A dedicated vascular access team drives improved outcomes

In 2015 a major oncology hospital in NSW established a dedicated vascular access team (VAT) service with the intention to reduce rates of bloodstream infections identified in an earlier review. This review also identified peripherally inserted central catheter (PICC) insertions as a specific procedural activity providing an opportunity to improve. Fully supported by the Hospital Executive, a Clinical Nurse Specialist (CNS) used his extensive clinical experience and qualifications to spearhead the planning and implementation of a highly skilled, dedicated VAT that today boasts a 98% success rate for PICC insertions.

VAT service scope and structure

The hospital delivers more than 320,000 occasions of outpatient services and over 16,000 inpatient treatments each year. In 2020 the VAT placed 320 PICCs and 250 midlines among other devices that also include peripherally inserted intravenous catheters (PIVCs). Most of the service is for patients with cancer, many of whom have poor coagulation and clotting profiles. The scope of the VAT service includes identifying and inserting the optimal device with all PICCs inserted in a dedicated VAT procedure room unless the patient is isolated (e.g., VRE, MRSA) or in a critical care setting, while midlines/PIVCs are completed at the bedside. After insertion, care of the device, line and dressings are undertaken by ward nursing staff or community nurses.

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The specialised team is overseen by the Haematology Nurse Unit Manager and staffed by one full-time equivalent (FTE) shared among 6 staff members - which allows for annual and sick leave cover - who work autonomously in providing a vascular access service Monday to Friday from 8.00am to 4.30pm. All nurses employed within the team have previous experience and are credentialled in PICC insertion, cannulation skills and ultrasound expertise. Outside of these hours, any urgent lines are placed by the on-call intensive care unit (ICU) registrar. Referral to the VAT is a simple process via fax or email from within the hospital. An external process is via a booking diary. Referrals may also involve liaising with the relevant ward or treating team. The unit requesting device insertion are required to supply an appropriately trained staff member to assist with the procedure and to transport the patient to and from the procedure room.

Benchmarking - CLABSI drives VAT need

In 2014-15, the hospital ranked as having one of the highest central line associated bloodstream infection (CLABSI) rates in NSW compared with other facilities, for which PICC insertions were identified as a key contributing factor due to a lack of uniformity and consistency. Indeed, nursing and medical teams from multiple departments were placing PICCs and other lines – diverted from their rostered duties to perform these insertions - for which there was an ad hoc approach with procedures, supplier choice, device selection and insertion technique (e.g., blind insertion versus the Sherlock 3CG™ Tip Confirmation System).

It was postulated that this lack of standardisation meant that device selection and insertions were not only under an inconsistent process but sometimes occurred under suboptimal conditions. This also impacted the ongoing care and maintenance of the patients, who were often a cohort of complex and vulnerable groups, and their devices.

Other consequences from the lack of consistent hospital-wide governance over vascular access included protracted patient waiting times resulting in treatment delays and suboptimal patient flow. In turn, this placed increased pressure on the ICU who were inserting devices in the absence of suitably skilled vascular access staff. Adding to these issues was an increasing demand for vascular access devices (VADs) and the consequent workload generated.

VAT as an executive mandate

“The high bloodstream infection rates were brought to the attention of the Hospital Executive who recognised the immediate need for change. They requested the setup of a VAT as a high priority for a vascular access service that would have a governance process with accountability” the CNS said.

In 2016 the Hospital Executive mandated the establishment of a VAT, for which ICU and Haematology were both seen as the departments with established, nurse-led, venous access practices. The CNS and his nursing colleagues formed the VAT as a specialised nurse-led service for which four of the six members have haematology backgrounds and the other two have ICU expertise. The CNS oversaw the VAT service from its initial planning and implementation through to future strategies and development.

Preparing the VAT business case

While there was strong executive support from the outset, a business case for establishing the VAT was still needed. “Having a clear outline of the future service from the onset is really important in developing the VAT business case” the CNS said. Key steps taken when preparing the business case to identify the resources needed were:

- Review of the vascular access service requirements including the number of lines being placed and by which staff.
- Application of a staff questionnaire to better understand the needs regarding the VAT service.
- Review of current VAD technologies and insertion procedures.
- Identification of the procedural space/ equipment required for the service.

External reconnaissance was also an important part of the assessment process whereby the CNS shadowed the VAT team at a larger NSW Hospital to gain valuable insights and learnings from their well-established service. He also consulted with industry/supplier contacts, in particular Becton Dickinson (BD) personnel who shared their expertise supporting VAT services.

Creating a streamlined VAT service

Planning and implementing the VAT service, including staff selection, training and equipment purchases, as well as advertising the new service, occurred within a short 2-3 month timeframe. All six nurses chosen for the VAT were already accredited to insert PICC lines before joining the team, however, they also completed additional training provided by BD to help ensure the standardisation of insertion techniques. Any new staff shadow the team prior to receiving the additional BD training, yet since its formation few changes have been made to the staff composition of the VAT.

Key stakeholder support was another important factor. “The Executive, the Director of Nursing and the Haematology Nurse Unit Manger were all instrumental in expediting the process” the CNS said. The Director of Nursing also had previous experience at

a facility with a VAT service and was able to incorporate these insights into the decision-making process.

Bringing uniformity to VAD use was an immediate benefit in forming the VAT. Previously, several supplier brands were used by different specialties, which made it hard for staff to manage the devices when patients were moved between wards and other area health networks. Since inception of the VAT over five years ago, BD has been the main supplier for the VAD range used. The Haematology unit had been using BD products long before the VAT existed and developed a sound relationship with the company. It therefore made sense to continue using BD products, which aligned with the hospital's VAT service goals and strategy.

In particular, the Sherlock™ 3CG Tip Confirmation System has long been used to place and confirm all lines except in certain circumstances. "Our experience is that this technology provides a more objective confirmation of tip placement compared with a chest X-ray. We also find it is more cost effective and practical than using fluoroscopy, which requires a radiologist to be on hand, requires more inter-hospital staff and patient movement and exposes staff and patients to ionising radiation. We can insert the PICC and verify its placement in 30 minutes" the CNS said.

He explained the exceptions to this are approximately 10% of patients with abnormal cardiac rhythms (no discernible p-wave) or pacemakers who still need an X-ray for final tip confirmation. Also, on occasion where patients require nickel-free devices (due to the embedded guide wire in the Sherlock 3CG™ Tip Confirmation System), the hospital sources alternative devices from BD or other companies. In addition, midline insertions have increased over time, for which the VAT has standardised the process by using other BD technologies to help optimise outcomes.

Implementing the VAT service was a smooth process, yet there was some initial resistance to adopting new vascular access technology. This was from longstanding medical staff who historically were used to placing lines "blind" and confirming the catheter placement with chest X-ray after the procedure had been completed, without real-time electrocardiogram (ECG) guidance. This unfamiliarity of new technologies meant education of the medical and nursing staff was critical to successfully implementing the VAT service and included inter-disciplinary consultation, as well as providing published literature on the Sherlock 3CG™ Tip Confirmation System. The CNS also promoted the new service within the hospital to raise staff awareness, highlighting that all complex vascular access lines, with the exception of ICU, would be inserted by the VAT.

Choice of VAD

Selecting the appropriate device is based on several factors, among which best practice is to use the smallest possible gauge. Other considerations include the type of procedure, potential vascular access and type of medication. The CNS explained that patients undergoing abdominal surgery and needing total parenteral nutrition would require a triple lumen device, whereas if access is complex both a double lumen and midline would be used. A single lumen is used for patients discharging on chemotherapy or on antibiotic infusion. Often the number of lumens is related to the acuity of the patient's presentation.

Reaping the benefits of a VAT

Reducing CLABSI was the primary goal and driver in establishing the VAT, after which the hospital has reported minimal bloodstream infection rates. Other goals achieved included having a standardised protocol in place, the uniformity of both device choice and insertion practice, increased documentation and reporting of device placement, as well as the development of insertion skills of a specialised core team and their expertise with various technologies (e.g., cannulation using an ultrasound). "Since establishing the VAT team, bloodstream infections have substantially declined, while we've seen yearly increases in successful insertion rates. For PICC insertions our success rate has climbed from 85% in 2015 to around 98% in 2020" the CNS said.

How safety and quality translate into financial incentives

While implementing a dedicated VAT service usually incurs additional costs, it can also be considered an investment in the reduction of blood stream infections and VAD related inflammatory complications.

In 2017 under Commonwealth legislation, the Independent Hospital Pricing Authority (IHPA) introduced funding adjustments for hospital acquired complications (HACs) . Under this risk adjustment model, funding is reduced for any episode of admitted care where a HAC occurs.

The national list of HACs includes healthcare associated infections, notably infections or inflammatory complications associated with peripheral and/or central venous catheters.

"It's important that the outlay for a standalone VAT service is weighed against the financial losses associated with unsatisfactory performance outcomes, as well the costs of treating patient adverse events and complications, which may be greater. This is where the value of a VAT service can truly be shown under a pay-for-performance funding model"

Clinical Nurse Specialist

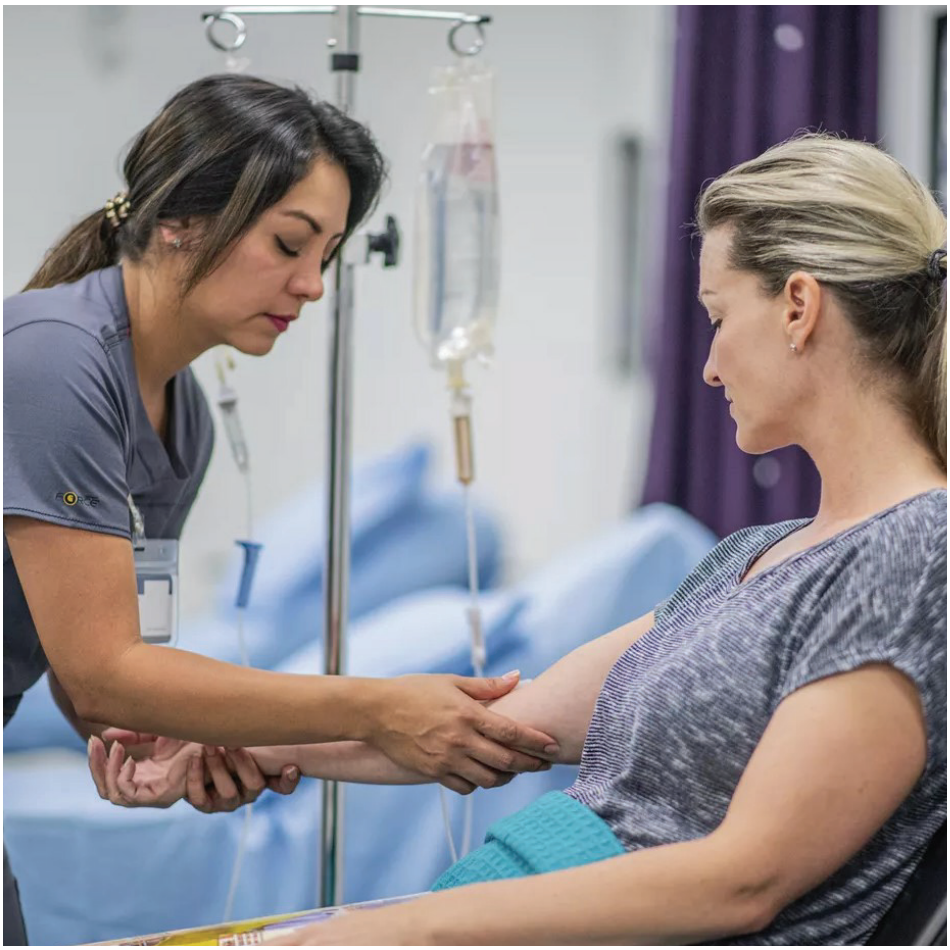
Monitoring outcomes is important

The VAT continually collects and interprets data to ensure objective patient outcomes from VADs are identified. All lines placed by the team are recorded via electronic medical records and tracked for patient and device outcomes (e.g., reason for removing the line). "We keep track of every line we insert" the CNS said. The VAT undertakes a fortnightly review, from which it is relatively easy to identify patients with infections as the tip is sent to pathology or they have returned positive blood or tip cultures. In addition, two spot audits are undertaken by Infection Control each year.

The team also regularly distributes a satisfaction survey for staff feedback. Such is the VAT's success that, based on the feedback, junior and resident medical officers have requested an expanded VAT service to include after hours and weekend cover. Junior medical officers in particular also continue to need education about the different types of devices, patient needs and what medications can be administered via each line. As a result, a business case is being prepared to support the proposed service expansion with the rationale that it will allow medical officers to better utilise their time, while the VAT costs should be at least comparable, if not less, than when junior staff place the lines.

Key insights for VAT service success

Critical to the success introducing a centralised and coordinated VAT service that not only improved patient outcomes, but also addressed related governance, vascular access practice and demand/workload issues, was the business-like approach taken.



"It's fundamental to set yourself up for success. This is not hard, but you do need to be systematic. That means planning what your service will look like and clearly defining its scope, the inputs needed, logistics, getting your Executive and other staff on side who will be impacted by the change through to promoting the service within your hospital, tracking your outcomes and getting feedback" the CNS said. The hospital experience found that having Executive support for the VAT from the outset was most critical, while the following were also considered key contributors to their success:

- **Leverage relationships with industry partners and other VATs.** This is important for facilities aiming to establish a VAT and especially if they lack Executive support. Suppliers of VADs can facilitate an introduction to VATs in other hospitals so the facility can draw on those experiences in developing the business case for a VAT. The value of vascular access supply partners also extends to ongoing staff education and training, standardising device usage, as well as leveraging network contacts in supporting the VAT to take ownership of the assessment, insertion, maintenance and education of VADs.
- **Identify resources and define/ standardise protocols.** This includes having a dedicated procedure room, a consumables storage room accessible to VAT staff only and an office for administration, alongside governance and setting standards. These resources are important in ensuring the independence and control of the VAT service and from an infection control standpoint in setting facility, team and service standards.
- **Promote VAT service to hospital staff.** Promoting the VAT service within the hospital maintains staff awareness and helps to ensure its optimal use for both patient and staff outcomes. Effective messaging should include a description of the VAT service offerings and program goals such as the improved patient outcomes, hospital efficiencies and reduced costs. The Executive can also help to promote the importance of the VAT service.

Given this hospitals success, the CNS noted very little would change if they had to set up their VAT service all over again.

"The hospital is happy with us – it's been pretty successful"

Clinical Nurse Specialist

Achieving improved vascular access outcomes

Issue	Solution	Outcome
High bloodstream infection rates	Have a dedicated VAT service and regular audits	Substantially reduced CLABSI rates
No hospital vascular access governance	Standardise device choice and insertion protocols	Insertion success rate climbs to 98% in 2020
Suboptimal patient care	Have clear referral and monitoring processes to support the VAT service	Continuity of care supports optimal patient outcomes

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