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Dedicated Vascular Access Team Benchmark Study

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<http://hdl.handle.net/10950/4108>

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DEDICATED VASCULAR ACCESS TEAM

Dedicated Vascular Access Team Benchmark Study

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The University of Texas at Tyler School of Nursing

In Partial fulfillment of

NURS 5382: Capstone

December 5, 2022

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Acknowledgments

I want to thank everyone who has been a part of my education journey for the last two years. It has not been an easy or swift path to travel, but I am all the more appreciative of it. First, thank you to the incredible professors at UT Tyler who have guided me with kindness and patience as I navigate the world of evidence-based practice. Second, Beth Neidlinger for encouraging me and sharing her wisdom. She helped me keep perspective and focus on what could be accomplished here and now. To the dedicated Vascular Access Team at CHRISTUS Good Shepherd, especially Kimberly Botschon. She has mentored me from the moment I entered the vascular access world and continues to do so today. Lastly, my incredible family and friends who prayed and motivated me to keep going when I thought it was impossible. Most importantly, my husband who has sacrificed much to ensure I follow my dreams. Without your support, I would not be here today, and I will be forever grateful.

Executive Summary

The most frequently performed invasive procedure in an acute care setting is the insertion of a peripheral intravenous (PIV) catheter. It is estimated that nearly two billion PIV catheters are sold worldwide each year (Marsh et al., 2018). The insertion of the PIV catheter is vital to patient care for numerous reasons, such as medications, fluids, and diagnostic testing. However, these benefits may be lost or delayed if there is difficulty inserting the catheter into a patient. These patients with difficult venous access are referred to as DIVA patients. They require three or more attempts or anticipating special techniques or equipment to obtain and maintain a PIV catheter (Plohal, 2021). These post-insertion failures from complications, such as occlusion, are as high as 69%, triggering multiple catheter insertions (Marsh et al., 2018). More and more clinicians encounter these patients considered to have difficult vascular access, and the results are frustrating and costly.

With so many difficulties to consider, Whalen et al. (2017) determine that a vascular access team (VAT) is essential in an acute care setting to assess and treat patients seeking medical attention. The article states that hospitals should consider incorporating a vascular access team in the patient's treatment plan to avoid poor outcomes, increased costs, and overuse of materials and staff (Whalen et al., 2017). This specialized team would have advanced knowledge of vascular access, including catheter selection, insertion location, advanced techniques (ultrasound-guided insertion), and medication management (Marsh et al., 2018).

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1. Rationale for the Project

"Do no harm" is the motto of the nurse. The ethical principle of nonmaleficence requires the nurse to be mindful of their care and addresses the importance of not harming patients (Melnyk & Fineout-Overholt, 2019). In most hospital admissions, receiving a vascular access device is necessary and often the most dreaded part of the hospital stay. With a growing population of critically ill patients with abundant comorbidities, there is also an increasing need for specially trained nurses to aid in inserting vascular access devices. Frequent trips to the hospital will result in worn-out and deteriorating veins. Every needle stick brings a different set of consequences. These patients will likely receive countless punctures from multiple attempts in a hospital setting. Even more frustrating is that these attempts will fail. Consulting a Vascular Access Specialist before multiple attempts occur can help prevent some of these devastating consequences.

1.1 Project Goals

This Benchmark study aimed to bring awareness to the benefits of utilizing a Vascular Access Specialist. As it stands, most hospitals do not have teams dedicated to vascular access. This benchmark project focused on a facility that started with two team members and is steadily growing. For the team to be effective and efficient, it should be staffed appropriately and according to the hospital's census. The team members bring value to the patient's plan of care. The members are proficient in the insertion of peripheral intravenous catheters and know when it is most appropriate for a more advanced line.

In most cases, they will also be the ones placing those lines. Utilizing a VAT member brings this knowledge and expertise to the bedside and can prevent a patient from experiencing

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multiple and frequent attempts. Every attempt is another puncture into the skin, an opportunity for infection. In the new INS standards of 2021, all vascular access devices will be considered when determining if a bloodstream infection, also known as BSI, has occurred (INS, 2021). Bloodstream infections are deemed critical and deadly hospital-acquired infections with a 12%-25% mortality rate (Johnson et al., 2017). These costs incurred from BSI can be upwards of \$48,000 or more, which is not reimbursable by CMS (CDC, 2021). Not only are the multiple attempts costly and increase their risk for infection, but it also causes damage to the vessels, preventing future access.

A successful PIV insertion is vital to patient care; accomplishing the insertion promptly and in less than two attempts is crucial to the results and is a matter of patient safety and treatment progress. According to Plohal (2021), the patients express emotional pain in addition to their physical pain. Implementing a vascular access team to monitor these devices' insertion, assessment, care, and maintenance will help improve the occurrence of BSIs, the quality of care, and patient satisfaction (Johnson et al., 2017).

2. Literature Discussion to Support Project

The world of vascular access is vast and ever-growing. Numerous individuals have devoted time to improving the way nurses approach vascular access. As mentioned, it is essential to the patient's successful completion of their treatment plan. While performing a literature review, many articles discussed the benefits surrounding the operation of a Vascular Access Team. The data retrieved included success rate, decreased failure rate, improved dwell time, time to insertion, number of attempts, patient satisfaction, reduced pain levels, and decreased cost. In

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addition to reviewing statistical results, a qualitative study provided feedback from patient interviews.

Marsh et al. (2018) explored a randomized controlled trial, providing crucial evidence regarding implementing a vascular access team. The study compared the insertion rate between a specialist and a generalist. The study determined that the PIV failure rate was higher with a generalist, 54%, than with a vascular access specialist, 48% (Marsh et al., 2018). Additionally, the mean insertion time for the vascular access specialist was two minutes and eleven minutes for the general nursing staff. (Marsh et al., 2018).

Similarly, Plohal et al. (2021) had the same insertion time for the specialist and the generalist. Overall, the vascular access specialist's satisfaction rate was higher than that of the general nursing staff, with a median rate of 7 for the specialist and 4.5 for the generalist (Marsh et al., 2018). More than half of the studies indicated a higher success rate. A quasi-experimental study revealed several elements that suggest the deployment of a Vascular Access Team (VAT) is beneficial to the hospital and the patient. The study used a control group, those with a vascular access device placed using the generalist model, and the intervention group, those with a vascular access device inserted using the VAT (Steere et al., 2019). The success rate of the control group was only 15% compared to the intervention group, 89% (Steere et al., 2019). The patients who also received the intervention had an improved dwell time, meaning the vascular access device did not have to be replaced as frequently, if at all (Steere et al., 2019). Dwell time is a significant outcome to recognize. Longer-lasting devices means fewer sticks for the patient, less opportunity for infection, and less physical and emotional trauma as well—furthermore, a decrease in cost. Steere et al. (2018) determined that after a year of using the VAT, there was a

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\$3,376 reduction in cost per bed per year. Raynak & Wood (2021) took an approach that went beyond the placement of vascular access devices. The experimental study reviewed how a specialist can prevent unnecessary placement of lines. By avoiding unnecessary treatment, the facility saved \$417,525 in one year (Raynak & Wood, 2021). For the insertion and ongoing care and maintenance of vascular access devices, a clinician with the appropriate education and skill on current best practices is fundamental to the hospital and patient's success.

Lastly, a qualitative study was reviewed (Plohal, 2021). The study's purpose was to understand the adult patient's experience when having a vascular access device inserted and the physical and emotional impact it could have long after the procedure is complete. The patients were observed during their treatment and then interviewed afterward. This study uncovered aspects of care that coincide with patient satisfaction. Patients reported that the vascular access specialist appeared to have an "aura" that displayed confidence when assessing a patient and inserting a PIV (Plohal, 2021).

Additionally, that same "aura" or confidence the specialist possesses promotes the timely completion of a patient's treatment. Assessing a patient, utilizing special equipment, and providing efficient and effective care can undoubtedly improve patient satisfaction. Patient satisfaction and better outcomes should be the goal of every hospital.

3. Project Stakeholders

Many will be affected by a project of this magnitude. Including all key stakeholders, those directly and indirectly affected. This project was presented at Christus Good Shepherd Medical Center. Christus Health is a Catholic, not-for-profit system of more than 600 centers, including long-term care facilities, community hospitals, walk-in clinics, and health ministries. It

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is a teaching hospital where you will often find physician residents and student nurses (ChristusHealth.org). The project stakeholders for this benchmark study include the Director of Education, the Critical Care Divisional Director, the Chief Nursing Officer, and five clinical directors. Additional stakeholders that will later have a vested interest in the project include the Vascular Access Team, staff nurses, and most importantly, the patients. A project like this will have a trickle-down effect and, conversely, can have that same effect when it is not executed. The lack of vascular access can affect the others involved in the patient's care, such as respiratory therapists, lab technicians, C.T. technicians, and pharmacists. They will only benefit from having reliable and timely access.

The care medical staff provides goes beyond the hospital doors. This project can indirectly affect those who have a connection to the patient. For example, a spouse or eldest child must take on extra responsibilities if their loved one is forced to stay in the hospital. Even further, a patient's co-worker can even be affected. They are now forced to take on more work, which could cause a strain on their personal life. Something as simple as a vascular access device can change all of that.

4. Proposed Outcomes

Continued improvement in all things vascular access, including education with the Vascular Access Team, collaboration with nursing units, and constant reassessment, is necessary for improved patient outcomes. By launching the program, the staff will utilize the consultation tool (Appendix A) embedded in the electronic charting system, bypassing countless needle sticks and trauma. The process will begin once the patient enters the hospital and access is deemed necessary. The nurse providing care to the patient can then review the assessment tool and send a

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referral to a VAT member if necessary. In order for this to be successful, proper staffing of the Vascular Access Team is critical. Before launching the tool in the charting system, the VAT should be fully staffed with members knowledgeable and trained to be proficient in vascular access device selection and placement.

Education is the heartbeat of any initiative. Because any nurse can use this tool, education must be launched system-wide. A task like this will require the clinical educators for each unit or specialty to be proactive and ensure that the nurses fully understand the tool's purpose and the initiative's end goal. Communication is imperative. To safeguard success, those involved must know the why and what is expected to change. Improved patient outcomes, preservation of the vascular system, and improved budget spending. Better results for all those involved.

5. Evaluation Design

After extensive research on this topic, gathering conclusive data was the most challenging. There are many moving parts to a patient being admitted to a hospital, and they will often pass through so many hands that collecting data and evaluating it can be challenging. Also, no one patient is made alike; therefore, it is like comparing apples and oranges in some cases. However, the information is still valuable.

Evaluation of this project will involve surveying the patients and reviewing the data collected from the charting system. Hospitals currently use HCAHP scores to assess the hospital's care. Three key components that could reflect the vascular access experience are communication, the responsiveness of staff, and pain control. So therefore, reviewing the results holds some value in the process.

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Plohal (2021) reports on the patient's experience in an acute care setting and their point of view on the topic. Patients stated that the vascular access specialist was more confident, whereas the generalists appeared to lack the experience, skill, and confidence to place a PIV (Plohal, 2021). This evaluation can be seen immediately by the patient's response to the Vascular Access Specialist and willingness to continue with treatment. Developing an evaluation tool for patients with five simple questions (Appendix B) can reveal these results.

The final piece of the evaluation design can be found in the data gathered from the charting system. Building a table to track and monitor the progress will help support this essential component of initiating a vascular access team. Multiple factors affect the ability to track the progress of insertion. Fortunately, with advances in technology, electronic charting now has the potential to bridge that gap and capture the charges during a challenging vascular access insertion (Appendix C). It can also track the time it takes to start and complete the process. The results table has not been designed at this time during the benchmark study but will be developed during the project's planning phase once approved.

6. Timetable/Flowchart

The development of this benchmark study began with the spirit of inquiry. The spirit of inquiry is needed to embark on a journey of this nature. The eagerness to question and challenge current practices is vital in cultivating change and promoting evidence-based practice (Melnyk & Fineout-Overholt, 2019). So next came the PICO. The first question, Spring 2021, resulted in too narrow a search criteria and proved challenging to find the appropriate amount of evidence to support it. After consulting with faculty members in the Fall of 2021, a revision was made to the PICO to encompass more of what a Vascular Access Specialist does. In an acute care setting,

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how can utilizing a vascular access team improve patient outcomes and satisfaction rates compared to not using a vascular access team? Recognizing that there was a need for change in the facility and then determining how to best implement that change came next over a sequence of semesters. Extensive research was performed to find the best evidence to support the change in practice. Rapid critical appraisals were applied to each article to determine the validity before incorporating it into evidence to support change.

In the final semester, Fall 2022, the request for implementation (Appendix D) was denied. However, communication with the Director of Education is open, and there are other opportunities to incorporate vascular access initiatives. The search for supporting evidence will continue. That includes any area of vascular access that promotes evidence-based practice.

7. Data Collection Method

The data collection method for this benchmark study was performed by reviewing previous studies. A systematic search for evidence was performed using the following database search engines: Cumulative Index to Nursing and Allied Health Literature (CINAHL), PubMed, and Cochrane Database. The keywords used in the various search engines were as follows: vascular access, vascular access team, vascular access specialist, acute care, difficult vascular access, PIV, peripheral intravenous catheter, and team. Additional filters were applied after the initial search, including a specific date range from 2018 to 2021 and a detailed search for meta-analysis, systematic review, qualitative, and random controlled trial studies.

If the project is approved, the data will be collected following HIPAA-approved modes. The survey will be distributed via email and text. In conjunction with the surveys, the statistical

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data will be collected through a reporting system built into the electronic charting system. All data will be reviewed and documented via charts, tables, and graphs for visual aids.

8. Discussion of Evaluation

This is a benchmark study and therefore does not have an official evaluation. Although this program cannot be launched, other initiatives promoting vascular access improvement are on the horizon. "Baby steps," but eventually, there will be discussion over the advantages and disadvantages of implementing a Dedicated Vascular Access Team.

9. Costs/Benefits

The total cost of the project was not analyzed at this time. However, things to consider when implementing would be the time spent to build an education piece, time spent to educate, time spent to construct an electronic charting piece, and the salary of the new hire (vascular access member). The amount of equipment used by the VAT members would not change, but the need for added ultrasound machines may be necessary. Those purchases could always come later and in small increments.

The benefits far outweigh the costs. The benefits of this change will be primarily reflected in the patient and nurse satisfaction rate in the beginning. Lightening the load and improving the patient's stay will be quick, easy fixes to see right away. The hospital will slowly see the change monetarily. In the project's first three months, there could be a reflection in charges on the floors. Over a year-long data collection, an actual change will be observed. The monies spent on resources for implementation would soon cancel out with the first BSI avoided and conservation of supplies and time.

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Due to this being a benchmark study, I could only use previous studies with cost analysis and estimates of potential costs. As mentioned previously, complications of vascular access device insertions can be costly. These costs include the time it takes to insert the device, the supplies used during the process, and the adverse events that occur when the device fails. Based on the U.S. Bureau of Labor Statistics, the average wage for a registered nurse is \$39.78 (2022). Patients considered DIVA can sometimes result in the nurse spending up to an hour in the room. The average cost of a Smith cathlon is \$2, and the average price of a Medline insertion kit is \$1.95. Currently, the policy does not specify the number of attempts required before notifying the Vascular Access Specialist. VAT members will encounter patients with anywhere from 4-9 failed attempts. That amount comes to approximately \$55-\$100 for one patient to obtain a device. Even then, there is no guarantee that the nurse will be successful or that the line will last for the duration of the treatment. Add infection from the multiple attempts and extended stay in the hospital, and the hospital is looking at an extra \$48,000-\$60,000 (2021).

Conclusions/Recommendations

Currently, implementation is not possible, so my recommendation is to provide education to the nursing staff. Giving the nursing staff the tools they need to be successful is the best option at this time. It should begin with proper assessment. Allowing the VAT members to round on units to provide their expertise regarding assessment is critical to the process. Using visual aids and equipment as reinforcement to reach all aspects of learning styles will aid in this process.

Providing education regarding the proper time to consult the VAT is also essential. The team has a total of three nurses to cover the entire hospital. Their responsibilities range from

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audits, PICC/Midline placement, port-a-cath access, trouble-shooting non-functioning lines, and obtaining access for DIVA patients. This does not include the administrative duties that require them to attend monthly/weekly meetings. Their time is limited, so it is necessary to ensure their services are truly needed. They encourage the nurses to learn proper medication administration. Certain lines are only appropriate for caustic or harsh medications, which brings the last education piece, monitoring for different signs and symptoms of complications. Each complication will require various interventions to save the patient from worsening conditions. Lastly, encouraging the nurses to explore evidence-based practice (EBP). As this facility encourages its staff to grow professionally by gaining certifications and advanced degrees, so will their willingness to adopt EBP. Gigli et al. (2020) report that nurses with specialty certifications are more likely to accept the evidence-based practice.

Peripheral intravenous access is essential to delivering life-saving measures. I hope that the need to preserve our patients' veins becomes more apparent; they are the lifeline to health and wellbeing. A Vascular Access Specialist can ensure that that lifeline remains open as long as possible. The patient's best chance is a collaboration with administration, education, clinical directions, and nursing staff.

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Appendix A

Electronic Charting System documentation to determine consultation for DIVA

Score	Visual Appearance	Palpable	History of DIVA	Justifying Factors
0	Many visible veins	Many palpable veins	No difficulty	None
1	Few visible veins	Few palpable veins	Some difficulty	Urgent needs, comorbidities
2	No visible veins	No palpable veins	Severe difficulty	Emergency condition, vesicants

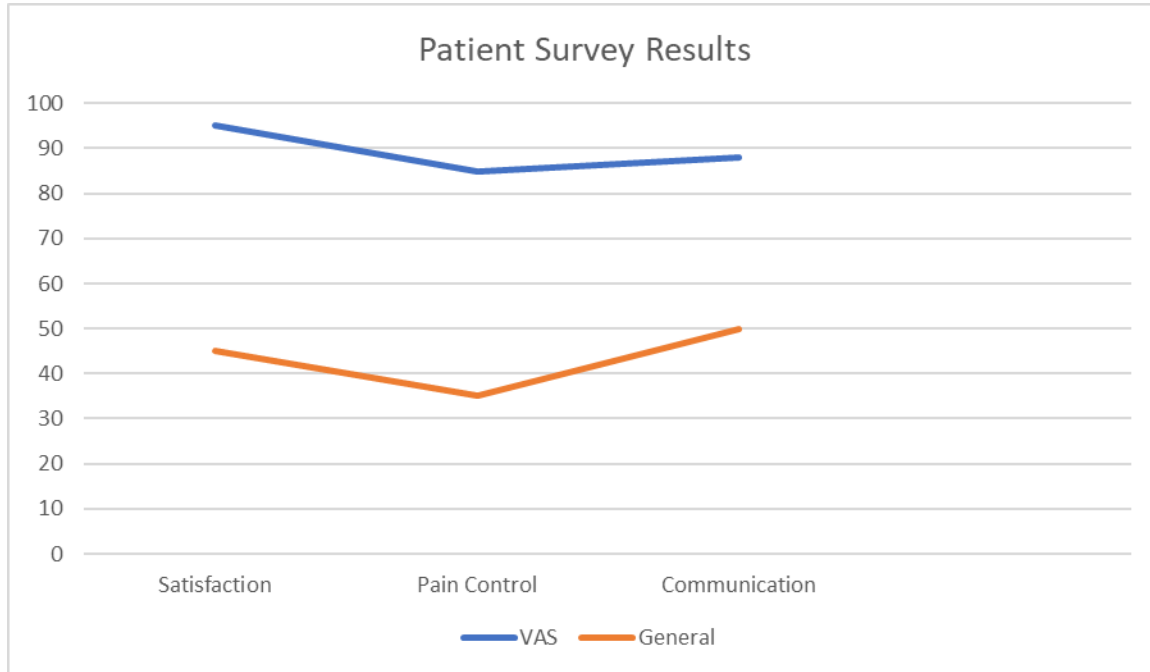
Score	Risk	Action
0-3	Low	Obtain IV access
4-5	Medium	Consult VAST
6+	High	Consider advanced line placement

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Appendix B

Patient Discharge Survey		
1) Did you require a peripheral intravenous catheter to receive medications or fluids during your stay at CHRISTUS Good Shepherd?	Yes	No
2) Did you require a specialist to place your vascular access device?	Yes	No
3) How would you rate your experience in receiving your device?		
Satisfied: the nurse or tech providing care was competent in their skills, and their attempts were met easily and confidently.	Somewhat satisfied: the nurse or tech providing care struggled slightly but eventually obtained access to your vein.	Unsatisfied: the nurse or tech providing care was not competent in their skills, required multiple attempts, and did not seem confident in their ability to gain access.
4) How would you rate your pain while receiving a vascular access device on a scale from 0-10? 0 being no pain at all and 10 being the worst pain you have ever experienced.		
0 1 2 3 4 5 6 7 8 9 10		
5) How would you rate the communication regarding the placement of your vascular access device on a scale from 0-5? 0 being no communication and 5 being a great communication		
0 1 2 3 4 5		

Sample of Results-Not Actual results



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Appendix C

Charting Items for charge capture and statistical analysis

Patient Admitted: Time:	Patients Require VA	Number of First-Time Attempts	Number of Attempts Before VA Consult	Number Kits used	Number of Catheters Used	VA Attempts
Yes or No	Yes or No					

Appendix D

Project Plan Flowchart: Timeline

