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Role of Point-of-Care Ultrasound (POCUS) in Survival and Mortality Prediction in Undifferentiated Shock: A Retrospective Study at Rama Medical College Hospital & Research Centre, Kanpur

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Abstract: Undifferentiated shock is a life-threatening emergency requiring rapid diagnosis and timely intervention. Point-of-care ultrasound (POCUS) has emerged as an important bedside tool for early identification of shock aetiology and hemodynamic assessment. **Objectives:** To evaluate the role of POCUS findings in predicting survival and mortality among patients presenting with undifferentiated shock in the Emergency Department. **Methods:** A retrospective observational study was conducted at Rama Medical College Hospital & Research Centre, Kanpur, from June 2025 to February 2026. A total of 120 adult patients presenting with undifferentiated shock were included. Clinical parameters, laboratory investigations, POCUS findings, treatment details, and outcomes were collected from hospital records. Survival status at discharge was the primary outcome. **Results:** Among 120 patients, 84 (70%) survived and 36 (30%) died during hospitalization. Mortality was significantly higher in patients with left ventricular dysfunction, right ventricular strain, plethoric inferior vena cava (IVC), and diffuse bilateral B-lines. POCUS-guided diagnosis demonstrated a diagnostic accuracy of 88.3%. Early POCUS assessment was associated with shorter time to diagnosis and improved survival. **Conclusion:** POCUS is a valuable bedside tool in patients with undifferentiated shock. Specific ultrasound findings are associated with increased mortality and can aid risk stratification and prognostication.

Keywords:
POCUS, Undifferentiated Shock, Mortality, Survival, Emergency Medicine, RUSH Protocol

INTRODUCTION

Shock is a state of acute circulatory failure resulting in inadequate tissue perfusion and cellular oxygen utilization. Early recognition of shock subtype is crucial because management strategies differ considerably among hypovolemic, cardiogenic, distributive, and obstructive shock.

Clinical examination alone frequently fails to identify the underlying cause. Point-of-care ultrasound (POCUS) enables rapid bedside assessment of cardiac function, intravascular volume status, pulmonary pathology, and obstructive causes of shock. Several studies have demonstrated improved diagnostic accuracy with the RUSH protocol and POCUS-based

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assessment. Therefore, this study was undertaken to evaluate whether POCUS findings can predict survival and mortality among patients presenting with undifferentiated shock.

MATERIALS AND METHODS

Study Design:
Retrospective observational study.

Study Setting:
Department of Emergency Medicine, Rama Medical College Hospital & Research Centre, Kanpur.

Study Period:
June 2025 to February 2026.

Study Population:
Adult patients presenting with undifferentiated shock.

Sample Size:
120 patients.

Inclusion Criteria:
• Age ≥18 years
• Systolic BP <90 mmHg or MAP <65 mmHg
• Clinical evidence of shock
• Aetiology not immediately apparent on presentation

Exclusion Criteria:
• Traumatic shock
• Cardiac arrest on arrival
• Incomplete records
• Pregnancy

Data Collection:
Patient demographics, vital signs, laboratory parameters, POCUS findings, diagnosis, management, ICU admission, and hospital outcome were collected from electronic medical records.

SAMPLE SIZE CALCULATION

Formula:

$n = Z^2 \times P \times (1-P) / d^2$

Where:
Z = 1.96 (95% confidence interval)
P = 0.50
d = 0.09

$n = (1.96)^2 \times 0.5 \times 0.5 / (0.09)^2$

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n = 118.6

Rounded sample size = 120 patients.

STATISTICAL ANALYSIS

Software:
SPSS Version 26.

Statistical Tests:
• Mean ± SD for continuous variables
• Frequency and percentage for categorical variables
• Chi-square test
• Independent t-test
• Logistic regression analysis
• $p < 0.05$ considered significant

Results

Table 1. Baseline Characteristics of Survivors and Non-Survivors in Undifferentiated Shock (n = 120)

Variable	Survivors (n = 84)	Non-survivors (n = 36)	p-value
Mean Age (years)	48.2 ± 14.6	61.8 ± 12.3	<0.001*
Male Gender	52 (61.9%)	24 (66.7%)	0.63
Diabetes Mellitus	22 (26.2%)	18 (50.0%)	0.01*
Hypertension	28 (33.3%)	17 (47.2%)	0.15

Values are expressed as mean ± standard deviation or number (%).

*Statistically significant (p < 0.05).

Table 1: Demographic Characteristics

Finding Mortality (%) p-value

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Table 2: Distribution of Shock Types

Shock Type	Number (%)	Mortality (%)
Distributive	48 (40.0)	22.9
Cardiogenic	30 (25.0)	46.7
Hypovolemic	24 (20.0)	16.7
Obstructive	18 (15.0)	38.9

Table 2: Distribution of Shock Types

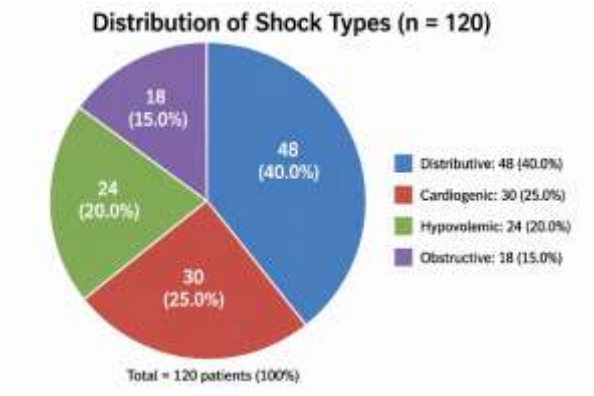
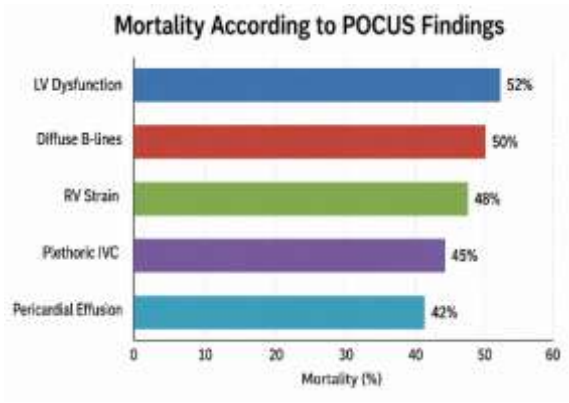


Fig 3: Pie chart: Outcome Measures

GRAPHICAL REPRESENTATION



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Graph 4: POCUS Findings and Mortality

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Discussion

The present study demonstrated an overall mortality rate of 30% among patients presenting with undifferentiated shock. Cardiogenic shock showed the highest mortality, followed by obstructive shock.
Patients with left ventricular dysfunction and diffuse pulmonary B-lines exhibited significantly higher mortality rates. These findings suggest that bedside cardiac and pulmonary ultrasound may provide important prognostic information beyond diagnosis alone.
The diagnostic accuracy of POCUS in identifying shock etiology was high and comparable to previously published studies. Early identification of cardiac dysfunction, volume status abnormalities, and obstructive pathology allowed targeted interventions.
The findings support integration of structured POCUS protocols such as RUSH into emergency department shock management pathways.

Limitations

- Retrospective design
- Single-centre study
- Limited sample size
- Operator dependency of ultrasound findings

Future Scope

- Conduct multicenter prospective studies validating prognostic value of POCUS.
- Compare POCUS findings with advanced hemodynamic monitoring techniques.
- Develop standardized ultrasound protocols for emergency shock assessment.
- Evaluate artificial intelligence-assisted interpretation of bedside ultrasound findings.
- Assess long-term outcomes associated with specific POCUS abnormalities.

Conclusion

POCUS is a rapid, non-invasive bedside modality that assists in both diagnosis and prognostication of undifferentiated shock. Left ventricular dysfunction, right ventricular strain, diffuse B-lines, and plethoric IVC were associated with increased mortality. Incorporation of POCUS into early shock assessment may improve risk stratification and clinical decision-making.

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