

Using the VeinViewer Vision To Increase the Identification of Peripheral Intravenous Access Targets in Pediatric Patients

Mackenzie B¹, Aronson S², Czepiel KS³, Stone J², and Becker, BM^{1,2}

Introduction

Intravenous (IV) cannulation is a common, minimally invasive medical procedure: the health care professional (HCP) places a plastic catheter in a patient's vein in order to administer medications and fluids.

Veins in children are often smaller than those in adults and can be covered with opaque, subcutaneous fat. Up to 50% of children who require an IV endure multiple needle sticks before successful placement. The VeinViewer® Vision (Christie Medical Holdings, Memphis TN) uses Near infrared (NIR) light at 750-900 nm to aid in the visualization of veins that are otherwise difficult to see with the naked eye. Projected NIR is absorbed by the iron in hemoglobin in red blood cells. Unabsorbed wavelengths reflect back to a detector, which digitally enhances and projects a "roadmap" of the venous anatomy in real time onto the patient's skin.

The goal of this study was to compare the number of venous access targets identified by an experienced HCP using two approaches: sight alone and sight plus digital palpation versus the VeinViewer Vision.

Method

These three approaches were performed on the dorsum of the hand and the antecubital fossa (AC), on a convenience sample of 120 pediatric patients ages 2-17 presenting with sub-acute complaints to the Emergency Department. Verbal consent (and assent >8 yr.) was obtained from parents/guardians

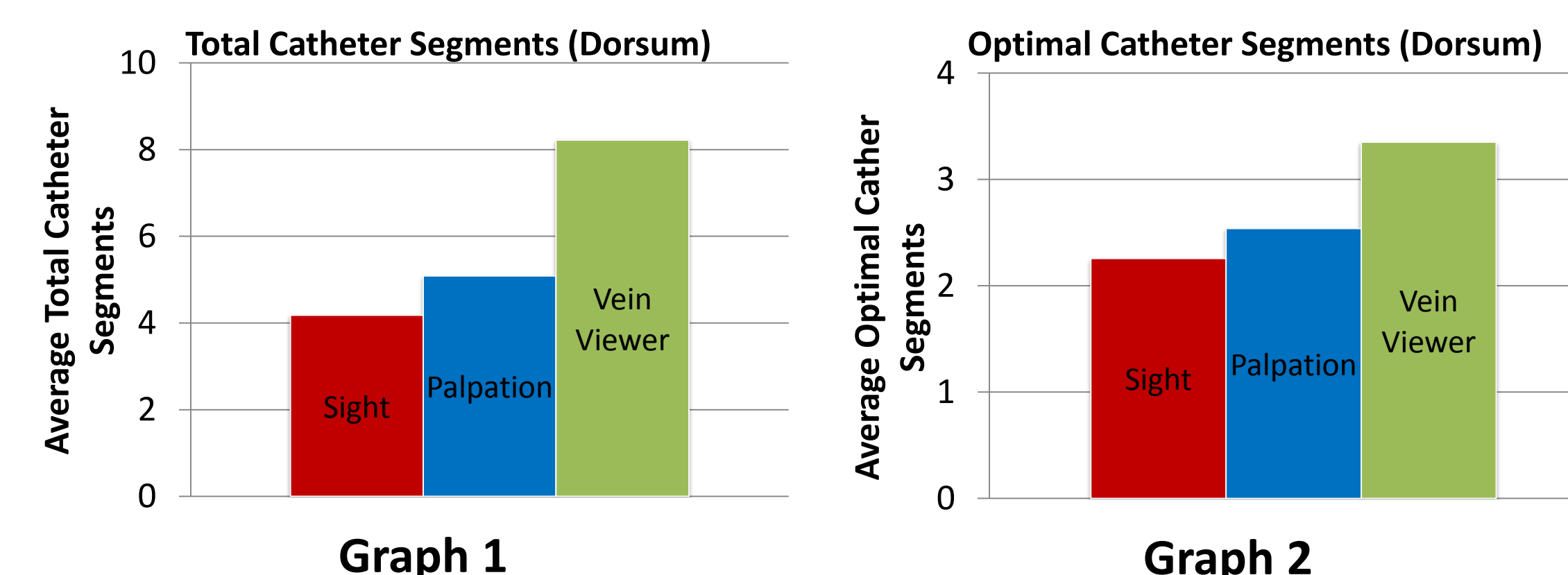
(participants) as well as demographic information. Target areas were outlined with black marker. Veins identified by (1) sight, (2) sight plus palpation, and (3) VeinViewer were marked with red, blue and green marker respectively and photographed (Figure 1). Marked veins were counted, photographed, and marks removed between evaluations. Clinicians distinguished between optimal and secondary catheter segments for each evaluation.



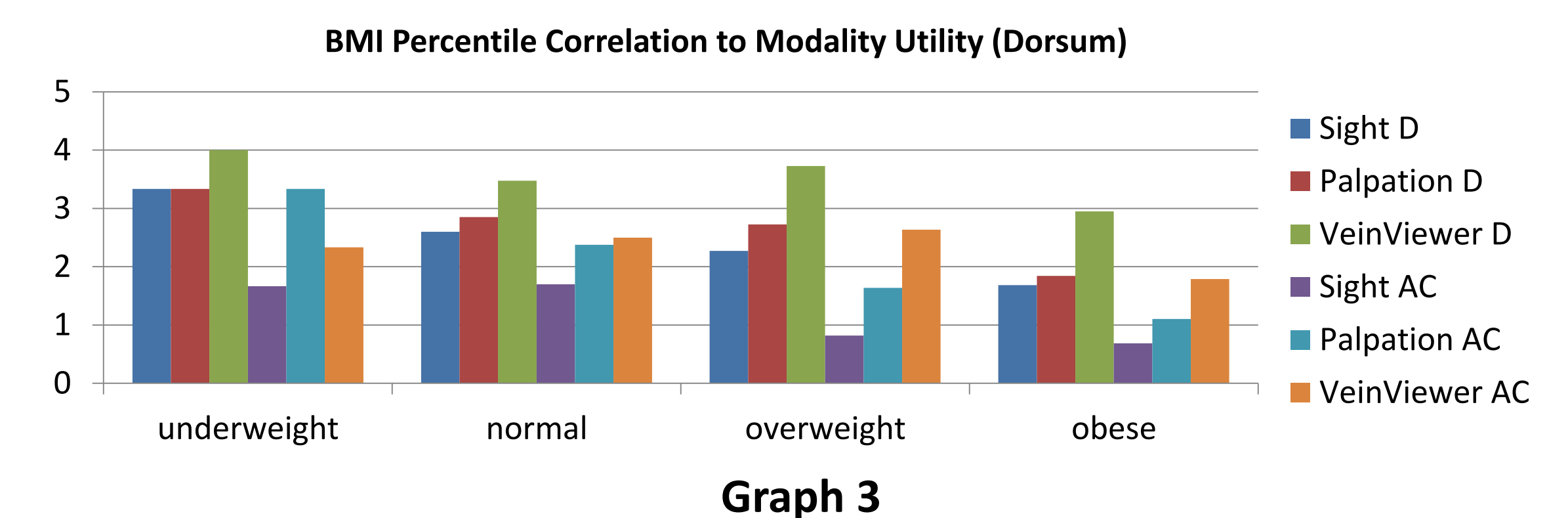
Figure 1: Evaluations 1, 2, and 3 on the dorsum of the hand. 3, 4, and 11 veins identified respectively.

Results

An analysis of the study was completed upon conclusion of enrollment. HCP's using the VeinViewer on the dorsum of 120 subjects identified significantly more total veins than sight or sight plus palpation (8.2 vs. 5.1 vs. 4.2) ($p < 0.05$) and more optimal catheter segments (2.8 vs. 1.8 vs. 1.4) ($p < 0.05$) (Graph 1 and Graph 2). Similar results were observed in antecubital fossa evaluations.



There was a non-significant but interesting trend suggesting that the VeinViewer Vision was most successful in identifying more potential venous catheter placement sites in patients with the greatest BMI (Graph 3).



Conclusion

HCP's were able to identify more total venous catheter options and more optimal catheter segments using the VeinViewer Vision than using sight or sight plus palpation. There was a trend suggesting greater effectiveness of the VeinViewer in participants with greater BMI and more subcutaneous fat. Future studies will focus on younger children and adults and children with high BMI's and/or chronic disease.

Acknowledgements

Lynda Thibeault, Molly Lacher-Katz, Roberta Wood—clinicians—and Jonah Ruddy, Chelsea Haynes, and Sidney Argueta—research assistants—for their time.

This study was sponsored by Christie Medical Holdings, Inc. (Memphis TN).

Affiliations

- ¹ Warren Alpert Medical School at Brown University
- ² Brown University
- ³ Boston College