response to medication adjustment	Direct medication route remains plausible

decline but stable oral status	mobility, cognition, or participation		while oral status is unchanged	
Oral deterioration and functional decline occurring together	Shared disease/frailty process affects both domains	Oral dysfunction contributing to later function loss	Repeated measures demonstrating which domain changes first	Common-cause explanation remains viable
Functional dependence followed by worsening oral health	Reduced capacity for oral self-care, hydration, food preparation, or accessing dental care	Primary progression of oral disease	Change in oral status after loss of independence	Reverse or reciprocal pathway
Improved oral comfort without functional recovery	Local oral intervention benefits symptoms but systemic decline persists	Advanced disease dominates function	Divergence between oral and functional response	Demonstrates limits of oral mediation

Medication–nutrition–function feedback loops

A one-way chain is unlikely to describe all patients. Oral impairment, reduced intake, nutritional vulnerability, and physical decline can plausibly reinforce one another. Poorer oral status and nutritional vulnerability frequently coexist in older clinical populations [24], while broader oral-health evidence also links several functional oral deficits with frailty [32]. The temporal direction of these relationships is incompletely established.

The framework therefore allows feedback while marking it as proposed synthesis. Declining function may reduce a person's ability to brush teeth, clean dentures, obtain drinks, prepare food, report oral symptoms, attend appointments, or manage complex medication schedules. These changes could worsen oral conditions or increase practical medication burden. Nutritional deterioration may simultaneously reduce resilience, making the consequences of further illness or oral dysfunction more pronounced. Such reciprocity should be tested with repeated measurements rather than inferred from cross-sectional co-occurrence.

Patient and disease modifiers

Pathway strength is likely to vary substantially by disease phenotype. In advanced dementia, frailty and dysphagia trajectories are closely intertwined, and disease progression may be a more powerful driver of swallowing and functional deterioration than medication-related oral mechanisms [34]. Advanced cancer may involve treatment-related mucosal disease, systemic inflammation, cachexia, infection, and symptom burden that similarly alter the relative importance of medication-mediated pathways.

Other modifiers include cognitive impairment, dependency for oral care, dentition, baseline nutritional reserve, neurological disease, hydration, prognosis, ability to communicate symptoms, and access to dental or swallowing expertise. These conditions do not merely add background complexity; they determine whether a medication–oral–function explanation is clinically plausible in a particular patient.

Proposed medication–oral–functional decline framework

The proposed framework integrates the evidence without treating any single pathway as universal. Its central claim is that medication burden can contribute to functional decline through several separable routes whose relative importance depends on oral phenotype, disease state, frailty, nutrition, time, and care context.

The first route is medication → oral dysfunction → intake/nutrition → function. This route is most plausible when medication exposure has a credible relationship with a specific oral problem, the oral problem affects eating or swallowing, and nutritional or functional change follows in a temporally coherent way. The second route is medication → oral dysfunction → function, where pain, dryness, dysphagia, communication difficulty, or treatment burden affects activity and well-being without demonstrable nutritional mediation. The third is a direct medication → function route, in which medication-related adverse effects or treatment burden impair function independently of oral status. The fourth is a disease/frailty common-cause route, where illness severity or reduced reserve generates higher medication exposure, oral deterioration, nutritional vulnerability, and functional decline in parallel.

Oral frailty data support keeping oral and global vulnerability connected but distinct. Multicentre evidence shows that oral frailty is associated with broader frailty status [35], while comparison of the Oral Frailty Index-8 with objective oral-hypofunction testing shows that screening and measured oral dysfunction overlap incompletely [36]. Accordingly, the framework does not use an oral-frailty score as proof of mechanism. Measurement discordance may itself identify whether subjective function, objective performance, symptoms, or systemic reserve is driving the clinical picture.

Feedback may emerge across all four routes. Reduced function can diminish oral self-care or capacity to manage treatment; poor intake can reduce reserve; disease progression can alter both medication requirements and oral tolerance. These reciprocal pathways are proposed rather than established and should remain visually and conceptually distinguishable from better-supported associations.

The resulting clinical question is therefore not whether medication burden “causes” oral complications and functional decline in general. It is which pathway is most plausible for a particular patient, which part is potentially modifiable, and whether intervention at that point produces the expected downstream response.

The conditional structure of these relationships is summarized in **Figure 1**.

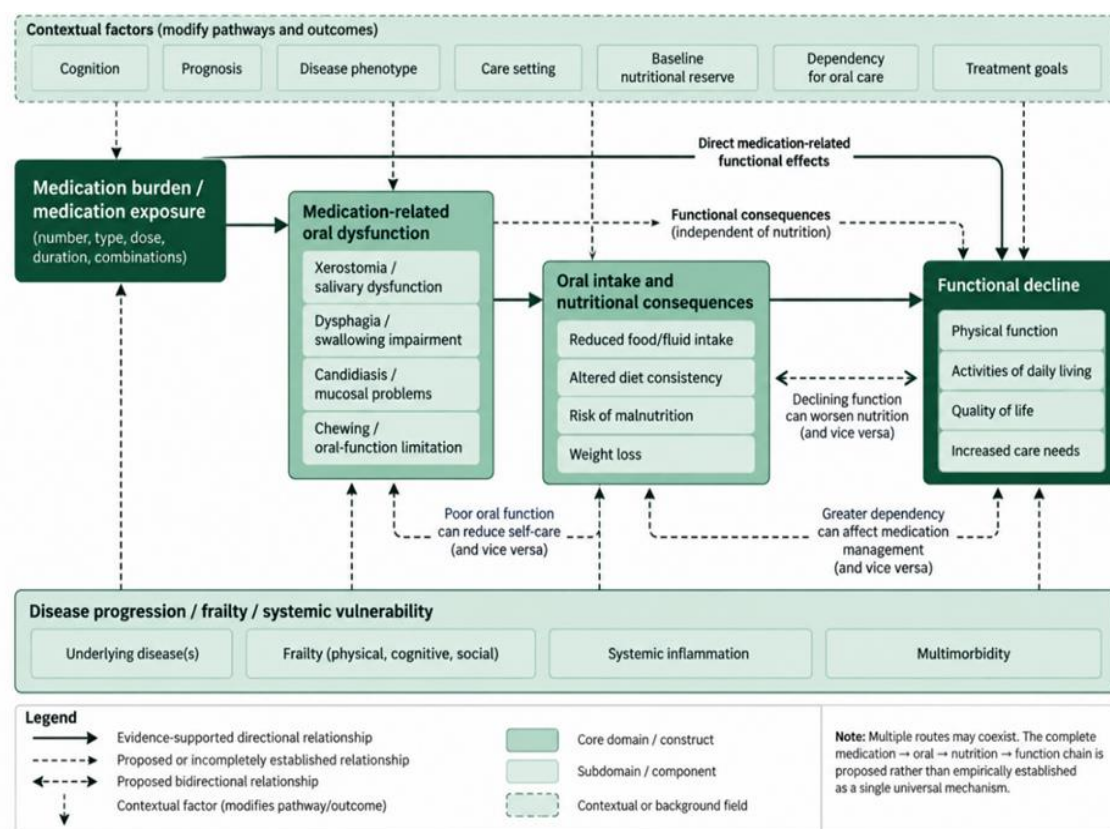


Figure 1. Conditional medication–oral–function pathways in older adults receiving long-term palliative care

Pharmacist medication review

Pharmacist medication review provides the medication-attribution component of the framework. The central question is not whether a patient takes many medicines, but whether individual medications, combinations, administration demands, or treatment goals remain aligned with the patient’s current condition. Polypharmacy management requires consideration of expected benefit, adverse effects, treatment burden, and patient priorities [1].

Within the medication–oral–function framework, pharmacists contribute by examining whether a medication regimen contains plausible contributors to oral complications or functional burden. Xerogenic medications represent one example where medication exposure may influence oral status through salivary changes [13]. However, the presence of a potentially xerogenic medicine does not establish that the medication explains the patient’s entire oral condition. Medication review must therefore occur alongside assessment of disease progression, hydration, oral pathology, nutritional status, and goals of care.

End-of-life deprescribing decisions further illustrate why medication review cannot be separated from context. Qualitative evidence indicates that deprescribing near the end of life depends on communication, continuity, professional relationships, and alignment with patient goals [11]. A medication reduction that appears theoretically appropriate may not improve symptoms if the dominant driver of decline is advanced disease, while a seemingly minor medication adjustment may meaningfully reduce treatment burden in another patient.

The pharmacist role within this framework is therefore one of structured attribution and reassessment. It helps identify where medication exposure may be contributing to oral or functional vulnerability, while preserving alternative explanations and avoiding the assumption that medication burden is always the primary mechanism.

Dental/oral-care contribution

Dental and oral-care professionals contribute a distinct assessment domain because oral dysfunction may involve conditions requiring diagnostic evaluation, preventive management, treatment of infection, prosthodontic assessment, or specialized oral rehabilitation. Palliative oral problems frequently arise from overlapping disease,

treatment, medication, and functional factors, making oral expertise important when routine surveillance identifies unresolved concerns [22].

The dental contribution differs from medication review because the central question is not whether a treatment regimen remains appropriate, but whether the oral condition itself has been adequately characterized and managed. Dryness, mucosal abnormalities, candidiasis, pain, chewing difficulty, and swallowing-related oral limitations may require different responses even when they occur in the same patient.

Importantly, the framework does not assign a hierarchy among professional groups. Evidence from terminally ill cancer populations suggests that nurse-led and dental professional-led approaches may each contribute within different domains of oral-health management. The relevant question is therefore how expertise is allocated according to need, not which profession universally owns oral care.

Research propositions

The framework generates research questions by separating pathways that are often combined in observational descriptions. Future studies should determine when medication exposure precedes oral deterioration, when oral dysfunction contributes independently to nutritional or functional decline, and when disease severity explains both medication burden and oral-functional vulnerability.

Proposition 1: Medication-specific oral pathways should demonstrate temporal coherence

If medication burden contributes meaningfully to oral dysfunction, changes in medication exposure should be associated with subsequent changes in relevant oral outcomes after accounting for disease severity, hydration, and baseline oral status. Studies should avoid using medication count alone as a proxy for medication-related oral risk.

Proposition 2: Oral dysfunction should be evaluated as a potential mediator rather than assumed mediator

Longitudinal studies should measure medication exposure, oral symptoms, objective oral function, intake, nutrition, and functional outcomes repeatedly. Such designs would help determine whether oral changes precede nutritional and functional deterioration or whether they simply accompany broader decline.

Proposition 3: Direct medication effects should be tested separately from oral-mediated pathways

Studies should examine whether functional outcomes change after medication adjustment when oral status remains unchanged.

Proposition 4: Disease phenotype should modify pathway dominance

Advanced dementia, advanced cancer, neurological disease, and other severe illnesses may produce different relationships among medication exposure, oral function, and decline. Future research should avoid assuming that one mechanism applies equally across palliative populations.

Proposition 5: Professional interventions should be evaluated according to pathway-specific outcomes

Nursing surveillance, pharmacist medication review, and dental interventions should not be judged only by global functional outcomes. Local outcomes, symptom relief, medication burden, oral function, nutritional participation, and patient-defined goals may represent different but meaningful endpoints.

Results and Discussion

This conceptual article proposes that medication burden, oral complications, and functional decline in older adults receiving long-term palliative care should be interpreted through multiple interacting pathways rather than a single explanatory chain. However, the evidence does not demonstrate that every functional decline associated with oral problems is medication-mediated.

The contribution of the medication–oral–function mechanism framework is therefore organizational and interpretive. It clarifies which observations belong to different explanatory categories. Medication burden may be a contributor, a marker of disease complexity, or both. Oral complications may represent a modifiable pathway, a consequence of illness, or a component of broader vulnerability. Frailty may represent a destination of decline, a modifier of susceptibility, or a common cause linking several domains.

This distinction matters because clinical decisions are often made from incomplete information. A patient may present with reduced intake, increasing dependence, multiple medications, and oral discomfort. Without pathway differentiation, medication reduction may be pursued when the dominant problem is disease progression, or oral treatment may be intensified when the primary issue is systemic decline. The framework encourages targeted assessment of which mechanism is most plausible before assigning intervention.

The strongest evidence currently supports associations among individual domains rather than validation of a complete integrated pathway. The proposed model should therefore be understood as a structure for organizing

observation, generating testable hypotheses, and preventing overinterpretation of complex geriatric and palliative-care presentations.

Implications for long-term palliative care

In long-term palliative care, the practical value of the framework lies in improving recognition of potentially modifiable contributors while maintaining realistic expectations. Medication review should consider oral consequences when clinically relevant, but oral problems should not automatically trigger medication reduction without considering indication, goals, prognosis, and alternative causes.

Routine nursing observation can identify emerging oral discomfort, swallowing difficulty, intake changes, or reduced ability to maintain oral care. Pharmacist review can clarify whether medication exposure plausibly contributes to symptoms or treatment burden. Dental and oral-care professionals can evaluate problems requiring specialized assessment or management. These roles are complementary because different parts of the pathway require different expertise.

The framework also supports patient-centred prioritization. In advanced illness, the most meaningful outcome may be comfort, ability to enjoy food, communication, or reduced treatment burden rather than reversal of functional decline. Intervention decisions should therefore remain aligned with what the patient considers valuable within the context of illness trajectory.

Limitations

Several limitations define the current boundaries of the framework.

First, the complete medication–oral–nutrition–function pathway has not been directly validated as a single causal model. Much of the available evidence examines relationships between individual domains rather than the full sequence proposed here.

Second, many studies linking oral health and frailty are observational. Although longitudinal findings improve temporal interpretation, residual confounding from disease severity, socioeconomic factors, cognition, healthcare access, and baseline vulnerability remains possible.

Third, oral-health constructs are heterogeneous. Xerostomia, hyposalivation, oral frailty, oral hypofunction, swallowing impairment, and oral-health status are related but distinct concepts. Measurement differences limit direct comparison across studies.

Fourth, much of the evidence comes from community, hospital, nursing-home, or cancer populations rather than specifically from long-term palliative-care populations. Transfer requires attention to prognosis, care setting, and patient goals.

Fifth, the framework proposes reciprocal and feedback relationships that remain hypotheses requiring longitudinal testing. Future research should determine which pathways are dominant in specific populations and which interventions produce meaningful patient-centred benefits.

Conclusion

Medication burden, oral complications, and functional decline in older adults receiving long-term palliative care are interconnected through several possible pathways rather than one universal mechanism. Medication exposure may contribute to oral problems, oral problems may influence intake and vulnerability, and functional decline may emerge through oral, medication, disease, or frailty-related routes. The most useful interpretation is therefore conditional: clinical assessment should identify which pathway is most plausible for the individual patient, while preserving uncertainty where evidence does not establish direction or causality.

Acknowledgments: None

Conflict of interest: None

Financial support: None

Ethics statement: None

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