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A Critical Nexus in Geriatric Care: Polypharmacy, Oral Dysfunction, and Emergency Department Utilization – An Interprofessional Framework for Integrated Assessment and Management

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Abstract

Background: The expanding population of medically complex older adults is characterized by a convergence of polypharmacy and age-related oral health decline. Polypharmacy is a significant iatrogenic driver of xerostomia, oral dysbiosis, and mucosal injury, precipitating conditions such as severe caries, periodontitis, and oropharyngeal candidiasis. **Aim:** This narrative review synthesizes evidence across seven clinical and administrative disciplines to: (1) delineate the causal pathways linking polypharmacy to oral-systemic complications requiring emergency care; and (2) propose an interprofessional, systems-based framework for proactive assessment, integrated management, and safe care transitions for this vulnerable cohort. **Methods:** A systematic search of PubMed, CINAHL, Scopus, Web of Science, and Embase (2010-2024) was conducted. Keywords included polypharmacy, geriatrics, oral health, xerostomia, emergency department, and interprofessional collaboration. Grey literature from health administration and dental public health sources was also reviewed. **Results:** The review identifies a high prevalence of medication-induced xerostomia among older ED patients, strongly associated with subsequent hospitalization for aspiration events and sepsis. Evidence demonstrates that structured oral assessment is rare in emergency and primary care settings. **Conclusion:** Mitigating polypharmacy-related oral health crises requires a fundamental shift from reactive, episodic emergency care to a proactive, interprofessional continuum. Implementing a standardized assessment and management framework within geriatric emergency care pathways is essential to reduce iatrogenic harm, decrease preventable admissions, and improve the quality of life for older adults.

Keywords: polypharmacy, geriatric oral health, xerostomia, interprofessional collaboration, emergency care pathways.

Introduction

Global demographic shifts are producing an unprecedented increase in the population of older adults, a cohort frequently characterized by multimorbidity and its attendant management with complex medication regimens—polypharmacy, typically defined as the concurrent use of five or more medications (Masnoon et al., 2017; Fujita et al., 2023). While often clinically indicated, polypharmacy is a primary source of iatrogenic harm, contributing to adverse drug events, drug-drug interactions, and significant anticholinergic burden. One of the most prevalent yet under-recognized consequences of this pharmacological load is its profound deleterious impact on oral health (Adolfsson et al., 2022). A multitude of commonly prescribed medications, including anticholinergics, antidepressants, diuretics, and antihypertensives, have xerostomic (dry mouth) side effects. Xerostomia is not merely a discomfort; it is a pathological state

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that disrupts the oral microbiome, impairs mucosal integrity, diminishes remineralization capacity, and compromises mastication and swallowing (Affoo et al., 2015). This creates a direct causal pathway from pill burden to oral dysbiosis, rampant dental caries, periodontal disease, oral mucosal lesions, and oropharyngeal candidiasis.

The sequelae of this "polypharmacy-oral health nexus" frequently escalate beyond the oral cavity, precipitating acute medical crises that drive utilization of high-acuity care settings. Dysphagia and aspiration of oral pathogens can lead to recurrent pneumonia (Langmore et al., 2021; Yoshimatsu et al., 2023). Pain and impaired chewing contribute to malnutrition and dehydration. Localized oral infections can spread, leading to bacteremia and sepsis. Consequently, older adults may present to the Emergency Department (ED) with non-specific geriatric syndromes—such as functional decline, confusion, or failure to thrive—or with acute infections, where the oral cavity is rarely examined as a potential primary source (Jaul & Barron, 2021). This represents a critical failure in diagnostic reasoning and systems design. Emergency care, focused on immediate life threats, often addresses the downstream complication (e.g., sepsis) while missing the upstream, modifiable cause (medication-induced xerostomia leading to infection).

Addressing this complex syndrome demands an integrated, interprofessional response that transcends traditional disciplinary boundaries. A singular focus on any one profession is insufficient. It requires the combined expertise of Pharmacy to conduct rigorous medication regimen reviews and identify xerostomia-inducing agents; Dentistry to diagnose and manage the resulting oral pathologies; Nursing and Emergency Medicine to conduct frontline assessments, recognize oral signs of systemic illness, and manage acute complications; Radiology Technology to obtain and optimize imaging (e.g., chest X-rays for aspiration, facial imaging for deep space infections) that informs diagnosis; Epidemiology to identify high-risk population profiles and quantify the burden of this issue; and Health Administration to create the policies, protocols, and financial structures that enable this collaboration. This narrative review synthesizes contemporary evidence (2010-2024) to delineate the pathophysiology of this nexus and to propose a pragmatic, interprofessional framework for its assessment and management within geriatric emergency care, aiming to shift the paradigm from reactive crisis intervention to proactive, integrated risk mitigation.

The Pathophysiological Cascade

Understanding the patient journey begins with recognizing the direct pharmacological insult. Over 500 medications list xerostomia as a side effect, with anticholinergics being the most potent offenders (Thomson et al., 2021). Saliva is essential for oral homeostasis: it lubricates the mucosa, buffers acids, provides antimicrobial enzymes (e.g., lysozyme, lactoferrin), and facilitates taste and swallowing. Its quantitative and qualitative reduction has catastrophic local effects. The loss of protective buffers and immunologic components leads to a shift in oral ecology, favoring acidogenic and cariogenic bacteria like *Streptococcus mutans* and *Lactobacillus* species, dramatically accelerating dental caries, particularly at the gingival margin and root surfaces (root caries) common in older adults with gingival recession (Tokumoto et al., 2022).

Furthermore, a dry, atrophic oral mucosa is more susceptible to trauma from dentures, leading to painful ulceration and to fungal overgrowth, notably *Candida albicans*, causing angular cheilitis and pseudomembranous candidiasis (thrush) (Tariq & Abbas, 2022). Periodontal disease, a chronic inflammatory condition, may also be exacerbated by a dysbiotic shift in subgingival plaque and impaired host response. The oral cavity thus transforms from a balanced ecosystem to a reservoir of pathogens and inflammation (Sousa-Neto et al., 2022).

The systemic consequences are direct and severe. Impaired swallowing (dysphagia) due to lack of lubrication increases the risk of aspiration of saliva and food boluses laden with these pathogens, a primary mechanism for recurrent aspiration pneumonia, a leading cause of death in frail elders (van der Maarel-Wierink et al., 2013). Additionally, odontogenic infections from advanced caries or periodontal abscesses can disseminate hematogenously, causing bacteremia, metastatic infection (e.g., infective endocarditis), or sepsis. Pain from oral conditions leads to reduced oral intake, precipitating or exacerbating dehydration and malnutrition, which in turn lowers systemic immunity and functional status, creating a vicious cycle of decline (Chan et al., 2023). This cascade explains why an older adult on multiple medications may ultimately present to the ED with a diagnosis seemingly distant from dentistry yet fundamentally rooted in oral pathophysiology (Table 1). Figure 1 illustrates the mechanistic cascade by which polypharmacy in older adults contributes to medication-induced xerostomia and oral dysbiosis, precipitating local oral diseases such as root caries, periodontal disease, and oral candidiasis.

Table 1: The Polypharmacy-Oral-Systemic Pathway: Mechanisms and Clinical Presentations in the ED

Stage of the Pathway	Primary Disciplinary Insight	Pathophysiological Mechanism	Resulting Oral Condition	Potential ED Presentation
1.	Pharmacy	Anticholinergic	Reduced salivary	*Not a direct*

Pharmacological Insult		burden; side effects of diuretics, SSRIs, etc.	flow & altered composition.	*presentation, but the root cause.*
2. Oral Ecosystem Collapse	Dentistry	Loss of buffering, antimicrobial, and lubricating functions.	Oral dysbiosis; mucosal atrophy.	*Rarely the chief complaint.*
3. Local Oral Disease	Dentistry / Nursing	Proliferation of cariogenic bacteria & fungi; increased plaque.	Rampant caries (esp. root caries); periodontal disease; oral candidiasis; mucosal ulceration.	Oral pain; difficulty wearing dentures.
4. Systemic Complication	Emergency Medicine / Radiology Tech	Aspiration of pathogens; hematogenous spread; reduced intake.	Aspiration pneumonia; bacteremia/sepsis; dehydration; malnutrition; functional decline.	**Chief Complaint:** Cough, fever, hypoxia (pneumonia). Altered mental status, hypotension (sepsis/UTI**). Weakness, falls (dehydration).**
5. Diagnostic & Management Challenge	All Disciplines	The oral cavity is not examined; the infection source is missed; medications are not reviewed.	Continuation of the cycle post-discharge.	Recurrent ED visits; "failure to thrive"; polypharmacy continues unabated.

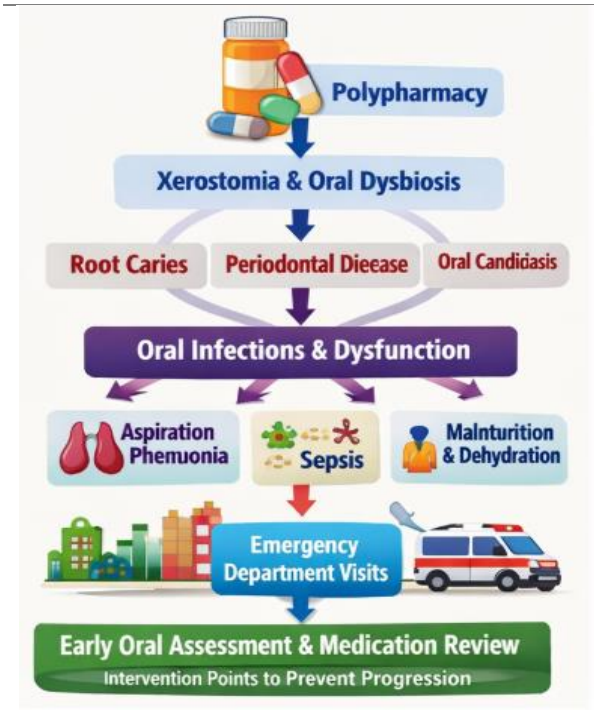

Figure 1. Pathophysiological Cascade Linking Polypharmacy to Oral–Systemic Emergencies

Gaps in Emergency and Primary Care

Despite the clear pathophysiology, significant gaps persist in clinical practice. In the high-pressure ED environment, the standard primary survey (ABCDE) does not include an oral assessment. Unless a patient complains explicitly of dental pain or has overt facial swelling, the oral cavity is typically overlooked as a potential source of sepsis or a contributor to delirium (Chang et al., 2017). Nurses, while skilled in holistic assessment, rarely receive training in systematic oral examination for signs of xerostomia, candidiasis, or decay. Emergency physicians, focused on identifying immediate life threats like myocardial infarction or stroke, may lack the time, training, or perceived mandate to perform a detailed oral evaluation (Wolfer et al., 2022).

This fragmentation extends beyond the ED. In primary care and geriatric medicine, where medication reviews are more feasible, the oral health impact of prescriptions is seldom a primary consideration during prescribing or deprescribing conversations. Dentists, who see the oral consequences, often operate in informational silos, unaware of a patient's complete medication list and without formal channels to communicate concerns to the prescribing physician (Austregésilo et al., 2015). Pharmacists conducting medication therapy management (MTM) may note dry mouth as a side effect but lack the clinical pathway or relationship with dental providers to recommend specific oral care interventions or trigger a dental referral. Radiology technologists, when imaging the chest for suspected pneumonia, are not prompted to consider an odontogenic source, and dental findings on cervical spine or facial bone CTs are often under-reported to clinical teams (Royuela et al., 2019).

Epidemiologically, the burden is clear but not operationalized. Studies confirm that poor oral health is an independent risk factor for aspiration pneumonia and all-cause mortality in older adults (Kotronia et al., 2021). Yet, this population-level evidence has not translated into standardized risk-assessment tools used in ED triage or geriatric assessment clinics. Health administration has yet to prioritize the integration of oral health into electronic health record (EHR) systems for non-dental providers

or to create reimbursement models that support interprofessional consultations between medical, pharmacy, and dental teams (Zhang et al., 2023). This systemic fragmentation ensures that the polypharmacy-oral health nexus remains an invisible driver of morbidity, mortality, and healthcare costs.

Proposing an Interprofessional Framework for Integrated Assessment and Management

To effectively bridge the identified clinical and systemic gaps, a deliberate and structured framework is imperative. This framework must be designed for operationalization at the point of care, particularly within environments that serve high-risk older adults, including specialized Geriatric Emergency Departments (EDs), clinical decision units, and geriatric assessment clinics. The following model delineates the specific roles, sequential actions, and necessary interactions among all seven disciplines, aiming to transform a fragmented response into a coordinated care continuum.

Triggered Screening and Risk Stratification

The foundational step in this integrated model is the proactive identification of patients at elevated risk. This process is led by a partnership between Health Administration, Epidemiology, and Nursing. Informed by epidemiological data that establishes clear risk profiles—such as age over 75, the use of five or more medications, a history of aspiration pneumonia, or a diagnosis of dementia—Health Administration can mandate the integration of a brief, validated screening tool into the electronic health record (EHR) at the point of ED registration or primary care intake (Ueno et al., 2022). A practical instrument, such as an adaptation of the "Minimum Oral Health Screening Tool for Older Adults" (MOST), comprising two to three targeted questions regarding dry mouth, difficulty chewing, or oral pain, can be efficiently administered by the triage or primary care nurse. A positive screen does not constitute a diagnosis but serves as a vital trigger, activating a predefined cascade of interprofessional evaluations and interventions, ensuring that risk is recognized early in the clinical encounter. Figure 2 depicts an interprofessional, systems-based framework for addressing the polypharmacy–oral health nexus in geriatric emergency care.

Comprehensive Interprofessional Evaluation

Following a positive screening, a synchronized, multi-faceted evaluation unfolds, engaging the core clinical and diagnostic disciplines.

A pharmacist or qualified pharmacy technician conducts a focused medication regimen review, utilizing validated tools such as the Anticholinergic Burden Scale (ABS) or the Drug Burden Index (DBI) to quantify the pharmacological contribution to xerostomia risk (Stewart et al., 2021). This analysis identifies and flags specific high-risk medications, with findings documented in a shared, accessible section of the EHR to inform the entire care team.

Figure 2. Interprofessional Framework for Integrated Assessment and Management in Geriatric Emergency Care

Concurrently, the attending nurse or emergency physician performs a targeted oral physical examination. Guided by a standardized clinical template, this assessment moves beyond a cursory glance to inspect the oral mucosa for signs of xerostomia (dry, sticky, or glazed appearance), ulceration, or pseudomembranous candidiasis. It includes a simple assessment of salivary pooling under the tongue and a visual check for obvious root caries or significant periodontal inflammation, thereby translating screening concern into documented clinical findings.

When diagnostic imaging is indicated for suspected systemic complications like pneumonia, the role of the radiologic technologist is optimized through protocol. For studies involving the head, neck, or chest, standardized imaging protocols should be employed to adequately evaluate potential odontogenic sources. Clear communication from the ordering provider regarding the clinical suspicion ("rule out dental source of infection") enables the technologist to tailor the study appropriately, ensuring images are acquired with the necessary windows and sequences to reveal dental pathology.

Dentistry represents the critical integration point for definitive diagnosis. The framework advocates for embedded dental consultants within geriatric care teams, accessible through in-person consultation or, more scalably, via tele-dentistry platforms. The consulting dentist synthesizes the inputs from pharmacy, nursing, and radiology, then performs a comprehensive oral examination. This evaluation yields a definitive diagnosis (e.g., "severe medication-induced xerostomia with recurrent root caries") and can be conducted during the ED

encounter or scheduled as a guaranteed urgent follow-up within 72 hours, closing the loop between emergency presentation and specialized oral care.

Collaborative Management and Care Planning

With a complete diagnostic picture established, the framework facilitates collaborative therapeutic planning and patient education.

Pharmacist-Physician-Dentist Collaboration

A core management activity is the interdisciplinary review of medication therapy. Based on the dentist's findings and the pharmacist's analysis, the team—including the primary or emergency physician—develops a personalized plan. This may involve deprescribing high-risk anticholinergic agents, substituting for medications with lower xerostomic profiles, or adjusting dosing schedules to minimize oral dryness during waking hours. Concurrently, the dentist prescribes targeted oral care interventions, such as high-fluoride prescription toothpaste, saliva substitutes, or antifungal agents, to manage the oral manifestations directly (Sardellitti et al., 2023).

Nursing and Care Coordination

Nurses assume a central role in patient engagement and continuity. They provide essential education, demonstrating proper oral hygiene techniques for a dry mouth and clearly explaining the connection between the patient's medications and their oral health. Furthermore, they act as care coordinators, ensuring that follow-up appointments with primary dental care are not only scheduled but that the patient understands their importance and has the logistical support to attend, thereby facilitating a safe transition from acute intervention to long-term management.

Health Administration

The sustainability of this collaborative model relies on administrative support. Health Administration is responsible for creating the enabling infrastructure: developing and implementing shared EHR templates that capture interprofessional assessments, establishing telehealth platforms for consultations, formalizing clinical consultation agreements between departments, and, most critically, advocating for reimbursement models that financially reward preventive care coordination and improved patient outcomes rather than solely procedural volume.

Longitudinal Monitoring and Feedback Loop

Finally, the framework incorporates a continuous quality improvement cycle driven by the epidemiology and health administration. Key outcome measures—such as rates of ED revisits for oral-systemic conditions, patient-reported outcomes on oral comfort and function, and successful deprescribing episodes—are systematically tracked. Epidemiological analysis of this aggregated data serves two vital functions: it refines the initial risk-stratification algorithms, making them more predictive over time, and it generates robust evidence on the model's clinical effectiveness and cost-benefit ratio. This evidence is essential for demonstrating value to policymakers and payers, securing ongoing funding, and ensuring the framework's long-term sustainability and potential for scaling to other populations and care settings (Table 2).

Table 2: The Interprofessional Framework: Roles, Actions, and Outputs

Discipline	Core Action in Framework	Key Tool/Assessment	Output/Contribution to Care Plan
Epidemiology	Informs risk stratification; evaluates program outcomes.	Population data on polypharmacy-oral health links.	High-risk criteria for screening tools; metrics for success.
Health Administration	Designs & implements system; ensures resources & reimbursement.	Policy creation; EHR integration; budget allocation.	Operational protocols, IT infrastructure, sustainable funding model.
Nursing (Triage/ED)	Conducts initial oral health screening; performs basic oral inspection.	Brief screening tool (e.g., MOST); standardized exam template.	Identification of at-risk patients; documentation of gross findings.
Pharmacy	Conducts focused medication review for xerostomia risk.	Anticholinergic Burden Scale (ABS); medication list analysis.	List of offending agents; recommendations for deprescribing/substitution.
Emergency Medicine	Orders appropriate imaging; integrates findings into Ddx.	Clinical decision-making; consultation requests.	Holistic medical management; initiation of interprofessional consult.
Radiology Technology	Acquires optimized imaging; identifies potential oral findings.	CT/CXR protocols; communication with radiologist.	High-quality images that can reveal dental sources of infection.
Dentistry	Provides definitive oral diagnosis & treatment planning.	Comprehensive oral exam; radiographs if needed.	Diagnosis (e.g., "Severe xerostomia with root caries"); specific oral care plan & follow-up.

Saudi Journal of Medicine and Public Health

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644

Implementation Challenges and Future Directions

The proposed framework, while evidence-based, faces significant implementation barriers. Professional Silos and Cultural Resistance are paramount; each discipline has its own workflow, lexicon, and priorities. Building trust and shared language requires dedicated interprofessional education (IPE) initiatives, such as joint simulation training on geriatric cases (Bridges et al., 2011; Grace, 2021). Financial and Reimbursement Models pose another major hurdle. Current fee-for-service systems do not pay for pharmacist-led medication reviews in the ED, dental consultations for inpatients, or nurse-led care coordination for oral health. Advocacy for value-based payment bundles that cover "geriatric oral-systemic health management" is essential (Atchison et al., 2022; Inglehart et al., 2022). Technological Interoperability is a foundational challenge. Most dental software is entirely separate from hospital EHRs. Health Administration must drive investments in health information exchanges (HIEs) that can securely share relevant data points (medication lists, problem lists, radiology reports) between medical and dental providers (Kern et al., 2012; Shekelle et al., 2021).

Future directions for research and practice must focus on validating the framework's components. This includes developing and testing the efficacy of the brief oral screening tool in the ED setting, evaluating the cost-effectiveness of embedded dental consultation, and measuring the impact on hard outcomes like 30-day readmission rates and mortality (Jungo et al., 2023; Ye et al., 2022). Furthermore, the expansion of tele-dentistry offers a promising mechanism to scale dental expertise across multiple facilities, allowing for remote consultation and guidance for ED and primary care teams (Estai et al., 2016; AlShaya et al., 2021).

Conclusion

The intersection of polypharmacy and oral health in older adults represents a critical, iatrogenic, and largely preventable driver of emergency care utilization and functional decline. The current fragmented system, which separates the management of the mouth from the management of the body, is ill-equipped to address this nexus, leading to diagnostic omissions, ineffective treatment, and recurrent crises. This review has argued that a solution is only possible through a deliberate, interprofessional, and systems-based approach. The proposed framework leverages the unique expertise of epidemiology, health administration, nursing, pharmacy, emergency medicine, radiology technology, and dentistry to create a cohesive continuum of care—from risk identification in the ED to collaborative management and safe transition back to the community. Moving forward, the imperative is clear: healthcare systems must recognize oral health as a vital sign of geriatric well-being and integrate its assessment and management into the standard of care for medically complex older adults. By doing so, we can mitigate a significant source of harm, improve the quality of life, and build a more rational, effective, and compassionate system for our aging population.

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