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POINT-OF-CARE TESTING IN THE ICU: CURRENT GAPS AND NEEDS

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Background: Point-of-care testing (POCT) in intensive care encompasses bedside laboratory diagnostics and point-of-care ultrasound (POCUS). Both offer rapid, repeatable information for managing shock, bleeding and respiratory failure, yet their clinical potential is constrained by fragmented implementation.

Objective: To identify shared gaps in ICU bedside diagnostics and outline priorities for integrating laboratory POCT and POCUS into precise, data-driven clinical workflows.

Key Themes: Five interrelated gaps are highlighted. First, diagnostic performance is affected by pre-analytical errors and assay limitations in laboratory POCT, and by operator dependence and qualitative interpretation in POCUS. Second, variable training, competency assessment and quality assurance undermine reproducibility. Third, incomplete electronic health record connectivity, manual transcription and inadequate image archiving prevent longitudinal analysis. Fourth, although diagnostic accuracy is extensively studied, evidence demonstrating improvements in patient outcomes and cost-effectiveness remains limited. Fifth, equipment costs, interoperability barriers and evolving European regulatory requirements complicate implementation. A proposed smart ICU workflow combines deterioration alerts, protocolised bedside laboratory testing and ultrasound, AI-assisted measurements, multimodal decision support, and documented reassessment after interventions. In shock, for example, serial lactate and blood-gas measurements can be integrated with quantitative cardiac and lung ultrasound and venous congestion assessment to guide individualised treatment.

Conclusions: Advancing POCT requires quantitative and interoperable tools, coordinated governance, structured education and certification, rigorous outcome-focused trials, and sustainable regulatory and funding pathways. The greatest opportunity lies not in faster isolated

tests, but in transforming bedside results and images into reliable, longitudinal clinical intelligence.

Keywords: Point-of-care testing; Critical care; Point-of-care ultrasound; Interoperability; Precision medicine