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Pilot Study

Multi-center Qualitative Observational Evaluation of Ultrasound Probe Protection using a Sterile Transparent Barrier and Securement Dressing to Standardize UGPIV Catheter Insertions

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Abstract

Ultrasound-guided peripheral intravenous (UGPIV) catheter insertions are commonly used to establish intravenous access in patients with difficult vascular access. Probe protection and supply usage with UGPIV insertions in acute care varies across clinicians and departments, with a lack of standardization. This multicenter qualitative evaluation compared probe protection using a sterile transparent barrier and securement dressing with a sterile sheath probe cover to standardize UGPIV catheter insertions. Investigators posited that by separating the gel and ultrasound probe from the skin, the barrier dressing would provide a standardized alternative to sheath probe covers. Results of 210 individual clinician responses following the use of the probe protective barrier dressing reported 97% to agree/strongly agree for the significant parameters of gel separation, adherence, size, imaging, ease of use, improved aseptic technique, and preference over sterile probe cover. Ninety-nine percent of respondents recommended adopting the new dressing and standardized procedure instead of the current probe sheath cover. Analysis of before and after supply costs for UGPIV probe protective supplies using the sheath probe cover was $10.54 and $4.47 using the barrier dressing. Incorporating the barrier dressing resulted in a 57% cost reduction in supplies. While more research is warranted on probe protection, the findings of this study suggest that standardization of the UGPIV protocol may be facilitated and improved using a transparent barrier dressing versus a probe sheath cover.

Keywords: Asepsis; Peripheral venous catheterization; Cost-effectiveness; Occlusive dressings; Standardization; ultrasound-guided.

Introduction

Nearly 60% of patients who require intravenous medication administration have difficult vascular access (DIVA), necessitating the use of visualization technologies such as ultrasound guidance to successfully achieve peripheral venous access [1]. It is estimated that 12 million ultrasound guided peripheral intravenous (UGPIV) catheter insertions are performed annually in North America [2]. Breaks in aseptic technique and failure to standardize the practice of ultrasound guided catheter insertion place patients at risk and increase the cost of acute care services. In the absence of standardized supplies and procedures for UGPIV insertions, supply usage, and best practices often vary between departments within the same facility. Results from a cross-sectional descriptive survey investigating supply usage practices among 26,649 clinicians involved in UGPIV insertions highlighted clinically meaningful inconsistencies in the use of supplies (i.e., gloves and gels) and concordance with aseptic techniques. Such variability has the potential to undermine patient safety. Thus, there is an ongoing need to evaluate the standardization of UGPIV insertion supply usage, probe protection, and safety. Given the steady rise in the number of DIVA patients and the demand for UGPIV catheter insertions, attention is being given to concerns over disinfection practices, ultrasound device protection, variability of supplies used, cost, and lack of standardization in the application of aseptic technique during the procedure [3-6].

Ultrasound transducers, commonly referred to as probes, are used as visualization technology to aid in locating the veins of DIVA patients. Typically, a cover or barrier is placed over the probe, which eliminates direct exposure of the surface of the ultrasound probe to the skin at the insertion site [7]. Application of unprotected probes to the skin during UGPIV insertions is a source of concern that compromise this aseptic procedure. Sterile and single-use probe covers afford considerable protection from equipment contamination at the insertion site [8]. In most cases, probe covers must be used in conjunction with ultrasound conductive gel applied to the probe face and skin to facilitate sound transmission. The use of conductive gel is problematic because it is often contaminated during ultrasound procedures and can introduce pathogens at the insertion site. Infection outbreaks have identified gel contamination as the mode of transmission in numerous reports [9]. Single-use, sterile gel packets are recommended for percutaneous procedures where the gel is applied to the skin, with probe covers requiring gel [7,8,10]. Single-use bacteriostatic or non-sterile packets of gel may be used with external ultrasound assessments performed on intact skin or when gel does not touch the catheter insertion area,8 as with transparent barrier and securement dressings [11,12]. Different probe covers and protection methods are available, some allowing gel elimination or separation from the insertion site. For example, the procedure first described by Thorn et al. [13] used a transparent dressing, folded, to perform an ultrasound guided venipuncture utilizing separation of the gel from the insertion site.

A comparison of different types of probe protection for UGPIV insertions is warranted to continue to improve all aspects of the procedure for safety, efficiency, and cost control. This report describes the qualitative clinician feedback of a multicenter evaluation that compared a sterile transparent securement and barrier dressing to conventional sterile probe covers used in UGPIV insertions and the associated supply costs. Therefore, the purpose of this qualitative probe protection and supply evaluation aimed to establish a standardized aseptic UGPIV insertion procedure using either the sterile probe sheath cover or the transparent barrier securement dressing for probe protection.

Materials and methods

This multi-center qualitative evaluation was initiated by a southwestern hospital group, and supported by the manufacturer for product and training, to compare UGPIV insertions using conventional sterile sheath probe covers versus the sterile transparent barrier and securement dressing (UltraDrape Barrier and Securement Dressing, Parker Laboratories, Fairfield, New Jersey, USA) [11]. Institutional hospital review, ethical review, and waiver of consent were received for this study under IRB# MCHS 190307-1. Inclusion criteria included patients admitted to the acute care facilities under standard hospital consent, 18 years of age or older, who required UGPIV insertion to establish vascular access. For the study, the procedure training included a three-step application with an adherent ultrasound view area, a gel and ultrasound probe separation flap, the gel removal layer, and a dressing pull-down section of the transparent barrier dressing [11].

Clinicians involved in the study were members of the vascular access team with prior experience in UGPIV insertions. The clinicians received initial training on the Aseptic Non Touch Technique (ANTT) guidelines and standardized UGPIV insertion procedures that integrated the sterile transparent barrier and securement dressing for probe protection. Each clinician participant was observed performing three insertions using the sterile transparent barrier and securement dressing, according to the manufacturer's instructions **(Figure 1)**. The participants entered responses immediately following each procedure into a Likert survey tool, accessed through the Survey Monkey online link **(Appendix 1)**.

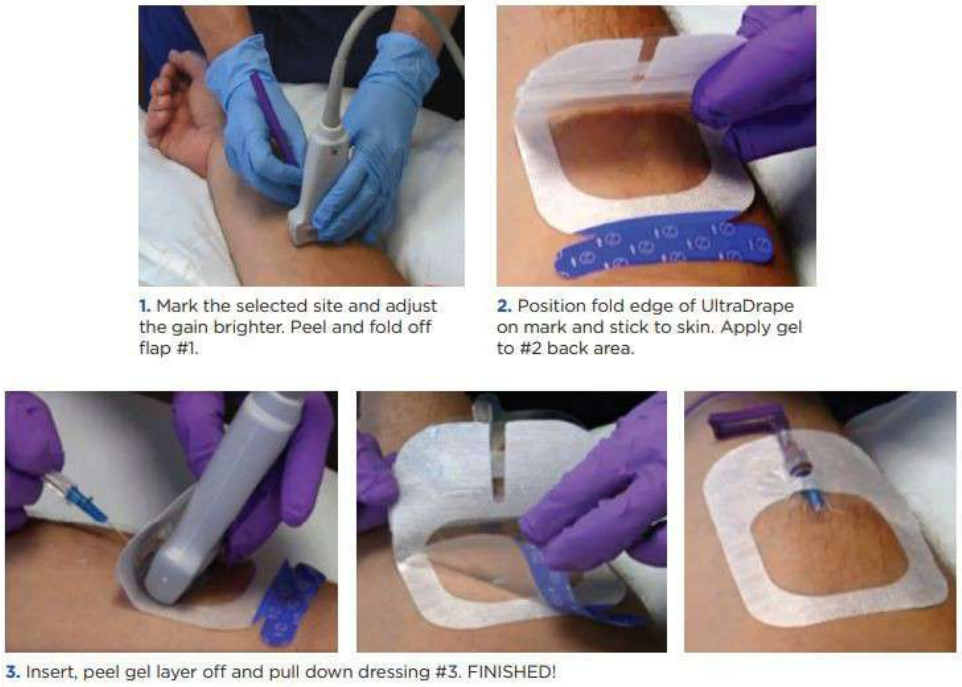

Figure 1: The 1-2-3 procedure for applying the sterile transparent barrier and securement dressing for probe protection. Photos used with permission from PICC Excellence.

Data were collected over five weeks, from April to May 2019, using a validated Likert study tool on the Survey Monkey website (Momentive Inc., One Curiosity Way, San Mateo, CA 94403, USA). The study tool was validated through a five-clinician feedback review performed at a Northeastern medical center. Data included facility location, the type of catheter device inserted for each procedure, and tool completion by the clinicians for each question listed in the tool. No personal medical information was collected for the patients in the UGPIV insertion procedures. Data from the clinician feedback was stored in a secure database and maintained for the required years.

The second arm of the evaluation included a supply and cost comparison of before and after procedural practices and supplies used with UGPIV insertions in the hospital system. Data pertaining to items and cost of dressing supplies used before the initiation of the study, supplies used with the sterile transparent barrier, and securement dressing were obtained through multidepartment collaboration. In addition, data were collected to evaluate the costs of developing a fully sterile UGPIV insertion kit with a sterile probe cover.

Data and Economic Analysis

Following a Likert survey tool validation process, data were collected and evaluated to determine the potential for adoption of the standardized UGPIV insertion procedure that included the sterile transparent barrier and securement dressing. Response analysis was performed through scoring calculations and percentages of agreement or disagreement.

The supply cost analysis incorporated the cost of each item used for UGPIV insertion before the initiation of the study, supplies used with the sterile transparent barrier and securement dressing during this evaluation, and supplies analyzed for system consideration in the development of a fully sterile UGPIV insertion kit. The total cost of each grouping of supplies was collected but blinded for individual items at the request of the hospital system.

Results

Survey responses

Data were collected from 210 unique UGPIV procedures, with clinician responses recorded immediately following the procedure in the Likert study tool that provided qualitative feedback on the probe protection performance and feasibility of the standardized procedure. A summary of clinician responses and results for the transparent barrier and securement dressing usage with UGPIV insertions is contained in (**Figure 2)**.

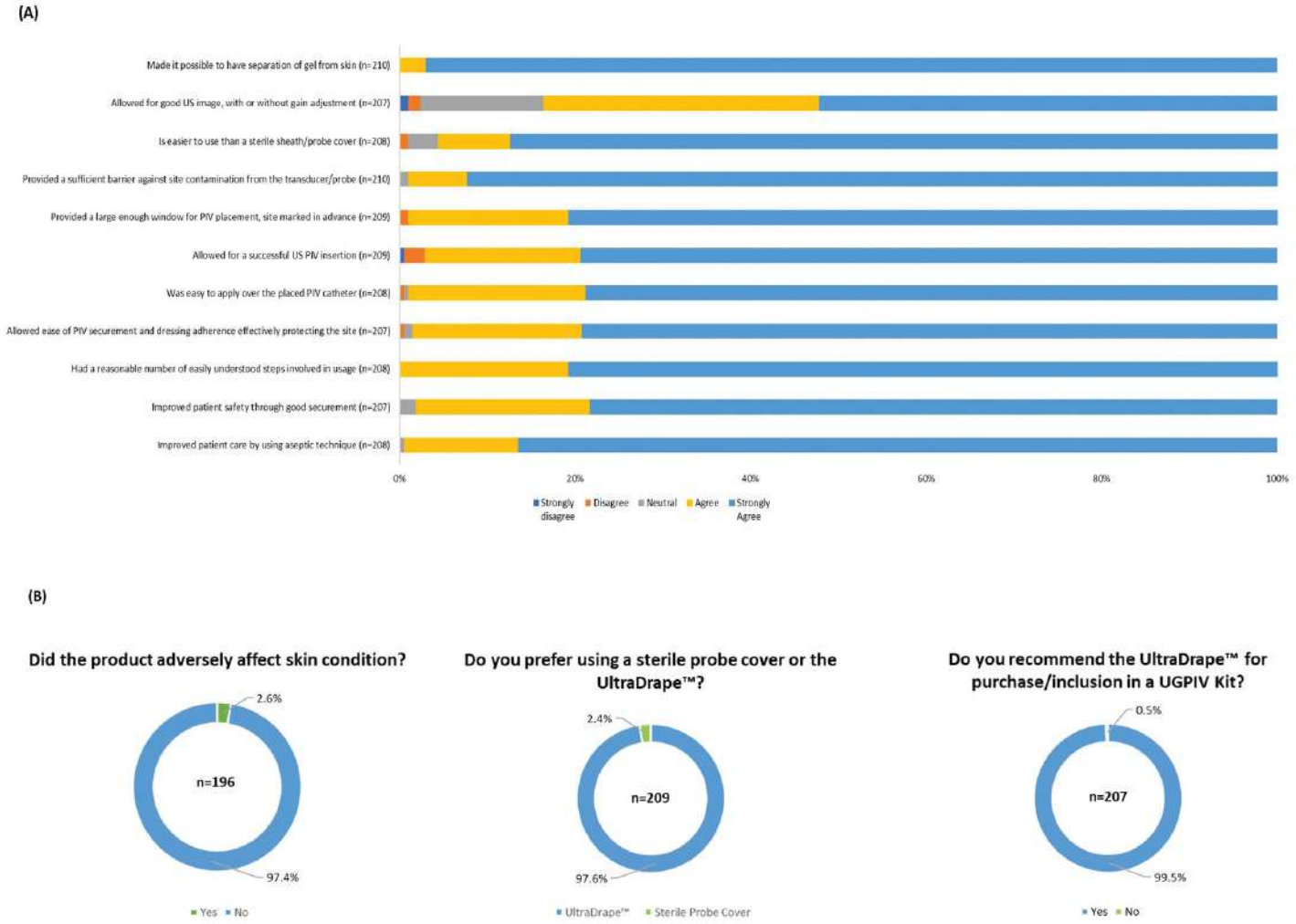

Figure 2: Summary of clinician responses regarding the use of the sterile transparent barrier and securement dressing with ultrasound-guided peripheral intravenous (UGPIV) catheter insertions.

Overall reported agreement with the standardized procedure reflected 95% with a range of 84%-100%. The questions directly evaluating probe protection performance with the transparent barrier dressing achieved 95.7% for ease of use compared to the sheath probe cover, with 99.1% agreement that the visualization window was large enough in the transparent barrier dressing and easy to apply over the placed PIV catheter for success ultrasound PIV insertion in 97.1%. Agreement for allowance of ultrasound resolution and visualization through the dressing achieved 83.6%, with a full separation of gel from the insertion site reported at 99.1%. Additionally, securement of the peripheral intravenous catheter with adequate dressing adherence was reported at 98.5%. Clinician feedback said that the sterile transparent barrier and securement dressing improved patient safety by using an aseptic technique and through suitable securement (98.1%) **(Figure 3)**. The dressing impact on skin with no adverse effects was reported at 97.4%.

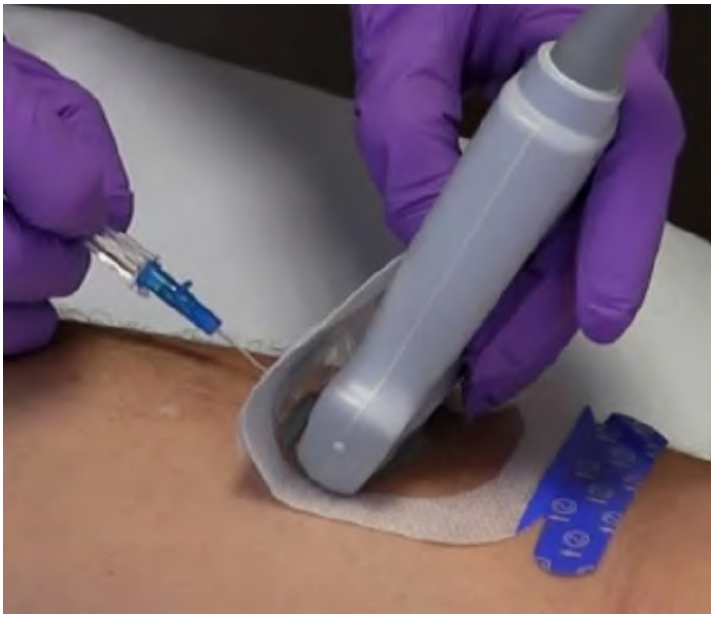

Figure 3: Representative photo illustrating UGPIV catheter insertion with sterile transparent barrier and securement dressing. Photo used with permission from PICC Excellence.

The final analysis of probe protection using the transparent barrier dressing versus the sterile probe sheath cover reported a preference for the transparent barrier dressing at 97.5% and a recommendation for the adoption of this standardized procedure and probe protection at 99.5%.

Summary of probe protection supply cost

Evaluation of prior procedural supplies included variability with no probe protection, probe cover, transparent dressing, transparent barrier and securement dressing, sterile and non-sterile, and sterile ultrasound gel. Supplies evaluated for cost review included probe cover, transparent barrier dressing, transparent dressing, ultrasound gel, IV start kit, alcoholic chlorhexidine, gauze, sodium chloride flush, sterile drape, clean and sterile gloves, skin protection wipe, tourniquet, and marker. Simple cost analysis and comparison of hospital supplies used for the current UGPIV procedure were $10.38, including the probe sheath cover, and $4.63 with the transparent barrier dressing. The difference in supply cost reflected a 55% change for the standardized procedure. The cost of the complete sterile UGPIV kit, still in evaluation, was $13.54, with a 67% change compared to the transparent barrier dressing **(Figure 4)**.

Standard Practice	**Full Sterile Insertion**
1. Ultrasound probe cover 2. Ultrasound gel, non-sterile single-use packet (assessment) 3. Ultrasound gel, sterile 4. IV start kit with alcoholic chlorhexidine, 1ml 5. Alcoholic chlorhexidine, 3ml 6. Gauze, 4x4 7. Sodium chloride 10ml flush **Total: $10.38**	1. Sterile ultrasound probe cover 2. Ultrasound gel, non-sterile single- use packet (assessment) 3. Ultrasound gel, sterile 4. IV start kit or UGPIV kit with alcoholic chlorhexidine, 1ml 5. Alcoholic chlorhexidine, 3ml 6. Gauze, 4x4 7. Sterile gloves 8. Sterile drape 9. Sodium chloride 10ml sterile peel packet **Total: $13.54**
Sterile Transparent Barrier and Securement Dressing/ANTT	
1. Sterile transparent barrier and securement dressing 2. Ultrasound gel, non-sterile single-use packet (assessment) 3. Skin marker 4. Disposable tourniquet 5. Alcoholic chlorhexidine, 3ml 6. Gauze, 2x2 7. Sodium chloride 10ml flush **Total: $4.63**	

Figure 4: Comparison of supply costs for three UGPIV insertion techniques: standard practice, full sterile insertion, and sterile transparent barrier and securement dressing/ANTT.

Discussion

As the number of patients with difficult access increases, UGPIV becomes a standard solution and procedure for establishing intravenous access. However, ultrasound probes and gels are common sources of contamination, requiring recommendations for probe protection for percutaneous vascular access procedures [9,12]. Aseptic techniques, probe protection, barrier methods, and incorporation of single-use or sterile gel packets are used to safeguard against insertion site contamination [8,10]. The supplies and protocols used for UGPIV insertions at the study hospitals before this evaluation varied between departments and hospitals. Concerns over the lack of standardization and variability of probe protection and supplies prompted an evaluation of UGPIV insertion practices at these three medical centers. The evaluation also compared the utility and cost of the sterile transparent barrier dressing and conventional sterile probe covers. The aim of this comparison also included the potential to standardize the UGPIV procedure using the sterile transparent barrier dressing.

Procedural standardization for UGPIV catheter practice falls into three main areas that represent adherence to an aseptic technique for catheter insertion. The three areas are equipment disinfection, probe protection, and appropriate gel for acoustic visualization with ultrasound. The American Institute of Ultrasound in Medicine (AIUM) recommends probe protection in the form of sterile coverings for probes with currently available plastic sheath covers or barrier transparent dressings to adequately reduce the exposure risk of the probe during a percutaneous procedure [8]. Rowley and Clare developed the ANTT model as a method to reduce contamination and protect key parts and key sites of supplies used during invasive procedures [6]. The Infusion Nurses Society (INS) and the Association for Vascular Access (AVA) have endorsed ANTT as a method to standardize practices with peripheral catheter insertions, including UGPIV catheter, and to improve adherence to aseptic measures with infusion therapy and device placement [7]. This trend of increasing attention and education on aseptic technique with ANTT application promotes foundational principles of infection prevention, helping to standardize and reduce contamination and variability in procedures such as in UGPIV catheter insertion.

The questions included in the Likert study tool for this study were designed to evaluate a different approach to probe protection qualitatively. Instead of a sterile probe cover that can be costly and time-consuming [13], consideration was given to a dual-purpose transparent barrier dressing for UGPIV insertions. The use of barrier dressings, such as the one described in the Thorn study, removes the gel from the insertion site and eliminates the post-procedural gel cleanup of the skin [14]. This gel-separated procedure was initially used for ultrasound guided blood sampling venipuncture and later modified into an ultrasound guided transparent barrier that also acted as a final securement dressing [14]. The transparent barrier dressing was selected because its design facilitates the use of ANTT procedure guidelines. The separation of gel from the UGPIV insertion site with the transparent barrier dressing effectively removes gel as a source of contamination, suggesting the sterility of gel used in the procedure becomes less critical. With this technique, the transparent barrier dressing allowed the positioning of the probe behind a barrier, and there was no skin contact during the insertion procedure **(Figure 3)**. Moureau et al. reported variability in clinicians' use of sterile and unsterile gloves for UGPIV placement [12]. The design of the sterile transparent barrier dressing may reduce touch contamination without the need for sterile gloves.

The recommended level of probe protection was achieved with the transparent barrier dressing without compromising image resolution, ease of use, or required time. Previous studies have described visualization challenges with the alignment of the center of the ultrasound probe [14]. These issues were circumvented by pre-intervention training, which required a pre-assessment mark at the intended insertion site and a slight increase in the gain to achieve optimal imaging. While the actual procedural time was not collected in this evaluation, the speed of insertion and completion was likely increased with the elimination of the complete sterile probe cover application and reduced skin cleaning time post-procedure, validated in another study [13].

Peripheral intravenous (PIV) catheterization is required in approximately 70% of hospitalized patients, and difficult venous access requires visualization technology in an estimated 40% of those patients [15]. Therefore, assessing the added cost associated with appropriate supplies, increased education for patients requiring visualization technologies such as ultrasound. This study also showed significant cost savings with the sterile transparent barrier dressing. Compared to the multi-healthcare center system's previous procedure and a full sterile insertion UGPIV kit, the use of the sterile transparent barrier and securement dressing represented a 67% reduction in cost. Furthermore, the cost of the UGPIV insertion was reduced by 55% by eliminating the probe cover, sterile gel, and IV start kit, and substituting the sterile transparent barrier and securement dressing, skin antiseptic agent and single-use gel packet. The total cost of UGPIV using the transparent barrier dressing was under $5.00 for all necessary supplies **(Figure 4)**. With more than 200 UGPIV insertions performed at the three study institutions over five weeks, the annual savings were estimated by the hospital at more than $35,000 by applying standardized supplies and probe protection with the transparent barrier dressings. Costs associated with supplies used with UGPIV insertions were not found in any published research and may represent a subject for future research.

Limitations

This study has some important limitations. The current study was designed to evaluate the functional role of probe protection for the clinician, and not designed, intended, or powered to evaluate clinical outcomes of sterile probe sheath covers or sterile transparent barrier and securement dressing. While this evaluation was a facility-initiated study, the limitation of manufacturer sponsorship for supplies and training added bias. Manufacturer funding of studies can be considered a limitation since results from industry sponsored investigations must reflect cautious interpretation with heightened concern for potential bias. Efforts were made to limit manufacturer involvement throughout the data collection, analysis, and manuscript development. Responses associated with observational performance research are subjective, based on opinion and judgment of each clinician. Results are limited by participation and, despite multi-center data collection, may not be representative of the whole. Likert scales contain multiple items and are therefore likely to be more reliable than single item. Qualitative clinical user data collection is not without bidirectional bias. An added potential weakness, and to some extent a strength, was the data collection by the vascular access team clinicians. A weakness of this evaluation is the lack of comparative publications that evaluate standardization of supplies and options for probe protection with UGPIV insertions. A strength of the research is the investigation of probe protection options and selection of supplies that impact procedural standardization and cost. Economic savings reflected in the supply usage for UGPIV insertions will vary by institution. While the design of the sterile transparent barrier facilitates ANTT during UGPIV insertions, future studies are needed to confirm its impact on the post insertion clinical outcomes of patients.

Conclusions

The findings of this study suggest that the use of a standardized UGPIV protocol using sterile transparent barrier and securement dressing may reduce the number of supplies needed and overall procedure costs. Supply usage was optimized in this study with an overall projected savings of greater than 67% per procedure. The UGPIV procedure was standardized over the three hospitals to a method that incorporated transducer protection and gel separation from the skin at the insertion site. The qualitative level of agreement for all evaluation parameters exceeded 95% reflecting high acceptance of the standardized procedure with the sterile transparent barrier and securement dressing. Ninety-nine percent of respondents recommended adoption of the new dressing and procedure. Evaluation of evidence and product options in conjunction with vascular access procedures may help to optimize necessary supplies and even help to create a standardized UGPIV insertion procedure that promotes consistency throughout departments and clinicians. Applying standardization in a way that may promote safe and cost effective UGPIV insertions may allow more patients to receive the benefits of ultrasound guided vascular access. While not analyzed in this evaluation, economic comparative reviews in the literature do report cost savings associated with successful UGPIV insertions that allow avoidance of central catheter placement [16]. Direct comparative studies are needed for UGPIV insertions to determine the impact of sterile transparent barriers on clinical outcomes and validation of the cost associated with optimal supply usage.

Author Contributions

The authors confirm contribution to the paper as follows: study conception and design: MD, NM; data collection: MD, KG, BD; economic evaluation: KG, NM; analysis and interpretation of results: NM; draft manuscript preparation: AC, NM. All authors reviewed the results and approved the final version of the manuscript.

Disclosures

The authors MD, KG, BD, and AC declare no competing interests. NM is the owner of PICC Excellence, Inc, a consultant, and speaker for 3M, Access Vascular, Accuvein, Advanced Medical Solutions, BBraun, Bedal, Chiesi, Civco, Exo, Javelin Health, Linear Health Sciences, Nexus Medical, Parker Laboratories, Piper, and Teleflex.

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Parker Laboratories funded the clinical evaluation. Clinician responses and data collection were performed independently from the manufacturer. The investigators designed and implemented the study protocols without input or oversight from the manufacturer. The study sponsor had no role in the study design, data collection, analysis, data interpretation, or writing of the manuscript.

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Author Biosketches

1. Michael Drafz, RN, CRNI, VA-BC, was the clinical lead of the vascular access service at Sharp Metropolitan Medical Campus during the study and functions as a vascular access specialist in the Sharp Healthcare system. Michael contributed to the study design and research process approval for the study.
2. Kurt Goeller, RN, BSN, VA-BC was the clinical lead during the study and is now the Advanced Clinician of the vascular access service at Sharp Grossmont Hospital. With almost 20 years in vascular access with the PICC/IV Team, Kurt also helped establish the Grossmont Infusion Center. Kurt worked with retrospective data collection, the economic analysis and coordinated the study within his facility.
3. Benilda Dizon, RN AC, is a vascular access specialist at Sharp HealthCare Chula Vista campus and worked to coordinate the study within her facility.
4. Aisha Cobbs, PhD, is a consultant and medical writer based in Social Circle, Georgia.
5. Nancy Moureau, PhD, RN, CRNI®, CPUI®, VA-BC™ is a speaker and expert in the field of vascular access practice with 40 years of experience. Dr. Moureau, the owner of PICC Excellence, Inc. is an online educational professional, an active clinician, and researcher as a member of the Alliance for Vascular Access Teaching and Research (AVATAR).

References

1. Armenteros-Yeguas V, Gárate-Echenique L, Tomás-López MA, Cristóbal-Domínguez E, Moreno-de Gusmão B, et al. (2017) Prevalence of difficult venous access and associated risk factors in highly complex hospitalised patients. J Clin Nurs 26: 4267-4275.
2. Gottlieb M, Sundaram T, Holladay D, Nakitende D (2017) Ultrasound-Guided Peripheral Intravenous Line Placement: A Narrative Review of Evidence-based Best Practices. WestJEM 18: 1047-1054.
3. Carrico RM, Furmanek S, English C (2018) Ultrasound probe use and reprocessing: Results from a national survey among U.S. infection preventionists. Am J Infect Control 46: 913-920.
4. Disinfection of Ultrasound Transducers Used for Percutaneous Procedures: Intersocietal Position Statement. J Ultrasound Med 40: 895-897.
5. Moureau NL, Carr PJ (2019) Health and Preservation: The Right Approach for Vascular Access. Springer International Publishing.
6. Rowley S, Clare S (2019) Standardizing the Critical Clinical Competency of Aseptic, Sterile, and Clean Techniques with a Single International Standard: Aseptic Non Touch Technique (ANTT®). Journal of the Association for Vascular Access 24: 12-17.
7. Gorski LA, Hadaway L, Hagle ME, Broadhurst D, Clare S, et al. (2021) Infusion Therapy Standards of Practice, 8th Edition. J Infus Nurs 44: S1-S224.
8. American Institute of Ultrasound in Medicine (AIUM). Guidelines for cleaning and preparing external- and internal-use ultrasound transducers and equipment between patients as well as safe handling and use of ultrasound coupling gel. Accessed September 5, 2022.
9. Yagnik KJ, Kalyatanda G, Cannella AP, Archibald LK (2019) Outbreak of Acinetobacter baumannii associated with extrinsic contamination of ultrasound gel in a tertiary centre burn unit. Infect Prev Pract. 1: 100009.
10. World Federation for Ultrasound in Medicine and Biology Safety Committee (Jacques S. Abramowicz, Iwaki Akiyama, David Evans, J. Brian Fowlkes, Karel Marsal, Yusef Sayeed and Gail ter Haar), Abramowicz JS, Basseal JM. World Federation for Ultrasound in Medicine and Biology Position Statement: How to Perform a Safe Ultrasound Examination and Clean Equipment in the Context of COVID-19. Ultrasound Med Biol 46: 1821-1826.
11. Parker Laboratories, Inc. UltraDrape® UGPIV Barrier and Securement. Accessed September 5, 2022.
12. Moureau N, Gregory EG (2020) Survey of ultrasound-guided peripheral intravenous practices: a report of supply usage and variability between clinical roles and departments. Br J Nurs 29: S30-S38.
13. Pressnall P, Moureau N (2022) Simple and Efficient: Standardizing Ultrasound-Guided Peripheral Insertions with Sterile Barrier Dressing Cuts Waste, Saves Time, Costs Less, Improves Patient Safety. Association for Vascular Access Annual Scientific Meeting, Minneapolis, MN, Abstract Poster, September 2022.
14. Thorn S, Gopalasingam N, Bendtsen TF, Knudsen L, Sloth E (2016) A Technique for Ultrasound-Guided Blood Sampling from a Dry and Gel-Free Puncture Area. J Vasc Access 17: 265-268.
15. Marsh N, Webster J, Larsen E, Cooke M, Mihala G, et al. (2018) Observational Study of Peripheral Intravenous Catheter Outcomes in Adult Hospitalized Patients: A Multivariable Analysis of Peripheral Intravenous Catheter Failure. J Hosp Med 13: 83-89.
16. Raynak A, Wood B. The Clinical Nurse Specialist Role and its Relevance to Vascular Access: A Canadian Perspective. J Assoc Vasc Acces 26: 25-30.

Overall Acceptability Directions: SELECT ONE (1-5)	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
1. The transparent barrier dressing made it possible to have **separation of gel** from skin	1	2	3	4	5
2. The transparent barrier dressing allowed for **good US** image (with or without gain adjustment)	1	2	3	4	5
3. The transparent barrier dressing is **easier to use** than a sterile sheath/probe cover	1	2	3	4	5
4. The transparent barrier dressing provided a sufficient barrier **against site contamination** from the transducer/probe	1	2	3	4	5
5. The transparent barrier dressing provided a **large enough window** for PIV placement (site marked in advance)	1	2	3	4	5
6. The transparent barrier dressing allowed for a **successful US PIV** insertion	1	2	3	4	5
7. The product was **easy to apply** over the placed PIV catheter	1	2	3	4	5
8. The transparent barrier dressing allowed **ease of PIV securement** and dressing adherence effectively protecting the site	1	2	3	4	5
9. There were a reasonable number of easily **understood steps** involved in usage	1	2	3	4	5
10. The transparent barrier dressing improved patient safety through **good securement**	1	2	3	4	5
11. The transparent barrier dressing improved patient care by using **aseptic technique**	1	2	3	4	5

1. Did the product adversely affect skin condition? **Yes** **No**
2. Do you prefer using a sterile probe cover or the transparent barrier dressing? Probe Cover or Transparent Barrier Dressing
3. Do you recommend Product for Purchase/Inclusion in a UGPIV Kit? **Yes** **No**

https://www.surveymonkey.com/r/YY5SVKM

Appendix 1: Qualitative Evaluation Likert Tool