EPIDEMIOLOGICAL TRENDS OF HEALTHCARE-ASSOCIATED INFECTIONS IN OLMAZOR DISTRICT (TASHKENT), 2022–2025

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Background. Healthcare-associated infections (HAIs) remain a major public health and patient-safety issue worldwide, contributing to prolonged hospitalization, increased antimicrobial use, higher costs, and preventable morbidity and mortality. In transitional healthcare systems, the HAI burden is frequently underestimated due to incomplete reporting, heterogeneity of surveillance practices, and limited integration between clinical, laboratory, and infection prevention data streams. In urban districts with high patient turnover, mixed facility profiles (maternity, pediatrics, general wards), and variable infrastructure, HAIs may demonstrate a non-linear epidemiological pattern where overall notification counts decline, yet high-risk subgroups experience an increasing and clinically significant burden.

Olmazor District (Tashkent city) represents a setting where routine surveillance data exist, but the true epidemiological dynamics of HAIs require systematic retrospective evaluation. Particular attention is warranted for purulent-septic infections (PSIs) in neonates and postpartum women, as well as respiratory infections that may reflect both community pressure and hospital transmission potential. The current study provides a structured analysis of surveillance indicators to describe trends, identify risk-priority conditions, and support the strengthening of district-level infection prevention and control (IPC) decision-making.

Keywords: healthcare-associated infections; purulent-septic infections; neonatal infections; postpartum infections; bronchopneumonia; epidemiological surveillance; infection prevention and control; Tashkent; Olmazor District.

The goal: To evaluate the retrospective epidemiological trends of HAIs and HAI-associated nosologies in Olmazor District healthcare facilities during 2022–2023, and to interpret early warning signals observed in 2024–2025 with a focus on high-risk groups and priorities for surveillance improvement.

Materials and Methods

A retrospective descriptive and analytical epidemiological study was conducted using:

1. official district surveillance and reporting data (CSEWPH reports),
2. facility-level internal epidemiological monitoring documentation, and
3. laboratory-confirmation records where available in the reporting structure.

The following indicators were extracted and compared by year (2022 vs 2023) and interpreted for subsequent period signals (2024–2025):

- number of rapid notifications (case alerts) by nosology,
- confirmed cases and confirmation proportion (%),
- number of identified foci/outbreak units,
- contact-related indicators and a contact coefficient (contacts/cases where applicable),
- investigation/coverage indicators (%),
- year-to-year percent change for main nosological groups.

The main group “PSIs + viral hepatitis + acute intestinal infections (total)” was used as a composite indicator for overall HAI-related surveillance workload. Nosologies included: neonatal PSIs, postpartum PSIs, acute respiratory viral infections (ARVI), bronchopneumonia, bronchitis, acute intestinal infections, hepatitis B, and hepatitis C. Statistical interpretation relied on basic comparative epidemiology (proportional differences, direction of change) and, where relevant, chi-square logic for differences in distributions ($p<0.05$ interpreted as meaningful for programmatic decisions).

Results

Overall surveillance dynamics

Across the composite HAI-related group (PSIs, viral hepatitis, and acute intestinal infections combined), rapid notifications decreased from **368 cases in 2022** to **300 cases in 2023**, representing an **18.5% reduction**. At a system level, this decline may reflect intensified surveillance control measures, changes in reporting behavior, or true epidemiological

reduction; however, the absolute number remained substantial, implying that the background HAI risk persisted.

Importantly, decreases in aggregated notifications did not translate uniformly across risk groups or nosological categories. Several high-risk conditions demonstrated an opposite direction of change, indicating a heterogeneous epidemiological process rather than a stable improvement trend.

High-risk signals: neonates and postpartum women

Neonatal purulent-septic infections increased from **72 cases (2022)** to **90 cases (2023)**, corresponding to a **25% increase**. This finding is epidemiologically critical because neonatal settings are characterized by high vulnerability, frequent device exposure, immature immunity, and the possibility of rapid cluster formation if IPC practices weaken. The observed increase suggests that neonatal units should be considered a primary risk zone requiring intensified surveillance, routine audits of aseptic technique, environmental hygiene controls, and workflow optimization.

Postpartum PSIs, not recorded in 2022, appeared in 2023 with **10 notified cases**, and **4 confirmed cases**, yielding a **40% confirmation proportion**. The emergence of postpartum PSIs may signal an expanding HAI landscape in maternity-related care pathways, potentially linked to peri-delivery procedures, surgical-site risk, staffing patterns, or changes in case detection. Even though the absolute number is small, the appearance of a new category in official reporting is an "epidemiological signal" requiring immediate attention—particularly in terms of case definitions, local outbreak investigation readiness, and structured postpartum infection surveillance.

Respiratory conditions: mixed trend with clinically significant increase

ARVI notifications decreased substantially from **84 cases (2022)** to **22 cases (2023)** (**−73.8%**). Such a reduction may be consistent with post-pandemic dynamics, altered community transmission pressure, changes in healthcare-seeking behavior, or the prioritization of other surveillance endpoints.

In contrast, bronchopneumonia increased from 96 cases (2022) to 130 cases (2023) (+35.4%). The confirmation proportion also increased (from 15.6% to 24.6%), indicating greater clinical/laboratory substantiation and potentially a heavier burden of severe respiratory outcomes. From a hospital epidemiology perspective, bronchopneumonia has dual relevance: it may reflect community-acquired infections requiring hospitalization, but in certain contexts may overlap with hospital-acquired respiratory infections—especially among prolonged-stay patients, intensive-care exposures, or post-procedural vulnerability. Therefore, this upward

trend warrants enhanced stratification by ward type, length of stay, and temporal clustering to differentiate community pressure from in-hospital transmission patterns.

Bronchitis showed a decrease from 114 cases (2022) to 45 cases (2023) (−60.5%), while confirmed cases reduced sharply (22 to 1). This divergence between bronchopneumonia and bronchitis suggests possible diagnostic substitution patterns or differences in clinical coding/reporting practices, which should be taken into account when interpreting surveillance trends.

Viral hepatitis and intestinal infections

Hepatitis B rapid notifications decreased from 2 to 0 (−100%), while hepatitis C appeared with 1 case in 2023 (with confirmed status noted in reports). Acute intestinal infections were recorded as 0 in 2022 and 2 in 2023. Although small in absolute magnitude, hepatitis B/C carries significant epidemiological weight because a limited number of cases can still yield high risk for exposure networks (e.g., occupational exposures, procedural transmission, or shared equipment concerns). These conditions require strict adherence to standard precautions, injection safety, sterilization protocols, and occupational health monitoring.

Contacts and investigation coverage: indicators of surveillance quality

Contact-related indicators suggested increased workload and potential exposure networks in 2023 compared to 2022. For the main group, contacts increased (e.g., from 8 to 25 in certain aggregated categories). Neonatal cases also generated identifiable contacts, and hepatitis C had recorded contacts. The contact coefficient (contacts/cases) can serve as a proxy for the responsiveness of epidemiological investigation: higher values may reflect better tracing, higher concern for exposure, or larger possible transmission networks. However, uneven investigation coverage in certain categories indicated that surveillance performance was not consistently robust across conditions and facilities.

Discussion

The data demonstrate that the epidemiological process of HAI-associated nosologies in Olmazor District is heterogeneous and risk-group dependent. A decline in aggregated rapid notifications may produce a misleading impression of improvement if not interpreted alongside subgroup signals. The clear increases in neonatal PSIs and the emergence of postpartum PSIs represent priority warning signs. These findings imply that high-risk wards (neonatal/maternity) may function as “sentinel environments,” where small operational deviations in hand hygiene compliance, aseptic technique, staffing workload, environmental cleaning, or device management can translate into measurable increases in infection risk.

The increase in bronchopneumonia, accompanied by higher confirmation proportion, suggests a clinically significant burden that should be studied further in relation to hospital stay duration, procedures, seasonal patterns, and clustering. The mixed respiratory trend also highlights the need for harmonized clinical coding and consistent case definition application—critical elements for trustworthy surveillance.

Furthermore, contact-related metrics and investigation coverage variability underline the necessity of strengthening routine outbreak preparedness and standardized epidemiological investigation protocols. Even when confirmed case counts remain limited, the presence of high-consequence conditions (neonatal infections, postpartum infections, viral hepatitis) calls for proactive IPC reinforcement and targeted education.

Conclusions

1. The overall composite HAI-related notifications decreased in 2023 versus 2022 (−18.5%), yet high-risk subgroup signals intensified, indicating a non-uniform epidemiological trend.
2. Neonatal purulent-septic infections increased by 25%, and postpartum PSIs emerged with a high confirmation proportion (40%), identifying maternity-related pathways as priority risk domains.
3. Bronchopneumonia increased by 35.4%, with a higher confirmation proportion, warranting deeper stratified analysis to clarify healthcare-associated components and to guide prevention planning.
4. Variability in investigation coverage and contact metrics suggests that surveillance and IPC responses require standardization and consistent implementation across facilities.

Practical Implications (Recommendations)

- Strengthen HAI surveillance in neonatal and maternity units using standardized case definitions and routine feedback loops.
- Implement targeted audits: hand hygiene, aseptic technique, device-related bundles, environmental cleaning, and staff workflow organization.
- Introduce routine stratification of bronchopneumonia by ward type and length of stay to detect potential hospital-acquired patterns.
- Improve investigation coverage and ensure uniform contact tracing documentation for high-consequence infections (PSIs, hepatitis, suspected clusters).

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