

Management of Subcutaneous Infusions in Palliative Care



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Research and Education



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A Guide to the Training Manual and Learning Package

This manual provides guidance to participants in the ‘Train the Trainer’ workshop in use of the Management of Subcutaneous Infusions in Palliative Care learning package, as well as some teaching and learning principles and resources.

Use of subcutaneous infusion devices has become standard practice in palliative care and improves patient comfort by administration of medications at a constant rate to assist in successful control of a variety of symptoms.

There are some limitations and risks in use of these devices including inflexibility of prescription, technical problems and skin reactions at the subcutaneous cannula insertion site. Subcutaneous infusion devices should be managed in accordance with local policies and procedures, by knowledgeable, appropriately trained staff to minimise risks presented by the limitations of individual devices and their use.

Information contained in the learning package is presented to promote a standard approach to clinical care involving a subcutaneous infusion. It is not intended as education in any specific device. It provides base line information to be used to develop knowledge for beginner level practice with subcutaneous infusion devices or revision for the more experienced practitioner.

Health professionals are at all times accountable and responsible for their own actions and should be aware of the limits of their knowledge, skills and competence and act within those limits.

Acquisition of basic knowledge about subcutaneous infusions in palliative care should be followed by demonstrations and supervised practice to attain beginner level competency in that device. Setting up and managing a subcutaneous infusion device is a skill that may lapse if not practised

regularly and maintaining competency can be difficult for practitioners who have variable exposure to devices and their use.¹

The package is presented in three different forms – website, DVD, and hard copy – to cater for different learning styles and preferences and the fact that some health professionals will not have good internet access and/or web navigation skills. The package presents introductory information about subcutaneous infusions and devices including recent changes in Australia, and six sections based on the Centre for Palliative Care Research and Education’s ‘Guidelines for subcutaneous infusion device management in palliative care’.

It is suggested participants work through each of the sections in turn. They should read the information in each section, read or watch given links and complete activities. At the end of each module, a series of questions in the form of a short quiz will be presented to enable participants to test their understanding. The answers to these questions are covered by the content, links and activities in each section. The package also requires participants to source certain information from their own organisation.

Completion of all sections of the learning package provides base line information for best practice use of subcutaneous infusion devices, allowing for competency development and maintenance. Completion of the self assessment including discussion with a knowledgeable health professional is recommended.

Some Adult Learning Principles

There is a vast amount of information available about teaching and learning principles. A selection is provided here to support you in your education of health professionals about subcutaneous infusion devices. Knowles’ theory of adult learning² is based on several assumptions:

²Knowles MS, Holton EF, Swanson RA (2005). The adult learner (Sixth ed). London: Elsevier.

1. **The need to know.** Adults need to know why they need to learn something before committing to learn it.
2. **The learners' self-concept.** Adults have a self-concept of being responsible for their own lives and decisions, and resent situations where they feel another is imposing their will on them. This can present challenges in adult education. It is important to help the learner be and feel as self-directed as possible.
3. **The role of the learners' experience.** Learners come with all their life experience which means that for many kinds of learning, the adult learners themselves already have rich resources for learning. However that can produce biases, mental habits and preconceptions that close our minds to fresh perceptions, new ideas and different ways of thinking. "...in any situation in which the participants' experiences are ignored or devalued, adults will perceive this as rejecting not only their experience, but rejecting themselves as persons."²
4. **Readiness to learn.** Adults are ready to learn the things they need to know and be able to do in order to be effective in real-life situations, such as their work.
5. **Orientation to learning.** Adults are life-centred, or task-centred or problem-centred in their learning orientation. They are motivated to learn to the extent they perceive the learning will help them solve problems or perform tasks in real life. Adults learn new knowledge most effectively when presented in the context of a real life situation.
6. **Motivation.** The most potent motivators for adults are internal, such as the desire for increased job satisfaction, quality of life, and self-esteem. External motivators such as better job, promotion, higher salary are important but less so. Adults are motivated to keep growing and developing but this may be blocked by negative self-concept, time constraints, and educational programs that violate adult learning principles.

Adult learners have a rich background of life experiences, both personal and work related. Try to tap into that experience when teaching – for example

- what experience does the person already have with infusion devices?
- do they have any concerns about using the devices e.g. a pre-conception that a subcutaneous infusion will hasten death?

For these sorts of reasons, start with identifying the beginning level of knowledge of your participants.

Adults enjoy the opportunity to apply new knowledge – a practical demonstration accompanied by the chance to actually use the device allows them that opportunity.

Some learning resources

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Management of Subcutaneous Infusions in Palliative Care

Introduction

This information is presented to promote a standardised approach to clinical care involving a subcutaneous infusion device. Such an approach should minimise practice errors that can result in serious adverse events and an ongoing risk to patient safety. It provides basic information for beginner level practice with subcutaneous infusion devices or revision for the more experienced practitioner. The package is not device specific, and in an organisational setting should be complemented by comprehensive information about the subcutaneous infusion device being used within that organisation or service.

Health professionals are at all times accountable and responsible for their own actions and should be aware of the limits of their knowledge, skills and competence and act within those limits. Competency has been described as an ability to think in action and make confident, clear decisions based on sound knowledge. Setting up and managing a subcutaneous infusion device is a skill that may lapse if not practised regularly, and maintaining competency can be difficult for practitioners who have variable exposure to the device and its use.¹

The acquisition of basic knowledge about subcutaneous infusion devices, reasons for their use and the drugs commonly administered in the care of a palliative patient should be followed by demonstrations and supervised practice to attain beginner level competency in a particular device.

As with all medical devices, the operation of a subcutaneous infusion device should only be undertaken by, or under the supervision of, appropriately trained staff and in accordance with local policies and procedures and manufacturers' guidelines.

Learning Aim

The aim of this learning package is to assist the clinician to develop knowledge and skills of the basic principles of care for people with subcutaneous infusion devices in palliative care settings.

This package is designed to provide self-directed learning; completion does not provide formal accreditation. Supervised practice with appropriately trained staff managing the device used by your service is recommended.

Learning Objectives

Following successful completion of this package, you should be able to:

- discuss the indications and contraindications for subcutaneous infusions in palliative care;
- explain management and safety principles when using infusion devices;
- discuss principles of appropriate and inappropriate site selection for insertion of a cannula;
- describe strategies for preventing site related problems;
- identify drugs commonly used in subcutaneous infusions, and their indications for use;
- provide accurate information and education to patients and families/ carers using subcutaneous infusion devices;
- safely monitor the patient with a subcutaneous infusion in situ.

Disclaimer

The information contained in this manual has been compiled by the Centre for Palliative Care Research and Education (CPCRE) and Palliative Care Australia (PCA) for educational and information purposes only. It is intended to assist healthcare professionals in developing their knowledge of key principles concerning the use of subcutaneous infusion devices in palliative care.

While CPCRE and PCA have taken particular care in compiling this manual, errors may occur. Therefore, CPCRE and PCA give no warranty as to its accuracy or completeness.

The manual is not intended to replace or constitute medical advice and should not be construed as specific instructions for the delivery of medical treatment or care or the use of any particular device for providing a subcutaneous infusion. It is not a substitute for independent professional medical advice and should not be relied upon to solve issues that may arise in individual cases.

CPCRE and PCA do not accept liability for any direct, incidental or consequential loss or damage arising from the use of or reliance upon the information contained in this manual.

Healthcare professionals should also seek training, supervision and advice from appropriately qualified and experienced clinicians in order to develop the required level of clinical competence to properly treat patients, where appropriate, using subcutaneous infusion devices.

How to Use this Self-Directed Learning Package

The Centre for Palliative Care Research and Education's 'Guidelines for subcutaneous infusion device management in palliative care' (the Guidelines) are an important complementary document to this learning package. It is suggested you work through each of the sections in turn. Read the information, read or watch given links and complete activities. The package also requires you to source certain information from your own organisation. At the end of each section, a series of questions in the form of a short quiz will be presented to enable you to test your understanding. The answers to these questions are covered by the content, links and activities in each section. Completion of the self assessment, including discussion with a knowledgeable health professional, is recommended.

Why are Subcutaneous Infusions Used in Palliative Care?

The World Health Organisation (2004) stated that palliative care is “an approach to care which improves quality of life of patients and their families facing life-threatening illness, through the prevention and relief of suffering by means of early identification and impeccable assessment and treatment of pain and other problems, physical, psychosocial and spiritual”.² Palliative care is provided according to the needs of the individual and may happen days, weeks or months before death. It should be available wherever the person chooses – at home or in a hospital, hospice or residential aged care facility and be supported by a team of health professionals including a specialist palliative care team if needed.

The administration of medication using a subcutaneous infusion device is common practice in palliative care for the management of pain and other distressing symptoms when other routes are inappropriate or ineffective.³ These devices are power driven, delivering medications at a controlled rate to provide symptom control. Subcutaneous infusion devices have become an important part of care to ensure comfort for many patients.⁴ For many years, the Graseby syringe driver was the primary device for

subcutaneous administration of a range of drugs in palliative care. In early 2007 the manufacturer of the Graseby MS16A and MS26 syringe drivers informed the Therapeutic Goods Administration (TGA) of their intention to withdraw the devices from sale in Australia. In October 2007 the new TGA regulatory standards regarding medical infusion devices became mandatory. Graseby syringe drivers purchased prior to October 2007 continue to be supported by the manufacturer for device maintenance, allowing services to transition to devices that meet the new regulatory standards. Information contained in this learning package is relevant to devices now in use in Australia.⁵

What are the Advantages and Limitations of Subcutaneous Infusion Devices?

Subcutaneous delivery of medication via an infusion device:

- allows the continuous supply of a range of drugs bypassing the gut and associated problems with swallowing and malabsorption³;
- can provide more stable plasma levels of drugs and better symptom control as peaks and troughs of intermittent drug administration are avoided³;
- generally involves a small, portable or relatively portable battery operated pump that delivers medications at an accurately controlled rate⁶;
- provides versatility offering a convenient, accessible alternative for continuous administration of medications;
- can be used for ambulant patients with most devices able to be worn relatively unobtrusively, not interfering with patients wanting to continue with their normal daily activities;

- can provide continued management of symptoms removing the need for frequent interventions like repeated oral medications or injections at end of life.

Indications and Contraindications

Indications for commencement of a subcutaneous infusion include:

- inability to swallow due to dysphagia from physical obstruction/ tumour in the mouth, throat or oesophagus;
- persistent nausea and vomiting;
- severe weakness;
- unconsciousness;
- bowel obstruction.³

Contraindications for use of this route include:

- lack of permission from the patient and/or family/carer as proxy;
- where other viable routes of administration are available;
- where contraindications exist related to the drugs to be infused.

The decision to commence a subcutaneous infusion of medication should be made after careful assessment and review by health professionals involved in the patient's care, the patient, and family/carer.

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Section 1: The Patient and Family/Carer Experience

Health professionals involved in end of life care have for a long time assumed that patients find use of a subcutaneous infusion device acceptable because of its compact size and that its use facilitates independence and the option of being cared for at home. However there has been little research into patients' attitudes to support this assumption about subcutaneous infusion devices.¹ Although it is true these devices have allowed many patients to be at home with their family, health care professionals need to be mindful of how the patient and family/carers perceive the experience of a subcutaneous infusion device.

Learning Objectives

At the completion of this section, you should be able to:

- describe aspects of the experience of having a subcutaneous infusion from the patient and family/carers point of view;
- demonstrate an understanding of the potential impact on patient and family/carers of having a subcutaneous infusion.

Some studies have reported that subcutaneous infusions are well accepted and can achieve almost 100% compliance amongst people with a life limiting illness², but being attached to a subcutaneous infusion device can pose difficulties for the patient and family/carers. In practical terms of normal daily activities, consideration needs to be given to:

- choosing clothes to wear;
- bathing;
- wearing a seat belt in relation to cannula position;
- the size and weight of the device and its ability to be worn discreetly;

- sleeping position in relation to cannula position;
- devices that may require frequent battery changes or frequent access to a power point for charging may create a reluctance to leave the home;
- reports by some patients that the devices are noisy³ and inconvenient;
- questions about food and alcohol intake;
- patients and family/carers who perceive these changes as a negative impact on their lifestyle.

Patient and family/carer perceptions or experiences of a subcutaneous infusion device are varied and individual to the person, the environment and the underlying cause for use of the device. Being mindful that the device will be perceived differently dependent upon these factors will aid the health professional to provide a positive experience for the patient and family/carer.

Remembering that the patient and family/carer may not have considered advance care planning goals, negative perceptions of the infusion device may be influenced by the following:

- the device may be viewed as an invasion of body privacy;
- the device may be perceived as an indicator of a poor prognosis⁴;
- the patient and family/carer may have fears associated with drugs commonly used in palliative care;
- the device may become the focus of fear of impending death.

Thoughtful explanation given with care to provide information and support appropriate to the individual patient and family/carer may assist the health professional to understand the significance that they attach to the change in care and any associated emotional distress.⁵ Good anticipatory care with well timed information ensuring patient and family/carer understanding can be associated with a positive experience for patient, family/carer and health professional.

Links

Section 1 ‘Guidelines for subcutaneous infusion device management in palliative care’

Activity

Read Client and Family/Carer Statements at the end of this booklet, about the experience of a subcutaneous infusion device.

Watch excerpt from Chapter 2 – ‘Who Needs one?’ of Brisbane South Palliative Care Collaborative’s Guide for Clinicians – How to Use a Syringe Driver for Palliative Care Patients.

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Quiz: Section 1 - The Patient and Family/Carer Experience

This quiz will test the objectives and content in Section 1 of the Learning Package and the 'Guidelines for subcutaneous infusion device management in palliative care' document.

Q1) When starting a subcutaneous infusion, which of the following should be considered when preparing the patient and family/carers for the experience:

- Changes in level of alertness
- clothing
- alcohol intake
- driving
- all of the above

Q2) Commencing a syringe driver is perceived by some to mean?

- Good prognosis
- Poor prognosis
- Doctors have 'given up' on them
- Nothing is working
- All of the above

Q3) Infusions are only commenced when death is likely to happen within days

- True
- False

Q4) Commencing a subcutaneous infusion via a device means that the person cannot attend to normal ADLs

- True
- False

Q5) Providing good information about a subcutaneous infusion device can change the experience for patient or family/carers

- True
- False

Section 2: General Equipment

Learning Objectives

At the completion of this section, you should be able to:

- describe subcutaneous infusion devices currently in use in palliative care in Australia;
- explain management principles when caring for patients with these devices;
- describe important safety principles when using this equipment.

Types of Subcutaneous Infusion Devices

Subcutaneous infusion devices are generally electronic, battery driven devices with a syringe, cassette or reservoir to hold medications to be delivered via the subcutaneous route to the patient. Devices currently in use in Australia include the Niki T34, Graseby, CADD Legacy PCA, GemStar and WalkMed 350LX.

Important Principles when using Subcutaneous Infusion Devices

The *Guidelines* discuss the following principles regarding equipment used for subcutaneous infusions. When setting up the equipment for a subcutaneous infusion, it is always important to consult the manufacturer's guidelines and verify the individual organisation's protocol regarding the preparation and set-up for changing the device.

General Principles

General management principles for all subcutaneous infusion devices include:

- always use the manufacturer's guidelines and your organisation's protocol regarding preparation and set-up for changing the device to guide your practice;
- an aseptic technique should be used when preparing and setting up the infusion¹;
- subcutaneous infusion devices have traditionally been used to deliver medications over a 24 hour period to reduce the risk of errors in setting up the device^{1,2-4};
- microbiological stability and physical and chemical compatibility data most commonly relate to a 24 hour period and it is for this reason that a 24 hour infusion period is still recommended⁵;
- documentation of volume to be infused (in the syringe or reservoir) is recommended at time of set-up and regular checks;
- consider using a tamper-proof 'lock-box' if there is a possibility of the patient or others tampering with the device or using the boost facility; it is possible that a tamper-proof box is mandatory within your organisation as a risk management stipulation;
- ensure that the patient and family have received a full explanation of how the subcutaneous infusion device works, its indications for use, and a 24-hour support number;
- devices should be serviced annually by the manufacturer or a biomedical technician.

Syringe Related Principles

- where a syringe is necessary, a Luer-Lok® syringe should be used to prevent risk of disconnection^{3,6}; 20 ml is the recommended minimum syringe size⁷ to reduce the risk of incompatibility and adverse site reactions, and minimise the effect of priming the line;
- the same brand of syringe should be used each time to minimise errors in setting up the device and calculating the rate^{3,6} (Graseby only);

Cannula Related Principles

Because a Teflon or Vialon cannula is associated with less site inflammation, it should be used rather than a metal needle.

Dosage Related Principles

- when changing the extension set and/or cannula, prime the line after drawing up the prescribed medications, and before connecting to the patient. After priming the line, note the volume to be infused and document the line change and the time the infusion is calculated to finish;
- a minimum volume extension set should be used to minimise dead-space in the line⁷;
- for the Graseby, it is the length of the solution within the syringe – not the volume – that will determine the rate, i.e. the syringe driver delivery rate is a measure of distance, not a measure of volume administered.

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QUIZ: Section 2 - Equipment Guidelines and Principles

This quiz will test the objectives and content in Section 2 of the Learning Package and the 'Guidelines for subcutaneous infusion device management in palliative care' document.

- Q1)** It is not necessary to verify your workplace protocol regarding preparation and set-up for subcutaneous infusion device.
True
False
- Q2)** The recommended subcutaneous infusion period is 24 hours.
True
False
- Q3)** The patient and family do not need an explanation of how the subcutaneous infusion device works, or indications for use.
True
False
- Q4)** The recommended minimum syringe size is 10ml.
True
False
- Q5)** Always employ an aseptic technique when changing the cannula.
True
False
- Q6)** The volume to be infused, i.e. the volume in the syringe or reservoir, should be documented at the time of set-up and regular checks.
True
False

Section 3: Selection, Preparation and Maintenance of the Site

Learning Objectives

At the completion of this section, you should be able to:

- explain the most appropriate sites for subcutaneous infusion;
- explain which sites are inappropriate for subcutaneous infusion;
- describe techniques that may assist in minimising site irritation;
- describe important principles for site inspection.

General principles for appropriate site selection

- use an area with a good depth of subcutaneous fat;
- use a site that is not near a joint;
- select a site that is easily accessible such as the chest or abdomen;
- select and use sites on a rotating basis¹;
- site selection will be influenced by whether the patient is ambulatory, agitated and/or distressed;
- the chest or abdomen are preferred sites², specifically the upper, anterior chest wall above the breast, away from the axilla. If the patient is cachectic, the abdomen is a preferred site²;
- site longevity can vary from 1–14 days; many variables influence site longevity, such as type of medication and type of cannula used;
- factors that cause site reactions include tonicity of the medication, solution pH, infection, and prolonged presence of a foreign body.³

Inappropriate site selection includes⁴

- lymphoedematous areas;
- areas where there is broken skin;
- skin sites that have recently been irradiated;
- sites of infection;
- bony prominences;
- in close proximity to a joint;
- sites of tumour;
- skin folds;
- inflamed skin areas;
- wherever ascites or pitting oedema are present;
- where scarring is present;
- areas where lymphatic drainage may be compromised¹, for example in women who have had a mastectomy.

Site related problems

Remember, any site problems will cause the patient discomfort and may also interfere with drug absorption and compromise effective symptom control. Therefore, the selection of an appropriate site for subcutaneous infusions via a syringe driver has implications for the patient.

Site problems may be associated with inappropriate site selection, or due to site irritation.

Factors contributing to site irritation/reactions include:

- the tonicity (concentration) of the medication;
- the pH of the solution;
- infection;
- prolonged presence of a foreign body³;
- some medications including:
 - ▶ cyclizine^{2,5}
 - ▶ levomepromazine
 - ▶ methadone
 - ▶ promethazine
 - ▶ morphine tartrate
 - ▶ ketamine⁴

Techniques that may be considered in consultation with the treating physician to minimise site irritation include:

- diluting the medications by using a larger syringe size²;
- using normal saline (0.9%) if applicable, instead of water for injection²;
- adding 1 mg of dexamethasone to the syringe⁶ - one Australian trial found that the addition of 1 mg of dexamethasone to syringe drivers can significantly extend the longevity of the subcutaneous infusion site⁷;
- use of a Teflon® or Vialon® cannula, e.g. the BD Saf-T-Intima, reduces site inflammation.^{2,8-10}

Site Inspection

Meticulous site inspection is integral to early identification and prevention of site related complications, and should be performed as part of routine care.^{6,11,12} Any site problems can potentially cause patient discomfort. They also interfere with drug absorption and compromise effective symptom control.

When inspecting the site, check for:

- tenderness or hardness at the site;
- presence of a haematoma;
- leakage at the insertion site;
- swelling—a sterile abscess can occur at the insertion site, causing local tissue irritation¹²;
- erythema (redness);
- the presence of blood in the tubing;
- displacement of the cannula.⁴

In addition to checking the site regularly (4 hourly is recommended), other important patient checks include:

- asking the patient how they feel (or family member/carer, if the patient is unable to comprehend): are their pain and other symptoms controlled?
- ensuring that the infusion device is working e.g.
 - ▶ on the Niki T34 the LED light flashes green;
 - ▶ on the GemStar arrows progress across the screen;
 - ▶ on the WalkMedLX350, squares progress across the screen and ‘infusing’ is seen on screen;

- ▶ on the Graseby the light flashes green and a ‘whirring’ sound can be heard as the device delivers the infusion;
- checking the volume remaining in the syringe, and that the device is running to time;
- ensuring there are no leakages, and that connections to the syringe and cannula are firm.

Principles for site preparation and cannula insertion include:

- an aseptic technique must be employed, as many patients who require a subcutaneous infusion are immuno-compromised. Ensure hands are washed thoroughly¹²;
- in consultation with the patient and family, select a suitable site¹² using the principles for appropriate site selection;
- select and use sites on a rotating basis¹;
- prepare the skin using an antiseptic with residual activity, e.g. a solution containing 0.5% to 2% chlorhexidine gluconate in >70% ethyl or isopropyl alcohol¹³, and wait for skin to dry. NB: ‘The solution should be applied vigorously to an area of skin approximately 15cm in diameter, in a circular motion beginning in the centre of the proposed site and moving outward, for at least 30 seconds’¹³;
- the point of the cannula should be inserted just beneath the epidermis. For thin people the angle of the cannula on insertion may need to be less (30 degrees) than for a person with more subcutaneous tissue (45 degrees). A deeper infusion may prolong the life of the infusion site.

To insert:

- grasp the skin firmly to elevate the subcutaneous tissue. Insert the cannula and release the skin;
- remove the stylet if using a BD Saf-T-Intima® and take care to hold the device in situ when removing the stylet so that the entire device is not accidentally removed from the patient.

Note: If a metal cannula is being used, place the bevel of the metal device downwards to deliver the drugs more deeply into the skin, and minimise irritation.

- the extension tubing is changed when the cannula is changed;
- when the tubing is placed against the skin, form a loop to prevent dislodgement if the tubing is accidentally pulled⁶. Use a transparent, semi-occlusive dressing to cover the site, as this permits inspection of the site by the caregiver^{6,8};
- where relevant, place the syringe in the syringe driver;
- record and document that the infusion has been commenced, and volume to be infused, as per local drug administration policies.

Activity

Choosing the site: Watch excerpt from Chapter 2 – ‘Who Needs One?’ of Brisbane South Palliative Care Collaborative’s Guide for Clinicians – How to Use a Syringe Driver for Palliative Care Patients.

Insertion of cannula: Watch excerpt from Chapter 2 – ‘Who Needs One?’ of Brisbane South Palliative Care Collaborative’s Guide for Clinicians – How to Use a Syringe Driver for Palliative Care Patients.

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QUIZ: Section 3 - Selection, Preparation and Maintenance of the Site

This quiz will test the objectives and content in Section 3 of the Learning Package and the 'Guidelines for subcutaneous infusion device management in palliative care' document.

Q1) You are preparing to insert a cannula for Mrs. Betty Smith, who requires a subcutaneous infusion via a syringe driver. What is generally the preferred site for insertion of the cannula?

- Upper Arm
- Thigh
- Chest or Abdomen
- Back of the hand

Q2) You are preparing to insert a cannula for Mrs. Betty Smith, who requires a subcutaneous infusion. If she was cachectic, what may be the preferred site?

- Back of the hand
- Abdomen
- Thigh
- Upper Arm

Q3) If Mrs. Smith is distressed or agitated, and there is a risk of dislodgement, which site might be considered?

- Scapula
- Thigh
- Abdomen
- Upper Arm

Q4) Each of the following is an important consideration in selecting an appropriate site EXCEPT:

- Choosing an area with a good depth of subcutaneous tissue
- Avoiding oedematous areas
- Selecting a site that is close to a joint
- Selecting a site that is easily accessible

Q5) Which of the following may assist in minimising site irritation?

- Ensuring the syringe driver is safely secured to prevent disconnection
- Using a metal needle
- Diluting the medications by using a larger syringe size
- Changing the cannula to another site

Q6) Key Principles when inspecting the insertion site would include all the following EXCEPT:

- Ensuring the syringe driver is safely secured to prevent disconnection
- Inspecting for redness at the site
- Inspecting for tenderness or hardness at the site
- Ensuring the patient doesn't get out of bed when the syringe driver is operational

Section 4: Drugs and Diluents

Learning Objectives

At the completion of this section, you should be able to:

- describe the most commonly used drugs in subcutaneous infusions, and their indications for use;
- explain which drugs are contraindicated in subcutaneous infusions;
- state the most commonly used diluent in subcutaneous infusions.

Drug administration via a subcutaneous infusion device

- a prescription from a medical officer or appropriately credentialed nurse practitioner is required before administering any medication;
- subcutaneous infusion devices can be used to deliver drugs to treat a variety of symptoms, particularly when other drug routes are no longer available, or are unacceptable to the patient; common symptoms include pain, nausea, vomiting, breathlessness, agitation, delirium and “noisy breathing”¹;
- a wide variety of drugs can be used together in different combinations with no clinical evidence of loss of efficacy²;
- the more drugs that are mixed together, the greater the risk of precipitation and reduced efficacy³;
- 2–3 drugs may be mixed in a subcutaneous infusion (occasionally up to 4 drugs^{4,5});
- if compatibility is an issue, the use of two subcutaneous infusion devices³ or regular or prn subcutaneous injections should be considered;

- before mixing any drugs together in a subcutaneous infusion, check for stability and compatibility information^{3,4,6-8} e.g. with hospital pharmacists; other sources include The Syringe Driver¹ and PalliativeDrugs.com¹²;
- use of the boost facility, where available, is not advocated; a boost dose rarely provides sufficient analgesia to relieve uncontrolled pain, and may lead to overdosing of other drugs being infused⁴;
- it is better to use breakthrough medication to treat uncontrolled symptoms than the boost facility⁹;
- normal saline is the most commonly used diluent in Australia¹⁰;
- the use of water for injection has been linked to pain due to its hypotonicity, although normal saline may be more likely to cause precipitation¹¹;
- 5% dextrose is used only occasionally as a diluent⁴, and is not commonly used in Australia.¹²

In the Australian context, symptoms that are encountered at the end of life are generally well controlled by the use of nine commonly used medications.¹³ These include:

- morphine sulphate/tartrate (an opioid);
- hydromorphone (Dilaudid, an opioid);
- haloperidol (Serenace, an antipsychotic/antiemetic);
- midazolam (Hypnovel, a short acting benzodiazepine);
- metoclopramide (Maxolon, an antiemetic);
- hyoscine hydrobromide (hyoscine, an antimuscarinic/antiemetic);
- clonazepam (Rivotril, a benzodiazepine);
- hyoscine butylbromide (Buscopan, an antimuscarinic); and
- fentanyl (a narcotic).

Temperature may affect the stability of drugs. This can be overcome by ensuring the infusion device is placed on top of bed clothes and outside of clothing, rather than beneath them.⁴

Medications contraindicated for use via subcutaneous infusion due to severe localised reactions^{3,11}:

- prochlorperazine (Stemetil, an antiemetic);
- diazepam (Valium, an anxiolytic); and
- chlorpromazine (Largactil, an antipsychotic)

Medications linked to abscess formation when used in subcutaneous infusions:

- pethidine hydrochloride (pethidine, an analgesic);
- prochlorperazine (Stemetil, an antiemetic); and
- chlorpromazine (Largactil, an antipsychotic).¹

Diluents

The choice between water for injection and 0.9% (normal) saline as a diluent is a matter of debate. The literature is divided with some recommending water for injection as the diluent^{3,4,10,12}, and recent literature recommending normal saline.¹ Normal saline can be used for most drugs, the main exception being cyclizine.⁴

Normal saline is most commonly used within Australia for two reasons¹:

- firstly, the majority of drugs can be diluted with normal saline with only

two exceptions: cyclizine and diamorphine (neither of which are commonly used in Australia);

- secondly, normal saline is isotonic, as are most injectable formulations. By diluting with normal saline, the tonicity of the solution is unaltered. Water for injection is hypotonic; using it as a diluent will potentially produce a hypotonic solution, which the literature suggests can contribute to the development of site reactions.¹ For example, the use of water for injection has been linked to pain due to its hypotonicity, although normal saline is more likely to cause precipitation.¹¹

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QUIZ: Section 4.1 - Drugs and Diluents

This quiz will test the objectives and content in Section 4 of the Learning Package and the 'Guidelines for subcutaneous infusion device management in palliative care' document.

Q1) Which two of the following drugs are contraindicated for subcutaneous infusions?

- Morphine Tartrate
- Fentanyl
- Chlorpromazine
- Pethidine

Q2) Normal saline is the most commonly used diluent for subcutaneous infusions in Australia.

- True
- False

Q3) The generic name for Dilaudid is:

- Serenace
- Hypnovel
- Durogesic
- Hydromorphone

Q4) The brand name for haloperidol is:

- Maxolon
- Durogesic
- Buscopan
- Serenace

Q5) The brand name for midazolam is:

- Hypnovel
- Metaclopramide
- Serenace
- Dilaudid

Q6) The generic name for Buscopan is:

- Durogesic
- Hyoscine Butylbromide
- Hypnovel
- Hyoscine Hydrobromide

Q7) The generic name for Maxolon is:

- Morphine
- Buscogesic
- Metoclopramide
- Hydromorphone

Q8) What are two indications for the use of morphine sulphate / tartrate in subcutaneous infusions?

- Morphine is well absorbed
- It is often used to dry terminal secretions
- Higher doses may control agitation and confusion
- It is an opioid for pain control

Q9) What are two indications for the use of hydromorphone in subcutaneous infusions?

- It is an opioid for pain control
- It may be used when morphine is not effective
- It is used as an antiemetic
- It is effective for controlling anxiety or terminal restlessness

Q10) What are two indications for the use of haloperidol in subcutaneous infusions?

It is not directly an antiemetic, but does reduce gastrointestinal secretions

It is an antipsychotic agent and dopamine antagonist

It is an opioid for pain control

It may be used in low doses to control nausea and vomiting

Q11) What are two indications for the use of midazolam in subcutaneous infusions?

It is an antiemetic

It is a narcotic

It is a short-acting benzodiazepine, used to control anxiety or terminal agitation

It is a short-acting benzodiazepine, used to control seizures

Q12) What are two indications for / characteristics of the use of metoclopramide in subcutaneous infusions?

It is useful in the treatment of nausea and vomiting

It may be used when morphine is not effective

Higher doses may control agitation and confusion

It is contraindicated in complete or suspected intestinal obstruction

Q13) What are two indications for the use of Buscopan in subcutaneous infusions?

It is an opioid for pain control

For the treatment of GIT spasm

Higher doses may control agitation and confusion

It reduces gastrointestinal secretions

Q14) What would be an indication for using fentanyl in a subcutaneous infusion?

It is often used to dry terminal secretions

It is often used to control seizures and anxiety

It is a narcotic for severe pain

It is used as an antiemetic

QUIZ: Section 4.2 - Drugs and Diluents (Calculations)

In the following 6 questions, calculate the volume for each of the breakthrough drugs ordered, using the strengths indicated.

Q15) (morphine 10mg in 1ml) morphine 2.5mg = ? ml

Q16) (morphine 10mg in 1ml) morphine 25mg = ? ml

Q17) (morphine 120mg in 1.5ml) morphine 80mg = ? ml

Q18) (midazolam 5mg in 1ml) midazolam 2.5mg = ? ml

Q19) (midazolam 5mg in 1ml) midazolam 7.5mg = ? ml

Q20) (haloperidol 5mg in 1ml) haloperidol 1.5mg = ? ml

In the next 4 questions you should calculate the volume required of each medication for the following subcutaneous infusion order over 24 hours: midazolam 10mg; morphine 15mg; metoclopramide 20mg. Note: the strength of available drug is shown in each question.

Q21) 10mg of midazolam (15mg/3ml) = ? ml

Q22) 15mg of morphine sulphate (30mg/1ml) = ? ml

Q23) 20mg of metoclopramide (10mg/2ml) = ? ml

Q24) What is the total volume of the medication? = ? ml

For the next 4 questions, the subcutaneous infusion order has now changed: re-calculate using the following medication order.

Q25) 25mg of midazolam(15mg/3ml)= ? ml

Q26) 45mg of morphine sulphate(30mg/1ml)= ? ml

Q27) 25mg of Maxolon (10mg/2ml)= ? ml

Q28) What is the total volume of the medication? = ? ml



Section 5: Patient and Family/Carer Education

Careful explanation and education about what the device will do, its advantages and possible disadvantages, as well as a 24-hour support number, is required for patients with subcutaneous infusion devices and their families.¹ When health professionals provide education to patients and family/carers it promotes safety and acceptance of the infusion device as a means of providing improved symptom control.² Good, well timed information can prepare the family/carer for the role they are taking on, minimising potential adverse consequences.³

Learning Objectives

At the completion of this section, you should be able to:

- outline the key elements of patient/family education to promote safe use of subcutaneous infusion devices by the patient/family;
- describe strategies to support patient/family decision making regarding symptom management.

Strategies for Providing Effective Education and Support

The patient and family/carer should be given verbal and practical guidance about living with a subcutaneous infusion device. Health professionals should be mindful that information and education given when the patient is unwell and the family/carer is anxious may need to be repeated and reinforced.

Explanation, demonstration and practice should be:

- simple and focus on needed motor skills e.g. changing the battery;

- repeated as needed;
- reassuring to the patient and family/carer about their ability to manage the device.

Written information should:

- be clear and understandable;
- include information about management of common issues with the device in use;
- include what to do if the device alarms;
- include how to contact a knowledgeable health practitioner out of hours.

Topics for Education

Information about the device

Subcutaneous infusion devices are very reliable. It is important that the patient and family/carer are informed about indicators of normal device functioning such as a 'whirring' noise, a small flashing light or a screen with arrows running across it.

The patient and/or family/carer should be encouraged to check the device regularly to ensure it is functioning normally, but they should also be encouraged not to worry about checking it overnight.

The patient and family/carer should be reassured that if they believe something is wrong with the infusion device or if the alarm sounds, it is likely to be a problem that is easily rectified. For these devices it is important the patient and family/carer are confident in their ability to manage simple issues that may arise in the normal functioning of the device.

Daily Living

The patient and family/carer should be encouraged and guided in ways to incorporate the subcutaneous infusion device into their everyday life. These devices are designed to make the patient's life more comfortable and to be able to continue with daily routines.

- the patient may shower or bathe as normal;
- instruction and clear written information regarding disconnection from the infusion device for showering, and reconnection afterwards, should be given by the health professional. The period of disconnection should be as brief as possible;
- patients and family/carers should be given information about general care of the device to allay fears of dropping or damaging the device⁴;
- the patient should be provided with a bag or encouraged to purchase a belt bag to conceal and carry the infusion device;
- a locked box or perspex cover should be provided as patients and family/carers have reported feelings of insecurity and concern about the robustness of the device.

Medications

Patients and family/carers should be informed there may be a change in the patient's level of alertness as a consequence of administering some medications subcutaneously. They should be reassured that the response is generally transitory, dependent on the general condition of the patient, and the drugs can be titrated appropriately if it remains a problem after a few days.

The patient and carer should be given clear instructions about management of breakthrough pain or other symptoms and be reassured about the use of medications on those occasions.⁵ Breakthrough medication is defined

as extra medication that may be required for symptoms not controlled by medications prescribed for continuous delivery.

Drug Storage and safety

The patient and family/carer should be advised about appropriate safety and storage measures for medications including information about the supply to be held in the home, safe storage in a locked cupboard if appropriate, as well as temperature and moisture control.

Carer Support

Education and information concerning the provision of care at home has been recognised as emotionally beneficial for family/carers⁶, reducing the risk of carer anxiety and stress. The family/carer may describe additional concerns as the patient's condition changes and they are called upon to make proxy decisions about symptoms and breakthrough medications. The family/carer should be provided with appropriate information about adjustments to care as the patient's condition changes and be reassured about their capability to make proxy decisions and continue providing care. Equally they should be reassured that if they can no longer care for the patient with a subcutaneous infusion device, they will be assisted in seeking out a care alternative.

Simple information strategies such as written guidance, supervised practice and professional contact when needed can decrease the family/carer's anxiety, reduce the chances of forgetting information, and may contribute to a lower incidence of problems.⁷ Good information will assist the family/carer to be confident in decision making, maintain the patient's comfort and have a positive experience of care.

Links

Section 5 of ‘Guidelines for subcutaneous infusion device management in palliative care (Revised Edition)’

Consumer medicine and symptom guide, available from:

http://www.healthnetworks.health.wa.gov.au/cancer/docs/Consumer_Book.pdf

(Government of Western Australia, Department of Health. Palliative care medicine and symptom guide. WA Cancer and Palliative Care Network; 2010.)

Activity

Review your organisation’s written instructions/guidelines/information for patients and family/carers.

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Quiz: Section 5 – Patient and Family/Carer Education

This quiz will test the objectives and content in Section 5 of the Learning Package and the ‘Guidelines for subcutaneous infusion device management in palliative care’ document.

- Q1)** Maintaining personal hygiene with a subcutaneous infusion device can be an issue for patients and family/carers. What advice would you give?
- Don't worry, patients can have a shower because the device is waterproof
 - The infusion can be disconnected for a brief amount of time for showering
 - Patients will need to have sponge baths after the infusion is commenced
- Q2)** Patients and family/carers may become concerned that pain and other symptoms still won't be controlled as the same drugs have been tried by other routes. What reassurance would you give?
- If there is breakthrough pain or other symptoms then extra medication can be given
 - All pain and symptoms will be managed, there will be no more problems
 - If the subcutaneous infusion doesn't work, nothing will
- Q3)** Patients may have a feeling of sedation or overwhelming tiredness when receiving medications via a subcutaneous infusion. What would you tell them?
- This is normal and they will adjust in few days after commencing/changing dose in the infusion
 - Sedation is a side effect of the drugs, nothing can be done about it
 - Once symptoms are controlled, the dose can be adjusted if it remains a problem for them
 - All of the above

- Q4)** Patients and family/carers need to take in a lot of information when a subcutaneous infusion device is being used. What kind of education strategies could you use to ensure that they are able to safely manage the device with confidence?
- a. Provide understandable, written guidelines for them to follow
 - b. Explain, demonstrate and allow time to practice any motor skills
eg. changing the battery
 - c. Provide information about out of hours point of contact with a trained health professional
 - d. All of the above

Section 6: Patient Assessment and Troubleshooting

Thorough assessment is important when caring for patients with a subcutaneous infusion and should include monitoring of the patient¹ and the subcutaneous cannula site², the device and equipment³, and compatibility of drugs being administered.^{4,5}

When troubleshooting equipment used in subcutaneous infusions of medication via a power driven device, it is important to understand the normal functioning of the device.⁶ The use of only one type of device in each setting has been suggested to prevent confusion which may lead to errors.⁷

Learning Objectives

At the completion of this section, you should be able to:

- demonstrate an understanding of relevant principles to guide assessment of the patient having a subcutaneous infusion;
- describe strategies to deal with common issues that arise with subcutaneous infusions and associated equipment.

Patient Assessment

Symptom assessment

Symptom management and control is the key reason for commencing a subcutaneous infusion so it is reasonable that a significant amount of time should be spent upon assessment of the patient's symptoms and efficacy of the intervention. Assessment should include:

- asking the patient how they feel and to rate their symptoms, or if the patient is not able to respond due to condition or comprehension, ask

the carer as an appropriate proxy to rate observable signs of symptoms;

- asking about patterns of symptoms experienced, unrelieved or poor control of symptoms;
- observation for and documentation of side effects of drugs being used.

Use of available, validated tools to assist in the assessment of symptoms and condition of patient and family/carer is recommended. Some tools in common use to aid assessment and documentation of findings can be found at the Palliative Care Outcomes Collaborative (PCOC) website <http://chsd.uow.edu.au/pcoc/>.⁸ Services do not need to be enrolled in PCOC to access or use the tools.

Unrelieved symptoms

Breakthrough medication is defined as extra medication that may be required for symptoms not controlled by medications prescribed for continuous delivery.⁹ Administration of breakthrough doses will aid good pain and symptom control and should be used when:

- a subcutaneous infusion is commenced as it may take up to 48 hours for drug levels to reach a steady state;
- a patient continues to report unrelieved or poor control of pain/symptoms; and
- device and site related problems have been excluded.

It is important to the successful commencement of an infusion that breakthrough medication is provided and used as needed in the first 48 hours after commencement. If symptoms continue to be unrelieved a review of medications being infused should be made. Check to ensure the

medication is appropriate, that an appropriate dose has been prescribed and that the correct dosage has been prepared and is being infused.

Adverse effects

Subcutaneous infusion devices have been used to deliver medications traditionally over a 24 hour period to reduce the risk of errors in setting up the Graseby.⁷ Although the Graseby is now being phased out, evidence on microbiological stability, and physical and chemical compatibility still most commonly relates to a 24 hour period. It is for this reason that a 24 hour infusion period is still recommended.⁹ To minimise the risk of a significant site related adverse event, careful inspection of the site and prompt response to any noted change should form part of good care.

Adverse events related to the drugs being infused, though relatively uncommon, should be noted. The infusion should be stopped and followed by observation of the patient and team discussion about ongoing management.

Subcutaneous cannula site

Ideally, site inspections should be performed at least 4 hourly, noting signs of inflammation and local site reaction² and then be documented on the relevant organisational form. For community services when this is not practical, consider patient and family/carer education regarding observable signs and directions for management of changes.

Inspection of the subcutaneous cannula site should be part of routine care and include checks for tenderness and presence of a haematoma at the cannula insertion site.^{1,4,6}

Other site issues may include:

Inflammation of the cannula insertion site:

- could be a localised skin reaction or an inflammatory response at a previous area of radiotherapy;
- the drugs being infused should be reviewed to confirm they are appropriate for subcutaneous administration and that;
- the drug/drugs are not at a concentration that may cause irritation.

Suggested solutions to manage site inflammation depend on the likely cause and may involve:

- removal and resiting of the subcutaneous cannula;
- increasing the diluent in the device reservoir to reduce the drug concentration;
- addition of dexamethasone to the reservoir to reduce localised site irritation;
- observation and management of consequences that may include infection.⁹

Pain at the cannula insertion site could be due to:

- inflammation for one of the reasons discussed above;
- shallow cannula insertion which may also be a cause of localised inflammation.

Pain at the insertion site requires removal and resiting of the subcutaneous cannula.

Leakage of infusion fluid at the cannula insertion site indicates:

- an unstable cannula position;
- all connections should be checked to ensure they are secure;
- change components as needed;
- the cannula may need to be removed and resited.

Leakage of fluid will contribute to unrelieved pain/symptoms.

Bleeding at the cannula insertion site:

- may be caused by trauma or a coagulation problem;
- requires removal and resiting of the cannula.

Pressure should be applied to the old site which should be observed for further bleeding.

Limited cannula access points:

- may be due to oedema, infection or cachexia;
- require consideration and discussion with colleagues to confirm appropriateness of subcutaneous medication infusion;
- indicate need to consider appropriate site selection (Section 3 of this package).

If the patient is restless, showing signs of delirium, confusion or impaired cognition:

- potential underlying causes should be investigated and treated;
- the possibility of terminal restlessness should be considered;

- causes of agitation like pain, full bladder or bowel should be checked and managed appropriately;
- siting of the cannula around the scapula should be considered to minimise risk of dislodgement;
- a breakthrough dose of an antipsychotic such as haloperidol, risperidone or olanzapine can also be considered.¹⁰

Documentation

Symptom control and efficacy of intervention/infusion should be noted on the appropriate forms of your service. It is suggested documentation should include:

- notations referring to times;
- volumes loaded;
- patient response;
- any adverse incidents or events;
- the capacity for the patient and family to continue management of the infusion device.

Family/Carer

The capability of the family/carer to participate in care of the patient with a subcutaneous infusion device should be checked before commencement of the infusion and assessed regularly after that. The status of the carer – employment, physical and emotional health – should be considered as potentially impacting on the outcome of the intervention.

Device

It is important that you understand the normal functioning of the device being used in your service area.⁶ The small flashing light on the front of the NikiT34 and the Graseby, the intermittent ‘whirring’ sound of the Graseby and the arrows running constantly across the screen of the GemStar all indicate the device is functioning normally.

Priming the line

Ensure that organisational protocol regarding priming of the extension tubing/device line is followed when setting up a subcutaneous infusion (see section 1 of this package).

Alarms

Each device has different settings for triggering its alarms. An alarm will sound if:

- the infusion reservoir (syringe or cassette) is empty;
- the battery or power source is exhausted requiring battery change or placement in a charging cradle;
- tubing is kinked, the cassette is unseated or the syringe is jammed;
- air is detected in the GemStar line or cassette (correction will require clearing the air from the line and re-priming).

The device should be monitored for a short time after correction to confirm normal functioning.

Battery/Power

Battery life is variable. To reduce the potential for a slowed or stopped infusion, batteries should be checked regularly to ensure they are not exhausted. If the device used by your service uses a charging cradle, ensure it is plugged in to mains power, that the device sits easily and properly into the charger, and the indicator light confirming it is on mains power 'flicks' on.

Delivery of Medication

Inspection of the volume remaining⁷ ideally should be at least 4 hourly with findings documented on the relevant organisational form. When this is not practical, consider patient and family/carer education regarding observation of infusion volume and management of findings.

As with any medication, the delivery of the right drug at the right time is essential.

Regular assessment is required to identify any of the following concerns:

Infusion has not run to time

Care should be taken at set up or refilling that correct measures (syringe and cassette volume) and rate of infusion are used. If the infusion does not end 'on time' or within accepted parameters, either early or late finish, basic checks should be made ensuring that:

- the rate has been set correctly and not been altered;
- the syringe length and volume to be infused has been measured correctly;
- the syringe or cassette reservoir is loaded properly into the device;
- there are no impediments to the tubing/line e.g. kinks, or clamps left on;

- the device has not sustained any water damage;
- the device has not been purposefully stopped;
- the device battery has power and is not flat which could cause the infusion to be slowed or stopped⁶;
- the 'boost button' has not been activated;
- estimated and prescribed breakthrough doses have not been exceeded or the GemStar.

For issues with the GemStar repeatedly finishing early due to more than expected breakthrough doses, the prescription can be altered to provide higher volume for infusion while maintaining the same drug concentration.

Infusion has stopped

The most likely reason for the infusion to stop is that there is no remaining fluid to be infused and reloading according to the medical prescription is required. If fluid for infusion remains then check that:

- the device battery is not flat causing the infusion to stop⁶;
- neither the line nor cannula are blocked;
- the drugs in the infusion mixture have not precipitated (crystallised) blocking the tubing;
- there is no mechanical malfunction causing failure of the infusion.

Tubing

Careful inspection of tubing for patency⁶ should ideally be done at least 4 hourly noting twists, kinks, signs of precipitation and secure connections. Findings should be documented on the appropriate form for your service.

Tampering

If it is suspected that there has been purposeful tampering with the device settings or undirected use of the 'boost' facility, a tamper proof 'lock box'⁷ or locking of the device's key pad should be considered to maintain infusion/ drug security.

Drugs

Calculations

When a subcutaneous infusion via a device is being set up or reloaded, all drug calculations should be checked according to local legislative requirements, organisational policy and protocol.

Drug Choice and Dosage

There are a number of drugs suitable and commonly prescribed for subcutaneous infusion in palliative care settings (Section 4). Prescriptions should be checked to ensure that:

- drugs to be infused are appropriate for subcutaneous administration;
- the drug is not at a concentration that may cause localised irritation at the cannula insertion site;
- the drug will provide comfort for the patient.

Compatibility

When a drug is to be infused, or if more than one drug is to be infused in combination, it is important to check the compatibility of the drug/drugs and the diluent to be used^{5,7} to prevent problems with:

- precipitation/crystallisation in tubing or the syringe which would require the syringe or cassette and tubing to be discarded and infusion set up commenced again;
- skin irritation from known drug irritants which would require change of cannula insertion site, but could be avoided by using a larger volume of diluent.⁷

Links

Section 6 of ‘Guidelines for Syringe Driver Management in Palliative Care’

Activity

Identify the tools currently used in your service/organisation for assessment of people receiving palliative care.

References

1. Ratcliffe N. Syringe drivers. *Community Nurse* 1997;3(6):25-26.
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5. Palliative Care Matters. <www.pallcareinfo>. Accessed 10 August 2010
6. Mitten T. Subcutaneous drug infusions: a review of problems and solutions. *International Journal of Palliative Nursing* 2001;7(2):75-85.
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8. Palliative Care Outcomes Collaborative <<http://chsd.uow.edu.au/pcoc/>>. Accessed 13 August 2010.
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10. Palliative Care Expert Group. Therapeutic guidelines: palliative care. Version 3. Melbourne: Therapeutic Guidelines Ltd;2010, p.292.
11. Driscoll A. Managing post discharge care at home: an analysis of patients' and their carer's perceptions of information received during their stay in hospital. *Journal of Advanced Nursing* 2000;31(5):1165-1173.

Quiz: Section 6 - Patient Assessment and Troubleshooting

This quiz will test the objectives and content in Section 6 of the Learning Package and the 'Guidelines for subcutaneous infusion device management in palliative care' document.

- Q1)** Your patient Mrs Smith has a subcutaneous infusion device in situ. Her symptoms have been well controlled however, she is now complaining of an exacerbation of her symptoms. Possible reasons may include:
- a. Device malfunction
 - b. Medication requires review
 - c. Mrs Smith's condition is changing or deteriorating
 - d. All of the above
- Q2)** Mrs Smith's infusion is not running 'on time'. What key areas should be assessed?
- a. Correct volume (more or less than required) added to reservoir at preparation
 - b. Failure to account for infusion volume required to prime the tubing
 - c. Infusion device set at correct rate
 - d. All of the above
- Q3)** Which two of the following infusion site characteristics would indicate problems?
- a. Pink skin
 - b. Tenderness/redness
 - c. Swelling/hardness
 - d. Absence of tenderness
- Q4)** Regular assessment of a patient with a subcutaneous infusion should include:
- a. Effectiveness of symptom management
 - b. Site inspection/assessment
 - c. Checking patency of tubing and syringe volume remaining
 - d. All of the above

Self Assessment

The following tool provides an opportunity for health care professionals involved in the management of subcutaneous infusions to undertake a self-directed assessment of their competency and then discuss their conclusions, if necessary, with another clinician.

This is a guide for individual knowledge and does not replace direct clinical teaching and supervision.

Consider your answer to each of the following questions. I can . . .	I understand and am able to practise safely	I need to learn more
identify indications and contraindications for use of a subcutaneous (s/c) infusion device (see Introduction)		
identify essential equipment required for a s/c infusion of medication (see Section 2)		
describe/demonstrate correct site selection and rationale for selection (see Section 3)		
demonstrate correct preparation and management of a s/c infusion (see Section 2 and Section 3)		
demonstrate understanding of indications for drugs commonly used in s/c infusions in palliative care (see Section 4)		
demonstrate understanding of relevant drug compatibilities (see Section 4)		
demonstrate correct set up of a s/c infusion device used in your organisation including relevant safety and equipment checks (see Section 2 and Section 3)		
describe how to troubleshoot/solve problems that may occur during subcutaneous infusion of medication (see Section 6)		
describe the nurse's role in ensuring individual needs are met including education of patient and carer (see Section 5)		
demonstrate understanding of assessment principles, symptoms, interventions, and potential adverse effects (see Section 6)		
demonstrate knowledge of required documentation (see Section 6)		
explain where to find legislation, policies and procedures relating to subcutaneous infusion of medication (see Section 6 - Drugs)		

Conclusion

The use of subcutaneous infusion devices has become standard and common practice in palliative care. Their use enhances patient comfort by administration of medications at a constant rate to assist in successful control of various symptoms.

Appropriate use of a subcutaneous infusion device allows patients and families the choice of care at home by family and friends with the support of their General Practitioner, visiting nurses, and the local specialist palliative care team as required. It allows effective symptom management with reduction of interventions such as repeated injections. However health care professionals should consider that patient and family/carer knowledge and understanding of a subcutaneous infusion device may be limited, contributing to possible negative perceptions of such devices. Comprehensive education about subcutaneous infusion devices by health professionals involved in the care of these patients and families may improve their knowledge and understanding, and reduce negative perceptions.

As with all medical devices there are some limitations and their use is not without risks including technical problems, medication incompatibilities, and skin reactions at the site of cannula insertion. Subcutaneous infusion devices should be managed by knowledgeable, appropriately trained staff to minimise the risks presented by the limitations of individual devices and their use.

Completion of all sections of this learning package provides base line information for best practice use of subcutaneous infusion devices in palliative care, allowing for competency development and maintenance. Completion of the self assessment including discussion with a knowledgeable health professional is recommended.

Quiz Answers

Section 1 - The Patient and Family/Carer Experience

- Q1) All of the above
- Q2) Poor prognosis
- Q3) False
- Q4) False
- Q5) True

Section 2 - Equipment Guidelines and Principles

- Q1) False
- Q2) True
- Q3) False
- Q4) False
- Q5) True
- Q6) True

Section 3 - Selection, Preparation and Maintenance of the Site

- Q1) Chest or abdomen
- Q2) Abdomen
- Q3) Scapula
- Q4) Selecting a site that is close to a joint
- Q5) Diluting the medications by using a larger syringe
- Q6) Ensuring the patient doesn't get out of bed when the infusion device is operational

Section 4.1 - Drugs and Diluents

- Q1) 3 and 4 - chlorpromazine and pethidine
- Q2) True
- Q3) hydromorphone
- Q4) Serenace
- Q5) Hypnovel
- Q6) hyoscine butylbromide
- Q7) metoclopramide
- Q8) 1 and 4 – morphine is well-absorbed and it is an opioid for pain control.

- Q9)** 1 and 2 – it is an opioid for pain control and it may be used when morphine is not effective
- Q10)** 2 and 4 – it is an antipsychotic agent and dopamine antagonist and it may be used in low doses to control nausea and vomiting.
- Q11)** 3 and 4 – it is a short-acting benzodiazepine, used to control anxiety or terminal agitation and it is a short-acting benzodiazepine, used to control seizures.
- Q12)** 1 and 4 – it is useful in the treatment of nausea and vomiting and it is contraindicated in complete or suspected intestinal obstruction
- Q13)** 2 and 4 – for the treatment of GIT spasm and it reduces gastrointestinal secretions
- Q14)** 3 – it is a narcotic for severe pain

Section 4.2 - Drugs and Diluents

- Q15)** 0.25 ml
- Q16)** 2.5 ml
- Q17)** 1 ml
- Q18)** 0.5 ml
- Q19)** 1.5 ml
- Q20)** 0.3 ml
- Q21)** 2 ml
- Q22)** 0.5 ml
- Q23)** 4 ml
- Q24)** 6.5 ml

Section 5 - Patient and Family/Carer Education

- Q1)** b – the infusion can be disconnected for a brief amount of time for showering
- Q2)** a – if there is breakthrough pain or other symptoms then extra medication can be given for this
- Q3)** d – All of the above
- Q4)** d – All of the above

Section 6 - Patient Assessment and Troubleshooting

- Q1)** d – All of the above
- Q2)** d – All of the above
- Q3)** b and c – tenderness and redness and swelling/hardness
- Q4)** d – All of the above

Patient and Family/Carer Statements

‘I felt fine, [about having the s/c infusion] I felt quite good about it because I thought rather than getting an injection – because I was getting one every night – I thought well that’s fine because it’s over 24 hours, it’s bound to help rather than taking tablets and still being sick.’ (Patient)

‘Once he got the [s/c infusion] he stopped being sick, so it was grand. Life was easier for him and for me.’ (Carer)

‘So if he hadn’t had the [s/c infusion], he maybe wouldn’t have been able to stay at home.’ (Carer)

‘I really didn’t want it. I thought the only time they hook you up to things like this was when your time was up. My doctor talked to me for a long time about why I need it – but I still don’t like the idea of needing a pump just to get through the day.’ (Patient)

‘It means that we don’t leave the house much now. The nurses keep telling me that we can go out but what if something happens . . . the battery went flat the other day – what if we had been somewhere and couldn’t get it changed. It’s too much of a worry so we stay home.’ (Carer)