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## Environmental Services

How to Contain Infection Risk During Hospital Building Projects

## Vascular Access

Goodbye Vascular Access Nurse, Hello Vascular Access Teams

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# Fighting COVID-19

## So Much Hangs On the Face Mask

**Chronic/Long-term Care Facilities**
Nursing Homes' Systemic Ills Open the Door to COVID-19

**Advanced Technology**
Telemedicine Steps Up To Take on COVID-19

**Healthcare-Acquired Infections**
Should US Hospitals Attempt To Find the Missing Link (Nurse)?

**Environmental Services**
How to Contain Infection Risk During Hospital Building Projects

**Vascular Access**
Goodbye Vascular Access Nurse, Hello Vascular Access Teams

vascular access

# Establishing Vascular Access Teams for Patient Safety

By Nancy Moureau, RN, PhD, CRNI, CPUI, VA-BC

Nancy Moureau

Vascular access devices (VAD) are used in almost all medical, surgical, and critical care specialties, pre-hospital, hospital, long-term care, and home-care settings.[1,2] The range of catheters and devices referred to as a VADs include: peripheral intravenous catheter (PIVC), midlines, peripherally inserted central catheter (PICC), central venous catheter (CVC), tunneled CVC, subcutaneous port, arterial catheter, intraosseous device, apheresis catheter, umbilical, and ECMO catheters. As a result of VADs being used daily in almost all inpatient settings a range of healthcare professional roles share the responsibility for insertion, management, and removal of VADs. The varied interdisciplinary members responsible for 1 such VAD, the PIVC, were researched in a qualitative study.[3] The research suggested the accepted practice of allowing multiple professional entities to insert and manage PIVCs jeopardizes patient safety. They called for consistent approaches for all interdisciplinary professionals to follow. This suggests there is an opportunity to improve the current fragmented process to achieve positive outcomes with vascular access ownership of (i) assessment, (ii) insertion, (iii) care maintenance, and (iv) education.

## Vascular Access Team

According to the US Centers for Disease Control and Prevention (CDC) in 2011, "Specialized teams have demonstrated unequivocal effectiveness in reducing infections, complications and cost of infusion therapy."[4] Although there are studies reporting that a vascular access services team (VAST) positively impacts patients' vascular access outcomes, there are no randomized controlled trials to support or refute the role of the VAST. A Cochrane systematic review on VAST describes a lack of high quality research on teams.[5] The Cochrane review defines these groups as any of the following; infusion teams, intravenous teams, individual specialists (nurse, doctor, respiratory therapist, radiological technologist, nurse practitioner, and physician assistant) who have knowledge and skills, through formal training, and who frequently perform insertion or manage VADs.[2]

The Infusion Nurses Society standards of practice present practice criteria for an infusion team and include benchmarks for peripheral and central catheters which include: first time insertion success; daily assessments; decrease in catheter related blood stream infections (CRBSI); increase in patient satisfaction; data collection for reporting quality outcomes; and impact on patient safety.[6] The purpose and function of a VAST or trained

individual may include the initial assessment, insertion and management of PIVCs, midlines, PICCs, arterial catheters, external and/or internal jugular, femoral, and subclavian placed catheters.[7]

Teams and individual specialist functions will vary and may exclude the insertion and maintenance of some of the devices and associated activities listed above. Other functions embraced by these specialists may include patient access for difficult blood draws, use of ultrasound guidance for any or all of the functions, dressing changes for central catheters, daily evaluation of catheter necessity, removal of unnecessary catheters, and monitoring of dressing and insertion site for complication identification. Additionally, they provide a professional point of care for education and resource of VAD queries for device maintenance and management of complications. However strong the evidence for specialized teams, professional application of empirical guidelines for teams within the acute care setting is limited.[8]

Whether through lack of awareness of guidelines and recommendations, changing administrative priorities or perceived economic constraints, the hospital adoption and support of VAST has been erratic. Similar to specific services where a cardiologist is required for a specific cardiac problem to provide the best evidence-based care, it is logical that seeking the services of a trained vascular access clinician to initiate and maintain the most appropriate intravenous device, is a worthy mandate. Given the growing complexity in patient needs, a unique specialist discipline, namely the VAST, is surely needed to provide for patient needs. Specialty teams are also seen as models that not only improve patient safety and outcomes but also can serve as a platform for clinical training of junior residents, medical students, and nursing clinicians. The evidence to date is suggestive that the highest achieving system of initiating and delivering treatment to patients in acute care is inexplicably tied to a purpose-driven group of skilled individuals and the processes that guide their practices.[9]

## Value of a Specialized Team

Evidence supports the value of a specialized infusion team for improved success with access, reduced insertion attempts, and reduced complications associated with intravenous or arterial device insertion. According to da Silva in 2010, use of a specialized team increased first attempt success with only 16% of attempts resulting in more than 1 attempt.[10] Teams of specialized individuals performing insertion of PIVCs report increased first-time insertion success.[11] Complications associated with VADs relate to the skill and knowledge of the operator for insertion[12-15] and for post-insertion complications related to maintenance by clinicians and patient specific risk factors.[16-19] Specialized education has led to infection prevention practices that reduce complications. [20-22] Advanced practice nurses and those teams receiving specialized training to perform insertions of all CVADs that work in collaboration with medical providers offer valuable contributions to the clinical care by performing insertions with low incidence of complications.[23-28] Consistent across all VADs, peripheral and central, teams historically represented the lowest levels of device-related complications.[19,29-33] Adoption of a team approach for care and maintenance has resulted in reduction of CVAD-associated infections.[34]

## Device Selection Reduces Risk

Adverse vascular events are largely avoidable through specific practices of assessment and selection of the vascular access device with the lowest infection risk for the patient and their treatment (**Figure 1**). Improving selection of the best device and inserter skill reduces unnecessary central venous catheter insertions.[35] These practices are evidenced in a variety of specific models, recommendations, and guidelines such as the Society of Healthcare Epidemiology of America (SHEA),[36] Vessel Health and Preservation (VHP),[37] MAGIC,[38] Infusion Nurses Society (INS) Standards of Practice,[6] European Society for Parenteral and Enteral Nutrition (ESPEN),[39] World Congress of Vascular Access (WoCoVA) consensus,[40] Evidence-based Guidelines for Preventing Healthcare-associated Infections (EPIC),[41] and National Institute for Clinical Excellence (NICE)[42] all recommend a focus on the necessity of specialized training for inserters and those managing VADs that integrate infection prevention and practices that avoid complications. Despite these recommendations, many insertion attempts of VADs are performed by clinical professionals with little to no formalized education or current training on insertion or the means to prevent complications with emphasis placed on the central line bundle and other practices that include device assessment for risk reduction as a key component.[4,43]

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## Qualified and Experienced Inserters

Vascular access catheter insertion is accepted as an invasive clinical procedure that exposes patients to

iatrogenic risks such as procedural pain, bruising, bleeding, vessel depletion, and inadvertent anatomical injury of adjacent structure, infection, and in extreme cases death.[34,44,45] When intravenous, peripheral, or central catheters are required, patients may undergo multiple attempts to successfully insert these devices. Moreover, initial device insertion can be associated with procedural complexity that involves repeated attempts following insertion failures leading to increased patient risk of complications.

Such complications associated with VADs are increased as the number of attempts and time during the insertion procedure increases.[46] Insertion of peripheral catheters by a variety of skilled and unskilled clinicians result in failure rates of 1.9 vs 2.9 insertions[46] or 12% to 26% in adults and 24% to 54%[45] in children.[47,48] For these reasons alone hospitals with VASTs reported higher insertion success rates and greater patient satisfaction.[5] Results of unsuccessful peripheral catheter attempts lead to vein depletion,[44] bruising and pain at the insertion sites,[49] and multiple punctures of the skin predisposing microorganism entry into the bloodstream.

Consistent with the VHP model for selecting the right device, right site, inserted by the right clinician (people) at the right time, the clinician performing the insertion must have training, qualification, and competence to perform the procedure in a safe manner.[40] Education and training of staff integrates technology that facilitates increased success. Ultrasound and visualization technology knowledge and training aid inserters in gaining access on the first pass and minimize number of attempts and complications associated with multiple attempts and traumatic insertions.[50-53]

Complications increase in number when there is difficulty with insertion. Currently, most patients will experience insertion failure and post-insertion failure prior to definitive device placement during their course of treatment. In research by Eisen and associates (2006), there was a 54% increase in complications when 2 or more puncture attempts are performed.[54] Inserters with experience of fewer than 50 CVAD procedures have greater than 50% risk of a complication occurring and more difficulty achieving successful insertions.[13] The use of specialist teams has demonstrated more positive clinical outcomes for patients including greater first attempt success, reduced CLABSIs, and subsequent economic advantages.[2,4,55,56]

Insertion of VADs is not without risk, but risk is also associated with management of these devices that comprises the largest time component of each patient's treatment process. Management of VADs requires the performance of regular assessment of device function, insertion site, securement, dressing adherence, and observation for signs of other complications. Of greatest concern is catheter-associated bloodstream infection (CABSI), as in the case of peripheral or central venous catheters, and specifically central line-associated bloodstream infection (CLABSI).[4,45]

In a study of maintenance bundles, CLABSI rates fell from a peak of 5.2/1000 catheter days to zero infections for 24 months by using a bundle incorpo-

## Figure 1. Vessel Health and Preservation Theme Key Concepts

### 1. Assessment/Selection

- Evaluate patient risk and vein choices
- Select device for therapy and duration
- Validate device specific indications
- Select device size based on vein size
- Verify number of lumens required

### 2. Insertion

- Performed by qualified/trained inserter
- Use observer/checklist for procedure
- Apply maximum barrier precautions
- Verify terminal tip using EKG or X-ray
- Use securement and antimicrobial dressing

EDUCATION

### 4. Evaluation

- Perform patient outcome audits of complications
- Evaluate staff competency, infection prevention compliance and educational needs
- Establish formal process for product evaluation

### 3. Management

- Perform daily assessment of site, device function, securement, and dressing
- Use aseptic technique for all access
- Identify, manage, and prevent complications
- Evaluate for device necessity; remove when no longer medically necessary

rating antimicrobial sponge dressing, chlorhexidine body wash, and daily device assessment by a specialist nurse.[57] Results of a cross-functional team demonstrated effectiveness in post-insertional care with statistically significant CLABSI reduction with major economic impact.[58] Evidence has demonstrated that education and training for insertion and maintenance of VADs, which includes criteria for educational content, simulation of practice and supervision, results in improved staff compliance with safe practices.[13,51,59-61]

Recommendations for education in the clinical setting are to provide consistent and varied staff education on infection prevention, best practices and consequences of poor technique.[62,63] Clinicians performing consistent insertions and maintaining current education with evidence-based practices are better equipped to provide safe patient care.[64-66] Application of evidence through education, while promoting peer to peer engagement, lead to high performance and consistency in safety practices.[67]

Effective device and site selection necessitates a heightened awareness of infection prevention guidelines that aid in site selection and insertion and the ability to choose the number of lumens necessary to complete treatment to minimize risk.[59] A higher risk of infection and other complications is associated with CVAD insertion when performed by unskilled, inexperienced, or unqualified inserters.[14,15] Therefore, integration of education, simulation practice, ultrasound training, and knowledge of complication management for CVAD insertions are part of the procedural competency necessary for those clinicians inserting or managing VADs.[59]

## The Future: Valuing Vascular Access Teams

Patient-focused safety initiatives should apply evidence of improved outcomes such as those represented in establishing and maintaining effective vascular access teams. Providing a consistent VAD assessment, insertion, and management service to patients in the pursuit of risk minimization involves healthcare personnel who have received special training. VAST contribute to infection prevention efforts to reduce CLABSI, CRBSI, and CABSI. Patients indicate the inadequate skill level of those performing these types of procedures is a source of great dissatisfaction, while use of technology and increased skills of the VAST promotes higher satisfaction.[68,69]

These occurrences were exposed in the qualitative study of patient and staff experience indicating a need for vascular access specialist as a quality initiative.[3] Device and vein selection and insertion processes, qualified inserters, effective management and evaluation of practices, clinical outcomes are all improved as reflected in the elimination or reduction of complications, prolonged dwell times, reduced length of stay and improvements in patient satisfaction.[48,56] Teams have the potential to effect significant improvements through both insertion and post-insertion care of patients. Providing dependable vascular access assessment, insertion techniques, and post-insertion care and management is a necessary patient requirement to support modern healthcare treatment plans, patient safety, and promote economic savings through efficiency of insertions.[70]

**The application of specialty teams in every hospital for insertion and management of vascular access devices could significantly contribute to the pursuit of making VADs complications history.**

## Conclusions

The value of specialized teams for insertion and management of vascular access has been demonstrated through numerous publications in a variety of research designs. Although there are currently no randomized controlled clinical trials that support the benefits of teams, the recommendation of the CDC and others continues for specialists as a method to reduce complications and infection associated with vascular access devices. Additionally, standards for infusion therapy call for teams for CVAD insertion, maintenance, and removal to promote patient safety and better outcomes. The discussion and research underscore the potential advantages of VAST for assessment, insertion, management, complications reduction, and staff education. Supported by the concepts of vessel health and preservation, the application of specialty teams in every hospital for insertion and management of vascular access devices could significantly contribute to the pursuit of making VADs complications history.[71] ICT

*References available at InfectionControlToday.com.*

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## SeekNFind Helps Quickly Locate Objects in a Healthcare Setting

Made from PTFE Teflon, the SeekNFind by Hallmark Industries Company, Inc., helps healthcare facility workers locate missing or mislaid trays or other items. The 240 x 86mm RFID tag is assembled with stainless steel eyelets for attachment to instrument baskets and other assets, according to a Hallmark press release. The RFID reader and label is how the system works. Each label is placed on trays so when a healthcare facility worker is searching for specific trays in a room, she or he can walk around with the RFID and it will beep when that particular item is located.

SeekNFind is just the latest addition to Hallmark's labeling line. The company has been developing and marketing systems and devices to help healthcare facilities since 1969.

"Healthmark Industries mission is to continue to innovate, continue to support and continue to serve the healthcare provider industry and support services that make it possible to deliver quality healthcare," the company said in a press release.

**www.hmark.com**


## EvaClean Infection Prevention Products Used Against COVID-19 in China

A partnership between the Boston-based EarthSafe Partners and Beijing Kanghai Yingda, a medical equipment supplier in China, has placed EarthSafe's EvaClean infection prevention products on the frontlines in the battle against COVID-19 in China.

EvaClean products are built around one disinfectant, a hypochlorous acid (HoCl)-based chemistry derived from sodium dichloroisocyanurate (NaDCC.)

"Not only is this chemistry EPA List-K approved as a sporicidal disinfectant for hard surfaces, but it has a top-level 2c classification with four kill claims against non-enveloped viruses, which are the most difficult pathogens to kill," EarthSafe said in a press release. "It's also the first chemistry to receive EPA registration as effective against bacteria present in biofilm, another potential contamination source, particularly in healthcare environments."

EarthSafe says that EvaClean products are much safer than most sporicidal disinfectants used today. EarthSafe developed two versions of disinfectant products—PURTABS for electrostatic sprayers and PUR:ONE for other application methods like microfiber, wipes or spray bottles.

**www.evaclean.com**

## WISER System Tracks Possible Routes of Infection


To help deal with the constant and constantly vexing problem of person-to-person pathogenic infection at hospitals and other healthcare facilities, the WISER Locator system tracks the real-time movement of medical staff, patients, and visitors. The system is a product of WISER Systems, Inc., a developer of wireless programs that guard against infectious diseases.

Hospital administrators and infection preventionists can use the system to track perimeter adherence, objects or people moving through decontamination protocols, or proximity interactions between medical staff, patients, visitors, and medical implements likely to be contaminated, the company said in a press release.

WISER CEO Elaine Rideout, PhD, says that the WISER system "can pinpoint in-person contact within six feet—typically within inches—and the system logs date, time, and duration of contact. This data will be invaluable when it comes to preventing the spread of disease and knowing who to quarantine. Historic data will help researchers explore and better understand how specific diseases spread. It will also help prevent unauthorized access to triage and staging areas or quarantined zones."

WISER is offering free on-site tests and demonstrations of the system to crowded facilities at risk of contagion. These could include regional hospitals, assisted living centers, nursing homes, or prisons, among other facilities.

**www.wisersystems.com/blog/stemming-coronavirus**

# 75,000 deaths occur annually in US hospitals due to HAIs

## (It's time to take proven infection prevention further)

Figures released from the CDC make stark reading for Infection Preventionists. An estimated 722,000 healthcare-associated infections occur annually, resulting in 75,000 deaths and billions in additional costs.[1] More than half of these occurred outside of the intensive care unit.

To change these numbers, hospitals are adopting Hibiclens® for housewide daily patient bathing as an easy, valuable, infection prevention strategy. Hibiclens is helping to reduce facility-wide HAI risks, such as CLABSIs, CDI, and MRSA.[2-4]


For more information on how daily bathing with Hibiclens can help you in your infection prevention strategy visit www.hibiclens.com.

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