

Ultrasound-Guided Peripheral Intravenous Catheterization: Literature Review

Ben Geisler

Lakeview College of Nursing

Dr. Ariel Wright

7/8/2022

Ultrasound-Guided Peripheral Intravenous Catheterization: Literature Review

This literature review aims to assess the usefulness of using ultrasound to guide peripheral venous catheters. This topic is essential because it has the potential to reduce the number of peripheral catheterization attempts, which will reduce patient frustration, pain, and risk of infection (Feinsmith et al., 2018). Ultrasound-guided peripheral catheterization also assists healthcare staff by easing the difficulty of obtaining vascular access (Feinsmith et al., 2018). Overall, ultrasound-guided peripheral catheterization helps the patients and staff, especially when obtaining access is difficult (Feinsmith et al., 2018).

Outcomes of a Simplified Ultrasound-Guided Intravenous Training Course for Emergency Nurses

This article studies the effectiveness of an ultrasound-guided intravenous catheterization class and if it will help reduce the number of sticks necessary to obtain peripheral access (Feinsmith et al., 2018). The researchers assessed the success rates of ultrasound-guided intravenous catheterization before and after a class taught by various physicians in the facility (Feinsmith et al., 2018). The study found that the class increased the success rates of peripheral intravenous access in general and ultrasound-guided intravenous catheterization (Feinsmith et al., 2018). Overall, the class increased intravenous access success rates for nurses.

Key Points

The researchers used a quantitative method and had 34 emergency registered nurses participate in the study (Feinsmith et al., 2018). The researchers used paper logs to keep track of the intravenous catheterization success rates (Feinsmith et al., 2018). The data showed that

ultrasound guidance would reduce the number of sticks and that the nurses would improve over time, making the data clinically significant (Feinsmith et al., 2018). The listed p-value was 0.013, and the authors concluded that ultrasound-guided intravenous catheterization could help nurses obtain difficult intravenous access (Feinsmith et al., 2018).

Assumptions

The author's primary assumption was that using ultrasound guidance to obtain intravenous access would help the staff and the patient, especially when intravenous access was difficult to obtain (Feinsmith et al., 2018). The authors assumed that when intravenous access was difficult to obtain, direct visualization of the vessels and access device would assist in successful catheterization (Feinsmith et al., 2018). After reviewing their data, the authors were correct to assume that ultrasound guidance would assist in successful catheterization (Feinsmith et al., 2018).

Deficit/Conclusion

After a review of the methodology, format, and results of the study, a researcher accepts the author's line of reasoning. This article proves that ultrasound-guided intravenous catheterization can reduce the number of times a patient is stuck and that ultrasound guidance is a tool that nurses should be able to utilize (Feinsmith et al., 2018). If nurses were to fail to accept the findings of this article, they would continue sticking patients multiple times to obtain difficult intravenous access. Failure to accept would lead to the patient becoming irritated over multiple sticks and the nurses spending more time attempting to obtain vascular access (Feinsmith et al., 2018).

Ultrasound-guided versus Landmark Approach for Peripheral Intravenous Access by Critical Care Nurses: A Randomized Controlled Study

The purpose of this article is to study the success rates of ultrasound-guided peripheral venous access versus the traditional landmark approach (Bridey et al., 2018). The researchers performed this study in an intensive care unit (ICU), where staff often have difficulty obtaining peripheral vascular access (Bridey et al., 2018). The study found that using ultrasound did not reduce intravenous catheterization attempts but using ultrasound did lead to larger gauge catheters than those inserted with the landmark approach (Bridey et al., 2018). Overall, the study did not find better success rates but found that ultrasound guidance is still helpful for obtaining peripheral catheterization with larger gauge catheters (Bridey et al., 2018).

Key Points

The researchers used a quantitative method and had 114 awake ICU patients participate in the study (Bridey et al., 2018). The researchers utilized nurses' reports and chart reviews to obtain the information they used in the study (Bridey et al., 2018). The data showed that ultrasound guidance did not reduce the number of intravenous catheterization attempts but did result in the use of larger gauge catheters than those inserted with the traditional landmark approach making the data clinically significant when larger gauge catheters are needed (Bridey et al., 2018). The listed p-value was 0.911, and the authors concluded that ultrasound-guided intravenous catheterization helps obtain the insertion of larger gauge catheters but does not reduce the number of attempts (Bridey et al., 2018).

Assumptions

The author's primary assumption was that using ultrasound guidance would lead to fewer peripheral catheterization attempts than would be required with the traditional landmark approach (Bridey et al., 2018). The authors assumed that when nurses obtained direct visualization of the vessels using ultrasound, they would be more successful in inserting a peripheral catheter (Bridey et al., 2018). After reviewing the data, the authors were incorrect in their assumption; however, they did find that the use of ultrasound resulted in larger gauge catheters being inserted (Bridey et al., 2018).

Deficit/Conclusion

After a review of the methodology, format, and results of the study, a researcher accepts the author's line of reasoning. While the results may differ from other studies, the authors still found reasonable benefits to ultrasound-guided peripheral intravenous catheterization (Bridey et al., 2018). The findings of this article suggest that using ultrasound leads to the insertion of larger gauge catheters which can speed up the infusion time of life-saving medications (Bridey et al., 2018). If a nurse failed to accept this line of reasoning, it would result in the use of smaller catheters which would lead to slower medication infusion times (Bridey et al., 2018).

Ultrasonographic Guidance to Improve First-Attempt Success in Children with Predicted Difficult Intravenous Access in the Emergency Department: A Randomized Controlled Trial

The primary purpose of this article is to study whether ultrasound-guided intravenous line placement can improve first-time success rates in children with predicted intravenous access difficulty (Vinograd et al., 2019). Specifically, the authors were looking for a 20% increase in

first-time success rates (Vinograd et al., 2019). The authors found that using ultrasound significantly increased first-time success rates and that the ultrasound catheterization resulted in more prolonged survival of the catheters when compared with the traditional approach (Vinograd et al., 2019). Overall, this article found that using ultrasound guidance had many benefits compared to the traditional intravenous catheterization approach (Vinograd et al., 2019).

Key Points

The researchers used a quantitative method and had 167 pediatric patients with predicted intravenous difficulty participate in the study (Vinograd et al., 2019). The researchers utilized logs for the nurses to fill out after they attempted peripheral catheterization to obtain the results (Vinograd et al., 2019). The data showed that ultrasound guidance increased first-time success rates by approximately 40%, and the catheters had a longer survival rate than those inserted with the traditional method (Vinograd et al., 2019). The listed p-value was 0.004, and the authors concluded that ultrasound-guided intravenous catheterization significantly increases first-time success rates in pediatric patients with predicted intravenous access difficulty (Vinograd et al., 2019).

Assumptions

The author's primary assumption was that using ultrasound guidance would increase first-time intravenous catheterization success rates when compared to using the traditional non-ultrasound method (Vinograd et al., 2019). The authors assumed that obtaining direct vessel visualization via ultrasound when a pediatric patient has predicted peripheral access difficulty would increase first-time success rates (Vinograd et al., 2019). After reviewing the data, the

author's assumptions were correct, as the first-time success rates rose approximately 40% when compared to the traditional approach to peripheral catheterization (Vinograd et al., 2019).

Deficit/Conclusion

After a review of the methodology, format, and results of the study, a researcher accepts the author's line of reasoning. This article implies that using ultrasound guidance for obtaining peripheral venous access on a child significantly increases first-time success rates and longevity of the catheter (Vinograd et al., 2019). Failure to accept this line of reasoning would lead to increased sticks in pediatric patients with predicted venous access difficulty (Vinograd et al., 2019).

Conclusion

The three articles evaluated showed the benefits of using ultrasound guidance when obtaining peripheral venous access. These benefits are an increase in first-time success rates, use of a larger gauge catheter, and longer surviving catheters, all of which will improve patient outcomes by decreasing sticks and infusion times (Vinograd et al., 2019). The benefits of ultrasound guidance impact nursing practice and healthcare by decreasing the number of peripheral access attempts necessary and therefore decreasing the amount of time before nurses can administer medication through the catheters. The three articles all give evidence for using ultrasound guidance which lets nurses apply evidence-based practice when using ultrasound to obtain peripheral access.

References

- Bridey, C., Thilly, N., Lefevre, T., Maire-Richard, A., Morel, M., Levy, B., & Kimmoun, A. (2018). Ultrasound-guided versus landmark approach for peripheral intravenous access by critical care nurses: A randomized controlled study. *BMJ Open*, *8*(6).
<https://doi.org/10.1136/bmjopen-2017-020220>
- Feinsmith, S., Huebinger, R., Pitts, M., Baran, E., & Haas, S. (2018). Outcomes of a simplified ultrasound-guided intravenous training course for emergency nurses. *Journal of Emergency Nursing*, *44*(2), 169-175. <https://doi.org/10.1016/j.jen.2017.10.001>
- Vinograd, A. M., Chen, A. E., Woodford, A. L., Fesnak, S., Gaines, S., Elci, O. U., & Zorc, J. J. (2019). Ultrasonographic guidance to improve first-attempt success in children with predicted difficult intravenous access in the emergency department: A randomized controlled trial. *Annals of Emergency Medicine*, *74*(1), 19-27.
<https://doi.org/10.1016/j.annemergmed.2019.02.019>