

# Continuous Subcutaneous Infusions

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[grovegl](#), [chess-williamsl](#), [textbook](#)

Continuous subcutaneous infusions (CSCI) are a common method of medication administration in palliative medicine, especially for patients near the end of their life.

Depending on the region and the devices used, there are various common usage terms to refer to CSCIs including syringe drivers, CADD pumps, NIKI pumps and Baxter pumps.

## Advantages and indications for subcutaneous infusions

Dying patients often require parenteral medications as they lose the ability to take medications orally. The subcutaneous route has many advantages over the intravenous route.<sup>1)</sup> Some of the advantages include are listed below:

- No risk of phlebitis or air embolus
- Allow patient to retain more mobility (IV site typically on hand or arm; subcutaneous sites include chest, thigh and abdomen)
- More comfortable for patient
- Less susceptible to occlusion or dislodgement
- Seen as kinder

The main indication for continuous subcutaneous infusions is for medication delivery when the oral route is unavailable. Examples include:

- Drowsiness
- Severe nausea or vomiting
- Severe dysphagia

## Medications that can be given subcutaneously and comparative dosing information

Medication	Approximate oral dose and subcutaneous dose equivalent
Alfentanil	
Clonidine	50microg oral = 50microg subcut
Clonazepam	
Cyclizine	
Dexamethasone	4mg oral = 4mg subcut (use as state doses)
Diclofenac	150mg oral = 75mg subcut (use only as CSCI as tissue necrosis has been reported with stat doses)
Esomeprazole	
Fentanyl	
Frusemide	40mg oral = 20mg subcut
Glycopyrrolate	
Granisetron	2mg oral = 1mg subcut

Medication	Approximate oral dose and subcutaneous dose equivalent
Haloperidol	2mg oral = 1mg subcut
Hydromorphone	3mg oral = 1mg subcut
Hyoscine butylbromide	
Hyoscine hydrobromide	
Ketamine	10mg oral = 10mg subcut
Ketorolac	10mg oral = 10mg subcut
Levetiracetam	25mg oral = 12.5mg subcut
Lignocaine	
Methadone	10mg oral = 5mg subcut
Metoclopramide	10mg oral = 10mg subcut
Morphine	15mg oral = 5mg subcut
Neostigmine	
Octreotide	
Omeprazole	
Ondansetron	8mg oral = 4mg subcut
Oxycodone	10mg oral = 5mg subcut
Paracetamol	
Phenobarbitone	100mg oral = 100mg subcut
Ranitidine	100mg oral = 50mg subcut
Remifentanyl	
Sufentanyl	
Valproate	200mg oral = 200mg subcut

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## Combinations and Compatibilities

Mixing medications in subcutaneous infusions can cause problems if there are drug incompatibilities that cause reactions. Look for crystallization when mixing medications.

### Morphine Compatibilities

#### 2 Drug Morphine Combinations

	Second Drug	Diluent
Morphine +	Cyclizine	Water
	Haloperidol	Water or Saline
	Hyoscine butylbromide	Water
	Ketamine	Saline
	Levomepromazine	Water or Saline
	Metoclopramide	Water or Saline
	Midazolam	Water or Saline
	Octreotide	Saline
	Ondansetron	Water or Saline

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### 3 Drug Morphine Combinations

	<b>Second Drug</b>	<b>Third Drug</b>	<b>Diluent</b>
Morphine +	Cyclizine +	Midazolam	Water
	Halperidol +	Cyclizine	Water
		Hyoscine butylbromide	Water or Saline
		Ketamine	Saline
		Midazolam	Water or Saline
		Octreotide	Water or Saline
	Hyoscine butylbromide +	Octreotide	Saline
		Ondansetron	Saline
		Ranitidine	Water
	Levomepromazine +	Hyoscine butylbromide	Water or Saline
		Metoclopramide	Water or Saline
		Midazolam	Water or Saline
		Octreotide	Water or Saline
		Ranitidine *	Water
	Metoclopramide +	Ondansetron	Saline
		Ranitidine	Saline
	Midazolam +	Cyclizine	Water
Hyoscine butylbromide		Water or Saline	
Ketamine		Water or Saline	
Octreotide		Water or Saline	
Ondansetron		Saline	

\* Add ranitidine last once all other drugs and diluent have been combined. Precipitation reported with high doses of levomepromazine > 75mg

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### 4 Drug Morphine Combinations

	Second Drug	Third Drug	Fourth Drug	Diluent	
Morphine +	Haloperidol +	Cyclizine +	Octreotide	Water	
			Ranitidine	Water	
		Midazolam +	Hyoscine butylbromide +	Ranitidine	Water
			Hyoscine butylbromide	Water	
	Levomepromazine +	Hyoscine butylbromide +	Octreotide	Saline	
			Ranitidine *	Water	
		Midazolam +	Hyoscine butylbromide	Water	
			Ketamine	Saline	
			Metoclopramide	Water or Saline	
			Ondansetron	Water	
	Metoclopramide +	Midazolam +	Ketamine	Saline	
			Octreotide	Water or Saline	
		Ondansetron +	Octreotide	Saline	
	Midazolam +	Hyoscine butylbromide +	Octreotide	Saline	
Cyclizine +		Ondansetron	Water		

\* Add ranitidine last once all other drugs and diluent have been combined. Precipitation reported with high doses of levomepromazine > 75mg

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## Oxycodone Compatibilities

### 2 Drug Oxycodone Combinations

	Second Drug	Diluent
Oxycodone +	Cyclizine	Water
	Haloperidol	Water or Saline
	Hyoscine butylbromide	Water or Saline
	Ketamine	Water or Saline
	Ketorolac	Saline
	Levomepromazine	Water or Saline
	Metoclopramide	Water or Saline
	Midazolam	Water or Saline
	Octreotide	Water or Saline
	Ondansetron	Water or Saline
	Ranitidine	Water or Saline

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### 3 Drug Oxycodone Combinations

	<b>Second Drug</b>	<b>Third Drug</b>	<b>Diluent</b>
Oxycodone	Halperidol +	Cyclizine *	Water
		Ketamine	Saline
		Midazolam	Water or Saline
		Octreotide	Water or Saline
	Hyoscine butylbromide +	Octreotide	Water
		Ondansetron	Water
		Ranitidine	Saline
	Levomepromazine +	Hyoscine butylbromide	Water or Saline
		Ketamine	Saline
		Metoclopramide	Water or Saline
		Midazolam	Water or Saline
		Octreotide	Water or Saline
		Ranitidine	Saline
	Metoclopramide +	Ondansetron	Water or Saline
		Ranitidine	Saline
	Midazolam +	Cyclizine *	Water
		Hyoscine butylbromide	Water or Saline
		Ketamine	Water or Saline
Metoclopramide		Water or Saline	
Octreotide		Water or Saline	
Ondansetron		Water or Saline	

\* Precipitation reported with higher doses of oxycodone > 100mg

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#### 4 Drug Oxycodone Combinations

	<b>Second Drug</b>	<b>Third Drug</b>	<b>Fourth Drug</b>	<b>Diluent</b>		
Oxycodone +	Haloperidol +	Hyoscine butylbromide +	Ranitidine	Saline		
	Hyoscine butylbromide +	Levomepromazine +	Ranitidine	Saline		
			Octreotide	Water		
	Midazolam +	Haloperidol +		Cyclizine *	Water	
				Hyoscine butylbromide	Water or Saline	
				Ketamine	Saline	
				Octreotide	Water	
		Hyoscine butylbromide +			Ondansetron	Water
					Levomepromazine	Water or Saline
					Ketamine	Saline
					Octreotide	Water or Saline
	Levomepromazine +			Ondansetron	Saline	
	Metoclopramide +			Levomepromazine	Water	
Ondansetron +			Octreotide	Water		
Hyoscine butylbromide +	Levomepromazine +		Ranitidine #	Saline		
			Octreotide	Water		

\* Precipitation reported with higher doses of oxycodone > 100mg

# Precipitation has been reported with higher doses of oxycodone >100 mg or levomepromazine >100mg

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## Fentanyl Compatibilities

### 2 Drug Fentanyl Combinations

	<b>Second Drug</b>	<b>Diluent</b>
Fentanyl +	Haloperidol	Water
	Hyoscine butylbromide	Water
	Levomepromazine	Water
	Metoclopramide	Water
	Midazolam	Water
	Ondansetron	Saline
	Ranitidine	Saline

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### 3 Drug Fentanyl Combinations

	<b>Second Drug</b>	<b>Third Drug</b>	<b>Diluent</b>	
Fentanyl +	Hyoscine butylbromide +	Levomepromazine	Water	
	Levomepromazine +	Ranitidine	Saline	
	Metoclopramide +	Levomepromazine	Water	
	Midazolam +		Cyclizine	Water
			Haloperidol	Water
			Hyoscine butylbromide	Saline
			Levomepromazine	Water
		Metoclopramide	Saline	

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### 4 Drug Fentanyl Combinations

	<b>Second Drug</b>	<b>Third Drug</b>	<b>Fourth Drug</b>	<b>Diluent</b>
Fentanyl +	Midazolam +	Haloperidol +	Hyoscine butylbromide	Water
		Metoclopramide +	Levomepromazine	Water
	Hyoscine butylbromide +	Levomepromazine +	Ranitidine	Saline

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## Alfentanil Compatibilities

### 2 Drug Alfentanil Combinations

	<b>Second Drug</b>	<b>Diluent</b>
Alfentanil +	Haloperidol	Water or Saline
	Hyoscine butylbromide	Saline
	Ketamine	Water or Saline
	Levomepromazine	Water or Saline
	Metoclopramide	Water or Saline
	Midazolam	Water or Saline
	Octreotide	Water or Saline
	Ondansetron	Water or Saline

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### 3 Drug Alfentanil Combinations

	<b>Second Drug</b>	<b>Third Drug</b>	<b>Diluent</b>
Alfentanil +	Haloperidol +	Cyclizine *	Water
		Ketamine	Saline
		Ondansetron	Saline
	Hyoscine butylbromide +	Ketamine	Saline
		Levomepromazine	Saline
	Levomepromazine +	Octreotide	Water or Saline
		Ondansetron	Saline
	Metoclopramide +	Ketamine	Saline
		Levomepromazine	Water or Saline
	Midazolam +	Haloperidol	Water or Saline
		Cyclizine #	Water
		Hyoscine butylbromide	Water or Saline
		Ketamine	Saline
		Metoclopramide	Water or Saline
Octreotide		Saline	
	Ondansetron	Water or Saline	
	Levomepromazine	Water or Saline	

\* Although various reports of this 3 drug combination, use caution because alfentanil + cyclizine alone is reported to be incompatible

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### 4 Drug Alfentanil Combinations

	<b>Second Drug</b>	<b>Third Drug</b>	<b>Fourth Drug</b>	<b>Diluent</b>
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Alfentanil +	Haloperidol +	Hyoscine butylbromide +	Ketamine	Saline	
	Hyoscine butylbromide +	Levomepromazine +	Octreotide	Saline	
			Ondansetron	Saline	
	Levomepromazine +	Octreotide +	Ondansetron	Saline	
	Midazolam +	Haloperidol +	Ketamine	Cyclizine	Water
				Hyoscine butylbromide	Water or Saline
				Hyoscine butylbromide +	Saline
		Levomepromazine +	Ketamine	Hyoscine butylbromide	Water or Saline
				Hyoscine butylbromide	Saline
				Metoclopramide	Saline
Metoclopramide +				Saline	
Ondansetron +	Octreotide	Water			

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## Methadone Compatibilities

### Methadone + second opioid compatibilities

	Second Drug	Third Drug	Fourth Drug	Diluent	
Methadone +	Morphine +	Midazolam +	Haloperidol	Water	
			Hyoscine butylbromide	Water	
			Levomepromazine *	Water	
		Hyoscine butylbromide	Hyoscine butylbromide	Water	
			Hyoscine butylbromide +	Levomepromazine	Water
			Metoclopramide +	Levomepromazine	Water
	Oxycodone +	Midazolam	Midazolam +	Ranitidine #	Water
				Haloperidol	Water
		Ketorolac	Ketamine *	Levomepromazine	Water
				Levomepromazine	Water
	Alfentanil	Haloperidol +	Ketamine *	Levomepromazine	Water
				Levomepromazine	Water
		Midazolam +	Ketamine *	Ranitidine #	Water
				Ranitidine #	Water
Midazolam +	Ketamine *	Haloperidol	Water		
		Haloperidol	Water		

\* Use caution as this combination is based on reported experience with a fifth drug

# Add ranitidine last once all the other drugs and diluent have been combined

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## 2 Drug Methadone Combinations (without another opioid)

	Second Drug	Diluent
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Methadone +	Cyclizine	Water
	Haloperidol	Water
	Ketamine	Water or Saline
	Levomepromazine	Water
	Midazolam	Water

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### 3 Drug Methadone Combinations (without another opioid)

	Second Drug	Third Drug	Diluent
Methadone +	Haloperidol +	Ketamine	Water or Saline
	Hyoscine butylbromide +	Ranitidine	Saline
		Levomepromazine	Water
	Metoclopramide +	Ranitidine *	Water
	Midazolam +	Haloperidol	Water
		Hyoscine butylbromide	Water
		Ketamine	Water
		Levomepromazine #	Water
	Metoclopramide	Water	

\* Add ranitidine last once all the other drugs and diluent have been combined

# Precipitation reported with doses of methadone greater than 40mg

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### 4 Drug Methadone Combinations (without another opioid)

	Second Drug	Third Drug	Fourth Drug	Diluent
Methadone +	Hyoscine butylbromide +	Haloperidol +	Ranitidine	Saline
		Midazolam +	Levomepromazine	Saline

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<sup>1)</sup> Gabriel J. The use of subcutaneous infusion in medication administration. Br J Nurs. 2013 Jul 25-August 7;22(14).

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