Is NIR Vein-viewing Technology Beneficial in Home Infusion Therapy?

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INTRODUCTION
(Background and Purpose)

Studies show safety of home infusion therapy compares favorably to hospital infusion treatments with respect to adverse events.[1] Added advantages include avoidance of hospital acquired conditions – especially for immunocompromised patients[2] – and patient preference for care at home. Polinski and Wasserman[1,2] report on the infection risk related to pneumonia and bronchitis with the finding that patients who received IGIV in a hospital outpatient infusion center (HOIC) were 1.5 times more likely to develop bronchitis and 1.8 times more likely to develop pneumonia compared to those receiving treatment at home.

Polinski further notes that home infusion patients in his study were no more likely to experience adverse drug events or side effects compared to those receiving infusions in a medical setting. Patients should be properly screened prior to start of therapy to identify possible risk factors for adverse reactions. Regardless of site of care, anaphylaxis medications should be available in the event that an adverse reaction occurs.

One universal infusion therapy challenge is difficult venous access (DVA), typically the result of long-term infusion therapy. Infusion Therapy Standards of Practice[3] issued in 2016 by the Infusion Nursing Society recommends that clinicians should consider the use of vein visualization technologies – such as near-infrared (NIR) vein viewers – to aid in vein identification and selection in patients with difficult venous access. NIR vein-viewing technology can aid in identification of more venous options for venous access or IV catheter placement. The home infusion company in this study uses a value-based approach to their care delivery programs. Utilizing a NIR technology aligned with this organization's commitment to making patient experience a measurable outcome. This study evaluates the use of NIR vein-viewing devices for infusion therapy in the home care setting.

METHODS

Over a six (6) month period, a home infusion company utilized NIR vein-viewing devices (VeinViewer®) to assess each patient's veins during home infusion therapy encounters to determine the appropriate location for venipuncture. Catheter placement and therapy followed the standard of care. Care delivery parameters – including number of stick attempts, venipuncture location, device usage, time to catheter placement – and patient satisfaction were measured. Nurses collected data at care delivery via computer-based system (Rare Care) for patient metrics.

NURSE ASSESSMENT QUESTIONS

1. IV access procedure Start Time
2. IV access procedure End Time
3. Standard of Practice Score (Include breakdown of DVA scoring)
4. Post VeinViewer Assessment Score
5. Which extremity was utilized for the score
6. Please indicate how you used VeinViewer:
   - Gained Access 'Under the Light'
   - Identified vein with VeinViewer and gained access without light
   - Did not use VeinViewer site
7. Known pre-existing IV site accessed today?
8. Did the VeinViewer improve or positively impact your visit today? Y/N/Neutral
9. Comment Box: (See Results)

RESULTS

The typical course of therapy (for IgG patient) was a loading dose – administered either in the hospital or at home – followed by infusions at varying intervals, specific to patient diagnosis. Patients on long-term infusion therapy frequently tell nurses where to access their veins. This 'self-direction' by patients impacted the resulting data. In 112 patient encounters, 98 patients received IgG therapy and 14 received other therapy. In each encounter, the nurse used NIR to assess and quantify veins suitable for peripheral intravenous catheter (PIVC) placement. After each assessment, PIVC was placed under the NIR light for 35 encounters, the vein was identified with NIR light and the light was removed for PIVC placement in 37 encounters and a NIR identified access site was not used in 40 encounters. Additional data was collected to evaluate whether an unknown vein was accessed after the 10th subject. Overall, a 'known vein' was accessed in 57 encounters and an unknown vein was accessed in 45 encounters. When asked if the NIR light device positively impacted the patient visit, 40 clinicians indicated 'Yes', 45 were neutral and 26 indicated 'No'.

While specific questions related to IV complications were not included in the data collection tool, a retrospective review of patient encounters concluded that no significant complications occurred during the study period other than hematoma associated with a missed stick.

PATIENT COMMENTS

"It's too bad that this wasn't utilized before."

"Will be a great advantage for the nurses and for people who you can't see their veins."

"The VeinViewer allows my nurse to see my veins better; however, it doesn't make it easier to insert the IV because my veins roll and have scar tissue buildup that aren't visible with the VeinViewer."

"I am often a hard stick and appreciate not having to use my hand as the (IV access) site."

NURSE'S COMMENTS

Upon 1st & 2nd attempts, immediate blood return obtained but quickly ceased. Unable to aspirate labs both times. VeinViewer confirmed veins remained intact, not blown. 3rd attempt immediate blood return, patency established.
Was able to identify a valve in the vein chosen for IV, which was helpful.
VeinViewer very beneficial for IV access today.
Used VeinViewer to visualize vein again when I was close to vein but didn't get blood return. Able to confirm I was in correct area and direct needle to access vein.
VeinViewer allowed me to properly anchor this "curvy" vein to avoid a valve.
Very helpful for getting the line where I needed it so it would be able to stay in for 3 day infusion.
Placed washcloth beneath patient's hand for more stable positioning. Setup VeinViewer at kitchen island, with patient seated.
Patient enjoys looking at veins but prefers "usual" spot.
Parents were able to watch the medication infuse through (their son's) his vein beneath the light, which they were very impressed.

NURSE'S CONCERNS

Patient's hair on arms interfered with vein viewing. Able to see one more good, accessible vein but patient preferred usual site in AC.
Patient only wanted antecubital to be accessed. Those are the sites typically used. RN saw other available site but patient states that anywhere else is painful.
Patient requested I use certain location on forearm. Could not visualize vein with VeinViewer at all, but was palpable. Went by feel and was able to access.
More veins are now able to be visualized with VeinViewer, but the exact location of the vein is deceiving if set up is not perfect. Patient's range of motion (ROM) makes access under the light difficult, he has a hard time turning arm directly facing upward towards the light. Limitation of patient's ROM and limited furniture options for set up at the correct angle over the patient's arm contributed to difficulty today.

DISCUSSION

The majority of this organization's participating patients were established prior to initiation of the study. Clinicians noted throughout the study that DVA patients welcome vein-viewing technology more than patients with an easy to access vein or known pre-existing access site. In the case where the patient has easily accessible veins, the clinician and patient generally reported that technology was either "not necessary" or "added a variable that made access more challenging". For new home care patients and patients with dark skin, NIR light device was helpful. Patients also liked seeing their veins to understand other vein access options.

CONCLUSION

This study evaluated the inclusion of NIR vein-viewing technology in the home infusion setting. It was determined that use of near-infrared, vein-viewing technology in home infusion therapy provided both patient and clinician benefits, especially for DVA patients.

Patients on long-term infusion therapy often experience difficult venous access. Vein-viewing technology can assist with venous access and placement of an IV catheter by identifying more access sites, identifying valves and tortuosity. By following published standards of care, clinicians are providing evidence-based patient care.

Home infusion therapy patients benefit from decreased exposure to hospital acquired infections with no greater risk of adverse drug events or side effects. The addition of NIR vein-viewing technology in home infusion aids in further improving the patient experience.

DISCLOSURE: Near-infrared, vein-viewing devices (VeinViewer®) for this evaluation were loaned to the home infusion company from Christie Medical Holdings, Inc.

1 Polinski JM, "Home Infusion: Safe, clinically effective, patient preferred and cost saving", Healthcare, 2017;5(1-2): 68-80.

2 Wasserman RL, Impact of Site of Care on Infection Rates Among Patients with Primary Immunodeficiency Diseases Receiving Intravenous Immunoglobulin Therapy, J Clin Immunol, 2017; 37:180-186.

3 Infusion Therapy Standards of Practice, J Infusion Nursing, 2016 edition.

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