RJNMSR
Review Journal of Neurological & Medical Sciences Review

Volume 4, Issue 4, 2026

IMPACT OF POINT OF CARE TESTING ON CLINICAL DECISION-MAKING IN BIOCHEMISTRY – A REVIEW

Waleed Ahmad[1], Talha Saleem[*2]

[1]*Superior University Lahore Pakistan*
[*2]*Faculty of Allied Health Sciences, The Superior University, Lahore Pakistan*

[1]su91-bmlsm-f22-034@superior.edu.pk, [*2]talha.saleem@superior.edu.pk

Corresponding Author: *
Talha Saleem

DOI: https://doi.org/10.5281/zenodo.19725121

Received	Accepted	Published
11 February 2026	04 April 2026	24 April 2026

ABSTRACT

Background: *Point-of-Care Testing (POCT) is a relatively new concept in contemporary clinical biochemistry, offering quick diagnostic data close to the bedside. In contrast to traditional laboratory testing, which is characterized by delays in the transportation of samples, their processing, and reporting, POCT provides real-time biochemical data that can have a direct impact on clinical judgment. The rise in its application in emergency rooms, intensive care units, outpatient departments, and critical care environments has piqued the curiosity on its application in enhancing patient management and healthcare efficiency.*

Purpose: *To assess the effects of point-of-care testing on clinical decision-making in biochemistry, and to determine how effectively point-of-care testing can be used to help reduce turnaround time, enhance diagnostic efficiency and aid in the timely management of a patient.*

Methodology: *This research was done as a cross-sectional analytical research within the biochemistry and clinical care sections, of a tertiary care hospital. Professionals in healthcare who dealt with the diagnosis and management of patients were factored in. A structured proforma was used to collect the data that included turnaround time, accuracy of results, impact on treatment decisions, and overall clinician satisfaction. The results of POCT were compared to the traditional laboratory testing in routine clinical practice. Data were compared with proper statistical techniques to establish the significance of the differences observed.*

Findings: *The research revealed that POCT greatly led to a shortening of the turnaround time, and it also offered quicker access to biochemical findings. This resulted in a more timely clinical decision, a timely start or change in treatment and enhanced patient flow in acute care. The majority of clinicians claimed that POCT enhanced the confidence in immediate patient care, especially in emergency and critical care situations. All in all, POCT had a positive effect on diagnostic efficiency and clinical decision-making.*

Conclusion: *POC testing has a useful purpose in clinical biochemistry as it helps in better clinical diagnosis and makes prompt clinical decisions. Its adoption in the medical environment could enhance patient care and maximize clinical performance.*

Key words: *Point-of-care testing, clinical decision-making, biochemistry, turnaround time, rapid diagnosis, patient management.*

INTRODUCTION

The most significant change in the laboratory medicine in the present day is the point of care testing POCT since the possibility of biochemical testing can be carried out at the point of patient care or at the point of patient care and not the traditional central laboratory

pathway. This transformation has seen the POCT in the past decades evolve into a much more comprehensive diagnostic platform, with blood gases, electrolytes, lactate, renal, cardiac biomarkers and a myriad of other clinically significant biochemical analysis, as compared to the relatively crude bedside glucose measurements of the past decades. This evolution has resulted in POCT becoming increasingly relevant to hospital biochemistry wherein treatment choices might just depend on the accuracy of the outcome in addition to how quickly such an outcome can be acquired. The attractiveness of POCT in acute and chronic care is founded on the reality that it will lessen the time lag between the gathering of a sample and its clinical analysis and hence bring laboratory information to the bedside. [1]

The increasing popularity of POCT has a strong connection with the shortcomings of the traditional laboratory tests in the time-sensitive environment. In the classical approach, samples have to be ferried to the laboratory, registered, done, scrutinized and in the end reported to clinicians. All of this could cause delay especially in the busy emergency departments, intensive care units and outpatient services, which have a high turnover of the patients. The fact that the main promise of POCT was not a mere technical decentralization, but an opportunity to transform care into a more patient-centered process in which the diagnostic information could be delivered and used immediately during a consultation or resuscitation has been the subject of the previous literature. This is important in biochemistry because many clinical pathways involve the timely interpretation of metabolic and biochemical disturbances and the timeliness of reporting can slow down the diagnosis, triage, interventions and disposition planning.[2]

Concurrently, the literature has continuously pointed out that speed should not be used as a criterion to determine the value of POCT. Systematic reviews also revealed that POCT evidence base is heterogeneous, and the analytical convenience does not always lead to an improved patient outcome unless the testing is undertaken as part of a pertinent clinical process. This is a serious issue that needs to be studied in biochemistry because adaptation of rapid test does not necessarily translate into better decisions in cases where the clinicians are not given results within a meaningful time period, there is no change of treatment algorithms or there is still a high rate of confirmatory laboratory dependence. It is, therefore, not a question of scientific interest whether POCT is capable, in principle, of being faster than the central laboratory testing, but rather how, in what circumstances and on what analytes this speed is in fact benefiting the decision-making. The latter renders the topic of the subject of the academic and clinical interest.[3]

Its applicability in the provision of biochemistry services has been further enhanced by the growing test menu that is offered by POCT. The new POCT systems can provide instant information about glucose, ketones, blood gas, electrolyte, creatinine, urea, inflammatory and lipids, troponin, BNP, and coagulation parameters and even basic metabolism. These do not constitute peripheral parameters to clinicians; they are central biochemical parameters, which are used in the diagnosis of sepsis, diabetic emergencies, acute kidney injury, electrolyte imbalance, myocardial infarction, shock and respiratory failure. Nichols defined POCT as a sensible expansion of laboratory medicine into the clinical setting and how portability, ease of use, connectivity and quick turnaround are redefining the relationship between generation of tests and clinical action. When applied to the field of biochemistry, this would mean that POCT is not simplistic laboratory medicine in the simplistic sense of the term but rather would be a re-packaging of sections of testing to when management may have been influenced by immediate-need. [4]

A randomized study by Kendall and colleagues in the emergency department was one of the first and most impactful clinical trials to show the clinical usefulness of POCT. Their experiment showed that the point-of-care analysis saved much time when it came to making management decisions that relied on the blood tests results, but in particular, biochemical tests results. They also discovered that the subjective changes about the treatments in a sub-group of the patients were faster in situations where the timing of the

treatment was considered to be clinically important. Though the study did not show significant differences in mortality, hospital stay or admission rate, it laid a very important principle on which this area of research will focus most of its attention; POCT could have its most imminent impact on process measures and clinician action before its impact on more hard outcomes becomes apparent. This is a great advantage of process in biochemistry, where clinicians are inclined to wait until serum results are known, before escalating care.[5]

LITERATURE REVIEW

Shaw et al., 2016 defined point-of-care testing as a decentralised lab medicine and studied the operational issues that are encountered when biochemical tests are moved out of the central lab and to wards, emergency units and other bedside locations. The authors have framed their article in the form of a practice-oriented review of the accreditation requirements and the real-life implementation issues, specifically, the POCT orders documentation, the transfer of the results into the medical record, operator competency, training, and supervision. The authors did not claim that POCT, in itself, is bad, but demonstrated that the clinical utility of rapid biochemical tests can be compromised in the case of weak governance systems. Their discussion revealed that even faster turn around cannot be effective in being able to improve decision making when there is poor result capture, traceability and accountability. Regarding research, this paper has a solid conceptual foundation since it connects the analytical speed to the broader clinical pathway and the reasons as to why POCT might be successful in one location and unsuccessful in another. The article is particularly applicable to the field of biochemistry since a great portion of bedside tests directly relates to fluid therapy, electrolyte replacement, kidney assessment, and emergency imaging. Shaw et al. thus elucidated that POCT influence in clinical decisions varies not just based on the functioning of the device, but also on the quality systems in institutions that render prompt findings as clinically credible and useful.[6]

Holt et al., 2016 critically reviewed the internal quality control of POCT and concentrated on the question of whether the results of a bedside biochemical test are reliable enough to make a decision about the treatment. They focused their article on an evidence-based review and not a clinical trial and they reviewed published methods to IQC on various POCT platforms such as those devices that were utilized beyond the laboratory by non-laboratory staff. Their work had a significant strength in the form of transitioning to risk-based framework being no longer based on the usual, rigid schedules of quality control. They reasoned that the proper frequency and intensity of quality control depends on the complexity of the analyser, system checks built-in, how frequently it is used, and the clinical harm that might be caused by an inaccurate result. Their results were significant in the sense that they revealed that there was limited evidence of most of the current IQC practices despite the fact that they form the basis of making decisions of glucose, electrolytes, gases as well as cardiac markers. The article plays an important role in the framework of clinical decision-making: only in case the clinicians can rely on a rapid biochemical result, it is valuable. Holt et al. thus aided the establishment of a methodological groundwork to POCT studies by demonstrating that clinical utility studies should also be mindful of the quality safeguards that ascertain that bedside figures can be responded to with certainty.[7]

Florkowski et al., 2017 tackled the question of POCT by using the concept of evidence-based laboratory medicine and specifically inquired about whether POCT was really beneficial in clinical decision-making. They based their methodology on literature review based on EBLM principles, with high-quality systematic reviews and meta-analyses (preferably with randomized controlled trials) having the highest priority. This contributed to their paper being particularly handy in terms of the review thesis since it was not merely a revelation that POCT was good, it judged the quality of the evidence available. The authors inferred that POCT benefits are the most apparent in the environments where timely biochemical data may become a part of the time-sensitive clinical pathway, i.e., emergency and acute care. They, however, also observed that the decreases in turnaround time do not necessarily decrease the total stays or result since other bottlenecks may

still exist. This is an equitable interpretation that is very pertinent to the topic at hand. It implies that POCT needs to be evaluated based on how it alters the time, accuracy, and course of clinical action as well as the speed of analysis. Thus, their article is justified by a less mature research question: not whether POCT is fast, but whether its speed can be used in clinical practice in everyday biochemical practice.[8]

The study by Morris et al., 2017 constitutes one of the most clinically relevant systematic studies in the area as it conducted a point-of-care lactate testing in terms of its use in sepsis when patients first attend a healthcare facility. Two reviewers conducted a search on six electronic databases with a maximally sensitive search strategy to screen 3063 records and include eight studies with 3063 patients, and evaluate the quality of observational-studies as to the tool of ROBINS-I. They found that POCT lactate was correlated with a significantly quicker availability of lactate data, sooner the administration of intravenous fluids and in certain studies earlier antibiotics and reduced ICU admissions. Simultaneously, they were also attentive to point out significant weaknesses: they did not find any randomized controlled trials, no primary-care studies, and included studies were heterogeneous and weak methodologically. This article has a lot of potential when it comes to a review thesis since it shows potential and uncertainty. It helps to prove that POCT can impact early clinical decisions in sepsis, particularly when the use of biochemical evidence is necessary as fast as possible, but it also demonstrates that more carefully designed studies are necessary before any definite conclusions regarding the mortality benefit can be made. Morris et al. therefore give a solid reason as to why the effect of rapid biochemistry on the actual treatment behavior should be further researched.[9]

MATERIAL AND METHODS

This study was conducted as a narrative review to evaluate the impact of point-of-care testing (POCT) on clinical decision-making in clinical biochemistry, focusing on turnaround time, diagnostic efficiency, and treatment outcomes. It was a desk-based study using published literature from scientific databases and credible journals, without any clinical or laboratory experimentation. The review process spanned approximately four months and included literature search, screening, data extraction, and interpretation. Around 30–45 relevant peer-reviewed articles were selected through purposive sampling based on their relevance to POCT applications in various healthcare settings. Only English-language studies with clear clinical relevance were included, while non-relevant, non-scientific, duplicate, and non-English studies were excluded.

Main Boday

This discussion was advanced by Parvin among others who explored how POCT could be used in a big emergency department to cut down the length of stay of patients by routinely using POCT. Their findings were beneficial to the field in that they revealed that the faster a laboratory is available, the more a corresponding improvement of the departmental throughput may not be expected. The lesson is important to the biochemistry-based decision research because the decision to take the test result to clinical disposition is influenced by the staffing, imaging time, bed space, senior review and complexity of the case in question. However, the study also offered a good insight into the fact that biochemical discoveries presented at the bedside can eradicate one of the most important bottlenecks in the emergency treatment. In other words, POCT would not be the cure-all to every one of the operational delays but, it can be a great contribution to the first and the most manageable step in the diagnostic management, which is clinical waiting based on laboratory.[10]

Subsequent research by Lee-Lewandrowski and other scholars has found that POCT effect is magnified in case of implementation that is associated with service redesign. Their article about a point-of-care satellite laboratory in the emergency department revealed that the turnaround time of tests and the length of stay decreased, implying that POCT is most efficiently implemented as a part of a comprehensive operational approach but not as a stand-alone device. This conclusion has great applicability to the hospital biochemistry as it supports the notion that the analytical technology and workflow architecture should be regarded as one. This is an applicable point of view especially in tertiary-care hospitals where

the delays are usually multifactorial and the biochemical data is institutionalized in the triage, stabilization and treatment instructions. By doing so, the literature validates the evaluation of POCT as the form of testing, and, as the paradigm of diagnostic services brought closer to the patient.[11]

Mogensen and colleagues have also touched on the concept of time to action, by comparing POCT to the traditional service of laboratory in emergency care. They worked on whether the speed of getting test results alters the time period over which clinicians can take action, a more pertinent question than simply the turnaround of clinical analyses when considering clinical utility. In the case of biochemistry, this difference is essential since only a test with a result that is obtained by the clinician in time to make a difference in the diagnosis or management process is valuable. Such research can help to change the literature towards less technical comparisons, and more clinical endpoints. They also indicate that POCT should be measured by how it will change the time and confidence in medical action and not the speed of a machine to provide a number. The given orientation perfectly coincides with the current topic in biochemistry on decision-making.[12]

Acute cardiovascular care is another important field that POCT has made an impact in decision-making. Collinson and co-authors reported the findings of a prospective randomized trial in a coronary care unit that demonstrated that POCT could help in the earlier interpretation of cardiac biochemical variables in high-risk patients. The time of troponin and other biomarkers in clinical situations such as acute coronary syndrome has a direct implication on risk stratification, follow-up of severity, antithrombotic therapy and transfer. The study therefore reveals the advantages of POCT in improving clinical usefulness of the biochemistry which entails relating the biomarker detection with bedside management. This is particularly significant since during cardiac emergencies the clinical window of intervention might be very limited and long diagnostic uncertainty can be caused by delay in laboratory validation. Coronary care literature will thus support the general argument that POCT is most applicable when biochemical markers are predominant in the decision making process as far as urgent therapeutic decisions are concerned.[13]

The assessment of the possible acute coronary syndromes in emergency department has also supported this effect. Renaud and colleagues examined POCT in the evaluation and treatment of patients with suspected ACS and revealed that quick testing could enhance the effectiveness of the assessment routes in the emergency. This literature is of great importance as ACS management relies greatly on the biochemical evidence, especially on decision pathways that involve the use of troponin to inform the observation, admission, serial testing, and referral to the specialists. With the ability to speed up the access to these results, POCT has the potential to decrease diagnostic uncertainty and the time frame during which clinicians will need to make decisions based only on symptoms and electrocardiographic results. These studies prove that POCT is not a form of a more rapid version of laboratory medicine, but a tool that is capable of changing the sequence of time of diagnosis and, consequently, the content of the practical decision-making itself.[14]

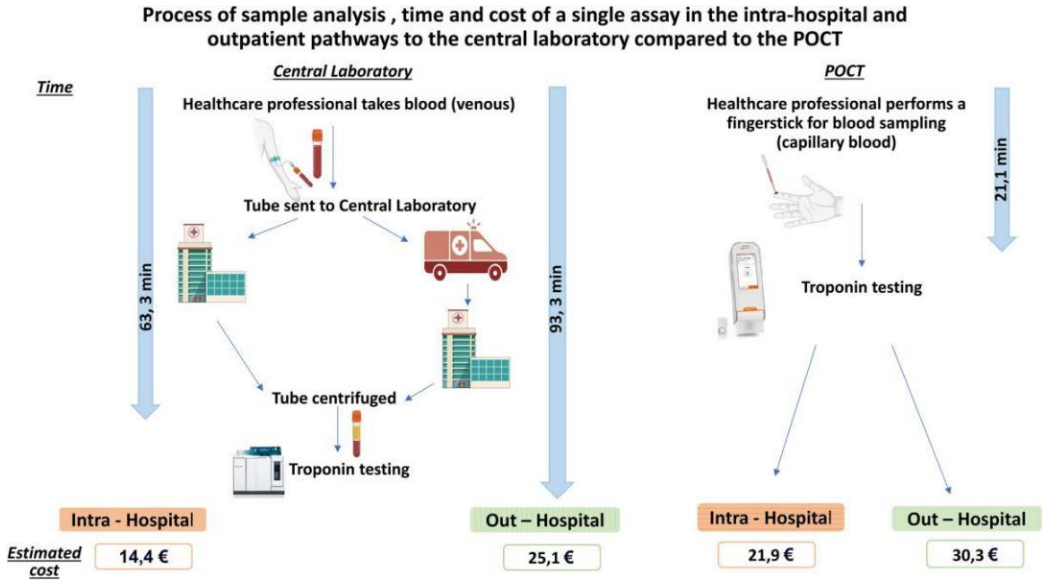

Figure 1: This figure indicates that POCT offers significantly quicker troponin testing in both intra-hospital and outpatient care than the central laboratory pathway, but at a relatively increased cost.

Cost and applicability questions are also of relevance in determining the relevance of POCT. Laurence et al. also determined the cost-effectiveness of POCT in general practice and proved that the technology needs to be evaluated regarding not only the speed and convenience, but also the usefulness of its advantages in the context of the resources used. This aspect is especially applicable to low-resource and middle-income healthcare systems, with implementation of POCT in biochemistry having to strike a balance between costs of equipment, consumable costs, maintenance, staff training and quality control. Simultaneously, evidence on cost-effectiveness can justify the generalizability of findings since it helps answer the question of the potential sustainability of POCT in the regular clinical process. In the case of a research project dealing with impact on decision-making, this literature will remind us that a good test is clinically beneficial as well as operationally and economically realistic in the environment in which it will be used.[15]

Although point-of-care testing has become increasingly popular in clinical biochemistry, there are still critical gaps that need to be filled in order to realize the full potential of this testing in real time clinical decision-making. Numerous past investigations addressed primarily the analytical performance, turnaround time or operational efficiency, whereas limited studies investigated the direct effect of POCT on the diagnostic confidence, treatment change, patient triage, and clinician judgment in routine hospital practice. In most healthcare facilities, particularly in developing nations, there is still little evidence on the feasibility of POCT into biochemistry services, its effectiveness under normal practices, and its applicability in delivering timely but correct decisions. Thus, additional studies are required to determine whether the promptness of the results of the biochemical tests provided by POCT indeed enhances the clinical decision-making and patient management processes. Finally, POCT seems to be a bright innovation in the contemporary biochemistry, yet further setting-specific data must be gathered to determine the actual clinical value of this method, how to best implement it, and what its role is in relation to traditional lab tests.[16]

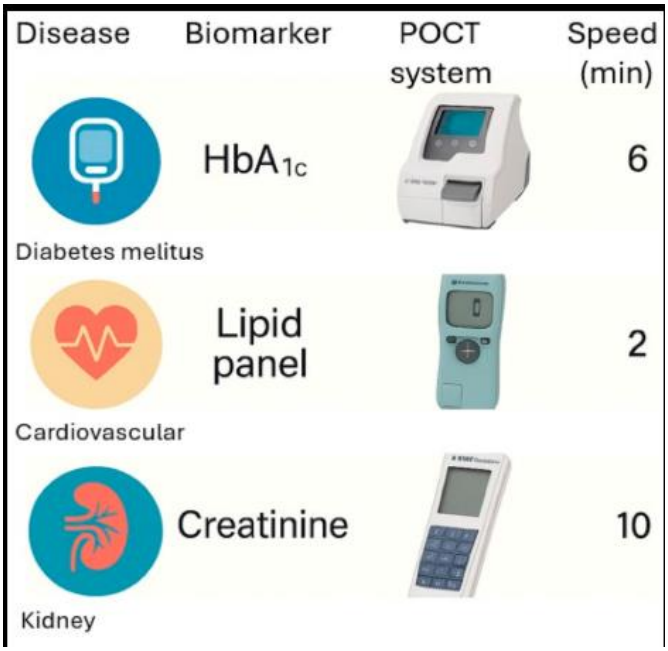

Figure 2 : This picture shows that POCT can rapidly measure key biomarkers such as HbA1c, lipid profile, and creatinine for diabetes, cardiovascular, and kidney diseases

There are certain limitations to this thesis review since it was solely a review of the published works and did not involve primary data or direct clinical work. Only articles in English language were considered thus they might have missed some useful studies. Another difficulty in the reviewed studies was that they were in different settings and applied varying methods and devices that made it hard to compare them. Moreover, numerous studies emphasized more on turnaround time and workflow than patient outcomes over the long-term. As not all studies were taken into consideration, but only a selection of them, some important evidence might not be captured and publication bias could also occur. Finally, the results are primarily descriptive and weaker since it was not a systematic review or meta-analysis study, but a narrative review.

Table 1: in this table, POCT is seen to enhance rapid testing and early diagnosis, as well as timely clinical decisions, but the actual utility of POCT hinges on the quality control, governance, accuracy and appropriate clinical integration.

Parameter	Positive Finding	Limitation / Concern
Turnaround Time	POCT reduced turnaround time and provided faster biochemical results.	Faster results did not always improve all clinical outcomes.
Time to Clinical Decision	POCT helped clinicians make earlier treatment decisions.	Benefit depended on whether rapid results were integrated into workflow.
Length of Stay / Patient Flow	Some studies showed shorter ED stay and better patient flow.	Other bottlenecks sometimes limited the overall effect.
Diagnostic Efficiency	POCT improved early diagnosis by giving immediate biochemical information.	Diagnostic benefit varied by setting and test type.
Sepsis Management	Lactate POCT supported earlier fluids, repeat lactate testing, and in some cases earlier antibiotics.	Mortality and full bundle adherence were not always improved.

Parameter	Positive Finding	Limitation / Concern
Cardiac Care	Troponin POCT supported rapid ACS assessment and early discharge decisions in low-risk patients.	In already efficient systems, the added benefit was sometimes small.
Imaging Pathway Efficiency	Creatinine POCT reduced waiting time before contrast-enhanced CT.	Broader patient outcomes were not always assessed.
Risk Stratification	Prehospital lactate POCT helped identify critically ill patients and predict early mortality.	Some studies were observational and need stronger validation.
Quality Control / Reliability	Good quality systems made POCT results more trustworthy for decision-making.	Weak IQC and poor governance reduced reliability.
Governance / Documentation	Proper oversight and documentation improved POCT usefulness.	Poor documentation and weak result transfer reduced clinical benefit.
Analytical Accuracy	Some POCT methods showed good agreement with central laboratory testing.	Certain specimen types, such as capillary lactate, showed poor agreement.
Cost-Effectiveness	POCT may be cost-effective in selected clinical pathways.	Economic benefit depended on organization, repeat visits avoided, and setting.
Clinical Applicability	POCT was useful in emergency care, ICU, transport, outpatient imaging, and remote settings.	Applicability varied across healthcare environments.
Transport / Prehospital Utility	POCT supported ventilation, transfusion, electrolyte correction, and escalation decisions during transport.	Evidence was often descriptive and not always based on controlled trials.
Overall Outcome	POCT improved rapid biochemical assessment and early management.	Its full impact depended on test quality, governance, and workflow integration.

7.1: CONCLUSIONS

To sum up, point-of-care testing is a valuable instrument in clinical biochemistry as it offers quicker lab findings close to the patient and assists physicians to make more rapid diagnostic, treatment, monitoring, and referral decisions. It is particularly convenient in the emergency and critical care facilities where time is highly valued. Nevertheless, POCT cannot be a full-fledged substitution of the traditional laboratory testing but must be seen as a supplementary technique, with adequate quality control, staff education, and supervision. In general, POCT positively impacts patient care; however, its effectiveness is determined by its accuracy, reliability, and the appropriate application in clinical practice.

7.2: RECOMMENDATIONS

POCT should be expanded in emergency, ICU, and critical care settings to enable rapid clinical decisions and improve patient outcomes. It should complement standard laboratory testing, especially where quick results enhance diagnosis and treatment. Strong quality assurance systems, regular staff training and competency assessments, and clear SOPs with institutional guidelines are essential to ensure accurate, reliable, and safe use of POCT in clinical practice.

7: LIMITATIONS

The limitations of this thesis review include the fact that it was tested on published research and lacked primary data or direct clinical activity. Only articles in English language were considered and thus some valuable studies

could have been overlooked. The studied articles were also in dissimilar settings and employed various techniques and equipment, which complicated the comparison process. Moreover, a significant number of studies paid more attention to turnaround time and workflow rather than patient outcomes over the long term. Only the chosen studies were involved so some valuable evidence might have been missed, and it is possible as well that publication bias occurs. Finally, since it was a narrative review, and not a systematic review or meta-analysis, the results are primarily descriptive, and statistically weaker.

REFERENCES

Luppa PB, Müller C, Schlichtiger A, Schlebusch H. Point-of-care testing POCT: current techniques and future perspectives. TrAC Trends Anal Chem. 2011;306:887-898.

St John A. The evidence to support point-of-care testing. Clin Biochem Rev. 2010;313:111-119.

Pecoraro V, Germagnoli L, Banfi G. Point-of-care testing: where is the evidence? A systematic survey. Clin Chem Lab Med. 2014;523:313-324.

Nichols JH. Utilizing point-of-care testing to optimize patient care. EJIFCC. 2021;322:140-144.

Kendall J, Reeves B, Clancy M. Point of care testing: randomised controlled trial of clinical outcome. BMJ. 1998;3167137:1052-1057.

Parvin CA, Lo SF, Deuser SM, Weaver LG, Lewis LM, Scott MG. Impact of point-of-care testing on patients' length of stay in a large emergency department. Clin Chem. 1996;425:711-717.

Lee-Lewandrowski E, Corboy D, Lewandrowski K, Sinclair J, McDermot S, Benzer TI. Implementation of a point-of-care satellite laboratory in the emergency department of an academic medical center: impact on test turnaround time and patient emergency department length of stay. Arch Pathol Lab Med. 2003;1274:456-460.

Chaisirin W, Wongkrajang P, Thoesam T, Praphruetkit N, Nakornchai T, Riyapan S, et al. Role of point-of-care testing in reducing time to treatment decision-making in urgency patients: a randomized controlled trial. West J Emerg Med. 2020;212:404-410.

Mogensen CB, Borch A, Brandslund I. Point of care technology or standard laboratory service in an emergency department: is there a difference in time to action? A randomised trial. Scand J Trauma Resusc Emerg Med. 2011;19:49.

Collinson PO, John C, Lynch S, Rao A, Canepa-Anson R, Carson E, et al. A prospective randomized controlled trial of point-of-care testing on the coronary care unit. Ann Clin Biochem. 2004;41Pt 5:397-404.

Renaud B, Maison P, Ngako A, Cunin P, Santin A, Hervé J, et al. Impact of point-of-care testing in the emergency department evaluation and treatment of patients with suspected acute coronary syndromes. Acad Emerg Med. 2008;153:216-224.

Shephard MDS, Mazzachi BC, Shephard AK, McLaughlin KJ, Denner B, Barnes G. The impact of point of care testing on diabetes services along Victoria's Mallee Track: results of a community-based diabetes risk assessment and management program. Rural Remote Health. 2005;5:371.

Laurence CO, Moss JR, Briggs NE, Beilby JJ, PoCT Trial Management Group. The cost-effectiveness of point of care testing in a general practice setting: results from a randomised controlled trial. BMC Health Serv Res. 2010;10:165.

Price CP, Smith I, Van den Bruel A. Improving the quality of point-of-care testing. Fam Pract. 2018;354:358-364.

Holt H, Freedman DB. Internal quality control in point-of-care testing: where's the evidence? Ann Clin Biochem. 2016;53Pt 2:233-239.

Venner AA, Beach LA, Shea JL, Knauer MJ, Huang Y, Fung AWS, et al. Quality assurance practices for point of care testing programs: recommendations by the Canadian Society of Clinical Chemists point of care testing interest group. Clin Biochem. 2021;88:11-17.

haw JLV. Practical challenges related to point of care testing. Pract Lab Med. 2016;4:22-29.