

The Role of Thermal Intervention in Optimizing Pulse Oximeter Reliability and SpO₂-SaO₂ Discrepancies in Critically Ill Patients - A Quasi-experimental Study

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Background:

Pulse oximetry, a cornerstone of non-invasive monitoring in the ICU, but its accuracy decreases in patients with poor peripheral perfusion. The perfusion index (PFI), derived from the pulse oximeter waveform, reflects peripheral circulation and is influenced by local vasomotor tone. This study aimed to investigate whether peripheral thermal intervention improves PFI and enhances the accuracy of SpO₂ compared to arterial oxygen saturation (SaO₂) in critically ill patients.

Methods:

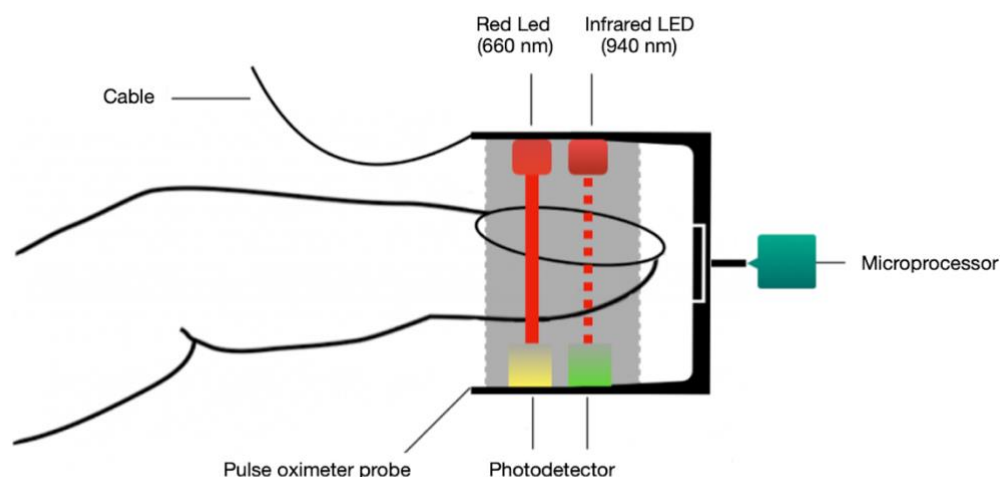
In this quasi-experimental study, 46 adult ICU patients with arterial catheters and PFI <1.0 underwent peripheral warming using a heating pad on the wrist and forearm for 15 minutes. SpO₂, PFI, and SaO₂ (via arterial blood gas) were measured immediately before and after intervention.

Results:

Thermal intervention led to a significant increase in PFI (mean difference -4.1, $p < 0.001$), with a large effect size (Hedges' $g = 2.06$) and strong linear correlation ($R^2 = 0.987$). The agreement between SpO₂ and SaO₂ improved markedly, with the mean difference decreasing from 5.0% to 0.1% ($p < 0.001$). No significant association was found between PFI change and other clinical variables, including cardiac index, use of vasoactive agents, or skin pigmentation.

Conclusion:

Peripheral warming significantly improves peripheral perfusion and enhances the accuracy of pulse oximetry in critically ill patients. As a simple, low-risk, and cost-effective intervention, thermal stimulation may support more reliable oxygen monitoring in patients with compromised perfusion. Its integration into nursing protocols could improve circulatory assessments and facilitate earlier detection of hypoxaemia.

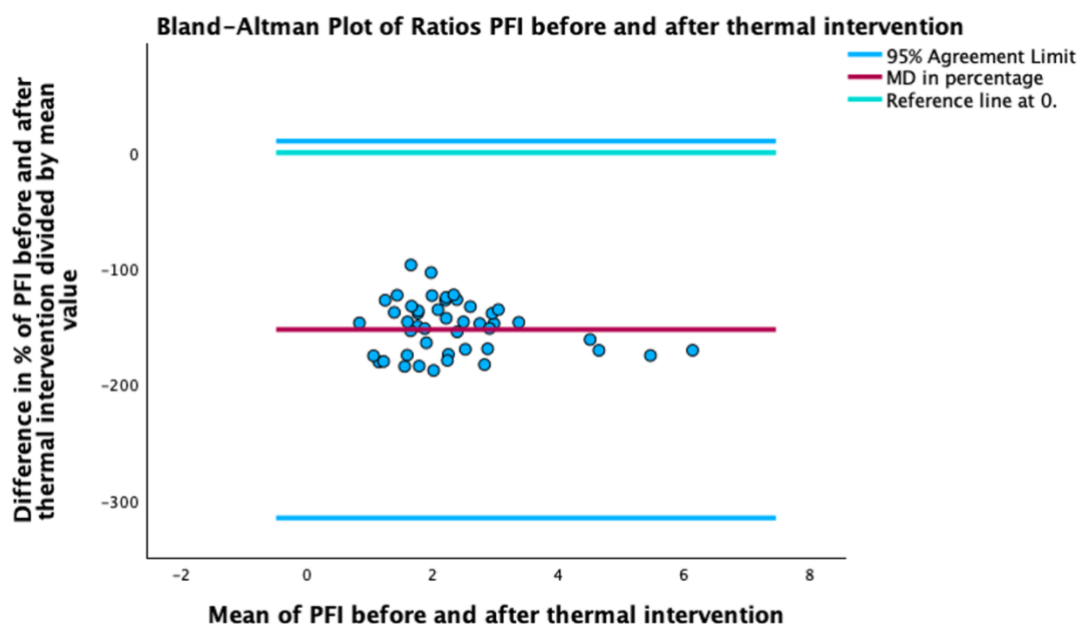


Variable	Timing	Results (MD)
n=46		
Age, gender	Baseline	57 years, *F 36%, *M 64%
Ethnicity, color of skin (FPS)*	Baseline	Caucasian 71%, Somali 29%, 1 71%, 2 29%
Admission diagnosis	Baseline	Surgical 52%, Chock/sepsis 26%, Neuro 22%
Sofa score	Baseline	21 points
Weight (admission + current)	Baseline	79,9/81,0 kg
Temperature	Pre + Post	37,3 C
PFI	Pre + Post	0,55/4,1
SpO2 and SaO2	Pre + Post	99/96 95/96
pH and Hb (ABG)	Pre + Post	7,39/109 7,39/109
SBP/DBP/MAP	Pre + Post	99/59/73 100/60/73

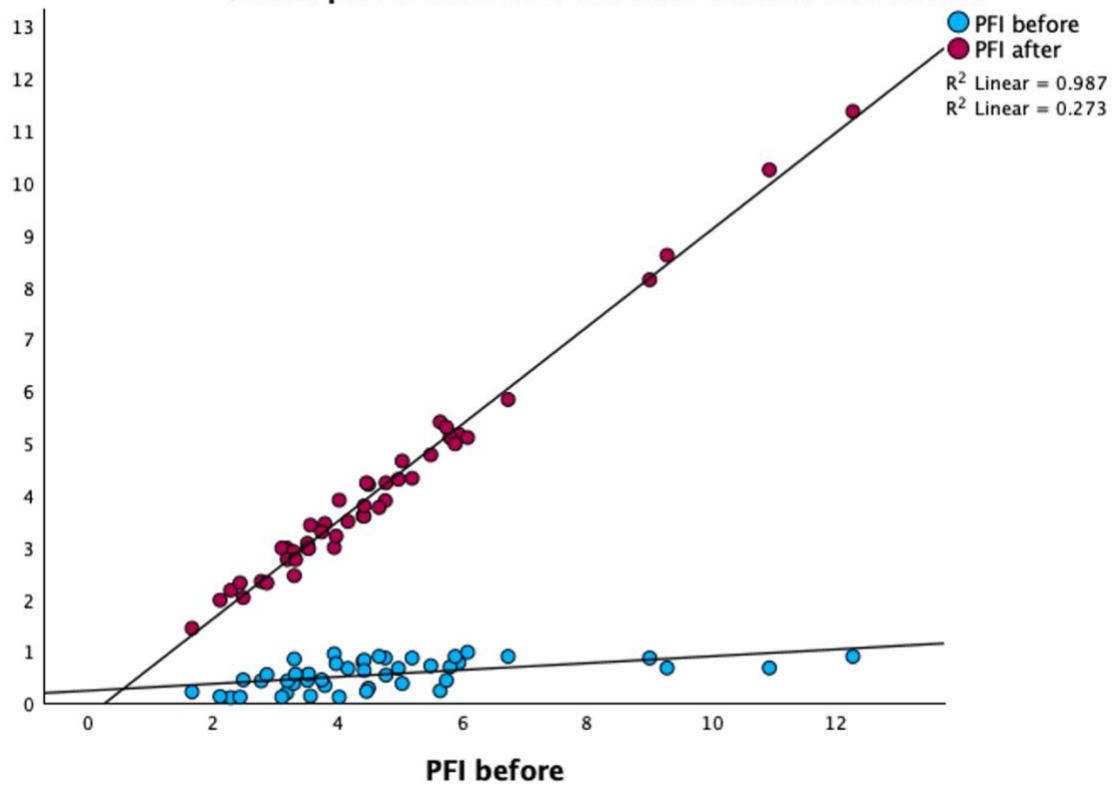
*FPS = Fitz Patrick Score

*F = Female

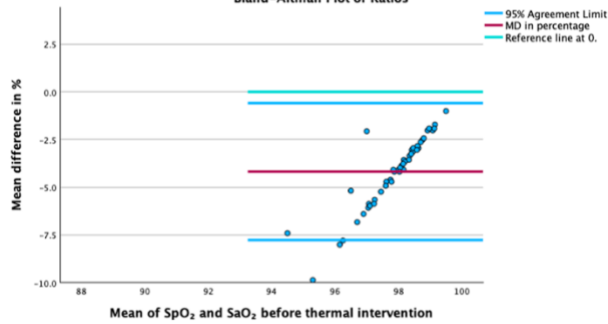
*M = Male



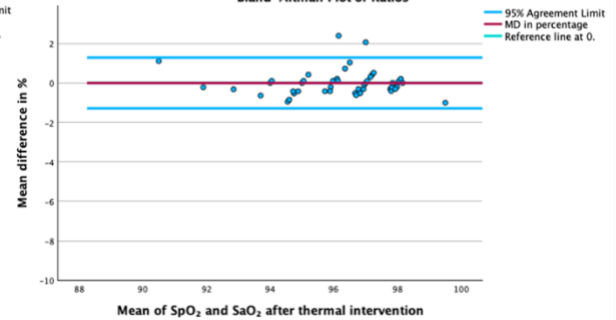
Scatter plot of PFI before and after thermal intervention



Bland-Altman Plot of Ratios



Bland-Altman Plot of Ratios



Prophylactic negative pressure wound therapy in cardiac surgery

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Background: Closed-incision negative-pressure wound therapy (NPWT) has shown to enhance wound healing and tissue regeneration. A few studies on cardiac surgery patients have shown positive effect of NPWT in high-risk patients. Our aim is to investigate its performance in preventing wound infection at cardiac surgery in everyday practice.

Method: Between November 2019 and January 2025, 2608 patients underwent cardiac surgery via sternotomy at our clinic and of these, 220 got prophylactic NPWT, at the discretion of the operating team, for at least 3 days. The NPWT group were compared with the other patients (control group, n=2408) regarding deep wound infection and risk factors for wound infection.

Result: The frequency of reoperation for sternal wound infection was 5% in the NPWT-group and 2% in the controls, $p=0,03$. In the NPWT group there were significantly more women, higher body mass index (BMI), higher incidence of diabetes mellitus (DM) and chronic obstructive lung disease, higher EuroScore and more were operated with CABG. In the regression analysis, BMI>30 kg/m², DM, surgery time, low hemoglobin were independently associated with sternal wound infection.

Conclusion: BMI>30 kg/m² seems to be the strongest predictor for sternal wound infection Prophylactic use of NPWT did not independently influence the incidence of sternal wound infection in this study.

Table 1. Variables independently associated with sternal wound infection

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	Odds Ratio	CI (95%)	p Value
BMI>30 kg/m ²	2,9	1,7–4,8	<0,001
DM	1,8	1,1–3,0	0,34
Surgery time (min)	1,001	1,000–1,002	0,013
Hemoglobin	0,98	0,97–0,99	0,004
NPWT therapy	1,1	0,55–2,36	0,7

Person-centred rounds in the Cardio-Thoracic Intensive Care Unit

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Background: Person-centred care promotes a holistic, collaborative care, aiming to improve patient outcomes, enhance interprofessional collaboration and increase patient and family satisfaction. Implementing person-centred team rounds is one method to achieve this, to enhance individualized care with a focus on nursing, ensuring that important aspects of the patient's well-being are considered.

Methods: At the Cardio-Thoracic Intensive Care Unit in Örebro, Sweden, person-centred rounds have been implemented weekly on Thursdays for patients with extended ICU stays (> 2 days), with about 15 minutes allocated per patient. The rounding team includes the patient's nurse, nursing assistant, anesthesiologist, physiotherapist and a project facilitator. Information is gathered from the patient and their family, to obtain a comprehensive understanding of the patient's needs, preferences, challenges, risks and resources. This multidisciplinary approach centers on the patient's overall experience, prioritizing their physical, emotional, and social needs rather than just the medical aspects. The rounds focus on tailoring the care plan to the patient's evolving situation, addressing potential barriers to recovery, and ensuring that care is coordinated and responsive.

Results: Since the start in March, a project facilitator has attended all rounds to ensure adherence to the new routine, time management and team participation. Early feedback suggests that the rounds can increase team involvement and communication between healthcare providers, patients, and their families.

Discussion: The possibility of enhancing communication is advantageous, but time constraints in the ICU may limit discussion depth. The project facilitator's role is identified as important to maintain adherence to the routine.

Prediction of Post-Intensive Care Syndrome after Cardiothoracic Intensive Care

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The authors have chosen not to publish the abstract