



Guidelines for the Use of Subcutaneous Medications in Palliative Care

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Acknowledgments

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Drug compatibility data has been extracted from the revised (2009) version of the Lanarkshire Palliative Care Guidelines.

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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.

The 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 an excessive number of tablets
- ❑ Cannula can be left in for 72 hours or longer if no redness/inflammation, therefore less demanding on nursing resources.

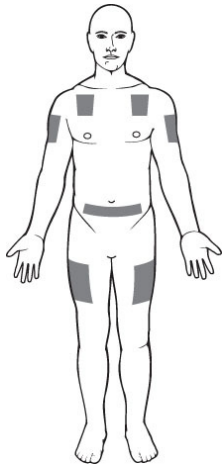
Disadvantages:

- ❑ 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):

- ❑ 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



Sites not suitable for injection

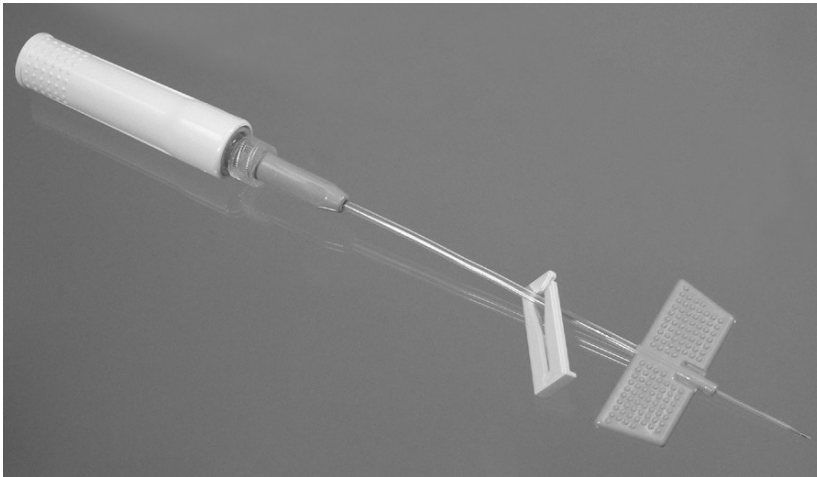
- ❑ Skin folds and breast tissue
- ❑ Directly over a tumour site
- ❑ Lymphoedematous limb or oedema – absorption may be reduced
- ❑ The abdominal wall if ascites present
- ❑ Bony prominences – little SC tissue, absorption reduced
- ❑ Previously irradiated skin – skin may be sclerosed, poor blood supply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

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. 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), code number FSP319.

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), code number FSP319
- Alcohol impregnated swab
- Occlusive dressing
- Non-sterile gloves

Procedure

1. Wash hands as per hand hygiene policy.
2. Explain procedure to patient and gain consent.
3. Clean skin with an alcohol-impregnated swab. Allow to dry for a minimum of 30seconds.
4. Put on gloves.
5. Remove and dispose of clamp on the BD Saf-T-Intima™ to avoid accidental occlusion.
6. Rotate white safety barrel to loosen needle.
7. Remove clear needle cover.
8. Grasp pebbled side wings, pinching firmly.
9. Pinch skin between thumb and forefinger to ensure SC tissue is identified.
10. Insert cannula at a 45-degree angle.
11. Cover the insertion site and wings with a transparent semi-permeable dressing e.g. Tegaderm.
12. Hold wings of the cannula firmly and remove introducer (needle) by pulling back in a smooth single movement. This should leave injectable bung in-situ.
13. Dispose of needle in sharps container as per local policy.
14. Document date, time and place of cannula insertion in nursing notes.
15. Wash hands as per hand hygiene policy.

Notes:

- ❑ Check site 4 hourly (daily in community setting) for erythema, pain or swelling. Document findings of check on monitoring sheet.
- ❑ If insertion is unsuccessful use another cannula. Do not reinsert
- ❑ If blood appears in the cannula insert a new one in another site.
- ❑ If the cannula is being used to deliver a subcutaneous infusion remove the bung and attach an anti-siphon extension set (e.g. McKinley 100-172S)
- ❑ If the cannula is being used to deliver subcutaneous bolus injections remove the bung and cap

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 removing cannula, 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 or the Palliative Care Formulary. The licensing process regulates the activities of pharmaceutical companies and not the prescribing practice of a qualified prescriber.

The marketing authorisation for many of the injectable drugs used in palliative care does not specifically cover SC administration. This is indicated on 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 1ml)
- Absorption will be severely limited in patients who are 'shocked' or hypovolaemic.

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

- Antibiotics.
- Diazepam.
- Chlorpromazine.
- Prochlorperazine (stemetil®).

If you have any queries or concerns please see contact details documented in Appendix 1.

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

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	X	X	X		Sodium Chloride 0.9%
Cyclizine	X	X			Water for injection
Dexamethasone-Organon brand	X				Sodium Chloride 0.9%
Dexamethasone-Mayne brand	X	X			Sodium Chloride 0.9%
Diamorphine					Water for injection
Glycopyrronium	X	X			Sodium Chloride 0.9%
Haloperidol	X	X			Water for injection
Hydromorphone	X	X	X	X	Sodium Chloride 0.9%
Hyoscine Butylbromide	X	X			Sodium Chloride 0.9%
Hyoscine Hydrobromide	X			X	Sodium Chloride 0.9%
Ketamine	X	X			Sodium Chloride 0.9%
Ketorolac	X	X			Sodium Chloride 0.9%
Levomepromazine		X			Sodium Chloride 0.9%
Metoclopramide	X	X			Sodium Chloride 0.9%
Midazolam- Roche brand	X	X			Sodium Chloride 0.9%
Midazolam- Phoenix brand	X	X	X		Sodium Chloride 0.9%
Morphine sulphate	X				Sodium Chloride 0.9%
Octreotide	X		X		Sodium Chloride 0.9%
Oxycodone			X		Sodium Chloride 0.9%

Part 2

Use of Continuous Subcutaneous Infusions (CSCI)

Rationale and Indications

Continuous subcutaneous infusions using a 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 is 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 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.

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
- 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 (daily in primary care settings) 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

The Saf-T-Intima™ is the cannula of choice for the administration of SC medications. The rationale behind this preference is:

- Less likely to cause site reactions
- Insertion is less traumatic
- 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 a new administration set each time. If skin reactions are persistent the choice of drug(s) may have to be reviewed. When in doubt contact a member of the specialist palliative care team.

Note: When delivering a CSCI an anti-syphon administration set (e.g. McKinley 100-172S) 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 a 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 Malfunction of pump resulting in 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.

Frequently asked questions

Which diluent should be used?

(Please consult page 18 for the diluent table on single drug infusions)

For cyclizine, higher doses of diamorphine, haloperidol and drug combinations, the diluent is usually water for injection.

For drug combinations, it is important to check for stability information.

When should the CSCI be started?

If the patient is in pain and not currently on a modified or slow release opioid, e.g. MST or Oxycontin, 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 by contacting Medicines Information (contact numbers listed in Appendix 1).

Information is also available from the following resources:

- The Oxford Textbook of Palliative Medicine
- Palliative Care Formulary
- The Syringe Driver -continuous subcutaneous infusions in palliative care

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 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 authorization. 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)

7. Single drugs for SC infusion

Note: The Palliative Care Team may recommend doses in excess of those mentioned in this table.

Single agent	Indications and dose range	Comments
MORPHINE 10mg, 30mg in 1ml 60mg in 2ml	Indications: Opioid responsive pain, breathlessness Dose: No max dose limit	<ul style="list-style-type: none"> • 1st line opioid analgesic
DIAMORPHINE 10mg, 30mg, 100mg, 500mg powder ampoules	Indications: Opioid responsive pain, breathlessness Dose: No max dose limit	<ul style="list-style-type: none"> • Can be diluted in a small volume • Preferred for high opioid doses
OXYCODONE 10mg in 1ml 20mg in 2ml	Indications: Opioid responsive pain, breathlessness Dose: No max dose limit	<ul style="list-style-type: none"> • 2nd line opioid analgesic if morphine/ diamorphine not tolerated
ALFENTANIL 1mg (1000micrograms) in 2ml, 5mg in 10ml	Indications: Opioid responsive pain, breathlessness Dose: No max dose limit	<ul style="list-style-type: none"> • 3rd line opioid; seek specialist advice • 1st line in stages 4 /5 chronic kidney disease
Antiemetics		
CYCLIZINE 50mg in 1ml	Indications: nausea and vomiting (bowel obstruction or intracranial disease) Dose: 50-150mg / 24 hours	<ul style="list-style-type: none"> • Anticholinergic; reduces peristalsis • Can cause redness, irritation at site
METOCLOPRAMIDE 10mg in 2ml	Indications: nausea and vomiting (gastric stasis/outlet obstruction, opioid) Dose: 20-120mg / 24 hours	<ul style="list-style-type: none"> • Prokinetic • Avoid if complete bowel obstruction or colic
HALOPERIDOL 5mg in 1ml 10mg in 2ml	Indications: opioid or metabolic induced nausea, delirium Dose: 2.5-5mg / 24 hours Antiemetic Dose: up to 30mg Agitation	<ul style="list-style-type: none"> • Long half life: can be given as a once daily SC injection
LEVOMEPRMAZINE 25mg in 1ml	Indications: Complex nausea, terminal delirium/ agitation Dose: 5-25mg / 24 hours - antiemetic Dose: 25-100mg / 24 hours - terminal sedation	<ul style="list-style-type: none"> • Lowers blood pressure • Reduces seizure threshold; combine with a benzodiazepine if risk of fits • Long half life: can be given as a once or twice daily SC injection

Anticholinergics for chest secretions or bowel colic		
HYOSCINE BUTYLBROMIDE 20mg in 1ml	Indications: chest secretions, bowel obstruction (colic, vomiting) Dose: 40-120mg / 24 hours	<ul style="list-style-type: none"> • First line; non-sedative
GLYCOPYRRONIUM 200microgram in 1ml 600microgram in 3ml	Indications: chest secretions or colic Dose: 600-1200 micrograms /24 hours	<ul style="list-style-type: none"> • Second line; non-sedative • Longer duration of action than hyoscine
HYOSCINE HYDROBROMIDE 400microgram in 1ml 600microgram in 1ml	Indications: chest secretions Dose: 400-1200 micrograms / 24 hours	<ul style="list-style-type: none"> • Second line; sedative • Can precipitate delirium
Sedative		
MIDAZOLAM 10mg in 2ml	Indications: anxiety, muscle spasm/ myoclonus, seizures, terminal delirium/ agitation Dose: titrate according to symptoms and response	<ul style="list-style-type: none"> • Anxiolytic (5-10mg/ 24 hours) • Muscle relaxant (5-20mg/ 24 hours) • Anticonvulsant (20-30mg/ 24 hours) • First line sedative (20-80mg / 24 hours)
Other medication occasionally given by SC route in palliative care		
DEXAMETHASONE 4mg in 1ml	Indications: bowel obstruction, raised intracranial pressure or intractable nausea and vomiting Dose: 2-16mg / 24 hours	<ul style="list-style-type: none"> • SC dose is the same as oral • Available as different dose formulations. Check preparation • Mixes poorly with other drug • Can be given as a daily SC injection (in the morning)
KETAMINE	Indication: Complex pain	<ul style="list-style-type: none"> • Specialist supervision only
KETOROLAC 10mg in 1ml 30mg in 1ml	Indication: bone/ inflammatory pain if patient in last days of life Dose: 10- 30mg / 24 hours	<ul style="list-style-type: none"> • Specialist supervision only • Give an oral PPI if still able to swallow • Long half life particularly in frail patients: given as a twice daily SC injection
OCTREOTIDE 200micrograms/ml (5ml multi-dose vial)	Indications: intractable vomiting due to bowel obstruction, fistula discharge Dose: 300–900 micrograms / 24 hours	<ul style="list-style-type: none"> • Some formulations very expensive • Potent antisecretory agent • Does not treat nausea • Limit fluid intake to 1-1.5 litre/ 24 hrs

Diluent

Single Drug

Water for Injection is the diluent of choice for most drugs. There are exceptions, however, and these drugs are listed below.

Drug	Preferred Diluent
Dexamethasone	Sodium chloride 0.9%
Ketamine (<i>specialist advice only</i>)	Sodium chloride 0.9% or Dextrose 5%
Ketorolac (<i>specialist advice only</i>)	Sodium chloride 0.9% or Dextrose 5%
Levomepromazine	Sodium chloride 0.9%
Octreotide	Sodium chloride 0.9%

Important

Cyclizine is incompatible with sodium chloride 0.9%.

Two or more Drugs

When two or more drugs are mixed in a syringe the diluent is usually water for injection. If compatibility/stability data is available for an alternative diluent then that diluent should be used

8. Morphine: Drug combinations for subcutaneous infusion that are stable for 24 hours

- **These are not clinical doses to prescribe. Most patients will not need high doses. Read the relevant guidelines.**
- Only use this table to check for concentrations that are stable
- Refer to Table 1 for the usual dose range for each of the medications. Use the minimum effective dose and titrate according to response
- Monitor closely for visible signs of incompatibility such as the solution becoming cloudy, changing colour or the appearance of crystals

Drug Combination	Maximum concentrations of two drug combinations that are physically stable	
	17ml in 20ml syringe	22ml in 30ml syringe
Morphine Sulphate Cyclizine	300mg 150mg	
Morphine Sulphate Glycopyrronium bromide	300mg 1200micrograms	
Morphine Sulphate Haloperidol	400mg 10mg	
Morphine Sulphate Hyoscine butylbromide	300mg 120mg	
Morphine Sulphate Hyoscine hydrobromide	450mg 1200micrograms	
Morphine Sulphate Levomepromazine	300mg 100mg	
Morphine Sulphate Metoclopramide	120mg 60mg	160mg 80mg
Morphine Sulphate Midazolam	300mg 30mg	380mg 40mg
Morphine Sulphate Octreotide	400mg 400micrograms	500mg 500micrograms

Drug Combination	Maximum concentrations of three drug combinations that are physically stable	
	17ml in 20ml syringe	22ml in 30ml syringe
Morphine Sulphate Cyclizine Haloperidol	40mg 100mg 2.5mg	
Morphine Sulphate Haloperidol Midazolam	100mg 5mg 20mg	130mg 6.5mg 25mg
Morphine Sulphate Hyoscine butylbromide Midazolam	50mg 40mg 60mg	60mg 50mg 75mg
Morphine Sulphate Metoclopramide Midazolam	50mg 30mg 7.5mg	60mg 40mg 10mg
Morphine Sulphate Glycopyrronium Haloperidol	270mg 1200micrograms 10mg	

9. Diamorphine: Drug combinations for subcutaneous infusion that are stable for 24 hours

- **These are not clinical doses to prescribe. Most patients will not need high doses. Read the relevant guidelines.**
- Only use this table to check for concentrations that are stable
- Refer to Table 1 for the usual dose range for each of the medications. Use the minimum effective dose and titrate according to response
- Monitor closely for visible signs of incompatibility such as the solution becoming cloudy, changing colour or the appearance of crystals

Drug Combination	Maximum concentrations of two drug combinations that are physically stable	
	17ml in 20ml syringe	22ml in 30ml syringe
Diamorphine Cyclizine	340mg 150mg	
Diamorphine Glycopyrronium bromide	425mg 1200micrograms	
Diamorphine Haloperidol	800mg 10mg	
Diamorphine Hyoscine butylbromide	1200mg 120mg	
Diamorphine Hyoscine hydrobromide	1200mg 1200micrograms	
Diamorphine Ketorolac	90mg 30mg	
Diamorphine Levomepromazine	850mg 100mg	
Diamorphine Metoclopramide	2550mg 85mg	3300mg 110mg
Diamorphine Midazolam	560mg 80mg	720mg 100mg
Diamorphine Octreotide	425mg 900 micrograms	

Drug Combination	Maximum concentrations of three drug combinations that are physically stable	
	17ml in 20ml syringe	22ml in 30ml syringe
Diamorphine Cyclizine Haloperidol	340mg 150mg 10mg	
Diamorphine Haloperidol Midazolam	800mg 7.5mg 65mg	1000mg 10mg 80mg
Diamorphine Hyoscine butylbromide Midazolam	120mg 80mg 20mg	150mg 100mg 25mg
Diamorphine Levomepromazine Metoclopramide	850mg 100mg 50mg	
Diamorphine Levomepromazine Midazolam	850mg 50mg 30mg	1100mg 60mg 40mg
Diamorphine Metoclopramide Midazolam	420mg 60mg 20mg	540mg 70mg 25mg

The following combinations are not stable:

- Diamorphine, dexamethasone and levomepromazine
- Diamorphine, dexamethasone and midazolam
- Diamorphine, cyclizine and metoclopramide
- Octreotide and levomepromazine
- Octreotide and cyclizine
- Octreotide and dexamethasone

10. Oxycodone: Drug combinations for subcutaneous infusion that are stable for 24 hours

- **These are not clinical doses to prescribe. Most patients will not need high doses. Read the relevant guidelines.**
- Only use this table to check for concentrations that are stable
- Refer to Table 1 for the usual dose range for each of the medications. Use the minimum effective dose and titrate according to response
- Monitor closely for visible signs of incompatibility such as the solution becoming cloudy, changing colour or the appearance of crystals

Drug Combination	Maximum concentrations of two drug combinations that are physically stable	
	17ml in 20ml syringe	22ml in 30ml syringe
Oxycodone Cyclizine	Do not mix - Incompatible	Do not mix - Incompatible
Oxycodone Haloperidol	140mg 10mg	
Oxycodone Hyoscine butylbromide	140mg 40mg	180mg 50mg
Oxycodone Hyoscine hydrobromide	130mg 1200micrograms	
Oxycodone Ketorolac	85mg 30mg	
Oxycodone Levomepromazine	120mg 100mg	
Oxycodone Metoclopramide	80mg 40mg	100mg 50mg
Oxycodone Midazolam	80mg 40mg	100mg 50mg
Oxycodone Octreotide	80mg 400micrograms	100mg 500micrograms

Drug Combination	Maximum concentrations of three drug combinations that are physically stable	
	17ml in 20ml syringe	22ml in 30ml syringe
Oxycodone	80mg	100mg
Haloperidol	2.5mg	5mg
Hyoscine butylbromide	100mg	120mg
Oxycodone	80mg	100mg
Haloperidol	2.5mg	5mg
Hyoscine hydrobromide	1000micrograms	1200micrograms
Oxycodone	80mg	100mg
Haloperidol	2.5mg	5mg
Midazolam	15mg	20mg
Oxycodone	80mg	100mg
Levomepromazine	20mg	25mg
Hyoscine butylbromide	100mg	120mg

11. Drug Conversions

Converting to Diamorphine or Morphine

Diamorphine and Morphine are the opioids of choice for moderate to severe pain. Diamorphine is particularly suitable for use in a syringe pump because it is highly soluble in small volumes. 1g of diamorphine can be dissolved in 1.6 ml of water (21 ml of water are needed to dissolve 1g of morphine sulphate). However, when dose requirement is low morphine can be used equally well. For advice please contact Hospital Palliative Care Team or St Andrew's Hospice. (Refer to Appendix 1, 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 24hour dose

i.e. $120 \text{ mg} + 120 \text{ mg} = 240 \text{ mg} \div 6 = 40 \text{ mg}$.

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

Total 24 hours oral morphine dose:

$120 \text{ mg} + 120 \text{ mg} + 40 \text{ mg} + 40 \text{ mg} + 40 \text{ mg} = 360 \text{ mg}$.

$360 \text{ mg} \text{ divided by } 3 = 120 \text{ mg of diamorphine subcutaneously over 24 hours.}$

OR

$360 \text{ mg} \text{ divided by } 2 = 180 \text{ mg of morphine subcutaneously over 24 hours.}$

Subcutaneous diamorphine is 1.5 x as potent as subcutaneous morphine.

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

12. Breakthrough analgesia

Breakthrough analgesia should still be prescribed subcutaneously when a continuous infusion is in use. The dose should normally be approximately 1/6th of the current 24hr opioid. If the 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 table on page 10.

Caution: Breakthrough analgesia given for movement related pain or incident pain in a patient whose background pain is satisfactorily controlled should not normally be added into the regular 24hour dose as toxicity may ensue. Continue to give as breakthrough in anticipation of incident related pain.

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Scottish Intercollegiate Guidelines Network (2008). Control of pain in adults with cancer. Scottish Intercollegiate Guidelines Network, Edinburgh

Lanarkshire Palliative Care Guidelines (2009)

Appendix 1

Hospital Palliative Care Teams

Hairmyers Hospital

Clinical Nurse Specialist	01355 584656
Medicines Information	01355 584879
Palliative Care Pharmacist	01355 584887

Monklands Hospital

Clinical Nurse Specialist	01236 712156
Medicines Information	01236 712555

Wishaw General Hospital

Clinical Nurse Specialist	01698 366053
Medicines Information	01698 367065

Primary Care

Community Macmillan Nursing Team

North team	01698 723282
South team	01698 723299

St Andrew's Hospice

24hour Advice	01236 766951
Macmillan Area Lead Pharmacist- Palliative Care	01236 772021

Strathcarron Hospice

24hour Cumbernauld area	01324 826222
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Appendix 2

Contributors

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