Vascular Access programme
INFORMATION FOR HEALTHCARE PROFESSIONALS
Roche would like to thank the following contributors who have kindly offered their expertise in developing this programme:

**Authors**

**Clinical Content**

Dr Richard Fluck,
Consultant Nephrologist
Clinical Director Derby Renal Services, Foundation NHS Trust
Member of the Joint Working Party for Vascular Access

Natasha McIntyre
RGN, MSc

Roche would like to thank the Advisory Board Members:-

**Advisory Board Members**

Timothy F Statham OBE, Chief Executive, National Kidney Federation
Marion Higgins, Patient Representative
Michael Scott, Patient Representative
Chris Payne, Patient Representative

Carol Anderson, Advanced Kidney Care Manager; Belinda Dring, Anaemia and Predialysis Nurse Specialist; Lynn Fullerton, Anaemia Nurse Specialist; Helen Hurst, Advanced Nurse Practitioner; Catherine Johnson, Anaemia and Predialysis Sister; Jane Macdonald, Lead Nurse, Renal Services; Kate Taylor, Practice Development Lead; Jackie Waller, Anaemia Co-ordinator; Gillian Wood, Anaemia Co-ordinator
Message from ANSA

The Renal team faces constant challenges in the 21st century; demands on our time have never been higher. In an increasingly busy NHS, there is often an overwhelming feeling that we are all working to our capacity. Patient volume continues to increase, dialysis facilities are overstretched, survival rates improve and early diagnosis means that nephrology nurses’ responsibilities are extended even further.

With few exceptions, the more information and preparation provided to our patients the better they are able to adjust to changes in lifestyle imposed by renal replacement therapies. However the NHS Institute has found that nurses in acute settings spend an average of only 40% of their time on direct patient care. The challenge is to reverse this trend, to release time from unnecessary activities and reinvest this in direct care and education.

ANSA supports time, a patient education programme developed by patients and healthcare professionals in collaboration with Roche which provides us with an opportunity to inform motivate and empower our patients, at a pace that suits the individual and environment which in turn has the potential to positively impact on outcomes.

Catherine Johnson
President
Anaemia Specialist Nurse Association (ANSA)
Foreword
Foreword

For all patients requiring long term dialysis, access is their lifeline. Safe and reliable care depends on excellent access with excellent care that minimises complications and maximises benefit. The consequences of infection or poor quality dialysis can be devastating for an individual. This guidance is a toolkit to both explain the types of vascular access and provide advice on care and usage. It cannot be absolute and we should always strive to provide for patients on an individual basis. However in providing this advice we hope to emphasise the principles of consistent, safe and reliable practice in this crucial area.

Dr Richard Fluck,
Consultant Nephrologist,
Clinical Director Derby Renal Services
Introduction
Introduction

The National Service Framework for renal services (2004), Standard 3 states that:

“All children, young people and adults with established renal failure are to have timely and appropriate surgery for permanent vascular or peritoneal dialysis access, which is monitored and maintained to achieve its maximum longevity.”

An arteriovenous fistula (AVF) is considered the best and most reliable form of access to a patient’s blood supply for haemodialysis (HD). However, when compared to other European countries, fewer UK patients start haemodialysis with a permanent AVF and a smaller proportion of the overall number of HD patients have an AVF (National Service Framework, 2004). Only 69% of prevalent HD patients in the UK use either an AV fistula or graft but The Renal Association suggests that approximately 80% of patients should do so, with as many people as possible having a functioning AVF in preference to other forms of vascular access (Renal Association et al, 2006; Renal Association, 2007).

The ideal vascular access would require minimal surgical intervention, would cause minimal physical or psychological dysfunction, would be consistent in providing effective cannulation and would require little maintenance. The reality is far from this ideal situation but the reliability and efficacy of existing techniques can be improved through the adoption of best practice in care and maintenance. This module provides the information needed to educate and counsel patients in caring for their vascular access to minimise infection and other complications.

Bacterial infections are the second leading cause of death for patients on dialysis, and renal nurses are ideally placed to detect infection and other complications at an early stage and to make appropriate referrals. They are also best placed to manage patient and staff education and to promote best practice in cannulation and access site care.

Disclaimer

This information is provided for guidance purposes only. Please note that each patient is treated on a case-by-case basis and you should ensure that patients have consulted their doctor before following any of the advice outlined below.
How to use
How to use

About time

The time programme is an initiative created to help empower renal patients and healthcare professionals, with the aim of improving patient care and strengthening the relationship that patients have with staff. To this end, t.i.m.e. stands for Time to Inform, Motivate and Empower. The title and concept of time has been chosen to represent this educational initiative for its ability to portray the idea that with a little time and focus, great gains can be made.

When a patient's understanding of their condition and their treatment is improved, there is increased satisfaction, empowerment and ultimately health outcomes. This greater patient understanding is what the time programme seeks to achieve by offering an integrated education campaign involving patients and healthcare professionals alike.

time is designed to be systematically implemented in the renal unit and, once in place, key messages can be effectively delivered using 3 minute blocks of time. This is important, as in today’s busy renal unit, time is at a premium, and this programme is built on the premise that if small efficiencies were made in the way that staff carry out care, these 3 minute blocks of time could be freed up and utilised to improve the care for patients.

Developed in conjunction with healthcare professionals and patient representatives, the time programme comprises resources that can be used by the individual renal unit to create their own targeted education campaign delivering consistent, clear and useful messages for renal patients.

time vascular access programme

The time vascular access programme has been developed to inform patients about the different types of vascular access and how to maintain health access. The materials described below will help you develop a vascular access education programme in your renal unit.

The following guide shows briefly what materials are included in the vascular access programme and how they may be used. Not all materials are designed to be used with every patient. Rather, a range of materials has been developed to help meet the needs of individuals.

Posters

The education programme begins the minute a patient walks into the unit. These posters are displayed in areas such as the waiting room to raise awareness about the importance of dialysis access care. The posters could be rotated to maintain interest (for example a different one for each month). They are specifically designed not to provide all information, but to initiate thoughts and comments, leading to dialogue with the healthcare professional.
Flashcards
The key messages in the vascular access programme are communicated via flashcards. They are designed to give clear and consistent messages in a short space of time. In addition to a key message, each flashcard shows a frequently asked question, the answer to which is revealed on the back of the card. Patients can either read the flashcards themselves, or nurses can use them as a prompt during discussion. Ideally they could be placed in a prominent position on the ward so that patients and staff can easily access them. They also have a wipeable surface.

Patient information manual
This contains detailed information for those patients who wish to read more. The information guides are designed to be kept on the unit for patients to read whilst having treatment.

Healthcare professional information manual
This guide contains, and elaborates on, the information presented in the Patient Information Manual. It may be used by staff interested to read more about vascular access and/or for general staff training. This guide also has a section on vascular access monitoring and surveillance techniques.

Top tips cards
The top tips cards are business-card sized reminders for patients to keep. They outline tips on caring for vascular access and provide a space for emergency contact numbers. There are separate top tips cards for both arteriovenous and central venous access.

Stethoscope
A stethoscope is given to every patient so they can check their fistula or graft regularly at home.

Squeezy ball
A squeezy ball is given to each patient with a new fistula so they are reminded to exercise to aid fistula development.
Key messages
Key messages

The key messages that you should aim to convey to your patients when discussing the importance of caring for their vascular access are:

1. Vascular access is the route and method by which blood is removed and returned to the circulation after being cleaned by dialysis. There are three types of vascular access:
   - Arterio-venous fistula (AVF)
   - Arterio-venous graft (AVG)
   - Central venous catheter

2. Good, effective dialysis relies on good vascular access. Good vascular access is one of the most important factors that affects the outcome of patients on dialysis.

3. Only a few sites on the body are suitable for vascular access. It is therefore important for patients to care for their access to ensure it lasts for as long as possible.

4. It is essential that patients take good care of their own vascular access:
   - Avoid wearing clothes with tight fitting sleeves
   - Avoid wearing watches or jewellery on their access arm
   - Do not carry heavy bags with their access arm
   - Do not sleep on their access arm
   - Never take blood samples from their access arm and never inject into it unless it is with a fistula needle when they are having a dialysis session
   - Do not have blood pressure readings taken on their arm with their functioning dialysis access

5. If they have had a fistula created in their arm, some simple exercises can help to encourage it to heal more quickly. They should make sure they carry out any exercises they are instructed to do.

6. It is essential to make sure that their vascular access is clean. Their access should be cleaned thoroughly before use, and anyone who will be handling their access should wash their hands and put on sterile gloves first.

7. They should make sure they check their vascular access for signs of infection or damage every day. These include:
   - Redness
   - Swelling
   - Pain
   - Numbness
   - Warmth
   - Fever
   - Pus or open sores
   - Ballooning of the access

8. It is important that they check their vascular access for signs of blockage every day. They can listen to the sound of the blood flow through it (the ‘bruit’) using a stethoscope and feel for the vibration using their fingers.

9. It is essential that they report any changes they see or feel in their access to their doctor or nurse immediately. Make sure they know who to contact.

10. They should discuss any concerns about their access with their doctor or nurse. They should make sure all staff treat their access as if it was their own.
There are three types of vascular access:

- Arterio-venous fistula
- Arterio-venous graft
- Central venous catheter

Arterio-venous fistula (AVF)

An AVF is a connection between an artery and a vein (an anastomosis) which diverts blood from the artery, increasing the size of the vein and making the access easier to reach. The preferred placement is radial-cephalic followed by brachial-cephalic (National Kidney Foundation, 2006). At least one month, and up to four months, is required for the fistula to mature sufficiently for dialysis. If a fistula is slow in developing, it may require investigation, such as a fistulogram. Patients can carry out handgrip exercises during this period to help the fistula mature more quickly.

Fistulas can last many years, are less prone to infection than other types of vascular access, provide high blood flows and have fewer complications such as aneurysm. However, they take the longest to mature and may fail to mature at all due to other health issues, such as poor circulation or diabetes.

Arterio-venous graft (AVG)

An AVG is similar to an AVF but uses artificial material, most commonly ePTFE (expanded polytetrafluoroethylene) to make a link between the artery and vein. Preferred sites for grafts are the forearm, upper arm or thigh.

A graft is usually available for use within 2 to 3 weeks, has a low initial failure rate and provides reliably high blood flow in patients who are unsuitable for a fistula. The life expectancy of a fistula is generally in the region of 18 months to 2 years. However, they are more likely than AVFs to become infected and to clot. The graft material — unlike blood vessels — does not have the capacity to prevent clot formation. Grafts are also prone to developing holes as the synthetic material does not self-heal after needle punctures in the way that natural skin does. They are more prone to failure as venous stenosis formation is common at the anastomosis, and require more interventions to keep the access viable.
Central venous catheter

The catheter is usually placed in the neck (jugular), chest (subclavian) or groin (femoral) and is usually a temporary substitute until a graft or a fistula is ready. Some patients who are unable to have a graft or fistula have a catheter as a permanent access. Permanent catheters are usually tunnelled. The preferred type is an internal jugular catheter as these are less likely to damage blood vessels than subclavian catheters. Femoral catheters are more commonly used for temporary access but can only be used for a short period of time and have high infection rates. Tunnelled femoral lines are rarely used – they have a very high risk of infection and are predisposed to thrombosis.

Catheters are the least favoured type of vascular access as they are the most prone to infection and clotting, and often provide poor blood flow rates. However, one advantage of catheters is that they can be used for dialysis on the day that they are inserted and can therefore be used in an emergency. Placement of the catheter should be checked with X-ray prior to its first dialysis to ensure that there is no pneumothorax or puncturing of adjacent vessels.

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<thead>
<tr>
<th>Type of access</th>
<th>Advantages</th>
<th>Disadvantages</th>
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<tbody>
<tr>
<td>AVF</td>
<td>• Can last many years</td>
<td>• Takes the longest to mature</td>
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<tr>
<td></td>
<td>• Less prone to infection than other access methods</td>
<td>• May fail to mature altogether</td>
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<tr>
<td></td>
<td>• Provides high blood flows</td>
<td></td>
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<tr>
<td></td>
<td>• Has fewer complications than other methods</td>
<td></td>
</tr>
<tr>
<td>AVG</td>
<td>• Available for use within 2 to 3 weeks</td>
<td>• More likely than AVFs to become infected and to clot</td>
</tr>
<tr>
<td></td>
<td>• Low initial failure rate</td>
<td>• Prone to developing holes</td>
</tr>
<tr>
<td></td>
<td>• Provides reliably high blood flow in patients unsuitable for a fistula</td>
<td></td>
</tr>
<tr>
<td>Central venous catheter</td>
<td>• Available for use immediately</td>
<td>• Prone to infection and clotting</td>
</tr>
<tr>
<td></td>
<td>• Good for use in an emergency</td>
<td>• Often only provide poor blood flow</td>
</tr>
</tbody>
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Timing of access placement

As recommended in the National Service Framework for renal services (2004), a permanent vascular access should be established as soon as possible in haemodialysis patients. It is recommended that this should be at least 6 months before the anticipated date for dialysis. This allows time for the maturation of the fistula, or its failure, and a further attempt. Patients should therefore be referred for an assessment and investigation into the best means of access in a timely way. Evidence has shown that patients who begin dialysis without a properly established and healed access site have higher morbidity and mortality rates (Dhingra, 2000; Gonscoves, 2000).

Preoperative investigations

For successful formation of a vascular access, it is recommended that the following should be carried out around possible vascular access sites, prior to surgery:

- A clinical examination
- Venous mapping
- A Doppler ultrasound
Access complications
Infection

With all types of vascular access, there is a considerable risk of infection. Infection of the access can be extremely dangerous, as it can lead to septicaemia, septic shock and even death. Further complications can develop if metastatic infection occurs – spreading to other parts of the body, such as heart valves, the spine, bones or brain. Bacterial infections are the second most common cause of death amongst haemodialysis patients (CDC MMWR, 2001). Prevention of vascular access-related infection should be a high priority in the renal unit (Renal Association, 2007).

Central venous catheters are at the highest risk of infection. The following precautions should be taken when connecting and disconnecting catheters: (Renal Association, 2007).

- Ensuring the environment is aseptic
- Wearing of a face mask or visor by the medical staff
- Wearing of a surgical mask by the patient to reduce the risk of infection from the nasal carriage of bacteria

With AVFs and AVGs, the site of the access should be cleaned thoroughly with an antibacterial soap or an appropriate antiseptic solution before it is used for dialysis. Any person handling the access should wash their hands thoroughly and put on sterile gloves before doing so.

Stenosis

Stenosis of the blood vessels is a major vascular access problem which decreases the efficacy of haemodialysis, causes vessel wall damage and clotting, and can limit fistula maturation (Ball, 2005). It can affect all types of vascular access. There are a number of possible causes of stenosis associated with fistulas or grafts:

- Scarring at the junction of the artery and vein
- Use of a central venous catheter
- Scar tissue from previous blood draws, IV lines, blood pressure readings or too many needle sticks (graft)

Blood should never be taken from the radial or cephalic veins in dialysis patients; blood should be taken from the back of the hand wherever possible. This ensures that veins are not damaged, causing stenosis.
Early signs of a possible stenosis are swelling, high venous pressures and prolonged bleeding after dialysis. There is also usually a change in the 'thrill' (pulse) and 'bruit' (sound) of the fistula or graft.

Emphasise to patients the importance of daily checks on the thrill and bruit: if the feel of the thrill changes, or if they notice a rise in pitch or absence of the bruit, they should call their doctor or dialysis care team as soon as possible.

A central venous catheter can cause central venous stenosis which permanently reduces the venous blood flow from the arm to the heart – a potential complication if the patient is scheduled to receive surgery for creation of an access on that arm. The signs of stenosis from a catheter include:

- Cold and pain in the hand on the catheter side
- Swelling of the arm
- Neck, face, chest / breast swelling on the catheter side
- The appearance of collateral (vessels that form to divert blood, when there is a narrowing preventing normal flow) over the upper arm or chest
- Poor dialysis adequacy from a fistula

Over time, the stenosis will decrease the adequacy of dialysis, decrease blood pumping speeds, increase venous pressures and lead to the access clotting. Stenosis can be treated either with surgery, balloon inflation or the insertion of a stent.

Aneurysm

In a fistula or graft, the vessel wall can be weakened by over use of the same area for access puncture, leading in some cases to aneurysm. Fistulas are less prone than grafts to aneurysm as natural vessels have the capacity to self-heal, unlike the artificial materials used in grafts.

Clotting

An untreated clot can block off a fistula or graft thereby preventing blood flow. Clots can also fragment and cause emboli at other sites. The risk of clotting can be increased by a number of factors including: stenosis, low blood pressure, excess fluid removal and the application of pressure on the access arm. Patient education is vital in order to involve patients in the process of minimising clot formation:

- Clotting and stenosis: monitor daily and report any changes immediately as thrombosis can often be treated with thrombolitics, radiology or surgery
- Low blood pressure: alert patients to the symptoms of low blood pressure during dialysis – dizziness, light-headedness and nausea. Ensure patients do not have blood pressure readings on the arm with the vascular access
Excess fluid removal: another reason why patients need to manage their fluid intake carefully to avoid fluid overload between treatments.

Local pressure: patients should be educated in how to apply optimal pressure to the access site after dialysis, and in between treatments should avoid:

- Sleeping on their access arm
- Carrying heavy weights across their access, thereby compressing it
- Wearing tight watches or bracelets
- Wearing clothes that are tight-fitting around the access arm

Catheters can also be affected by clotting, while this can usually be resolved rapidly, in certain circumstances, catheters may need to be replaced.

‘Steal syndrome’ occurs when the access diverts too much blood from the arm during dialysis, leaving the hand cold and numb. Steal syndrome causes hypoxia in the tissues and in extreme cases may lead to digital ulceration and gangrene if not treated. The majority of cases resolve spontaneously, but around 5% of patients will need surgical intervention to correct the flow (Henriksson, 2004). Patients with diabetic neuropathy or pre-existing vascular disease are at greatest risk for developing severe Steal syndrome.

Complications of vascular access

Infection, stenosis, aneurysm and clotting are all common complications associated with vascular access.

- Infection is potentially life-threatening if it leads to septicemia
- Stenosis decreases the efficiency of dialysis and can cause vessel wall damage and clotting, as well as limiting access maturation
- Aneurysm can lead to vessel rupture
- Clotting can block the access and prevent blood flow, and in some cases can result in emboli

It is essential for patients to carry out daily checks on their vascular access for signs of these complications. These checks should include:

- Visual inspection
- Pulpation
- Auscultation of the access arm
Vascular access care
Care of vascular access

It is essential that vascular accesses are closely cared for to avoid the complications described above. This is not only the responsibility of the dialysis unit; patients should take the majority of the responsibility for checking and cleaning their access. However, it is important to have clear hospital evidence-based guidelines on the insertion and maintenance of all forms of vascular access to ensure that complications are kept to a minimum.

Between treatments

Patients must be counselled to play their part in preventing infection and in looking for signs of stenosis. Patients with fistulas or grafts should wash the site with antibacterial soap and water before each dialysis session. Patients with a catheter need to keep it clean and dry at all times and to ensure that the caps are only removed for dialysis and are kept in place at all other times.

Patients should palpate their fistula or graft every day to check that the pulse (called a ‘thrill’) is normal. The vibration is due to turbulence of the blood flow at this point created by high pressure arterial blood merging with the low pressure venous system. Patients are also advised to avoid putting excess pressure on their access arm either through carrying heavy weights across the arm, sleeping on it, or wearing tight fitting clothes or jewellery. Also they should never allow other healthcare staff to take blood pressure, or blood draws from the access arm, or to insert an IV line. Blood should be taken from the back of the hand wherever possible.
At dialysis

Hand washing and gloves are essential for any staff member engaged in dialysis preparation or cannulation, and patients must wash their access arm, even if they have showered before coming to dialysis. It may also be recommended that staff wear a mask when dealing with a dialysis catheter. It has also been recommended that where dialysis catheters are used, antibiotic locking will reduce infection rates (Renal Association et al., 2006; Taal, 2006). Further resources for reducing healthcare-associated infections in renal medicine can be found in Safer Practice in Renal Medicine (DoH, 2006) and in the Renal Dialysis Care Bundle (DoH, 2007).

The vascular access site must be assessed at each visit with visual inspection, palpation and auscultation. Inspection of the vascular access site will identify early signs of infection (redness, tenderness, pus, swelling), stenosis, haematoma and aneurysm. If there is any suspicion of infection, cannulation must not be attempted.

Care of vascular access

At dialysis, strict care procedures should be carried out in order to ensure the access is clean and healthy before it is used. This should involve:

- Hand washing
- Wearing sterile gloves
- Washing the access arm
- Wearing a mask
- Visually inspecting the access
- Palpation of the access
- Auscultation of the access
- Antibiotic locking of dialysis catheters, where used

Preparing the site

Infection is potentially preventable yet it remains the second most common cause of death in haemodialysis patients (CDC MMWR, 2001). Staphylococcus aureus is a major cause of systemic sepsis, especially in patients utilizing some form of venous catheter for venous access (UK Renal Registry, 2005). As haemodialysis patients have an increased staphylococcus aureus carriage rate (Kluytmans et al., 1997) pre-cannulation hygiene is critical. After the patient has washed their arm the insertion site should be cleaned with a unit-approved antimicrobial solution and anaesthetised if the patient requires it.
The importance of good needling technique

Patients with grafts need to use site rotation for the dialysis needles, preferably using the ‘rope ladder’ pattern in which needles are inserted at least 1.5 inches apart, and 1.5 inches from the anastomosis (artificial connection between the artery and vein). As well as the ‘rope-ladder’ technique, patients with fistulas can practice what has become known as the ‘buttonhole’ technique. It was reported by Kronung (1984) that no aneurysms were associated with the buttonhole access while the greatest aneurysm formation occurred with general area puncture.

Buttonhole technique at the puncture site

Early practice with AVFs was to rotate puncture sites to avoid complications such as haematoma, dilatation, stenosis and infection. However, another approach is to use the same site each time and to create a tunnel, or track, similar to that in pierced ears, which goes from the surface of the skin to the blood vessel wall. Constant puncture over a general area weakens that area and increases the risk of aneurysm, but puncture at exactly the same site causes the tunnel to be formed, which is not prone to aneurysm. Once the track has healed, there are no nerve endings or tissue in the path of the needle to cause pain on entry.

Twardowski was the first person to report the buttonhole technique (1979) and subsequently published his experience of using the buttonhole technique in nearly 10,000 dialyses (1995). In this later paper he concludes that:

- Insertion into a previously used site is easier and quicker
- Cannulation is less painful
- The need for re-siting of needles is virtually eliminated
- Haematoma formation is reduced at least ten-fold

Twardowski emphasises that the technique is unlikely to be suitable for patients with grafts. Although he initially recommended the buttonhole technique for new fistulas, others are now using the technique widely in patients with mature and scarred fistulas (Ball, 2006). The only major disadvantage of the buttonhole technique is that the same person should cannulate until the track has formed. Cannulation is an individual process in which each clinician chooses the angle of insertion based on their individual assessment of the depth of the access. Therefore, if several different people cannulate, a tunnel may be formed that is not the same shape as the needle, which may result in oozing (Ball, 2006).

The initial puncture site is created by an experienced cannulator after close inspection of the vessels to determine the best angle of entry. Ideally the originator will photograph or document the insertion angle to facilitate subsequent punctures. At subsequent dialyses the scab has to be removed by an approved method before cleaning the site and inserting the sterile needle (see box overleaf). After around 10 cannulations (more in diabetic patients) it is usually possible to make a transition to blunt needles (Ball, 2006).
Scab removal at site of buttonhole puncture

Use either:
- Aseptic tweezers
- Pads soaked with sterile saline. Pinch the pad to remove the scab
- Pads of alcohol-based gel, pinch pad as above
- Alcohol wipe taped over the site by the patient prior to dialysis

Do not flip off the scab with the puncture needle as this contaminates the needle.
Do not use a separate sterile needle as this could harm the skin and break the scab, and also requires sharps disposal.
Do not let the patient remove the scab with their fingernails as they are likely to be contaminated even after washing.

Inevitably, there are some complications with the buttonhole technique. Oozing can occur during dialysis (Ball, 2006) if the tunnel is not the same diameter as the dialysis needle. It may occur if needles have been inserted at different angles creating a cone-shaped tunnel. Using sharp needles can also cause the side of the tunnel to be cut during needle insertion.

Monitoring and surveillance

Evidence shows that access dysfunction endangers the patient (increased hospitalisation rates and associated co-morbidities) and is costly (Ifudu, 1996; Beathard, 2002). Timely detection of a deteriorating access condition, namely a stenosis, before it can affect haemodialysis efficacy is the key aim to monitoring and surveillance of vascular access (Lopot, 2005).

Regular monitoring

Regular monitoring that can be done easily and monitored by dialysis staff at every dialysis session include checking the following:
- Clinical assessment
- Any needling or dialysis problems
- Kt/V delivery where available
- Pump speeds
- Venous pressures

Any problems with these should be noted and acted upon immediately, or if they continue into the next two dialysis sessions. Delays may make any problems worse.
Advanced monitoring: Vascular Access Quality Surveillance (VAQS)

Vascular Access Quality Surveillance (VAQS) is used more and more by haemodialysis centres to identify problems with vascular access. The introduction of a Vascular Access Quality Surveillance (VAQS) programme requires the choice of parameters and methods to measure those parameters (Lopot, 2005). Possible assessment parameters are:

- **Venous Pressures:** It is generally believed that an increased venous pressure at the same blood flow rate in three consecutive dialysis sessions is a sign of a haemodynamically significant stenosis. This is the simplest Vascular Access Quality parameter. However, this may be less reliable in native AVFs because they have different pressure profiles from those of AVGs. Pressures should not be used as the only parameter to assess Vascular Access Quality Surveillance (VAQS).

- **Recirculation:** There are a number of methods for doing this, although it may not be a suitable Vascular Access Quality Surveillance (VAQS) parameter. It does not detect problems in AVFs quickly enough and is not applicable to AVGs.

- **Access flow (also referred to as QVA or QA):** Knowledge of access flow (QA or QVA) enables the detection of a growing stenosis regardless of its location. Regular monitoring of access flow (QA or QVA) can assess deterioration long before a measurable access recirculation appears. Access flow (QA or QVA) is therefore the best way to measure Vascular Access Quality. There are a number of methods for measuring access flow (QA or QVA), for example ultrasound dilution using the Transonic device (Transonic Systems, Ithaca, NY, USA) and using ionic dialysance. However, covering these in detail is beyond the scope of the programme.

Monitoring vascular access is not something that requires large amounts of time. In setting up a systematic programme of Vascular Access Quality Surveillance (VAQS), with the services to support the interventions that may be needed as a result, much could be saved in terms of resource, morbidity, mortality and disappointment for dialysis patients in the long term.

**Standards and audit of performance**

All HD units should collect and audit information on the rates of infection per 1000 patients days when using AVFs, AVGs and central venous catheters. The rates of bacteraemia (and specifically the rates of MRSA bacteraemia) should be recorded for each access type (Renal Association, 2007). This will help to identify how effective the care guidelines for each access type are. The Department of Health suggests that a clear responsibility structure for the audit and review of infection control should be defined in each HD team. Clinical champions should be identified who are individually responsible for ensuring that infection control standards are met (DoH, 2006).

Standards and audit
Renal Networks (commissioners and providers) should audit:
1) Incident patients
2) Prevalent patients
3) Morbidity
4) Surgical audit

A: Incident patient audit markers
There should be a summary statement to include:
1) Number and % of patients starting elective haemodialysis with functioning vascular access
2) Number and % of patients on haemodialysis with natural access at 6 months after starting the treatment (primary and secondary patency rates)
3) Number and % of patients on the transplant waiting list at start of RRT and at 6 months after starting.
This information should be obtained from individual data sheets on all new patients starting RRT to include:
   a) Date of 1st contact with provider (outpatient, inpatient or other)
   b) Date renal replacement therapy (RRT) started
   c) Type of RRT and type of haemodialysis access employed for the 1st RRT (Table 1)
   d) Date of referral for vascular access (or not referred)
   e) Transplantation status at first RRT (Table 2)
   f) Basic diagnostic and demographic data (ID, DoB, ethnicity, primary renal disease)

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<thead>
<tr>
<th>Type of access</th>
<th>Comments</th>
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<tr>
<td>PD</td>
<td>Peritoneal dialysis</td>
</tr>
<tr>
<td>AVF (simple)</td>
<td>Wrist or brachial AV fistula</td>
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<td>AVF (complex)</td>
<td>Other AVF including transpositions</td>
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<tr>
<td>AVG</td>
<td>AV grafts</td>
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<td>Tunnelled line</td>
<td>Cuffed tunnelled access</td>
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<th>Transplant status</th>
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<td>Referred or in work up</td>
</tr>
<tr>
<td>Assessed as unsuitable</td>
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<tr>
<td>Not referred</td>
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<tr>
<td>Pre-emptive LD</td>
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B: Prevalent patient audit markers
A quarterly return of access of all prevalent patients on dialysis (haemo and peritoneal) should be returned. The classification in Table 1 should be used.

C: Morbidity data
1) An annual return of all episodes of bacteraemia in chronic dialysis patients, resulting from Staphylococcus Aureus sub-defining the number due to Methicillin Resistant Staphylococcus Aureus (MRSA) should be collected.
2) Consideration should be given to collecting data on in-patient bed usage by chronic haemodialysis patients. In particular we suggest the number of admissions for vascular access procedures, acute complications or chronic problems, per 100 prevalent dialysis patients. To facilitate such data collection, the Renal Registry should be supported to develop the IT infrastructure.

D: Surgical audit
The results and complications of surgery should be reported and audited in the standard fashion. This will include the success of surgery as evidenced by access patency and usability, and complications including early thrombosis, haemorrhage and infection.
Summary
Summary

Of the three types of vascular access (AVF, AVG and central venous catheter), the AVF is the preferred type of vascular access. However, each patient should be assessed individually for the type of access that is best suited to them. Following surgery, AVFs and AVGs must heal and mature before they can be used, and thus timing of access placement is an important factor. All haemodialysis patients should be provided with vascular access as soon as possible, and at least 6 months before the start of dialysis. Evidence has shown that patients who begin dialysis without properly established and healed access have a higher morbidity and mortality rate.

The four major complications associated with vascular accesses are infection, stenosis, aneurysm and clotting. Bacterial infection is the second leading cause of death amongst haemodialysis patients (USRDS, 2005). It is essential for patients to ensure that their access is kept clean and to check it every day for any signs of complications. This should be done via visual inspection, palpation and auscultation. Any changes in the characteristics of the access should be reported immediately. At each dialysis session, established hygiene protocols should be followed to ensure that the access is both suitable for use and kept clean throughout the procedure.

Good needling technique is important when using the vascular access to ensure as little damage is caused as possible. Patients with an AVG should use the ‘rope ladder’ technique to rotate the site of puncture. Patients with an AVF, however, may also use the ‘buttonhole’ technique to create a tunnel between the skin and the access and therefore reduce the pain caused when using needles.

All vascular access should be monitored to maintain efficiency, check for complications and reduce the risk of failure.
Frequently asked questions

Here are a few questions your patients may wish to think about and discuss with you.

After surgery, when can my access be used?
If you have an AV fistula, you should be able to use it after 6 weeks. Sometimes they can mature earlier, sometimes they take longer to mature. AV grafts can usually be used after 2 weeks, and catheters can normally be used straight away (after x-ray). However, this may change slightly depending on your unit policy.

How can I help my fistula to mature?
You can help by exercising your arm regularly, as advised by your nurse.

Will it hurt?
You may experience some discomfort straight after the surgery, but this should disappear after a few days. However, if the discomfort continues, you should check your access for any signs of infection and seek advice from your doctor or nurse.

How do I clean my access?
You should clean your access regularly using soap and water at home. Before your access is used for dialysis, it should be cleaned with an antibacterial solution as advised by your dialysis unit. You should ensure that your skin is dry before a needle is inserted.

What dressings should I use to protect my access?
If you have been fitted with a catheter, you should use a clean, dry gauze dressing after every dialysis session. If you have an AV fistula or graft, you do not need to use a dressing once it has healed after surgery.

How should I check my access?
You should check your access every day for the ‘thrill’ and the ‘bruit’. If you have an AV graft, you may not be able to feel the ‘thrill’, and it is therefore very important that you check your access is working properly by listening for the ‘bruit’ with a stethoscope. You should make sure you check that your access is clean and that there are no signs of tenderness or redness. It is important that you do this every day.

Should my nurse wear gloves when dealing with my access?
Yes. Your nurse should always wash their hands thoroughly and put on a clean pair of gloves before they handle your access.

Will the way my needles are put in affect my access?
Yes. It is important that your nurse has a good technique for inserting needles into your access to avoid causing unnecessary damage.
How far away should my needles be from each other when they are inserted into my AV fistula or graft?
Your needles should be inserted at least 1.5 inches apart, and at least 1.5 inches from the anastomosis (artificial connection between your artery and vein).

If I have an infection in my access arm, can the needles still go where the infection is?
No. It is essential that needles are not inserted into infected areas in order to avoid transferring the infection into the bloodstream, which can be very dangerous and even life threatening.

Should I learn to put my own needles in?
Yes – your nurse will direct you as to how to do this. This means that once your access is mature, you may be responsible for inserting your own needles. This may help you to feel more at ease and to reduce the risk of your access become infected with bacteria from other people.

Is it good for my needles to be turned once they have been inserted into my fistula?
No. This can cause damage to the access by enlarging the puncture site.

Should I put lots of pressure on my access when my needles have been removed?
Some pressure to stop bleeding is ok, but not too much for too long. This can lead to problems with blood flow to your access.

Who should I contact in the unit if I have a problem with my access?
You should ensure you have the appropriate contact numbers for your dialysis unit.

What changes should I be concerned about?
You should always report any changes you see, but in particular:

- Redness or pain
- No ‘bruit’ (buzzing sound)
- A change in the ‘bruit’
- A change in the ‘thrill’ (buzzing sensation) in the area of your access
- A change in your skin colour or temperature
- Numbness or pain in your hand, or difficulty moving it.

What will happen if my fistula stops working?
If your fistula stops working, your dialysis support staff will organise for appropriate tests and investigations to see what the problem is. If possible, you may be given treatment to resolve the problem. However, this may not always be possible, and you may be referred for an assessment for the formation of alternative access.

What does it mean when my fistula has ‘blown’?
This means that some blood has leaked out of the vein around the needle site and has moved into the surrounding tissues. This may lead to bruising.
What is 'Steal syndrome'?
'Steal syndrome' occurs when your access diverts too much blood from your arm during dialysis, leaving your hand cold and numb. Steal syndrome results in a lack of oxygen in the tissues and in extreme cases may lead to ulcer formation if it is not treated. It is important to be on the lookout for Steal syndrome.

Can I play sports?
Yes, although you should take care not to participate in anything too rigorous. You should always be very careful not to damage your access arm.

Can I swim in a swimming pool or lake?
If you have been fitted with an AV fistula or graft, then yes you can. Unfortunately, if you have a catheter, you are not allowed to go swimming.

Do I need to keep it covered when I shower?
If you have been fitted with an AV fistula or graft, then you do not need to keep it covered. However, if you have a catheter, then yes, you should ensure that it is covered.

Can I wear a watch on my access arm?
No.

Can I have blood pressure taken from my access arm?
No. You should never allow anyone to take blood pressure readings from your access arm.

Can I carry the shopping with my access arm?
You should not carry anything too heavy with your access arm. You should also never carry a bag with the handles hanging over your access.

Should I sleep with my arm on a pillow?
Not necessarily, no. It is important that you don’t sleep awkwardly on your arm, so if a pillow makes you more comfortable then it will do the access no harm. However, it is not essential.
References


The Department of Health. Safer practice in renal medicine. A resource for reducing healthcare associated infections such as MRSA, 2006.


Vascular Access
programme
INFORMATION FOR HEALTHCARE PROFESSIONALS