

Clinical Survey of Ultrasound-Guided PIV Practices: Uncovering a Need to Standardize Aseptic Procedures to Improve Patient Safety

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Background and Purpose

Peripheral intravenous (PIV) catheters are the most common devices used to deliver medications, fluids, blood products, and nutrition. Every year, nearly 2 billion PIV catheters are inserted worldwide.¹ Several factors complicate the successful establishment of a PIV, including an aging population, increasing numbers of difficult access patients, and usage of irritating intravenous medications as well as obesity, IV drug use, and conditions such as diabetes, cancer, and sickle cell disease.² Ultrasound-guided peripheral cannulation has improved PIV access success for patients with known difficult-to-access veins^{3,4}—which studies estimate is nearly 60% of today's patients.⁵ As a result, ultrasound-guided PIV (UGPIV) is increasingly being used to ensure PIV placement success.^{6,7} As new devices and practices emerge, it is necessary to consider gaps in procedural asepsis, evaluate areas of non-compliance with policies and apply current guidelines to ensure ongoing safety for patients.⁸

The purpose of this study was to investigate ultrasound-guided peripheral intravenous (UGPIV) practices to assess if differences existed between supply usage of transducer/probe covers, glove types, gel and skin disinfectants of clinicians functioning in primary vascular access, emergency department, or other roles.

Methods

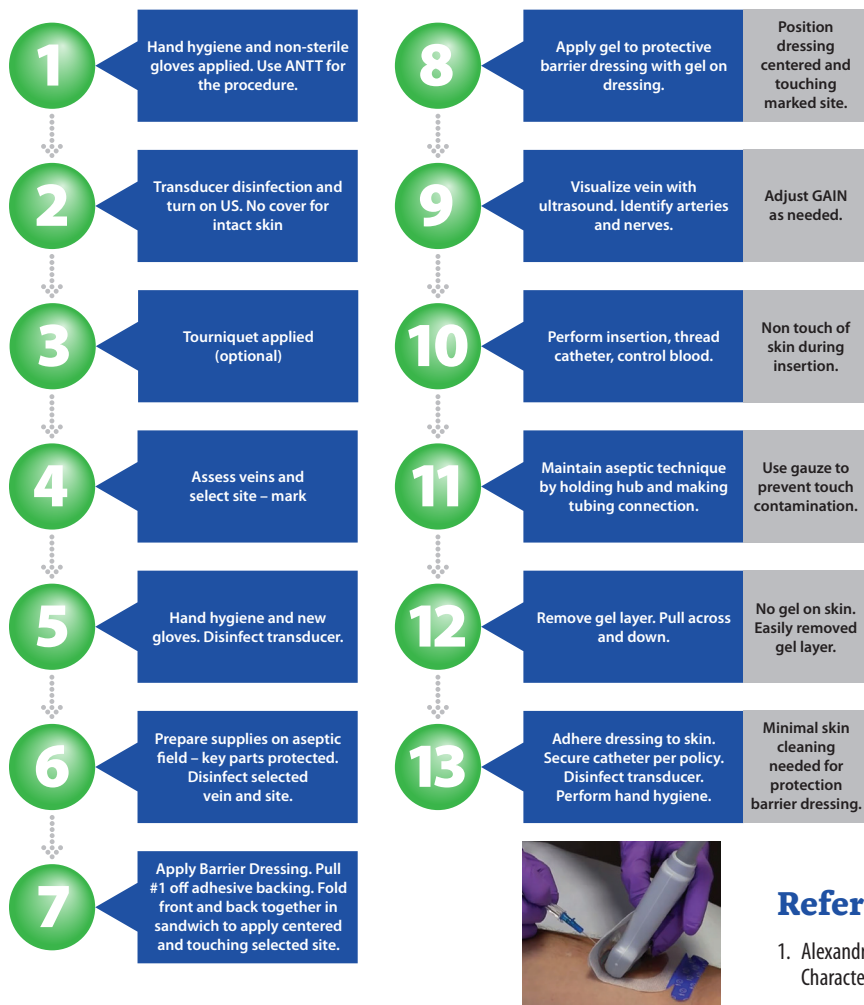
A voluntary cross-sectional descriptive survey was conducted via SurveyMonkey in 2019. Data collection included demographic information, practice-oriented information, procedural activities, and supplies used for UGPIV insertions, and economic indicators of current and perceived procedural activities associated with UGPIV. Frequency distributions and results of Fisher's Exact test and one-way ANOVA were reported using R v.3.5.2.

Results

A total of 26,649 surveys were distributed with a response rate of 5.5% (n=1475). Forty-eight percent of respondents (n=709) indicated that they worked in a vascular access role, 310 (21%) worked in an emergency department, and 455 (31%) categorized their role as "other." Survey results indicate aseptic technique reported as very important (90%), sterile technique less important (56%), sterile gel important (80%) but used less (64%). Personnel in vascular access roles had the highest percentage of aseptic glove use, sterile glove use, aseptic gel use, and sterile gel use with meaningful differences in all variables ($P < .0001$). There are substantial and meaningful inconsistencies in supplies and procedures used by vascular access specialists, emergency department personnel, and other personnel.

- **The survey confirms that UGPIV procedures are performed frequently with a high number, 49% (n = 478), of respondents reporting 5–20 procedures per day**
- **95% of vascular access (VA) clinicians and 91% of emergency department (ED) nurses believe successful UGPIV insertion improves patient care**
- **Results demonstrate a wide variety of supply usage practices between departments with UGPIV insertions**
- **Aseptic technique was identified as Very Important by 92% of VA nurses but only 82% Always use it**
- **One-third of the vascular specialists used alcohol alone, and 46% of the ED personnel reported not using alcoholic chlorhexidine for skin antisepsis**
- **90% of VA nurses and 88% of ED nurses reported transducer/probe disinfection before the procedure; Approximately 80% of VA and ED clinicians spend 2 minutes or less disinfecting the transducer**
- **73% of VA nurses and 65% of ED nurses use a transducer/probe cover during the procedure**
- **Sterile gel was used by 69% of vascular access nurses and 56% of ED nurses, and more than 22% of survey respondents stated they sometimes used each of the gel categories of multi-use, single gel packet and sterile gel packet**
- **Inadequate gel removal was cited as a potential cause of securement and dressing adherence issues by 41% of VA nurses and 51% of ED nurses**
- **Majority of all respondents believe UGPIV insertion avoids riskier procedures, such as central venous access or an external jugular catheter**
- **These data and survey results represent the first known collection of clinical feedback on supplies used with the UGPIV procedure, and differences associated with clinician usage in various departments and care settings.**

Performing UGPIV Insertion with Barrier



Discussion

Numerous studies, particularly those using Lean Six Sigma methodologies and its applications in healthcare, have shown that standardization reduces risk and improves performance by systematically removing variation of practice while also pinpointing areas of waste, ultimately leading to greater efficiency and cost reduction.⁹ Responses to this survey demonstrated a wide variety of insertion techniques and variable supply usage.

In the results of this survey, almost one-third of all respondents reported no use of ultrasound transducer/probe or transparent dressing covers. The remaining two-thirds always or sometimes used the ultrasound probe protection. Some probe covers and gel-separating dressings may mitigate this contamination risk by removing gel from the insertion and puncture site. Gel-free insertion practices have been described in the literature and may increase procedural safety while reducing costs. These results suggest the need for investigation of guideline application and evaluation of compliance within policies for all departments and care settings to

promote standardization of safety practices with UGPIV insertions.

Conclusion

Inconsistency and lack of standardization exist within UGPIV practices and supply usage. Yet it is well known that risk is reduced when procedures are standardized, education is provided, and compliance is monitored. Indeed, 5 organizations recently joined forces to publish an intersocietal position paper on the need for standardizing low-level disinfection practices in the UGPIV space.¹⁰ Patient safety concerns are driving changes supporting increased vigilance of aseptic technique for ultrasound usage. Results demonstrate a wide variety of practices indicating the need for standardization, consistency, and understanding to safely perform UGPIV insertions. These results are suggestive of interventions that standardize procedures in keeping with guidelines and recommendations.

References

- Alexandrou E, Ray-Barruel G, Carr PJ, et al. Use of Short Peripheral Intravenous Catheters: Characteristics, Management, and Outcomes Worldwide. *J Hosp Med.* 2018;13(5).
- Dychter SS, Gold DA, Carson D, Haller M. Intravenous therapy: a review of complications and economic considerations of peripheral access. *J Infus Nurs.* 2012;35(2):84-91.
- Galen B, Baron S, Young S, Hall A, Berger-Spivack L, Southern W. Reducing peripherally inserted central catheters and midline catheters by training nurses in ultrasound-guided peripheral intravenous catheter placement. *BMJ Qual Saf.* 2020;29(3):245-249.
- van Loon FHJ, Buise MP, Claassen JJF, Dierick-van Daele ATM, Bouwman ARA. Comparison of ultrasound guidance with palpation and direct visualisation for peripheral vein cannulation in adult patients: a systematic review and meta-analysis. *Br J Anaesth.* 2018;121(2):358-366.
- Armenteros-Yeguas V, Garate-Echenique L, Tomas-Lopez MA, et al. Prevalence of difficult venous access and associated risk factors in highly complex hospitalized patients. *J Clin Nurs.* 2017;26(23-24):4267-4275.
- Gottlieb M, Sundaram T, Holladay D, Nakitende D. Ultrasound-Guided Peripheral Intravenous Line Placement: A Narrative Review of Evidence-based Best Practices. *West J Emerg Med.* 2017;18(6):1047-1054.
- Stuckey C, Curtis MP. Development of a nurse-led ultrasound-guided peripheral intravenous program. *J Vasc Nurs.* 2019;37(4):246-249.
- Moureau NL, Gilbert GE. A Survey of Ultrasound-Guided PIV Practices: A Report of Supply Usage and Variability Between Clinical Roles and Departments. *JAVA.* 2020;25(3):28-33.
- Steere L, Ficara C, Davis M, Moureau N. Reaching One Peripheral Intravenous Catheter (PIVC) Per Patient Visit With Lean Multimodal Strategy: the PIV5Rights™ Bundle. *JAVA;*2019;24(3):31-43.
- Disinfection of ultrasound transducers used for percutaneous procedures. Intersocietal Position Statement. *J Ultrasound Med* 2021; 9999:1–8.

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