# Use of near-infrared vein visualization technology to improve peripheral intravenous assessment and catheter placement in an emergency department

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## Background

Almost 90% of inpatients will require a peripheral intravenous catheter (PIVC). These procedures are often performed by staff in the emergency department (ED).[1,2] On average, 1.37-2.35 attempts are required to place PIVCs.[3,4] Reducing PIVC attempts can improve patient care and increase cost savings.[2,4-7] A study conducted at an 867-bed, Level 1 trauma center with approximately 105,000 patients entering the ED annually, reported cost savings of $3,376 per bed per year, or $2.9 million annually related to fewer PIVC attempts, improved PIVC dwell time and greater patient satisfaction.[6] NIR vein visualization technology has been shown to improve PIV assessment prior to PIVC placement, decrease the overall procedure time, and decrease the number of required attempts.[8-10] Yet, adoption of this beneficial technology is limited, especially in the ED setting. This quality improvement initiative implemented NIR technology to improve peripheral intravenous catheter (PIVC) placement in the ED. Staff were equipped with NIR technology and provided with education on NIR-guided PIV site assessment and PIVC placement. A survey was used to evaluate the impact on escalation of care, perceived patient satisfaction, number of PIVC attempts, and usability of the technology.

## Purpose

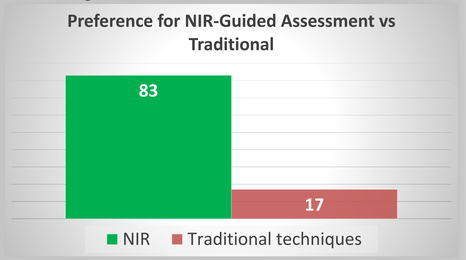
To evaluate the impact of a quality improvement initiative that utilized education and NIR technology to improve PIVC placement in the ED of Methodist Hospital of Southern California.

## Implementation / Methods

Staff in the ED were educated on NIR-guided PIV assessment and equipped with NIR devices (AV500, AccuVein Inc., Medford, NY). A survey was administered to nurses (n=24), 6-months after the implementation of education and technology, to evaluate escalation of care, perceived patient satisfaction, number of PIVC attempts, and usability of the NIR devices.

## Results – What were the findings?

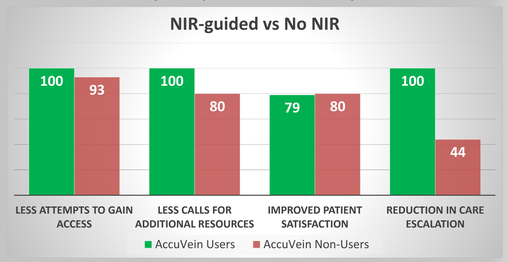
Almost half of nurse respondents (n=11, 46%) had less than 2 years' experience placing PIVCs, while 38% (n=9) had 5 years' experience or more. In terms of device usability, 83% reported good to excellent usability and 96% agreed that the device was easy to use (AV500, AccuVein Inc., Medford, NY). Most nurse respondents preferred NIR-guided assessment to traditional techniques (n=20, 83%). Of those who had never used NIR (n=15), 93% would expect to have less attempts to gain access and less calls for additional resources (80%) when using the technology as an assessment tool prior to PIVC placement.




## Results Contd.

Most agreed that NIR technology could improve patient satisfaction (80%) while less than half would expect to see a reduction in care escalation (44%).

Of those who had used NIR technology (n=8), most reported improved patient satisfaction (79%). All nurse respondents reported less attempts to gain access (100%), a reduction in escalation of care (100%), and less calls for additional resources (100%), when using the technology as an assessment tool prior to PIVC placement.




## Conclusions and Future Directions

This quality improvement initiative highlighted the impact of NIR vein visualization technology on care efficiency and patient satisfaction in the ED. Through this project, we found that NIR vein visualization technology can improve staff perception of patient satisfaction, decrease the number of PIVC placement attempts and reduce the need to escalate care or use additional staff resources. Considering nursing staff time is extremely limited, NIR vein visualization technology has the potential to enhance PIVC placement and care in the ED, while improving efficiency, staff resilience and reducing cost.

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