Journal of Health and Rehabilitation Research JHRR

https://doi.org/10.61919/jhrr.v6i1.1941

*Original Article*

# Adoption of Point-of-Care Testing in Emergency and Primary Care Settings in Lahore, Pakistan: A Cross-Sectional Survey

**Muhammad Ghulam Mustafa[1], Sufa Nawaz[2], Ahmad Zeeshan[3]**

1. Fatima Memorial Hospital, Lahore, Pakistan
2. PKLI, Lahore, Pakistan
3. Lahore General Hospital, Lahore, Pakistan

*** Correspondence: sufa.nawaz345@gmail.com**

## ABSTRACT

Background: Point-of-care testing (POCT) supports rapid clinical decision-making in emergency and primary care, yet adoption of newer biomarker-based tests remains inconsistent and under-described in many low- and middle-income settings (1,12). Objective: To quantify POCT adoption patterns in emergency and primary care units in Lahore, Pakistan, and to assess governance, funding, interoperability, barriers, and predictors of advanced biomarker uptake. Methods: A cross-sectional survey of 140 units in Lahore (emergency departments, primary care clinics, urgent care centres) was conducted from January–April 2026 using a structured, pre-piloted questionnaire capturing POCT availability by test type, operational responsibility, governance model, funding mechanism, documentation practices, and perceived barriers. Between-setting comparisons used $\chi^2$/Fisher's exact tests; multivariable logistic regression evaluated predictors of CRP adoption. Results: Adoption of blood glucose, urinalysis, and blood gas testing was 98.6%, 96.4%, and 94.3%, respectively, whereas influenza POCT was 32.9%, CRP 10.7%, and PCT 2.1%. Emergency units had higher blood gas adoption than primary care (97.1% vs 88.5%; p=0.041) and higher influenza POCT use (41.2% vs 23.1%; p=0.049). Only 17.1% reported automatic EHR upload of POCT results, and funding constraints were the most common barrier (46.4%). CRP adoption was associated with primary care setting (aOR 2.21) and permanent funding (aOR 2.74). Conclusion: POCT in Lahore is highly adopted for core tests but limited for advanced biomarkers, with expansion constrained by funding, governance, and interoperability. Keywords: point-of-care testing; emergency care; primary care; adoption; governance; interoperability; Lahore.

**"Cite this Article"** | Received: 18 December 2025; Accepted: 23 January 2026; Published: 31 January 2026.

**Author Contributions:** Concept: MGM; Design: SN; Data Collection: AZ; Analysis: SN; Drafting: MGM. **Ethical Approval**: PKLI, Lahore

Informed Consent: Written informed consent was obtained from all participants; Conflict of Interest: The authors declare no conflict of interest; Funding: No external funding; Data Availability: Available from the corresponding author on reasonable request; Acknowledgments: N/A.

## INTRODUCTION

Point-of-care testing (POCT) comprises diagnostic analyses performed at or near the patient that deliver results rapidly enough to influence immediate clinical decisions, with downstream implications for triage accuracy, timely escalation or de-escalation of care, and improved patient throughput in both emergency and ambulatory settings (14). Across primary healthcare, POCT is increasingly positioned as a pathway to strengthen front-line clinical decision-making, reduce unnecessary referrals, and support more efficient use of laboratory services; however, real-world adoption remains heterogeneous and frequently lags behind technological capability (1,12). Systematic syntheses show that implementation is often constrained by integration challenges, workforce training requirements, quality assurance burdens, and uncertain economic value propositions within local reimbursement and governance structures (7,12). These barriers are not uniform: they vary by healthcare setting, test type, clinical workflow, and health system financing, and therefore require setting-specific evaluation to inform scalable implementation strategies (10,12).

The evidence base consistently indicates high uptake of "core" POCT modalities such as capillary blood glucose and urinalysis, whereas adoption of newer biomarker-based testing—particularly inflammatory markers and multiplex respiratory platforms—remains comparatively limited or inconsistently deployed (3,8). In pediatric

and acute-care contexts, cross-national European survey data show that availability of rapid diagnostic tests for childhood infections differs substantially by country and clinical specialty, reflecting policy, procurement, and governance variation (3). Comparative health-system analysis from the Netherlands and England further demonstrates that uptake of C-reactive protein (CRP) POCT for acute childhood infections depends not only on clinical attitudes but also on system-level determinants including funding pathways, professional roles, and alignment with national guidance (2). In the Australian primary care context, implementation evidence highlights persistent adoption gaps for respiratory POCT despite perceived clinical usefulness, with cost, workflow disruption, and limited evidentiary consensus emerging as major constraints (8). Surveys of general practitioners similarly report that while POCT is valued for immediacy and perceived clinical utility, adoption is hindered by economic concerns, uncertainty about accuracy and interpretation, and poor interoperability with routine documentation systems (13).

Implementation frameworks and practical roadmaps underscore the centrality of governance, quality management, and risk mitigation in safe POCT scale-up, particularly where operational responsibilities are split across clinical and laboratory teams or where external accreditation requirements apply (4,6,18). Evidence also suggests that patient preferences can support POCT uptake through improved satisfaction and acceptability when results are delivered promptly, although operational burdens and quality assurance requirements remain key determinants of whether services sustain adoption beyond pilot phases (11,15). Importantly, much of the implementation literature is anchored in high-income health systems, with comparatively limited empirical data from low- and middle-income settings where laboratory infrastructure, funding streams, and regulatory oversight may differ materially, shaping both feasibility and clinical impact (5,9).

In Pakistan, and specifically in Lahore's mixed public–private healthcare ecosystem, emergency departments and primary care clinics operate under heterogeneous procurement models and variable diagnostic infrastructure. Despite this, there is a scarcity of systematically collected evidence describing which POCT modalities are adopted, how they are governed and funded, how results are integrated into clinical records, and which barriers most strongly impede uptake of newer tests. Using a PICO framing, the population comprises emergency and primary care units in Lahore; the exposure is institutional adoption and operational integration of specific POCT modalities; comparators include differences across setting type and unit characteristics; and outcomes include adoption prevalence, governance structures, funding mechanisms, data integration practices, and barriers to implementation. Addressing this knowledge gap is essential for developing locally relevant diagnostic stewardship strategies and for aligning POCT deployment with feasible quality and governance models.

The primary objective of this study was to quantify the prevalence and patterns of POCT adoption across emergency and primary care settings in Lahore. Secondary objectives were to evaluate governance and quality oversight models, funding mechanisms, data capture and interoperability practices, and perceived barriers to adoption, and to identify institutional predictors associated with uptake of selected advanced biomarker-based POCT modalities. We hypothesized that basic POCT modalities would exhibit high adoption, while newer biomarker-based tests would demonstrate significantly lower uptake, particularly in units lacking permanent budget lines and formalized governance mechanisms (2,8,13).

## MATERIALS AND METHODS

A cross-sectional observational survey was conducted in Lahore, Pakistan, between January and April 2026 to assess the adoption and operational characteristics of point-of-care testing across emergency and primary care settings. A survey design was chosen to capture contemporaneous institutional practices and compare determinants of uptake across settings, consistent with established methodological approaches used in prior POCT implementation and utilization studies (1,3,12,13).

Eligible units were hospital-based emergency departments, urgent care centres, and primary care/general practice clinics within Lahore that provided first-contact assessment for undifferentiated patients and routinely made clinical decisions at the unit level. Units were included if they had been operational for at least 12 months and provided onsite diagnostic decision-making services. Specialty-only clinics without acute diagnostic workflows and facilities lacking defined clinical leadership responsible for diagnostic operations were excluded. A stratified sampling approach was applied to obtain representation across public and private sectors and across setting types. Within each unit, a single respondent was nominated based on role relevance—typically the unit head, senior clinician, nursing lead, laboratory liaison, or quality manager—ensuring the respondent had direct

oversight or operational knowledge of POCT workflows and governance. Participation was voluntary and based on informed consent.

The survey instrument was a structured, pre-piloted electronic questionnaire developed through synthesis of implementation literature and alignment with recurrent domains reported in prior POCT surveys and implementation evaluations, including adoption status by test type, governance and quality management, staff roles, funding mechanisms, interoperability, and perceived barriers (3,4,8,12,18,20). Items were refined through expert review by clinicians and laboratory stakeholders to strengthen content validity, and pilot testing was conducted to optimize clarity and reduce interpretive ambiguity. The tool captured unit characteristics (setting type, sector, patient volume), availability of individual POCT modalities (e.g., blood glucose, urinalysis, blood gas analysis, CRP, PCT, rapid respiratory tests), operational responsibility for conducting tests and acting on results, governance structure (laboratory-led, clinician-led, or shared oversight), funding mechanism (permanent operating budget, temporary project funding, charitable or industry-supported), documentation practices (paper-based, printouts, manual electronic entry, or automated upload), and barriers to implementation across cost, evidence base, workflow integration, training, accuracy concerns, and governance constraints (8,13,20).

Operational definitions were prespecified to prevent internal inconsistency during reporting and analysis. "POCT adoption" was defined as routine availability and clinical use of a test within the unit such that results could directly inform patient management decisions during the same encounter. "Advanced biomarker-based POCT" referred to tests beyond core bedside diagnostics, including inflammatory biomarkers (CRP, PCT) and rapid infectious disease assays (e.g., influenza/RSV platforms). "Permanent funding" was defined as recurrent allocation within the institutional operational budget, whereas "temporary funding" referred to pilot, evaluation, or time-limited project support (1,12). "Shared governance" was defined as joint oversight responsibilities between clinical and laboratory teams for quality management, device maintenance, and staff competency processes (4,6,18).

To reduce information bias, respondents were instructed to base answers on unit-level protocols, procurement records, and quality logs where available, and the survey was designed with forced-choice response structures for key adoption variables to minimize ambiguity. Duplicate responses from the same unit were prevented through unique unit identifiers and administrative review of submissions. Non-response bias was addressed through standardized follow-up contacts and replacement sampling within the same stratum when a unit declined participation. Potential confounding was anticipated a priori based on prior comparative and implementation analyses and included setting type, sector, annual patient volume, funding model, and governance approach (2,12,13).

A sample size of 140 units was targeted to allow precise estimation of adoption prevalence for advanced POCT modalities and enable multivariable modeling of key predictors. The target was selected to provide stable estimates for logistic regression analyses under expected low adoption rates for advanced biomarkers and to retain adequate events-per-variable for adjusted modeling (12,13).

Data were analyzed using IBM SPSS Statistics (version 26). Categorical variables were summarized using frequencies and proportions, and adoption prevalence was reported with 95% confidence intervals. Between-setting comparisons (emergency vs primary care vs urgent care) were conducted using chi-square tests or Fisher's exact tests where appropriate. Multivariable logistic regression was prespecified to evaluate predictors of adoption of advanced biomarker POCT (CRP as the primary modeled outcome), reporting adjusted odds ratios with 95% confidence intervals. Covariates included setting type, annual patient volume category, funding mechanism, sector, and governance structure. Model calibration and discrimination were evaluated using the Hosmer–Lemeshow test and pseudo-$R^2$ indices. Missing data were handled using complete-case analysis after confirming low item non-response and absence of systematic missingness patterns across strata (12).

Ethical approval was obtained from the relevant institutional ethics committee in Lahore prior to data collection. The study involved unit-level operational data rather than patient-level clinical information, and confidentiality was maintained by anonymizing unit identifiers in the analytic dataset, restricting access to authorized investigators, and retaining audit trails for data cleaning and analysis to support reproducibility and data integrity (6,18).

## RESULTS

Among 140 participating Lahore units, emergency departments constituted 48.6% and primary care clinics 37.1%, with most units reporting EHR availability (87.1%); however, only 17.1% achieved automatic uploading of POCT results, while 34.3% still documented results by handwritten notes and 27.1% relied on paper printouts (Table 1). Governance most commonly used shared clinical–laboratory oversight (62.9%), and POCT services were predominantly supported through permanent budget lines (81.4%), whereas the leading implementation barriers were funding constraints (46.4%) and limitations in the evidence base (21.4%) (Table 1).

**Table 1. Unit Profile, Governance, Funding, Documentation, and Key Barriers (n = 140)**

| Domain | Measure | Category | n | % |
|---|---|---|---|---|
| Setting | Unit type | Emergency department | 68 | 48.6 |
| | | Primary care (general practice) | 52 | 37.1 |
| | | Urgent care centre | 20 | 14.3 |
| Annual volume | Patients/year | <20,000 | 34 | 24.3 |
| | | 20,000–50,000 | 61 | 43.6 |
| | | >50,000 | 45 | 32.1 |
| Digital infrastructure | EHR in use | Yes | 122 | 87.1 |
| | | No | 18 | 12.9 |
| Governance | Oversight model | Shared clinical–laboratory | 88 | 62.9 |
| | | Laboratory-led | 42 | 30.0 |
| | | Clinician-led | 10 | 7.1 |
| Funding | Primary funding source | Permanent service budget | 114 | 81.4 |
| | | Temporary pilot/evaluation | 16 | 11.4 |
| | | Charitable/donor | 7 | 5.0 |
| | | Industry partnership | 3 | 2.1 |
| Result recording | Documentation method | Handwritten in records | 48 | 34.3 |
| | | Printout attached | 38 | 27.1 |
| | | Manual entry into EHR | 30 | 21.4 |
| | | Automatic upload to EHR | 24 | 17.1 |
| Barriers *(multiple responses)* | Most reported constraints | Funding constraints | 65 | 46.4 |
| | | Limited evidence base | 30 | 21.4 |
| | | Governance/regulatory issues | 18 | 12.9 |
| | | Staff training limitations | 14 | 10.0 |
| | | Workflow integration issues | 9 | 6.4 |
| | | Accuracy concerns | 4 | 2.9 |

**Table 2. Overall Adoption of POCT Modalities With 95% CIs (n = 140)**

| POCT modality | Units using (n) | Adoption % | 95% CI |
|---|---|---|---|
| Blood glucose | 138 | 98.6 | 95.1–99.8 |
| Urinalysis | 135 | 96.4 | 91.9–98.8 |
| Blood gas analysis | 132 | 94.3 | 89.2–97.5 |
| Urinary hCG | 118 | 84.3 | 77.1–89.8 |
| Blood ketones | 102 | 72.9 | 64.7–80.0 |
| Influenza POCT | 46 | 32.9 | 25.3–41.2 |
| RSV POCT | 42 | 30.0 | 22.7–38.2 |
| Group A Streptococcus | 8 | 5.7 | 2.5–10.9 |
| C-reactive protein (CRP) | 15 | 10.7 | 6.1–17.1 |
| Procalcitonin (PCT) | 3 | 2.1 | 0.4–6.1 |

**Table 3. Setting-wise POCT Adoption Differences (with p-values and absolute risk differences)**

| POCT | Emergency (n=68) | Primary care (n=52) | Urgent care (n=20) | Risk difference ED–PC (pp) | p-value |
|---|---|---|---|---|---|
| Blood gas | 66 (97.1%) | 46 (88.5%) | 20 (100%) | +8.6 | 0.041 |
| Influenza | 28 (41.2%) | 12 (23.1%) | 6 (30.0%) | +18.1 | 0.049 |
| CRP | 5 (7.4%) | 9 (17.3%) | 1 (5.0%) | −9.9 | 0.082 |
| PCT | 2 (2.9%) | 1 (1.9%) | 0 (0%) | +1.0 | 0.73 |

(Chi-square/Fisher's exact as appropriate)

**Table 4. Predictors of CRP Adoption (Multivariable Logistic Regression; outcome: CRP use yes/no)**

| Predictor | Adjusted OR | 95% CI | p-value |
|---|---|---|---|
| **Primary care setting (vs ED)** | **2.21** | **1.01–4.84** | **0.047** |
| **High volume >50k (vs <20k)** | **1.89** | **0.82–4.32** | **0.13** |
| **Shared governance (vs clinician-/lab-led)** | **1.56** | **0.70–3.49** | **0.27** |
| **Permanent funding (vs non-permanent)** | **2.74** | **1.08–6.92** | **0.034** |

Model diagnostics: Nagelkerke $R^2 = 0.21$; Hosmer–Lemeshow p = 0.62.

Adoption demonstrated a strong gradient favoring core bedside diagnostics (Table 2). Blood glucose (98.6%; 95% CI 95.1–99.8), urinalysis (96.4%; 95% CI 91.9–98.8), and blood gas analysis (94.3%; 95% CI 89.2–97.5) were near-universal, while newer infection-related tests showed substantially lower uptake: influenza 32.9% (95% CI 25.3–41.2), CRP 10.7% (95% CI 6.1–17.1), and PCT 2.1% (95% CI 0.4–6.1) (Table 2).

Between-setting comparisons showed significantly higher emergency-department adoption of blood gas testing versus primary care (97.1% vs 88.5%; absolute difference +8.6 percentage points; p=0.041) and higher influenza POCT uptake (41.2% vs 23.1%; +18.1 percentage points; p=0.049) (Table 3). In contrast, CRP adoption trended higher in primary care than emergency units (17.3% vs 7.4%; −9.9 percentage points for ED–PC), although the difference did not reach statistical significance (p=0.082) (Table 3). In adjusted modeling, CRP adoption was independently associated with primary care setting (aOR 2.21; 95% CI 1.01–4.84; p=0.047) and permanent funding (aOR 2.74; 95% CI 1.08–6.92; p=0.034), while governance structure and patient volume did not show statistically significant independent effects (Table 4).

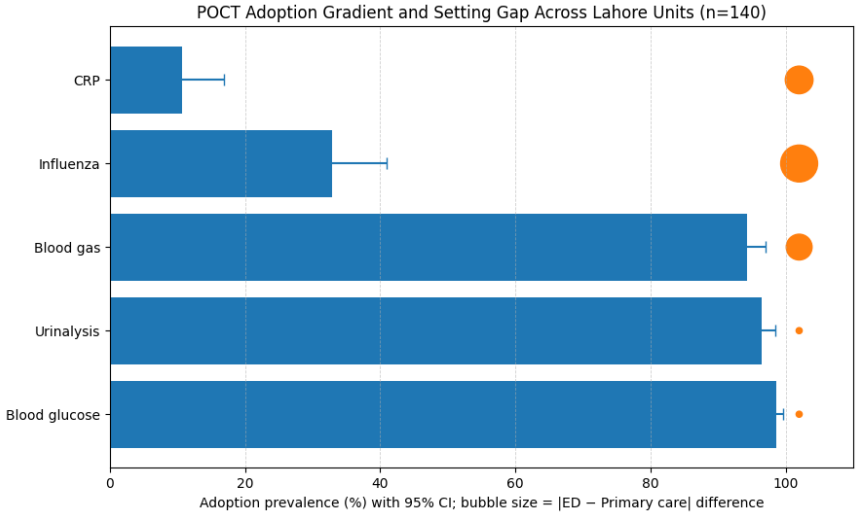


*Figure 1 PCT Adoption Gradient and Setting Gap Across Lahore*

## DISCUSSION

This cross-sectional survey from Lahore demonstrates a clear stratification in POCT adoption, with near-universal implementation of core bedside tests and substantially lower uptake of advanced infection-related biomarkers. This pattern is consistent with the broader POCT implementation literature, which shows that tests with mature clinical pathways and operational familiarity diffuse more rapidly than biomarker-driven or multiplex platforms that demand stronger evidence positioning, workflow redesign, and sustained quality infrastructure (1,10,12). The high penetration of glucose, urinalysis, and blood gas testing aligns with the role of POCT in accelerating time-to-decision and reducing avoidable delays in acute care, particularly where rapid stabilization and disposition decisions are required (5,14).

A key operational signal in the present study is the persistence of documentation and interoperability gaps despite high EHR availability. Automated upload of POCT results remained uncommon, suggesting that digitization at the facility level does not necessarily translate into integrated diagnostic data flows. Implementation evaluations emphasize that weak interoperability increases transcription burden, can

compromise traceability and audit readiness, and undermines continuous quality monitoring—an especially important issue for programs scaling beyond basic tests (12,18). Risk-mitigation frameworks in emergency medical services also highlight that POCT failure modes often cluster around governance, competency, and data capture rather than device analytics alone, reinforcing the need for structured oversight and standardized documentation in routine practice (6).

The between-setting results indicate that emergency units adopt acuity-linked technologies more frequently than primary care, as reflected by higher blood gas and influenza testing. This is clinically coherent because emergency departments often face higher severity presentations and may be institutionally closer to laboratory systems and quality teams. By contrast, CRP adoption was comparatively higher in primary care in adjusted analysis, aligning with international evidence where CRP POCT is positioned as a decision aid for ambulatory infection management and stewardship-oriented prescribing pathways (2,3). However, the overall CRP adoption level remained low, mirroring cross-system reports that uptake depends on financing mechanisms, implementation governance, and the perceived adequacy of the evidence base for local guideline alignment (1,2,12,13). Consistent with a health-systems lens, roadmaps from Central and Eastern Europe underscore that large-scale POCT implementation requires explicit service models defining who funds the test, who owns quality assurance, and how results enter records and oversight dashboards (4).

Funding constraints were the leading barrier in Lahore, which is in line with studies showing that recurring consumable costs, device maintenance, quality control, and training requirements create sustained budget pressure even when clinical utility is recognized (1,10,12,13). Reviews of ambulatory POCT panels suggest that benefits can be clinically meaningful, but implementation success depends on context-specific value demonstration and operational integration, rather than technology availability alone (7). Provider-perspective surveys similarly describe enthusiasm for faster decisions and patient satisfaction alongside persistent concerns about cost, reliability, training, and workflow disruption, which map closely to the barrier profile observed in this study (15,20). Patient preference evidence also supports acceptability of rapid testing in many contexts, but acceptability does not replace the need for governance and sustainable financing if adoption is to be maintained beyond early deployment (11).

Several limitations temper interpretation. The cross-sectional design measures availability and reported use rather than downstream clinical outcomes, and causal inference is not possible. Survey responses may be subject to reporting variability, although structured operational definitions and the selection of unit-level respondents with diagnostic oversight reduce ambiguity. Additionally, while multivariable modeling identified associations with CRP adoption, determinants may differ across other advanced tests such as PCT or respiratory multiplex platforms because their clinical placement and evidence expectations are distinct (8,10,12). Despite these limitations, the study provides a locally grounded baseline, indicating that scaling POCT beyond core tests in Lahore will likely depend on strengthening sustainable funding pathways, governance standardization, competency assurance, and electronic interoperability—priorities emphasized across international implementation and safety literature (4,6,12,18).

## CONCLUSION

In Lahore, POCT adoption is dominated by core bedside tests, while advanced infection-related biomarkers remain uncommon, with uptake shaped primarily by structural determinants including sustainable funding, governance arrangements, and limited interoperability; policy and service strategies that formalize quality oversight, secure recurring budgets, and integrate POCT results into routine electronic records are likely to yield the greatest gains in safe, clinically interpretable POCT expansion.

## REFERENCES


1. Alrubayyi A, Fahimi R, Hassan M, Madan J, Uthman OA. Current clinical practices and future perspectives for primary healthcare use of point-of-care devices: a scoping review. Int J Clin Pract. 2025;2025(1).
2. Dewez JE, Nijman RG, Fitchett EJA, Lynch R, de Groot R, van der Flier M, et al. Adoption of C-reactive protein point-of-care tests for the management of acute childhood infections in primary care in the Netherlands and England: a comparative health systems analysis. BMC Health Serv Res. 2023;23(1).
3. Dewez JE, Pembrey L, Nijman R, Torso SD, Grossman Z, Hadjipanayis A, et al. Availability and use of rapid diagnostic tests for the management of acute childhood infections in Europe: a cross-sectional survey of paediatricians. PLoS One. 2022.
4. Dózsa C, Horváth K, Cserni I, Cseh B. Roadmap for large-scale implementation of point-of-care testing in primary care in Central and Eastern European countries: the Hungarian experience. Prim Health Care Res Dev. 2022;23.
5. Elrobaa IH, Khan K, Mohamed E. The role of point-of-care testing to improve acute care and health care services. Cureus. 2024.
6. Füzéry AK, Kost GJ. Point-of-care testing practices, failure modes, and risk-mitigation strategies in emergency medical services programs in the Canadian province of Alberta. Arch Pathol Lab Med. 2020;144(11):1352–71.
7. Goyder C, Tan PS, Verbakel J, Ananthakumar T, Lee JJ, Hayward G, et al. Impact of point-of-care panel tests in ambulatory care: a systematic review and meta-analysis. BMJ Open. 2020;10(2):e032132.
8. Jamshidi N, Waine M, Binet M, Mohan V, Carter DJ, Morgan B. The adoption of point-of-care testing technologies for respiratory tract infections in primary care in Australia: challenges and facilitators. Diagn Microbiol Infect Dis. 2024.
9. Jumah MA, Magliah FF, Ageel SA, Almutairi JA, Alsubhi WA, Alamer S, et al. Utilization and benefits of point-of-care testing in primary healthcare. Int J Community Med Public Health. 2025.
10. Korte BJ, Rompalo A, Manabe YC, Gaydos CA. Overcoming challenges with the adoption of point-of-care testing. Point Care. 2020;19(3):77–83.
11. Lilly C, Ensom E, Teebagy S, DiMezza D, Dunlap DR, Hafer N, et al. Patient preferences for point-of-care testing. Point Care. 2020.
12. Lingervelder D, Koffijberg H, Kusters R, Ijzerman MJ. Point-of-care testing in primary care: a systematic review on implementation aspects addressed in test evaluations. Int J Clin Pract. 2019;73(10).
13. Matthes A, Wolf F, Schmiemann G, Gágyor I, Bleidorn J, Markwart R. Point-of-care laboratory testing in primary care: utilization, limitations and perspectives of general practitioners in Germany. BMC Prim Care. 2023;24(1).
14. Nichols J. Utilizing point-of-care testing to optimize patient care. EJIFCC. 2021.
15. Orwig T, Sutaria S, Wang Z, Howard-Wilson S, Dunlap D, Lilly CM, et al. Sampling healthcare professionals' perspectives on point-of-care technologies from 2019–2021: a survey of benefits, concerns, and development. PLoS One. 2024.

16. Pandey M, Lyttle M, Cathie K, Munro A, Waterfield T, Roland D, editors. Point-of-care testing in paediatric settings in the UK and Ireland: a cross-sectional study. Arch Dis Child. 2022.

17. Pandey M, Lyttle MD, Cathie K, Munro A, Waterfield T, Roland D, et al. Point-of-care testing in paediatric settings in the UK and Ireland: a cross-sectional study. BMC Emerg Med. 2022;22(1).

18. Patel KK, Suh-Lailam BB. Implementation of point-of-care testing in a pediatric healthcare setting. Crit Rev Clin Lab Sci. 2019.

19. Shephard M, Shephard A, Matthews S, Andrewartha K. The benefits and challenges of point-of-care testing in rural and remote primary care settings in Australia. Arch Pathol Lab Med. 2020;144(11):1372–80.

20. Teebagy S, Wang Z, Dunlap DR, Saleeba C, DiMezza D, Crain J, et al. Understanding healthcare professionals' perspectives on point-of-care testing. Diagnostics. 2022.