Infection prevention in IV therapy

IV3000◊ dressing: meeting the challenge
Contents

4 Foreword
5 Use of dressings to secure intravenous devices
9 Non-tunnelled CVC following surgery
10 CVC in an outpatient haematology unit
11 PICC in an intensive care setting
12 PICC in an acute oncology setting
13 PICC in a community setting
14 Midline in a surgical ward
15 Peripheral cannula in the community
16 Peripheral cannula in an acute setting
17 Benefits of an e-learning module

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Intravenous (IV) dressings should have two predominant aims: to stabilise and secure the IV device and to prevent infection. In today’s healthcare environment, we are constantly testing the limits of IV dressings and their ability to fulfil these aims as we extend the boundaries as to where, when and how we provide IV therapy.

There are many recommendations for the ideal IV dressing. It should be transparent in order to allow easy and early visualisation of any problems at the entry site (Department of Health, 2011), be sterile (Royal College of Nursing (RCN), 2010), be secure yet gentle to remove, be unlikely to cause allergies, and be waterproof to allow patients to shower yet semipermeable so that moisture can escape (Loveday et al, 2014).

IV dressings for peripherally inserted venous cannulae (PIVC) and central venous catheters (CVCs) should be able to secure the device completely. An unsecured PIVC allowing device movement leads to the risk of mechanical phlebitis (Hadaway, 2003). An unsecured CVC dressing can result in the device tip being dislodged from its optimal position at the right cavaostial junction. CVCs with a poorly positioned tip have an increased risk of venous thrombosis (Kearns et al, 1996), which is associated with catheter-related sepsis (Fletcher and Bodenham, 2000).

The IV dressing should also act as an effective barrier against infection. Microorganisms can enter by migration from the cannula via the interface with the skin. Inserting a peripheral vascular cannula through the skin will breach the body’s natural defences and open the circulatory system to risks of infection (Lavery, 2010). Interrelated actions associated with preventing IV device infection include maintaining an aseptic non-touch technique when inserting and accessing the device (RCN, 2010) and taking account of the anatomical location of device placement (Cicolini et al, 2009) as well as the patient’s physical condition (Hart, 2008). While numerous factors can increase the propensity of an IV device to fail, the importance of choosing the correct IV dressing and applying it appropriately cannot be underestimated.

Recent recommendations in the literature (Webster et al, 2013; Loveday et al, 2014) have challenged the traditional practice of routinely removing a PIVC at 72–96 hours. Studies have found that asymptomatic peripheral cannulae may not require removal at regular intervals as some patients remained healthy and asymptomatic with indwell PIVC times of up to 10 days (Powell et al, 2008). However, extending the potential PIVC dwell time requires careful insertion techniques and meticulous ongoing observation and maintenance; integral to this is the quality of the IV dressing. If managed effectively, with extended dwell times, increased cost savings (11% of catheter-related expenditure) can be achieved (Webster et al, 2013).

This supplement discusses the requirements needed for an IV dressing to perform effectively in challenging healthcare contexts. It describes the challenges associated with the different IV lines available, the settings in which they are used, and the requirements of an IV dressing to perform effectively. It also acknowledges that, even when the most appropriate IV dressing is selected, its reliability is only as good as the skill and understanding of the practitioner placing it, so education on placement of the IV dressing is essential.


In modern medicine, intravenous (IV) therapy is a fundamental component of care for patients both in the hospital setting and in the community (Griffiths, 2007; Scales, 2008). It has been reported that more than 60% of patients admitted to hospital are likely to receive IV therapy via a vascular access device (Aziz, 2009). However, a number of complications are associated with this therapy, as the vascular access device breaches the integrity of the skin, which is the body’s main defence barrier against microorganisms. Phlebitis is the most common complication of peripheral IV therapy, which places the patient at increased risk of erythema, pain, swelling, localised infection and catheter-related bloodstream infections (CRBSIs) (Campbell and Bowden, 2011).

Which vascular access device?

A vascular access device provides access to the vascular system for the administration of medications, fluids, blood products and parental nutrition (Bowden, 2010). In recent years, there has been an increase in the number and range of vascular access devices used in both the acute hospital and community (Kelly, 2011). When considering which vascular access device is most suitable for a particular patient, many factors need to be considered, such as patient characteristics (for example, age and condition of the peripheral veins) and type/duration of IV therapy (Hadaway, 2002). If possible, patients should be fully informed of the benefits and risks of the vascular access device proposed for them so that they can be included in the decision-making process (Mickler, 2008).

Peripheral venous cannulas

A short peripheral venous cannula (PVC) is a short-term device that is inserted, usually into the veins of the hand or forearm, to administer IV therapy within the hospital setting (Bowden, 2010). The PVC is the most commonly used vascular access device; however, it is unsuitable for the administration of vesicant and irritant medications, or solutions with a pH of less than 5 or greater than 9, as these will damage the intima of the vein (Kelly, 2011; Royal College of Nursing (RCN), 2010). While much guidance states that PVCs should be considered for removal after 72 hours (RCN, 2010; Infusion Nurses Society, 2011), in order to minimise the risk of phlebitis and resultant infection, more up-to-date evidence suggests there is no clinical benefit in routinely changing PVCs every 72–96 hours and that there may be a cost saving with changing only when clinically indicated by the presence of phlebitis (Webster et al, 2013). The use of a PVC should only be a short-term option and other vascular access devices should be considered if IV therapy is planned for longer than 5 days (Hadaway, 2002).
Midline catheters

For more lengthy IV therapy, one option is a midline catheter, as it can remain indwelling for up to 6 weeks. It is suitable for patients who are discharged early from hospital but still require medium- to long-term therapy, for example, IV antibiotics for cellulitis or endocarditis (Kelly, 2011). Midlines are inserted into the antecubital fossa, with the tip lying in the axillary vein in the upper arm. Although still a peripheral device, there is a greater flow rate of blood around the catheter tip, which dilutes the medications being administered and reduces the risk of damage to the intima of vein and chemical phlebitis (Griffiths, 2007).

Central venous catheters

Non-tunnelled central venous catheters (CVCs) are commonly used in emergency departments and critical care areas. These are invasive devices, inserted via the subclavian, jugular or femoral vein (Hadaway, 2002) (Figure 1), to allow the delivery of medications and fluids into the fast-flowing central circulation, ensuring rapid distribution of the medication while reducing the risk of chemical phlebitis from vesicant and irritant drugs (Scales, 2008). The optimal dwell time for non-tunnelled CVCs is unknown, but the insertion site should be closely observed and the patient’s overall condition monitored for clinical signs of phlebitis or infection (Scales, 2008). This vascular access device has the highest rate of CRBSI and should be only considered as a temporary access device (Jones, 2004; Kelly, 2011).

Peripherally inserted central catheters

Peripherally inserted central catheters (PICCs) are inserted into a peripheral vein and advanced until the tip sits within a central vein (Scales, 2008) (Figure 2). These vascular access devices are traditionally used in oncology; however, there has been an increase in their use in other specialties (Kelly, 2013). PICCs are a reliable and stable...
option for patients who require long-term therapy, in particular those receiving irritant, vesicant and hyperosmolar solutions (Obaid and Amerasekera, 2011). However, as this is an external catheter, it is important to assess whether this type of vascular access device is compatible with the patient’s activity and lifestyle (Hadaway, 2002).

Other options
Other long-term options include tunnelled CVCs and implanted ports. Tunnelled CVCs, such as Hickman catheters, are inserted into either a jugular or subclavian vein and can remain indwelling for years (Figure 3). They are often chosen for patients requiring long-term, continuous or intermittent therapy, for example, chemotherapy (Kelly, 2011). The skin insertion site is usually a short distance away from the vein insertion site, which reduces the risk of CRBSI (Scales, 2008). In addition, there is a fibrous Dacron cuff which, when positioned in the skin tunnel, stabilises the device and reduces the migration of microorganisms into the catheter tract (Kelly, 2011). Implanted ports are small access devices that are inserted into a surgically created subcutaneous pocket; a catheter then connects the port to a central vein. When administering medication, the port is accessed by puncturing the skin with a needle, which may cause the patient some discomfort (Hadaway, 2002). This device is a suitable option for patients requiring long-term intermittent IV therapy, in particular those with body image concerns (Jones, 2004). The primary advantage of this vascular access device is that it is fully implanted, thereby reducing the risk of infection and allowing activities of daily living (Jones, 2004; Kelly, 2011).

Securing the vascular access device and protecting the entry site
As stated above, a number of vascular access devices are available, reflecting a diverse patient group and varying clinical situations. However, all of these invasive devices breach the integrity of patient skin and so significantly increase the risk of CRBSI (Campbell and Bowden, 2011). The other major risk with all vascular access devices is dislodgement and, to promote patient wellbeing and recovery, it is essential that accidental device loss is minimised. Untimely dislodgement can lead to loss of therapy and extravasation of medication, and also can cause patient distress when the device is replaced. Peripheral device loss is a persistent problem and, although there is no precise data on the cost of extra bed days caused by failure to administer treatment owing to accidental device loss, anecdotally this remains a huge issue.

In addition, inadequately securing the device can result in phlebitis, leakage of infusate from the entry site and extravasation (Royer, 2003). Historically, vascular access devices were secured by suturing them to the skin (Gabriel, 2010); however, in recent years, dressings have been developed that aim to protect the entry site and secure the access device. Some of these dressings have an integral hub lock, e.g. Statlock™ (Bard Medical); others have adhesive strips that anchor the wings of the device to the skin, e.g. IV3000Ø (Smith & Nephew) and Tegaderm™ (3M). The ideal IV dressing is secure (to prevent device dislodgement), transparent (to permit assessment of the device and surrounding skin), and will promote an environment around the entry site that reduces the risk of infection.

Infection prevention
In recent years, much has been written about preventing infection associated with the use of vascular access devices (Le Corre et al, 2003; Jones, 2004; Rickard and Ray-Barruel, 2009). The advent of the care bundles for central venous access devices (Institute for Healthcare Improvement, 2011) and peripheral devices (Health Protection Scotland, 2012) has dramatically reduced the incidence of CRBSIs (Szakmany et al, 2011). A key element of both the central venous access device bundle and the peripheral device bundle is that the dressing should be dry and in place. In general, film dressings have been found not only to be more durable than gauze dressings, but also to have a high moisture vapour transfer rate (MVTR), which causes them to adhere better to skin, even when the patient is sweating excessively (Jones, 2004). Furthermore, Richardson (1991) found that a high MVTR minimises the presence of fluid around the entry site, resulting in a suboptimal environment for bacterial growth.

The ideal dressing would be secure to prevent dislodgement, transparent to permit assessment and it should promote an environment that reduces infection.

To date, research has failed to identify a reduction in infection rates when using one of the many transparent dressings on the market, or dry gauze (Le Corre et al, 2003), although there are perceived benefits with transparent...
dressings. One of these is the ability to visualise the insertion site. Part of the CRBSI bundle is to assess the catheter insertion site daily for signs of infection. A transparent dressing facilitates this without the need to remove or otherwise disturb the dressing, saving both nursing time and minimising the risk of contamination. Le Corre et al (2003) identified that this led to an overall cost saving when transparent, semipermeable dressings were used.

The other advantage with the use of a semipermeable dressing is that the patient is able to shower/wash without the need for dressing renewal. For longer term devices in particular—PICCs, midlines and tunnelled central venous access devices—this may greatly improve quality of life for the patient and reduce costs incurred by frequent dressing changes.

**Conclusion**

Although there is no research evidence to demonstrate that any one semipermeable film dressing is superior over another, IV3000® does have the characteristics described above as being essential for an IV dressing. The latest version of IV3000 contains two securing strips that have been improved to increase conformability and therefore aid security (Smith & Nephew, 2013a; 2013b). The adhesive used is positioned in a grid pattern to facilitate easy dressing removal (Wille et al, 1993) and maximise comfort (Wheeler, 1991), while the dressing’s high MVTR (Tompkins, 2008) ensures it remains in place, even in the presence of moisture caused by sweating. The dressing is transparent and comes in a variety of sizes designed for the variety of vascular access devices available. It also helps prevent bacterial contamination (Benson, 2003). The following case studies provide examples of the use of IV3000 on patients with different lines in various clinical settings.

Hadaway LC (2002) IV rounds: choosing the right vascular access device, part II. *Nursing* 32(10): 74–6
Infusion Nurses Society (2011) Infusion nursing standards of practice

Tompkins L (2008) IV3000 1 Hand Dressing Physical Properties. Smith & Nephew, Hull
Tompkins L (2008) IV3000 1 Hand Dressing Physical Properties. Smith & Nephew, Hull
A 64-year-old woman attended the author’s trust for elective surgery for a large pelvic mass, thought to be ovarian or sarcoma cancer. She underwent bilateral insertion of nephrostomy tubes followed by pelvic exenteration, and was then admitted to critical care for elective post-surgical management. It was estimated that she would spend 2 days in the critical care unit.

Preoperatively, an anaesthetist had inserted a quadruple lumen non-tunnelled central venous catheter (CVC) into the patient’s right internal jugular vein. A multiple lumen device was required for her postoperative management, which included intravenous (IV) administration of:
- Total parenteral nutrition (TPN)
- Noradrenaline
- Paracetamol
- Omeprazole
- Pabrinex
- Ciprofloxacin.

The non-tunnelled CVC was in place for 7 days postoperatively, and was removed when the TPN was discontinued. The catheter was secured with the ported IV3000 dressing.

**Outcomes**

The anaesthetist found the ported IV3000 simple and easy to apply. Its adhesion strips facilitated good securement for as long as the device was in situ (Figure 1). As the dressing was transparent, the nursing/medical teams could easily assess the skin and insertion site. No signs of infections were observed while the dressing was in place, or during the dwell time of the catheter. No moisture build-up under the dressing were observed, and there were no signs of infection, erythema, tenderness or oozing around the entry site.

The dressing remained intact and in place throughout the postoperative period, and secured the device. It was therefore considered a cost-efficient option.

Despite the position of the right internal jugular placement, the patient did not find the catheter troublesome, and stated that the dressing was comfortable, and held the catheter in place.
CVC in an outpatient haematology unit

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Figure 1. The IV3000® dressing in situ over a dual-lumen tunnelled CVC

This case study concerns a 25-year-old woman who was undergoing phase II induction treatment for acute lymphocytic leukaemia and was preparing for a bone marrow transplant. Her treatment involved the insertion of a dual-lumen cuffed tunnelled central venous catheter (CVC). On the first day of this evaluation, the CVC had been in situ for 68 days and the patient was 2.5 weeks into the second phase of her treatment. She appeared to be coping extremely well with the treatment, but her haematological profile illustrated how vulnerable and prone to infection she was. Throughout the 7-day evaluation period, her blood counts showed a neutropenic picture, with her white cell count ranging from 0.2 to 0.9 x 10⁹/L and her neutrophil counts from 0.3 to 0.00 x 10⁹/L.

Due to the nature of her treatment, she was receiving chemotherapy and other intravenous (IV) support including cytarabine, cyclophosphamide, blood transfusions, blood product support, prophylactic antibiotics to cover neutropenic episodes, and low molecular weight heparin for a non-CVC-related thrombosis.

In the author’s trust, IV3000 is the standard IV dressing for patients with tunnelled CVCs. As recommended by Epic3 (Loveday et al, 2014), IV dressings are generally only used until the catheter exit site has healed and to allow sufficient time for the Dacron™ cuff to embed or for the tissues to graft onto the cuff (usually 3 weeks). More research is required to demonstrate the efficacy of the dressing for longer-term use with tunnelled CVCs. While the Epic3 guidelines confirm that a dressing is required until the site is healed, they also state that ‘a dressing may no longer be required once the insertion site is healed’. It is therefore left to the clinician’s judgement and the patient to decide whether to keep it in place at this point. In the author’s haematology unit, IV dressings are used for the duration of therapy if the patient prefers, with weekly dressing changes. In this case, the patient chose to keep the dressing in place during treatment, as she felt more reassured that it was protecting the exit site.

Outcomes

The catheter site was examined daily when the patient attended for treatment. Over 6 days, there were some reports of slight redness, approximately 0.5 cm around the exit site, depending on who observed the site, although the patient explained that it normally looked like this and there was no pain or discomfort in the area. Nevertheless, the exit site was swabbed and blood samples were taken, which revealed no signs of bacterial growth but a c-reactive protein (CRP) rate of <5.

The CRP rate remained at this level throughout the 2-week follow-up period, during which time no signs of exit-site infection were observed.

The patient found the dressing comfortable and accepted that having a catheter and IV dressing was a part of her life for the time being. She showered daily, but did not wear the protective cover over the dressing. It was only at the end of the 7-day evaluation that the dressing started to peel slightly at the edges, although this did not significantly affect its integrity over the catheter site.

Since the tunnelled CVC was inserted, up to and including the above evaluation period, the patient has not experienced any CVC-related episodes of infection, despite being in an exceptionally vulnerable clinical condition. This is a testament to the practice of the staff caring for this patient.

Although the evidence on the use of a transparent semipermeable dressing such as IV3000 on a healed entry site is unclear, this case illustrates how it can be used successfully as part of a care and maintenance strategy to prevent infection in a vulnerable patient.

A 70-year-old man underwent Hartmann’s procedure for bowel cancer. Following surgery, he developed sepsis and was admitted to intensive care. A laparotomy revealed an anastomotic leak. A peripherally inserted central catheter (PICC) line was placed to deliver parenteral nutrition, as well as the following intravenous (IV) medications:

- Propofol infusion
- Remifentanil infusion
- Paracetamol 1 g four times a day
- Frusemide 40 mg two times a day
- Fluconazole 400 mg once a day
- Piperacillin with tazobactam 4.5 g three times a day.

The IV antibiotics were prescribed for 7 days and the diuretic for 8 days, while the parenteral nutrition continued for 14 days, followed by enteral nutrition via a nasogastric tube for the rest of his hospital stay. Sedation medications were used for the first 4 days.

**Outcomes**

The patient was extremely unwell, and when the PICC was first inserted, he was febrile and his skin was clammy to the touch. The PICC was in situ for a total of 6 weeks, and the IV3000◊ dressing was used throughout this period. Both the dressing and the needle-free connector were changed every 7 days.

Throughout the 6-week period, each IV3000 dressing remained intact until its scheduled dressing change. It was therefore considered to be cost-effective. In addition, the skin under the dressing was found to be dry and intact at each dressing change, with no signs of irritation. Despite the long-term use of parenteral nutrition, it was not necessary to switch to a chlorhexidine gluconate-containing IV dressing, which the trust protocol recommends for the prevention of local site infection.

The dressing fitted over the PICC line and its stabilisation device, keeping them secure and reducing the risk of migration and contamination. In addition, the dressing’s design—it is ported at the top with extra strong sides—helped to secure the PICC line, especially at the sides.

The dressing was easy to remove, with clear guidance on which section to remove and in what order. Following removal, no adhesive was left on the skin and the patient did not experience any skin irritation. *Figures 1 and 2* show the appearance of the skin before and after dressing removal.

The patient was repositioned every 2 hours, during which time the dressing remained intact (*Figure 3*). He did not comment on any dressing-related discomfort. The patient was discharged to the ward after 20 days in intensive care and then home one week after the final dressing change.
A 77-year-old female was diagnosed with breast cancer in November 2014. Following a wide local excision on her right breast and axillary clearance, she was transferred to the medical oncology team for cytotoxic chemotherapy (fluorouracil (5FU), epirubicin and cyclophosphamide). The first two cycles were uneventful and venous access was achieved easily with a peripheral cannula. Some 10 days after the third cycle, the patient felt unwell and became shivery, owing to pyrexia. Her local chemotherapy unit arranged for her to be assessed immediately by the acute oncology team.

She was diagnosed with neutropenic sepsis and prescribed IV antibiotics and fluids. Difficulties were encountered in cannulation, so the decision was made to site a single-lumen, 4 Fr open-ended peripherally inserted central catheter (PICC), under ultrasound guidance. The PICC was placed in the basilic vein in her left upper arm.

**Outcomes**

The PICC was secured against the patient’s skin with the two sterile adhesive strips supplied with the ported IV3000® dressing. The insertion site was covered with a 5 cm² sterile gauze (to absorb any blood that may have oozed from the cannulation site) and covered with IV3000 (Figure 1). This dressing combination remained in situ for 24 hours, when it was changed, as per the organisation’s policy for PICC dressings.

The insertion site and surrounding area were then cleansed with 2% chlorhexidine gluconate and allowed to dry. A new IV3000 dressing was applied to the patient’s skin without sterile gauze, as there had been minimal blood loss from the cannulation site overnight. The nurse found the dressing easy to remove and apply, while the patient did not report any discomfort during removal.

The patient continued to receive the IV antibiotics for a further 5 days. As the ported IV3000 dressing is transparent, it allowed for easy observation of the PICC insertion site, without compromising the integrity of the dressing. There were no signs of exudate or phlebitis.

When the patient’s pyrexia settled and she began to feel better, she was able to shower with assistance. The IV3000 dressing had a waterproof barrier that protected the PICC insertion site during showers and maintained its integrity. An indicator of the dressing’s vapour permeability is that the skin was found to be dry at each dressing change.

After the patient had completed her course of IV antibiotics, her PICC was flushed with 10 ml of heparinised sodium chloride 10 I U/ml. The following day, the continuation of her chemotherapy was discussed with her, and it was decided that she would have a break of 2 weeks before recommencing. She was given the option of retaining the PICC for the future administration of her chemotherapy, but declined. Although she had found the PICC and its dressing comfortable during her hospital stay, she did not want any visual reminders of her treatment between chemotherapy cycles. The PICC was therefore removed immediately before discharge.

Apart from the small puncture hole resulting from the PICC insertion site, there were no other reminders of the device, including no redness or irritation caused by the dressing (Figure 2).
A 65-year-old male was referred to a community intravenous (IV) therapy service by Royal Marsden Hospital while he was still receiving chemotherapy treatment. A peripherally inserted central catheter (PICC) was inserted to enable him to have chemotherapy treatment for a colorectal carcinoma at home.

Weekly home visits were required to monitor and maintain the patency of the PICC and to change the dressing and the needle-free access device. At each visit, the PICC was flushed with 0.9% 10 ml normal saline to ensure that it remained patent and the exit site was clean, and to prevent infection. Meanwhile, the entry site was inspected using the visual infusion phlebitis (VIP) score.

The patient’s history included a hiatus hernia in 2013, cancer of the colon in 2014 and atrial fibrillation in 2014. He had a right-sided ureteric stent inserted and a laparotomy for small bowel obstruction, both in 2014.

In addition to the chemotherapy, the patient was receiving the following oral medication:
- Amiodarone 200 mg once daily
- Lansoprazole 30 mg once daily
- Hyoscine butylbromide 20 mg once daily
- Tramadol 50 mg if required
- Atenolol 50 mg once daily
- Warfarin, as per international normalised ratio, as per the dose in the anticoagulation book.

The patient lives with his wife and receives no input from social services. When able to, he leads an active family life.

**Outcomes**

At the time of writing (March 2015), the ported IV3000\(^\text{1}\) dressing had been in situ for 7 days, and did not appear to become uncomfortable for the patient, who was instructed to contact the community team if a review of the dressing was required.

The dressing was easy to apply, while its transparency aided visualisation of the PICC entry site, facilitating accurate assessment of the VIP score. In addition, the dressing was effectively secured, and it protected the PICC entry site, reducing the risk of contamination and accidental removal of the device. There was no build-up of moisture under the dressing, with the device remaining secure at all times during the 7-day period.

Despite his clinical diagnosis, the patient is active and the dressing did not restrict his arm movement or, indeed, his lifestyle. The dressing was easy to remove and left no marks on the skin.

**Figures 1 and 2** depict the skin integrity before and after 2 weeks’ use of IV3000.

The patient stated that, as a subcutaneous catheter securement device was already in situ when the IV3000 securing strips were applied, the strips caused pain and irritation to his skin, so he stopped using them but continued to use the dressing.

The patient showers daily, and uses a PICC line waterproof shower protector, which he is able to apply over the dressing with ease.

Update: since this case study was first written, the patient has been using the ported IV3000 dressing for over 2 months without any problems, with only weekly dressing changes required.
The subject of this case study is a 41-year-old woman with a complex bowel history, including an ileal stricture performed in 2013, who was admitted to hospital with abdominal pain and vomiting. MRI revealed a bowel stricture, which was treated conservatively with intravenous (IV) fluids, pain relief and anti-emetics. The patient had multiple cannulations, and so was referred to the vascular access team. She was in severe pain and unable to tolerate anything orally, so received infusions in the surgical ward.

The following medications were administered:
- Paracetamol 1 g three times a day
- Tramadol 100 mg three times a day
- Cyclizine 50 mg three times a day
- Metoclopramide 10 mg three times a day
- Omeprazole 40 mg two times a day
- 0.9% sodium chloride 1000 ml over 8 hours.

Outcomes
When the midline was first inserted, the patient’s skin was sweaty and clammy to the touch. As often occurs following insertion, there was bleeding at the entry site, which was therefore covered with a gauze dressing and the ported IV3000 dressing for 24 hours, as per the standard procedure, by which time the bleeding had stopped. IV3000 was then used alone for the remaining 14 days that the midline was in place, with the dressing and needle-free connector being replaced every 7 days.

As the entry site was assessed daily using the visual infusion phlebitis (VIP) score, a transparent dressing was required. The dressing was a good size, fitting over the stabilisation device and midline, keeping it secure and free from contamination (Figure 1). The dressing is ported at the top, which enabled the complete midline to be secured well at the sides, reducing the risk of migration and contamination. It was also easy to remove, with no adhesive left on the skin or signs of skin irritation (Figure 2).

The dressing remained intact over each 7-day period that it was in situ, while patient movement had no effect on it (Figure 3). At dressing change, the patient’s skin was observed to be dry, minimising the risk of excoriation. The skin integrity was the same as that on the surrounding skin further up the arm.

The patient had had other midlines inserted in the past, and so was able to compare the new version of IV3000 with both the previous version and other IV dressings. She said the new version felt secure and comfortable, as it did not pull on her skin.

The patient continued to receive IV infusions until she was able to tolerate fluids and discharged home.
Peripheral cannula in the community

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In January 2015, a 48-year-old woman was diagnosed with breast cancer and underwent a wide local excision of her left breast in April. Following discharge from hospital, she was transferred to the community intravenous (IV) specialist team. She required IV antibiotics for an infection at the mastectomy wound site. Due to the length of the treatment, which totalled 4 days, it was decided to continue administration of the IV antibiotics via a peripheral cannula, with a view to placing a peripherally inserted central catheter (PICC) at a later date. The community nurses administered the antibiotics in the patient’s home once daily throughout the 4-day course. The effectiveness of the ported IV3000® dressing was monitored during this time.

Outcomes

The IV3000 dressing, which was placed over the peripheral cannula when it was inserted, remained intact for the full 4 days. The cannula was effectively secured by an adhesive strip (Figure 1), while the dressing was large enough to cover it entirely with ease, thereby limiting the risk of contamination. The dressing adhered well to the patient’s skin.

The patient was advised to continue with her normal lifestyle but to be mindful of the cannula when washing and dressing. She was able to wash on a daily basis and, while she avoided getting the dressing wet, she reported that she sometimes splashed it. Despite this, the dressing remained completely intact and free of infection. The patient said the dressing did not cause any irritation or limit her ability to maintain her activities of daily living.

The IV3000 has a large transparent section, which covered the cannula exit site. This allowed the nurses to inspect the site for any signs of infection, allergic reactions or problems with the line, such as misplacement or migration. Daily inspections using the visual infusion phlebitis (VIP) scoring chart indicated that the site remained free of infection throughout the treatment period.

Outcomes

The community nurses found the dressing easy to apply and remove, which was assisted by clear markings showing which sections to remove/apply and in what order.

Following the completion of the course of antibiotics, a stretching technique was used to remove the dressing. It was comfortably eased off, causing minimal distress to the patient and her skin (Figure 2). As the antibiotics eliminated the wound-site infection, the cannula was removed and the patient was able to continue her recovery from surgery.

Figure 1. The peripheral cannula was secured with an adhesive strip

Figure 2. Skin integrity after removal of the dressing
A 76-year-old female was admitted to her local hospital with ascites and pleural effusions. A computerised tomography (CT) scan showed an ovarian mass. Following biopsy, cytology revealed adenocarcinoma, likely of ovarian origin. The patient was referred to the regional medical oncology team for review, and a treatment plan was devised that included the administration of carboplatin AUC5 400 mg. Her past medical history included diverticular disease, osteoporosis and osteoarthritis.

Chemotherapy was administered via a peripheral cannula. The insertion site and surrounding area were cleansed using 2% chlorhexidine gluconate in alcohol and allowed to dry. Peripheral venous cannulation was achieved at the second attempt using an aseptic non-touch technique.

**Outcome**

The cannula was secured on the patient’s skin with the two sterile adhesive fixing strips supplied with the ported IV3000 dressing. These strips kept the cannula secure, preventing its movement. The transparent nature of the dressing allowed for easy observation of the puncture site without compromising the dressing’s integrity. The visual infusion phlebitis (VIP) score remained at zero during this time.

The cannula was removed the following day when the consultant decided that a blood transfusion was not necessary. During the 25 hours that the cannula and dressing were in place, the patient did not report any discomfort during the dressing’s application and removal. The dressing itself was very easy to apply and remove.

The patient was able to wash herself during her hospital stay, and the IV3000 dressing provided a waterproof barrier that both maintained its integrity and protected the cannula. Apart from the small puncture hole resulting from the insertion site, there were no other reminders of the cannula, including no redness or irritation caused by the dressing. Despite the vulnerable nature of the patient’s skin, its integrity was not compromised during dressing removal (Figures 1 and 2).

**Figure 1. Skin integrity before application of IV3000**

**Figure 2. Skin integrity after 25 hours’ use of IV3000**

A 76-year-old female was admitted to her local hospital with ascites and pleural effusions. A computerised tomography (CT) scan showed an ovarian mass. Following biopsy, cytology revealed adenocarcinoma, likely of ovarian origin. The patient was referred to the regional medical oncology team for review, and a treatment plan was devised that included the administration of carboplatin AUC5 400 mg. Her past medical history included diverticular disease, osteoporosis and osteoarthritis.
The venepuncture and peripheral IV cannulation e-learning module, sponsored by Smith & Nephew, provides digital training on venepuncture and peripheral cannulation. It is based on the work of Leeds Teaching Hospital NHS Trust, the Royal College of Nursing Standards for Infusion Therapy and the Royal Marsden Hospital’s manual of clinical nursing procedures. The module comprises eight e-chapters, each of which concludes with an assessment on the information given. The user’s progress is monitored by a practice/research supervisor.

The module comprises eight chapters:

- Chapter 1: professional and legal issues, including accountability, consent, duty of care, negligence, documentation, vicarious liability and confidentiality
- Chapter 2: anatomy and physiology, including the vascular system, suitable veins for venepuncture and peripheral cannulation, structure of the skin and blood vessels, how to differentiate between veins and arteries, skin assessment, fluid distribution in the body, pH and osmotic concentration
- Chapter 3: site selection and vein assessment, including criteria for site and vein selection, with information on visual inspection, palpation, physiological considerations, key sites to avoid and how to enhance venous access
- Chapter 4: equipment sets, covering selecting equipment for venepuncture and cannulation, gauge sizes, use of smaller cannulae, haemodilution, needle-free access systems, non-ported, ported and winged cannulae, extension sets and semi-permeable transparent dressings
- Chapter 5: venepuncture and peripheral cannulation insertion procedure, with step-by-step guides and videos
- Chapter 6: potential complications, covering thrombosis, thrombophlebitis, haematoma, infiltration and extravasation
- Chapter 7: post-insertion (cannulation), including insertion, observation, dressing the device, maintaining patency and removal
- Chapter 8: infection prevention, including hand hygiene, aseptic non-touch technique, identifying patients at increased risk, routes of contamination, plus national infection prevention guidelines and safe disposal of sharps.

At end of the course, the user should be able to:

- Assess the patient’s understanding of the procedure
- Assess the condition of the patient’s veins, distinguish between different structures, and recognise and locate veins suitable for venepuncture and cannulation
- Identify and access suitable veins in order to achieve venepuncture and cannulation successfully
- Recognise and manage any complications arising during and from the procedure.

Nevertheless, the e-learning module does not certify competence and is not a replacement for hands-on training, a full clinical assessment or professional clinical judgement.

Katherine Hill is a practice development nurse at NHS Greater Glasgow and Clyde, who is implementing the e-learning module in her trust. She is involved in the delivery of education and training, ranging from clinical skills to specialty-specific training, and talks about it here:

**Why did you think that an alternative form of education was required?**

There was an increasing demand, because both registered and unregistered staff can attend venepuncture and cannulation training. Now registered staff can complete the e-learning module before attending a practical session. This means we can deliver a shortened practical session and run two sessions per day instead of one—essentially doubling the amount of registered staff we are training.

**How is the module being rolled out in your trust?**

All registered staff who want to attend venepuncture and cannulation practical sessions must complete the e-learning module first.

**How expensive is it, in terms of cost and nurses’ time?**

We paid to upload it onto LearnPro, an NHS e-learning system, so there was an initial outlay of around £1200, but this includes technical support. It takes the nurses a few hours to do the module, but the practical session is shorter, so time at the workplace is probably similar to before. Owing to the clinical pressures that many nurses have, though, they might not get time to complete the module in the workplace.

**How can you ensure that nurses will complete the e-learning module training?**

Nurses must bring their completed certificates with them, and if they don’t, they cannot stay for the practical session and will not be issued with a competency book to complete supervised practice within their clinical area.

For further details, please email: iv3000@smith-nephew.com

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**Selection of the correct dressing for insertion sites is advised as a best practice to prevent infections.**

Our range includes four types of dressings in various sizes:

- **Frame Delivery**
  - A transparent film dressing with moisture-responsive technology that incorporates non-woven wings which reinforce fixation around the catheter. The backing paper design allows users to apply the dressing using only one hand.

- **Non-ported dressings**
  - A transparent film dressing with moisture-responsive technology with edges of orange tape. These can either be torn from the edges or secured with the dressing.

- **Ported dressings**
  - A transparent film dressing with moisture-responsive technology with two securing strips and a documentation label.

- **Infection Prevention Guidelines**
  - Our range of dressings is designed to prevent infections, with features such as moisture-responsive technology and non-woven wings to reinforce fixation.

**Recommended indications**

- **Central**
  - 4cm x 5cm** 4654 100 Paediatric
  - 6cm x 8cm 4923 100 Peripheral
  - 10cm x 14cm 6680 100 Central
  - 6cm x 8.5cm 4924 100 Peripheral
  - 6cm x 10cm 4655 100 Paediatric

- **Peripheral**
  - 3cm x 4cm 4653 100 Paediatric
  - 4cm x 5cm 4654 100 Paediatric
  - 6cm x 8cm 4923 100 Peripheral
  - 6cm x 8.5cm 4924 100 Peripheral
  - 6cm x 10cm 4655 100 Paediatric

**Management of Catheter Sites, JAVA, vol. 9, pp. 26-33, 2004.**


Smith & Nephew. Wound Management.
IV3000 product range

Selection of the correct dressing for insertion sites is advised as a best practice to prevent infections¹. IV3000 offers an extensive range of dressings designed to meet the most common IV therapy practices. Our range includes four types of dressings in various sizes²:

**Ported dressings**
A transparent film dressing with moisture-responsive technology that incorporates non-woven wings which reinforce fixation around the catheter site. The dressing has an opening designed to host the cannula’s port. The dressing also includes two sterile IMPROVED securing strips for catheter or tube fixation and a sterile documentation label³,⁴.

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*Availability and product code could vary per country

**Non-ported dressings**
A transparent film dressing with moisture-responsive technology with two IMPROVED securing strips and documentation label³,⁴. The backing paper design allows users to apply the dressing using only one hand⁵.

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*Availability and product code could vary per country

**Frame Delivery**
A transparent film dressing with moisture-responsive technology. The frame delivery system allows user to position the dressing over the catheter with immediate visualization of the IV site. The dressing includes two securing strips and documentation label⁶.

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*Availability and product code could vary per country

**Reinforced handle (orange-handles)**
A transparent film dressing with moisture-responsive technology with edges of orange tape. These can either be torn from the edges of the dressing and used for extra security of the catheter or left in place as part of the dressing⁷.

<table>
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*Availability and product code could vary per country

References