

Syringe Pumps

Introduction

Portable infusion pumps are used in palliative care to deliver a continuous subcutaneous infusion of medication over 24 hours. Mixing of medications in this manner is unlicensed but is supported by practice.

Some acute areas will use non-ambulatory pumps e.g. Alaris pump. Check which device is used in your area.

Indications

A patient is unable to take medication orally due to:

- Persistent [nausea and/ or vomiting](#).
- Dysphagia.
- [Bowel obstruction](#) or malabsorption.
- Reduced level of consciousness, such as in the [last days of life](#).

General information

Use the current local protocols for setting up and monitoring the syringe pump you are using. The tables in this guideline contain information about preparations, dose ranges, diluents and indications for single drugs that can be given by subcutaneous infusion for symptom control in palliative and end of life care.

Assessment

- The figures in these tables are NOT clinical doses to prescribe. Most patients will require much lower doses.
- Refer to relevant guidelines to obtain usual dose range for each medication
- Use minimum effective dose and titrate according to response
- Concentrations equivalent to or less than those stated in table are physically stable for 24 hours
- For doses greater than those stated in the tables seek specialist advice
- The tables contain information about the stability and compatibilities of drug combinations for use in a subcutaneous infusion in palliative care.
- The compatibility tables contain information for a subcutaneous infusion using a CME T34 syringe pump or a non-ambulatory pump containing:
 - Alfentanil and one or two other drugs (see: [Alfentanil guideline](#) & seek specialist advice)
 - Diamorphine and one or two other drugs
 - Hydromorphone and one or two other drugs (seek specialist advice)
 - Ketamine and one or two other drugs (see: [Ketamine guideline](#) & seek specialist advice)
 - Morphine and one or two other drugs
 - Oxycodone and one or two other drugs (using 10mg/ml and 50mg/ml preparations)
 - Drug combinations, diluents or doses other than those listed in the compatibility tables are used occasionally on the recommendation of a palliative care specialist. Stability data to support this combination should be checked with a clinical pharmacist before infusion. Any recommendation given by the palliative care specialist should be documented clearly in the patient's notes.

Single drugs used in a subcutaneous infusion over 24 hours in Palliative Care

Diluent: water for injection unless stated and make up to 17ml in 20ml syringe or 22ml in 30ml syringe using a CME T34 pump or 24ml or 48ml in a 50ml syringe in a non-ambulatory pump.

Single agents	Indications and dose range	Comments
Opioids See Choosing & Changing opioids		
MORPHINE SULFATE 10mg, 30mg in 1ml 60mg in 2ml (other strengths available but not used commonly)	Indications: opioid responsive pain, breathlessness. Dose: 5 to 10mg/24 hours, if no opioid before	<ul style="list-style-type: none"> 1st line opioid analgesic. Caution in stage 4/5 chronic kidney disease.
DIAMORPHINE 5mg, 10mg, 30mg, 100mg, 500mg powder ampoules	Indications: opioid responsive pain, breathlessness. Dose: 5 to 10mg/24 hours, if no opioid before	<ul style="list-style-type: none"> Can be diluted in a small volume. Preferred for high opioid doses. Caution in stage 4/5 chronic kidney disease.
OXYCODONE 10mg in 1ml 20mg in 2ml 50mg in 1ml (use may be restricted in some areas)	Indications: opioid responsive pain, breathlessness. Dose: 2 to 5mg/ 24 hours, if no opioid before	<ul style="list-style-type: none"> 2nd line opioid analgesic if morphine/ diamorphine not tolerated. Caution in stage 4/5 chronic kidney disease
ALFENTANIL 1mg in 2ml 5mg in 1ml (use may be restricted in some areas)	Indications: opioid responsive pain, breathlessness. Dose: Specialist advice and supervision required.	<ul style="list-style-type: none"> 3rd line opioid; specialist advice needed. 1st line in stages 4/5 chronic kidney disease. Caution with high strength preparation (5mg in 1ml); only use in line with local policy.
HYDROMORPHONE 10mg in 1ml 20mg in 1ml 50mg in 1ml	Indications: opioid responsive pain, breathlessness. Dose: Specialist advice and supervision required.	<ul style="list-style-type: none"> 3rd line opioid; specialist advice needed. Unlicensed preparation available from Cardinal Health Martindale Products Caution in stage 4/5 chronic kidney disease

Single drugs used in a subcutaneous infusion over 24 hours in Palliative Care

Diluent: water for injection unless stated and make up to 17ml in 20ml syringe or 22ml in 30ml syringe using a CME T34 pump or 24ml or 48ml in a 50ml syringe in a non-ambulatory pump.

Single agents	Indications and dose range	Comments
Antiemetics		
CYCLIZINE 50mg in 1ml	Indications: nausea and vomiting (bowel obstruction or intracranial disease). Dose: 50 to 150mg / 24 hours	<ul style="list-style-type: none"> • Anticholinergic; reduces peristalsis. • Can cause redness, irritation at site. • Incompatible with 0.9% saline
METOCLOPRAMIDE 10mg in 2ml	Indications: nausea and vomiting (peristaltic failure, gastric stasis/outlet obstruction, opioid) Dose: 20 to 120mg / 24 hours	<ul style="list-style-type: none"> • Prokinetic. • Avoid if complete bowel obstruction or colic. • Possible risk of extrapyramidal side effects
HALOPERIDOL 5mg in 1ml 10mg in 2ml	Indications: opioid or metabolic induced nausea, delirium. Dose: 2 to 5mg / 24 hours	<ul style="list-style-type: none"> • Long half-life: can also be given as a once daily SC injection. • Extrapyramidal side effects
LEVOMEPRMAZINE 25mg in 1ml	Indications: complex nausea, terminal delirium/ agitation. Dose: 5 to 25mg / 24 hours - antiemetic. Dose: 25 to 100mg / 24 hours - sedative.	<ul style="list-style-type: none"> • Protect from light, exposure can cause purple/yellow discolouration; discard if this occurs. • Lowers blood pressure. • Long half-life: can be given as a once or twice daily SC injection. • Second line sedative if midazolam ineffective. • See: Levomepromazine guideline.

Single drugs used in a subcutaneous infusion over 24 hours in Palliative Care

Diluent: water for injection unless stated and make up to 17ml in 20ml syringe or 22ml in 30ml syringe using a CME T34 pump or 24ml or 48ml in a 50ml syringe in a non-ambulatory pump.

Single agents	Indications and dose range	Comments
Anticholinergics for chest secretions or bowel colic		
HYOSCINE BUTYLBROMIDE (Buscopan) 20mg in 1ml	Indications: chest secretions, bowel obstruction (colic, vomiting). Dose: 40 to 120mg / 24 hours	<ul style="list-style-type: none"> 1st line; non-sedative
GLYCOPYRRONIUM 200 micrograms in 1ml 600 micrograms in 3ml	Indications: chest secretions or colic. Dose: 600 to 1200 micrograms /24 hours	<ul style="list-style-type: none"> 2nd line; non-sedative. Longer duration of action than hyoscine.
HYOSCINE HYDROBROMIDE 400 micrograms in 1ml 600 micrograms in 1ml	Indications: chest secretions. Dose: 400 to 1200 micrograms / 24 hours	<ul style="list-style-type: none"> 3rd line; sedative. Can precipitate delirium

Single drugs used in a subcutaneous infusion over 24 hours in Palliative Care

Diluent: water for injection unless stated and make up to 17ml in 20ml syringe or 22ml in 30ml syringe using a CME T34 pump or 24ml or 48ml in a 50ml syringe in a non-ambulatory pump.

Single agents	Indications and dose range	Comments
Non Steroidals (NSAIDS)		
DICLOFENAC 75mg in 3ml	Indications: relief of pain and inflammation. Dose: 75 to 150mg/ 24 hours	<ul style="list-style-type: none"> Administer in separate syringe pump, incompatible with most drugs Avoid in patients with history of, or risk factors for heart disease. Monitor renal function Injection is irritant, dilute maximally with 0.9% saline
KETOROLAC 10mg in 1ml 30mg in 1ml	Indications: short term management of pain Dose:60 to 90mg/ 24 hours	<ul style="list-style-type: none"> Likely to cause more GI irritation than diclofenac, concurrent gastro protection recommended. Avoid in patients with history of, or risk factors for heart disease. Monitor renal function Injection is irritant, dilute maximally with 0.9% saline.

Single drugs used in a subcutaneous infusion over 24 hours in Palliative Care

Diluent: water for injection unless stated and make up to 17ml in 20ml syringe or 22ml in 30ml syringe using a CME T34 pump or 24ml or 48ml in a 50ml syringe in a non-ambulatory pump.

Single agents	Indications and dose range	Comments
Sedative		
MIDAZOLAM 10mg in 2ml	Indications: myoclonus, seizures, terminal delirium/ agitation. Dose: titrate dose according to symptoms and response.	<ul style="list-style-type: none"> • Anxiolytic (5 to 10mg/ 24 hours). • Muscle relaxant (5 to 20mg/ 24 hours). • Anticonvulsant (20 to 30mg/ 24 hours). • 1st line sedative (20 to 80mg / 24 hours). • 10mg in 2ml preparation for palliative care.



Single drugs used in a subcutaneous infusion over 24 hours in Palliative Care

Diluent: water for injection unless stated and make up to 17ml in 20ml syringe or 22ml in 30ml syringe using a CME T34 pump or 24ml or 48ml in a 50ml syringe in a non-ambulatory pump.

Single agents	Indications and dose range	Comments
Other medication occasionally given by the subcutaneous (SC) route in palliative care		
DEXAMETHASONE INJECTION 3.3mg/ml or 3.8mg/ml refrigerated storage	Indications: bowel obstruction, raised intracranial pressure or intractable nausea and vomiting. Dose: 2 to 16mg / 24 hours	<ul style="list-style-type: none"> • Check preparation: available as different dose formulations. • Often given as a once or twice daily SC injection (in the morning). • Given as a single drug infusion: poor compatibility if mixed with other drugs.
KETAMINE 10mg in 1ml (20ml vial) 50mg in 1ml (10ml vial) 100mg in 1ml (10ml vial)	Indications: Refractory chronic pain Dose: initial dose 50 to 100mg, titrate up as needed to maximum 600mg/ 24 hours	<ul style="list-style-type: none"> • Can also be given by burst treatment; see guideline. • Injection is irritant, dilute maximally with 0.9% saline.
OCTREOTIDE 200micrograms/ml (5ml multi-dose vial) 100 micrograms in 1ml 500 micrograms in 1ml	Indications: intractable vomiting due to bowel obstruction, fistula discharge. Dose: 300 to 900 micrograms / 24 hours	<ul style="list-style-type: none"> • Potent antisecretory agent. • Does not treat nausea. • Limit fluid intake to 1 to 1.5 litre/ 24 hours.

Subcutaneous morphine sulfate infusion - **TWO DRUG COMBINATIONS****Diluent : water for injection**

- The figures in these tables are **NOT** clinical doses to prescribe. They are the maximum amounts of each drug that can be mixed in the syringe and generally be considered physically stable for 24 hours
- Most patients will require much lower doses. Refer to relevant guidelines to obtain the usual dose range to prescribe for each drug. Use minimum effective dose and review according to response.
- Mixing of drugs in this manner is unlicensed but is supported by clinical practice.
- Seek specialist advice from a clinical pharmacist if the doses needed are greater than those stated in the tables
- Check the infusion after set up and in acute setting every 4 hours for any signs of precipitation, cloudiness, particles or colour change as external factors e.g. light, heat may cause problems

Type of pump				
Drug combinations	Dilute using water for injection to a final volume of:			
	17ml in 20ml syringe and use <u>CME T34 pump</u>	22 ml in 30ml syringe and use <u>CME T34 pump</u>	24ml in 50ml syringe and use <u>non ambulatory pump</u>	48ml in 50ml syringe and use <u>non ambulatory pump</u>



MAXIMUM amounts that can be mixed together and are considered physically stable for 24h

Morphine Sulfate	270mg	350mg	380mg	760mg
Cyclizine	115mg	150mg	150mg	150mg
Morphine Sulfate	225mg	290mg	315mg	730mg
Haloperidol	6mg	8mg	8mg	10mg
Morphine Sulfate	170mg	220mg	240mg	480mg
Hyoscine butylbromide	90mg	120mg	120mg	120mg
Morphine Sulfate	65mg	85mg	90mg	180mg
Hyoscine hydrobromide	1800micrograms	2400micrograms	2400micrograms	2400micrograms
Morphine Sulfate	105mg	140mg	150mg	300mg
Levomepromazine	45mg	55mg	60mg	120mg
Morphine Sulfate	120mg	160mg	175mg	350mg
Metoclopramide	50mg	70mg	75mg	120mg
Morphine Sulfate	140mg	180mg	195mg	395mg
Midazolam	35mg	45mg	49mg	98mg
Morphine Sulfate	100mg	140mg	150mg	300mg
Octreotide	380micrograms	500micrograms	540micrograms	900micrograms

Subcutaneous infusion of medication in Palliative Care **Table 1a:** Subcutaneous morphine sulfate infusion

Subcutaneous morphine sulfate infusion - **THREE DRUG COMBINATIONS****Diluent : water for injection**



- The figures in these tables are NOT clinical doses to prescribe. They are the maximum amounts of each drug that can be mixed in the syringe and generally be considered physically stable for 24 hours
- Most patients will require much lower doses. Refer to relevant guidelines to obtain the usual dose range to prescribe for each drug. Use minimum effective dose and review according to response.
- Mixing of drugs in this manner is unlicensed but is supported by clinical practice.
- Seek specialist advice from a clinical pharmacist if the doses needed are greater than those stated in the tables
- Check the infusion after set up and in acute setting every 4 hours for any signs of precipitation, cloudiness, particles or colour change as external factors e.g. light, heat may cause problems

Type of pump				
Drug combinations	Dilute using water for injection to a final volume of:			
	17ml in 20ml syringe and use CME T34 pump	22 ml in 30ml syringe and use CME T34 pump	24ml in 50ml syringe and use non ambulatory pump	48ml in 50ml syringe and use non ambulatory pump
MAXIMUM amounts that can be mixed together and are considered physically stable for 24h				
Morphine Sulfate	90mg	120mg	130mg	260mg
Cyclizine	115mg	150mg	150mg	150mg
Haloperidol	3mg	5mg	5mg	10mg
Morphine Sulfate	90mg	120mg	130mg	260mg
Haloperidol	3mg	5mg	5mg	10mg
Midazolam	20mg	30mg	30mg	60mg
Morphine Sulfate	100mg	130mg	140mg	280mg
Hyoscine butylbromide	90mg	120mg	120mg	120mg
Midazolam	15mg	20mg	20mg	40mg
Morphine Sulfate	90mg	120mg	130mg	260mg
Metoclopramide	20mg	30mg	30mg	60mg
Midazolam	20mg	30mg	30mg	60mg
Morphine Sulfate	90mg	120mg	130mg	260mg
Midazolam	35mg	50mg	50mg	100mg
Levomepromazine	20mg	30mg	30mg	60mg
Morphine Sulfate	90mg	120mg	130mg	260mg
Cyclizine	115mg	150mg	150mg	150mg
Midazolam	20mg	30mg	30mg	60mg
Morphine Sulfate	310mg	400mg	430mg	860mg
Haloperidol	7mg	10mg	10mg	20mg
Hyoscine hydrobromide	900micrograms	1200micrograms	1300micrograms	2400micrograms

Subcutaneous infusion of medication in Palliative Care **Table 1b:** Subcutaneous morphine sulfate infusion

Subcutaneous Diamorphine Infusion - **TWO DRUG COMBINATIONS****Diluent: Water for injections**



- The figures in these tables are **NOT** clinical doses to prescribe. They are the *maximum* amounts of each drug that can be mixed in the syringe and generally be considered physically stable for 24 hours
 - Most patients will require much lower doses. Refer to relevant guidelines to obtain the usual dose range to prescribe for each drug. Use minimum effective dose and review according to response.
 - Mixing of drugs in this manner is unlicensed but is supported by clinical practice.
 - Seek specialist advice from a clinical pharmacist if the doses needed are greater than those stated in the tables
- Check the infusion after set up and in acute setting every 4 hours for any signs of precipitation, cloudiness, particles or colour change as external factors e.g. light, heat may cause problems

Type of pump				
Drug combinations	Dilute using water for injection to a final volume of:			
	17ml in a 20ml syringe and use a <u>CME T34 pump</u>	22ml in a 30ml syringe and use a <u>CME T34 pump</u>	24ml in a 50ml syringe and use a <u>non ambulatory pump</u>	48ml in a 50ml syringe and use a <u>non ambulatory pump</u>
MAXIMUM amounts that can be mixed together and are considered physically stable for 24h				
Diamorphine	340mg	440mg	480mg	950mg
Cyclizine	150mg	150mg	150mg	150mg
Diamorphine	425mg	550mg	600mg	1000mg
Glycopyrronium	1200micrograms	1200micrograms	1200micrograms	1200micrograms
Diamorphine	800mg	1000mg	1000mg	1000mg
Haloperidol	10mg	10mg	10mg	10mg
Diamorphine	1000mg	1000mg	1000mg	1000mg
Hyoscine butylbromide	120mg	120mg	120mg	120mg
Diamorphine	1000mg	1000mg	1000mg	1000mg
Hyoscine hydrobromide	1200micrograms	1200micrograms	1200micrograms	1200micrograms
Diamorphine	850mg	1000mg	1000mg	1000mg
Levomepromazine	100mg	100mg	100mg	100mg
Diamorphine	1000mg	1000mg	1000mg	1000mg
Metoclopramide	85mg	110mg	120mg	120mg
Diamorphine	560mg	720mg	1000mg	1000mg
Midazolam	80mg	80mg	80mg	80mg
Diamorphine	425mg	550mg	1000mg	1000mg
Octreotide	900micrograms	900micorgrams	900micrograms	900micrograms

Subcutaneous infusion of medication in Palliative Care **Table 2a:** Subcutaneous Diamorphine infusion 2 Drug Combinations

Subcutaneous Diamorphine Infusion - **THREE DRUG COMBINATIONS****Diluent: Water for injections**



- The figures in these tables are NOT clinical doses to prescribe. They are the *maximum* amounts of each drug that can be mixed in the syringe and generally be considered physically stable for 24 hours
 - Most patients will require much lower doses. Refer to relevant guidelines to obtain the usual dose range to prescribe for each drug. Use minimum effective dose and review according to response.
 - Mixing of drugs in this manner is unlicensed but is supported by clinical practice.
 - Seek specialist advice from a clinical pharmacist if the doses needed are greater than those stated in the tables
- Check the infusion after set up and in acute setting every 4 hours for any signs of precipitation, cloudiness, particles or colour change as external factors e.g. light, heat may cause problems

Type of pump				
Drug combinations	Dilute using water for injection to a final volume of:			
	17ml in a 20ml syringe and use a CME T34 pump	22ml in a 30ml syringe and use a CME T34 pump	24ml in a 50ml syringe and use a non ambulatory pump	48ml in a 50ml syringe and use a non ambulatory pump
MAXIMUM amounts that can be mixed together and are considered physically stable for 24h				
Diamorphine	340mg	440mg	480mg	960mg
Cyclizine	150mg	150mg	150mg	150mg
Haloperidol	10mg	10mg	10mg	10mg
Diamorphine	800mg	1000mg	1000mg	1000mg
Haloperidol	7mg	10mg	10mg	10mg
Midazolam	65mg	80mg	80mg	80mg
Diamorphine	320mg	410mg	445mg	900mg
Haloperidol	5mg	6mg	7mg	13mg
Hyoscine butylbromide	90mg	115mg	120mg	120mg
Diamorphine	120mg	150mg	165mg	320mg
Hyoscine butylbromide	80mg	100mg	110mg	120mg
Midazolam	20mg	25mg	27mg	55mg
Diamorphine	850mg	1000mg	1000mg	1000mg
Levomepromazine	100mg	100mg	100mg	100mg
Metoclopramide	50mg	60mg	65mg	120mg
Diamorphine	800mg	1000mg	1000mg	1000mg
Levomepromazine	100mg	100mg	100mg	100mg
Midazolam	60mg	75mg	80mg	80mg
Diamorphine	420mg	540mg	590mg	1000mg
Metoclopramide	60mg	75mg	80mg	120mg
Midazolam	20mg	25mg	27mg	55mg
Diamorphine	1000mg	1000mg	1000mg	1000mg
Hyoscine butylbromide	120mg	120mg	120mg	120mg
Levomepromazine	50mg	65mg	70mg	100mg

Subcutaneous infusion of medication in Palliative Care **Table 2b:** Subcutaneous Diamorphine infusion 3 Drug Combinations

Subcutaneous Oxycodone Infusion using 10mg/ml and 20mg/2ml injection - TWO DRUG COMBINATIONS
Diluent : water for injection

- Compatibility for the 50mg/ml preparation is different than for the 10mg/ml and 20mg/2ml refer to separate table (3b) when using the 50mg/ml preparation
- Do not mix the 50mg/ml preparation with the 10mg/ml or 20mg/2ml preparations
- The figures in these tables are **NOT** clinical doses to prescribe. They are the *maximum* amounts of each drug that can be mixed in the syringe and generally be considered physically stable for 24 hours
- Most patients will require much lower doses. Refer to relevant guidelines to obtain the usual dose range to prescribe for each drug. Use minimum effective dose and review according to response.
- Mixing of drugs in this manner is unlicensed but is supported by clinical practice.
- Seek specialist advice from a clinical pharmacist if the doses needed are greater than those stated in the tables
- Check the infusion after set up and in acute setting every 4 hours for any signs of precipitation, cloudiness, particles or colour change as external factors e.g. light, heat may cause problems



Type of pump				
Drug combinations using Oxycodone 10mg/ml & 20mg/2ml injection	Dilute using water for injection to a final volume of:			
	17ml in 20ml syringe and use CME T34 pump	22 ml in 30ml syringe and use CME T34 pump	24ml in 50ml syringe and use non ambulatory pump	48ml in 50ml syringe and use non ambulatory pump
MAXIMUM amounts that can be mixed together and are considered physically stable for 24h				
Oxycodone	30mg	40mg	40mg	80mg
Glycopyrronium	500micrograms	600micrograms	600micrograms	1200micrograms
Oxycodone	140mg	180mg	195mg	390mg
Haloperidol	10mg	10mg	10mg	10mg
Oxycodone	140mg	180mg	195mg	390mg
Hyoscine butylbromide	40mg	50mg	55mg	110mg
Oxycodone	130mg	160mg	175mg	350mg
Hyoscine hydrobromide	1200micrograms	1200micrograms	1200micrograms	1200micrograms
Oxycodone	120mg	150mg	160mg	320mg
Levomepromazine	100mg	100mg	100mg	100mg
Oxycodone	80mg	100mg	105mg	210mg
Metoclopramide	40mg	50mg	55mg	110mg
Oxycodone	80mg	100mg	105mg	210mg
Midazolam	40mg	50mg	55mg	100mg
Oxycodone	80mg	100mg	105mg	210mg
Octreotide	400micrograms	500micrograms	500micrograms	900micrograms
Subcutaneous infusion of medication in Palliative Care Table 3a: Subcutaneous Oxycodone Infusion using 10mg/ml & 20mg/2ml injection				

Subcutaneous Oxycodone Infusion using 50mg/ml injection - TWO DRUG COMBINATIONS

(not available to prescribe in some health boards)

Diluent : water for injection

- Compatibility for the 50mg/ml preparation is different than for the 10mg/ml and 20mg/2ml refer to separate table (3a) when using the 50mg/ml preparation
- Do not mix the 50mg/ml preparation with the 10mg/ml or 20mg/2ml preparations
- Oxycodone 50mg/ml injection is significantly more expensive; use it only when the prescribed dose cannot be administered using 10mg/ml injection.
- The figures in these tables are **NOT** clinical doses to prescribe. They are the *maximum amounts* of each drug that can be mixed in the syringe and generally be considered physically stable for 24 hours
- Most patients will require much lower doses. Refer to relevant guidelines to obtain the usual dose range to prescribe for each drug. Use minimum effective dose and review according to response.
- Mixing of drugs in this manner is unlicensed but is supported by clinical practice.
- Seek specialist advice from a clinical pharmacist if the doses needed are greater than those stated in the tables
- Check the infusion after set up and in acute setting every 4 hours for any signs of precipitation, cloudiness, particles or colour change as external factors e.g. light, heat may cause problems

Type of pump				
Drug combinations using Oxycodone 50mg/ml injection	Dilute using water for injection to a final volume of:			
	17ml in 20ml syringe and use CME T34 pump	22 ml in 30ml syringe and use CME T34 pump	24ml in 50ml syringe and use non ambulatory pump	48ml in 50ml syringe and use non ambulatory pump
MAXIMUM amounts that can be mixed together and are considered physically stable for 24h				
Oxycodone	380mg	500mg	540mg	1080mg
Glycopyrronium	900micrograms	1200micrograms	1200micrograms	1200micrograms
Oxycodone	640mg	840mg	910mg	1820mg
Haloperidol	10mg	10mg	10mg	10mg
Oxycodone	640mg	840mg	910mg	1820mg
Hyoscine butylbromide	75mg	100mg	105mg	120mg
Oxycodone	525mg	680mg	740mg	1480mg
Hyoscine hydrobromide	900micrograms	1200micrograms	1200micrograms	1200micrograms
Oxycodone	470mg	610mg	665mg	1330mg
Levomepromazine	75mg	100mg	100mg	100mg
Oxycodone	270mg	360mg	390mg	780mg
Metoclopramide	50mg	70mg	75mg	120mg
Oxycodone	270mg	360mg	390mg	780mg
Midazolam	50mg	70mg	75mg	100mg

Subcutaneous infusion of medication in Palliative Care **Table 3b:** Subcutaneous Oxycodone Infusion using 50mg/ml injection (not available to prescribe in some health boards)

Subcutaneous Oxycodone Infusion using 10mg/ml and 20mg/2ml injection - **THREE DRUG COMBINATIONS**

Diluent : water for injection

- Do not mix the 50mg/ml preparation with the 10mg/ml or 20mg/2ml preparations
- **If mixing the 50mg/ml preparation in a three drug combination SEEK SPECIALIST ADVICE**
- The figures in these tables are **NOT** clinical doses to prescribe. They are the *maximum* amounts of each drug that can be mixed in the syringe and generally be considered physically stable for 24 hours
- Most patients will require much lower doses. Refer to relevant guidelines to obtain the usual dose range to prescribe for each drug. Use minimum effective dose and review according to response.
- Mixing of drugs in this manner is unlicensed but is supported by clinical practice.
- Seek specialist advice from a clinical pharmacist if the doses needed are greater than those stated in the tables
- Check the infusion after set up and in acute setting every 4 hours for any signs of precipitation, cloudiness, particles or colour change as external factors e.g. light, heat may cause problems

Type of pump		
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Drug combinations using Oxycodone 10mg/ml & 20mg/2ml injection	Dilute using water for injection to a final volume of:			
	17ml in 20ml syringe and use CME T34 pump	22 ml in 30ml syringe and use CME T34 pump	24ml in 50ml syringe and use non ambulatory pump	48ml in 50ml syringe and use non ambulatory pump

MAXIMUM amounts that can be mixed together and are considered physically stable for 24h

Oxycodone	80mg	100mg	105mg	210mg
Haloperidol	4mg	5mg	6mg	10mg
Hyoscine butylbromide	100mg	120mg	120mg	120mg
Oxycodone	80mg	100mg	105mg	210mg
Haloperidol	4mg	5mg	6mg	10mg
Hyoscine hydrobromide	1000micrograms	1200micrograms	1200micrograms	1200micrograms
Oxycodone	80mg	100mg	105mg	210mg
Haloperidol	4mg	5mg	6mg	10mg
Midazolam	15mg	20mg	20mg	40mg
Oxycodone	80mg	100mg	105mg	210mg
Hyoscine butylbromide	100mg	120mg	120mg	120mg
Levomepromazine	20mg	25mg	25mg	50mg
Oxycodone	80mg	100mg	105mg	210mg
Hyoscine butylbromide	100mg	120mg	120mg	120mg
Midazolam	15mg	20mg	25mg	50mg
Oxycodone	40mg	50mg	50mg	100mg
Levomepromazine	40mg	50mg	50mg	100mg
Midazolam	25mg	30mg	30mg	60mg
Oxycodone	40mg	50mg	50mg	100mg
Metoclopramide	25mg	30mg	50mg	100mg
Midazolam	25mg	30mg	30mg	60mg

Subcutaneous infusion of medication in Palliative Care **Table 3c:** Subcutaneous Oxycodone infusion using 10mg/ml or 20mg/2ml injection
3 DRUG COMBINATIONS

Subcutaneous Alfentanil infusion **TWO DRUG COMBINATIONS**

Diluent : water for injection



Alfentanil is available in 2 strengths: 500microgram/ml and 5mg/ml.

Please note: the high strength concentration (5mg/ml) may not be available/ recommended in some settings. Refer to local policy for its use.

Take care not to confuse Alfentanil with Fentanyl. These are two different strong opioids with varying potencies.

- The figures in these tables are **NOT** clinical doses to prescribe. They are the **maximum** amounts of each drug that can be mixed in the syringe and generally be considered physically stable for 24 hours
- Most patients will require much lower doses. Refer to relevant guidelines to obtain the usual dose range to prescribe for each drug. Use minimum effective dose and review according to response.
- Mixing of drugs in this manner is unlicensed but is supported by clinical practice.
- Seek specialist advice from a clinical pharmacist if the doses needed are greater than those stated in the tables
- Check the infusion after set up and in acute setting every 4 hours for any signs of precipitation, cloudiness, particles or colour change as external factors e.g. light, heat may cause problems

The doses of alfentanil stated below may not always be appropriate if using the 500 microgram/ml preparation, as the volume of this preparation needed would not fit into the syringe.

Type of pump				
Drug combinations using Alfentanil 500microgram/ml and 5mg/ml	Dilute using water for injection to a final volume of:			
	17ml in 20ml syringe and use <u>CME T34 pump</u>	22 ml in 30ml syringe and use <u>CME T34 pump</u>	24ml in 50ml syringe and use <u>non ambulatory pump</u>	48ml in 50ml syringe and use <u>non ambulatory pump</u>
MAXIMUM amounts that can be mixed together and are considered physically stable for 24h				
Alfentanil	4mg	5mg	5mg	10mg
Cyclizine	150mg	150mg	150mg	150mg
Alfentanil	50mg	65mg	72mg	100mg
Glycopyrronium	1200micrograms	1200micrograms	1200micrograms	1200micrograms
Alfentanil	70mg	90mg	100mg	100mg
Haloperidol	10mg	10mg	10mg	10mg
Alfentanil	55mg	70mg	80mg	100mg
Hyoscine butylbromide	100mg	120mg	120mg	120mg
Alfentanil	70mg	90mg	100mg	100mg
Levomepromazine	40mg	50mg	50mg	100mg
Alfentanil	40mg	50mg	55mg	100mg
Metoclopramide	30mg	39mg	42mg	84mg
Alfentanil	45mg	55mg	60mg	100mg
Midazolam	30mg	40mg	40mg	80mg
Alfentanil	3mg	3mg	4mg	8mg
Octreotide	500micrograms	650micrograms	700micrograms	1200micrograms

Subcutaneous infusion of medication in Palliative Care **Table 4a:** Subcutaneous Alfentanil infusion 2 Drug Combinations

Subcutaneous Alfentanil infusion - THREE DRUG COMBINATIONS

Alfentanil is available in 2 strengths: 500microgram/ml and 5mg/ml.

Please note: the high strength concentration (5mg/ml) may not be available/ recommended in some settings.



Refer to local policy for its use.

Take care not to confuse Alfentanil with Fentanyl. These are two different strong opioids with varying potencies.

Diluent: water for injection

- The figures in these tables are **NOT** clinical doses to prescribe. They are the **maximum** amounts of each drug that can be mixed in the syringe and generally be considered physically stable for 24 hours
- Most patients will require much lower doses. Refer to relevant guidelines to obtain the usual dose range to prescribe for each drug. Use minimum effective dose and review according to response.
- Mixing of drugs in this manner is unlicensed but is supported by clinical practice.
- Seek specialist advice from a clinical pharmacist if the doses needed are greater than those stated in the tables
- Check the infusion after set up and in acute setting every 4 hours for any signs of precipitation, cloudiness, particles or colour change as external factors e.g. light, heat may cause problems

The doses of alfentanil stated below may not always be appropriate if using the 500 microgram/ml preparation, as the volume of this preparation needed would not fit into the syringe.

Type of pump		
--------------	-----------------------------------------------------------------------------------	-------------------------------------------------------------------------------------

Drug combinations using Alfentanil 500microgram/ml and 5mg/ml	Dilute using water for injection to a final volume of:			
	17ml in 20ml syringe and use CME T34 pump	22 ml in 30ml syringe and use CME T34 pump	24ml in 50ml syringe and use non ambulatory pump	48ml in 50ml syringe and use non ambulatory pump



MAXIMUM amounts that can be mixed together and are considered physically stable for 24h

Alfentanil	6mg	7mg	8mg	16mg
Cyclizine	150mg	150mg	150mg	150mg
Haloperidol	10mg	10mg	10mg	10mg
Alfentanil	8mg	11mg	12mg	24mg
Cyclizine	150mg	150mg	150mg	150mg
Midazolam	25mg	30mg	35mg	70mg
Alfentanil	1mg	1.5mg	1.5mg	3mg
Haloperidol	1mg	1.5mg	1.5mg	3mg
Hyoscine butylbromide	50mg	60mg	70mg	120mg
Alfentanil	8 mg	11mg	12mg	24mg
Haloperidol	4mg	5mg	5mg	10mg
Levomepromazine	20mg	25mg	30mg	60mg
Alfentanil	8 mg	11mg	12mg	24mg
Haloperidol	4mg	5mg	5mg	10mg
Midazolam	25mg	30mg	35mg	70mg
Alfentanil	12mg	15mg	17mg	34mg
Hyoscine butylbromide	120mg	120mg	120mg	120mg
Levomepromazine	25mg	30mg	35mg	70mg
Alfentanil	8mg	10mg	12mg	24mg
Levomepromazine	20mg	25mg	30mg	60mg
Metoclopramide	50mg	60mg	70mg	120mg
Alfentanil	30mg	40mg	45mg	90mg
Levomepromazine	100mg	100mg	100mg	100mg
Midazolam	30mg	40mg	45mg	90mg
Alfentanil	8mg	10mg	12mg	24mg
Metoclopramide	25mg	30mg	35mg	70mg
Midazolam	25mg	30mg	35mg	70mg

Subcutaneous infusion of medication in Palliative Care **Table 4b:** Subcutaneous Alfentanil infusion 3 Drug Combinations

Subcutaneous Hydromorphone infusion - **TWO DRUG COMBINATIONS****Diluent : water for injection**



- The figures in these tables are **NOT** clinical doses to prescribe. They are the *maximum* amounts of each drug that can be mixed in the syringe and generally be considered physically stable for 24 hours
- Most patients will require much lower doses. Refer to relevant guidelines to obtain the usual dose range to prescribe for each drug. Use minimum effective dose and review according to response.
- Mixing of drugs in this manner is unlicensed but is supported by clinical practice.
- Seek specialist advice from a clinical pharmacist if the doses needed are greater than those stated in the tables
- Check the infusion after set up and in acute setting every 4 hours for any signs of precipitation, cloudiness, particles or colour change as external factors e.g. light, heat may cause problems

Type of pump				
Drug combinations	Dilute using water for injection to a final volume of:			
	17ml in 20ml syringe and use CME T34 pump	22 ml in 30ml syringe and use CME T34 pump	24ml in 50ml syringe and use non ambulatory pump	48ml in 50ml syringe and use non ambulatory pump
MAXIMUM amounts that can be mixed together and are considered physically stable for 24h				
Hydromorphone	6mg	8mg	8mg	16mg
Cyclizine	150mg	150mg	150mg	150mg
Hydromorphone	34mg	44mg	48mg	96mg
Glycopyrronium	1200micrograms	1200micrograms	1200micrograms	1200micrograms
Hydromorphone	170mg	200mg	200mg	200mg
Haloperidol	10mg	10mg	10mg	10mg
Hydromorphone	8mg	11mg	12mg	24mg
Hyoscine butylbromide	120mg	120mg	120mg	120mg
Hydromorphone	8mg	10mg	11mg	22mg
Hyoscine hydrobromide	800micrograms	1100micrograms	1200micrograms	1200micrograms
Hydromorphone	170mg	200mg	200mg	200mg
Levomepromazine	100mg	100mg	100mg	100mg
Hydromorphone	200mg	200mg	200mg	200mg
Metoclopramide	120mg	120mg	120mg	120mg
Hydromorphone	200mg	200mg	200mg	200mg
Midazolam	8mg	11mg	12mg	24mg

Subcutaneous infusion of medication in Palliative Care **Table 5a:** Subcutaneous Hydromorphone infusion 2 Drug Combinations

Subcutaneous Hydromorphone infusion - **THREE DRUG COMBINATIONS****Diluent : water for injection**



- The figures in these tables are **NOT** clinical doses to prescribe. They are the *maximum* amounts of each drug that can be mixed in the syringe and generally be considered physically stable for 24 hours
- Most patients will require much lower doses. Refer to relevant guidelines to obtain the usual dose range to prescribe for each drug. Use minimum effective dose and review according to response.
- Mixing of drugs in this manner is unlicensed but is supported by clinical practice.
- Seek specialist advice from a clinical pharmacist if the doses needed are greater than those stated in the tables
- Check the infusion after set up and in acute setting every 4 hours for any signs of precipitation, cloudiness, particles or colour change as external factors e.g. light, heat may cause problems

Type of pump				
Drug combinations	Dilute using water for injection to a final volume of:			
	17ml in 20ml syringe and use <u>CME T34 pump</u>	22 ml in 30ml syringe and use <u>CME T34 pump</u>	24ml in 50ml syringe and use <u>non ambulatory pump</u>	48ml in 50ml syringe and use <u>non ambulatory pump</u>
MAXIMUM amounts that can be mixed together and are considered physically stable for 24h				
Hydromorphone	105mg	130mg	145mg	190mg
Haloperidol	4mg	5mg	5mg	10mg
Midazolam	8mg	10mg	10mg	20mg
Hydromorphone	25mg	30mg	35mg	70mg
Hyoscine butylbromide	3mg	4mg	4mg	8mg
Levomepromazine	5mg	6mg	7mg	14mg
Hydromorphone Hyoscine butylbromide	2mg	3mg	3mg	6mg
Midazolam	64mg	80mg	90mg	120mg
Midazolam	8mg	10mg	10mg	20mg
Hydromorphone	45mg	60mg	65mg	130mg
Levomepromazine	15mg	20mg	20mg	40mg
Midazolam	10mg	15mg	15mg	30mg
Hydromorphone	5mg	7mg	7mg	14mg
Metoclopramide	15mg	20mg	25mg	50mg
Midazolam	2mg	3mg	3mg	6mg

Subcutaneous infusion of medication in Palliative Care **Table 5b:** Subcutaneous Hydromorphone infusion 3 Drug Combinations

Subcutaneous Ketamine infusion - **TWO DRUG COMBINATIONS****Diluent : 0.9% Saline**

- The figures in these tables are **NOT** clinical doses to prescribe. They are the *maximum* amounts of each drug that can be mixed in the syringe and generally be considered physically stable for 24 hours
- Most patients will require much lower doses. Refer to relevant guidelines to obtain the usual dose range to prescribe for each drug. Use minimum effective dose and review according to response.
- Mixing of drugs in this manner is unlicensed but is supported by clinical practice.
- Seek specialist advice from a clinical pharmacist if the doses needed are greater than those stated in the tables
- Check the infusion after set up and in acute setting every 4 hours for any signs of precipitation, cloudiness, particles or colour change as external factors e.g. light, heat may cause problems

Type of pump				
Drug combinations	Dilute using 0.9% saline to a final volume of:			
	17ml in 20ml syringe and use <u>CME T34 pump</u>	22 ml in 30ml syringe and use <u>CME T34 pump</u>	24ml in 50ml syringe and use <u>non ambulatory pump</u>	48ml in 50ml syringe and use <u>non ambulatory pump</u>

MAXIMUM amounts that can be mixed together and are considered physically stable for 24h

Ketamine (alone)	600mg	600mg	600mg	600mg
Ketamine	500mg	600mg	600mg	600mg
Alfentanil	6mg	7mg	8mg	15mg
Ketamine	600mg	600mg	600mg	600mg
Diamorphine	500mg	500mg	500mg	500mg
Ketamine	350mg	450mg	490mg	980mg
Morphine	180mg	230mg	250mg	500mg
Ketamine	600mg	600mg	600mg	600mg
Dexamethasone*	1mg	1mg	1mg	1mg
Ketamine	300mg	400mg	435mg	870mg
Haloperidol	10mg	10mg	10mg	10mg
Ketamine	500mg	600mg	600mg	600mg
Midazolam	35mg	45mg	50mg	100mg

*dilute the ketamine in 0.9% saline before adding the dexamethasone to avoid precipitation

Subcutaneous infusion of medication in Palliative Care **Table 6:** Subcutaneous Ketamine infusion alone and in 2 Drug Combinations

Practice points

- A continuous subcutaneous infusion of medication aims to maintain symptom control. If the patient has uncontrolled symptoms before the infusion is started or during the infusion period, give breakthrough doses of medication as required.
- Prescribe the medication(s) for subcutaneous infusion and the diluent, calculating appropriate dose when converting from oral to subcutaneous route. The infusion is given over 24 hours.
- Prescribe the correct breakthrough dose, as required, for each medication in the infusion, a maximum volume of 2ml can be used for SC bolus but consider your patient and avoid a volume over 1ml for patients with little subcutaneous tissue. These should be administered via a separate SC site.
- Cannula does not need to be flushed prior to administering medicines, but should be flushed after with sterile water for injection and between any incompatible medications (see local guidelines for more information on SC administration of as required medication)
- Prepare a new syringe every 24 hours.
- Protect the syringe from direct light and heat.
- Check the syringe after set up and within acute setting every 4 hours for precipitation, cloudiness, particles, colour change. Make sure the pump is running to time. Check the line, connection and cannula regularly.

Drug Administration Table: Unlicensed Routes

Many 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	CSCI	SC Inj	IM inj	IV inj	Sublingual	Buccal	Topical	Oral	Intranasal	Via stoma	Nebulised
Adrenaline 1 in 1000	N/A	N/A	YES	N/A	N/A	N/A	†	N/A	†	N/A	N/A
Alfentanil	†	†	†	YES	†	†	N/A	N/A	†	N/A	N/A
Carbocisteine	N/A	N/A	N/A	N/A	N/A	N/A	N/A	YES	N/A	N/A	†
Clonazepam	YES	†	YES	YES	†	N/A	N/A	YES	N/A	N/A	N/A
Cyclizine	†	†	YES	YES	†	N/A	N/A	YES	N/A	N/A	N/A
Dexamethasone Injection Hameln brand	†	†	YES	YES	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dexamethasone Injection Hospira brand	YES	YES	YES	YES	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Diamorphine Injection	YES	YES	YES	YES	†	N/A	†	N/A	†	N/A	N/A
Diazepam Rectal	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	†	N/A
Diclofenac	†	Not recommended	YES	Infusion	N/A	N/A	YES	YES	N/A	†	N/A
Glycopyrronium	†	†	YES	YES	†	N/A	N/A	†	N/A	N/A	N/A
Haloperidol Injection	†	†	YES	YES	†	N/A	N/A	YES	N/A	N/A	N/A
Hydromorphone	†	†	†	†	N/A	N/A	N/A	YES	N/A	N/A	N/A

Hyoscine Butylbromide	†	†	YES	YES	N/A	N/A	N/A	YES (poor absorption)	N/A	N/A	N/A
Hyoscine Hydrobromide	†	YES	YES	†	N/A	YES	YES	N/A	N/A	N/A	N/A
Ketamine	†	†	YES	YES	†	N/A	†	†	†	N/A	N/A
Ketorolac	†	†	YES	YES	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Levomepromazine	YES	†	YES	YES	†	N/A	N/A	†	N/A	N/A	N/A
Lorazepam	†(caution)	†	YES	YES	†	N/A	N/A	YES	N/A	N/A	N/A
Metoclopramide Injection	†	†	YES	YES	N/A	N/A	N/A	YES	N/A	N/A	N/A
Midazolam Injection- Roche brand	†	†	YES	YES	†	†	N/A	N/A	†	N/A	N/A
Midazolam Injection - Phoenix brand	†	†	†	YES	†	†	N/A	N/A	†	N/A	N/A
Midazolam Buccal Solution	N/A	N/A	N/A	N/A	N/A	†	N/A	N/A	†	N/A	N/A
Morphine sulfate	†	YES	YES	YES	N/A	N/A	YES	YES	N/A	N/A	N/A
Octreotide Injection	†	YES	N/A	YES	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Oxycodone Injection	YES	YES	†	YES	N/A	N/A	N/A	YES	N/A	N/A	N/A
Phenobarbital	†	†(not recommended)	YES	YES	N/A	N/A	N/A	YES	N/A	N/A	N/A
Sodium Chloride 0.9%	†	†	†	YES	N/A	N/A	†	N/A	YES	N/A	YES
Sucralfate	N/A	N/A	N/A	N/A	N/A	N/A	†	YES	N/A	N/A	N/A
Tranexamic Acid	N/A	N/A	N/A	YES	N/A	N/A	†	YES	N/A	N/A	N/A

Key:

YES - indicates a licensed route,

NA indicates this route is Not Applicable,

† indicates that this route is unlicensed

Adapted from information prepared initially Elayne Harris, Joe Harrison, Susan Addie NHS Greater Glasgow & Clyde 2006

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