

Assessing Lower Extremity Hypoperfusion in ICU Patients on Vasopressors Using Thermographic Imaging

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INTRODUCTION

- Critically ill patients are known to be at an increased risk for pressure injury development¹.
- Vasopressors treat hypotension in critically ill patients by constricting distal blood vessels and are predictive of pressure injury development^{2,3}.
- Heels are one of the most common locations for pressure injuries in ICU patients⁸.
- Distal hypoperfusion related to vasopressor use is associated with ischemic injury to the extremities⁴.
- Infrared thermography is a reliable tool to identify changes in tissue perfusion^{5,6}.
- Enhanced skin assessment using infrared thermography in critically ill patients is a best practice recommendation and may improve the understanding of primary etiology of skin changes⁷.

The purpose of this study is to compare distal lower extremity hypoperfusion in critical care patients who were treated with or without vasopressors using infrared thermography.

METHODS

- Convenience sample of patients admitted to two critical care units at a 900 bed level-1 trauma center
- Infrared thermography protocol completed on all patients within eight hours of admission by trained RNs
- Retrospective analysis of thermographic images of patients who met inclusion criteria
- Blinded analysis of thermographic images performed by Wound Team; temperature differential from knee to heel.
- Demographic data extracted from EMR. Statistical analysis comparing patients with and without vasopressor therapy.

Figure 1. Thermographic Image Assessment Example

- Infrared thermography image demonstrating lower extremity hypoperfusion
- Gradient measured from knee to heel
- Graph shows 6° C temperature differential along the extremity

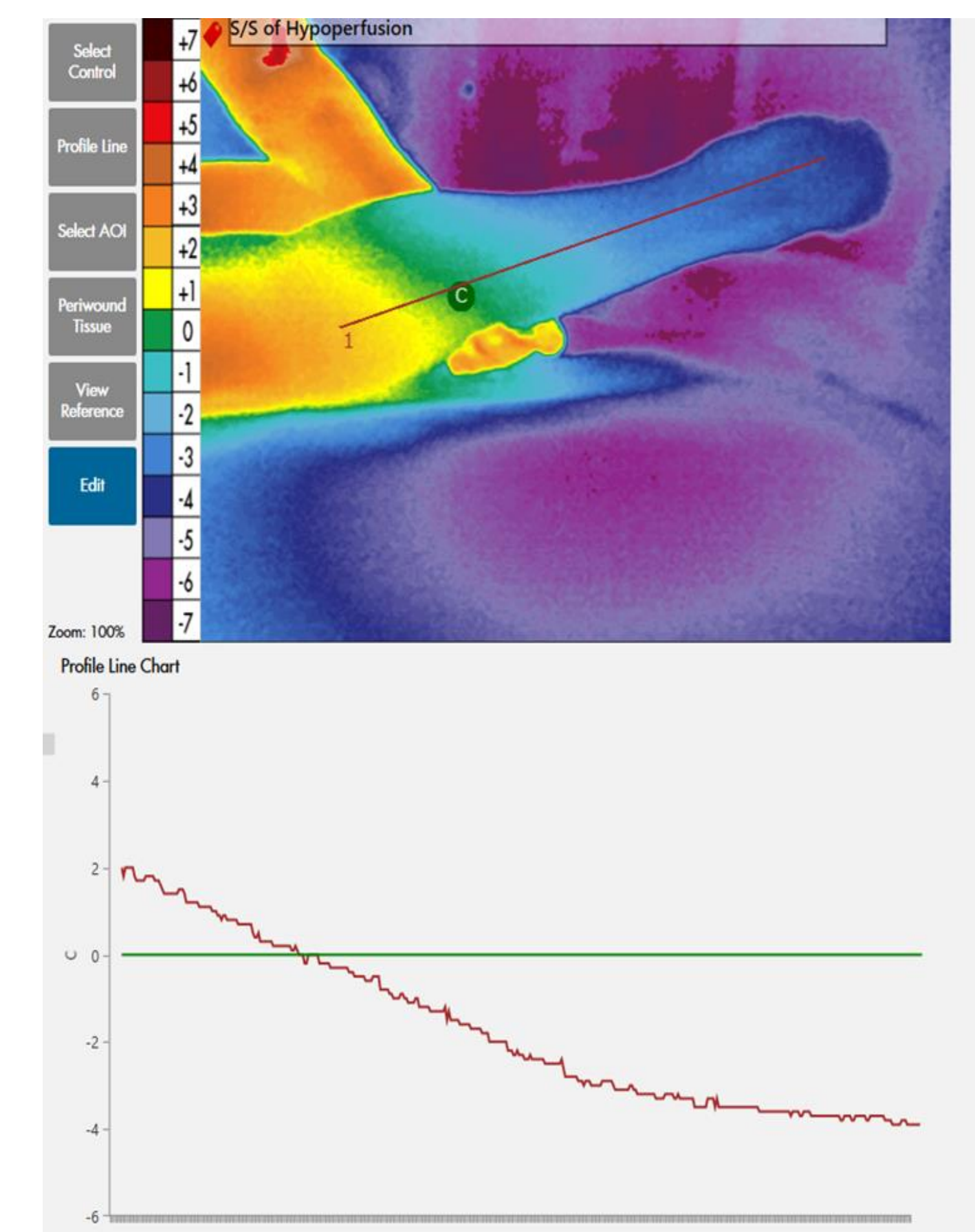
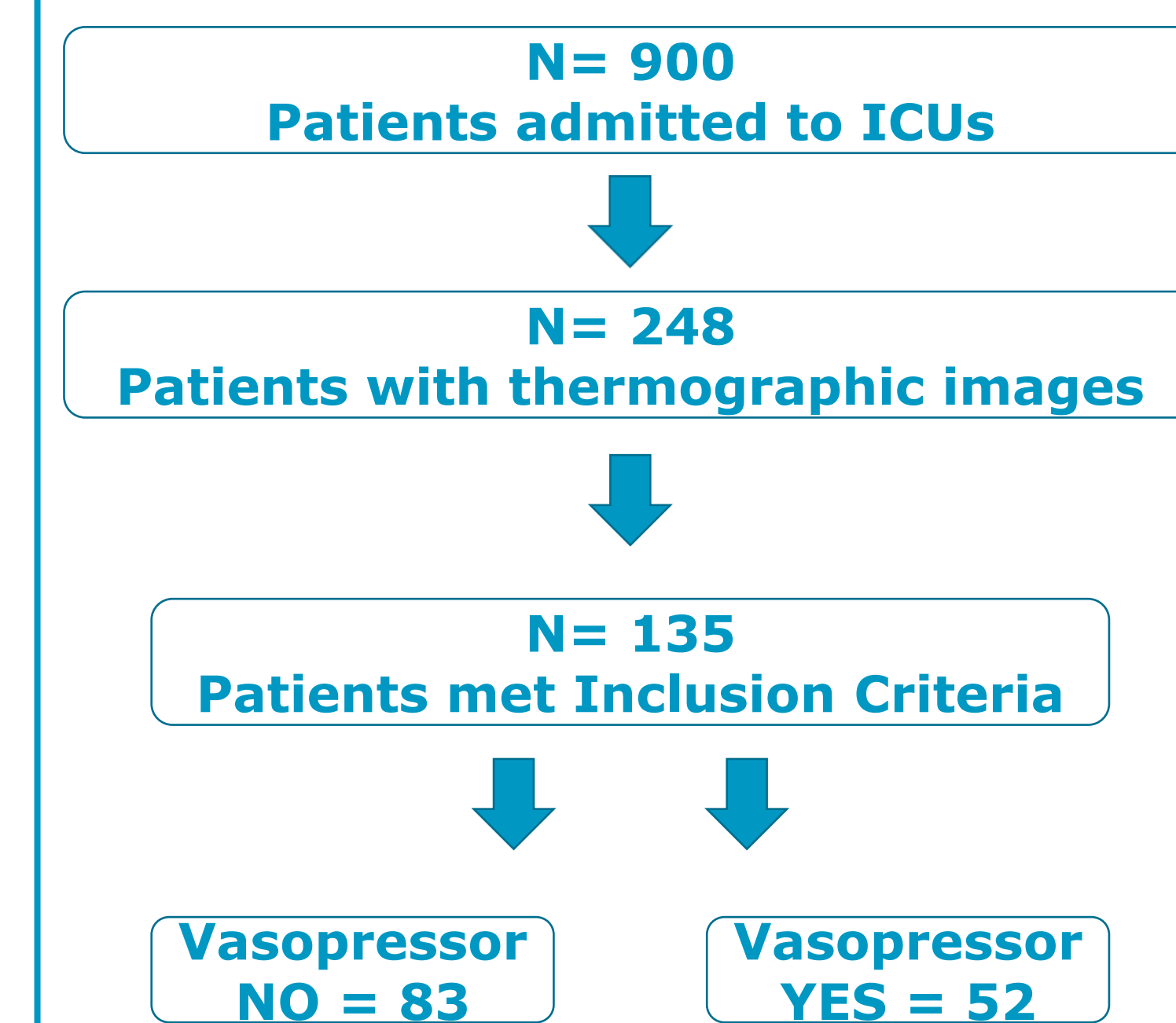


Figure 2. Sample Selection



Inclusion Criteria:

- ≥18 years old
- Admitted from 7/2020-12/2020
- Unobstructed thermographic scan from knee to heel

Table 1. Demographics

	N
Gender	
Female	55
Male	80
Age (mean)	
Vasopressor group	63.67 (S.D. ±15.88)
No vasopressor group	60.71 (S.D. ±14.69)
Race	
White	106 (78.5%)
Black/African American	10 (7.4%)
Asian/Pacific Islander	3 (2.2%)
Unknown	16 (11.9%)
Ethnicity	
Non-Hispanic	117 (90%)
Hispanic	13 (10%)
Past Medical History	
Coronary Artery Disease	78 (57.7%)
Peripheral Vascular Disease	56 (41.5%)
Diabetes Mellitus	50 (37.0%)
Hypertension	83 (61.5%)
Admitting Diagnosis	
Cardiac	45 (33.3%)
Sepsis/Septic shock	18 (13.3%)
Gastrointestinal	9 (6.67%)
Respiratory	4 (3.0%)
Vascular	19 (14.1%)
Renal	3 (2.2%)
Neoplasm	8 (5.9%)
Trauma	18 (13.3%)
Neuro	3 (2.2%)
Other	8 (5.9%)
Cardiovascular Risk	70 (51.9%)

RESULTS

- N=135 Patients met Inclusion Criteria
 - 38.5% of sample required vasopressors
 - 2 patients developed wounding to the lower extremity
 - 70 patients with lower extremity hypoperfusion
- Significant increase in knee to heel temperature differential was noted in patients with multiple (≥2) vasopressors when compared to patients with no vasopressors (left leg $P = .013$, right leg $P = .031$)
- No significant difference when comparing patients with one vasopressor to those with no vasopressors
- No significant difference comparing patients who had never received vasopressors and those who had previously received vasopressors

CONCLUSION

- Patients on vasopressor support are at high risk for skin injury from pressure and tissue ischemia.
- Risk of injury may rise when multiple vasopressors are needed due to decreased lower extremity perfusion
- Using infrared thermography to detect tissue ischemia in patients requiring vasopressors will help practitioners determine the primary etiology of lower extremity wounds.
- This contributes to the objective evidence discerning primary wound etiology in critically ill patients.

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