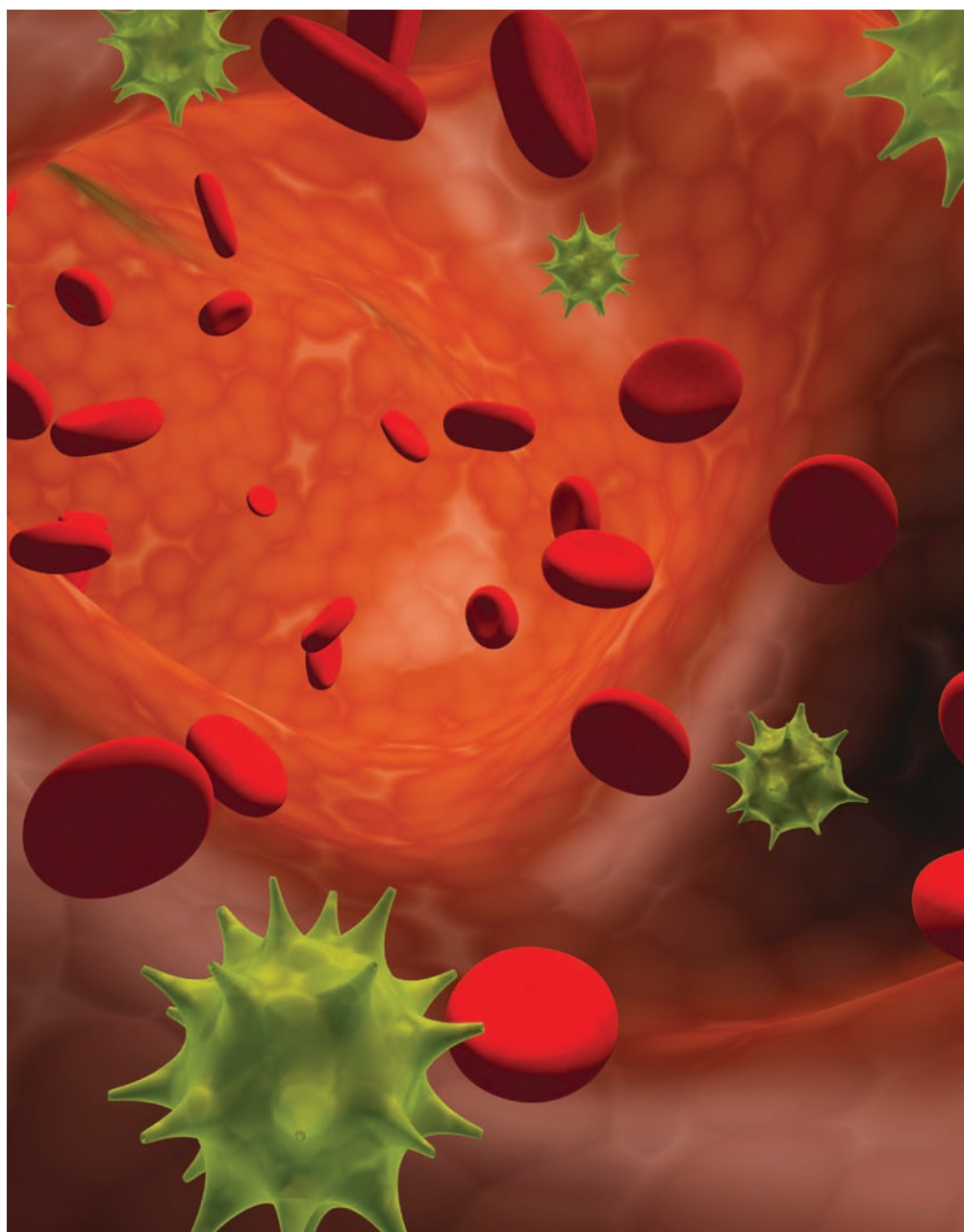


# Infection control in IV Therapy

REDUCING CATHETER-RELATED BLOOD STREAM INFECTIONS (CRBSIS) CAN SAVE LIVES AND MONEY AND REDUCE HEALTHCARE BURDENS, WRITES VASCULAR ACCESS EXPERT AND CLINICAL NURSE CONSULTANT AT SYDNEY'S LIVERPOOL HOSPITAL, TIM SPENCER.



**EFFECTIVE** use of vascular access devices are vital for administering various fluids and drug therapies, but it's critical clinicians maintain appropriate infection control.

As a Clinical Nurse Consultant of the Central Venous Access & Parenteral Nutrition Service at Liverpool Hospital, Sydney, I specialise in Vascular Access. I have placed more than 3,600 central venous catheters, vascaths and Peripherally Inserted Central Catheters (PICCs) during this time, with the Central Venous Access Service placing well over 5,500 catheters since its inception in 1996. Also, being trained in ultrasound, I also facilitate and advocate the advancing role of ultrasound-guided vascular access for all catheter insertions.

Vascular access devices are vital for administering fluids and drug therapies commonly in use across a multitude of healthcare settings, from public and private hospitals to day surgeries and aged care facilities. Painful and expensive complications, such as phlebitis, infiltration, dislodgement, and infections can occur with certain vascular access devices, which can lead to more serious complications and catheter-related blood stream infections (CRBSIs).

On average, CRBSIs can cost \$3,000 and \$29,000 per occasion<sup>1</sup>. A recent study in a Productivity Commission investigation estimated that Australia has 180,000 hospital-acquired infections annually and these occupy almost two million bed days<sup>2</sup>. Beyond hospital costs, IV infectious complications include patient pain and personal loss of earnings with longer lengths of stay in hospital.

Resolving fundamental IV therapy challenges has the potential to greatly reduce these complications, costs and negative patient outcomes.

ON AVERAGE, CRBSIS CAN COST \$3,000 AND \$29,000 PER OCCASION<sup>1</sup>. A RECENT STUDY, IN A PRODUCTIVITY COMMISSION INVESTIGATION ESTIMATED THAT AUSTRALIA HAS 180,000 HOSPITAL-ACQUIRED INFECTIONS ANNUALLY AND THESE OCCUPY ALMOST TWO MILLION BED DAYS<sup>2</sup>. BEYOND HOSPITAL COSTS, IV INFECTIOUS COMPLICATIONS INCLUDE PATIENT PAIN AND PERSONAL LOSS OF EARNINGS WITH LONGER LENGTHS OF STAY IN HOSPITAL.

**IV THERAPY CHALLENGES**

Some of the main challenges of vascular access occur in combating inadequate skin antisepsis, secure catheter placement, the choice of devices and site locations, chemical phlebitis, infiltration and extravasation. All of these can lead to infection and other serious complications. It is all about Vessel Health and Preservation.

Clinicians can prevent many infections occurring with appropriate preparation of the access site prior to insertion of a device. It sounds obvious, but problems can and do occur regularly, and it's usually because of a hurried preparations and inadequate experience.



Infection control Liverpool's Tim Spencer

Before inserting a vascular access device (VAD), the skin around the puncture site needs correct preparation. Skin antisepsis occurs in two stages; there is the immediate kill of bacteria and then there is the ongoing residual kill to ensure the site's skin antisepsis is maintained. This length of time will be dependent on how long the device is to remain insitu. This is from the combination of isopropyl alcohol and the chlorhexidine gluconate (CHG).

Currently, there are many clinicians that continue to use an alcohol swab to remove bacteria prior to insertion; this function is the immediate kill, but an alcohol swab only

provides approximately 15 seconds of bacterial kill and doesn't protect the patient for a longer period, especially if the device will be in use for up to 72 hours.

It's important to use an agent that provides ongoing protection such as Chlorhexidine Gluconate (CHG), which provides the longer-term residual activity. One way of providing an ongoing antibacterial coverage is to use an IV dressing impregnated with Chlorhexidine Gluconate (CHG).

If an IV device becomes dislodged and is no longer secured correctly, this can also lead to infection as small movements of a catheter pistoning in and out of the insertion site can encourage bacteria to enter the bloodstream or surrounding tissue. There are a number of IV securement dressings now available that are specifically designed to keep a device secure and help to reduce IV-restarts, which are both costly to the institution and patient in terms of comfort.

Choosing the most appropriate VAD is based around the common principle of: the most appropriate device, for the right therapy and for the right duration, and getting these elements right from the start will help reduce the number of healthcare worker hours and number of needle sticks to the patient, but also maintain vessel health and preservation.

For day surgery, a peripheral cannula is quite appropriate, as the device is probably only going to be used for a few hours and then removed. For long term hospital stays, the most



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Irrespective of the access point, effective dressings and good process, as above, will stop infections.

appropriate may be a midline, a peripherally inserted central catheter (PICC) or a central venous catheter (CVC) – there are choices that need to be made through proper patient and vascular device assessment.

Choosing the right location for the device is paramount, and proper clinical assessment prior to insertion of the device is imperative to minimising any insertion-based complications.

Another issue that clinicians need to be aware of is many medications can cause chemical irritation of the vessel wall and that stimulates a localised inflammatory response where the patient may develop chemical phlebitis. This challenge can be overcome with correct pre-vascular assessment, ensuring the most appropriate device is used for the right therapy, in the right vessel, at the optimal insertion location, for the right duration. It all ties in together to help reduce detrimental outcomes to the patient.

The challenges and costs of vascular access are high and can have ongoing ramifications for facilities, staff and patients. Litigation is becoming more frequently encountered an incident in the US a few years ago saw a young patient lose her forearm due to extravasation of a chemotherapy agent and she sued the health facility for US\$14 million.

Extravasation is when a solution, usually a vesicant, leaks out of the vessel into the surrounding material and causes tissue necrosis and damage which can have quite severe complications, requiring surgery, skin grafts or other complicated interventions. Infiltration, on the other hand, is when the administration of a

drug agent or fluid is infused into the surrounding tissue. It doesn't necessarily cause any major damage to the surrounding tissue like an extravasation does, but it is dependent on the infused drug and can be quite uncomfortable for the patient and it's still a complication.

Patients can have quite severe outcomes from VADs that go wrong and these complications can be financially costly to an institution in terms of additional pharmaceuticals, extra admission/bed days and extra nursing time.

#### SOLUTIONS

There are many steps that can be followed in order to mitigate the comprehensive array of infection and other complications and these include:

- Appropriate choice of skin antiseptic e.g. using CHG in 70 per cent isopropyl alcohol as well as a securement dressing which may be impregnated with CHG
- Establishing a wide sterile field during insertion e.g. Using a sterile drape with a window area to work in to create a sterile worksite which is not at risk of being contaminated
- Use of personal protective equipment e.g. face mask, gown, sterile gloves and other personal protective equipment (PPE)
- ANTT – following the Aseptic Non Touch Technique – a technique that maintains asepsis and is non-touch in nature.
- Early removal of devices – if it's no longer needed or required, remove it!
- Ongoing monitoring and auditing – this reduces any unnecessary complications and facilitates early removal of the device

- Education, being up-to-date on evidence-based practices
- Bundled care approach – which many research papers have shown to reduce CRBSI rates to zero

Having appropriately trained personnel and ongoing education based around evidence-based research and practices needs to be a strong focus to ensure staff are up-to-date with the latest guidelines and practices. The staff managing patients' ongoing stays in hospital, whether it's an overnight stay or for several weeks, also plays a huge role in the monitoring and auditing of the IV device in order to prevent infections.

Unfortunately many hospitals don't have a dedicated Venous Access Team filtering out educational information and many clinicians are still working to old practices which aren't evidence-based. Educational workshops, short courses and clinical bedside teaching are all really important tools in order for staff to keep their skills up-to-date, especially if they are inserting devices infrequently.

Infrequent inserters, who only insert approximately 1-2 devices a week, tend to have a 50 per cent higher complication rate than frequent clinicians. IV skills are volumetric-based; the more procedures that are completed correctly by clinicians, the more efficient and skilled they become, therefore reducing complication rates as well.

Early removal of a device is paramount to reducing infectious complications, particularly with all types of VADs.

Unfortunately, in medicine and nursing, devices are often left in 'just in case' they are needed. If there is no intravenous therapy being administered, then devices should be removed immediately to reduce the risk of infection. Extra care must also be taken with older patients who have reduced immune systems, as these patients can be at greater risk of infection. It's the same with immunosuppressed patients, such as haematology, oncology, HIV and transplant patients, where their immune systems are weakened due to various treatments and disease processes.

There are many considerations that affect first attempt vascular access insertion: body habitus, pre-existing disease, coagulation status, surgical site infection, thrombosis, poor vessel compressibility and patient trauma, which can limit the number of site choices for vascular insertion.

One of the latest IV Therapy techniques which is making a significant difference and improving better patient outcomes is ultrasound (US) guidance. Pre-puncture scanning and proper vessel assessment is paramount and US is helping to locate vessels that are in good shape and suitable for the device that needs to be placed.

Ultrasound guided insertion, for peripheral cannulas and central venous catheters, allows nurses to visualise the vessel that will be punctured. It takes time to learn the hand and eye coordination, e.g. looking at a screen instead of a patient's arm, but once mastered it allows clinicians first-time insertion, avoiding multiple attempts as a blind technique. We should not be promoting the old fashioned 'blind sticking' technique.

Midlines are becoming more popular and are ideally suited for patients needing isotonic infusions or simple medication therapy that requires extended duration; and difficult cannulation. For example, an emergency department patient who needs a blood transfusion and IV fluid, but various attempts to cannulate have failed.

The benefits of midlines are they can be put in first-time using ultrasound, they don't require x-rays, can be used immediately and can remain insitu for up to 3-4 weeks, sometimes longer depending on the type of therapy being administered. With ongoing education, awareness and an ongoing audit process, along with great technique and maximising the benefits of reducing vascular access complications, the risks of IV complications and infections are reduced significantly.

Most importantly, IV therapy should never be taken for granted at any level of healthcare facility or institution. **HA**

REFERENCES

1. *Safer Systems-Saving Lives. Preventing central venous catheter related bloodstream infections – Version 5. State Government of Victoria, Australia, Department of Health.* [http://www.health.vic.gov.au/ssl/interventions/central\\_line.htm](http://www.health.vic.gov.au/ssl/interventions/central_line.htm)
2. [http://www.pc.gov.au/\\_data/assets/pdf\\_file/0016/93040/09-chapter6.pdf](http://www.pc.gov.au/_data/assets/pdf_file/0016/93040/09-chapter6.pdf)

**TOURNIQUETS MAY BE INFECTIOUS**

REUSABLE venesection tourniquets may be a source of transmission of multi-resistant organisms (MROs) in hospitals, according to research published in the latest Medical Journal of Australia (MJA).

It is estimated that around six per cent of hospitalised patients will acquire an infection during their admission, leading to increased length of stay, further treatment, and higher overall cost, Dr Thomas Gottlieb, from Concord Repatriation General Hospital in Sydney, said.

They randomly collected 100 of the reusable tourniquets, which are wrapped around a patient's arm to assist with gaining access to a vein for blood removal, and found that 61 per cent were colonised with bacterial species that would not be considered normal upper-limb skin flora. A quarter of the tourniquets yielded an MRO.

"If a single patient MRO transmission is perceived to be an avoidable patient care outcome, then any re-use of MRO-colonised tourniquets may present an unacceptable risk," Dr Gottlieb said.

"While disposable tourniquets are readily available, their use is not universal due to perceived difficulties in application and patient discomfort. "However, a study found that 85 per cent of patients found disposable



Dr Thomas Gottlieb

tourniquets at least as good as reusable tourniquets, and 95 per cent of doctors found them as easy to use.

"Reducing the burden of hospital-associated infections is being addressed through multi-faceted approaches such as hand hygiene and antimicrobial stewardship programs. "As reusable tourniquets are frequently colonised with MROs and may be a source of cross-transmission, the burden of MRO colonisation from the hospital environment also needs to be considered.

"With current high prevalence rates of MROs, continued use of reusable tourniquets may not be justified in the hospital setting."

The study concluded reusable tourniquets can be colonised with MROS which may be passed on to patients. The MJA is a publication of the Australian Medical Association.

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