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Objective Capillary Refill to Rapidly Detect Hemorrhage at the Bedside

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Keywords

Objective Capillary Refill, Manual Capillary Refill Time, Hemorrhage, Blood Donation,

Abstract

Introduction

Detection of rapid loss of intravascular volume due to hemorrhage or fluids can be a time sensitive data point in critical situations. One way to measure this is through the assessment of capillary refill time (CRT) which has been shown to significantly vary between physicians. Recent literature has shown objective technology for this assessment with good accuracy across wide varieties of skin tones. Goal-directed fluid management often uses manual CRT measurements as a guiding metric. The goal of this study was to evaluate the objective CRT metric before and after healthy subjects donated blood. The hypothesis was that the CRT would become prolonged after donation.

Methods

This study was approved by the University of Portland Institutional Review Board (IRB00006544) and all subjects gave consent. All subjects signed up to donate blood were approached. All subjects had 473 milliliters (15.99 oz) of blood removed from a large bore intravenous catheter. We conducted this study over two blood drives with a combined sample of (N=26) participants. A paired sample t-test was performed.

Results

26 adults greater than 17 were enrolled, with a mean age of 25.8. The study participants had a mean weight of 79.4kg and 53.8% of the study population were males. CRT was measured before blood donation and after. The CRT mean before blood donation was 2.31 and after donation the CRT mean was 3.01. There was a 30.1% increase in CRT with a p-value of = 0.02487.

Conclusion

Shock can be hard to identify in prehospital settings. This device could potentially allow us to rapidly identify shock. This study used a cutoff of 3 seconds as normal and other studies looking at CRT have found that abnormal times correlated with significant morbidity and mortality. Therefore, the prolongation of approximately 30.1% is an interesting finding to stimulate future research.

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