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Preoperative infection-related laboratory documentation and recorded marker reactivity in ophthalmic procedures at a Somali referral hospital: a retrospective cross-sectional study

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Abstract

Background

Reliable preoperative laboratory records require clear test identification, interpretable results, and traceable timing within ophthalmic care pathways. We evaluated four-marker documentation completeness and recorded reactivity among patients with recorded completed ophthalmic procedures at a specialist referral hospital in Mogadishu, Somalia.

Methods

We conducted a retrospective cross-sectional study of patients with recorded completed ophthalmic procedures at Al Ihsan Specialist Hospital from 1 January 2025 to 31 August 2026. The co-primary descriptive outcomes were four-marker documentation completeness and marker-specific recorded reactive proportions for HBsAg, HCV antibody, HIV screening, and an electronic treponemal screening marker recorded under the source-system label “TPHA” within 30 days before or on the index procedure date. One index procedure and one deterministic result per marker were selected per patient.

Results

The cohort included 10,268 patients with recorded completed ophthalmic procedures; cataract/lens procedures accounted for 7,566 (73.69%). Complete interpretable four-marker results were available for 9,502 patients (92.54%), but documentation varied by pathway: 98.12% in cataract/lens procedures, 94.95% in oculoplasty/adnexal procedures, 40.99% in vitreoretinal procedures, and 27.86% in ocular trauma. Recorded reactivity was 4.18% for HBsAg (401/9,588; 95% CI 3.80–4.60), 0.48% for HCV antibody (46/9,590; 95% CI 0.36–0.64), 0.16% for HIV screening (15/9,589; 95% CI 0.09–0.26), and 11.04% for the electronic treponemal screening marker recorded under the source-system label “TPHA” (1,049/9,506; 95% CI 10.42–11.68); patient-level assay identity and confirmatory status were unavailable.

Conclusions

Among patients with recorded completed ophthalmic procedures, four-marker documentation was near-complete in the dominant cataract/lens pathway but varied substantially across other pathways, particularly ocular trauma, vitreoretinal procedures, and intravitreal injections. Lower electronic documentation does not establish omitted testing or inadequate care. The findings reflect one hospital’s record workflow and should not be generalized to all patients evaluated for ophthalmic intervention or to other settings.

Background

Preoperative laboratory records are useful only when the documented test, result, timing, and follow-up pathway can be identified reliably. Hepatitis B and C remain important global public-health concerns, but screening results recorded in surgical pathways should not be interpreted as population prevalence [1].

Previous studies have reported hepatitis B, hepatitis C, and HIV screening results in cataract and mixed ophthalmic surgical populations, although the included markers, assays, and patient populations vary [5, 6, 7, 8, 9]. Hospital-based blood-donor data from Mogadishu provide local laboratory-screening context but are not comparable with ophthalmic surgical patients [10].

At Al Ihsan Specialist Hospital, preoperative laboratory documentation varied by ophthalmic pathway. The co-primary descriptive outcomes were four-marker documentation completeness and marker-specific recorded reactive proportions among patients with interpretable results. A secondary objective was to describe how electronic documentation differed across ophthalmic procedure groups.

The study was designed as a laboratory-record and preoperative-documentation analysis. Patient-level confirmatory testing, prior-diagnosis status, counselling, referral, treatment, and surgical decisions after a reactive result were not available in the frozen analytical dataset.

Methods

Study design and setting

We performed a retrospective cross-sectional study using routinely collected electronic clinical and laboratory data from Al Ihsan Specialist Hospital, a specialist referral hospital in Mogadishu, Somalia. The study period was 1 January 2025 through 31 August 2026. The study used all eligible patient records within the predefined period; no a priori sample-size calculation was performed.

Study population

We identified patients with a recorded completed ophthalmic procedure in the hospital electronic clinical system during the study period. Patients whose procedures were cancelled, deferred, performed elsewhere, or never completed were not represented. The source definition yielded 10,538 unique patients; 181 could not be linked to the patient master file using the institutional identifier and were excluded. The frozen source workflow did not retain enough information to determine the linkage-failure mechanism for each patient or compare those patients reliably with linked patients on demographic or laboratory variables. Among 10,357 linked patients, 89 were excluded because their index procedure belonged to a combined lacrimal source category identified in the frozen export as “probing/propping”, for which the routine panel was not ordinarily expected. The export grouped these labels together, so separate counts for “probing” and “propping” could not be recovered without returning to the live source system. The final cohort comprised 10,268 patients. Findings therefore apply only to patients with recorded completed procedures and cannot describe all patients evaluated for ophthalmic intervention.

Eligible procedures were grouped as cataract/lens, other ophthalmology, intravitreal injection, oculoplasty/adnexal, ocular trauma, corneal, globe removal, strabismus, glaucoma, vitreoretinal, and lacrimal procedures. Dacryocystorhinostomy remained eligible because it followed the standard preoperative pathway. Urgency, anaesthesia type, detailed indication, care setting, and laterality were not consistently available in the de-identified analytical dataset.

Laboratory measures and outcome definitions

The primary laboratory analysis included HBsAg, HCV antibody, HIV screening, and an electronic treponemal screening marker recorded under the source-system label “TPHA”. Procurement records documented rapid-test supplies for these screening domains during 2025–2026, but they could not be linked to individual patient results. The patient-level extract did not reliably retain assay platform, analytical thresholds, specimen details, quality-control information, repeat-testing practices, or confirmation algorithms. Accordingly, the analysis reports electronically recorded screening reactivity rather than assay-specific positivity or diagnostic accuracy.

Source-system result labels were classified using prespecified rules. Explicit “positive”, “postive”, or “reactive” variants were classified as reactive; “negative” and “non-reactive” variants as non-reactive; and numeric-only, ambiguous, invalid, or other nonstandard entries as unclassified. The electronic treponemal result was not treated as a standardized TPHA assay because patient-level assay identity was unavailable. For each marker, the eligible result closest to the index procedure date within 30 days before or on that date was selected; remaining ties were resolved by deterministic source-record order. Supplementary Table S6 documents the verified mapping and selection rules.

The co-primary descriptive outcomes were: (1) four-marker documentation completeness, defined as an interpretable HBsAg, HCV-antibody, HIV-screening, and electronic treponemal-screening result within the 30-day window; and (2) marker-specific recorded reactive proportions among patients with interpretable results. A marker was classified as absent when no corresponding electronic laboratory result was identified within the prespecified 30-day window. Absence of an electronic result could reflect testing not performed, testing performed externally, documentation outside the laboratory system, delayed or incomplete data capture, or testing outside the selected time window; these possibilities could not be distinguished from the available dataset. Unclassified electronic results were retained separately from absent results. Supplementary Table S10 reports interpretable, unclassified, and absent electronic results by marker and procedure group.

Reactive results were treated as screening findings only and were not considered diagnostic confirmation. HBsAg alone does not establish chronic HBV infection; HCV antibody does not establish current viraemia; HIV screening reactivity requires confirmation; and the electronic treponemal screening marker cannot distinguish active, historical, or previously treated infection [2, 3, 4].

Covariates

Age was calculated at the index procedure date and grouped as 0–17, 18–39, 40–59, and ≥ 60 years. These prespecified categories separated paediatric patients from younger, middle-aged, and older adults while preserving adequate group sizes for descriptive and exploratory analyses. Sex was classified as female or male. Study year was 2025 or 2026. Residence was grouped as Mogadishu, outside Mogadishu, or Somalia unspecified. Procedure group was treated as a key operational variable because preoperative documentation pathways differed across ophthalmic services.

Statistical analysis

Categorical variables were summarized as counts and percentages and age as median with interquartile range. Marker-specific reactive proportions are presented with Wilson 95% confidence intervals using the exact interpretable denominator for each marker. One index procedure and one deterministic result per marker were selected for each patient, so the primary analysis contained one patient-level observation and did not require clustering adjustment for repeated laboratory records. Complete-versus-incomplete four-marker documentation was compared descriptively by age, sex, study year, residence, and procedure group. Secondary exploratory models and timing sensitivity analyses are described in the Supplementary Material and were not used to draw causal conclusions.

Ethical considerations

The Al Ihsan Specialist Hospital Research Committee approved retrospective secondary analysis of routinely collected clinical and laboratory records generated from 1 January 2025 to 31 August 2026 (reference ASH2026OPHSER01; approved 15 September 2026) and waived individual informed consent. Research-specific extraction, linkage, de-identification, and statistical analysis began after approval. Record linkage and export were performed within the hospital environment; the analytical dataset used for statistical analysis was de-identified and handled under institutional confidentiality and data-governance procedures. The study was conducted in accordance with the Declaration of Helsinki.

Results

Cohort characteristics

The final cohort comprised 10,268 patients with recorded completed ophthalmic procedures. Median age was 60 years (IQR 48–70). Among 10,266 patients with known age, 914 (8.90% of the full cohort) were aged < 18 years and 9,352 (91.08%) were aged ≥ 18 years; age was unknown for 2 patients. Female patients accounted for 5,297 (51.59%). A total of 5,744 procedures (55.94%) occurred in 2025 and 4,524 (44.06%) in 2026 through 31 August. Most patients were recorded as residing in Mogadishu (7,205; 70.17%). Demographic characteristics are summarized in Table 1.

Table 1
Demographic characteristics of patients with completed ophthalmic procedures (N = 10,268).

Characteristic	n	%
Total	10,268	100.00
Age 0–17 years	914	8.90
Age 18–39 years	1,040	10.13
Age 40–59 years	2,275	22.16
Age ≥ 60 years	6,037	58.79
Age unknown	2	0.02
Female	5,297	51.59
Male	4,971	48.41
2025	5,744	55.94
2026	4,524	44.06
Mogadishu	7,205	70.17
Outside Mogadishu	1,320	12.86
Somalia unspecified	1,743	16.98

Note: Age was unknown for 2 patients. Percentages use the full cohort denominator unless otherwise stated; percentages may not total exactly 100 because of rounding.

Ophthalmic procedure pathways and screening documentation

Cataract/lens procedures were the dominant pathway (7,566; 73.69%). Four-marker documentation completeness differed substantially by procedure group. The key finding is that a single hospital-wide completeness estimate masks this pathway variation. Procedure-group counts and four-marker documentation completeness are presented in Table 2.

Table 2
Ophthalmic procedure pathways and completeness of interpretable four-marker screening documentation.

Procedure group	Patients, n	% of cohort	Complete four-marker documentation, n/N (%)	Incomplete, n
Cataract/lens	7,566	73.69	7,424/7,566 (98.12%)	142
Other ophthalmology	734	7.15	671/734 (91.42%)	63
Intravitreal injection	363	3.54	211/363 (58.13%)	152
Oculoplasty/adnexal	297	2.89	282/297 (94.95%)	15
Ocular trauma	280	2.73	78/280 (27.86%)	202
Corneal	218	2.12	179/218 (82.11%)	39
Globe removal	204	1.99	161/204 (78.92%)	43
Strabismus	175	1.70	168/175 (96.00%)	7
Glaucoma	173	1.68	170/173 (98.27%)	3
Vitreoretinal	161	1.57	66/161 (40.99%)	95
Lacrimal	97	0.94	92/97 (94.85%)	5

Note: Complete four-marker documentation required an interpretable HBsAg, HCV antibody, HIV-screening, and electronic treponemal-marker result within 30 days before or on the index procedure date. The measure reflects recorded availability in the study cohort, not adherence to a universal testing standard.

Primary recorded screening-marker reactivity findings

HBsAg was reactive in 401 of 9,588 patients with interpretable results (4.18%; 95% CI 3.80–4.60). HCV antibody was reactive in 46 of 9,590 (0.48%; 95% CI 0.36–0.64), HIV screening in 15 of 9,589 (0.16%; 95% CI 0.09–0.26), and the electronic treponemal screening marker in 1,049 of 9,506 (11.04%; 95% CI 10.42–11.68). The treponemal estimate represents reactivity to an electronic laboratory label; patient-level assay identity and confirmation status were unavailable. Marker-specific result availability and recorded reactive proportions are presented in Table 3.

Table 3
Availability and recorded reactivity of preoperative infection-related screening markers (N = 10,268).

Marker	Recorded result n	Interpretable result n	Reactive result n (%; 95% CI)	Non-reactive result n	Unclassified result n	No recorded result n
HBsAg	9,593	9,588	401 (4.18%; 95% CI 3.80%–4.60%)	9,187	5	675
HCV antibody	9,593	9,590	46 (0.48%; 95% CI 0.36%–0.64%)	9,544	3	675
HIV screening	9,592	9,589	15 (0.16%; 95% CI 0.09%–0.26%)	9,574	3	676
Electronic treponemal screening marker recorded under source-system label “TPHA”	9,527	9,506	1,049 (11.04%; 95% CI 10.42%–11.68%)	8,457	21	741

Note: Recorded result n denotes any result documented within 30 days before or on the index procedure date. Interpretable n equals reactive plus non-reactive results; unclassified values are excluded from reactive proportions. Reactive percentages and Wilson 95% confidence intervals use the interpretable denominator. The electronic treponemal screening marker derives from the source-system label “TPHA”; patient-level assay platform and confirmatory status were unavailable, so the 11.04% estimate must not be interpreted as active syphilis prevalence or assay-standardized TPHA positivity.

Complete interpretable four-marker results were available for 9,502 of 10,268 patients (92.54%); 766 lacked at least one interpretable result. Because testing was not uniformly required across all procedure pathways, this percentage describes electronic record completeness within the study cohort rather than adherence to a universal screening standard. Complete cases were older and more frequently female than incomplete cases, and completeness varied markedly by procedure group (Supplementary Table S1).

Narrower 7- and 14-day timing analyses, co-reactivity patterns, exploratory adjusted models, and the locally used five-test panel including random blood glucose are reported in the Supplementary Material.

Discussion

A single hospital-wide completeness estimate concealed substantial differences between ophthalmic procedure pathways. Cataract/lens surgery, which accounted for nearly three-quarters of the cohort, had near-complete four-marker documentation, whereas ocular trauma, vitreoretinal procedures, and intravitreal injections had substantially lower electronic completeness.

Lower electronic documentation does not establish that screening was omitted, clinically indicated testing was missed, or care was inadequate. The observed differences may reflect urgent care pathways, external testing, differences in laboratory-record integration, or procedure-specific preoperative requirements. Urgency, indication, anaesthesia type, time to procedure, and care setting were not consistently available.

The electronic treponemal screening result cannot be interpreted as a standardized diagnostic test because the patient-level extract did not identify the assay or confirmation pathway. The source-system label was “TPHA”; manufacturer, platform, prior treatment status, and paired non-treponemal results were also unavailable. The 11.04% estimate should therefore be interpreted primarily as a laboratory-information-system signal of recorded treponemal screening reactivity rather than evidence of active, untreated, or confirmed syphilis [4]. The same principle applies to the other markers: HBsAg does not establish chronic HBV infection, HCV antibody does not establish current viraemia, and HIV screening reactivity requires confirmation [2, 3].

The retrospective records did not permit assessment of confirmation, counselling, referral, treatment, surgical scheduling decisions, or infection-control documentation after a reactive result. Future prospective audits should record these steps directly. Standard precautions remain necessary for all ophthalmic procedures regardless of recorded screening status.

Hospitals should standardize laboratory test names, retain key assay information, document how reactive results are confirmed, and record whether patients are referred for follow-up. Periodic pathway-level audit could then distinguish clinically appropriate variation from documentation gaps.

The study used patient-level records, a predefined index-procedure rule, marker-specific denominators, and separate categories for absent and unclassified results. Important limitations remain. The cohort was restricted to patients with recorded completed procedures and therefore may overestimate documentation completeness relative to all patients evaluated for intervention. Patient-level assay identity and confirmatory pathways were unavailable; external testing may have been missed; 181 patients could not be linked to the patient master file; and the frozen export grouped 89 excluded lacrimal records under the combined source category “probing/propping”. These findings reflect the electronic laboratory-record workflow of one specialist referral hospital and should not be interpreted as estimates of infection burden, routine preoperative practice, or documentation quality across Somalia or other ophthalmic settings.

Conclusions

Among patients with recorded completed ophthalmic procedures, four-marker documentation was near-complete in the dominant cataract/lens pathway but varied substantially across other pathways, particularly ocular trauma, vitreoretinal procedures, and intravitreal injections. Lower electronic completeness does not establish omitted testing or inadequate care. The electronic treponemal screening marker and HBsAg had the highest recorded reactivity, but patient-level assay identity and confirmatory status were unavailable. Hospitals can strengthen these records by standardizing test names, preserving assay information, documenting confirmation pathways, and recording referral follow-up.

Declarations

Ethics approval and consent to participate: Ethical approval for retrospective analysis of routinely collected clinical and laboratory records from 1 January 2025 to 31 August 2026 was granted by the Al Ihsan Specialist Hospital Research Committee, Mogadishu, Somalia (reference ASH2026OPHSER01; approved 15 September 2026). The hospital routinely collected these data during patient care; research-specific extraction, linkage, de-identification, and statistical analysis began after approval. The Committee explicitly waived individual informed consent because the study involved no participant contact or intervention and used de-identified data. The study was conducted in accordance with the ethical principles of the Declaration of Helsinki and applicable institutional requirements.

Consent for publication: Not applicable; no individual patient is identifiable in the manuscript.

Availability of data and materials: Individual-level clinical records are not publicly available because of institutional confidentiality and data-governance requirements. De-identified aggregate data, the analytic data dictionary, result-classification rules, and analysis code may be requested from the corresponding author, Dr Liban Hassan Mohamud (Qualitycontrol@alihsanhospital.so), subject to approval by Al Ihsan Specialist Hospital and applicable ethics and data-governance requirements. No public repository is currently used for the patient-level dataset.

Competing interests: The authors declare no conflicts of interest.

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Authors' contributions (CRediT): Liban Hassan Mohamud — Conceptualization, Methodology, Data curation, Formal analysis, Investigation, Software, Validation, Visualization, Project administration, Writing – original draft, Writing – review & editing. Mohamoud Ahmed Mohamed — Methodology, Investigation, Resources, Supervision, Validation, Writing – review & editing. Abdullaahi Abdiasiis Faarah — Investigation, Validation, Writing – review & editing. Abdinasir Aw Dahir — Resources, Supervision, Project administration, Validation, Writing – review & editing. Liban Hassan Mohamud led study design, data preparation, analysis, interpretation, and drafting. All authors contributed substantially to

interpretation or critical revision, approved the final manuscript, and accept accountability for the integrity of the work.

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Supplementary Files

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