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ENHANCING ONCOLOGICAL VIGILANCE AND EARLY DIAGNOSIS IN PATIENTS AT HIGH RISK OF HEAD AND NECK TUMORS

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Abstract

Background: Head and neck malignancies are clinically heterogeneous and often present first to primary care physicians, dentists, or otorhinolaryngologists rather than oncology specialists. Delayed recognition of alarm symptoms and fragmented referral pathways may postpone morphological verification. Objective: To synthesize current evidence on risk factors, early detection, diagnostic delay, and interdisciplinary referral in tumors of the ear, nose, and throat (ENT) organs and adjacent head and neck regions, with particular emphasis on Uzbekistan and other Commonwealth of Independent States (CIS) countries, and to formulate a practical risk-oriented diagnostic algorithm. Methods: A narrative review of 40 sources published between 2005 and 2025 was performed. The evidence base included international epidemiological reports, systematic reviews and meta-analyses, clinical guidelines, professional society recommendations, original studies, and regional publications. Particular attention was given to tobacco- and alcohol-related risk, potentially malignant oral disorders, HPV- and EBV-associated disease, endoscopy, narrow-band imaging, biopsy techniques, and organizational causes of diagnostic delay. Results: Current evidence does not support universal population-based screening for all head and neck tumors. In contrast, risk-oriented active case finding is clinically relevant in individuals with tobacco and alcohol exposure, potentially malignant mucosal lesions, persistent dysphonia or dysphagia, unexplained cervical lymphadenopathy, and other warning signs. Endoscopy and appropriately selected biopsy remain central to diagnostic confirmation, while p16/HPV and EBV-related testing are valuable in defined clinical settings. Available data from Uzbekistan and CIS countries indicate regional disparities, late-stage presentation, and dependence of outcomes on the quality and speed of the initial diagnostic pathway. Conclusion: A standardized multidisciplinary pathway based on risk assessment, recognition of red-flag symptoms, prompt endoscopy, tissue verification, selective molecular testing, and quality auditing may strengthen oncological vigilance and reduce avoidable diagnostic delay, particularly in health systems with uneven access to specialized services.

Keywords: head and neck tumors; ENT oncology; oncological vigilance; early diagnosis; risk factors; screening; biopsy; Uzbekistan; CIS; multidisciplinary care.

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Introduction

Head and neck tumors comprise a biologically and anatomically heterogeneous group of malignancies arising in the oral cavity, oropharynx, hypopharynx, larynx, nasopharynx, nasal cavity, and adjacent structures. A distinctive feature of this disease group is that the diagnostic pathway frequently begins outside an oncology center. Patients often first seek care from a general practitioner, dentist, or otorhinolaryngologist; therefore, the quality of the initial assessment and the timeliness of referral directly influence the interval to definitive diagnosis [1–7].

Oncological vigilance extends beyond nonspecific clinical caution. It requires systematic identification of high-risk individuals, recognition of alarm symptoms, interpretation of symptoms in the context of exposure history and anatomical localization, and timely transition from repeated empirical treatment to morphological verification. Persistent dysphonia, dysphagia, odynophagia, non-healing oral ulceration, leukoplakia or erythroplakia, unexplained cervical lymphadenopathy, and unilateral otalgia lasting more than 2–3 weeks are among the manifestations that should prompt accelerated evaluation [8–20].

Delayed diagnosis remains clinically important because several oral and oropharyngeal lesions are accessible to direct inspection, yet a substantial proportion of patients are still diagnosed at advanced stages. Potential contributors include underestimation of risk factors, repeated symptomatic treatment, delayed inter-specialty referral, and limited access to endoscopy, biopsy, and pathology services [15–20].

For Uzbekistan, the problem has additional relevance. Available national epidemiological indicators include modeled estimates, while regional studies suggest substantial geographic variation in incidence and diagnostic patterns. These limitations support the need for a risk-oriented and multidisciplinary diagnostic pathway adapted to local health-system conditions [35–37].

The objective of this review was to synthesize current evidence on risk factors, early detection strategies, diagnostic delay, and oncological vigilance in head and neck tumors, to compare selected findings from Uzbekistan and other CIS countries with global evidence, and to develop a practical multidisciplinary diagnostic algorithm suitable for adaptation to clinical practice in Uzbekistan.

Materials and Methods

This study was designed as a narrative literature review. A total of 40 scientific and professional sources published between 2005 and 2025 were analyzed. The evidence base comprised international epidemiological reports, systematic reviews and meta-analyses, clinical practice guidelines, professional society recommendations, original research articles, and regional publications from Uzbekistan and other CIS countries [1–40].

The review focused on six thematic domains: (1) epidemiology and major risk factors for head and neck malignancies; (2) symptom patterns associated with delayed diagnosis; (3) population screening and risk-based active case finding; (4) endoscopic, morphological, and molecular diagnostic methods; (5) epidemiological and organizational

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characteristics in Uzbekistan and selected CIS countries; and (6) construction of a multidisciplinary referral algorithm.

Particular attention was given to tobacco, alcohol, and smokeless tobacco exposure; HPV-associated oropharyngeal carcinoma; EBV-related nasopharyngeal carcinoma; oral potentially malignant disorders; narrow-band imaging (NBI); ultrasound-guided fine-needle aspiration biopsy (FNAB) and core needle biopsy; histopathological verification; and the potential role of circulating and salivary biomarkers.

Because the included publications were heterogeneous in design, population, outcomes, and geographic context, no quantitative meta-analysis was performed. Findings were synthesized descriptively, with emphasis on clinically reproducible principles and on areas relevant to referral organization in Uzbekistan.

Results

Global epidemiological patterns and risk factors

The epidemiology of head and neck cancer varies by geographic region and etiological profile. Tobacco, alcohol, and smokeless tobacco remain major risk factors for cancers of the oral cavity and other head and neck sites. Combined tobacco and alcohol exposure is associated with a greater carcinogenic effect than either exposure considered in isolation [6,7].

Contemporary risk assessment must also account for virus-associated disease. HPV-related oropharyngeal carcinoma may occur in comparatively younger patients and in individuals without substantial tobacco exposure; in some cases, painless cervical lymphadenopathy is the initial clinical manifestation [3,31,32]. EBV-associated diagnostic approaches are particularly relevant in nasopharyngeal carcinoma [33,34].

Oral potentially malignant disorders, especially leukoplakia, erythroplakia, and epithelial dysplasia, represent an important opportunity for earlier detection. Their malignant transformation risk depends on lesion phenotype, anatomical site, histological grade, and the quality of longitudinal surveillance [11–14]. Overall, the reviewed literature supports multidimensional risk assessment based on age, carcinogenic exposure, symptom duration, lesion localization, and objective examination findings rather than reliance on a single risk factor.

Diagnostic delay and clinical warning signs

Diagnostic delay frequently begins before advanced technology becomes relevant. At the primary-care stage, patients may receive repeated symptomatic treatment for presumed pharyngitis, laryngitis, stomatitis, or lymphadenitis before malignancy is suspected [15–20].

Isolated symptoms such as a non-healing ulcer, foreign-body sensation, dysphagia, persistent dysphonia, unexplained otalgia, or cervical lymphadenopathy may appear nonspecific. Their diagnostic significance increases substantially when they persist and coexist with recognized risk factors. Health-system contributors include delayed specialist referral, restricted access to endoscopy and biopsy, pathology turnaround time, and

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inconsistent follow-up [18–20]. These findings support conceptualizing oncological vigilance as a property of the entire referral pathway rather than solely as an individual clinician attribute.

Screening and risk-oriented active detection

The reviewed evidence does not establish a sufficient basis for universal population-based screening across all ENT and head and neck malignancies. However, risk-oriented examination of selected populations, particularly for oral cancer and potentially malignant oral lesions, has demonstrated practical value [21–25].

A cluster-randomized study from Kerala reported a mortality benefit associated with periodic visual oral examination among high-risk individuals [21]. Subsequent work has supported strategies that combine age, tobacco and alcohol exposure, symptoms, and visible mucosal abnormalities to improve selection for further diagnostic assessment [22–25]. Accordingly, the most defensible clinical approach is targeted case finding in high-risk groups together with rapid evaluation of symptomatic patients rather than indiscriminate universal screening.

Endoscopic, morphological, and molecular diagnostics

The core diagnostic sequence is clinical examination followed by endoscopic assessment and morphological verification. Endoscopy facilitates detection of suspicious lesions and assessment of lesion extent. NBI may improve visualization of superficial epithelial and vascular changes and can assist in selecting an appropriate biopsy site, although it does not replace histopathological examination [26,27].

For unexplained cervical lymphadenopathy, ultrasound-guided FNAB is an important first-line method of morphological assessment, with core needle biopsy considered when additional tissue architecture is required [28]. Liquid biopsy, circulating tumor DNA, exosomes, and salivary biomarkers remain promising research tools but currently cannot substitute for careful clinical assessment, endoscopy, and tissue biopsy [29,30].

Molecular testing has established roles in defined settings. p16/HPV testing is clinically relevant in oropharyngeal carcinoma and is addressed in College of American Pathologists recommendations [31,32]. Plasma EBV DNA is a promising diagnostic and monitoring tool in nasopharyngeal carcinoma and may have practical value in selected clinical contexts [33,34].

Findings relevant to Uzbekistan

GLOBOCAN 2022 estimates reported approximately 1,010 new cases of lip and oral cavity cancer, 154 cases of laryngeal cancer, and 151 cases of hypopharyngeal cancer in Uzbekistan [35]. Because part of the available national burden is based on modeled estimates, direct comparisons with countries possessing complete population-based cancer registry systems should be interpreted cautiously.

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Regional research from Uzbekistan suggests meaningful geographic heterogeneity. Khazratov et al. analyzed 5,015 oral cancer cases and reported that 62.5% occurred in men, with higher standardized incidence rates in selected regions [36]. Data from the Bukhara region indicated an average of approximately 27 pharyngeal cancer cases annually during 2015–2023; 80.9% of patients were men, and the oropharynx accounted for 73.4% of cases [37]. Late-stage detection and regional variation were highlighted as important challenges.

These findings support strengthening oncological vigilance not only within oncology institutions but also in primary healthcare, dental services, and ENT practice. Priority measures include standardized risk and red-flag checklists, systematic oral cavity and neck examination, prompt referral for fiberoptic endoscopy, shorter intervals to biopsy, telemedicine support for regional facilities, and regular auditing of stage at diagnosis.

Evidence from selected CIS countries

Reports from Russia, Kazakhstan, and Belarus identify diagnostic delay and regional inequality as recurring health-system concerns. Russian clinical guidelines for laryngeal cancer standardize endoscopic assessment, morphological verification, and subsequent management, although the existence of a formal algorithm does not itself guarantee timely patient access [38].

In Kazakhstan, regional differences in hypopharyngeal cancer incidence were described for 2017–2021 [39]. In Belarus, analysis of laryngeal malignancies during 2000–2019 demonstrated a high proportion of stage III–IV disease and a concentration of cases among adults aged 55–74 years [40]. Across these settings, recurrent patterns include male predominance, frequent advanced-stage diagnosis, territorial disparities, and strong dependence of diagnostic outcomes on the quality of the initial assessment and referral process.

Proposed multidisciplinary algorithm for oncological vigilance

On the basis of the reviewed evidence, a multidisciplinary pathway is proposed to reduce avoidable diagnostic delay. The pathway prioritizes early risk assessment, recognition of red-flag symptoms, rapid endoscopic evaluation, and timely transition to cytological or histological verification. The target intervals shown below are proposed organizational benchmarks rather than formal administrative standards.

Table 1. High-risk groups and criteria for accelerated diagnostic referral

Patient profile	Alarm signs	Initial diagnostic measure	Target interval
Long-term tobacco use, combined tobacco/alcohol exposure, older age	Persistent dysphonia, dysphagia, odynophagia, weight loss, hemoptysis	ENT examination, neck palpation, endoscopy	Up to 7 days
Non-healing oral ulcer or plaque	Leukoplakia, erythroplakia, induration, contact bleeding	Dental/ENT examination and biopsy	Up to 7 days

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Unexplained cervical lymphadenopathy	Firm or enlarged node persisting for more than 2 weeks	Ultrasound + FNAB/core biopsy	Up to 7 days
Suspected HPV-associated tumor	Painless cervical lymphadenopathy with mild local symptoms	Oropharyngeal endoscopy and biopsy	Up to 7 days
Suspected nasopharyngeal tumor	Unilateral nasal obstruction, epistaxis, unilateral serous otitis media, cervical lymphadenopathy	Nasopharyngoscopy and biopsy	7–10 days
Potentially malignant lesion/dysplasia	Increase in size, induration, ulceration	Repeat examination and biopsy	No later than 7 days
History of head and neck cancer	New mucosal lesion, dysphonia, dysphagia, lymphadenopathy	Referral to a specialized center	Up to 7 days

Table 2. Multidisciplinary algorithm for early diagnosis of head and neck tumors

Stage	Main activity	Responsible specialists	Target interval
1	Assessment of risk factors, symptom duration, oral/oropharyngeal inspection, and neck palpation	General practitioner, dentist, ENT specialist	Day of presentation
2	Risk stratification and identification of red-flag findings	General practitioner, dentist, ENT specialist	Immediately
3	Fiberoptic endoscopy, NBI when available, and neck ultrasound	ENT specialist, radiologist	7–10 days
4	Incisional biopsy or FNAB/core biopsy with histological/cytological examination	ENT surgeon, oncologist, pathologist	10–14 days
5	CT/MRI and indicated molecular tests, including p16/HPV or EBV-related testing	Oncologist, radiologist, pathologist	After morphological results

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6	Multidisciplinary review and determination of treatment strategy	Multidisciplinary oncology team	Up to 21 days
7	Quality audit: stage at diagnosis, time to biopsy, 1-year mortality, and referral indicators	Administration, oncologist, epidemiologist	Monthly/quarterly

Discussion

This review indicates that the principal opportunity for improving early detection of head and neck cancer lies not in a single diagnostic technology but in the organization of a coherent pathway from first clinical suspicion to definitive tissue diagnosis. This interpretation is consistent with evidence showing that delays may arise at multiple stages, including symptom appraisal, first-contact management, specialist referral, endoscopy, biopsy, and pathology [15–20]. Consequently, oncological vigilance should be operationalized as a reproducible process rather than treated as an abstract professional attitude.

The distinction between universal screening and targeted active detection is particularly important. Evidence remains insufficient to justify population-wide screening for all head and neck malignancies, whereas visual examination and risk-based selection may be beneficial for oral cancer and potentially malignant lesions in high-risk groups [21–25]. This supports a pragmatic model in which screening resources are concentrated on individuals with recognized exposures or persistent warning signs, while symptomatic patients are fast-tracked for diagnostic clarification.

Technological advances can strengthen this pathway but should not displace morphology. NBI can improve lesion visualization and biopsy targeting [26,27], and ultrasound-guided FNAB or core biopsy can accelerate assessment of cervical nodes [28]. Likewise, liquid biopsy and salivary biomarkers are scientifically promising [29,30], yet their present role remains complementary. The same principle applies to molecular testing: p16/HPV and EBV-related assays are most informative when applied in appropriate anatomical and clinical contexts rather than as indiscriminate screening tools [31–34].

The findings from Uzbekistan deserve cautious interpretation because national estimates are partly modeled and regional publications remain relatively limited [35–37]. Nevertheless, the available data consistently point toward male predominance, geographic variation, and clinically important late-stage diagnosis. These features resemble patterns reported in other CIS settings [38–40], suggesting that organizational barriers and regional disparities may be shared challenges even when epidemiological profiles differ.

The proposed algorithm therefore emphasizes system-level coordination among primary care physicians, dentists, ENT specialists, radiologists, pathologists, and oncologists. Its most important feature is not the exact number of days assigned to each step, but the principle that every transition should reduce diagnostic uncertainty and move the patient toward definitive verification. Repeated empirical treatment without

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reassessment, unnecessary circulation between specialists, and delays between suspicion and biopsy are the types of losses the pathway is designed to minimize.

From a quality-improvement perspective, implementation should be accompanied by measurable indicators. Particularly useful metrics include the proportion of tumors diagnosed at stages I–II, median time from first presentation to biopsy, the proportion of justified urgent referrals, pathology turnaround time, and 1-year mortality. These indicators could allow regional institutions to identify bottlenecks and assess whether an oncological vigilance program produces meaningful organizational improvement.

This review has limitations. It was narrative rather than systematic, the included evidence was heterogeneous, and regional data from Uzbekistan and other CIS countries were less extensive than international evidence. In addition, the proposed time intervals have not yet been prospectively validated as national standards. Future work should evaluate the algorithm in real clinical settings, quantify delays at each referral stage, and determine whether structured risk-based pathways improve stage distribution and patient outcomes.

Conclusion

Early diagnosis of head and neck malignancies depends not only on the technical capacity of specialized oncology services but also on the quality and speed of the patient's first contact with the healthcare system. Coordinated work among general practitioners, dentists, ENT specialists, radiologists, pathologists, and oncologists is therefore essential for reducing avoidable diagnostic delay.

Universal population-based screening is not supported by sufficient evidence for all head and neck tumors. By contrast, risk-oriented active case finding, prompt assessment of persistent red-flag symptoms, endoscopic evaluation, and timely morphological verification are supported by the current evidence base.

For Uzbekistan, strengthening standardized referral pathways is particularly relevant because available epidemiological data are partly modeled, regional variation is evident, and access to diagnostic services is not uniform. A practical sequence of risk assessment → red-flag recognition → standardized examination → endoscopy → biopsy and pathological verification → selective molecular testing → multidisciplinary review → quality audit provides a clinically coherent framework for improving oncological vigilance.

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