

# Advancing cost-effective vascular access

In 2010 a medium sized public hospital in Australia introduced a standalone vascular access team (VAT) as a cost-effective solution to the financial burden of their service and the increasing demand for vascular access support. Since 2018 the VAT has been solely managed by one of the Hospitals Clinical Nurse Specialists (CNS) who leveraged his longstanding background in vascular access to further develop the service including infection prevention education. Here, the CNS details the hospital's journey from having a high cost to cost-effective VAT service that has since expanded to include education in driving quality patient care and optimal outcomes.

## VAT service scope and structure

Providing a specialised vascular access service to mainly inpatients for over a decade, the VAT in 2020 placed a total of 110 peripherally inserted central catheter (PICC) and 190 midline catheter lines. The VAT service is a separate function reporting into the Surgical and Acute Services coordinator and operating Monday to Friday 8am to 4.00pm. Outside of these hours urgent lines are placed by the Intensive Care Unit (ICU) or Anaesthetics Consultant. Non-urgent lines (e.g., for planned antibiotics) have a peripheral cannula placed until the next business day when the VAT can reassess. The scope of the service includes pre-placement education, bedside insertion, follow up care and discharge education. Care of the vascular access device (VAD) for inpatients is provided by the ward, yet if any complication



arises (even after discharge) they are managed in consultation with the VAT. In rare cases where vascular access is not attainable by regular means, the patient is referred to the nearest hospital with an interventional radiology department to insert the line under fluoroscopy or via the jugular access point using a mini Hickman line. Patients are mainly referred via the medical team, although nursing staff also identify patients who may benefit from a VAT review. The VAT assesses these patients and recommends the most appropriate VAD.

Since it began, the VAT has been operating with one full time equivalent (FTE) resource, yet due to the increasing demand for vascular access services an additional staff member representing one FTE was trained and onboarded in 2021.

## High costs drive VAT business case

Prior to having a dedicated in-house VAT, patients were referred to neighbouring hospitals for their vascular access insertions. However over time this became unsustainable with each PICC insertion costing approximately \$1,000, which included procedure costs, patient transport charges and incidentals.

This cost, combined with the need to provide patients a seamless healthcare experience, only highlighted the importance of having a financially sustainable dedicated internal VAT service to manage all vascular access activities in the one location for quality patient care.

Consequently, a proposal by the Clinical Nurse Specialist predecessor in 2010 won Executive approval based on a cost analysis

comparing current vascular access protocols with the implementation of an internal VAT service and associated financial benefits, as well as the expected tangible patient benefits.

## Establishing the VAT service

The VAT service was established with few barriers. Among hospital stakeholders, the ICU supported the introduction of a dedicated VAT and also assisted in its creation. Although other wards such as Anaesthetics and Surgery were initially neutral to its inception, the VAT did become widely accepted by nursing staff within its first year and more broadly across the hospital thereafter. This was due to greater awareness of the VAT and promotion of its service which, in turn, increased staff acceptance.

Initially, the VAT encountered some resistance when determining which vascular access technology would be used, yet this was later resolved. When the VAT was first established chest X-ray was to be used to confirm tip placement, however as new technologies such as the electrocardiogram (ECG)-guided Sherlock 3CG™ Tip Confirmation System entered the market, the decision was made to use this technology. “While chest X-ray is the gold standard for tip placement confirmation, it is a costly procedure that exposes patients to radiation and there was increasing evidence for ECG-guided PICC tip positioning” the CNS said. “We also did not have a fluoroscopy suite, which not all staff were aware of, and so this was never considered as an option for our hospital.”

To commence the service, the previous CNS who prepared the business case was trained in-house on vascular access procedures by the Surgical Ward and then started ward based device insertions. As demand for

vascular access services grew, one FTE position was created for a dedicated vascular access staff member. In 2018 a new CNS joined, experienced with vascular access procedures having completed vocational training that required a number of successful device insertions under the supervision of an interventional radiologist. The vocational training included both theory and practical components to be deemed competent.

Today a more structured vascular access training program exists whereby new staff initially learn the theory component; which includes an introduction to vascular access followed by several online learning packages, as well as in-house sessions. The practical component involves training with a rubber arm to develop basic dexterity and, once satisfactory, the trainee will then assist the CNS with two person insertions until they are ready to undertake supervised insertions. Fifty supervised insertions are required for the trainee to be deemed competent; this takes approximately six to nine months to complete.

“We are also now working in collaboration with another hospital with a well-established VAT service to develop an accreditation package that will further advance the training and induction process” the CNS said.

## Choice of VAD

The hospital follows a methodical algorithm for selecting the appropriate VAD based on several factors including use, time required and patient considerations e.g., those difficult to cannulate. In general where:

- Less than seven days access is required, peripheral IV access is used.
- Between 7 and 28 days access is needed, a midline is used.

- More than 28 days access is required, a PICC is used.
- For patients receiving total parenteral nutrition a PICC is placed, irrespective of time.

For PICC tip confirmation, the ECG-guided Sherlock 3CG™ Tip Confirmation System is routinely used unless the patient does not have a discernible P-wave, a good ECG trace or has a pacemaker, in which case a chest X-ray is required.

A benefit from the algorithm is that it empowers the VAT team to take a proactive approach in identifying patients with difficult venous access or those misidentified by the medical team. “A typical situation would be that we approach the medical team to recommend a longer term device for a patient needing vascular access who is admitted for an extended period of time. The aim is to optimise patient care through the earlier identification of patients best suited to a particular VAD” the CNS said.

## VAT evolution and expansion

By 2012 the hospital’s VAT had evolved from a ward-based service to a dedicated department with no competing priorities, allowing the vascular access staff to give patients their total attention. Over time the hospital’s VAT service has further progressed to also take on most of the infection management portfolio, monitoring central line infections and preventing blood stream infections (BSIs) related to VADs. Although monitoring and preventing BSIs was not initially a goal of the service, the VAT now plays a key role in monitoring for VAD related infections and managing infection prevention education relevant to VAD use for the medical team.

In addition, the CNS established a nursing staff education program to address knowledge gaps identified on “no touch” aseptic techniques as these play a crucial role in preventing BSIs. BSIs can lead to extended

hospitalisations for the patient and also result in a loss of funding for the hospital<sup>1</sup>. The hospital’s Medical Education Department in collaboration with the VAT is also looking to help guide the next generation of healthcare professionals by educating medical students who frequently perform venous insertions yet lack adequate aseptic protocol education in their university courses.

## Key factors for VAT success

“The sooner the VAT can be set up as an independent department the better as not being independent or operating under a ward does create conflicting priorities. Having a strong business case and support at the Executive level at the start are both very important.” The CNS also attributes the hospital’s VAT success to the increased demand for the dedicated vascular access service, as well as resulting improved awareness of selecting the optimal VAD for patients.



“With increasing demand for vascular access support and our focus on optimising patient care and experiences, having our own dedicated VAT was really the only way to go”

*Clinical Nurse Specialist*

## Five key factors for VAT service success

- ✓ Strong business case (e.g., improved patient and/or hospital outcomes)
- ✓ Executive management support from the start
- ✓ Well trained and experienced VAT staff removes barriers
- ✓ Education on the VAT service raises hospital staff awareness and acceptance
- ✓ Benchmarking and comparing VADs is advantageous

“This enabled a cultural shift at our hospital in moving away from inserting consecutive short term access devices to using appropriate long term VADs” the CNS said. Indeed, clinicians recognised the benefits to patients, which has cemented the hospital’s independent VAT as an essential service.

Other success factors included having well trained and experienced VAT staff which, although not essential, does remove certain barriers. However this can also be a challenge due to the limited number of Clinical Nurse Specialist staff with vascular access expertise. Alternative approaches to training new VAT staff include a “home grown” method, which involves an ICU doctor training a Clinical Nurse

Specialist in vascular access insertion. “Because ICU is responsible for inserting a large number of VADs, it provides a trainee the best learning environment” the CNS said. “From a VAT member perspective, having a background knowledge of other wards and departments can help in creating a standalone VAT service. Also benchmarking and comparing current VADs on the market is advantageous when establishing or improving your vascular access service.”

While financial imperatives initially drove establishment of this VAT service, it is impressive that over the past 3 years this facility can boast a perfect score of zero infections for PICC insertions and midlines.



1. Australian Commission on Safety and Quality in Health Care. Implementation Guide: Surveillance of Central Line-Associated Bloodstream Infection. Sydney: ACSQHC; 2019

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