Letter to the Editor

POCT in Cardiovascular Operating Room: A Game Changer?

Sibtain Ahmed[1*], Raif Jafri[2], Amal Mahmood[3]

[1]*Aga Khan University, Karachi, Pakistan Department of Pathology and Laboratory Medicine, Aga Khan University, Karachi, Pakistan*
[2]*United Medical & Dental College, Karachi, Pakistan*
[3]*Medical College, Aga Khan University, Karachi, Pakistan*

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[*]***Corresponding Author:***
Sibtain Ahmed
Assistant Professor
Pathology and Laboratory Medicine
The Aga Khan University, Karachi, Pakistan
Stadium Road, P. O. Box 3500
Karachi 74800, Pakistan
E-mail: sibtain.ahmed@aku.edu

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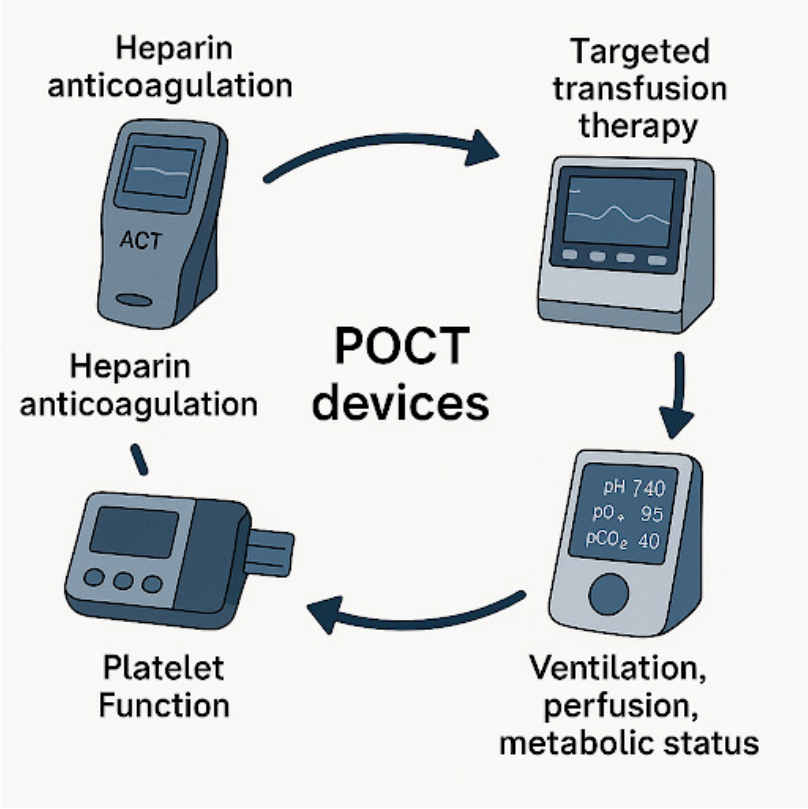
Abstract

Point of care testing (POCT) refers to diagnostic tests performed near the patient, rather than in a laboratory, It has been an essential component of operating rooms (ORs) since it was first introduced in the 1980s as it offers rapid diagnostic results that help physicians and surgeons to take critical care decisions, affecting the treatment pathway of a patient. This is particularly crucial in cardiovascular surgeries, where swift and accurate assessments of coagulation status, blood gases and other critical parameters are vital for patient safety and improved patient outcomes [1,2].

The main selling point of POCTs are their ability to deliver immediate and accurate results, enabling surgeons to make prompt, informed decisions in tense situations during surgery [1,3]. Traditional central laboratories often involve huge delays due to sample transportation and processing times, which can be fatal in the fast paced OR environment. POCT devices that are located near the OR eliminate these delays, allowing for real time monitoring of the patient's physiological status. For instance, during cardiopulmonary bypass (CPB) procedures, maintaining appropriate anticoagulation is critical to prevent thrombosis and hemorrhage. ACT, ROTEM, Sonoclot, Clotpro,i-STAT,PFA-100 etc are commonly used to asses hypercoagulability and hypocoagulability[4]. Implementing these technologies has been shown to improve precision and reduce the time required for repeat testing, thereby enhancing overall efficiency in the Cardiovascular Operating room [5,6].

ACT is essential for monitoring heparin anticoagulation during CPB. POCT devices help to provide rapid ACT results, facilitating timely adjustments to heparin dosing [5,7] The function of all POCT devices are listed in the table below.

Technology	Function	Clinical Use
ROTEM (rotational thromboelastometry) [8]	Assesses coagulation dynamics,detects fibrinolysis and guides transfusions	Clotting assessment and transfusion guidance
TEG(Thromboelastography) [9]	Measures Clot formation, strength, and breakdown, including platelet contribution	Guides uses of antifibrinolytics
Quantra	Ultrasound-Based viscoelastic testing, fully automated	Faster and simpler than ROTEM/TEG, best for ICU/post op care.
Sonoclot Analyzer	Measures clot formation, fibrin interaction, and platelet function	Combines coagulation & platelet function testing in one device.
ClotPro	Cartridge based testing with multiple assays	Faster and more flexible alternative to ROTEM/TEG.
TAS-TEG	Compact, cartridge-based TEG, rapid clot assessment.	Trauma and emergency use in the OR.
HMS Plus	Precise heparin & protamine dosing during CPB.	Optimizing heparin reversal, reducing complications.
Hemochron Signature Elite	Measures Activated Clotting Time (ACT) for heparin monitoring.	Routine ACT monitoring during CPB.
i-STAT [4]	Portable blood gas [10], ACT, APTT, INR, electrolytes [11], and troponins.	Multi-function analyzer for ICU & intraoperative monitoring.
VerifyNow	Measures platelet function and response to antiplatelet drugs (Aspirin, Clopidogrel)	Assessing antiplatelet therapy before/after surgery.
PFA-100	Shear-stress-induced platelet function testing, detects von Willebrand disease.	Diagnosing platelet dysfunction in surgical patients.



The selection of POCT depends on clinical needs: ROTEM for speed, TEG for detail, Quantra for automation, HMS Plus for precise anticoagulation management, and VerifyNow for platelet function testing.This ensures tailor made and effective intraoperative and postoperative hemostatic management for all patients [4].

By providing precise coagulation profiles,POCT enables targeted therapy,reducing unnecessary blood product administration. Studies have demonstrated that implementing POCT guided transfusion algorithms in surgery leads to a reduction in blood product use.Timely correction of coagulopathies and metabolic imbalances during surgery can reduce the incidence of complications such as excessive bleeding or acidosis [12,13].

Reduced result times because of POCT has been shown to contribute to shorter operative times,improved workflow and lower mortality rates as decisions can be made swiftly without having to wait for central laboratory results [2].

While POCT offers numerous advantages,its challenges must also be addressed.Stringent quality control measures and regular maintenance are necessary to maintain the accuracy, reliability and integrity of test results [3,10]. OR personnel must be adequately trained to perform and interpret these results to ensure proper utilization of the machinery [7]. Additionally, seamless integration of POCT results into the patient's electronic health record (EHR) is crucial for comprehensive documentation and continuity of care [11].

The development of smaller and more portable devices increases the accessibility and convenience of POCT in various surgical settings, helping to broaden the scope of POCTs, providing surgeons with a more comprehensive and coordinated care plan [2,3,8,10].

The future of Point-of-Care Testing (POCT) in cardiovascular surgery is moving toward AI-driven automation, miniaturization, and personalized diagnostics. Next-generation viscoelastic analyzers like Quantra and ClotPro will be faster and fully automated, while lab-on-a-chip and wearable POCT devices will enable real-time coagulation monitoring for high-risk patients. AI-powered interpretation will enhance decision-making, reducing human error and improving precision in transfusion and anticoagulation management. Multiparameter handheld analyzers will integrate coagulation, blood gases, and cardiac biomarkers into a single test, optimizing patient care in the OR, ICU, and even remote settings. The shift toward cloud-connected, predictive, and personalized POCT will revolutionize perioperative and critical care medicine, ensuring faster interventions and better outcomes.

Conflict of interests

None.

Ethical Approval

Not required as study does not involve human subjects or data.

Author Statement

Sibtain Ahmed conceived the idea and wrote the paper. Raif Jafri conducted the literature review and contributed to writing. Amal Mahmood assisted with the literature search and formatting. All authors reviewed and approved the final manuscript.

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