Subcutaneous infusion in palliative care: the neria™ soft infusion set

Janice Gabriel

Abstract

Patients approaching the end of their life may be unable to tolerate the administration of oral medication owing to their underlying disease and/or symptoms, such as nausea and vomiting. Subcutaneous infusion is an alternative route of administration that offers several advantages over oral and intravenous routes. This product focus article provides an overview of subcutaneous infusion, including how the selection of the most appropriate infusion device can greatly contribute to the overall comfort of the patient. This in turn minimises the potential for premature device loss, which can lead to repeated insertion procedures for the patient, increases the potential for infection, and has resource implications. The article then describes the neria™ soft infusion set, as well as providing case studies of its use.

Key words: Palliative care ● Subcutaneous infusion ● Syringe pumps (drivers) ● Device securement ● Neria™ soft infusion set

Medicines and fluids may be administered via the parenteral route when a patient is unable to take them orally owing to their underlying disease or symptoms. If a patient is severely dehydrated the parenteral route may also be used for rapid fluid replacement (Dougherty, 2006; Twycross et al, 2009). Infusions of fluids and medicines directly into the blood stream, i.e. intravenously (IV), have an instantaneous effect, and for the majority of patients that is the desired objective. However, in the palliative care setting, IV administration is not likely to be the most appropriate alternative to oral administration. Subcutaneous infusion is generally preferable, as it is less invasive, likely to be more comfortable, and maintains more stable drug levels in the plasma (NHS Greater Glasgow and Clyde, 2010).

This paper provides an overview of subcutaneous infusion and then goes on to describe one subcutaneous infusion device, the neria™ soft infusion set. It also provides case studies illustrating the use of this set in clinical practice and the benefits it offers.

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Subcutaneous infusion

Subcutaneous infusion, sometimes referred to as interstitial infusion, involves the insertion of a hollow-bore infusion device (needle or cannula) under a patient's skin. It is commonly used to infuse low volumes of fluids or medication(s) for patients who are unable to take them orally. Common conditions that may warrant the establishment of a subcutaneous infusion in the palliative care setting include nausea and vomiting, intestinal obstruction, uncontrolled pain, breathlessness, agitation, dysphagia, and unconsciousness (Queensland Health, 2010; Twycross and Wilcock, 2011).

Subcutaneous infusion is not subject to the same range of complications that affect vascular infusions, such as thrombosis, infiltration, and device occlusion (Dougherty, 2006). This is because, unlike vascular access devices (VADs), subcutaneous infusion devices do not reside in a blood vessel and so cannot for example become blocked by blood reflux (Gabriel, 2008). The placement of a peripheral VAD, commonly in the hand or lower arm veins, can also result in mobility limitations for the patient (Ingram and Lavery, 2005). As subcutaneous infusion devices are sited under the skin, they impose fewer physical limitations (Twycross and Wilcock, 2011) (*Figure 1*). Although subcutaneous infusion devices still require securement to minimise the potential for dislodgement, they are more comfortable for the patient, especially if the individual is frail and/or has complex care challenges, such as restlessness or limited mobility.

Subcutaneous infusion can ensure the patient receives their prescribed treatment reliably and in a timely fashion, in particular if a syringe driver is used for continuous subcutaneous infusion (CSCI) (Twycross and Wilcock, 2011). Here, the syringe volume containing the medication(s) is programmed into the syringe driver to ensure it delivers the prescribed amount over a given time period. A further advantage of this is reduced need to disturb the patient. The more commonly

used syringe drivers are small, easily portable, and battery operated. A motor depresses the plunger on the syringe, which then forces the fluid from the syringe, through the tubing and cannula and into the subcutaneous tissue, where it is absorbed (Twycross and Wilcock, 2011).

Very few patients require CSCI for administration of analgesia alone; rather, it is generally used to administer a mixture of medications (Twycross and Wilcock, 2011). Guidlines on which drugs can be mixed are available (NHS Greater Glasgow and Clyde, 2010; Twycross and Wilcock, 2011), and pharmacists or palliative care specialists may also be able to advise.

Devices

Subcutaneous infusion devices fall into two main groups: the more traditional hollow-bore, steel needle, winged infusion devices, and the newer soft cannulae, commonly constructed from Teflon™ or Vialon™. The latter group are introduced into the subcutaneous tissue via a hollow-bore 'introducer' needle. Once the cannula is *in situ* the introducer needle is removed, leaving the cannula in place. Not only is this more comfortable for the patient, but it also greatly diminishes the potential for sharps-related injuries as the needle is only used to insert the cannula and then safely disposed of (Trim, 2004; Royal College of Nursing (RCN), 2010; Gabriel, 2012). The risk of inflammation of the infusion site is also reduced (Dawkins et al, 2000; Torre, 2002).

As subcutaneous infusions involve administering a low volume of fluid, a small-gauge cannula can be used. The smaller the gauge, the less discomfort caused to the patient during the insertion procedure (RCN, 2010).

Establishing a CSCI

Common subcutaneous insertion sites include the upper chest (intercostal plane), upper arm (outer aspect), abdomen, thigh, and upper back (Twycross and Wilcock, 2011). As for all infusions, the establishment of a CSCI is an invasive procedure, and aseptic technique should be used (Pratt et al, 2007; Gabriel, 2008; RCN, 2010). To reduce the potential for infection, as well as post-insertion complications, the health professional inserting the device should adhere to the following (Pratt et al, 2007; RCN, 2010):

- Explain the procedure to the patient and ensure they are comfortable
- Remove excess hair from the intended insertion site, using scissors or an electric shaver
- Wash hands thoroughly with soap and water, and dry them carefully
- Apply gloves

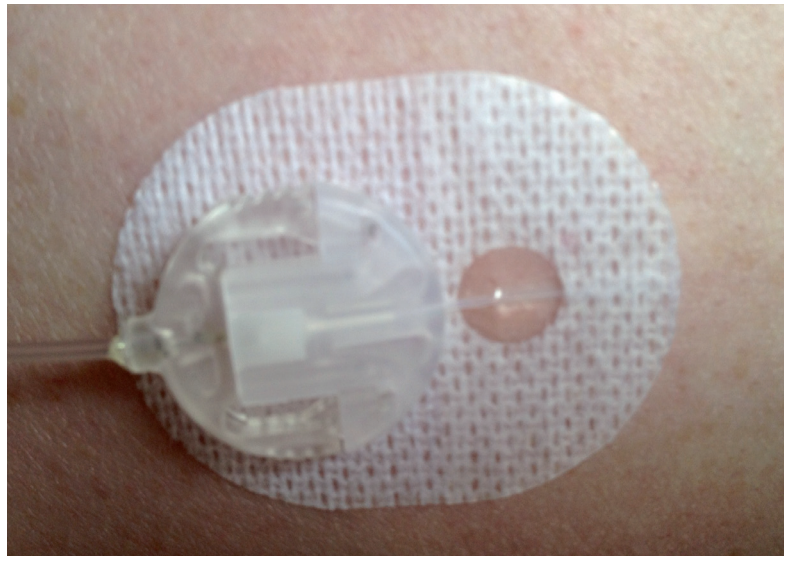

Figure 1. A subcutaneous infusion device* in situ*: the neria™ soft infusion set

- Use only sterile, single-use equipment
- Clean the intended insertion site with an appropriate antimicrobial solution, preferably one that is chlorhexidine based, and allow it to dry
- Prime the infusion tubing with the fluid/medication(s) in the syringe to expel any air from the system
- Insert the device
- Remove any blood on the patient's skin
- Secure the device to the patient's skin to minimise the potential for dislodgement
- Cover with a sterile dressing
- Connect the primed tubing to the infusion device
- Connect the syringe containing the medication(s) to the syringe driver
- Activate the syringe driver/pump to deliver the prescribed medication(s)
- Ensure the patient is comfortable and the syringe driver/pump is secure
- Clear away the used equipment, including safe disposal of any sharps
- Record the procedure in the patient's notes
- Change the syringe every 24 hours.

The neria™ soft infusion set

One subcutaneous infusion device is the neria™ soft infusion set (*Figure 2*). This device has previously been used for other delivery systems and is now being used in palliative care settings following the recent completion of morphine stability testing. Features of the neria™ soft set include:

- Soft cannula
- Small-gauge introducer needle (27g)
- Angled insertion (20–45 degrees)

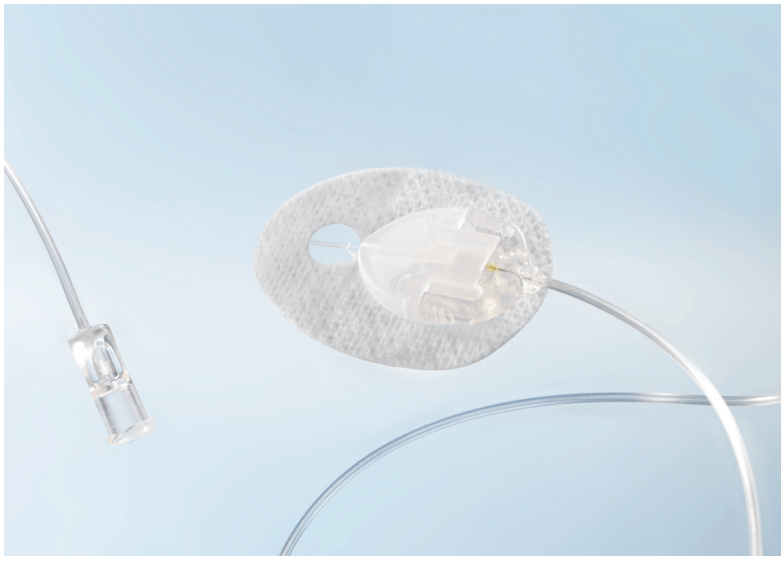

Figure 2. The neria™ soft infusion set.

- Built-in adhesive dressing with integral transparent panel over the insertion site
- Small-bore, double-layer infusion tubing with standard Luer-lock.

Given that the subcutaneous soft cannula, infusion tubing, and dressing are all included in one sterile packet, dispensing with the requirement for several different items, makes the device ideal for patients being cared for outside the secondary care setting. Establishing a CSCI with the neria™ soft set is straightforward. Once primed, the proximal end of the infusion tubing is directly attached to the infusion soft cannula, and the Luer lock at the other end is connected to the syringe, which in turn is placed into the syringe driver.

The small bore of the neria™ soft infusion set tubing helps to minimise drug wastage during priming, and its double layer helps to prevent kinking, which is a substantial problem with other infusion devices (Griffith, 2011). Furthermore, in the author's experience the integral adhesive dressing is skin-friendly and yet at the same time it is extremely secure. This is a particularly important consideration for patients with advanced disease whose skin may be fragile. Adequate securement will help to prevent premature device removal by minimising the potential for accidental dislodgment. This is beneficial for the patient as it ensures uninterrupted administration of the medication and eliminates the distress and discomfort of replacement (Twycross and Wilcock, 2011). An appropriate dressing over a cannulation site also minimises the risk of infection. Crnich and Maki (2002) demonstrated the effectiveness of self-adhesive anchoring of IV devices, not dissimilar to the integral dressing of the neria™ soft set, in minimising the risk of infection.

The potential for infection is also minimised by the transparent window that is incorporated into the dressing of the neria™ soft set. This allows the health professional to observe the insertion site for any signs of inflammation and/or infection without having to disturb the dressing or compromising its integrity. This also adds to the overall comfort of the patient. For the NHS there are also resource implications, as additional expenditure will not be incurred in replacing an infusion device that has been prematurely lost or in treating a device-related infection. Indeed, many guidelines now recommend the use of dressings with transparent windows (Queensland Health, 2010; NHS Greater Glasgow and Clyde, 2010).

Case study 1

Mr C was a 68-year-old, married, retired fireman who had advanced metastatic prostate cancer. His skin was quite oedematous, creating an additional nursing challenge in ensuring it retained its integrity. He was being cared for at home with the support of the community nursing and local hospice at home teams. CSCI was required to control his pain and nausea. A neria™ soft infusion set was used to deliver his prescribed medication. This allowed easy observation of the insertion site, without the need to disturb the dressing. The integral dressing also firmly secured the device to Mr C's skin without causing any irritation, helping to retain its integrity. Skin adhesion had been a particular challenge with other devices as Mr C had been sweating quite profusely, but the adhesive dressing of the neria™ soft set was able to contend with this. The length of the tubing allowed easy changing of the syringe, yet without kinking. The neria™ soft set allowed Mr C to receive his medication without any interruptions until he died peacefully 5 days later.

Case study 2

Mr P, a 72-year-old retired civil servant, presented with weight loss, increasing breathlessness, and upper abdominal pain in late July 2012. He was diagnosed with advanced colon cancer and extensive liver metastases. After discussions with the colorectal multidisciplinary team and Mr P himself, the decision was made to refer him for palliative care.

Although Mr P had terminal cancer, initially he was still quite active. However, he was experiencing a great deal of abdominal pain, for which he was prescribed oral analgesia. Over the next 2 weeks his conditioned deteriorated and he became less mobile and unable to tolerate

oral medication. The decision was made to commence him on a syringe driver for the administration of subcutaneous morphine and anti-emetics. The neria™ soft infusion set was chosen for this purpose. Mr P tolerated this method of drug administration well and was able to enjoy several short outings with his family, before his condition deteriorated further in early September. He was admitted to his local hospice for 3 days to assess his overall management, which resulted in a change of medications. Although Mr P had become quite emaciated, the neria™ soft set was not causing any problems with either adherence to his abdominal skin or skin irritation. The device remained *in situ* and Mr P was transferred home with the support of the hospice's community team, where he died several days later.

Case study 3

Mrs A was a 54-year-old housewife with advanced ovarian cancer. She was admitted to hospital as an emergency with abdominal ascites. This was subsequently drained, but as she had widespread disease she was still in a lot of discomfort. She was referred to the specialist palliative care team who, following an initial assessment, arranged for Mrs A to be transferred to the local hospice for symptom management.

Mrs A spent 5 days in the hospice, where her pain management involved titrating her oral morphine medication. However, she was still feeling very nauseated and had difficulty with eating and drinking. Once her pain was controlled the decision was made to commence her on a syringe driver, so both her analgesia and anti-emetics could be delivered subcutaneously. The syringe driver was established using a neria™ soft infusion set, with the cannula inserted subcutaneously on the outer aspect of her left upper arm.

Over the following day Mrs A received continuing physiotherapy support to help her mobilise. The establishment of the subcutaneous infusion did not interfere with this, or indeed with any other aspects of daily living including showering. Mrs A was then discharged home with the support of the hospice's outreach team, her local GP, and the community nursing service.

Conclusion

The overall comfort and wellbeing of a terminally ill individual is the key concern for palliative care professionals. When considering what infusion device to use, safety, simplicity, reliability, effectiveness, and comfort are paramount (Gabriel, 2008). As technology advances, it is reassuring to see that palliative care patients can benefit. The neria™ soft infusion set incorporates not only safer sharps designs, but a skin-friendly, secure, and comfortable dressing with a transparent window, and the added benefit of kink-resistant infusion tubing. The presence of all of these in one small, sterile pack makes the neria™ soft set ideal for use in hospices and community settings, where it can often be difficult to ensure that all the appropriate components required for establishing and/or changing a subcutaneous infusion are at hand. The result of such developments significantly contributes to improved quality of patient care.

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Statement of interests

Unomedical—a ConvaTec company, the manufacturer of the neria™ soft infusion set, paid for the publication of this article. They also supplied the author with free samples of the neria™ soft infusion set. MA Healthcare retained sole editorial responsibility for the content of the article. IJPN

Crnich CJ, Maki DG (2002) The promise of novel technology for the prevention of intravascular device-related bloodstream infections. II. Long-term devices. *Clin Infect Dis* **34**(10): 1362–8

Dawkins L, Britton D, Johnson I, Higgins B, Dean T (2000) A randomized trial of winged Vialon cannulae and metal butterfly needles. *Int J Palliat Nurs* **6**(3): 110–6

Dougherty L (2006) *Central Venous Access Devices: Care and Management*. Blackwell Publishing, Oxford

Gabriel J (2008) Infusion therapy. Part two: prevention and management of complications. *Nurs Stand* **22**(32): 41–8

Gabriel J (2012) Sharps injuries and their prevention: what the new European legislation may mean for palliative care services. *Int Journal Palliat Nurs* **18**(5): 222–3

Griffith S (2011) Improving practice using action research: resolving the problem of kinking with non-metal cannulae. *Int J Palliat Nurs* **17**(11): 531–6

Ingram P, Lavery I (2005) Peripheral intravenous therapy: key risks and implications for practice. *Nurs Stand* **19**(46): 55–64

NHS Greater Glasgow and Clyde (2010) *Guidelines for the Use of Subcutaneous Medications in Palliative Care for Adults – Primary Care and Hospices*. NHS Greater Glasgow and Clyde

Pratt R J, Pellowe C M, Wilson J A et al (2007) epic2: National evidence-based guidelines for preventing healthcare-associated infections in NHS hospitals in England. *J Hosp Infect* **65**(Suppl 1): S1–S64

Queensland Health (2010) *Guidelines for Subcutaneous Infusion Device Management in Palliative Care. Second Edition*. The State of Queensland

Royal College of Nursing (RCN) (2010) *Standards for Infusion Therapy*. RCN, London

Torre MC (2002) Subcutaneous infusion: non-metal cannulae vs metal butterfly needles. *Br J Commun Nurs* **7**(7): 365–9

Trim JC (2004) Raising awareness and reducing the risk of needlestick injuries. *Prof Nurs* **19**(5): 259–64

Twycross R, Wilcock A (2011) *Palliative Care Formulary*. 4th edn. palliativedrugs.com

Twycross R, Wilcock A, Stark Toller C (2009) *Symptom Management in Advanced Cancer*. 4th edn. palliativedrugs.com