

Guidelines for the Use of Subcutaneous Medications in Palliative* Care for Adults

NHS Greater Glasgow, Acute Services Division
Palliative Care Practice Development Team

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* For Acute Pain Management please refer to the Acute Pain Manual

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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).

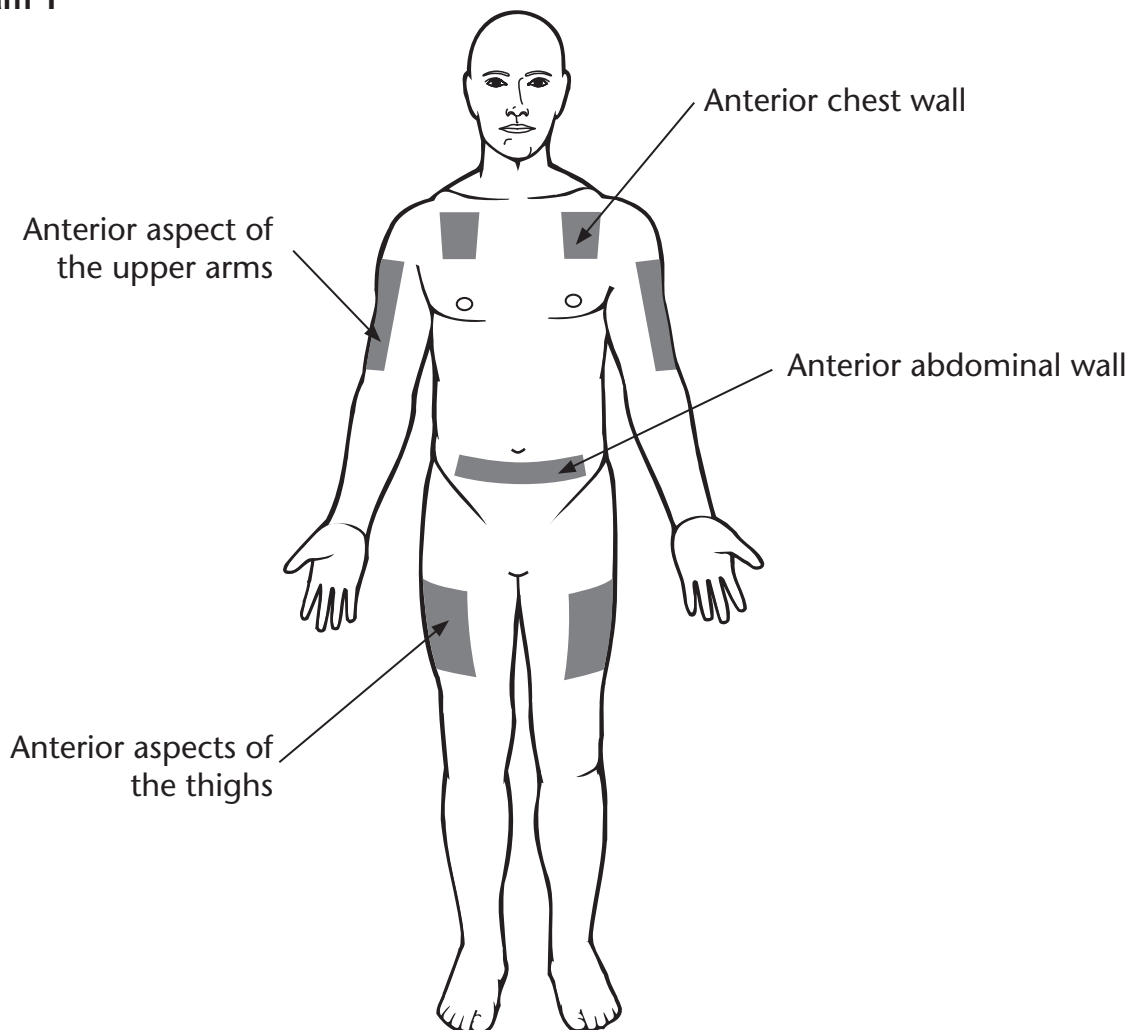
Bolus Administration

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

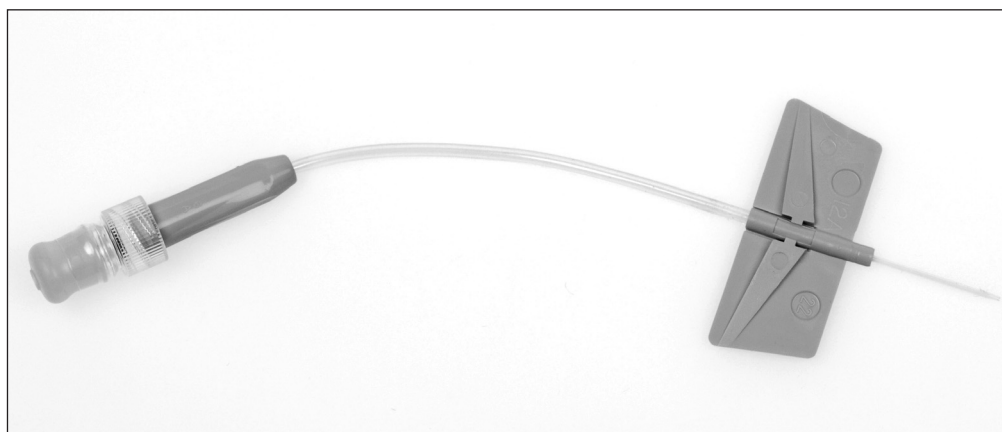


If a local reaction occurs, the cannula should be resited using a fresh cannula and administration set. If this recurs, consider further diluting the drug(s). **The site need not be changed for up to 72 hours, or longer if the site is viable (sites may last for 7 days or longer).**

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 code number L003052.
(Note: If the blue cannula is unavailable, BD Saf-T-Intima™ 24 Gauge cannula (yellow), is also suitable).
- Usual IV dressings
- Non-sterile gloves.

Continues overleaf

Bolus Administration

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.
4. Prepare cannula dressing and write on 'For Subcutaneous use only'.
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. Remove and dispose of clamp on the BD Saf-T-Intima™ to avoid accidental occlusion.
9. Dispose of needle in sharps container as per hospital policy.
10. Document date, time and place of cannula insertion in nursing notes.
11. Wash hands as per hand hygiene policy.

Note: Check site 4 hourly for erythema, pain or swelling. Document findings of check on monitoring chart (see Appendix 4, page XX).

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.

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.

Bolus Administration

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' or 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 Hospital Palliative Care Teams documented in Appendix 1, page 30.

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)

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 medicine kardex and the SC infusion chart (see Appendix 3, page 32).

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 every four hours on the CSCI monitoring chart (see Appendix 4). The entire administration set should be replaced if a new mixture of drugs is used.

2. Choice of cannula and infusion set

The Saf-T-Intima™ cannula is the choice of cannula for SC medications. Discontinue use of metal butterflies as soon as stock is available. The rationale behind this preference is:

- Less likely to cause site reactions
- Insertion is less traumatic

Continues overleaf

Use of Continuous Subcutaneous Infusion (CSCI)

- Needle stick injury is reduced
- Less expensive
- Can remain in situ longer than other devices.

Other considerations

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 Hospital Palliative Care Team.

Note: When delivering a CSCI an anti-syphon set is strongly recommended, as there is a risk of ‘free flow’.

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 or Palliative Care Team review. Set up new infusion using fresh administration set and needle.
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 compatibility charts on pages 22-27.

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[®] or Oxycontin[®] 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, or contacting Medicines Information (contact numbers listed in Appendix 1, page 30). 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 the palliative care pharmacist via switchboard, or another member of the palliative care team. 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)

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)

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

Note

The Palliative Care Team 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	*Sodium Chloride 0.9% (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	Sodium Chloride 0.9% .	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. Palliative Care input recommended.
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)	*Sodium Chloride 0.9% (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	*Sodium Chloride 0.9% (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	*Sodium Chloride 0.9% (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	*Sodium Chloride 0.9% (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
	22ml in a 30ml syringe	24ml in a 50ml syringe		
Diamorphine and Cyclizine <i>*MAX CYCLIZINE DOSE IS 150mg/24 HOURS</i>	440 150	480 480 (1)	If >480 Diamorphine then no more than 240 cyclizine.	If exceed these amounts then will get precipitate. (1) Maximum daily amount usually 150mg.
Diamorphine and Dexamethasone	1100 8	1200 9.6		Can precipitate if undiluted drugs are mixed during preparation.
Diamorphine and Haloperidol	2200 30 (2)	2400 72 (2)		If exceed these amounts then likely to get precipitate. (2) Amount higher than used in clinical practice.
Diamorphine and Hyoscine Hydrobromide	3300 2400 micrograms (3)			(3) Maximum daily amount usually 2.4mg/24 hours.
Diamorphine and Hyoscine Butylbromide (Buscopan)	3300 1280 (4)			(4) Maximum daily amount usually 180mg/24 hours.
Diamorphine and Levomepromazine (Nozinan)	1100 220 (5)	1200 240 (5)		(5) Amount higher than used in clinical practice.
Table continues opposite				

Guidelines for Use of Subcutaneous Medications in Palliative Care for Adults
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
	22ml in a 30ml syringe	24ml in a 50ml syringe	
Diamorphine and Metoclopramide	3300 110	3600 120	Mixture can be irritant - dilute to largest possible volume.
Diamorphine and Midazolam	1100 44	1200 48	
Diamorphine and Octreotide	500 2400micrograms (6)	600 2700micrograms (6)	(6) Maximum daily amount usually 600micrograms/24 hours.
Diamorphine and Ondansetron	100 14	120 15	

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
	22ml in a 30ml syringe (McKinley T34)	24ml in a 50ml syringe	
Diamorphine and Cyclizine and Haloperidol	440 150 30	480 480 (1) 48 (2)	Above these amounts the mixture is likely to precipitate. (1) Maximum daily amount of cyclizine usually 150mg. (2) Maximum daily amount of haloperidol usually 30mg.
Diamorphine and Dexamethasone and Haloperidol	1100 8 22	1200 9.6 24	Only stable if diamorphine and haloperidol are well diluted before dexamethasone is added. Use only if no other options.
Diamorphine and Dexamethasone and Metoclopramide	1100 8 66	1200 9.6 72	
Diamorphine and Haloperidol and Midazolam	1540 11 88	1680 12 96	
Diamorphine and Hyoscine Butylbromide (Buscopan) and Midazolam	1540 11 62	1680 12 68	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

Guidelines for Use of Subcutaneous Medications in Palliative Care for Adults
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
	22ml in a 30ml syringe (McKinley T34)	24ml in a 50ml syringe	
Diamorphine and Hyoscine Hydrobromide and Midazolam	930 2000 micrograms 51	1015 2200 micrograms 56	
Diamorphine and Levomepromazine and Metoclopramide	1100 220 (3) 66	1200 240 (3) 72	(3) Amount higher than used in clinical practice.
Diamorphine and Levomepromazine and Midazolam	2070 64 38	2258 70 41	
Diamorphine and Metoclopramide and Midazolam	543 77 25	592 84 27	

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)

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.

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	24mls in a 50ml syringe	Diluent	Comment
Oxycodone Dexamethasone sodium phosphate 5mg/ml	160 30 (1)	Water for injection	(1) Amount higher than used in clinical practice.
Oxycodone Haloperidol	207 14	Water for injection	
Oxycodone Hyoscine butylbromide (Buscopan)	209 56	Water for injection	
Oxycodone Hyoscine hydrobromide	183 2117micrograms	Water for injection	
Oxycodone Levomepromazine	169 169 (2)	Water for injection	(2) Amount higher than used in clinical practice.
Oxycodone Metoclopramide	120 59	Water for injection	
Oxycodone Midazolam	120 59	Water for injection	
Oxycodone Octreotide	120 600micrograms	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	22mls in a 30ml syringe		24mls in a 50ml syringe		Diluent	Type of data
Oxycodone Haloperidol Metoclopramide	123 4.9 42		134 5.3 46		Water for injection.	Visually compatible.
Oxycodone Haloperidol Midazolam	110 5.5 22		120 6 24		Water for injection or Sodium Chloride 0.9%.	Chemically compatible.
Oxycodone Haloperidol Hyoscine Butylbromide (Buscopan)	110 5.5 132		120 6 144		Water for injection or Sodium Chloride 0.9%.	Chemically compatible.
Oxycodone Haloperidol Hyoscine Hydrobromide	110 5.5 1.3		120 6 1.44		Water for injection or Sodium Chloride 0.9%.	Chemically compatible.
Oxycodone Hyoscine butylbromide (Buscopan) Midazolam	6.3 125 12.5	12.5 74.8 13.7	6.8 137 13.7	13.7 82 13.7	Water for injection.	Visually compatible.
Oxycodone Levomepromazine Metoclopramide	44 18.2 88		48 19.8 96		Sodium Chloride 0.9%.	Visually compatible.
Oxycodone Levomepromazine Hyoscine Hydrobromide	110 27.5 1.3		120 30 1.44		Water for injection or Sodium Chloride 0.9%.	Chemically compatible.
Oxycodone Levomepromazine Hyoscine butylbromide (Buscopan)	110 27.5 132		120 30 144		Water for injection or Sodium Chloride 0.9%.	Chemically compatible.
Oxycodone Levomepromazine Octreotide	110 27.5 550		120 30 600 micrograms		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 31.

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 – for advice please contact Hospital Palliative Care Team - see Appendix 1, page 31 for contact details.

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.

Appendices

15. Transdermal Fentanyl

For information on Fentanyl Patches please refer to Fentanyl Algorithm at www.palliativecareglasgow.info or palliative care information via local Intranet sites.

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Dickman A., Scheider J., Varga J (2005) 2nd Ed. Syringe Driver Handbook Oxford University Press Oxford.

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

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

Appendix 1

Hospital Palliative Care Teams

South Glasgow

Clinical Nurse Specialists	65742/61266
Medicines Information	61381
Palliative Care Pharmacist	61396 (Radiopage 07659 514069)

North West Glasgow (Western, Gartnavel, BOC)

Clinical Nurse Specialists	57041/57042
Palliative Care Pharmacist	(Page 07659 532241)

North East Glasgow (Glasgow Royal, Stobhill)

Clinical Nurse Specialists	24541
Palliative Care Pharmacist	(Radiopage 07659 532241)

Appendices

Appendix 2

Contributors to this document

Palliative Care Practice Development Facilitators, Acute Services Division

Irene Wotherspoon

Fiona Wylie

North Glasgow sector

Joe Harrison, Hospital Palliative Care Pharmacist

Claire O'Neill, Palliative Care Clinical Nurse Specialist

Libby Pearson, Macmillan Palliative Care, Clinical Nurse Specialist

Jackie Wright, Macmillan Palliative Care, Clinical Nurse Specialist

South Glasgow sector

Susan Addie, Palliative Care Pharmacist

Richard Auckland, Palliative Care Clinical Nurse Specialist

Sheila McGettrick, Consultant in Palliative Medicine

Valerie Oates, Consultant In Palliative Medicine

Jane Rafferty, Senior Staff Nurse, Ward 5, Victoria Infirmary


Lorna Telfer, Senior Staff Nurse, Ward 23, Southern General Hospital

Primary Care Division

Elayne Harris, Area Palliative Care Pharmacist

Appendix 3

Subcutaneous Infusion Prescription and Monitoring Chart

Name: Ward: Unit/CHI No: <i>Attach sticky label here</i>	Subcutaneous Infusion Prescription and Monitoring Chart Note: use one chart per driver/pump Infusion No. _____ of _____					
[For inpatients, all drugs must also be prescribed on drug kardex] Remember to also prescribe breakthrough medication						
Date/Time	Drug(s)	24 hour dose	Diluent	Prescribed by (full signature)	Date stopped	Stopped by
			Water for injection OR Sodium Chloride 0.9% depending on stability/compatibility			
Discontinue infusion by scoring through whole box, dating and signing. New prescription should be written using boxes below.						
			Water for injection OR Sodium Chloride 0.9% depending on stability/compatibility			
			Water for injection OR Sodium Chloride 0.9% depending on stability/compatibility			
			Water for injection OR Sodium Chloride 0.9% depending on stability/compatibility			
			Water for injection OR Sodium Chloride 0.9% depending on stability/compatibility			
			Water for injection OR Sodium Chloride 0.9% depending on stability/compatibility			
			Water for injection OR Sodium Chloride 0.9% depending on stability/compatibility			
<p>NEVER ADJUST RATE once driver has been commenced or add another drug to the syringe as there is a lag time in effect of up to 4 hours which means that the patient will not receive the medication they require to control the breakthrough symptoms at the time they need it but over time accumulation of medication can result in toxicity. The increased rate administers an increased dose of all the medications in the syringe.</p> <p>NEVER ADD a further drug to the syringe contents once infusion has started as this will alter the relative concentration of the other drugs.</p> <p>NEVER USE THE BOOST BUTTON of the GRASEBY MS26 TO GIVE A BOLUS as it will only deliver 1/200th of the total daily dose and not the recommended 1/6th.</p> <p><i>For further information about compatibility etc. contact local pharmacy department or specialist palliative care team</i></p>						
**** THIS CHART SHOULD BE RETAINED IN THE PATIENT'S NOTES ****						

Appendices

Appendix 4 (continued)

Subcutaneous Infusion Prescription and Monitoring Chart

Patient:	Drugs:
Unit/CHI No.:	

Record of Administration

Type of infusion device: _____ Flow rate in ml/hr mm/24hours

Reference/Serial No.: _____

DAILY SET UP	Date and Time		Flow rate: (please state)	MONITORING	Time							
			Battery check: (if applicable)		(4 hrly checks for in-patients)							
	Diluent:		Site appearance e.g. "OK"									
	Batch No.:					Syringe appearance e.g. "clear"						
	Total Volume:		Flow rate setting (N.B. do not alter)									
	Batch Number(s) of medication:					Volume remaining						
	1)		Volume infused									
	2)					Battery check: (tick if ok)						
3)		Sign										
Site used and appearance					Signature(s)							
Please note volume remaining and then sign if drugs are discarded.					VOLUME DISPOSED:	SIGN:						

DAILY SET UP	Date and Time		Flow rate: (please state)	MONITORING	Time							
			Battery check: (if applicable)		(4 hrly checks for in-patients)							
	Diluent:		Site appearance e.g. "OK"									
	Batch No.:					Syringe appearance e.g. "clear"						
	Total Volume:		Flow rate setting (N.B. do not alter)									
	Batch Number(s) of medication:					Volume remaining						
	1)		Volume infused									
	2)					Battery check: (tick if ok)						
3)		Sign										
Site used and appearance					Signature(s)							
Please note volume remaining and then sign if drugs are discarded.					VOLUME DISPOSED:	SIGN:						

DAILY SET UP	Date and Time		Flow rate: (please state)	MONITORING	Time							
			Battery check: (if applicable)		(4 hrly checks for in-patients)							
	Diluent:		Site appearance e.g. "OK"									
	Batch No.:					Syringe appearance e.g. "clear"						
	Total Volume:		Flow rate setting (N.B. do not alter)									
	Batch Number(s) of medication:					Volume remaining						
	1)		Volume infused									
	2)					Battery check: (tick if ok)						
3)		Sign										
Site used and appearance					Signature(s)							
Please note volume remaining and then sign if drugs are discarded.					VOLUME DISPOSED:	SIGN:						

