

Point-of-Care Ultrasound (POCUS): Expanding the Role of Nurses in Bedside Diagnostics

Mrs.Guna K

Nursing Tutor.,Shri SathyaSai College of Nursing., Sri Balaji Vidyapeeth (Deemed to be university),Chennai, Tamil Nadu,India

ABSTRACT

The advancement of healthcare has expanded the role of nurses, requiring integration of innovative diagnostic tools to support timely and accurate clinical decision-making. Point-of-Care Ultrasound (POCUS) is a portable imaging modality that enables real-time bedside assessments, significantly enhancing the quality and efficiency of patient care. In critical care settings, particularly for patients with Difficult Intravenous Access (DIVA), POCUS empowers nurses to visualize vascular structures, improving first-attempt success rates for peripheral intravenous catheterization (PIVC) and reducing patient discomfort. Beyond vascular access, POCUS supports rapid evaluation of cardiac, pulmonary, abdominal, renal, and musculoskeletal systems, streamlining diagnostics and interventions. This paper highlights the expanding role of POCUS in nursing practice, the importance of education and competency development, and the clinical implications and challenges associated with its implementation. By adopting POCUS, Critical Care Nurses (CCNs) can deliver safer, more efficient, and patient-centered care in increasingly complex clinical environments.

KEYWORDS: Point-of-Care Ultrasound (POCUS),Difficult Intravenous Access (DIVA)Ultrasound-Guided PIVC (USGPIVC), Peripheral Intravenous Catheters (PIVCs), Emergency Nurse Practitioners' (ENPs).

How to Cite: Mrs. Guna. K., (2025) Point-of-Care Ultrasound (POCUS): Expanding the Role of Nurses in Bedside Diagnostics, Vascular and Endovascular Review, Vol.8, No.10s, 280--282.

INTRODUCTION

The advancement of healthcare services necessitates that nursing professionals adopt innovative diagnostic technologies to enhance accuracy and efficacy in clinical decision-making. Point-of-care ultrasound (POCUS) encompasses the immediate utilization of portable ultrasound apparatus at the patient's bedside for diagnostic and procedural purposes. Unlike traditional ultrasound, which requires a referral to an imaging department, POCUS empowers nurses to promptly observe real-time physiological conditions, thereby augmenting the continuity of care.(1-2)

Recent advancements in portable ultrasound technology and simulation-based education have amplified the feasibility of Point-of-Care Ultrasound (POCUS) within the nursing discipline. The integration of POCUS aligns with the global movement towards improved nursing practice, facilitating a more proactive role for nurses in early identification, monitoring, and intervention. It serves as an imaging modality for the heart and lungs, assisting in the diagnosis of undifferentiated shock. This instrument enables the assessment of cardiac function and hemodynamic status, thereby broadening the responsibilities of nurses in delivering timely and effective patient care at the bedside.(3-4)

OVERVIEW

Patients who are admitted to the Intensive Care Unit (ICU) may endure significant distress attributable to factors such as pain, confinement to a bed, attachment to various lines, tubes, and monitoring devices, as well as the overarching nature of their critical illness. Furthermore, patients within the ICU receiving high-risk infusion therapy through Peripheral Intravenous Catheters (PIVCs) are particularly vulnerable to severe complications associated with infusion. Challenges in achieving peripheral venous access necessitate that patients with Difficult Intravenous Access (DIVA) have PIVCs placed in suboptimal anatomical sites, thereby exacerbating their pain, discomfort, and limitations in mobility. Additionally, such patients frequently encounter PIVCs that are ill-suited for their prescribed therapies, increasing their risk for potential adverse events.(5)

It is reasonable to postulate that patients with DIVA in the ICU face an elevated probability of experiencing complications, emotional suffering, feelings of objectification and alienation, as well as diminished autonomy over their own bodies compared to other ICU patients. Mitigating and alleviating suffering constitutes a fundamental aspect of nursing care that practitioners should diligently pursue when attending to critically ill individuals. The reduction of pain and discomfort experienced by the patient can enhance overall well-being and diminish suffering. Point-of-Care Ultrasound (POCUS) empowers Critical Care Nurses (CCNs) to visualize internal vascular structures, enabling the identification of veins that were previously neither discernible nor palpable. The ability to locate appropriate veins for cannulation and to visualize the PIVC during the insertion procedure results in a significantly elevated first-pass success rate, thereby diminishing the patient's pain experience.

Nurses frequently encounter challenges while providing care to patients with DIVA. CCNs have characterized the process of inserting PIVCs in patients with DIVA as both time-consuming and resource-intensive. The inability to deliver optimal quality of care can induce moral distress among CCNs. In the intricate environment of the ICU, POCUS emerges as a valuable adjunctive tool; CCNs may utilize POCUS to facilitate enhanced care for patients with DIVA. Employing POCUS as an extension of the

CCNs' observational capabilities allows them to visualize the patient's anatomy, thereby streamlining a procedure that is often fraught with pain and complexity. Proficiency in the utilization of POCUS equips CCNs to deliver superior quality care to patients with DIVA by alleviating suffering and ensuring the safe administration of infusion therapies without undue delay, thus mitigating the risk of serious complications. This research highlights the importance of Ultrasound-Guided Peripheral Intravenous Catheterization (USGPIVC) as an essential skill for CCNs who are responsible for the care of patients with DIVA. Consequently, it is imperative that CCNs leverage their technological acumen to acquire proficiency in USGPIVC to ensure the delivery of high-quality care to patients with DIVA in the ICU.(6)

CLINICAL APPLICATIONS

- **Cardiac Assessment:**
Point-of-care ultrasound (POCUS) elevates the involvement of nurses in cardiac evaluations by providing swift identification of ailments such as congestive heart failure and pericardial effusion. This technology permits focused imaging, streamlining urgent clinical decisions and enhancing patient outcomes in critical cardiac scenarios.
- **Respiratory Care:**
POCUS augments the proficiency of nursing professionals in conducting bedside diagnostics by enabling swift assessments of the lungs for ailments such as pleural effusions and pneumothorax, thus enhancing respiratory care..(3)
- **Vascular access;**
POCUS in nursing practice enhances vascular access by allowing critical care nurses to visualize veins, increasing first-pass success rates for peripheral intravenous catheter insertion, reducing patient discomfort, and empowering nurses through improved action readiness and confidence in managing difficult intravenous access.
- POCUS in nursing practice for vascular access includes early detection of catheter thrombosis, identification of complications like extravasation and obstruction, and assessing catheter patency through saline flush visualization, enhancing patient safety and care quality in infusion therapy.(9-10)
- **Abdominal Assessment:**
POCUS enriches abdominal evaluations by empowering nurses to scrutinize the hepato-biliary system, direct interventions such as paracentesis, and pinpoint complications like fluid accumulations or liver tumors, thereby broadening their diagnostic capabilities for patients grappling with cirrhosis. POCUS incorporates cardiac ultrasound, assisting in the assessment of volume status and hemodynamic indicators like cardiac output, systemic vascular resistance, cardiac contractility, and pulmonary artery pressure, which are crucial for the early and precise diagnosis of heart failure, cirrhotic cardiomyopathy, porto-pulmonary hypertension, hepatopulmonary syndrome, arrhythmias, and pulmonary embolism. This further facilitates effective fluid management and the administration of vasopressors during the resuscitation process of patients suffering from cirrhosis.(11)
- Additionally, its role is essential to assess liver masses, foci of sepsis, for appropriate sites for paracentesis, and to assess for vascular disorders such as portal vein or hepatic vein thrombosis. Renal ultrasound can identify renal and post-renal causes of AKI and aid in diagnosis of pre-renal AKI through volume assessment. In this review, we address the principles and methods of POCUS in hospitalized patients and in outpatients with cirrhosis and discuss the application of this diverse modality in clinical hepatology.(12)
- **Musculoskeletal and Wound Care:**
Musculoskeletal point-of-care ultrasound (POCUS) amplifies diagnostic precision for localized injuries and inflammation, bolstering nurses in bedside diagnostics. It acts as a complementary tool to clinical assessments, necessitating a thorough understanding of normal ultrasound appearances and anatomy for proficient application in musculoskeletal and wound care. The area of focus is assessed from two orientations (long- and short-axis), utilizing a high-frequency transducer. A machine-split screen may be utilized to juxtapose the area of interest with the opposite normal side; however, mastery of the normal ultrasound depiction of MSK structures and knowledge of relative anatomy is essential for proficiency..(13)

BENEFITS

- POCUS enriches nurses' roles by facilitating bedside diagnostics, enhancing patient outcomes through prompt evaluations, and simplifying procedures like central venous catheter placement. It fosters efficient care delivery, diminishes dependence on CT scans, and bolsters accurate diagnoses across a spectrum of medical conditions.(14)

EDUCATIONAL INTEGRATION AND COMPETENCY

Integrating online didactic training into Emergency Nurse Practitioners' (ENPs) education enhances their POCUS skills, allowing for improved competency assessment and increased confidence in performing ultrasound applications, ultimately expanding nurses' roles in bedside diagnostics.(15)

CLINICAL SIGNIFICANCE AND IMPLICATIONS

POCUS enables quick interventions by allowing for the rapid viewing of anatomical structures and the detection of urgent circumstances like pneumo-thorax, pericardial effusion, or abdominal bleeding. It can lessen the need for expensive imaging techniques like CT scans or X-rays, which might be scarce or unavailable in places with few resources. POCUS can help with real-time guidance for procedures like thoracentesis, para-centesis, or central line insertion, lowering complications and increasing success rates. POCUS can help with the quick evaluation and triage of patients, allowing for the efficient use of scarce resources. POCUS has improved patient safety by lowering the chance of complications from invasive procedures. During

procedures, real-time visualization helps prevent inadvertent injuries or punctures. POCUS enables ongoing monitoring of patients at the bedside. It provides important data for continuous patient treatment by evaluating fluid responsiveness, heart function, and lung conditions. Healthcare professionals now have more training and skill development opportunities thanks to the inclusion of POCUS in emergency and critical care residency programs.⁽²⁾ Some of the challenges in low-resource environments include issues with constrained healthcare budgets, the initial cost of obtaining ultrasound equipment, and subsequent maintenance is a barrier. Maintaining quality control, standardization, and ongoing training for POCUS can be difficult.⁽⁸⁾

TECHNICAL AND CLINICAL CHALLENGES

POCUS, including overuse, inaccurate diagnoses, inappropriate usage, and excessive dependence on the technology. These challenges necessitate proper prescription, application, and documentation to ensure patient safety and effective integration into bedside diagnostics by nurses. It is dependent on the operator's skill and experience, along with equipment availability, costs, and training, which are significant technical and clinical challenges in expanding its role in bedside diagnostics for nurses.⁽¹⁶⁾

CONCLUSION

POCUS has emerged as a valuable bedside diagnostic tool that enhances the clinical capabilities of nurses in critical and emergency settings. It improves accuracy in assessments, increases success in vascular access, and reduces patient discomfort, especially in DVA cases. Its broad applications across cardiac, respiratory, abdominal, and musculoskeletal evaluations strengthen timely decision-making. Integrating POCUS into nursing education builds confidence and competency among practitioners. Although challenges such as training and equipment availability exist, its benefits outweigh the limitations. Overall, POCUS empowers nurses to deliver safer, faster, and more patient-centered care.

REFERENCES

1. Nguyen, C., Parfianowicz, D., & Bennett, C. (2024). Point of care ultrasound and shock: The value in bedside diagnosis and hemodynamic assessment in undifferentiated shock patients. *Journal of Translational Critical Care Medicine*, 6(3). <https://doi.org/10.1097/jtccm-d-24-00010>.
2. Hansen, O., & Solbakken, R. (2024). Experiences and perceptions of critical care nurses on the use of point-of-care ultrasound (POCUS) to establish peripheral venous access in patients with difficult intravenous access: a qualitative study. *BMJ Open*, 14(6), e078106. <https://doi.org/10.1136/bmjopen-2023-078106>.
3. Ward, J. L., & DeFrancesco, T. C. (2023). The Role of Point-of-Care Ultrasound in Managing Cardiac Emergencies. *Veterinary Clinics of North America-Small Animal Practice*. <https://doi.org/10.1016/j.cvsm.2023.05.017>
4. Ingawale, S., Hotchandani, H., & Upadhyaya, V. (2024). Pocus: an emerging bedside tool (pp. 139–155). <https://doi.org/10.58532/v3bfms8p5ch3>.
5. Premkumar, M., Karvellas, C., Kulkarni, A. V., Bhujade, H., & Reddy, K. R. (2024). Role of Point-of-Care ultrasound (POCUS) in clinical hepatology. *Hepatology*. <https://doi.org/10.1097/hep.0000000000000990>
6. Tagliafico, A. (2014). Musculoskeletal Ultrasound. *Seminars in Musculoskeletal Radiology*, 24, 081–082. <https://doi.org/10.4264/numa.72.30>.
7. Arnold, M. J., Jonas, C. E., & Carter, R. E. (2020). Point-of-Care Ultrasonography. *American Family Physician*, 101(5), 275–285. <https://www.aafp.org/afp/2020/0301/p275.html> Nelson BP, Melnick ER, Li J. Portable ultrasound for nurses: Expanding scope of practice. *J Clin Nurs*. 2022;31(4):789–797.
8. Tadesse, A. Z. (2023). POCUS as an adjunct to clinical examination and management in resource-limited emergency and critical care setting. *Pan-African Journal of Emergency and Critical Care*, 1(2). <https://doi.org/10.58904/2023/68>
9. Da'na, M. K. F., & Al-Zoubi, A. S. (2025). Expansion of Point-of-Care Ultrasound (POCUS). *Scholars Academic Journal of Biosciences*, 13(06), 712–722. <https://doi.org/10.36347/sajb.2025.v13i06.008>
10. Walsh, A., Colio, P. A., & Singh, S. (2025). From Classroom to Practice. *Advanced Emergency Nursing Journal*. <https://doi.org/10.1097/tme.0000000000000583> Davis EM, Feinsmith S, Amick AE, Sell J, McDonald V, Trinquero P, Moore A, Gappmaier V, Colton K, Cunningham A, Ford W, Feinglass J, Barsuk JH. Difficult intravenous access in the emergency department: Performance and impact of ultrasound-guided IV insertion performed by nurses. *Am J Emerg Med*. 2021;46:539–544. DOI:10.1016/j.ajem.2020.11.013. (cited in POCUS J) [Open Journals](#)
11. Edwards C, Jones J. Development and Implementation of an Ultrasound-Guided Peripheral Intravenous Catheter Program for Emergency Nurses. *J Emerg Nurs*. 2018;44(1):33–36. DOI:10.1016/j.jen.2017.07.009. (also cited in POCUS J) [Open Journals](#)
12. Sou V, McManus C, Mifflin N, Frost SA, Ale J, Alexandrou E. A clinical pathway for the management of difficult venous access. *BMC Nursing*. 2017;16:64. DOI:10.1186/s12912-017-0261-z. [BioMed Central](#)
13. Point-of-care examinations using handheld ultrasound devices performed by intensive care nurses in a cardiac intensive care unit. *Eur J Cardiovasc Nurs*. 2023;22(5):482–488. DOI:10.1093/eurjcn/zvad031. [OUP Academic](#)
14. Morata LD, Bowers M. Ultrasound-Guided Peripheral Intravenous Catheter Insertion: The Nurse's Manual. *Crit Care Nurse*. 2020;40(5):38–46. DOI:10.4037/ccn2020240. [Ovid+1](#)
15. Systematic review: Outcomes of POCUS-Guided Peripheral Intravenous Access in Difficult Venous Access Patients. *J-something*. (2025) — from meta-analysis showing improved success rates, fewer attempts, lower complications. [PubMed](#)
16. Recent Advances in Ultrasound-Guided Peripheral Intravenous Catheter Insertion. *Current Trends in Healthcare*. (MDPI). 2024. Highlights nurse-led training, technical improvements, patient-centered benefits