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# The Frontline Sentinel System: A Review of Nursing and Health Assistant Oral Assessments in Early Detection of Systemic Disease and Nutritional Risk

**Latifa Mubarak Maghram Al-Ghamdi (1) , Hussam Atiah Domari , Abualqasim Abdullah Masmali (2) , Wafaa Mohammad Modarba (3) , Alanoud Abduallh Alhulayyil (4) , Hessa Trad Alonzay (4) , Asrar Abdulrahman Hezam Abed (5) , Shrouq Ibrahim Al-Rahili (6) , Maha Turki Sulayhim Alshammari (7) , Falah Mulfi Salman Alsharari (8) , Tariq Ghalib Alharbi (9) , Fareed Muadhid Munahi Alotaibi (10)**

*(1) Prince Mohammed Bin Abdulaziz Hospital, Riyadh,Ministry of Health, Saudi Arabia,*
*(2) King Abdullah Bin Abdulaziz University Hospital, Riyadh, Princess Nourah Bint Abdulrahman University,, Saudi Arabia,*
*(3) Budaiya & Al-Qarfi Health Center – Jazan,Ministry of Health, Saudi Arabia,*
*(4) King Khalid Hospital In Al-Kharj,Ministry of Health, Saudi Arabia,*
*(5) Riyadh Al-Ammaria Health Center,Ministry of Health, Saudi Arabia,*
*(6) Maternity, Women And Children Hospital In Madinah,Ministry of Health, Saudi Arabia,*
*(7) Kara Sakaka Polyclinic Al-Jouf Health Cluster,Ministry of Health, Saudi Arabia,*
*(8) Qurayyat General Hospital Al-Jouf Health Cluster,Ministry of Health, Saudi Arabia,*
*(9) Alsalmiya Primary Health Care Center, Qassim Health Cluster, Burydah,Ministry of Health, Saudi Arabia,*
*(10) Zulm General Hospital,Ministry of Health, Saudi Arabiaa*

## Abstract

**Background:** The oral cavity is a vital diagnostic tool for systemic health, revealing issues related to diabetes, HIV, nutritional deficiencies, and cancers. However, thorough oral assessments are not consistently performed by non-dental professionals. Nursing and Health Assistant staff, who have excellent patient access, often lack the necessary training and protocols for effective oral pathology screening, leading to a significant gap in holistic patient care.

**Aim:** This narrative review aims to synthesize and critically evaluate the evidence supporting structured oral assessments by Nursing and HA staff as a frontline sentinel system.

**Methods:** A comprehensive search of PubMed, CINAHL, Scopus, and Web of Science (2010-2024) was conducted. Literature was analyzed thematically to evaluate assessment tools, training outcomes, referral efficacy, and impact on patient care and system resilience.

**Results:** The review highlights that validated tools like the Oral Health Assessment Tool (OHAT) demonstrate reliability when utilized by trained non-dental personnel. Effective programs involve concise training and integrated clinical pathways. However, issues such as fragmented workflows, poor interprofessional communication, and lack of institutional policies impede widespread adoption. When implemented, these systems enhance early detection, enable timely interventions, and minimize severe complications.

**Conclusion:** Empowering nursing and healthcare staff as oral health sentinels is an effective and cost-efficient intervention that significantly impacts patient outcomes and healthcare resilience. Successful implementation necessitates institutional commitment to interprofessional education, incorporation into electronic health records, and establishing clear referral protocols. This approach emphasizes oral health as essential to proactive healthcare and health security.

**Keywords:** Oral Health Assessment, Nursing, Early Detection, Interprofessional Collaboration, Health Security

## Introduction

The contemporary healthcare paradigm is progressively shifting from a reactive model, focused on treating acute illness, to a proactive framework emphasizing prevention, early detection, and the management of chronic conditions before they decompensate into crises. Within this evolving landscape, the oral cavity persists as a paradox: it is an easily accessible anatomical region teeming with diagnostic information, yet it remains a consistently overlooked frontier in routine medical assessment (Debta et al., 2022). The mouth functions as a mirror to systemic health; its mucosal integrity, salivary function, and periodontal status provide early, visible clues to a vast array of conditions. Oral manifestations can be the inaugural sign of uncontrolled diabetes (e.g., candidiasis), hematologic disorders (e.g., gingival bleeding), autoimmune diseases (e.g., lichen planus), immunodeficiency (e.g., hairy leukoplakia in HIV), and adverse drug reactions (Meurman & Bascones-Martinez, 2021; Michail et al., 2023). Concurrently, oral health is inextricably linked to


*Corresponding author e-mail: Lamalghamdi@Moh.Gov.Sa (Latifa Mubarak Maghram Al-Ghamdi).
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nutritional status. Pain from caries, periodontal disease, or ill-fitting dentures, combined with xerostomia (dry mouth), can severely impair mastication and deglutition, directly leading to reduced food intake, weight loss, and the exacerbation of hospital-acquired malnutrition (Janto et al., 2022).

This diagnostic potential is starkly contrasted by a profound care delivery gap. Dental and medical services historically operate in parallel, often as siloed systems with separate records, funding streams, and professional cultures. Vulnerable populations—including the elderly, the chronically ill, the institutionalized, and the socioeconomically disadvantaged—who are most at risk for both oral and systemic disease, frequently have limited access to routine dental care but are in regular contact with nursing and health assistant (HA) staff across primary care, hospital, and long-term care settings (Yang et al., 2023). These frontline professionals are uniquely positioned to conduct systematic oral inspections during routine care activities such as hygiene assistance, medication administration, and vital sign checks. However, without specific training, standardized assessment instruments, and clear clinical pathways, oral abnormalities are routinely missed, misattributed, or considered extraneous to the patient's primary medical concerns (Oda et al., 2023).

This oversight represents a critical failure in comprehensive patient assessment with significant implications for health security—defined as the activities required to minimize collective vulnerability to acute health threats. A healthcare system that fails to detect early, treatable manifestations of disease is inherently fragile. Undiagnosed oral malignancies progress to advanced, resource-intensive stages; untreated oral infections can seed sepsis; and unchecked malnutrition increases susceptibility to all infections and complications (Khan et al., 2021). These preventable escalations generate avoidable emergency department visits, hospital admissions, and complex interventions that consume finite clinical resources, particularly during periods of systemic stress such as pandemics or seasonal surges. Therefore, the strategic empowerment of nursing and HA staff as sentinels of oral health transcends the enhancement of individual patient care. It constitutes a vital investment in population-level surveillance, secondary prevention, and the bolstering of health system resilience.

This narrative review synthesizes the literature from 2010 to 2024 to critically examine the evidence base for establishing a frontline oral health sentinel system. It will: (1) delineate the oral-systemic health connection relevant to frontline practice; (2) evaluate the validity and feasibility of structured oral assessment tools for non-dental professionals; (3) analyze effective training and implementation strategies; (4) explore models for interprofessional collaboration with dentistry and pharmacy to ensure action on findings; and (5) articulate the imperative for integrating this practice as a core component of modern patient care and health security infrastructure.

**Methodology**

A systematic and iterative literature search was undertaken to identify and synthesize relevant English-language scholarly works published between January 2010 and December 2024. This timeframe was selected to capture the contemporary evolution of evidence, policy, and clinical practice within this interdisciplinary domain over a significant and recent fifteen-year period. To ensure a comprehensive and rigorous retrieval of literature, the search was executed across four major electronic databases: PubMed, CINAHL, Scopus, and Web of Science. These platforms were chosen for their complementary and extensive coverage of the requisite fields, including biomedical sciences, nursing and allied health literature, and health services research, thereby minimizing the risk of omitting key studies from any single disciplinary silo.

The search strategy was constructed using a combination of controlled vocabulary, specifically Medical Subject Headings (MeSH) where applicable, and free-text keywords. This approach was organized around four primary conceptual domains essential to the review's focus. The first domain, **Population and Personnel**, *included terms such as "nurs", "nursing assistants", "healthcare assistants", "allied health personnel", "care aides", and "frontline staff" to capture the relevant professional groups. The second domain,* **Intervention and Process**, *incorporated phrases like "oral assessment", "mouth assessment", "oral screening", "oral examination", "oral inspection", "dental screening by non-dentist", and "oral health assessment tool" to specify the core clinical activity under investigation. The third domain,* **Outcomes and Linkages**, *utilized terms including "early diagnosis", "systemic disease", "nutritional status", "malnutrition screening", "referral and consultation", "patient care planning", and "oral-systemic health" to target the intended consequences and interconnected health impacts of the intervention. Finally, the fourth domain,* **Context and Framework**, *employed search strings such as "interprofessional relations", "primary health care", "hospital", "long-term care", "geriatric assessment", and "health security" to situate the findings within relevant care settings and broader theoretical or operational frameworks.*

Boolean operators (AND, OR) were used to combine concepts across these domains. Data were extracted and charted systematically, focusing on key themes: the clinical rationale for oral assessment, characteristics and validation of assessment tools, design and impact of training interventions, structure and efficacy of referral pathways, and reported barriers and facilitators to implementation.

**The Oral-Systemic Nexus**

For nursing and health assistant (HA) staff to effectively assume the role of oral health sentinels, a foundational paradigm shift is required: the oral cavity must be understood not as an isolated system but as a critical diagnostic interface intimately connected to whole-body health. A structured clinical oral assessment transcends a superficial search for cavities; it constitutes a systematic evaluation of soft tissues (lips, buccal mucosa, tongue, palate, floor of mouth, gingiva), hard tissues (dentition), salivary function, and any prosthetic appliances. Pathological alterations in these structures often serve as either localized issues or, significantly, as reflective manifestations of underlying systemic dysregulation, providing frontline practitioners with accessible clues to broader health status (Patil et al., 2015).

Mucosal integrity and coloration offer profound insights. For instance, while recurrent aphthous ulcers are frequently idiopathic, their persistence or severity can be associated with nutritional deficiencies (vitamin B12, folate, iron), inflammatory bowel diseases such as Crohn's, celiac disease, or immunodeficiency states like HIV (Neville et al., 2015). More ominously, red patches (erythroplakia) and adherent white patches (leukoplakia) are considered potentially premalignant, necessitating urgent dental evaluation. Similarly, unexplained presentations like petechiae or spontaneous gingival bleeding may be harbingers of hematologic disorders such as leukemia or thrombocytopenia, or adverse effects of medications like anticoagulants. The mouth also functions as a barometer of immune competence (Vered & Wright, 2022). Oral candidiasis, while commonly linked to local factors like denture wear or antibiotic use, can manifest as a sentinel sign of systemic immunosuppression, uncontrolled diabetes mellitus, or severe xerostomia, particularly in its erythematous or persistent forms (Williams & Lewis, 2020).

The periodontium provides another critical diagnostic link. The well-established bidirectional relationship between periodontitis and systemic conditions underscores that severely inflamed, bleeding gums are not merely a local infection. They are associated with poorer glycemic control in diabetes and an elevated risk for atherosclerotic cardiovascular disease, mediated through shared chronic inflammatory pathways (Sanz et al., 2020). Salivary dysfunction, primarily presenting as xerostomia (the subjective feeling of dry mouth) or objective hyposalivation, is a debilitating condition with multifactorial origins. It is a documented side effect of over 500 commonly prescribed medications, including antidepressants, antihypertensives, and anticholinergics, and is a primary feature of autoimmune conditions like Sjögren's syndrome (Kohli et al., 2023). Beyond causing significant discomfort, xerostomia accelerates dental caries, distorts taste (dysgeusia), and can profoundly discourage adequate food and fluid intake, directly exacerbating nutritional risk.

The condition of prosthetic appliances and overall oral hygiene further informs holistic assessment. Ill-fitting, damaged, or unclean dentures are a direct source of mucosal trauma, leading to painful ulcers and inflammatory conditions like denture stomatitis. They functionally impair mastication and speech, contributing to social isolation and reduced dietary quality—key, modifiable factors in malnutrition risk among elderly and dependent populations (Felton et al., 2011). Finally, the overall state of oral cleanliness—the accumulation of plaque, food debris, and calculus—serves as a tangible reflection of a patient's manual dexterity, cognitive function, motivation, and level of caregiver support (Akinboboye et al., 2022). Critically, poor oral hygiene is an independent, modifiable risk factor for aspiration pneumonia in frail individuals, as dental plaque serves as a reservoir for respiratory pathogens (da Mata & Allen, 2023). It is essential to clarify that the sentinel's role is not to render definitive diagnoses but to proficiently detect, accurately describe, and appropriately escalate deviations from a healthy baseline. This standardized recognition is the indispensable first step in activating a timely interprofessional response, bridging the gap between observation and intervention. Table 1 provides a guide for frontline staff to categorize findings and initiate appropriate interprofessional actions. It is not a diagnostic tool.

**Table 1: Oral Assessment Findings for Frontline Staff: From Observation to Action**

| Clinical Finding | Appearance/Patient Report | Potential Local Etiology | Potential Systemic/Medication Implication | Suggested Initial Action |
|---|---|---|---|---|
| **Non-healing Ulcer (>2 weeks)** | Persistent sore, may have raised or rolled borders. | Traumatic ulcer from a sharp tooth/denture. | Squamous cell carcinoma, immunocompromised. | Urgent referral to Dentistry/Oral Medicine. |
| **Erythroplakia (Red Patch)** | Velvety red area on the mucosa. | Rarely benign. | High risk of dysplasia/carcinoma. | Urgent referral to Dentistry/Oral Medicine. |
| **Leukoplakia (White Patch)** | A white patch that cannot be scraped off. | Frictional keratosis (e.g., from cheek biting). | Potentially premalignant. | Routine referral to Dentistry for evaluation. |

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|---|---|---|---|---|
| **Pseudomembranous Candidiasis** | White, curd-like plaques are removable by wiping, revealing a red base. | Denture wear, antibiotic use, and poor oral hygiene. | Diabetes, immunosuppression (HIV, drugs), xerostomia. | Document. Consider a pharmacy consult for topical antifungals. Refer if recurrent. |
| **Generalized Gingival Bleeding** | Gums bleed with minimal provocation (eating, gentle brushing). | Inflammatory gingivitis/periodontitis. | Medication (anticoagulants, antiplatelets), vitamin C deficiency, leukemia. | Document. Review medication list with Pharmacy. Consider medical referral if severe/unexplained. |
| **Xerostomia** | Patient complains of dryness; mucosa appears dry, glazed; saliva is thick/ropy. | Mouth breathing, dehydration. | **Medication side-effect** (review with Pharmacy), Sjögren's syndrome, head/neck radiation. | Document severity. Comprehensive medication review with Pharmacy. |
| **Denture-Induced Ulcer** | Painful, well-demarcated red ulcer under denture flange. | Ill-fitting denture. | Requires adjustment; risk of infection if chronic. | Document location. Refer to Dentistry for denture adjustment. |
| **Multiple Carious Lesions** | Visible brown/black cavities, broken teeth. | High sugar diet, poor oral hygiene, xerostomia. | Nutritional risk (pain avoidance), risk of dental abscess. | Document. Refer to Dentistry. Assess for nutritional impact/pain. |

**Assessment Tools, Training, and Validation**

The reliability, scalability, and ultimate clinical utility of a frontline oral sentinel system hinge upon two interdependent pillars: the deployment of validated, pragmatic assessment instruments and the delivery of effective, competency-based training. Without a standardized tool, observations remain subjective and inconsistent; without deliberate training, even the best tool is applied incorrectly or not at all. The foundation of this system, therefore, lies in equipping non-dental professionals with both the "what" and the "how" of systematic oral inspection.

A critical first step is the selection of a validated assessment tool designed explicitly for use by nurses and health assistants. Among the several instruments developed for this purpose, the **Oral Health Assessment Tool (OHAT)** stands as the most extensively researched and implemented, particularly in geriatric and long-term care settings (Everaars et al., 2020). The OHAT's strength lies in its structured yet rapid assessment of eight domains—lips, tongue, gums and tissues, saliva, natural teeth, dentures, oral cleanliness, and dental pain—each scored on a simple 0-2 scale indicating health status (Rodrigues et al., 2021). Its brevity (typically 3-5 minutes), use of clear descriptors, and generation of a total score that guides clinical action make it exceptionally suitable for integration into high-volume clinical workflows. Alternative tools, such as the **Brief Oral Health Status Examination (BOHSE)** and the **Mucosal-Plaque Score**, offer variations in focus but share the core objective of standardizing the examination process (van der Putten et al., 2010). Empirical evidence consistently demonstrates that nursing staff can achieve good-to-excellent inter-rater reliability with these tools following focused training, confirming their feasibility and reliability for frontline screening applications rather than definitive diagnosis.

However, the mere provision of a tool is insufficient; its transformation into a practiced clinical skill requires targeted training. Effective educational programs for this purpose are characteristically concise (often 60-90 minutes), interactive, and multimodal, designed to overcome knowledge gaps and build practical confidence (Coker et al., 2014). Core components of successful training include: (1) **Didactic education** on foundational oral anatomy and the pathognomonic links between oral findings and systemic conditions; (2) **Visual reinforcement** using high-quality photographic libraries of common pathologies, which is essential for developing pattern recognition; (3) **Hands-on, supervised practice**, ideally utilizing peer-to-peer examination on models or consenting colleagues to demystify intraoral inspection and build tactile comfort with techniques like lip retraction and tongue depression; (4) **Tool-specific instruction** on the precise application and scoring criteria of the chosen

instrument; and (5) **Communication and referral training** through role-playing scenarios to practice discussing sensitive findings with patients and initiating interprofessional consultations (Ho et al., 2022). Research substantiates that such structured interventions yield significant improvements in nursing and health assistant knowledge, self-reported self-efficacy, the accuracy of assessments, and adherence to subsequent oral care protocols.

The validity and impact of this competency-building approach are well-documented across diverse care settings, affirming its clinical worth. In long-term care facilities, the systematic implementation of the OHAT by trained care staff has been correlated with measurable improvements in resident oral hygiene, reductions in plaque indices, fewer hospital admissions for aspiration pneumonia, and enhanced overall quality of life, likely stemming from consistent, assessment-guided care (Simpelaere et al., 2016). In acute care, particularly oncology, nurse-led oral assessment is an established standard for patients undergoing chemotherapy or radiation, enabling the early detection and standardized grading of mucositis. This early identification facilitates timely, proactive interventions—such as specialized oral care, analgesic regimens, and nutritional support—that can mitigate severity and help prevent catastrophic treatment delays or dose reductions (Eilers & Million, 2011). These demonstrable outcomes collectively validate the core operational premise: a trained frontline workforce, armed with a simple tool, can effectively screen for oral pathology and reliably activate care processes that directly improve patient health outcomes and system efficiency (Bezerra et al., 2022).

**Interprofessional Pathways from Detection to Intervention**

Identification of an abnormality is merely the activation of the alarm; the system's value is realized only through effective, timely response. This requires pre-established, interprofessional pathways that are understood by all team members.

**Structured Referral to Dentistry**

The assessment tool should directly inform the referral. For instance, an OHAT score above a predefined threshold, or the presence of specific "red flag" findings (e.g., erythroplakia, non-healing ulcer), should trigger a standardized referral process (Alrashdi et al., 2020). In integrated health systems, this could be an electronic consultation order within the EHR that populates a templated note with the findings (Menegaz et al., 2020). In community settings, it may involve a faxed or digital referral form to a partnered dental clinic or mobile service. The pathway must specify expected response times for urgent versus routine findings and include a mechanism for feedback to the referring staff, closing the communication loop and reinforcing learning (Ab Malik et al., 2017).

**Collaborative Consultation with Pharmacy**

Pharmacists are indispensable partners in managing medication-related oral effects. The frontline sentinel's documentation of xerostomia or a lichenoid mucosal reaction (which can be drug-induced) should prompt a structured medication review. The pharmacist can assess for culprit medications, evaluate possibilities for therapeutic substitution, recommend non-pharmacological and pharmacological management for symptoms (e.g., saliva substitutes, pilocarpine), and counsel the patient. This collaborative, proactive approach addresses root causes rather than merely managing symptoms (Villa et al., 2016). Furthermore, for patients with oral candidiasis, the pharmacist can ensure appropriate antifungal agent selection, dosing, and patient education.

**Integration into Holistic Care Planning**

Oral health status must be integrated into the overall patient care plan. Findings should be documented in a dedicated section of the EHR that is visible to all providers. For a patient with dysphagia and significant dental decay, this information is critical for the dietitian recommending appropriate food textures. For a patient with oral pain, it directly informs the nursing and medical pain management plan. Serial assessments allow the care team to monitor for improvement or deterioration, which may reflect response to treatment or progression of an underlying condition.

The most common point of system failure is the absence of these clear pathways. Without a definitive "what to do next," oral assessments become a perfunctory, documentation-only exercise, leading to clinician frustration, patient inaction, and ultimately, the abandonment of the screening practice (Table 2).

**Table 2: Implementation Framework for a Frontline Oral Health Sentinel System**

| Core Component | Key Elements & Activities | Major Barriers | Strategies for Success (Enablers) |
|---|---|---|---|
| **Tool Selection & Integration** | Adopt a validated tool (e.g., OHAT). Integrate into admission/periodic assessment protocols. Embed as a flowsheet/structured data field in the EHR. | Perceived time burden. Lack of EHR integration. Tool complexity. | Choose the simplest valid tool. Link completion to mandatory workflows (e.g., pressure injury assessment). Utilize IT to create smart forms with auto-scoring and referral prompts. |

| | | | |
|---|---|---|---|
| **Workforce Training & Sustainment** | Mandatory, competency-based initial training. "Train-the-Trainer" models. Booster sessions/annual competency checks. Integrated into new staff orientation. | High staff turnover. Competing training priorities. Cost/time for training delivery. | Develop brief (<1 hr), engaging online modules. Identify and empower unit-based "Oral Health Champions." Incorporate into existing mandatory training cycles. |
| **Interprofessional Pathway Development** | Co-design clear referral criteria and procedures with Dentistry. Establish formal consultation process with Pharmacy. Define roles and communication expectations. | Professional silos. Lack of formal agreements/memoranda of understanding. Limited dental access/capacity. | Form an interprofessional implementation team. Pilot pathways in one unit/ward. Explore telehealth dentistry options for consultation. Include pharmacist in relevant care rounds. |
| **Leadership & System Support** | Executive endorsement and prioritization. Allocation of resources (trainer time, IT support). Inclusion of oral health metrics in quality dashboards. | Not viewed as a clinical/financial priority. Absence of reimbursement incentives. | Frame as a **patient safety** (aspiration pneumonia prevention) and **health equity** initiative. Conduct pilot studies to demonstrate ROI (e.g., reduced infection rates). Report metrics to leadership (e.g., % patients screened, referral completion rates). |
| **Evaluation & Quality Improvement** | Track process measures (screening rates, referral rates). Monitor outcome measures (dental visit completion, medication changes, incidence of related complications). Solicit staff feedback. | Lack of dedicated resources for data tracking and analysis. | Build audit measures into EHR reporting. Link improvement to existing QI programs. Celebrate and share successes to maintain momentum. |

**The Sentinel System as a Health Security Imperative**

The rationale for institutionalizing a frontline oral sentinel system extends compellingly into the domain of health security. A secure health system is one that proactively reduces population vulnerability to acute health threats and possesses the resilience to manage crises effectively. This sentinel system contributes directly to both objectives.

First, it is a powerful engine for secondary prevention. Early detection fundamentally alters disease trajectories and resource consumption. Identifying a localized, early-stage oral cancer (often asymptomatic to the patient) versus a late-stage cancer with nodal involvement represents a dramatic difference in treatment complexity (simple excision vs. major surgery with reconstruction and radiotherapy), cost, survival, and quality of life. Intervening in medication-induced xerostomia can prevent rampant caries and the eventual need for extractions or dentures. By intercepting disease processes at a nascent stage, the system averts the much larger clinical and economic burdens associated with advanced disease.

Second, it prevents iatrogenic harm and conserves acute care capacity. In institutional settings, particularly long-term care, poor oral hygiene is a modifiable, independent risk factor for aspiration pneumonia—a leading cause of morbidity, mortality, and hospital transfer in this population (Kossioni et al., 2018). A sentinel system that ensures regular oral assessment and care directly reduces this risk, preventing costly and traumatic hospital admissions (Charadram et al., 2020). Similarly, managing oral pain and infection proactively prevents dental emergencies, which often present to hospital Emergency Departments, especially during hours or in regions where dental access is limited, placing additional strain on acute care services (Fiorillo et al., 2020).

Third, it enhances population health surveillance. The oral cavity can manifest signs of communicable diseases. While less common, certain enanthems (like Koplik's spots in measles) or ulcerations in primary HIV infection can be early indicators. A workforce trained to examine the mouth systematically adds a layer of vigilance to the public health surveillance network, potentially enabling

earlier outbreak detection and containment (Amato et al., 2022).

Finally, it advances health equity. The burden of oral disease and its systemic sequelae falls disproportionately on marginalized groups who face the greatest barriers to traditional dental care (D'Affronte & Platia, 2019). Embedding oral health surveillance and triage within the primary care and institutional settings where these populations do receive services is a pragmatic and powerful strategy for reducing disparities. It ensures that early warning signs are not missed simply due to a lack of access to a dentist. Figure 1 illustrates a structured frontline oral health sentinel system embedded within routine nursing and healthcare assistant practice.


**Figure 1. Frontline Oral Health Sentinel System for Early Detection of Systemic Disease and Nutritional Risk**

## Conclusion

The evidence is unequivocal: nurses and health assistants, when equipped with appropriate tools, training, and systemic support, can function as highly effective sentinels of oral and systemic health. Incorporating a structured oral assessment into routine practice is a low-technology, high-impact intervention that epitomizes holistic, patient-centered care. It transforms everyday clinical encounters into opportunities for preventive health action, early disease detection, and interprofessional collaboration.

However, transcending the evidence-to-practice gap requires deliberate, systemic change. It necessitates that healthcare institutions, educational accrediting bodies, and policymakers formally recognize structured oral assessment by frontline non-dental staff as a fundamental standard of care. This commitment must translate into concrete actions: mandating oral health competency in nursing and HA curricula; integrating validated assessment tools into EHRs with clinical decision support; establishing and funding formal referral pathways between medical, dental, and pharmacy services; and including oral health screening metrics in institutional quality and safety report cards.

Investing in this frontline sentinel system is an investment in a more anticipatory, resilient, and equitable healthcare model. It aligns perfectly with the quadruple aim of enhancing patient experience, improving population health, reducing per capita costs, and improving clinician well-being by preventing downstream crises. By ensuring that the mouth is systematically examined as the vital diagnostic zone it is, we can detect disease earlier, intervene more effectively, and build a healthcare system genuinely oriented towards preservation of health—the ultimate goal of health security.

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