Reliability and patient experience of point-of-care testing for clozapine monitoring: A scoping review

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Introduction

- Clozapine is the recommended anti-psychotic for patients with treatment resistant schizophrenia [1].
- Clozapine use requires regular blood monitoring due to its serious side effects, including agranulocytosis [2].
- However, there are limitations to blood monitoring, including patient adherence and resource intensity [3].
- Point-of-care testing (POCT) has emerged as a more accessible and convenient alternative to traditional laboratory monitoring [4].

The purpose of the study is to synthesize the existing quantitative and qualitative literature on the 1) accuracy and reliability and 2) patients' and providers' experiences of POCT compared to traditional laboratory monitoring.

Methods

MEDLINE and Embase (OVID) were searched for relevant articles. The titles and abstracts of all records were initially screened, and then full text articles were screened according to the PRISMA-ScR checklist [5] (Figure 1).

Figure 1. Study inclusion criteria.

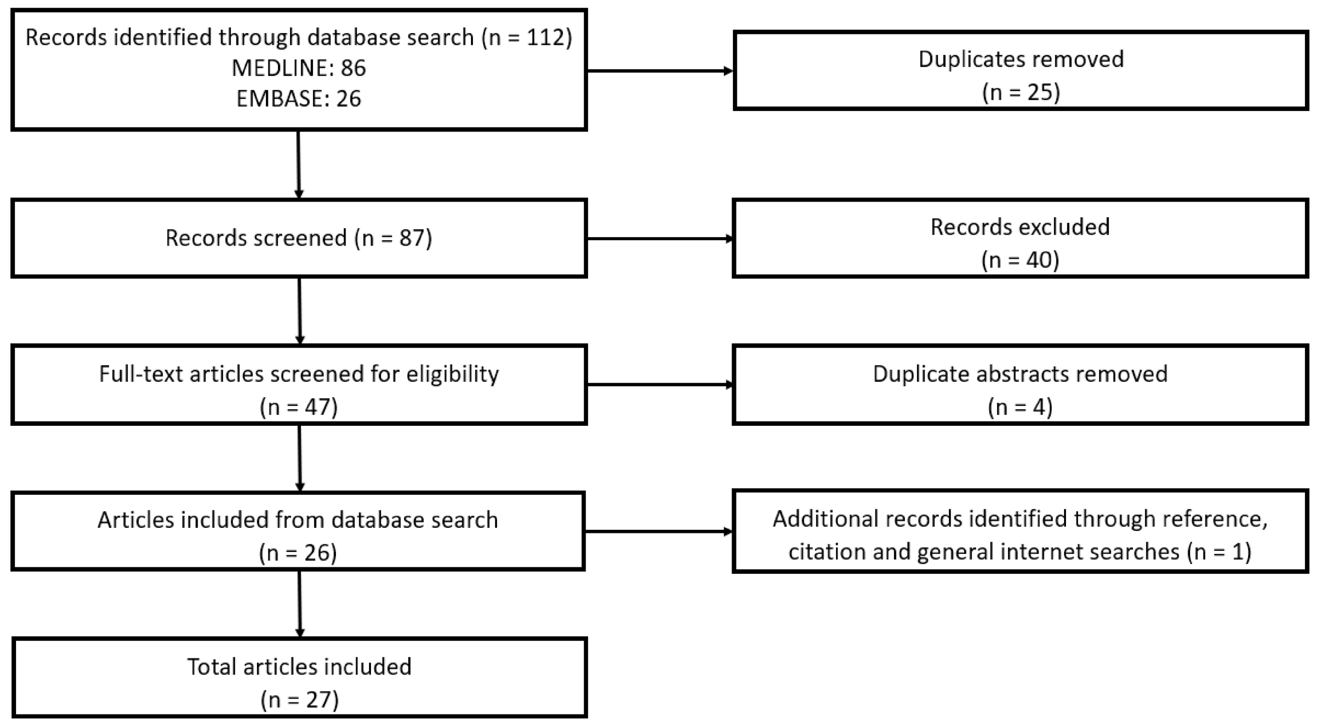

Table 1. Summary of primary studies assessing accuracy and reproducibility of various POCT devices compared to traditional venous laboratory monitoring results (N=15).

Measures	White Blood Cells (WBC) Count	Absolute Neutrophil Count (ANC)	Clozapine Levels	Reproducibility
# of Studies	7	7	9	8
How the Measure was Assessed	1. Capillary R and venous R 2. Correlation coefficient (e.g., slope) OR 3. Correlation variance between capillary R and venous R	1. Capillary R and venous R 2. Correlation coefficient OR 3. Clinical concordance between capillary R and venous R	1. Correlation coefficient OR 2. Frequency of ≥ 50% change between capillary and venous R	1. Minimal bias for the POCT device compared to traditional monitoring device 2. Repeatability coefficient 3. Within-laboratory precision 4. Intra-assay reproducibility
Overall Results	All ≥ **0.72** correlation coefficient. 6 studies found ≥ 0.93 correlation between POCT and traditional monitoring.	All ≥ **0.80** (except for one POCT device) correlation coefficient.	**0.88** [0.83-0.96] mean correlation coefficient.	**Low overall biases** found for capillary vs traditional monitoring methods. Repeatability coefficients = 6% or 11% in two separate studies. Within-laboratory precision = 12% or ≤ 13% in two separate studies.

Table 2. Summary of primary studies on the patient and provider experience of POC compared to traditional venous laboratory monitoring (N=15).

Experiences	Patient	Provider
# of Studies	13	11
Measures Assessed	1. Pain perception 2. Patient-rated convenience 3. Preference 4. Satisfaction 5. Involvement with care or engagement with results 6. Patient-rated acceptability 7. Anxiety about monitoring OR 8. Fear of monitoring method of POCT vs traditional monitoring 9. Adherence to monitoring 10. Safety 11. Reduced length of hospitalization	1. Preference 2. Perception of benefits (e.g., usefulness, solution to the barriers of traditional monitoring) 3. Satisfaction with device 4. Satisfaction with immediate results OR 5. Perception of improved patient care of POCT vs traditional monitoring 6. Interventions/recommendations per visit 7. Expedited clinical decisions
Overall Results	Most studies (except one) found that the patient experience for POCT was better on all the above measures (e.g., less pain perceived for POCT than traditional monitoring, less anxiety or fear of monitoring, etc.) Measures most often studied include pain perception, preference, and acceptability of POCT for patients.	All studies found the provider experience for POCT was better on all the above measures. Measures most often studied include preference and satisfaction of POCT, and perceived benefits of POCT.

Results

A final N=27 was collected and summarized (Tables 1 & 2).

Characteristics of Studies

- Publication years of studies: 2003 to 2025.
- Sample sizes: 4 (case reports) to 309.
- 10 POCT devices used from different brands, 2 unknown.

Summary of Results

- High correlation between POCT and laboratory monitoring for WBC: all studies found ≥72% correlation, most ≥90%.
- High correlation for ANC found: all ≥80% most ≥85%.
- High correlation for clozapine levels: ≥80%.
- Minimal bias found for most studies assessing reproducibility.
- Patients (12 out of 13 studies) and providers (all 11 studies) were found to prefer POCT.

Discussion

- Accuracy for POCT, as assessed by correlation with laboratory blood monitoring results, was found for all measures (WBC, ANC, and clozapine levels).
- Reproducibility was measured heterogeneously in the literature but overall was also found for POCT.
- Patient and providers preferred POCT over traditional monitoring due to the reduced burden on patients, resources and staff.
- Our findings emphasize the reliability of POCT as a replacement for traditional clozapine blood monitoring, and encourage providers, policy- and guideline-makers to potentially implement POCT as standard practice.

References 1. Kane J, Honigfeld G, Singer J, Meltzer H. Clozapine for the treatment-resistant schizophrenic: a double-blind comparison with chlorpromazine. Arch Gen Psych. 1988;45(9):789-96. doi: 10.1001/archpsyc.1988.0180033001300. 2. Alvir JM, Lieberman JA, Safferman AZ, Schwimmer JL, Schaaf JA. Clozapine-induced agranulocytosis. Incidence and risk factors in the United States. N Engl J Med. 1993 Jul 15;329(3):162-7. doi: 10.1056/NEJM199307153290303. 3. Farooq S, Choudry A, Cohen D, Naeem F, Ayub M. Barriers to using clozapine in treatment-resistant schizophrenia: systematic review. BJPsych Bulletin. 2019;43(1):8-16. doi:10.1192/bjb.2018.67. 4. Nielsen J, Thode D, Stenager E, Andersen KO, Sondrup U, et al. Hematological clozapine monitoring with a point-of-care device: a randomized cross-over trial. 2012;22(6):401-5. doi: 10.1016/j.euroneuro.2011.10.001. 5. Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. Ann Intern Med. 2018;169: 467–473. doi:10.7326/M18-0850.