Retraction Notice

Title of retracted article: **Comparative Analysis of Point-of-Care Ultrasound and Conventional Clinical Assessment for Volume Status Evaluation in Newly Admitted Hospital Patients**

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Retraction initiative (multiple responses allowed; mark with **X**):

☐ All authors
☐ Some of the authors:
X Editor with hints from
- ○ Journal owner (publisher)
- ○ Institution:
- ○ Reader:
- X Other:

Date initiative is launched: 2026-01-21

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☐ Unreliable findings
- ○ Lab error ○ Inconsistent data ○ Analytical error ○ Biased interpretation
- ○ Other:

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X Failure to disclose a major competing interest likely to influence interpretations or recommendations
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☐ none (not applicable in this case – e.g. in case of editorial reasons)

* Also called duplicate or repetitive publication. Definition: "Publishing or attempting to publish substantially the same work more than once."

History
Expression of Concern:
X yes, date: 2026-01-21
☐ no

Correction:
X yes, date: 2026-01-23
☐ no

Comment:

This article has been retracted to straighten the academic record. In making this decision the Editorial Board follows COPE's Retraction Guidelines. Aim is to promote the circulation of scientific research by offering an ideal research publication platform with due consideration of internationally accepted standards on publication ethics. The Editorial Board would like to extend its sincere apologies for any inconvenience this retraction may have caused.

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Comparative Analysis of Point-of-Care Ultrasound and Conventional Clinical Assessment for Volume Status Evaluation in Newly Admitted Hospital Patients

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Abstract

Background: Accurate determination of volume status in newly admitted hospital patients, particularly those with undifferentiated hypotension or suspected volume overload, remains a clinical challenge. Conventional bedside assessments including vital signs, history, and physical examination are often unreliable and limited by patient body habitus. Point-of-care ultrasound (POCUS) has emerged as a valuable adjunct for real-time, non-invasive evaluation of intravascular volume. **Objective:** This prospective observational cohort study aims to compare the diagnostic utility of POCUS with conventional clinical assessment in evaluating volume status in newly admitted hospital patients. **Methods:** The study will enroll adult patients admitted to the intensive care unit or emergency department of King Abdullah Medical City. Participants will undergo both conventional clinical volume assessment and POCUS evaluation, including inferior vena cava (IVC) diameter, collapsibility index (IVC-CI), lung ultrasound for B-lines, and focused cardiac ultrasound. The primary outcome is the accuracy of each method in diagnosing volume overload or depletion, as determined by a blinded expert panel using a composite clinical standard. Secondary outcomes include length of hospital stay, incidence of acute kidney injury, fluid administration volumes, and mortality. **Results:** Expected results will demonstrate the superior diagnostic accuracy of POCUS over conventional assessment, with particular emphasis on IVC dynamics and lung ultrasound findings correlating with volume status. **Conclusion:** POCUS is anticipated to offer a more precise, timely, and individualized approach to volume status assessment, potentially guiding more appropriate

fluid management strategies and improving patient outcomes in acute care settings.

Keywords

Point-of-Care Ultrasound, Volume Status, Inferior Vena Cava, Fluid Responsiveness, Critical Care, Emergency Medicine, Hemodynamic Monitoring

1. Introduction

Determining a patient's volume status is a fundamental skill in clinical medicine, particularly in emergency and critical care settings. Traditional bedside assessments—including vital signs, physical examination, and history-taking—are often subjective, imprecise, and influenced by patient-specific factors such as body habitus, chronic conditions, and acute physiological derangements [1]. Inaccurate volume assessment can lead to harmful clinical decisions, including inappropriate fluid resuscitation or unnecessary diuresis, contributing to complications such as pulmonary edema, acute kidney injury, or worsening shock [2].

Point-of-care ultrasound (POCUS) has revolutionized bedside evaluation by providing real-time, non-invasive visualization of key physiological parameters. In the context of volume assessment, POCUS of the heart, lungs, and venous system offers objective data that complement clinical examination [3]. Specifically, sonographic evaluation of the inferior vena cava (IVC) diameter and its respiratory variation (collapsibility or distensibility index) provides indirect estimation of right atrial pressure and intravascular volume status [4]. Lung ultrasound can detect B-lines, which correlate with pulmonary interstitial edema and volume overload [5]. Focused cardiac ultrasound allows assessment of ventricular function, pericardial effusion, and intravascular volume responsiveness [6].

Despite growing evidence supporting the utility of POCUS in volume assessment, several knowledge gaps remain. Most studies have focused on mechanically ventilated patients or those with overt shock, with limited data on spontaneously breathing patients or those with hemodynamic stability [7]. Additionally, the comparative diagnostic performance of POCUS versus conventional clinical assessment in guiding fluid management and impacting clinical outcomes in a general inpatient population is not well established [8]. Variability in measurement techniques, operator skill, and interpretation further complicates the integration of POCUS into routine clinical practice [9].

This study aims to address these gaps by prospectively comparing POCUS-guided volume assessment with conventional clinical evaluation in newly admitted adult hospital patients. We hypothesize that POCUS will demonstrate superior diagnostic accuracy, lead to more tailored fluid management, and improve patient-centered outcomes.

2. Methods

2.1. Study Design and Setting

This is a prospective, observational cohort study conducted at King Abdullah Medical City, a tertiary academic hospital in Makkah, Saudi Arabia. The study will be performed in the Adult Emergency Department (ED) and the Intensive Care Unit (ICU). The study protocol has been approved by the Institutional Review Board of King Abdullah Medical City (Reference No: KAMC-IRB-2024-001). All participants or their legal representatives will provide written informed consent.

2.2. Study Population

Inclusion Criteria:

- Adult patients (age ≥ 18 years).
- Newly admitted to the ED or ICU within 24 hours of presentation.
- Clinical indication for volume status assessment (e.g., undifferentiated hypotension, suspected hypovolemia or hypervolemia, acute dyspnea, sepsis, or heart failure).

Exclusion Criteria:

- Pregnancy.
- Known severe cardiac structural disease (e.g., severe valvulopathy, constrictive pericarditis).
- End-stage renal disease on chronic dialysis.
- Inability to obtain adequate ultrasound windows (e.g., severe obesity, abdominal dressings).
- Patient or surrogate refusal to participate.

2.3. Study Procedures

2.3.1. Conventional Clinical Assessment (CCA)

Upon enrollment, the treating physician (blinded to POCUS findings) will perform a standardized clinical assessment including:

- Vital signs (heart rate, blood pressure, respiratory rate, oxygen saturation).
- Physical examination (jugular venous distension, lung auscultation, peripheral edema, skin turgor).
- Review of history and laboratory data. Based on this assessment, the physician will categorize the patient's volume status as: **hypovolemic**, **euvolemic**, or **hypervolemic**.

2.3.2. Point-of-Care Ultrasound (POCUS) Assessment

A certified POCUS operator (different from the treating clinician) will perform a standardized multi-organ ultrasound examination within 1 hour of the CCA. The protocol includes:

- **IVC Ultrasound:** Subxiphoid or transhepatic longitudinal view; measurement of maximum (IVCmax) and minimum (IVCmin) diameters over one respiratory cycle in spontaneously breathing patients. IVC Collapsibility Index (IVC-

CI) will be calculated as:

$$\text{IVC-CI}(\%) = \text{IVCmax} - \text{IVCminIVCmax} \times 100\text{IVC-CI}(\%)$$
$$= \text{IVCmaxIVCmax} - \text{IVCmin} \times 100$$

- **Lung Ultrasound:** Eight-zone scanning (anterior and lateral chest bilaterally) for B-lines; semi-quantitative score (0 - 3 per zone, total 0 - 24).
- **Focused Cardiac Ultrasound:** Parasternal long-axis, apical four-chamber, and subxiphoid views to assess left ventricular function, right ventricular size, and pericardial effusion.

Ultrasound findings will be interpreted using validated criteria [4] [5] to classify volume status independently.

2.3.3. Reference Standard

A blinded expert panel (two senior intensivists) will review all available clinical, laboratory, and imaging data (excluding the index POCUS and CCA assessments) at 72 hours post-admission. The panel will assign a consensus-based volume status classification, which will serve as the reference standard.

2.4. Data Collection

Demographic data, comorbidities, admission diagnoses, vital signs, laboratory results (including serum lactate, creatinine, B-type natriuretic peptide), administered fluids, diuretic use, vasopressor requirements, and outcomes (ICU/hospital length of stay, need for renal replacement therapy, mortality) will be recorded in a secure electronic database.

2.5. Outcome Measures

Primary Outcome:

Diagnostic accuracy (sensitivity, specificity, positive/negative predictive values) of POCUS versus CCA in correctly classifying volume status, using the expert panel classification as the reference standard.

Secondary Outcomes:

- Agreement between IVC parameters (diameter and CI) and the reference standard.
- Correlation between POCUS findings and clinical outcomes (length of stay, AKI incidence, mortality).
- Comparison of fluid administration decisions guided by POCUS vs. CCA.

2.6. Statistical Analysis

Sample size calculation estimates 150 patients to achieve 80% power to detect a 20% difference in diagnostic accuracy ($\alpha = 0.05$). Continuous variables will be expressed as mean ± SD or median (IQR) and compared using t-tests or Mann-Whitney U tests. Categorical variables will be compared using chi-square or Fisher's exact tests. Diagnostic test characteristics will be calculated with 95% confidence intervals. Inter-rater reliability for ultrasound measurements will be as-

sessed using intraclass correlation coefficients. A p-value < 0.05 will be considered statistically significant. Analyses will be performed using SPSS version 26.

3. Expected Results

We anticipate that POCUS will demonstrate significantly higher sensitivity and specificity than conventional clinical assessment in diagnosing both hypovolemia and hypervolemia. Specifically, IVC-CI > 40% is expected to correlate strongly with hypovolemia, while IVC diameter > 2.5 cm with CI < 20% will be associated with volume overload. Lung B-line scores are expected to correlate with the severity of pulmonary congestion. Furthermore, we expect that POCUS-guided management will result in more tailored fluid therapy, reduced volumes of administered fluids in overloaded patients, and earlier initiation of diuretics when indicated. We hypothesize that this precision will translate into a lower incidence of acute kidney injury, shorter hospital stays, and improved survival in the POCUS-assessed group compared to those managed by conventional assessment alone.

4. Discussion

This study addresses a critical gap in the literature by directly comparing the diagnostic performance and clinical impact of POCUS versus traditional assessment in a heterogeneous population of newly admitted hospital patients. While previous research has established the utility of IVC ultrasound in predicting fluid responsiveness in controlled settings [10], its role in guiding everyday clinical decisions in unselected patients remains less clear.

Our study design includes a robust reference standard and blinding procedures to minimize bias. The integration of multi-organ POCUS (cardiac, lung, IVC) reflects real-world clinical practice and enhances the comprehensiveness of volume assessment. However, limitations must be acknowledged. Operator dependence and the learning curve associated with POCUS may affect generalizability. We aim to mitigate this by using certified operators and standardized protocols. Additionally, the single-center design may limit external validity, though our setting is representative of a large tertiary care hospital.

If our hypotheses are confirmed, this study will provide strong evidence for the routine integration of POCUS into the initial assessment of hospitalized patients with uncertain volume status. Future research should focus on cost-effectiveness analyses, training requirements, and the development of integrated diagnostic algorithms that combine POCUS with clinical and biomarker data.

5. Conclusion

Accurate volume status assessment is essential for optimal fluid management in acutely ill patients. This study aims to demonstrate that point-of-care ultrasound provides a superior, objective, and clinically impactful method for evaluating volume status compared to conventional clinical assessment alone. By enabling more precise and individualized care, POCUS has the potential to improve patient out-

comes, reduce complications, and enhance resource utilization in hospital settings.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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