NIVAS
National Infusion and Vascular Access Society

The Benefits of a Nursing Led Vascular Access Service Team:

A White Paper to outline a standardised structure and approach for the NHS to deliver vascular access services in every hospital.

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Chair of NIVAS
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The National Infusion and Vascular Access Society (NIVAS) is a multidisciplinary organisation. The board consists of specialist nurses, doctors, anaesthetists, and other allied healthcare specialists all with a special interest in vascular access and IV therapy. As the only dedicated society in the United Kingdom representing IV therapy and vascular access practice, a critical focus for NIVAS is the creation and standardisation of vascular access service teams across the NHS. This work stream is part of our three-year plan to improve patient safety, choice and availability of vascular access and IV therapy services within the NHS. This is running in parallel with the creation of our national guidelines for vascular access and IV therapy and the national accredited qualification for vascular access nurses.

NIVAS works closely with the Infection Prevention Society (IPS), Association for Safe Aseptic Practice (ASAP), NHS England (NHSE), Medicines and Healthcare products Regulatory Agency (MHRA) and NHS Health Scotland alongside other national and international organisations to promote and advance the interests of intravenous and vascular access clinical practice. NIVAS also engages with the NHSE, MHRA, NHS Resolution, NHS Supply Chain and NICE (National Institute for Health and Care Excellence) to offer expertise and a voice when a national opinion or strategy is required in relation to vascular access and IV therapy.

Foreword

NIVAS is recommending the creation of a national framework for vascular access service teams. We know the difference this structure can make to patients' safety and experience, and how it can reduce harm and improve outcomes. Vascular access in all its forms is the most common, invasive procedure patients will experience in healthcare today. From obtaining blood samples to the delivery of intravenous therapy, vascular access is a cornerstone of modern medicine. In order to deliver these therapies, safe and reliable access from peripheral cannulas through to implanted ports, is essential.

For many patients, the placement of a vascular access device or the process of taking a blood sample is the only invasive procedure they will experience when in hospital. This can be a difficult or a stressful process if the patient has difficult vascular access. For some patients vascular access can be traumatic and extremely painful. The true number of patients with difficult intravenous access is unclear because there is no national reporting of this complication. Poor venous access can lead to a number of complications associated with the number of attempts made to gain IV access and the quality of the device/vein situation after insertion. Often a more advanced or longterm vascular access devices is the best option for the patient. Having a vascular access service team in place can ensure that the patient achieves the optimal vascular access device for their intavenous therapy whether that therapy is administered in hospital or out of hospital.

The focus in recent times to promote vessel health, a joint project between NIVAS and the Infection Prevention Society (IPS), has helped to reduce the number of unsuccessful attempts to gain vascular access or obtain a blood sample. Assessment of the patients' veins and requirements for vascular access with a focus on placing the best vascular access device as early as possible to achieve one device for the duration of the IV therapy is becoming more common. This is especially true in those NHS Trusts with access to vascular access teams. However, these dedicated teams are not a feature of every Trust, and the aim of this white paper is to outline the benefit of hospital vascular access teams and the benefits of a standardised approach which can be adpoted throughout the NHS.

I must take this opportunity to thank the NIVAS board for its support in producing this white paper and to Becton Dickinson (BD) for its prelimanary work in data collection on this project. BD started this journey by commisioning a roundtable working group (appendix 1) which explored the current level of service provision in the NHS for vascular access and concluded that there is no standardised model for vascular access teams in the NHS and that if there were, this would improve safety and patient experience.

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The Board of NIVAS

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A patient's perspective

Patient experience is a critical aspect of vascular access. This white paper would not be complete without a foreword from a patient who has extensive experience of vascular access. I believe Jane's story gives context as to why it is so important to have a specialist vascular access team making a dfference to patients, the healthcare team and pathway managers in every hospital in the NHS.*

"Vascular access, in particular a Hickman line, has been part of my life for the last 15 years. I have short bowel syndrome and can only manage very small amounts of cooked, plain pasta orally each day, and therefore I need IV nutrition and electrolytes to keep me going".

"In the early days I had no problems with my veins. I had a PICC** for about a year and during my frequent admissions to hospital, they would use them in my hand and arms to take blood and would use a cannula in my hand for fluids. After a few years I found cannulas and bloods so painful because they could never get them in. They said my veins had blown, it was terrible, that's when I had my first Hickman line.

"The Hickman line revolutionised my life at home and when I came into hospital. I was having nutrition into my vein as an infusion every night and sometimes I would need potassium or magnesium infusions. I could get these in hospital through my Hickman. It was about a year before I got my first line infection. The worst part of this was coming in into hospital and feeling so unwell. This was made worse by the doctors and nurses trying up to 10 times to get a cannula in my hand. Over the years I have had four or five Hickman lines and so many PICCs I've lost count. My experiences with repeated attempts at cannulation and taking blood has left me scared to go back into hospital. I fear the pain and worry about how the staff will look after my Hickman line. All my veins are shot now, and I can't have any more Hickman lines. They tell me this is my last catheter, which is scary, and even more so because I have found myself needing more frequent visits to the hospital with overnight stays.

"I have had my treatment at a few hospitals, and my most local one is the one I will go to if I have the choice. This is because they have a vascular access team who use ultrasounds to take my bloods and put cannulas in. They always use a cold spray and never cause me much pain. They also oversee the care of my Hickman line when I have to stay overnight, and this stops me worrying about getting a line infection when I am in the hospital. The vascular access team are there every day so I can call them and pop in to see them directly if I have any problems. The other two hospitals I use don't have a vascular access team. I really do not like going there, mainly because I know they will struggle with my veins, and I worry about the Hickman line.

"It would be amazing to have the same standard of expertise for vascular access in all the hospitals I visit. Having a vascular access team makes such a big difference to my experience and peace of mind."

**Name changed to protect patient identity.*

***Peripherally Inserted Central Catheter*

Executive summary

This white paper, submitted by NIVAS, will examine the arguments advocating for Vascular Access Services Team (VAST) across the NHS. It acknowledges the current pressures of restarting the NHS following the pandemic and the roadmap to reduce the elective waiting lists. The paper will outline how integrating a standardised model of VAST into the healthcare systems of the NHS will benefit patients, the new Integrated Care Systems (ICS) and the wider objectives of the NHS. Adoption of a standardised vascular access service aligns with the NHS Long Term Plan[1] and the February 2021 DHSC Integration and Innovation white paper[2].

We are calling on the NHSE to implement the following recommendations:

- NHS England to implement standardised vascular access provision across the whole NHS with ringfenced funding.
- NHS England to conduct their own national survey to understand fully the vascular access provision within all Trusts. This survey needs to provide complete information on current practice and impact on patients, staff, the Trust, and the wider integrated care system (ICS).
- NHS England to support NIVAS in creating a national standardised training programme for vascular access.
- NHS England to support the creation of academically recognised professional qualifications for training in vascular access and establish a career pathway to include recognition of qualifications.
- Vascular access to be recognised as an essential specialist discipline with agreed national key performance indicators.
- Recording and reporting of all complications associated with vascular access to be mandatory.

Ensuring safe vascular access is a fundamental part of the care of many hospital patients with up to 90% of inpatients requiring intravenous access for delivery of fluids, medication and/or blood sampling. Yet 35–50% of peripheral vascular catheters do not meet their intended dwell time, largely due to complications which can cause delays in treatment and patient discharge[3]. The Marsh Report[4] describes a link between peripheral intravenous complications and interruptions to important treatment regimens which can be distressing for patients and result in longer hospital stays with increased healthcare costs.

Peripheral intravenous catheter (PIVC) use in healthcare is common worldwide[5]. Through the NIVAS network and wider NHS, it is evident there is significant variation in the provision of vascular access services in the NHS. Nurses are usually responsible for insertion of most peripheral vascular catheters alongside junior doctors who are often referred the most difficult cannulations. Failure of PIVCs is common, resulting in premature removal and replacement. Intravenous access can be difficult to obtain, especially in patients with a lack of visual or palpable apparent veins and in patients with a known history of a difficult intravenous access[6]. A published research article in 2017 reported that 33% of adults and up to 50% of children who present to a hospital requiring a PIVC are reported to have difficult venous access, making first attempt success even harder to achieve[7].

In organisations where no formal vascular access service team exists, these patients would need to be referred to more experienced clinicians. They can be passed between numerous 'expert' staff which often results in patients experiencing multiple attempts to access a vein, sometimes as much as 15 attempts in one day. This can destroy the patient's peripheral veins, cause pain and discomfort and traumatise the patient. This situation could easily be avoided if additional technology is used to assist peripheral access placement or a central vascular access device can be placed, if required. This can be achieved if a vascular access service team is in place.

The insertion of more complex and invasive central vascular catheters is traditionally performed by surgeons, anaesthetists, interventional radiologists, and other medical consultants. However, this is in addition to their critical workloads in theatres, ITU and radiology. This can lead to delays in hours or days before patients receive either an emergency vascular access device or appropriate central vascular access to start treatments and this is one contributing factor that may increase a length of stay in hospital. There are also additional costs to the NHS.

The additional pressures caused by the recent pandemic have highlighted further the difficulties with this traditional model and as the NHS recovers from the pandemic, the use of theatre and interventional radiology time is in greater demand as the NHS clears its backlog of operations and procedures.

There is a better model

A specialist vascular access service team (VAST) is responsible not just for placement of devices but 'to assess, insert, manage, perform surveillance, analyse their service data, solve clinical concerns and where possible remove vascular access devices (VADs)'[8]. Having a vascular access service will result in fewer delays in starting treatment, a reduction in infection rates and other complications, better patient experience, and reduced length of stay for patients. All of which NIVAS believes would alleviate pressures within the NHS.

There is evidence of a reduction in these complications for patients with the most reliable vascular access device for the duration of the treatment regime, with successful placement on first attempt being the primary function of an effective vascular access service team[9]. The argument for VAD insertion by a VAST is that best-practice care is supported by a consistent, knowledgeable, and skilled approach. Higher levels of inserter knowledge and confidence, built upon experience and procedural competence, suggest the VAST approach has positive insertion outcomes for patients[10] [11] [12].

Interest in this subject has been reignited following a roundtable "Ensuring Safe Vascular Access" (Appendix 1) held in the spring of 2021. The panel looked at the importance of dedicated vascular access management teams for future healthcare in the UK. Clinical experts and other key NHS leaders joined Carolyn Wheatley representing the patient group PINNT (Patients on Intravenous and Naso-gastric Treatment) to discuss related topics. While different viewpoints were raised, the panel agreed that good, reliable vascular access and

patient trust is vital for patient care. The roundtable strongly acknowledged the importance of dedicated vascular access teams for future healthcare in the NHS[13].

Introduction and background – the current situation and opportunity

Many patients admitted to hospital or who are in receipt of healthcare in other settings, including their own homes, will become recipients of one or more infusion therapies at some stage[14]. Over a billion Peripheral Intravenous Catheters (PIVCs) are used globally every year with at least 25 million sold annually in the UK[15] [16]. The NHS spends an estimated £29m of its annual acute sector budget on PIVC procurement[17] and around 70% of all hospitalised patients require at least one PIVC during their stay. Yet despite their extensive and routine use, PIVC failure rates are reported as high as 50-69%[18].

Ensuring Safe Vascular Access roundtable (Appendix 1)

This roundtable stated that for some patients a vascular access procedure will be the most invasive procedure they will undergo while in hospital, with procedures ranging from a simple blood test to a peripheral cannula, or the more complex placement of central vascular catheter such as a peripherally inserted central catheter (PICC). The attendees confirmed that introducing specialist teams to do this has many advantages from both an organisational perspective and for the patient.

Key points from the roundtable:

- **A Vascular Access Service (VAS) is a central part of hospital services extending into the community and a modern hospital should not function without one**
- **Vascular access services can positively impact safety, infection rates and length of stay which can be cash releasing**
- **There is overwhelming evidence that vascular access advanced practitioners are the most effective in delivering a vascular access service**

However, the diversity of care delivery, its commissioning, equipment, therapies, vascular access devices and environments for infusion therapy, can have implications for patient safety and care. Healthcare professionals must ensure each patient receives the most appropriate infusion therapy via the most appropriate device and site, in the right environment and at the right time[19].

Patient Safety – the impact of complications of vascular access

A recent observational prospective study by Simin et al.[20] ranked phlebitis first among complications, with occurrence of 44%, followed by infiltration of 16.3%, while the incidence of occlusion and catheter dislodgement was 7.6% and 5.6%, respectively. This study identified a link between increased phlebitis rates with multiple cannulation attempts.

Healthcare Associated Infections (HAIs) are the most common cause of preventable harm in hospital, affecting one in 20 European patients[21]. HAIs result in triple the length of stay in hospital and almost double the rate of patient readmission[22].

Catheter related bloodstream infections account for up to 20% of HAIs[23] are one of the most frequent, costly and potentially life-threatening complications of central venous catheterisation[24], with some types of bloodstream infection pathogens on the rise in the NHS[25].

Patient Safety – the cost impact of HAIs on NHS

- In 2016/2017, there were an estimated 653,000 HAIs among the 13.8 million adult inpatients in NHS general and teaching hospitals in England, of which 22,800 patients died as a result of their infection[26].
- The total annual cost in the UK is estimated to be £774 million (328m–2,192m). Bloodstream infection (BSI) and pneumonia were the costliest HAI types per case[27]. Manoukian et al.[28] also state that BSI had the greatest impact in bed days lost averaging 11.4 additional days of extended hospitalisation.
- The recent published data from NHSE outlines the number of reportable blood stream infections acquired during a hospital stay associated with a central vascular access device. This data is limited to MRSA and MSSA infections, both of which are mandatory reported. The number of these infections can be seen in figure 1 below.
- A recent paper published by Stewart et al.[29] reported that in Scotland the excess length of stay attributable to hospital acquired infections (HAI) was 7.8 days. It estimated that 58,000 bed-days are occupied due to HAI in Scotland annually. A reduction of 10% in HAI incidence could make 5,800 bed-days available. These could be used to treat 1,706 elective patients in Scotland annually and help reduce the number of patients waiting treatment.

Table 17. MRSA counts and rates by source of bacteraemia, England: April 2007 to March 2008 to April 2020 to March 2021

Financial year	Catheters and lines*	SSTI**	Pneumonia	Other***	Unknown	Total
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
2007/2008	617 (25.6)	395 (16.4)	160 (6.6)	705 (29.2)	537 (22.2)	2,414 (100.0)
2008/2009	346 (22.5)	276 (17.9)	113 (7.3)	552 (35.8)	254 (16.5)	1,541 (100.0)
2009/2010	178 (19.5)	191 (20.9)	63 (6.9)	328 (35.8)	155 (16.9)	915 (100.0)
2010/2011	118 (17.5)	146 (21.6)	47 (7.0)	251 (37.1)	114 (16.9)	676 (100.0)
2011/2012	71 (14.7)	98 (20.3)	41 (8.5)	177 (36.7)	95 (19.7)	482 (100.0)
2012/2013	72 (18.3)	74 (18.8)	34 (8.6)	128 (32.5)	86 (21.8)	394 (100.0)
2013/2014	39 (13.3)	57 (19.4)	33 (11.2)	100 (34.0)	65 (22.1)	294 (100.0)
2014/2015	30 (11.9)	53 (20.9)	39 (15.4)	64 (25.3)	67 (26.5)	253 (100.0)
2015/2016	38 (15.5)	56 (22.9)	25 (10.2)	89 (36.3)	37 (15.1)	245 (100.0)
2016/2017	51 (20.0)	80 (31.4)	21 (8.2)	88 (34.5)	15 (5.9)	255 (100.0)
2017/2018	50 (15.4)	101 (31.1)	40 (12.3)	118 (36.3)	16 (4.9)	325 (100.0)
2018/2019	37 (12.8)	97 (33.6)	30 (10.4)	115 (39.8)	10 (3.5)	289 (100.0)
2019/2020	33 (12.8)	80 (31.1)	24 (9.3)	96 (37.4)	24 (9.3)	257 (100.0)
2020/2021	33 (15.6)	55 (25.9)	27 (12.7)	91 (42.9)	6 (2.8)	212 (100.0)

*'Catheters and lines' includes the following options from the HCAI DCS question: dialysis lines, central venous catheter (CVC) associated, peripheral venous catheter (PVC) associated and intravenous (IV) lines.
**Skin and Soft Tissue Infection
***'Other' includes the following options HCAI DCS: endocarditis, osteomyelitis, other, prosthetic joint, surgical site infection (SSI), septic arthritis, urinary tract infection (UTI) and ventilator-associated pneumonia.

30 **Table 21. MSSA counts and rates by source of bacteraemia, England: April 2020 to March 2021**

Financial year	Catheters and lines*	SSTI**	Pneumonia	Other***	Unknown	Total
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
2011/2012	565 (17.1)	670 (20.3)	197 (6.0)	1093 (33.1)	780 (23.6)	3,305 (100.0)
2012/2013	492 (15.1)	699 (21.4)	232 (7.1)	1088 (33.3)	755 (23.1)	3,266 (100.0)
2013/2014	435 (13.4)	684 (21.1)	218 (6.7)	1124 (34.7)	775 (23.9)	3,236 (100.0)
2014/2015	445 (13.1)	706 (20.8)	305 (9.0)	1087 (32.0)	855 (25.2)	3,398 (100.0)
2015/2016	493 (15.3)	769 (23.9)	306 (9.5)	1169 (36.3)	487 (15.1)	3,224 (100.0)
2016/2017	499 (15.7)	871 (27.4)	365 (11.5)	1279 (40.2)	169 (5.3)	3,183 (100.0)
2017/2018	516 (14.6)	1003 (28.4)	445 (12.6)	1440 (40.8)	125 (3.5)	3,529 (100.0)
2018/2019	578 (15.5)	1030 (27.6)	450 (12.1)	1596 (42.8)	78 (2.1)	3,732 (100.0)
2019/2020	633 (15.3)	1173 (28.3)	502 (12.1)	1729 (41.7)	112 (2.7)	4,149 (100.0)
2020/2021	559 (16.3)	942 (27.4)	430 (12.5)	1434 (41.7)	74 (2.2)	3,439 (100.0)

*'Catheters and lines' includes the following options from the HCAI DCS question: dialysis lines, central venous catheter (CVC) associated, peripheral venous catheter (PVC) associated and intravenous (IV) lines.
**'Skin and Soft Tissue Infection
***'Other' includes the following options HCAI DCS: endocarditis, osteomyelitis, other, prosthetic joint, surgical site infection (SSI), septic arthritis, urinary tract infection (UTI) and ventilator-associated pneumonia.

The benefits of a dedicated VAST include reduction in central line associated bloodstream infections (CLABSI) which results in decreased expenses and increased efficiency, quality of care, patient satisfaction and improved patient outcomes. The key to reducing HAIs related to vascular access devices is to standardise care, utilise evidence-based care bundles and employ an VA team to ensure that patients can have the most appropriate and safest vascular access device placed for the duration of their treatment. The team can educate, audit and perform surveillance with the aim of maintain staff adherence to care and maintenance bundles for vascular access devices[31].

Patient safety – the importance of selecting the right vascular access device

- Optimising device selection reduces avoidable complications, e.g., multiple attempts to achieve vascular access, phlebitis, thrombophlebitis and infection[32]. Choosing the right vascular access device at the right time for the right therapy has the potential to improve efficiency and reduces costs[33].
- Poor VAD selection may be due to an absence of clear guidelines about which device to select in different clinical situations and a lack of understanding of the rationale for specific device selection[34] [35].
- Vein location technology can reduce multiple vein access attempts reducing the risk of thrombosis and vein stenosis. A Vascular Access Service Team (VAST) can cascade training for unit/ward-based teams to use ultrasound or infrared technology to assess vessels and place peripheral cannula with lower failure rates.
- Local guidelines to limit the number of attempts to gain vascular access is vital in reducing patient harms however the organisation must have an escalation policy to enable vascular access to be placed after a number of failed attempts and this is where the VAST is required.

- VAST can be instrumental in monitoring and reviewing clinical complications which can arise from poor practice and quickly put in place a local training programme to improve knowledge and compliance with standardised care bundles.

Healthcare Worker safety

- Healthcare workers (HCWs), particularly those performing clinical procedures with sharps such as cannulation and venepuncture, are at risk for needlestick injuries, blood splashes and exposure to bloodborne pathogens during PIVC insertion. A systematic literature review by Hadaway[36] identified risks to HCWs that were related to key challenges, such as knowledge deficits and lack of access to safety-engineered catheters. A survey conducted by Jagger et al.[37] was used to explore blood exposure risk during PIVC placement and found that 46% of nurses reported at least one exposure per month during PIVC insertion. Davidson et al.[38] undertook further investigation into needle stick injuries associated with peripheral cannula and found these could be further reduced with good education, changes to policy, using a closed system cannula and improving first stick rates.

- One systematic review by Elder and Paterson[39] reported sharps injury rates in the United Kingdom by calculating an incidence of 12.74 per 100 beds per year. The most recent figures suggest an estimated 40,000 needle stick injuries occur annually in the NHS, but due to under-reporting the true figure is likely to be significantly higher[40].

- The responsibility for needle stick injuries management is usually handled by the occupational health team but prevention is better than a cure. A hospital with an established VAST means there is a proactive lead to ensure the practice for which they are specialists in can oversee the procurement, training, use and audit of each sharp device used in vascular access. One of the primary risks to the healthcare workforce is sharps related injuries[41]. Having a VAST in place can give assurance to the Trust that a team has a complete overview of sharp safety in the organisation, improving staff and patient safety.

Local and national organisational impact

- National guidance, clinical alerts, and communications from organisation like MHRA, NICE, NHSI/E, NHS SC and more provide communications regarding vascular access and IV therapy safety in practice on a regular basis. This information is often sent to patient safety leads in NHS organisations. This information is then disseminated to local stakeholders for action. Locally this is often a disjointed process which can lead to information being miscommunicated. A proactive use of the vascular access service team is to act as central point for this information. They can then disseminate and advise on alternative practices or in the case of supply chain problems, can advise on suitable and safe alternatives. This process can have a positive outcome for the organisation by ensuring treatment is not compromised or delayed.

- Prolonged stays in hospital are bad for patients, especially for those who are frail or elderly[42]. Spending a long time in hospital can lead to an increased risk of falling, sleep deprivation, catching infections and sometimes mental and physical deconditioning. Despite this, nearly 350,000 patients spend more than three weeks in acute hospitals each year. An avoidable cause of an increased length of stay is seen in patients who have difficult IV access. Repeated attempts at peripheral cannulation, with no opportunity for a referral to a specialist vascular access team who can place a PICC can lead to long delays in patients receiving IV therapy, missed doses and suboptimum treatment with alternative oral therapies resulting in increased length of stay and poor clinical outcomes.

- A hospital that offers the availability of reliable vascular access through a VAST can ensure that patients receive the full regime of IV therapy without interruptions or delays. Interruptions in IV therapy courses can increase the number of days a patient will stay in hospital and risk the chance of successful treatment.

- According to NHS Resolution extravasation remains one of the top clinical incidents resulting in litigation within NHS hospitals with top causes of extravasation resulting from administration of chemotherapy and CT contrast. NHS Resolution recently published its 10-year data on extravasation[43] which demonstrated a cost to NHSE of £16m. The causes of these extravasations included wrong route of IV therapy administration, staff not following manufacturer's guidance for administration of IV drugs and delay in identifying extravasation injury caused by CT contrast injections through peripheral cannulas which became dislodged.

- NIVAS recently canvassed its membership asking about the incidence and service provision for non-chemotherapy related extravasation in their organisations. The biggest cause in this group was via CT contrast in scanning. The NIVAS membership reported that in most cases there was no local standardised provision for the prevention, recognition, management and incident reporting of non-chemotherapy extravasation. A national strategy is needed that can be used by local VAST to produce local guidelines.

NHS development of safety culture – NHS Patient Safety Strategy

The NHS Patient Safety Strategy: Safer culture, safer systems, safer patients, was published in July 2019 by NHS Improvement (now NHS England and NHS Improvement)[44] and detailed three strategic aims:

- Improving understanding of safety by drawing intelligence from multiple sources of patient safety information (Insight)
- Equipping patients, staff and partners with the skills and opportunities to improve patient safety throughout the whole system (Involvement)

- Designing and supporting programmes that deliver effective and sustainable change in the most important areas (Improvement)

This document directly aligns with the intended outcomes for VAST being standardised within the NHS. The first nurse-led hospital wide vascular access service was set up in Oxford in 1991 by Helen Hamilton and Nicola York. The Oxford service proved the instillation of a VAST could provide a radical reduction in infections and complications for patients, associated with vascular access devices and IV therapy, including the development of a community based IV team and provision of outpatient care in people's homes[45].

Yet in 2022 there is still no standardisation in provision of vascular access across the NHS. What has developed over this time is that vascular access services have become established in some places providing different variations of a PICC service, usually in oncology or more recently, for outpatient parenteral antimicrobial therapy (OPAT) services[46] [47]. These pockets of vascular access services are very effective but limited to providing VAST services to a small group of service users and often not extended to all patients within the acute or community setting.

To be successful and cost effective, the VAST should be multifunctional and provide services to all clinical areas and service users. The service should respond to all cases of difficult IV access patients, including children. The use of a VAST in emergencies, as part of the deterioration patient or cardiac arrest response can also be valuable.

Alternatives to a nurse-led vascular access service include provision of device placement by consultant radiologists and anaesthetists. While there is great value in having these clinicians as clinical leads for the VAST, their time is better spent undertaking more complex clinical work. A service that relies solely on interventional radiology or anaesthetics to place PICCs and difficult IV access models usually do not include follow up, care and maintenance, staff training, audit and evaluation, all critical components of a vascular access service. Delays in device placement and subsequent treatment delays can be much higher where a dedicated team is not formally set up and there are competing priorities to undertake clinical procedures alongside vascular access.

Interventional Radiology (IR) departments and vascular access

For hospitals without a vascular access service or nurse led PICC team, interventional radiology IR) doctors are usually the fall back for vascular access provision, in particular for PICCs, ports and tunnelled catheters. Pressures on radiology within the NHS have been widely acknowledged, even before the pandemic, in the 2019 NHS Long Term Plan. This called for radical investment and reform of diagnostic services[48]. Together with Sir Mike Richards' report Diagnostics: Recovery and Renewal and the annual radiology workforce census published by the Royal College of Radiologists (RCR)[49] these three publications all underline existing capacity issues. Releasing clinical time by moving PICC insertion out of the IR suite and to the bedside by a nurse-led service is an effective initiative.

IR replaces or enhances more invasive surgical procedures. Benefits of IR for the NHS are faster recovery times, shorter hospital stays, reduced morbidity and mortality vs surgery.

However, the Royal College of Radiologist's (RCR) Clinical Radiology UK Workforce Census 2020 Report[50] found a worsening shortage of radiologists, radiographers and nurses and commented that the 'situation remains dire'.

The RCR Census[51] reported that radiology departments may be worried about the demands vascular access is putting on them and the difficulties in providing timely access for patients. A dedicated team can reduce those demands.

- **10% of Consultant Radiologist posts (433) in the UK are vacant with nearly 66% of consultant vacancies remain unfilled after one year in 2020.**
- **An average of 33% of services were short-staffed in keeping up with demands for scanning and surgery pre-pandemic with staff shortfalls >40% N and West Wales, N Scotland, NE England and East Midlands.**
- **44% shortfall in radiologists expected by 2025 (3,613 consultants).**
- **7% increase in radiology outsourcing, insourcing and ad hoc locums in NHS England sites costing £173.3m in 2020.**

The RCR Census advised that without changes to radiology provision "we are effectively turning the lights out and leaving other clinicians to tackle cancer, strokes and more in the dark". Other findings included:

- Safety concerns: 'we can no longer provide acute cancer care'
- Workforce stress, pressure on recruitment retention
- Backlogs and delays

Interventional radiology is one of many services in the NHS that have a backlog of waiting lists post-pandemic for IR procedures. The Royal College of Radiologists and the British Society of Interventional Radiology recently published their COVID-19 interim guidance on restarting elective work: interventional radiology (image guided surgery) services[52] which prioritised central venous access and PICC insertion as needed to be achieved within 72hrs, classifying them as Priority 2 urgent. This is a difficult priority as the emergency work and elective cancer work is still overwhelming the services. A dedicated VAST would be able to take on most of this vascular access work to relieve some of the pressure.

Currently the insertion of peripherally inserted central catheters (PICCs) for uncomplicated patients is recommended by NICE to be attempted using Sherlock 3CG™ guidance negating the need for fluoroscopy or a confirmatory chest x-ray[53]. Using ECG technology for catheter tip location verification not only releases fluoroscopy/IR room time but saves money per patient[54]. A systematic review and meta-analysis to examine the accuracy and safety of using the electrocardiogram (ECG) positioning technique to localize the peripherally inserted central catheter (PICC) tip position to provide objective evidence for its clinical application was undertaken by Chen et al.[55] 9 studies were identified and reviewed and the overall conclusions showed that the application of ECGs in PICC tip positioning can improve the accuracy of catheter tip positioning and reduce the incidence of related complications

Theatres, surgery, anaesthetics, and vascular access

Placement of vascular access devices is often undertaken by anaesthetists in theatres though this is usually in addition to their existing role and not as a pre-planned activity or their sole activity. Currently, NHS England theatre costs are £20 per minute[56]. Placement for PICC and CVC in theatres involves, at the very least, a consultant anaesthetist with an assistant, a nurse runner, a scrub nurse, a porter, recovery staff and more. The cost of the theatre space should also be taken into account as well as any mobile radiology equipment and radiographer.

The latest data, published in March 2022 by NHSEI reports patients waiting to start treatment at the end of March 2022 was 6.4 million patients. Of those, 306,286 patients had been waiting more than 52 weeks and 16,796 patients had been waiting more than 104 weeks, the highest number since records began[57]. Removing routine vascular access placement from theatre lists can facilitate better use of theatre capacity and anaesthetic time to manage the current surgical waiting lists backlog. Trusts often rely on emergency theatre availability to place VADs however this is never guaranteed depending on the life-threatening emergencies that take precedence. This can lead to delays for patients in starting treatment and may lead to a longer stay in hospital.

Vascular Access and IV community services

Healthcare closer to home or in the patient's home has been a priority for NHS providers for the past five years and this initiative has accelerated since the pandemic. IV therapy, especially antibiotic therapy, has historically been given in the community setting under the framework of OPAT (outpatient parenteral antimicrobial therapy). Most established OPAT services will include an element of vascular access service[58]. Since the pandemic the portfolio of IV therapy regimes has been extended to include immunoglobulin therapy, monoclonal antibody therapy and other medications. A vascular access service can be robust enough to help provide these additional IV services through satellite services where short and long-term vascular access devices can be placed through community hospitals and health centres or even in the patient's home. This is especially possible with the advent of mobile ultrasound scanners and ECG technology to confirm PICC tip placements.

International prospective on vascular access teams

Vascular access as a specialism and VASTs are becoming more widespread through Europe. Each country has a different service model and while it is recognised that in the UK, nurses have taken the lead in becoming independent practitioners and nurse consultants in vascular access, other countries are also focusing on developing nurse-led services.

A faculty of multidisciplinary European Vascular Access Team (VAT) leads and experts including from the UK, led by Professor Mussa[59] recently published a research paper which sought to reframe how the implementation of a service team could have positive impacts on patients and hospitals.

While these teams vary in structure and function, clarity of purpose and supportive training and education are key. Barriers to the implementation of a VAST show common threads

across countries, such as lack of investment, insufficient training, and lack of awareness. Proven markers of success include rapid referrals, improved patient outcomes and improved organisational efficiency. Standardisation of outcomes, data capture, processing and reporting are key to monitoring performance against a baseline. Awareness of the cost of complications arising from inappropriate choice and placement, and poor care and maintenance of the vascular access device must be raised.

The implementation of a VAST can positively impact patient safety and satisfaction, improve organisational efficiencies and cost-effectiveness, and could create new opportunities for in- and outpatient services, beneficial to both patients and institutions.

Corcuera Martínez[60] reports success in Spain where a vascular access team was created in 2018 with the aim of improving vascular access and reducing complications associated with catheters. The impact of the introduction of the team in the insertion and maintenance of peripheral insertion central catheters (PICCs) was assessed. The cost-benefit associated with the use of a VA team was evaluated and the satisfaction of patients and professionals interacting with that team was measured.

The conclusion of the study revealed low complication rates and high overall satisfaction scores from patients and professionals, showing that a specialist vascular access service team can have a positive impact in the insertion of PICCs and a clear economic benefit.

Current Vascular Access Service (VAS) in the NHS (NIVAS study)

Between August and October 2020 NIVAS carried out a survey of its members and received 58 responses representing NHS Trusts. The survey was designed to get a better understanding of current vascular access services in NHS Trusts across England.

The results showed discrepancies in a range of areas, including how guidelines are interpreted and what is considered to be a VA service.

40 of the 58 respondents say their Trust has a dedicated and established VAS, which tends to be a hospital-wide service (90%), rather than departmental (10%). Out of those, 85% have a comprehensive service, but 15% of those only provide device placement.

The survey showed a variation in provision of vascular access services with some only providing an element of a service. Some had a full VAS, but many have a PICC insertion nurse solely for PICC insertion for the whole organisation. Some Trusts provide a nurse for PICC insertion in oncology only, and the same can be seen in gastroenterology units where there is a PICC nurse for parenteral nutrition. Some NHS Trusts have a consultant anaesthetist or surgeon responsible for placing implantable ports or tunnelled catheters, with renal units often having a separate vascular access team to focus on fistulas and renal catheters only. The true number is difficult to discover as there is no standardised definition.

The survey respondents who reported they did not have a VA service but were the sole vascular access practitioner, said this was due to the perceived cost of running such a service. Staff also pointed to a lack of engagement or understanding from hospital board members and senior management as to the necessity for such a service.

Experiences from dedicated VASTs were generally positive, with some acknowledgement of the pressures their teams are under because of high demand.

When NIVAS members were asked whether they considered the national training materials available to them related to vascular access services to be sufficient, the majority of respondents (51%) said they did not. This indicates a need for more resources to aid the training of VAST staff. This group of respondents stated that specialist training, academic qualifications, and national guidelines (as opposed to hospital-led) would be useful recommendations in driving service improvement. In addition, some respondents highlighted that more online training would be useful in reducing staffing pressures and making VAST resources more sufficient.

When prompted, 94% agreed that a national service specification for VAST could help reduce national and regional variation in the system.

Other key results from the survey:

Technology:

- NIVAS members indicated a strong presence of technology assisted vascular access insertion (91% of respondents) most frequently highlighting ultrasound, Sherlock 3CG™ Tip Guidance System (supported by NICE Medical Technology Guidance) and Electrocardiograph (ECG placement) tip placement systems

- There appears to be high adoption of guidelines (Epic 3, Royal College of Nursing (RCN), Infusion Nurses Society (INS), NICE, Centres for Disease Control and Prevention (CDC) to inform practice with 80% of respondents stating this is the case at their Trust. However, a 52% majority acknowledged a lack of consistency in applying the Royal Nursing “standards for infusion therapy” across Trusts.

- Two thirds of respondents (64%) said they considered their VAST to be multidisciplinary, but 44% of respondents say their Trust does not have an efficient staffing mix set up, and a 52% majority said that there are certain positions that are challenging to fill.

Staffing challenges:

- Almost half of respondents (44%) say there is not an efficient mixing of staff in the VAS team and one third of respondents (36%) say they are not part of a multidisciplinary VAS. This demonstrates the need for best practice to aid Trusts in restructuring staff to make service improvements.

Audit:

- Catheter complications are not routinely captured across all Trusts, for every type of vascular access. This does not allow hospitals to capture clinical outcomes and demonstrate quality initiatives to improve patient safety.

Patient experience:

- 64% of respondents state they do not measure patient experience in vascular access at their Trust. Looking at the minority that do, it tends to be carried out through friends/ family surveys or patient feedback forms.
- A significant majority of 94% of respondents believed that specific guidelines for vascular access service could also lead to a reduction in waiting times and infection rates.

The results of the NIVAS survey were not a surprise. NIVAS is working to develop a national qualification for vascular access and national guidelines to help services standardise care, maintenance and dealing with complications to improve patient safety. Work has started on both these workstreams. However, progress has been hindered due to the increased clinical pressures from the pandemic.

Evidence and case studies to support the case for a dedicated Vascular Access Service Teams

The variability in provision of VASTs to support the delivery of intravenous therapy means patients may not get the right device at the right time. This can impact patient experience and efficiency of the NHS.

The RCN Guidelines[61] standard states that:

"All NHS acute service providers should consider the establishment of a Vascular Access Service (VAS) to enable health care providers to meet the requirements of national standards of care associated with VAD."

Ultimately, we want to be able to empower patients, so they can make informed choices. We need to make people aware there is a choice. A study at Weston Park Hospital describes a service improvement project that offered patients with breast cancer who required vesicant chemotherapy a choice between a PICC and a cannula as early in their treatment pathway as possible[62]. The patients were supported in making their choices by a multidisciplinary team approach. Evaluation of the project showed that patients had an overwhelming preference for PICCs and that this has improved their experience of care and potentially reduced the risk of complications associated with cannula-administered vesicant chemotherapy.

In 2015 NICE evaluated technology specifically for placement of peripherally inserted central catheters at the bedside[63]. This technology supports the move from a traditional anaesthetic/IR placement model to a comprehensive nurse or other registered Health Care Practitioner (HCP) led VAS. NICE stated use of the technology, which can be used at patient's bedside, provided benefits to patients, staff and the NHS compared with placement in theatres or radiology. During the evaluation NICE consulted with multiple NHS organisations who had experience in use of the technology for PICC placement.

NICE[64] looked at a Quality Innovation Productivity and Prevention Programme (QIPP) case study at Leicester Royal Infirmary. This reported the impact of a central nurse-led vascular

access team. The drivers to create the team included: the variability in infection control practice, a lack of training for junior staff, blocking of anaesthetic emergency theatre list, and device failure complications.

It found that the new service helped to address these issues. They saw an improvement in device choice and an increase in cost savings due to reduced bed stays, reduced infection rates and reduced repetition of work.

As a minimum, a standard five-day vascular access service for a 700-bed hospital, would need at least two Band 7 specialist nurses (or other Band 7 HCPs such as radiographers or operating department practitioners (ODPs)), and an unregistered clinical assistant (and 3 or 4).

There is overwhelming evidence to prove that a VAST is well aligned to enable acute Trusts to meet the following points found within the NHS Long Term Plan[65]:

- **Boost out of hospital care.** A VAST is integral to home IV therapy or outpatient parenteral antimicrobial therapy services.
- **More options, better support and properly joined up care at the right time in the optimal care setting.** A VAST can ensure optimal IV therapy care and enable faster diagnostics for patients who have difficult to access veins where ultrasound is required for taking bloods or placing IV devices.
- **Same Day Emergency Care (SDEC) rolled out across all acute hospital increasing the proportion of acute admissions typically discharged on day of attendance from 1/5 to 1/3, all hospitals with major A&E to have SDEC seven days a week, 12 hours per day.** A seven-day VAST has been shown to improve safety and patient satisfaction in the author's Trust, a seven-day VAST enables continuous IV therapy care which ensures IV therapy regimes are affective, and length of stay is not increased due to delays in IV therapy.
- **NHS will redesign and reduce pressure on emergency hospital services.** A VAST can support elective services and community services to enable IV therapy to be given more effectively in non-acute settings.
- **Aim to reduce delayed transfer of care.** A VAST can reduce delays in IV therapy and support transfers of care while the patient is still receiving IV therapy, to community and rehab settings and can support day unit services.

Any Trust setting up a dedicated VAST is a positive move to improve patient care and safety, an ambition to provide a seven-day service should be the next step. A seven-day service, for a single hospital site with approximately 700 beds, would require three Band 7 specialist nurses working 12-hour shifts, with support from Band 3 or 4 unregistered clinical assistants. A multi-site trust wanting to provide a 12 hour a day, seven days a week service would need six Band 7 specialist nurses (or other HCPs) with Band 3 or 4 unregistered clinical assistant support and a senior Band 8 nurse / HCP to lead the service. This is based on the Frimley Health NHS Foundation Trust VAST model.

The Frimley Health NHS Foundation Trust VAST

In 2009 I was a Band 7 clinical nurse specialist in IV therapy. I started placing PICCs in the interventional radiology unit using ultrasound and fluoroscopy. The service was set up to reduce the wait for patients who required a PICC for chemotherapy and parenteral nutrition and who at that time were waiting two weeks. Once the nurse led service began the wait reduced to 48 hours. In the beginning the nurse led PICC service operated with a single operator three mornings a week and I was placing 300 PICCs a year.

The service quickly grew to include overseeing the Trust's IV therapy, venepuncture, and cannulation training for all nurses alongside the practice development team. Within six months the PICC service moved out of interventional radiology to a nurse-led service at the patient bedside using ultrasound and chest X-ray to confirm placement.

In 2013 the nurse led PICC service formally became the Vascular Access Service, still operated by one person, placing PICCs at the bedside, using innovative catheter tip navigation and ECG PICC tip confirmation technology. Adopting a navigation system with ECG confirmation for PICCs ensured the PICC tip was in the optimal position. Using this system reduces malpositions to virtually zero and confirmation that the PICC can be used at the point of insertion saves time and money. ECG tip confirmation has become a standard of care which has been adopted by many PICC placers in the NHS.

The VAS also offered ultrasound cannulation for difficult IV access patients. The service continued to grow and in 2015 I was promoted to an advanced nurse practitioner Band 8a. An additional clinical nurse practitioner role Band 7 for vascular access was created to support the growing service. Following the merger of Frimley Park Hospital and Wexham Park and Heatherwood Hospitals, the nurse led vascular access service changed. It became two teams of Band 7 clinical nurse specialists in vascular access, one WTE at the Frimley site and 1.6 WTE at the Wexham site with me overseeing the service and undertaking advanced insertion practice. The vascular access services operated Monday to Friday 8am until 5pm.

The service has continued to grow to what it is today. A dynamic nurse led service that places all vascular access devices including PICC, port and tunnelled catheters. The service continues to provide support to the training of all staff in the delivery of IV therapy, venepuncture, and cannulation. All devices are placed with technology including magnetic tip navigation and ECG for PICC tip confirmation.

The service has evolved and is now part of the Intravenous and Vascular Access Service (IVAS) unit, a dedicated department in the Trust which includes the home IV therapy service, OPAT, the VAST and a new 22 chaired infusion unit and an international vascular access training service. Over the past two years, driven by the pandemic, the service now provides a seven-day service 8am until 8pm. The team has also grown. It is now a team of seven working across the different sites. The infusion and OPAT teams also participate in advanced vascular access.

Keeping all the services involved in IV therapy and vascular access has multiple benefits. The day unit allows patients to be seen as outpatients and they can be referred in by GPs. This is

not just for infusions but also if a patient has difficult IV access, needs a blood test or a cannula for an outpatient CT appointment, they can drop into the unit. The inpatient vascular access service being present and available to all clinical areas every day has been very successful and the service use has increased exponentially since 2019.

To set up a successful service, requires a solid business case and buy-in from senior clinical and non-clinical leadership. It is important to identify members of staff who can be 'champions' within the Trust, to drive the adoption of a VAST. These advocates could include the director of nursing and the infection control lead – both of whom will be focused on patient safety.

For a business case to be successful, it needs to detail the problems which can be alleviated for the organisation, through implementing a VAST (see Appendix 2 Frimley case study).

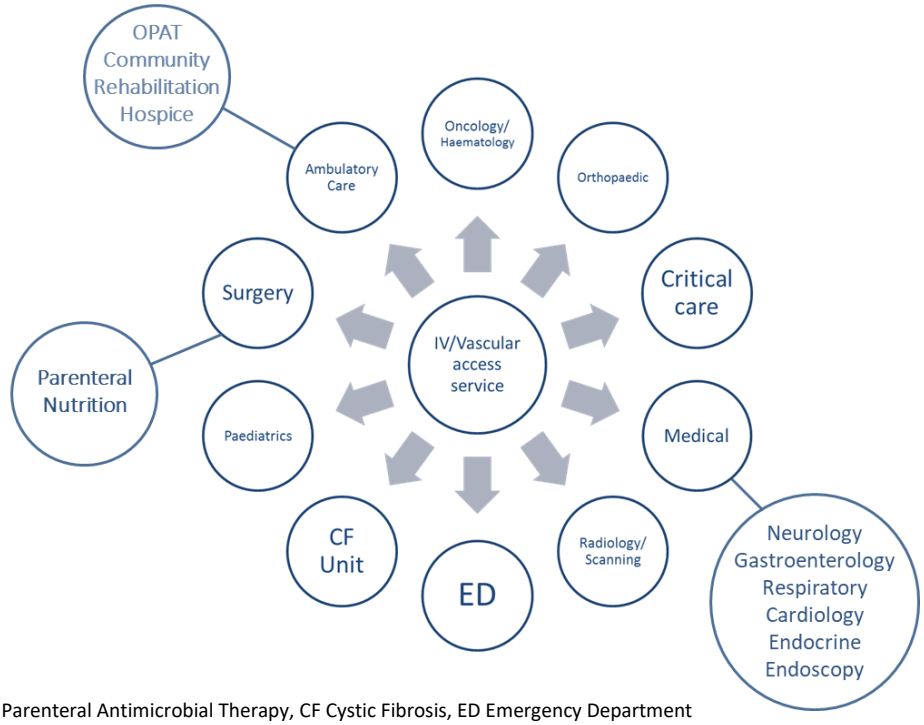
The IVAS at the Trust has the following aims and intentions:

- Four services working together to standardise care
- Prevent unnecessary use of IV therapy and vascular access devices
- Facilitate early discharge with IV therapy and admission avoidance wherever possible
- Prevent infection associated with vascular access devices
- Promote vessel health and preservation
- Maintain patient safety and learn from past incidents
- Improve patient experience, listen and act on feedback
- Utilise the most up to date evidence and technology
- Be a leading, model service in the UK and around the world.

The VAST now delivers the following:

- Vessel health and preservation assessment
- Device insertion
- Procurement
- Training delivery
- Competency assessment
- Governance, practice guidelines, and policy making
- Research and practice development
- Complication management
- Care and maintenance
- Safety operating guidelines
- Insertion training
- Standardising organisational practice
- Incident reviews
- Audit and surveillance

The VAST supports the following clinical areas:



OPAT Outpatient Parenteral Antimicrobial Therapy, CF Cystic Fibrosis, ED Emergency Department

The experience at Frimley clearly demonstrates improved efficiency (from both the practitioner's, and the patient's perspective) in terms of patient flow and waiting times. Frimley is not alone in this success. Other NHS Trusts which have invested in a VAST have had similar successes. In Appendix 2 you can see other examples from the NIVAS board members.

Patient safety is bolstered as the patient is at the centre of this model; with best practice focused on the right patient, right device, right time, right inserter.

While there can be some identifiable savings from vascular access teams, it can sometimes be harder to quantify all the benefits in cost savings alone. Other benefits include improvements in patient safety and satisfaction, and patients not having to undergo repeated attempts to insert a vascular catheter.

Infection rates and other complications in patients with IV catheters (which can be costly to the NHS) may drop once an experienced VAST is in place.

Topics to consider ahead of implementing a VAST

- Discussion will be needed around best practice, competence, training of medics, and out of hours cover.
- Upfront investment will be needed in people, technology, and space.
- Changes in culture. NIVAS is aware how busy clinical teams are. Clinical conservatism can make it challenging to consider change, despite potentially high levels of nurse empowerment in this area.
- Current practice. VAST developments are still not seen as priority within NHS Trusts

- Supporting drivers within the NHS Long Term Plan. Reduce the practice of using IR and anaesthetists to do procedures when this could be led by other HCPs.

Conclusion and recommendations

A comprehensive vascular access service encompasses assessment, placement, management and surveillance of patients and devices used. It also includes training of HCPs which adheres to local, national, and international guidelines.

The NIVAS survey has highlighted the inequity in provision of vascular access across NHS England ranging from comprehensive, to device placement only, to completely ad-hoc services by different hospital departments.

This can lead to variable waiting times for a patient for example, zero to five days. For the patient, this can delay the implementation of their IV therapy impacting their individual pathway. For the NHS, the delay in discharge of patients increases bed days and impacts the patient flow through the hospital.

University Hospital Southampton NHS Foundation Trust published its experience of setting up an HCP led service, transferring the placement of PICCs from radiology to bedside which reduced the time that patients waited for PICC placement from 5.9 days to 1.5 days[66]. Other key drivers were to avoid transferring clinically unstable critical care patients to fluoroscopy and to reduce requirement for emergency acute central venous catheters for difficult intravenous access patients. Their experience gained them a highly commended award at the NICE shared learnings annual awards[67].

NIVAS final recommendations and call to action

- NHS England to implement standardised vascular access provision across the whole NHS with ringfenced funding.
- NHS England to conduct its own national survey to understand fully the vascular access provision within all Trusts. This survey needs to provide complete information on current practice and impact on patients, staff, the Trust, and the wider integrated care systems (ICS).
- NHS England to support NIVAS in creating a national standardised training programme for vascular access.
- NHS England to support the creation of academically recognised professional qualifications for training in vascular access and establish a career pathway to include recognition of qualifications.
- Vascular access to be recognised as an essential specialist discipline with agreed national key performance indicators.
- Recording and reporting of all complications associated with vascular access to be mandatory.

NHS England has an opportunity to help shape healthcare in a way that will help patients now and in the future. Pressure on the NHS workforce will be alleviated, and a standardised training programme will support retention and career progression.

To say ‘change is too hard’ is now null and void. In the last two years the NHS, with support, has demonstrated it can change at pace when needed. We need to do more. Patients need us to do more. Creating a nationwide vascular access service will improve outcomes and make the patient experience less arduous.

NIVAS presents this white paper to NHS England and will offer its support in the next steps to gather data and opinion.

Appendix 1

Roundtable: Ensuring safe vascular access

(https://guides.hsj.co.uk/5921.guide)

Written by **Alison Moore HSJ 2021**

Specialised teams can help to better organise vascular access and enhance patient safety, an HSJ roundtable heard.

Ensuring safe vascular access is a fundamental part of the care of many hospital patients with up to 90% of inpatients requiring intravenous access for delivery of fluids and medication or blood sampling.

Historically vascular access has been carried out by anaesthetists, radiologists and medical consultants. But an *HSJ* roundtable heard that introducing specialist teams to assess patients for vascular access, and then insert, care, and maintain devices has many advantages from both an organisational perspective and that of the patient.

Chapter 1

A comprehensive service

Roundtable Panel

Claire Read, *HSJ* – chair
Giles Maskell, consultant radiologist the Royal Cornwall Hospitals Trust and former president of the Royal College of Radiologists
Andrew Barton, nurse consultant, Frimley Health Foundation Trust and chair of the National Infusion and Vascular Access Society
Adam Wolverson, clinical director for theatres, anaesthesia, and critical care at United Lincolnshire Hospitals Trust
Clare Culpin, group medical governance director at Spire Healthcare (attending in a personal capacity)
Carolyn Wheatley, executive committee member of Patients on Intravenous and Nasogastric Nutrition
Claire James, Macmillan lead chemotherapy nurse and clinical matron at Frimley Health Foundation Trust

Radiologist Giles Maskell, from the Royal Cornwall Hospitals Trust, said: “In my view this is an area of clinical practice which has been ripe for professionalisation. I don’t think a modern hospital should function without a vascular access team. It is a central part of hospital services and also extending out into the community to help patients get out of hospitals or stay in their home.”

Yet at the moment not all hospitals have vascular access teams providing a comprehensive service. Andrew Barton, a nurse consultant at Frimley Health Foundation Trust and chair of

the National Infusion and Vascular Access Society, said NIVAS's membership included about 90 teams. But what services were provided differed between teams.

The cost factor

But, with trusts strapped for cash, a case often has to be made for investment in such services. "It is always the funding that is the problem. There is a large investment needed in the first place," he said. Measuring the difference that services made was also important.

Luckily, vascular access services can impact on safety, infection rates and length of stay which can be cash-releasing, he added. "All of these are impacted by vascular access services and that is where the money comes from. "

But issues around patient experience and safety could also be a driver for board members such as directors of nursing to get engaged, he said. He advised anyone wanting to set up a service to go through previous clinical incidents and find cases where there was no vascular access or poor vascular access. Often these would have had a severe impact on the patient.

In the US, the monitoring of vascular access catheter-related sepsis – which can be devastating for the patient as well as costly for the health system – had been an important driver of change, said Dr Maskell. "The way that things were improved in the States and the way that things will probably eventually be improved here is by counting and publicising rates of infections. My strong suspicion is that only when we will do that at a national level will we start to see the funding required," he said.

Adam Wolverson, clinical director for theatres, anaesthesia and critical care at United Lincolnshire Hospitals Trust, said a lot of work had been done on the impact on this in ICU, which can result in "huge" costs – quoted at anything from £2000 to £30,000 for the cost of a single patient with an infection. "Your specialist vascular access team don't have to prevent many catheter-related bloodstream infections to pay for themselves," he added. "The cost for patients is huge but even if you can't justify your service on those grounds, then you may be able to justify it on cost grounds."

But what practitioners are needed to set up a service? Clare Culpin, a former NHS executive who now works in the private sector, said her experience of setting up IV services in the NHS was that advanced nurse practitioners could be used to provide vascular access services. "There was overwhelming evidence that advanced practitioners specific to this care was the most effective – including cost effective," she said.

The current emergency care agenda did offer an opportunity to move forward on this agenda, and the "balanced scorecard" approach used in NHS organisations had helped in putting forward business cases and service redesign cases, she said.

Providing care closer to home was another driver – for example, outpatient parenteral therapy could be a way of avoiding patients being admitted to hospital in the first place.

An experience

For some patients, a vascular access procedure will set the tone for their whole experience in hospital, said Carolyn Wheatley, an executive committee member of Patients on Intravenous and Nasogastric Nutrition. Failing to get the right access adds to delay in treatments, she said: "If someone is really dehydrated, that could be six to seven attempts by several people. That patient may be sitting there for two to three days until someone gets a line in." There was a cost in this delayed appropriate treatment which could mean the patient staying in hospital, she added.

"Long-term patients going into hospital in need of vascular access for lots of different reasons sometimes have a good experience, and sometimes it is not so good. Many have difficult access. Having access to a knowledgeable skilled team is certainly better for the patient's experience and that's what we would like to see more access to," she said.

And in extreme cases patients can even turn down treatment because of their previous poor experience of vascular access. Claire James, Macmillan lead chemotherapy nurse and clinical matron at Frimley Health Foundation Trust, said she had had patients reject lifesaving chemotherapy because of this. Patient safety was a huge driver around vascular access in oncology: extravasation during chemotherapy – where the [toxic] liquid is released into the subcutaneous tissue or subdermal tissues – can be "catastrophic," she said.

But the covid crisis may have created new opportunities for specialist teams to demonstrate their value. For example, Frimley's chemotherapy services have enabled many chemotherapy patients to be treated away from the acute site, reducing the risk of coming into contact with covid positive cases. Ms James said: "Covid is not going away. We have to work with covid now and it is about empowering the community teams."

She added there was a role for vascular access services in keeping patients safe while covid persisted but ensuring that they received the same quality of treatment as they could in an acute setting.

Mr Barton's vascular access team has also operated 8am to 8pm during the covid pandemic, seven days a week and has expanded from two vascular access nurses to six: he is now developing a business case to keep them. "It's made a massive difference to ITU, level ones [the wards], A&E and the community. We are taking the pressure off the anaesthetists and the A&E doctors," he said.

And both Dr Wolverson and Dr Maskell agreed covid has also shown the need for a vascular access service. "To all of us it is self-evident that in terms of patient safety, patient experience and cost savings we can't see why it has not happened already," said Dr Maskell.

One size fits all?

Standardisation of what a vascular access team looks like would be challenging in the NHS with its wide range of hospitals of different sizes. But there could be a case for some standardisation.

“We are not going to be able to deliver the same model in all organisations, regardless of size,” said Dr Wolverson. Small organisations would have specialist practitioners who did not use their skills very much, he warned, and there could even be worries about whether they could maintain them.

Aiming for the definition of standards of what a service should deliver and then some freedom around how they were delivered in particular situations would be the right way ahead, he said. Mr Barton agreed that it was not about a specific rigid model of vascular access but said it was important to have someone in the organisation who oversaw the service.

Ms Wheatley would welcome specifications for services but said it was often necessary to work with the resources available in any location and find ways to bring about improvement. “It is not about the process, it is about the output,” she said.

There are many different models of vascular access, and the vascular access team is often separate from other clinical teams. However, in Cornwall vascular access services are integrated with the radiology team. Dr Maskell said there were several advantages of this, including starting with a readymade team around the service when it was first set up. The vascular access service also gave another opportunity for development and career advancement for interventional radiology nurses, who could be hard to recruit. “It gives the opportunity for people to develop more in other areas such as ultrasound-guided draining of ascites and pleural drainage,” he said.

And the radiology department was well used to balancing demands from different departments – something vascular access teams would also have to do. “It is a model which works well for us, and I would recommend it to others as well,” he said.

Even a hospital with a large vascular access team is unlikely to have a specialist practitioner on duty at 3am on a Sunday when someone comes in as an emergency and swift vascular access is needed. It is, inevitable, therefore that other members of staff will have to do some procedures but because most of the work is done by a specialist team, other staff risk becoming deskilled through doing relatively few of these and may struggle with the more difficult procedures.

Dr Wolverson, who works at a multisite trust, supports vascular access teams but said: “The challenge is to ensure those skills are available 24/7 particularly when you have multiple hospital sites. When we looked at the service, we found it would have been difficult to justify having enough vascular access clinicians on site 24/7 to meet the potential demand. For that, you probably have to rely on other practitioners. It’s about being more imaginative about how we do this.”

Dr Maskell suggested greater use of simulation could help train staff in techniques – and training other professionals was part of the role for the vascular access team.

Vascular access for cancer treatment

The use of central venous access devices in cancer care could improve the patient experience and support improved treatment pathways

Good vascular access is vital for cancer services – many patients need regular access for chemotherapy and other cancer drugs, as well as for taking bloods. How that access is gained will be important for the patient experience as well as safety and the smooth running of oncology services.

Lisa Barrott, a board member of the UK Oncology Nursing Society, says there can be issues with chemotherapy drugs delivered intravenously: some of these very toxic drugs can be extremely irritating to veins and there can also be a risk of extravasation – where the medication gets into the tissues surrounding the insertion site.

“There is always the risk that when you put a line into the vein, the vein is damaged, and the drug gets into the surrounding tissues. With some chemotherapy drugs, which have the potential to cause significant local damage to the skin and underlying structures,” says Ms Barrott, Macmillan nurse and allied health professional lead for cancer, specialist palliative and end of life care at Western Sussex Hospitals Foundation Trust – now part of University Hospitals Sussex FT. “In some cases, referral to plastic surgery services is required.

“You also have the issue that many patients are having treatment regularly over a period of months, with regular cannulation being required; some may also need a small portable pump attached containing chemotherapy to be delivered over 48 hours. Regular cannulation and treatment via a peripheral route can be detrimental to vein health and lead to increasing difficulty in obtaining access; while ambulatory pumps cannot be administered via peripheral cannulas” she says. Patients can find regular cannulation distressing and painful and where access is difficult, several attempts to gain access may be required leading to delays in starting treatment.

‘Not all patients may be suitable for a central device, so specialist review and discussion with the patient is a key part of the decision process’

Some patients, such as those following surgery for breast cancer, may also be limited to which arm can be used for cannulation, as most guidance advises using the opposite limb to the side where surgery took place. This further limit the veins that can be used for treatment.

For all of these reasons, many cancer patients will be offered the choice of a central line – generally a peripherally inserted central catheter. It has a number of advantages

over a cannula, including giving long term access for treatment and the regular blood tests needed before each chemotherapy appointment. It also removes the need for regular cannulation. Some patients may be offered an implanted venous access device (port) which provides the same access and advantages as a PICC, but sits under the skin, usually in the chest, and sometimes in the arm.

Most PICC’S are inserted by specialist vascular access nurses, while ports may require interventional radiology or an anesthetist to place them: they also usually require sedation to be administered for the procedure.

“There are several things that need to be considered regarding vascular access before a patient starts systemic treatment for cancer,” continues Ms Barrott. “The type of treatment

a patient will be having, how often it is to be administered and for how long, and whether an ambulatory pump will need to be attached, should all be taken into consideration, as well as a review of the patient's veins. Also, previous treatment with chemotherapy may have affected the patient's vein health and is another reason to consider a central device.

"Patient preference is also very important to consider; not all are keen to have a long-term device placed as it requires regular care and for PICC lines can be visible as it sits in the arm. Also, not all patients may be suitable for a central device, so specialist review and discussion with the patient is a key part of the decision process."

PICC lines require regular flushing to help prevent blood clot formation and a weekly dressing change to the insertion site; the site should also be assessed regularly for any signs of infection or clot formation. During the covid-19 pandemic, some cancer center's developed pathways to support a carer or relative to provide this care between treatments to help reduce the need to visit the hospital. However, some cancer patients had treatments paused or altered and many clinical trials were also put on hold, balancing the importance of treatment with the risk of contracting covid-19 in this vulnerable patient group has been challenging.

Central venous access devices should stop the need to cannulate patients or take peripheral blood tests, but not all clinical staff outside cancer services are used to managing them, which can lead to distress for patients when attending for unplanned care. "It is important that specialist teams do everything they can to support their colleagues in areas such as emergency and primary care by providing information and education around the management of PICCs and ports," says Ms Barrott. "Overall, the use of central venous access devices in cancer care has improved the patient experience and supported improved treatment pathways."

Making a case for dedicated vascular access teams

"Greater standardisation and ultimately accreditation of specialised vascular access teams would ensure a basic level of competency and quality of care, argues one of its champions".

Many trusts have tussled with the challenge of how to provide reliable and safe vascular access services to their patients. Increasingly, they are deciding dedicated vascular access teams are the way to go.

Andrew Barton, chair of the National Infusion and Vascular Access Society and a nurse consultant at Frimley Health Foundation Trust, says such teams can contribute to patient safety and infection prevention and control, as well as reducing length of stay for patients. Making a case for investment in such a team will start with understanding what the need for it is and what problems it can resolve or alleviate for the trust concerned.

Identifying "champions" within the organisation can be important in getting the case for a vascular access team accepted. These can include the director of nursing and the infection control lead – both of whom will be concerned about patient safety. Radiology departments

may also be worried about the demands vascular access is putting on them and the difficulties in providing timely access for patients: a dedicated team can reduce those.

Identifying staff

But in a cash-strapped environment a compelling business case may be necessary to get the investment needed. Establishing a team of, say, four band seven specialist nurses to run a service without weekend cover can cost up to £300,000 a year.

While there can be some identifiable savings from vascular access teams, it can sometimes be harder to quantify all of the benefits in cost savings alone – such as the improvements in patient safety and satisfaction or patients not having to undergo repeated attempts to insert a line.

And outcomes such as reduced length of stay can be measured but are often due to a number of factors and it can be hard to untangle what is due to the vascular access team. However, infections rates and other complications in patients with IV catheters – which may drop once an experienced vascular access team is in place - can be measured.

But how many staff members are needed to establish a vascular access team? At its most basic at least two band seven specialist nurses to provide a nurse led peripheral inserted central catheter service and an unregistered clinical assistant to do basic cannulation. Also, database administration will be needed to provide a daytime five days a week service in a 700 bedded hospital, Mr Barton suggests. To make this seven days a week will need at least three band seven specialist nurse, with unregistered clinical assistants supporting a band three or four.

“If NICE were to produce specific guidance on vascular access teams, this would drive standardisation and make the UK a leader in this field”.

A multi-site trust wanting to provide a 12 hour a day, seven days a week, service would need six band seven specialist nurses with band 3 or 4 unregistered clinical assistant support and a senior nurse band 8 or above to lead the service, he says. This is the model currently in use in Frimley Health Foundation Trust, where the covid pandemic has led to extended hours and extra staff for the service with great success.

Such a team will carry out a number of in-hospital procedures – dependent on what services the trust provides - but may also work with community teams to provide services outside the acute sector or limit the time patients have to spend in it: during the covid pandemic, this has been particularly important as it reduces risks to the patient.

But the team’s impact will be more than just providing hands on care. It is likely to be involved in, for example, procurement decisions over IV catheters and other IV devices. Mr Barton believes that standardisation of which devices are used within a trust can enhance safety and this is more likely to happen in trusts with vascular access teams who can lead this. And the team will provide governance over who does what procedure.

Currently there is no standardisation of what a vascular access team does or who it is made up of. There is enormous variety in the work such teams take on, depending on the trust they are based in and the services it provides. Some teams will take on oncology or renal access, for example, or deliver a paediatric service in addition to that for adults.

Exactly what is delivered may also depend on the skills and grades of staff available. Mr Barton suggests that PICC placement will require band seven specialist nurses, with insertion guided by ultrasound at the bedside, for example.

In the long run, NIVAS would like to see greater standardisation and ultimately accreditation of such teams to ensure a basic level of competency and quality of care. If NICE were to produce specific guidance on vascular access teams, that would drive standardisation and make the UK a leader in this field, Mr Barton suggests.

A survey by NIVAS has revealed enormous variation in vascular access services across the NHS.

A third of the 59 members who responded to its survey in 2020 said their trust did not have a dedicated vascular access service, mainly due to cost and a lack of understanding of what such services provide. The patient groups most commonly offered VAS were oncology, haematology and critical care patients. However, nearly two thirds said they did not measure patient experience and a majority said their trust did not record data on complications in using catheters.

Nearly half felt there was not an efficient mixing of staff in the VAS team and over a third said they were not part of a multidisciplinary team. There was a high variance in team size and professional expertise between trusts. Ninety-four per cent of responders felt a national service specification could help reduce variation.

While most services adopted guidelines, just over half of responders said there was a lack of consistency in using the Royal College of Nursing infusion therapy guidelines.

A good patient experience

The advantages of a specialist team responsible for vascular access include better workflow with increased efficiency, reduction in infection rates, improved patient outcomes and quality of care

Why the future of vascular access services is at the heart of a good patient experience

BD was delighted to support the *HSJ* roundtable looking at the importance of dedicated vascular access services in future healthcare.

NHS leaders and patient representatives participated, including Andrew Barton, chair of the National Infusion and Vascular Access Society (NIVAS), and Carolyn Wheatley, chair of Patients on Intravenous & Nasogastric Nutrition Therapy (PINNT).

There were different perspectives, yet the panel agreed that reliable vascular access and patient trust is vital for patient care.

The advantages of a specialist team responsible for vascular access are numerous including better workflow with increased efficiency, reduction in infection rates, improved patient outcomes and quality of care.

Why have a dedicated team?

More than 90 per cent of patients admitted to hospital need Intravenous (IV) access, a crucial component of patient care.

Peripheral vascular access device insertion is routinely carried out by nurses and junior doctors. In the absence of a vascular access team, placement of difficult peripheral access and central vascular devices remains the responsibility of anaesthetists, radiologists and other medical consultants. This is often in addition to their other duties and can lead to significant delays for patients before the device is placed and IV treatment started.

NIVAS Survey

In August 2020 a NIVAS survey of its members found over 30 per cent of the 59 respondents did not have a dedicated vascular access service which included the proper advanced knowledge of vascular access, and the right skills to assess correct insertion, as well as care and maintenance of devices.

The current landscape

Radiology services in the NHS are under pressure due to growth in demand for imaging and diagnostic procedures and increased workforce shortages. Transferring routine vascular access insertion from radiology reduces pressure on radiology.

A dedicated vascular access service can release theatre capacity helping to clear surgical procedure backlogs exacerbated by the pandemic.

The NHS long-term plan promotes care closer to home and development of Same Day Emergency Care centers, but both are reliant on a robust vascular access service.

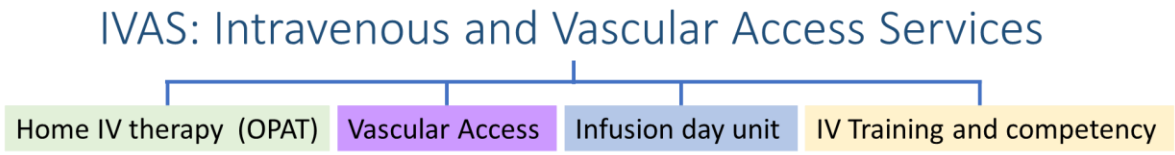
The road to creating a model Vascular Access Team

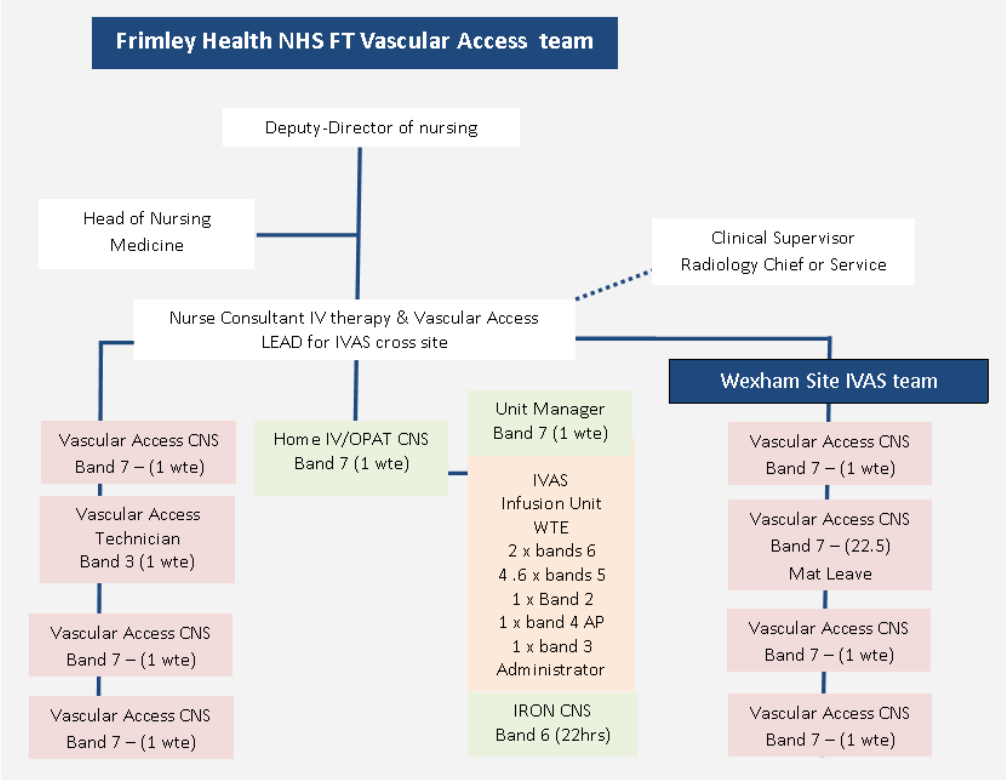
There are understandable challenges. Until there is a national directive, each trust must weigh the potential wins a dedicated team could bring, against the allocation of resources and detailed training required for the teams.

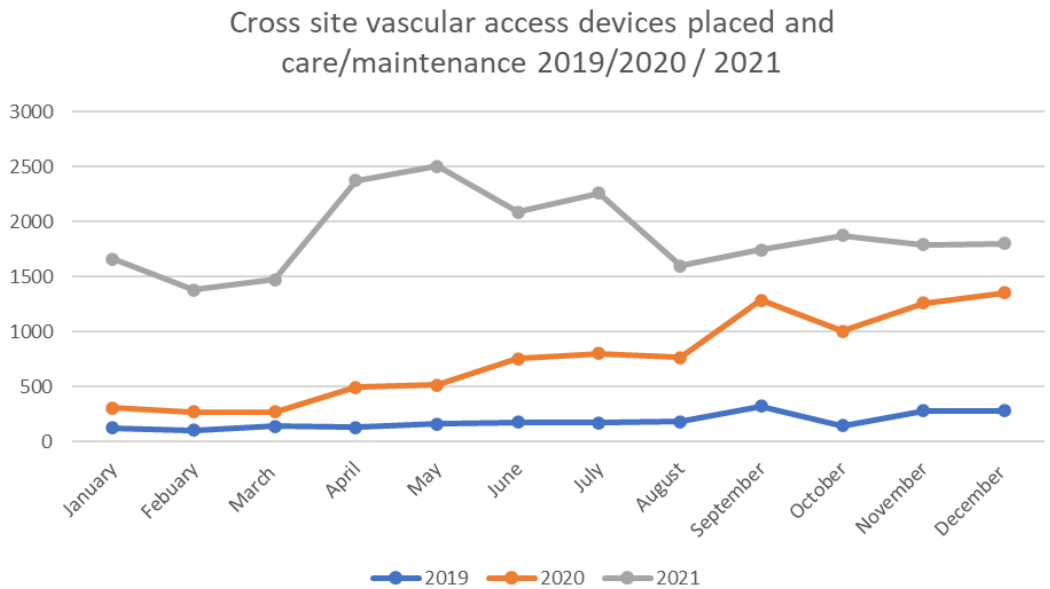
Tony Kirk, country leader UK for BD medication delivery solutions, said: “We have partnered with many trusts and health boards across the UK developing vascular access services and have seen the benefits to patients, staff and hospitals. We continue to share our experience and evidence supporting the evolving NHS as we advance the world of healthcare.”

Appendix 2

Frimley Health NHS Foundation Trust IVAS VAST DATA

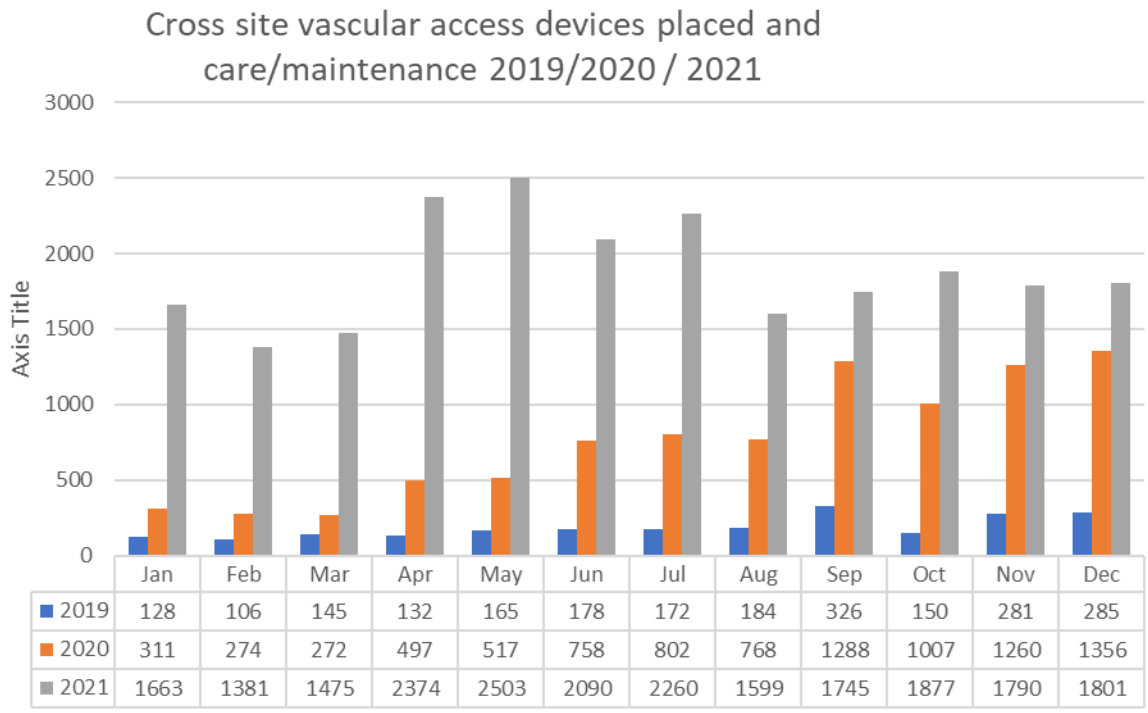




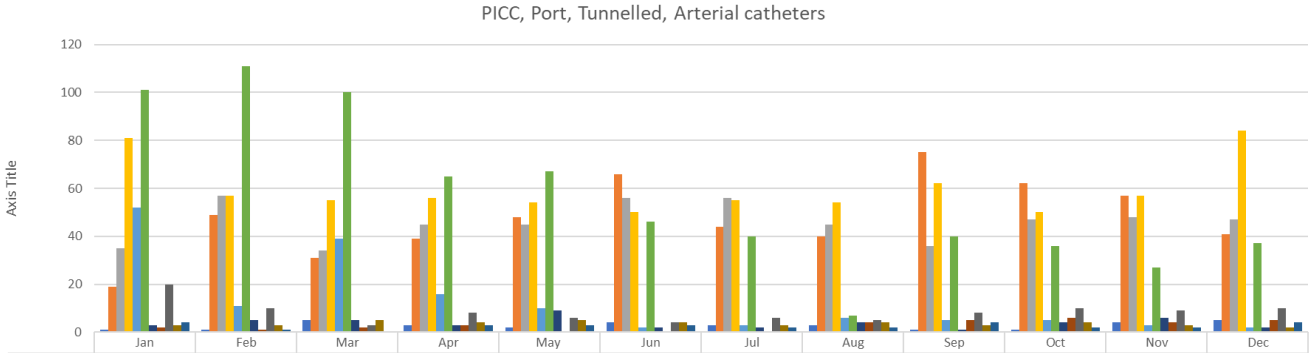


IVAS Vascular Access Service activity

Total number of VADs placed/C&M interactions cross site		
2019	2020	2021
2,252	9,083	22,458

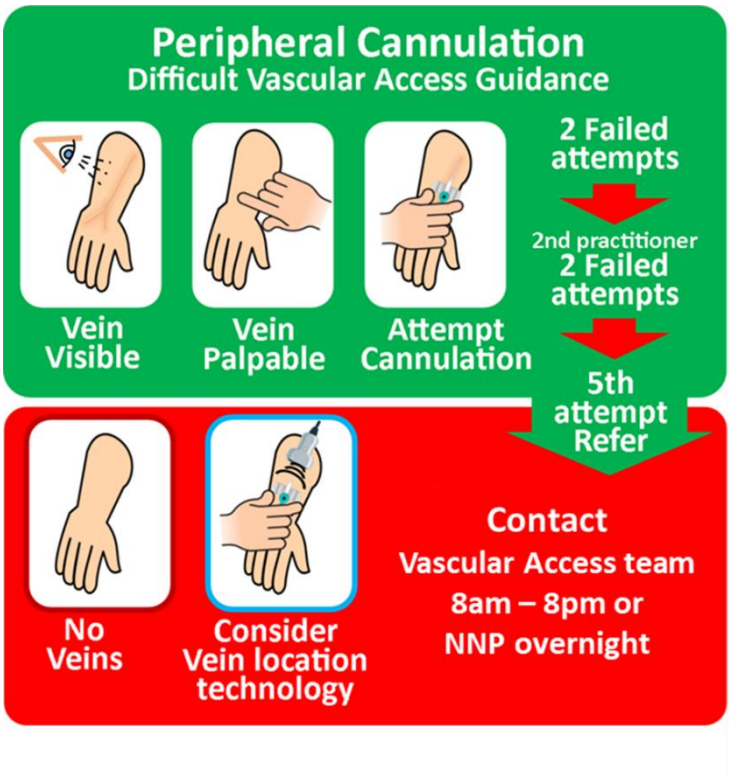


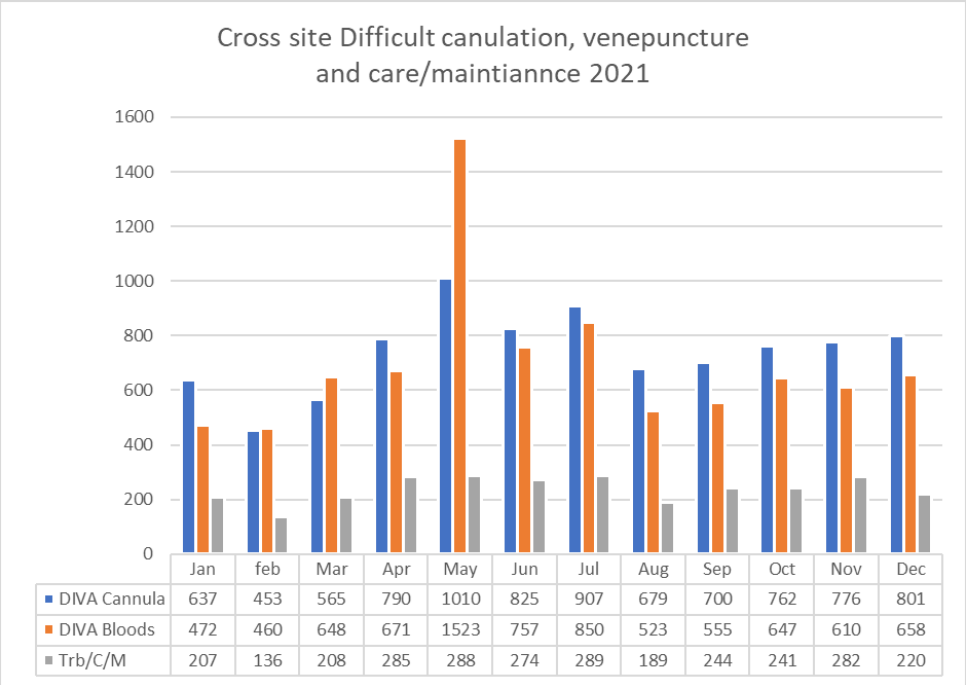
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2019	128	106	145	132	165	178	172	184	326	150	281	285
2020	311	274	272	497	517	758	802	768	1288	1007	1260	1356
2021	1663	1381	1475	2374	2503	2090	2260	1599	1745	1877	1790	1801



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3fr PICC	1	1	5	3	2	4	3	3	1	1	4	5
4fr PICC	19	49	31	39	48	66	44	40	75	62	57	41
5fr db PICC	35	57	34	45	45	56	56	45	36	47	48	47
5fr Trp PICC	81	57	55	56	54	50	55	54	62	50	57	84
Pwrglide	52	11	39	16	10	2	3	6	5	5	3	2
introcan	101	111	100	65	67	46	40	7	40	36	27	37
Grosh MID	3	5	5	3	9	2	2	4	1	4	6	2
STCVC	2	1	2	3	0	0	0	4	5	6	4	5
ArtLine	20	10	3	8	6	4	6	5	8	10	9	10
TIP	3	3	5	4	5	4	3	4	3	4	3	2
Tun Line	4	1	0	3	3	3	2	2	4	2	2	4

Difficult IV access (DIVA) patients are often the group of patients who often suffer the most complications associated with multiple attempts and gaining IV access. A VAST can not only ensure a proper vessel assessment and clinical plan is put in place, they can enable ultrasound to be used as a standard of care for DIVA patients. The Frimley pathway to reduce the number of attempts before referral to the VAST is below, the number of DIVA patients seen in 2021 is also shown here:





	Jan	feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
DIVA Cannula	637	453	565	790	1010	825	907	679	700	762	776	801
DIVA Bloods	472	460	648	671	1523	757	850	523	555	647	610	658
Trb/C/M	207	136	208	285	288	274	289	189	244	241	282	220

Appendix 3

The University Hospitals Plymouth NHS Trust (UHPNT)VAST

UHPNT's vascular access service was initially set up to provide outpatient vascular access device insertion for oncology and haematology patients, a role previously undertaken by a select number of anaesthetists in operating theatres. The team at this time consisted of one Clinical Nurse Specialist who performed PICC and midline insertions, supported by a consultant anaesthetist one afternoon per week who would perform skin-tunneled catheter insertion and removals.

Over the next few years, the success of this service became apparent. In addition, they were asked to undertake procedures for in-patients within the Trust, such as those requiring TPN, long term IV antibiotic therapy or those with difficult IV access issues.

The staffing for the service increased to two Clinical Nurse Specialists to meet this increased demand. At this time the team were performing approximately 90 procedures a month whilst also providing troubleshooting support, training and education and audit work.

With demand increasing, not only in terms of patient numbers but also in patient complexity, the availability of staff competent in advanced procedures became a problem. As wait times for procedures increased, this led to delays in treatment. The team's lead nurse began the process of learning to undertake advanced procedures such as the insertion/removal of skin-tunneled catheters, apheresis catheters and totally implantable venous access devices (TIVADs). The ability to use different approaches for procedures was developed including veins in the neck, chest, and leg. These developments, alongside technological advancements now used by the team, such as ECG tip location devices, trans-thoracic echocardiogram, and ultrasound doppler has meant that any patient referred to the service can receive the treatment or device type they need on any day of the week.

Since proving the team's abilities and the demand required of it, the vascular access service at UHPNT has grown. It now has one Advanced Clinical Practitioner (Band 8), two full time Clinical Nurse Specialists (Band 7), two full time Healthcare Assistants (Band 3) and the support of three consultant anaesthetists who rotate to cover one clinic session a week providing daily cover five days a week.

This staffing level allows the team to operate two teams (one team consists of one specialist supported by an HCA) on at least four days a week with the other team available during the remaining time. The service runs Monday to Friday out of a dedicated procedure room at the Trust. The teams can take on certain procedures in other locations such as ICUs, at ward bedsides, and in operating theatres

The vascular access service at UHPNT now performs 240-250 procedures a month alongside its training and education commitments, audit work and policy and service development.

The team now wants to expand its staffing levels further to move to a six or seven-day service as demand and complexity continues to grow.

Appendix 4

The Broomfield Hospital, part of the Mid and South Essex (MSE) NHS Foundation Trust Vascular Access Service Team

The initial business case submitted by our Consultant Anaesthetist lead was to implement a service within Broomfield Hospital (within the original smaller MEHT Trust). Approval was received in 2012 following an innovation grant from the local Clinical Commissioning Group (CCG).

Within the first year 149 devices were inserted by two seconded Band 6 senior general intensive care unit nurses one day a week. It then grew rapidly year after year with many business cases to increase the staff and provision of equipment. In 2014 a clinical lead joined the team to help with the business case element of the service.

In 2016 the team got final approval to become a fully nurse led service, five days a week with the introduction of Julie Godfrey as the Band 8a consultant nurse and clinical lead. Activity has continued to grow. The larger MSE Trust now provides an OPAT service and PICC service at each site and a more comprehensive vascular access service. There is more to do, and a proposal is underway to ask for the introduction of a nurse led port insertion service which would save the Trust money and provide a more efficient service for all patients requiring the most appropriate device for their chemotherapy.

The numbers of cancer/chemotherapy patients have quadrupled since the service started in 2012 and currently the team is struggling to keep up with demand. A new business case is needed to give the provision to grow the service accordingly.

Vascular services, especially those which are nurse led are not always given the profile they require within the clinical support services of a hospital despite them being integral to a vast number of other services that require patients to have the necessary vascular access for their treatment. This is one more element of service delivery that we strive to overcome with the help of NIVAS.

Appendix 5

The East Kent Hospitals University NHS Foundation Trust VAST

East Kent Hospitals University NHS Foundation Trust (EKHUFT) established a vascular access team in 2010. The team was originally led by a consultant anaesthetist as part of their job plan with a full-time lead nurse who became a nurse consultant over time.

Over the years the service has grown due to demand and demonstrable quality and safety improvements and now consists of 7.2 full time Band 6/7 nurses and 10 Band 3 IV access technicians.

The service is split into two teams:

The first team has qualified nurses who work across the whole of EKHUFT clinical areas leading on the placement and maintenance of all IV access devices including both peripheral and central venous access devices. They place ultrasound guided cannulas, midlines, catheter lines, port-a-caths and arterial lines. The majority of lines are placed on the day of referral and in accordance with the vessel health preservation model. This team also has responsibility for the IV access education and training of all the clinical staff across the whole Trust, the Trust IV access policies, and guidelines and the IV access audits.

This team allows patients to receive TPN on day of referral, and patients to go home on IV therapy meaning there is an improvement in patient experience and timely reliable IV access to administer urgent lifesaving treatments.

The second team mainly has IV access technicians. This team is based in the emergency department, and all are trained in venepuncture and cannulation using ultrasound control. They aim for first time placement even on patients with potentially difficult access. They work closely with the clinical teams based in ED and aim to:

- Ensure blood samples are obtained, processed and results presented to the requesting decision maker as quickly as possible.
- Provide timely, reliable, first time, appropriate venous cannulation, as per national Vessel Health Preservation recommendations, to patients only when necessary and not as a routine procedure.
- Ensure all blood cultures are taken to the appropriate standard, minimising the possibility of contamination.

This team aims to reduce waits in EDs, reduce the cost associated with unnecessary venous cannulation and significantly improve patient experience by ensuring first time cannulation. This team was noted as an area of outstanding practice by the CQC.

Appendix 6

King's College Hospital NHS Foundation Trust Case Study

Jeni Caguioa, previously Lead IV Practitioner (2009-2021), currently International Recruitment and Ethnic Minorities Nurse Advisor, NHS England.

King's College Hospital NHS Foundation Trust, a large teaching hospital in South-East London, started an IV team in October 2009 to improve standards of VAD insertion and care, and to reduce bacteraemia related to IV catheters. This was particularly challenging, as King's College Hospital has

more than seven thousand staff across a wide range of clinical specialties. There are also organisational implications as foundation trust status requires achieving methicillin resistant Staphylococcus aureus (MRSA) bacteraemia targets set by the Department of Health (DH). Half of the MRSA bacteraemia cases for 2010–11 at King's were related to IV devices. The IV team worked on the premise that improving IV standards would lead to a reduction in infection rates and would have a direct positive impact on length of stay, costs, and patient outcomes. The IV team (a team of two) set out to gather baseline audit data in November 2009 about IV device care across the Trust. The following areas were selected for improvement:

- Adherence to basic infection control standards such as hand hygiene, aseptic technique during VAD insertion and ongoing care;
- Documentation of VAD use from insertion through daily care to removal; a need to monitor these procedures and support root cause analysis for catheter-related bloodstream infection;
- Standardisation of IV equipment available to staff. There was a need to standardise to only use evidence-based products and ensure these products were available to clinical staff;
- Standardisation of practice. Different clinical areas had different protocols and procedures in VAD care and insertion;
- Identification of infection control champions in different clinical areas to function as bridges for dissemination of information between the IV team and frontline staff.

In 2009, the National Patient Safety Agency (NPSA) developed a quality improvement project based on Pronovost's model, named Matching Michigan, which was implemented in critical care units across England (NPSA, 2009). Care bundles needed to be strengthened outside the critical care setting as well. The IV team aimed to provide a well-structured educational programme for staff who insert and care for patients with VADs within and beyond critical care. Following discussions with a link lecturer from King's College University, the lead IV practitioner hypothesised that there were common actions that needed to be carried out to ensure that practice was standardised and safe for patients. The lead IV practitioner created the mnemonic and the blueprint for the much-needed trust-wide sustainable education programme. HANDS[68] is:

■ Hand hygiene

■ Antisepsis with 2% chlorhexidine gluconate in 70% isopropyl alcohol

■ Non-touch technique

■ Date on a clear dressing, Daily inspections, Documentation

■ Scrub the hub for 15 seconds and allow to dry.

The IV Team was supported by a network of ward based IV link nurses who were trained to audit and troubleshoot vascular access devices through the delivery of masterclasses. The team worked with the IT department to ensure the documentation of VAD was an ongoing education tool helping to embed the HANDS standards. King's College Hospital NHSFT was among the first trust to have electronic documentation of vascular devices which helped in monitoring data analytic trends related to its use and complications.

Along with this education drive was a trustwide standardisation of IV consumables which helped in the strategy of standardising IV practice for both peripheral and central VADs. In 2013, there was a need to review the current radiology based PICC service provision to ensure that it was responsive to the vascular access needs of patients across the trust. As the team expanded to have another four

staff members, a midline service was added alongside having the IV Practitioners trained by Radiologists to insert PICCs. The emergence of National Institute for Health and Care Excellence (NICE) approved ECG guided technologies for PICC insertion[69] and implementation at Kings College NHSFT has enabled the development of a nurse led service, supported by anaesthetists and radiologists. With provision of a dedicated procedure room the Kings college NHSFT nurse led PICC service was formalised in 2017. Since then, fluoroscopy PICC procedures have declined as the number of ECG guided PICC procedures increased. (Table 1)

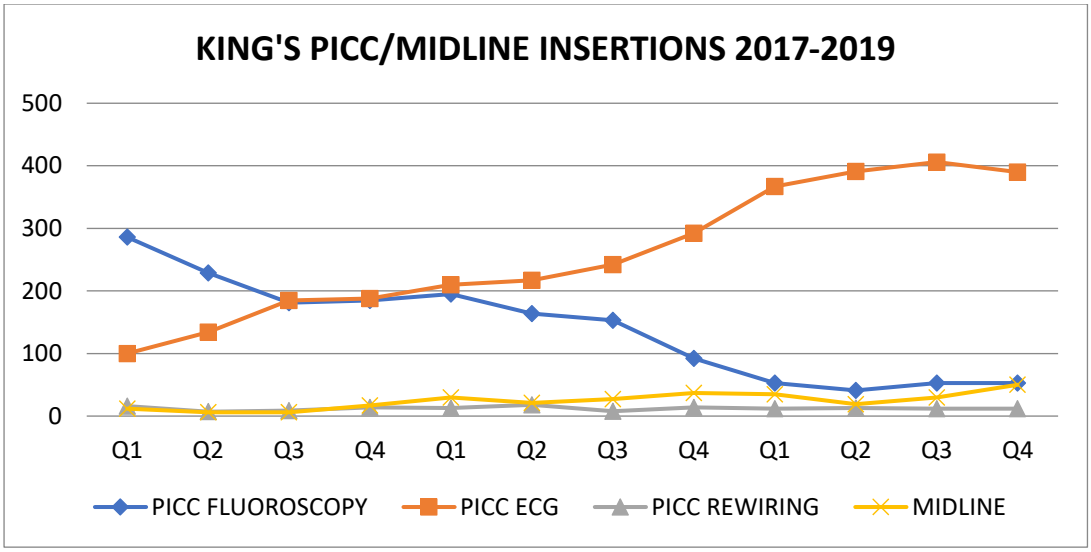


Table 1 Kings College NHS Foundation Trust PICC/Midline insertions

Ref: CRIS Reporting System data analytics for PICC and midline procedures 2017-2019

Along with these developments, came the recognition of the Difficult IV Access (DIVA) Patients and a timely investment of the trust to make available more ultrasound (US) equipment across sites. This has led to a huge increase in US guided cannulation for DIVA pathways in line with the aim of vessel health preservation's aim of right line, right time on the right patient.

A decade later, we now have an established team of eight Vascular Access Nurse Specialists, delivering the specialist service across Trust sites providing education, advice, troubleshooting and timely provision of vascular devices, including two specialists pioneering the Paediatric Vascular Access Service.

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