

# Guidelines for the Use of Subcutaneous Medications in Palliative Care for Adults – Primary Care and Hospices

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Primary Care Palliative Care Team**

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# Part 1

## Bolus Administration



## 1. Rationale and indications

When the oral route is unavailable to patients the subcutaneous (SC) route is the preferred method of drug administration. Intravenous (IV) injections should be avoided because they are invasive and no more effective than the subcutaneous route. Intramuscular (IM) injections should be avoided, as they are painful, particularly in patients who are cachectic.

The SC route should not only be reserved for use in a dying patient. Consider this route for the treatment of pain and/or other symptoms when other routes of administration are inappropriate. Listed below are possible reasons why the SC route could be used:

- Unable to take by mouth
- Nausea and vomiting
- Poor absorption e.g. ileostomy.

SC route will not give better analgesia than the oral route unless there is a problem with absorption or administration.

## 2. Advantages and disadvantages of SC route

### Advantages:

- Can be used when patients can no longer tolerate oral therapy due to nausea, vomiting or dysphagia
- Increased patient comfort, avoiding the need for repeated injections
- Suitable for patients who are very drowsy, comatose or semi-comatose
- Avoids the administration of excessive tablets
- Cannula can be left in for 72 hours or longer if no redness/inflammation, therefore less demanding on nursing resources.

### Disadvantages:

- Possible inflammation or irritation at infusion site
- Possible leakage of SC site
- Possible allergic reaction (rare occurrence).

## 3. SC cannula insertion sites

### Acceptable SC cannula insertion sites (see diagram 1):

- Anterior aspect of the upper arms or anterior abdominal wall
- Anterior aspect of the thigh
- The scapula if the patient is distressed and/or agitated
- Anterior chest wall (least common).

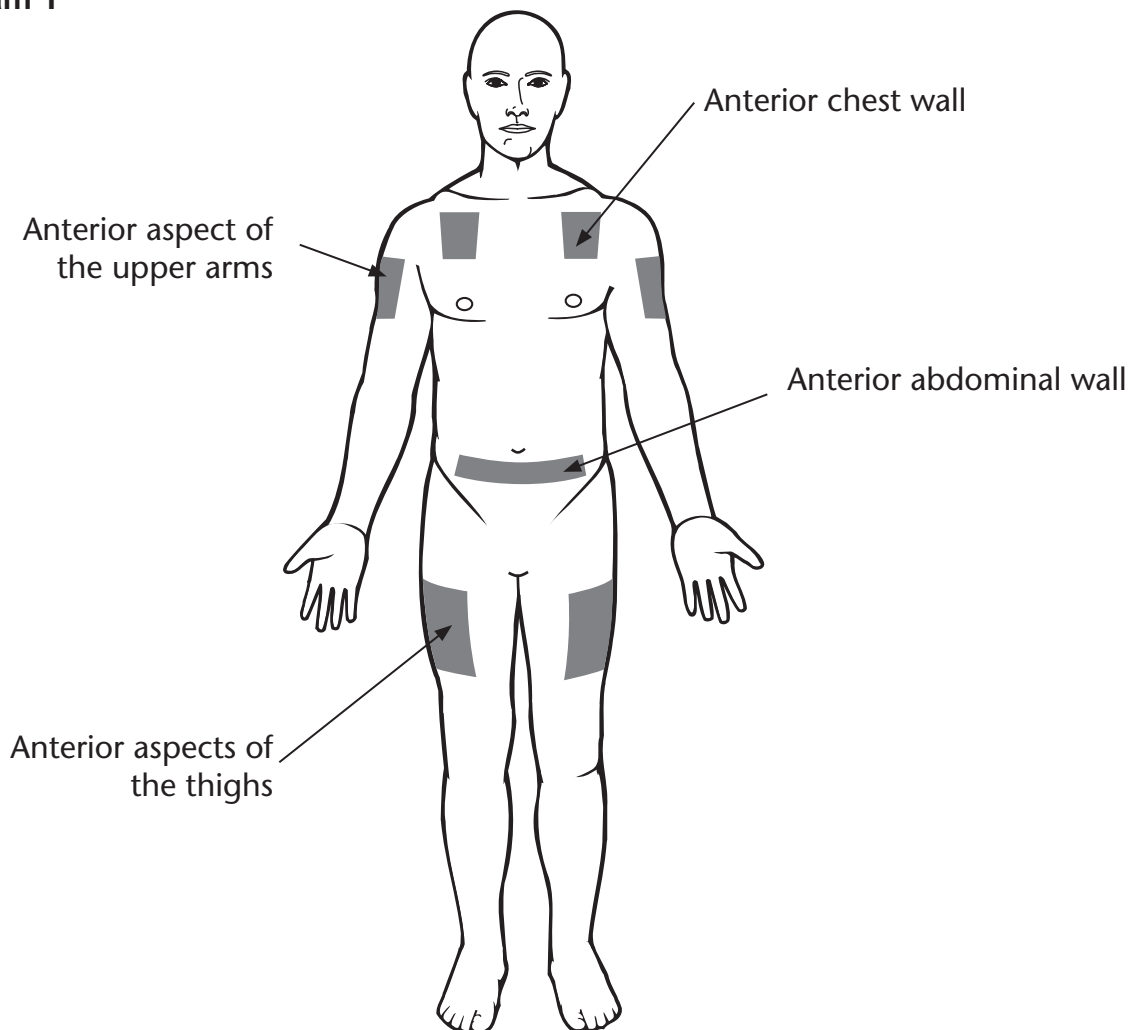
## Bolus Administration

### Sites not suitable for injection

- Skin folds and breast tissue
- Directly over a tumour site
- Lymphoedematous limb or oedema – absorption may be reduced
- The abdominal wall if ascites present
- Bony prominences – little SC tissue, absorption reduced
- Previously irradiated skin – skin may be sclerosed, poor blood supply
- Sites near a joint – uncomfortable, increased risk of displacement
- Infected, broken or bruised skin.

### Acceptable SC cannula insertion sites

Diagram 1

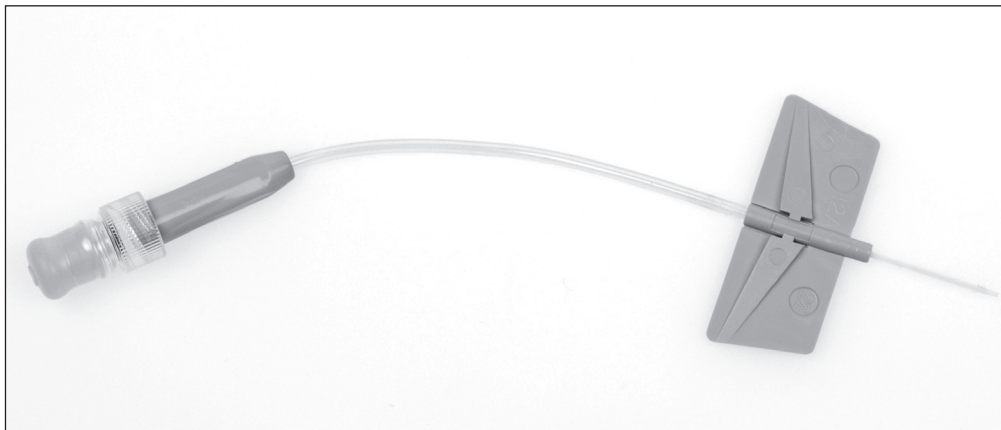


If a local reaction occurs, the cannula should be resited using a fresh cannula and administration set. If this recurs, consider further diluting the drug(s). **The site need not be changed for up to 72 hours, or longer if the site is viable (sites may last for 7 days or longer).**

#### 4. Choice of cannula

The BD Saf-T-Intima™ cannula, shown below, is the choice of cannula for SC medications. Discontinue use of metal butterflies as soon as your clinical area has obtained stock of the BD Saf-T-Intima™ cannula. The rationale behind this preference is:

- Site reactions are less common
- Insertion is less traumatic
- Needle stick injury is reduced to patient and staff
- Less expensive than alternatives
- Can remain in situ longer than other devices.



BD Saf-T-Intima™  
22 Gauge cannula  
(blue) stores code  
number L003052.

#### Note

The BD Saf-T-Intima™ cannula has a dead space of 0.2ml.

Drugs therefore require to be flushed through with at least 0.2ml of appropriate diluent.

The diluent used will depend on the medication being given. For guidance please refer to Drug Administration Table, page 12. If a patient is started on a continuous SC infusion they may require a separate BD Saf-T-Intima™ cannula for bolus medications.

**It is highly recommended that a luer lock syringe is used for all bolus injections and flushes to avoid possible leakage.**

#### 5. Preparation of patient for insertion of SC cannula

- BD Saf-T-Intima™ 22 Gauge cannula (blue), Stores order number L003052.
- Usual IV dressings
- Non-sterile gloves.

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## Bolus Administration

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### Procedure

1. Wash hands as per hand hygiene policy.
2. Explain procedure to patient and gain consent.
3. Ensure the skin is clean. Wash with soap and water if visibly soiled.
5. Put on gloves.
6. Pinch skin between thumb and forefinger to ensure SC tissue is identified.
7. Insert cannula at a 45-degree angle bubble surface face down. Secure insertion site with a transparent semi-permeable dressing e.g. Tegaderm. Whilst holding 'butterfly', remove introducer (needle) in a smooth single movement. If unsuccessful use another cannula. If blood appears in the cannula remove and insert a new one in another site.
8. Dispose of needle in sharps container as per local policy.
9. Remove and dispose of clamp on the BD Saf-T-Intima™ to avoid accidental occlusion.
10. Document date, time and place of cannula insertion in nursing notes.
11. Wash hands as per hand hygiene policy.
12. Replace removable bung with a Bionector. This should be changed after 7 days if the cannula is still in situ. Document change in nursing notes.

**Note: Check site at each visit for erythema, pain or swelling. Document findings of check on monitoring chart.**

### 6. Removal of cannula

The SC cannula can remain in situ for up to 72 hours or longer if there is no pain, swelling or erythema at the insertion site.

- Document removal of cannula in nursing notes.
- Once the cannula is removed cover the site with a small elastoplast if any leakage appears.

**Note: Before discontinuing SC route and cannula is removed, symptoms must be well controlled and patient able to tolerate oral medications.**

### 7. Information on drugs given SC in Palliative Care

It is common in palliative care to use licensed medicines for an unlicensed indication, route or dose. Such use can be supported by experience in clinical practice and accepted reference sources such as The Oxford Textbook of Palliative Medicine, the Palliative Care Formulary or local intranet sites. The licensing process regulates the activities of pharmaceutical companies and not the prescribing practice of a qualified prescriber.

## Bolus Administration

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The product licence for many injectable drugs does not specifically cover SC administration as is indicated by the chart on page 12. In palliative care the SC route is preferred as it is less painful than IM and can also be utilised as a continuous infusion.

Clinicians administering a drug that they have not previously used by the SC route, should be aware that:

- Absorption may be slower than by IM route
- Irritant drugs may cause a greater inflammatory reaction SC than IM
- The total volume for a bolus injection is not too great (recommended maximum is 2mls)
- Absorption will be severely limited in patients who are 'shocked', hypovolaemic or oedematous.

**The commonly used drugs listed below must not be given by the SC route as they may cause tissue necrosis:**

1. Antibiotics.
2. Diazepam.
3. Chlorpromazine.
4. Prochlorperazine (Stemetil).

If you have any queries or concerns please see contact details of Primary Care Palliative Care Teams/local hospice documented in Appendix 1, page 31.

## Bolus Administration

### 8. Drug Administration Table

All of the drugs below are commonly given by subcutaneous bolus or infusion in palliative care patients regardless of their licensed routes of administration. (N.B. diclofenac only given by CSCI, not bolus.)

**Note: If administering cyclizine or haloperidol ensure line is flushed before and after use with water for injection.**

Drug	Licensed for CSCI	Licensed for SC inj.	Licensed for IM inj.	Licensed for IV inj.	After injection FLUSH cannula/ line with:*
Alfentanil	■	■	■	✓	Sodium Chloride 0.9%
Cyclizine	■	■	✓	✓	Water for injection
Dexamethasone- Organon brand	■	✓	✓	✓	Sodium Chloride 0.9%
Dexamethasone- Mayne brand	■	■	✓	✓	Sodium Chloride 0.9%
Diamorphine	✓	✓	✓	✓	Water for injection
Diclofenac	■	■	✓	✓	Not applicable
Glycopyrronium	■	■	✓	✓	Sodium Chloride 0.9%
Haloperidol	■	■	✓	✓	Water for injection
Hydromorphone	■	■	■	■	Sodium Chloride 0.9%
Hyoscine Butylbromide	■	■	✓	✓	Sodium Chloride 0.9%
Hyoscine Hydrobromide	■	✓	✓	■	Sodium Chloride 0.9%
Ketamine	■	■	✓	✓	Sodium Chloride 0.9%
Levomepromazine	✓	■	✓	✓	Sodium Chloride 0.9%
Metoclopramide	■	■	✓	✓	Sodium Chloride 0.9%
Midazolam- Roche brand	■	■	✓	✓	Sodium Chloride 0.9%
Midazolam- Phoenix brand	■	■	■	✓	Sodium Chloride 0.9%
Morphine sulphate	■	✓	✓	✓	Sodium Chloride 0.9%
Octreotide	■	✓	■	✓	Sodium Chloride 0.9%
Oxycodone	✓	✓	■	✓	Sodium Chloride 0.9%

\*If NaCl 0.9% is not available, then water for injection may be used for any of the listed medications. This may be more painful for the patient as the latter is hypotonic.

■ Drug is NOT LICENSED to be given by this route.

✓ Drug IS LICENSED to be given by this route.

Part 2

# Use of Continuous Subcutaneous Infusions (CSCI)



## Use of Continuous Subcutaneous Infusion (CSCI)

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### 1. Rationale and Indications

Continuous subcutaneous infusions using a syringe driver or syringe pump are popular in palliative care as a method of delivering a wide range of medications when other methods of drug delivery are no longer available, or are unacceptable to the patient. Using the SC route avoids having to intravenously cannulate a terminally ill patient although the use of a CSCI should not be reserved for the dying patient. The medication is administered into the fatty tissue under the skin and thus absorbed systemically.

A CSCI infusion allows for a continuous infusion of drugs over a calculated period of time and can provide constant dosing for a range of commonly used agents including opioid analgesics (primarily morphine and diamorphine in the UK), antiemetics, anxiolytic sedatives, corticosteroids, non-steroidal anti-inflammatory drugs (NSAIDs) and anticholinergic drugs.

A significant advantage of subcutaneous infusion over other drug delivery methods is that plasma levels of a drug are much more stable, and appropriate symptom control can be achieved without the toxic effects of the peaks and troughs resulting from episodic drug administration. It can also give relief of multiple symptoms including pain, nausea and vomiting, restlessness, confusion and excess respiratory secretions.

**Note: All drugs to be given by CSCI must be prescribed on the SC infusion chart.**

#### Indications for use of a CSCI

- Severe dysphagia/swallowing difficulties
- Mouth, throat and oesophageal lesions
- Intestinal obstruction
- Profound weakness
- Poor absorption of oral drugs
- Unacceptable number of oral medications or volumes of syrups which make ingestion difficult
- Unconscious patient
- Intractable symptoms that are not well controlled by oral methods
- When rectal route is inappropriate.

Sites may last for up to 72 hours or longer if there are no local reactions. However, these should be checked and documented at each visit on the CSCI monitoring chart. The entire administration set should be replaced if a new mixture of drugs is used.

### 2. Choice of cannula and infusion set

**Note: At the time of writing the Saf-T-Intima cannula is being trialed in some clinical areas (hospices and hospital wards) along with an extension set that has an integrated anti-siphon valve for added safety. If these trials are successful then this option will be rolled out to primary care areas. In the meantime continue to use the current winged infusion sets for continuous SC infusions.**

Continues overleaf

## Use of Continuous Subcutaneous Infusion (CSCI)

### Precautions

Resite cannula if there are local reactions – use new administration set each time.

If skin reactions are persistent the choice of drug(s) may have to be reviewed. If in doubt contact a member of the Primary Care Palliative Care Team/local hospice.

### 3. Potential problems with CSCI

Problem	Possible cause	Suggested action
Medication being administered is not controlling or managing symptoms. Patient comfort is not maintained.	Inappropriate or inadequate medication. Check that infusion is running – e.g. is there any crystallization? Check that the syringe pump is working.	Reassess patient’s symptoms, request medical review. Set up new infusion using fresh administration set and needle/cannula.
Irritation of skin.	Due to subcutaneous medication.	Check that drugs are reconstituted in correct diluent and in appropriate volume. Resite cannula.
Confusion. Pin point pupils. Agitation and restlessness. Semi purposeful movements. Visual and auditory hallucinations. Drowsiness. Vivid dreams or nightmares. Twitching or plucking at the air. Myoclonic jerks. Seeing shadows at periphery of vision.	Adverse effects due to opioid toxicity. Incorrect rate set on pump/driver. Malfunction of pump/driver resulting over infusion.	Stop infusion. Contact medical staff to review: - patient - dosage and choice of drug - dosage and choice of other medication. The correct dose relieves pain without adverse side effects. Ensure adequate hydration. Sedation may be present until symptoms resolve.
Leakage at subcutaneous site.	Inflammation at the site.	Resite infusion changing the whole set.

### 4. Frequently asked questions

#### Which diluent should be used?

(Please consult pages 19-21 for the diluent tables on single drug infusions)

*For cyclizine, higher doses of diamorphine, haloperidol and drug combinations, the diluent is usually water for injection. With some drug combinations, such as octreotide, the diluent must be sodium chloride 9%.*

*For drug combinations, it is important to check for stability information. Refer to the compatability charts on pages 22-28.*

## Use of Continuous Subcutaneous Infusion (CSCI)

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### When should the CSCI be started?

*If the patient is in pain and not currently on any modified or slow release opioid, e.g. MST<sup>®</sup> or Oxycontin<sup>®</sup> or on an opioid 'as required' only, the CSCI can be started immediately. If the patient is on a modified or slow release opioid preparation, start the CSCI when the next dose of oral modified or slow release opioid is due. If the patient is on a fentanyl patch, refer to the fentanyl patch algorithm, or consult the palliative care pharmacist or another member of the palliative care team for advice.*

*If the patient has pain or other symptoms, e.g. nausea or distress, at the time of commencing the infusion, consider giving an initial breakthrough dose (by subcutaneous bolus route as it may take several hours for the infusion to have an effect).*

### When should the CSCI be stopped if oral treatment is to be re-started?

*The CSCI can be stopped as soon as the oral modified release dose of opioid is due to be given. The patient should have oral breakthrough medication prescribed as this may be required until the modified release dose reaches a therapeutic level.*

### What is the usual number of drugs that can be mixed together?

*It is common to use two or three drugs mixed in a syringe. Before mixing drugs together it is important to check for stability information. This can be found on the attached charts or by consulting a pharmacist or palliative care specialist, (contact numbers listed in Appendix 1, page 31). Information is also available from the following resources. The Oxford Textbook of Palliative Medicine, the Palliative Care Formulary, Syringe Driver Handbook, or local Palliative Care intranet sites.*

## 5. Compatibility and stability of drugs

'Instability' or 'incompatibility' refers to chemical reactions that occur when diluting or mixing drugs, resulting in the formation of different chemicals that can be therapeutically inactive or possibly toxic to the patient. Sometimes there are visible signs of incompatibility such as cloudiness, change in colour or the appearance of crystals. However, some reactions will not be identified through changes in appearance. If in doubt, contact a palliative care pharmacist or your nearest hospice. Factors that affect stability include light, heat, pH, time and volume of diluent. Therefore, if a solution is to be given by CSCI, it is important to know that it will be stable in a suitable volume for 24 hours at room temperature.

## 6. Commonly used drugs given SC in Palliative Care

It is important to understand that the licensing process regulates the activities of pharmaceutical companies and not the prescribing practice of a qualified prescriber. If an untoward incident occurs with a licensed product in an approved clinical situation, depending on the circumstances, any liability arising subsequently may in part or whole be transferred to the license holder. Due to licensing restrictions, it is common in palliative care to use licensed medicines for an unlicensed indication, by an unlicensed route or in an unlicensed dose. This is 'off-label' use of a medicine with a UK marketing authorisation

Continues overleaf

## Use of Continuous Subcutaneous Infusion (CSCI)

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and in this case the manufacturer is unlikely to be found liable if the patient is harmed. The prescriber and the clinical pharmacist assume responsibility for ensuring appropriate use of medication and patient safety. Nursing staff who administer 'off-label' medications also have a duty of care to the patient. 'Off-label' use of medication can be supported by experience in clinical practice and accepted reference sources such as The Oxford Textbook of Palliative Medicine or the Palliative Care Formulary or local/national guidelines.

(See table in Part 1, Section 8, pages 22-23)

## Use of Continuous Subcutaneous Infusion (CSCI)

### 7. Single drugs for subcutaneous infusion which are stable for 24 hours

#### Note

A Palliative Care Specialist may recommend doses in excess of those mentioned in this table.

Drug	Preferred diluent	Indication/ Action	Common dosage in 24 hours	Potential problems
Alfentanil	Sodium Chloride 0.9% or Water for injection.	Pain. Shortness of breath.	USE ONLY UNDER INSTRUCTION OF PALLIATIVE CARE TEAM. SEEK ADVICE.  No maximum dose limit. Alternative to morphine/ diamorphine/oxycodone/ hydromorphone if side-effects not tolerated.	Dose too high = opioid toxicity. Sub-optimal dose = pain. Considered to be a safer opioid in renal impairment.
Cyclizine	Water for injection ONLY.	Anti-emetic	100-150 mg in 24 hours	Can cause irritation at injection site. Dilute as much as possible. Incompatible with Sodium Chloride 0.9%
Dexamethasone	<b>*Sodium Chloride 0.9%</b> (or Water for injection).	Steroid.	4-16mg over 24 hours but is preferable to give as a once or twice a day (before 3pm) SC bolus.	Little compatibility information when mixed with other drugs. *Can be irritant.
Diclofenac	<b>Sodium Chloride 0.9%</b> .	Non-steroidal anti-inflammatory drug.	150mg over 24 hours.	Can be irritant. Dilute as much as possible. Do not give as SC bolus. Must be given via a separate driver. Do not mix with other drugs. Consider risks to gastrointestinal tract (ulceration; bleeding), renal function (hyperkalaemia; uraemia and acute renal failure) and use in elderly patients. <b>Palliative Care input recommended.</b>
Diamorphine	Water for injection.	Pain. Shortness of breath.	If opioid naïve use small dose (e.g. 5 - 10mg) per 24 hrs, otherwise use conversion chart to calculate dose.  Very soluble in small volumes, No maximum amount limit.	Beware of opioid toxicity. Suboptimal dose = pain. Caution in renal failure. Note: Diamorphine supplies low in recent months.

Table continues overleaf

## Use of Continuous Subcutaneous Infusion (CSCI)

(Single drugs for subcutaneous infusion which are stable for 24 hours (continued))				
Drug	Preferred diluent	Indication/ Action	Common dosage in 24 hours	Potential problems
Haloperidol	Water for injection.	Anti-emetic with some sedative properties in higher dose.	Usually 2.5-10 mg over 24 hours (up to 30mg for agitation).	Precipitates at high concentrations if mixed with Sodium Chloride 0.9%. Can be given as a once daily SC bolus as action is of long duration.
Hydromorphone *** (Non-formulary GGHB) Unlicensed product **	Sodium Chloride 0.9% or Water for injection.	Pain Shortness of breath.	Use conversion chart to calculate dose. No maximum dose limit. Alternative to morphine/ diamorphine/ oxycodone if side-effects not tolerated.	Dose too high = opioid toxicity. Sub-optimal dose = pain. USE ONLY UNDER INSTRUCTION OF PALLIATIVE CARE. SEEK ADVICE.
Hyoscine Butylbromide (Buscopan)	Sodium Chloride 0.9% or Water for injection	Intestinal colic and large volume vomiting associated with bowel obstruction.	60-180mg over 24 hours.	Incompatible with cyclizine. (Note 2 different preparations of hyoscine.)
Hyoscine Hydrobromide	Sodium Chloride 0.9% or Water for injection.	Dries noisy chest secretions. Anti-emetic properties.	0.8-2.4mg over 24 hours.	More sedating than the butylbromide as crosses blood brain barrier. (Note 2 different preparations of hyoscine.)
Levomopromazine (Nozinan)	<b>*Sodium Chloride 0.9%</b> (or Water for injection).	Anti-emetic with sedative properties.	6.25-25mg over 24 hours depending on sedation achieved (up to 200mg for agitation).	*Can be irritant therefore Sodium Chloride 0.9% preferred diluent. Dilute as much as possible. Consider giving as a once or twice daily SC bolus.
Metoclopramide	<b>*Sodium Chloride 0.9%</b> (or Water for injection).	Anti-emetic.	30-120mg over 24 hours.	*Can be irritant therefore Sodium Chloride 0.9% preferred diluent. Dilute as much as possible. Monitor for dystonic side-effects.

Table continues opposite

## Use of Continuous Subcutaneous Infusion (CSCI)

(Single drugs for subcutaneous infusion which are stable for 24 hours (continued))				
Drug	Preferred diluent	Indication/ Action	Common dosage in 24 hours	Potential problems
Midazolam	<b>*Sodium Chloride 0.9%</b> (or Water for injection).	Sedative. Useful for terminal agitation/ seizures.	10-60mg over 24 hours.	Tolerance will develop after several days of treatment and may require an increase in the dose to achieve same clinical effect. *Can be irritant therefore NaCl 0.9% preferred diluent.
Morphine (Alternative to diamorphine)	Sodium Chloride 0.9% or Water for injection.	Pain. Shortness of breath.	If opioid naïve use small dose (e.g. 5 - 10mg) per 24 hrs, otherwise use conversion chart to calculate dose.  Less soluble than diamorphine – comes pre-diluted. Volume can be problematic if large dose required.	Beware of opioid toxicity. Sub-optimal dose = pain. Caution in renal failure.
Octreotide	<b>*Sodium Chloride 0.9%</b> (or Water for injection).	Bowel obstruction.	300-600 micrograms over 24 hours.	*Can be irritant therefore Sodium Chloride 0.9%. preferred diluent. Dilute as much as possible.
Oxycodone (GGHB formulary, restricted to Palliative Care and Oncologist Specialists.)	Sodium Chloride 0.9% or Water for injection.	Pain. Shortness of breath.	If opioid naïve use small dose (e.g. 5mg) per 24 hrs, otherwise use conversion chart to calculate dose.  No maximum dose limit. Alternative to morphine/ diamorphine if side-effects not tolerated.	Dose too high = opioid toxicity. Sub-optimal dose = pain. Caution in renal failure. Do not mix with cyclizine.

## Use of Continuous Subcutaneous Infusion (CSCI)

### 8. Diamorphine: Two drug combinations for subcutaneous infusion which are stable for 24 hours

The table below is not a guide to amounts used in clinical practice but indicates the maximum amounts in combination that have been demonstrated to be stable. Cautions are indicated in italics, thus (1) and referenced in the 'Comment' column.

Diluent : Water for injections BP				
Drug	Maximum amount (in milligrams) known to be stable in:			Comment
	15ml in a 20ml syringe (MS26)	20ml in a 30ml syringe (MS26)	22ml in a 30ml syringe (McKinley T34)	
Diamorphine and Cyclizine <i>*MAX CYCLIZINE DOSE IS 150mg/24 HOURS</i>	300 150	400 150	440 150	If exceed these amounts then will get precipitate.
Diamorphine and Dexamethasone	750 6	1000 8	1100 8	Can precipitate if undiluted drugs are mixed during preparation.
Diamorphine and Haloperidol	1500 30	2000 30	2200 30	If exceed these amounts then likely to get precipitate.
Diamorphine and Hyoscine Hydrobromide	2250 2400 micro-grams	3000 2400 micro-grams	3300 2400 micro-grams	
Diamorphine and Hyoscine Butylbromide (Buscopan)	2250 180	3000 180	3300 180	
Table continues opposite				

## Use of Continuous Subcutaneous Infusion (CSCI)

(Two drug combinations for subcutaneous infusion which are stable for 24 hours continued)				
Drug	Maximum amount (in milligrams) known to be stable in:			Comment
	15ml in a 20ml syringe (MS26)	20ml in a 30ml syringe (MS26)	22ml in a 30ml syringe (McKinley T34)	
Diamorphine and Levomepromazine (Nozinan)	700 150	1000 200 (1)	1100 220 (1)	(1) Amount higher than used in clinical practice.
Diamorphine and Metoclopramide	2250 75	300 100	3300 110	Mixture can be irritant - dilute to largest possible volume.
Diamorphine and Midazolam	750 30	1000 40	1100 44	
Diamorphine and Octreotide	375 1700 micrograms (2)	500 2200 micrograms (2)	550 2400 micrograms (2)	(2) Maximum daily amount usually 600micrograms/24 hours.
Diamorphine and Ondansetron	75 10	100 13	110 14	

Monitor closely for visible signs of incompatibility such as the solution becoming cloudy, changing colour or the appearance of crystals.

## Use of Continuous Subcutaneous Infusion (CSCI)

### 9. Diamorphine: Three drug combinations for subcutaneous infusion which are stable for 24 hours

The table below is not a guide to amounts used in clinical practice but indicates the maximum amounts in combination that have been demonstrated to be stable. Cautions are indicated in italics, thus (1) and referenced in the 'Comment' column.

Diluent: Water for Injections BP				
Drug	Maximum amount (in milligrams) known to be stable in:			Comment
	15ml in a 20ml syringe (MS26)	20ml in a 30ml syringe (MS26)	22ml in a 30ml syringe (McKinley T34)	
Diamorphine and Cyclizine and Haloperidol	300 150 30	400 150 30	440 150 30	Above these amounts the mixture is likely to precipitate.
Diamorphine and Dexamethasone and Haloperidol	750 6 15	1000 8 20	1100 8 22	Only stable if diamorphine and haloperidol are well diluted before dexamethasone is added. Use only if no other options.
Diamorphine and Dexamethasone and Metoclopramide	750 6 45	1000 8 60	1100 8 66	
Diamorphine and Haloperidol and Midazolam	1050 7 60	1400 9 80	1540 11 88	
Diamorphine and Hyoscine Butylbromide (Buscopan) and Midazolam	1050 7.5 42	1400 10 56	1540 11 62	Hyoscine Butylbromide is usually used at doses of 60-120mg/24 hours. Stability at these concentrations is not known in three drug combinations.

Table continues opposite

## Use of Continuous Subcutaneous Infusion (CSCI)

(Three drug combinations for subcutaneous infusion which are stable for 24 hours continued)				
Drug	Maximum amount (in milligrams) known to be stable in:			Comment
	15ml in a 20ml syringe (MS26)	20ml in a 30ml syringe (MS26)	22ml in a 30ml syringe (McKinley T34)	
Diamorphine and Hyoscine Hydrobromide and Midazolam	634 1363 micrograms 35	845 1818 micrograms 46	930 2000 micrograms 51	
Diamorphine and Levomepromazine and Metoclopramide	750 150 (1) 45	1000 200 (1) 60	1100 220 (1) 66	(1) Amount higher than used in clinical practice.
Diamorphine and Levopromazine and Midazolam	1411 44 26	1882 58 35	2070 64 38	
Diamorphine and Metoclopramide and Midazolam	370 52.5 17	494 70 23	543 77 25	

Monitor closely for visible signs of incompatibility such as the solution becoming cloudy, changing colour or the appearance of crystals. If you are using drug combinations via the continuous subcutaneous infusion route not covered in the previous tables, please seek advice from contact details given in Appendix 1, page 31.

## Use of Continuous Subcutaneous Infusion (CSCI)

### 10. Syringe driver compatibility information for morphine sulphate combinations

There is little information on amounts or volumes used in these mixtures; infusions should be monitored closely for signs of incompatibility e.g. cloudiness, colour change.

#### Syringe driver compatibility for morphine sulphate: two drug admixtures stable for 24 hours

Drug	Diluent	Compatible	Type of data
Morphine and Metoclopramide	Water for injection	Yes	Visually compatible.
Morphine and Haloperidol	Water for injection	Yes	Visually compatible.
Morphine and Cyclizine	Water for injection	Yes	Visually compatible.
Morphine and Levomepromazine (Nozinan®)	Water for injection	Yes	Visually compatible.
Morphine and Hyoscine hydrobromide	Water for injection	Yes	Chemically compatible.
Morphine and Hyoscine butylbromide (Buscopan®)	Water for injection	Yes	Chemically compatible.
Morphine and Midazolam	Water for injection	Yes	Visually compatible.
Morphine and Octreotide	Sodium Chloride 0.9%	Yes	Visually compatible.

#### Syringe driver compatibility for morphine sulphate: three drug admixtures stable for 24 hours

Drugs	Diluent	Compatible	Type of data
Morphine, Haloperidol and Metoclopramide	Water for injection	Yes	Visually compatible.
Morphine, Cyclizine and Haloperidol	Water for injection	Yes	Visually compatible.
Morphine, Hyoscine hydrobromide and Haloperidol	Water for injection	Yes	Compatibility based on clinical experience.
Morphine, Midazolam and Metoclopramide	Water for injection	Yes	Visually compatible.
Morphine, Midazolam and Haloperidol	Water for injection	Yes	Visually compatible.
Morphine, Midazolam and Cyclizine	Water for injection	Yes	Visually compatible.
Morphine, Midazolam and Hyoscine hydrobromide	Water for injection	Yes	Visually compatible. Compatibility based on clinical experience.
Morphine, Midazolam and Levomepromazine	Water for injection	Yes	Visually compatible.

Monitor closely for visible signs of incompatibility such as the solution becoming cloudy, changing colour or the appearance of crystals.

## Use of Continuous Subcutaneous Infusion (CSCI)

**11. Oxycodone: Two drug combinations for subcutaneous infusion which are stable for 24 hours**

Cautions are indicated in italics, thus (1) and referenced in the 'Comment' column.

**Maximum amount in milligrams (mg) known to be chemically stable in:**

Drugs	20mls in a 30ml syringe (MS26)	22mls in a 30ml syringe (McKinley T34)	Diluent	Comment
Oxycodone Dexamethasone	133 25 (1)	146 27.5 (1)	Water for injection	(1) Amount higher than used in clinical practice.
Oxycodone Haloperidol	172.5 12	190 13	Water for injection	
Oxycodone Hyoscine butylbromide (Buscopan)	174 47	191 52	Water for injection	
Oxycodone Hyoscine hydrobromide	152.5 1764 micro-grams	168 1940 micro-grams	Water for injection	
Oxycodone Levomepromazine	141 141 (2)	155 155 (2)	Water for injection	(2) Amount higher than used in clinical practice.
Oxycodone Metoclopramide	100 49	110 54	Water for injection	
Oxycodone Midazolam	100 49	110 54	Water for injection	
Oxycodone Octreotide	100 500 micro-grams	110 550 micro-grams	Sodium Chloride 0.9%	

Monitor closely for visible signs of incompatibility such as the solution becoming cloudy, changing colour or the appearance of crystals.

## Use of Continuous Subcutaneous Infusion (CSCI)

## 12. Oxycodone: Three drug combinations for subcutaneous infusion which are stable for 24 hours

Maximum amount in milligrams (mg) known to be stable in:

Drugs	20mls in a 30ml syringe (MS26)		22mls in a 30ml syringe (McKinley T34)		Diluent	Type of data
Oxycodone Haloperidol Metoclopramide	112 4.4 38		123 4.9 42		Water for injection.	Visually compatible.
Oxycodone Haloperidol Midazolam	100 5 20		110 5.5 22		Water for injection or Sodium Chloride 0.9%.	Chemically compatible.
Oxycodone Haloperidol Hyoscine Butylbromide (Buscopan)	100 5 120		110 5.5 132		Water for injection or Sodium Chloride 0.9%.	Chemically compatible.
Oxycodone Haloperidol Hyoscine Hydrobromide	100 5 1.2		110 5.5 1.3		Water for injection or Sodium Chloride 0.9%.	Chemically compatible.
Oxycodone Hyoscine Butylbromide (Buscopan) Midazolam	5.7 114 11.4	11.4 68 11.4	6.3 125 12.5	12.5 74.8 13.7	Water for injection.	Visually compatible.
Oxycodone Levomepromazine Metoclopramide	40 16.5 80		44 18.2 88		Sodium Chloride 0.9%.	Visually compatible.
Oxycodone Levomepromazine Hyoscine Hydrobromide	100 25 1.2		110 27.5 1.3		Water for injection or Sodium Chloride 0.9%.	Chemically compatible.
Oxycodone Levomepromazine Hyoscine Butylbromide (Buscopan)	100 25 120		110 27.5 132		Water for injection or Sodium Chloride 0.9%.	Chemically compatible.
Oxycodone Levomepromazine Octreotide	100 25 500		110 27.5 550		Water for injection or Sodium Chloride 0.9%.	Chemically compatible.

Monitor closely for visible signs of incompatibility such as the solution becoming cloudy, changing colour or the appearance of crystals.

If you are using drug combinations, via the continuous subcutaneous infusion route, not covered in the previous tables, please seek advice from contact details given in Appendix 1, page 30.

## Use of Continuous Subcutaneous Infusion (CSCI)

### 13. Drug Conversions

#### Converting to Diamorphine or Morphine

Diamorphine is the opioid of choice for syringe drivers because it is highly soluble in small volumes. 1g of diamorphine can be dissolved in 1.6 ml of water (16 ml of water are needed to dissolve 1g of morphine). At the time of writing there is a nationwide shortage of diamorphine, so morphine is the drug of choice. If diamorphine is not available morphine can be used equally well, when dose requirement is low.

**Subcutaneous diamorphine is 3 times the potency of oral morphine.**

**i.e. 30mg oral morphine = 10mg subcutaneous diamorphine.**

*To convert from oral morphine to subcutaneous diamorphine:*

*The total 24-hour dose of oral morphine should be divided by 3.*

**Subcutaneous morphine is 2 times the potency of oral morphine.**

**i.e. 30mg oral morphine = 15mg subcutaneous morphine.**

*To convert from oral morphine to subcutaneous morphine:*

*The total 24-hour dose of oral morphine should be divided by 2.*

#### Example:

Patient is on MST 120mgs twice daily.

Breakthrough dose is 1/6th of total 24 hour dose = 120 mgs + 120 mgs = 240 mgs divided by 6 = 40 mgs.

Patient has required 3 doses of breakthrough medication in preceding 24 hours.

**Total 24 hours oral morphine dose:** 120 mgs + 120 mgs + 40 mgs + 40 mgs + 40mgs = 360 mgs.

360 mgs divided by 3 = 120 mgs of diamorphine subcutaneously over 24 hours.

**OR**

360mg divided by 2 = 180 mgs of morphine subcutaneously over 24 hours.

**Subcutaneous diamorphine is 1.5 x as potent as subcutaneous morphine.**

**i.e. 10mg subcutaneous diamorphine = 15mg subcutaneous morphine.**

### 14. Breakthrough analgesia

Breakthrough analgesia should still be prescribed subcutaneously when a continuous infusion is in use. If 1/6th dose is difficult to calculate round up or down to the nearest easy dose to achieve. To avoid repeated injections a separate BD Saf-T-Intima™ cannula can be left in situ at a SC site, secured with a dressing. Extra doses can be administered via this SC route followed by a 0.2ml flush of sodium chloride 0.9% or water for injection. Please refer to diluent tables on pages 19-21.

### 15. Transdermal Fentanyl

For information on Fentanyl Patches please refer to Fentanyl Algorithm at [www.palliativecareglasgow.info](http://www.palliativecareglasgow.info).

## Appendices

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### References

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British National Formulary (2006), March.

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Twycross R., Wilcock A., Thorp S. (2002) 2nd Ed. Palliative Care Formulary Radcliffe Oxon.

Watson M., Lucas C., Hoy A., Back I (2005) Oxford Handbook of Palliative Care Oxford University Press Oxford.

[www.palliativecareglasgow.info](http://www.palliativecareglasgow.info)

Scottish Intercollegiate Guidelines Network (2000). Control of pain in patients with cancer. Scottish Intercollegiate Guidelines Network, Edinburgh.

## Appendix 1

**Primary Care Palliative Care Team .....0141 427 8251**

Palliative Care Pharmacist ..... (Mobile 07876 478 140)

### **Out-of-hours contacts**

Huntershill Hospice..... 0141 531 1300

Prince and Princess of Wales Hospice ..... 0141 420 6785

St Margaret of Scotland Hospice..... 0141 435 7011

## Appendices

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### Appendix 2

#### Contributors to this document

This document is adapted with kind permission from guidelines produced by NHS Greater Glasgow and Clyde Acute Services Division, Palliative Care Practice Development Team.

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