Remember the risks of intravenous therapy and know how to reduce them

Nicola Brooks, Associate Dean, Faculty of Health and Life Sciences, De Montfort University, reflects on the potential problems that can occur with the administration of intravenous therapy

While undertaking research for my book, Intravenous Therapy Administration: A Practical Guide, I realised the importance of the role that intravenous (IV) therapy plays in medicines management, due to its widespread use across healthcare services (Brooks, 2017). IV therapy use has grown rapidly since it was first described in the early 1970s, with more recent figures suggesting that up to 80% of patients admitted to hospital are likely to receive it (Doyle et al, 2014).

With increasing demands for hospital beds and lengthening waiting lists for treatment, provision has further expanded—IV therapy services have been implemented within community healthcare services as an alternative to hospitalisation and as a strategy for hospital avoidance. Researching for my book led me to focus on knowledge that the practitioner needs to avoid potential patient harm, and prevent the more common risks and complications that are inherent in the preparation and administration of IV therapy.

Complications of IV therapy include: infection, phlebitis, infiltration, extravasation, speed shock, circulatory overload and anaphylaxis.

Infection
Staphylococcus epidermis may enter into the circulatory system through the access device insertion site and cause infection. Other bacteria such as Staphylococcus aureus and enterococci or candida species can be introduced through contaminated infusion fluid (McCallum and Higgins, 2012), causing systemic bacteraemia or fungal infection. Signs and symptoms of infection include localised erythema (reddening of the skin), pus, warmth to the area, and pain, ranging to fever, malaise, tachycardia, hypotension, shock and death, if the infection spreads systemically. In order to reduce the risk of infection it is essential that good handwashing practice and an aseptic non-touch technique (ANTT) are used when managing an IV device, as this significantly reduces risk.

Phlebitis and thrombophlebitis
Phlebitis is another common problem, described as inflammation of the tunica intima of the vein. Signs and symptoms of phlebitis include erythema and swelling along the vein—this leads to vein hardening with a ‘cord-like’ appearance. The area will feel warm, and the patient may feel discomfort/pain during administration of IV therapy. Worryingly, it is estimated that up to 80% of patients receiving IV therapy reported signs and symptoms of phlebitis (Ung et al, 2002).

There are three different types of phlebitis:

- Mechanical phlebitis occurs when the device causes inflammation to the tunica intima part of the vein. To reduce risk the smallest gauge peripheral access device should be inserted (Scales, 2008); and changing the device every 72 hours (Loveday et al, 2014; Royal College of Nursing (RCN), 2016) reduces the likelihood of complications.

- Thrombophlebitis is caused by microorganisms entering the vein through the insertion site, either due to a poor cannulation technique or as a consequence of poor hand hygiene. Microorganisms can also originate from the patient’s skin flora or via cross-contamination through injectable ports on the IV access device. It is important that healthcare practitioners use an ANTT when inserting a peripheral IV access device and adopt regular IV access device care.

- Chemical phlebitis is caused by fluid/medication causing vein inflammation; this can be due to the irritant nature of the medication, the pH or osmolality (concentration) of the medication. It is important that the correct strength of the infusion is prepared and administered in accordance with the manufacturer’s guidelines to reduce risk.

Many healthcare providers have adopted the use of a phlebitis scale to assist with daily IV access device care. Although there are various published scales, the RCN (2016) has adopted the Jackson score (1998) as the preferred risk assessment tool. Jackson (1998) uses a scoring system ranging from 0 (no signs of phlebitis) to 5 (advanced stage thrombophlebitis) and provides a management plan dependent on the score. Early phlebitis at an IV access device site usually resolves after the infusion is stopped and the device is removed. The affected limb can be elevated to minimise inflammation (dos Reis et al, 2009) and anti-inflammatory analgesia can be administered to treat inflammation and pain associated with phlebitis (Higginson and Parry, 2011).

Infiltration and extravasation
Perhaps the most common complication is often referred to in clinical practice as the IV access device ‘tissuing’, but the technical term would be either infiltration or extravasation. Both refer to the inadvertent administration of a fluid into surrounding tissues; extravasation is the term for a vesicant (chemical substance that causes irritation) fluid/medication, whereas infiltration relates to a non-vesicant fluid/medication.

Signs and symptoms include swelling at the insertion site, cooling/blanching of the skin, and leakage around the peripheral access device. The patient may complain of pain; this is usually due to the amount of swelling at the insertion site. Extravasation can show as redness around the affected site, similar to sunburn. Sometimes the patient may complain of a burning sensation—immediate patient assessment and action is needed, as tissue necrosis may occur.

The degree of tissue damage will depend on the type of drug or fluid being infused, and how long it is present in the tissues before being discovered. Both complications usually
cause the slowing or stopping of the infusion, which is often the first sign of a problem. If an IV medication/fluid is running it should be stopped immediately. If therapy is to be maintained, the IV access device should be re-sited onto another upper limb.

**Speed shock**

Speed shock is a less common complication of IV therapy, and one that can certainly be avoided with foresight and knowledge. Speed shock is a systemic reaction that occurs when the IV fluid/medication is administered rapidly (Weinstein and Hagle, 2014). It is more of a hazard when administering IV therapy using a bolus method. In order to avoid speed shock it is essential that IV therapy is administered at the prescribed rate. Sadly, I hear reports of healthcare workers administering medicines too quickly, resulting in discomfort and patient harm. When flushing a peripheral access device, a ‘push pause’ method should be used to reduce speed of administration (Ingram and Lavery, 2005).

**Circulatory overload**

Circulatory overload can occur when fluid is given too rapidly. Venous pressure increases and creates the potential for cardiac dilution and pulmonary oedema (Dougherty, 2013). Circulatory overload can result in congestive cardiac failure, shock and cardiac arrest. Particular patients at risk are elderly people, those with impaired cardiac/renal function and children. To avoid both speed shock and circulatory overload, an infusion device is essential to ensure that the therapy is delivered at a prescribed rate. A sound knowledge of the medication and the correct rate of administration is critical to ensure safe practice.

**Anaphylaxis**

The final risk to be considered is anaphylaxis. Fortunately, I have never seen anaphylaxis occur due to administration of IV medication, but I have spoken to colleagues who have.

Anaphylaxis is an immediate systemic hypersensitivity reaction caused by an immunological release of mediators from mast cells and basophils (Ingram and Lavery, 2005). It can have life-threatening consequences for an individual. Anaphylaxis is often predictable, so it is important to identify how to reduce risks, and consider factors such as patient history, the route of administration, the rate of medication/fluid, known patient allergies or previous history of anaphylaxis. Reactions from anaphylaxis range from a mild skin reaction to cardiovascular collapse.

The actions that the health professional will need to take depend on the severity of the symptoms. If anaphylaxis is suspected, the medication should be discontinued immediately, and help summoned. Vital signs should be monitored. If the patient is unconscious, their airway, breathing and circulation (ABC) should be checked, and cardiopulmonary resuscitation (CPR) started if there is no pulse present. Once help arrives, the next step is to administer oxygen, IV fluids and adrenaline in the prescribed amount. If the patient is conscious, it is important to provide reassurance, communicate with them effectively and provide information to reduce their fears.

**Conclusion**

It is hoped that this article has highlighted some of the common risks associated with the preparation and administration of IV therapy, and will broadly serve to update and refresh readers’ knowledge.

Nurses must make sure that they keep their skills up to date, and never administer any fluid or medication if they are unsure of the process. They must always adhere to local policy and clinical practice guidelines to ensure patient safety and to reduce the risk of patient harm. **BJN**