

Ultrasound Guided IV Placement Training for Emergency Department Nurses: A QI Project.

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Background

- Peripheral intravenous (IV) catheter insertion is the most commonly performed in hospital procedure with over 200 million placed annually (Archer-Jones et al., 2020, Amick et al., 2021).
- IV catheter insertion can be challenging in certain patient populations, including: "...obesity, chronic illness, hypovolemia, intravenous drug abuse and vasculopathy..." (Edwards & Jones, 2018, p. 33). These patients are classified as having difficult IV access (DIVA) (Davis et al., 2020).
- DIVA is commonly defined as: requiring >2 attempts at IV access using traditional means or requiring alternative vascular access techniques (Stuckey & Curtis, 2019).
- Ultrasound guided peripheral IV (USGPV) techniques allow the placement of peripheral IVs in patients with DIVA with great success. Hackett, et. al. found a first attempt success rate for USGPV placement of 85% vs 70% for traditional means in adult patients and 85% vs 35% in pediatric patients (2021).
- Ultrasound guided IV placement is within RN scope of practice, and RNs in a variety of hospital settings have been successfully trained in this technique (Amick et al., 2021, Davis et al., 2020, Edwards & Jones, 2018, Hackett et al., 2021, Mitchell et al., 2022, Morata & Bowers, 2020, Salinas et al., 2021, Stuckey & Curtis, 2019).
- The PICOT question developed for this QI project is: In (P) Emergency Department RNs, does (I) RN USGPV placement training compared to (C) traditional methods improve (O) RN ability to independently place IV catheters, thus improving care and reducing costs (T) over a six-month time period?

Review of Literature

Six common themes were identified in the review of literature.

- DIVA is a prevalent condition with rates as high as 24% in adult patients (Salinas et al., 2021).
- DIVA delays critical patient care, such as: medications, fluids, blood products, and phlebotomy (Hackett et al., 2021).
- DIVA increases costs for both the patient and facility (Amick et al., 2021, Salinas et al., 2021).
- DIVA increases negative patient outcomes, including: discomfort, damage to ancillary structures, and the risks of central venous catheter (CVC) placement (Amick et al., 2021, Edwards & Jones, 2018, Hackett et al., 2021, Salinas et al., 2021).
- USGPV placement is an effective technique for establishing peripheral IV access in patients with DIVA. It is now the preferred rescue technique for establishing vascular access in this patient population (Davis et al., 2020).
- RNs can be effectively trained in USGPV skills. This can improve outcomes and reduce costs (Archer-Jones et al., 2020).

Framework

- The Revised Iowa Model:
 - Nine step process with decision points and feedback loops.
 - Uses question about current practice to develop evidence-based practice changes.
- Identify triggering issues/opportunities.
 - State the question or purpose.
 - Is the topic a priority?
 - Form a team.
 - Assemble, appraise, and synthesize the body of evidence.
 - Is there sufficient evidence?
 - Design and pilot the practice change
 - Identify and sustain the practice change.
 - Disseminate the results.

Methods

- Study Population:
 - RNs, $N = 17$, from a 25 bed, rural, critical access hospital ED in Northeast Wisconsin.
 - Experience ranged from 1 to 30 years ($M = 11.09$, $SD = 9.64$).
- Didactic Training:
 - 30-minute PowerPoint presentation conducted via zoom.
 - Topics: DIVA, basics of ultrasound, knobology, scanning techniques, USGPV insertion techniques.
- Hands on Training:
 - 1-on-1 sessions in ED or Pre-Op.
 - Review of ultrasound machine, scanning and IV placement technique.
 - Ultrasonography on a live model.
 - Completion of didactic quiz.
 - Goal of 5 IV placements on patients.
- Data Collection:
 - Author created pre-training and post-training Likert Survey.
 - Number of USGPV placements for 60-days post training.

Results

- The RNs showed a significant, $t(23) = -4.58$, $p < .001$, improvement in their confidence with USGPV placement from the pre-training to the post-training Likert survey.
- RNs so far have successfully placed multiple, $N = 15$, USGPVs post training!
- Ultrasound was used as a primary technique in the majority of patients, $n = 11$. These patients had poor vasculature, difficult to find veins, veins not ideal for traditional techniques, or a history of DIVA.
- Ultrasound was used as a rescue technique in the minority of patients, $n = 4$. These patients had already had >2 attempts using traditional methods.

Implication for Practice

- Improved patient care:
 - Reduced number of access attempts.
 - Reduced delays in care and reduced length of stay.
 - Improved satisfaction.
- Reduced costs:
 - Reduced staff time.
 - Reduced supply costs.
 - Reduced lengths of stay.
 - Reduced CVC placements.

Conclusion

- RNs can be quickly and effectively trained to become confident in the placement of USGPVs through a combination of didactic and hands on training. By giving bedside RNs the ability to independently place IVs in patients with DIVA, vascular access can be more rapidly achieved, improving patient cares and reducing costs.
- Potential Training Improvements:
 - Add simulation training prior to hands on training with real patients. This will allow RNs to develop hand-eye coordination and confidence with the ultrasound machine and placement techniques prior to actual USGPV placements.
 - Conduct 1-on-1 training in high patient volume areas such as surgery pre-op.
 - Consider training "unit champions".

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