



Compatibility of syringe driver admixtures for continuous subcutaneous infusion

Continuous subcutaneous infusion (CSCI) is a very effective route of drug administration, particularly in palliative care. Palliative care patients often have a number of symptoms for which polypharmacy is required for symptom control. Thus the combination of drugs in the same syringe is common practice, however admixture compatibility is not always established.

The following charts and tables have been developed by the Auckland Hospital Pharmacy Department as an in-house resource. The information has been collected from various primary and tertiary reference sources and via communication with the Palliative Care Team.

[Chart 1: Syringe driver compatibility for two drug admixtures](#), [Chart 2: Syringe driver compatibility for morphine sulphate three drug admixtures](#), [Chart 3: Syringe driver compatibility for morphine tartrate three drug admixtures](#), and [Chart 4: Syringe driver compatibility for miscellaneous three drug admixtures](#), summarise the information collected, and are useful as a quick reference. For more detailed compatibility information and its reference source, CLICK on the ® symbol within the chart, which will link to a series of tables. Alternatively access the tabulated information by scrolling through the document. All references are listed at the end of the document and are available in hard copy from the Medicines Information Department.

Admixture compatibility is expressed as either visual/physical or chemical/HPLC. Visual/physical compatibility (✓) or incompatibility (X) is based on the presence of a precipitate or colour change upon combining the drugs and for the duration of the infusion. Chemical/HPLC compatibility (✓) or incompatibility (X) is based on laboratory HPLC testing (High Performance Liquid Chromatography), which determines the pharmacological stability and compatibility of the drug admixture under certain conditions, for a set period of time.

Disclaimer

When possible, original references have been used as the basis for the charts. Great care has been taken with accuracy but ultimate responsibility lies with the prescriber. It should also be noted that for some drugs included in the charts, administration by the subcutaneous route falls outside the product license.

Chart 1: Syringe driver compatibility for two drug admixtures

| Morphine sulphate | Morphine tartrate | Metoclopramide | Haloperidol | Cyclizine | Methotrimeprazine | Hyoscine Hydrobromide | Hyoscine Butylbromide | Midazolam | Dexamethasone | Methadone | Ketamine | Octreotide | Phenobarbitone | Clonazepam |
|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|-----------------------|-----------------------|---------------------|---------------------|-----------|----------|------------|----------------|------------|
| ✓ Ⓜ | ✓ Ⓜ | ? | ✓ Ⓜ | ✓ Ⓜ | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? |
| ✓ Ⓜ | ✓ Ⓜ | ? | ✓ Ⓜ | ✓ Ⓜ | X Ⓜ | ? | ? | ? | ? | ? | ? | ? | ? | ? |
| ✓ Ⓜ | ✓ Ⓜ | ? | ✓ Ⓜ | ✓ Ⓜ | X Ⓜ | ? | ? | ? | ? | ? | ? | ? | ? | ? |
| ✓ Ⓜ | ✓ Ⓜ | ✓ Ⓜ | ✓ Ⓜ | X Ⓜ | X Ⓜ | ✓ Ⓜ | ? | ? | ? | ? | ? | ? | ? | ? |
| ✓ Ⓜ | ✓ Ⓜ | ✓ Ⓜ | ✓ Ⓜ | ? | ✓ Ⓜ | ✓ Ⓜ | ? | ? | ? | ? | ? | ? | ? | ? |
| ✓ Ⓜ | ✓ Ⓜ | ? | ✓ Ⓜ | X Ⓜ | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? |
| ✓ Ⓜ | ? | ✓ Ⓜ | ? | ? | ✓ Ⓜ | ? | ? | ? | ? | ? | ? | ? | ? | ? |
| ✓ Ⓜ | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? |
| ✓ Ⓜ | ✓ Ⓜ | ? | ? | ? | ? | ? | ? | ✓ Ⓜ | ✓ Ⓜ | ? | ? | ? | ? | ? |

| Key | |
|-----|--------------------------------------|
| ✓ | Compatible |
| X | Incompatible |
| ? | Compatibility unknown |
| ✓X | Compatibility dependant on variables |
| | Irrational drug admixture |
| Ⓜ | CLICK for reference |

Note: Sodium chloride 0.9% is the recommended diluent for ketamine, and octreotide. For all other drugs the recommended diluent is water for injections because there is less chance of precipitation. As a general rule, dilute the drug volume by at least 100% (if necessary use a 20ml syringe) because this helps to reduce inflammation at the infusion site.

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Chart 2: Syringe driver compatibility for **MORPHINE sulphate** three drug admixtures

| | Metoclopramide | Haloperidol | Cyclizine | Methotrimeprazine | Hyoscine hydrobromide | Hyoscine butylbromide | Midazolam | Dexamethasone | Ketamine | Octreotide | Phenobarbitone | Clonazepam |
|------------------------|----------------|-------------|-----------|-------------------|-----------------------|-----------------------|-----------|---------------|----------|------------|----------------|------------|
| MS + Metoclopramide | | | | | | | | | | | | |
| MS + Haloperidol | ✓ ® | | | | | | | | | | | |
| MS + Cyclizine | ✓ ® | ✓ ® | | | | | | | | | | |
| MS + Methotrimeprazine | ? | ? | ? | | | | | | | | | |
| MS + Hyoscine HBR | ? | ✓ ® | ? | ? | | | | | | | | |
| MS + Hyoscine BBR | ? | ? | ? | ? | ? | | | | | | | |
| MS + Midazolam | ✓ ® | ✓ ® | ✓ ® | ? | ✓ ® | ? | | | | | | |
| MS + Dexamethasone | ? | ? | ? | ? | ? | ? | ? | | | | | |
| MS + Ketamine | ? | ? | ? | ? | ? | ? | ? | ? | | | | |
| MS + Octreotide | ✓ ® | ✓ ® | ? | ? | ✓ ® | ? | ? | ? | ? | | | |
| MS + Phenobarbitone | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | | |
| MS + Clonazepam | ✓ ® | ✓ ® | ✓ ® | ? | ? | ? | ? | ? | ? | ? | ? | |

| Key | |
|-----|---|
| ✓ | Compatible |
| X | Incompatible |
| ? | Compatibility unknown |
| ✓ | Compatible based on clinical experience |
| | Irrational drug admixtures |
| MS | Morphine sulphate |
| HBR | Hydrobromide |
| BBR | Butylbromide |
| ® | CLICK for reference |

Note: Sodium chloride 0.9% is the recommended diluent for ketamine, and octreotide. For all other drugs the recommended diluent is water for injections because there is less chance of precipitation. As a general rule, dilute the drug volume by at least 100% (if necessary use a 20ml syringe) because this helps to reduce inflammation at the infusion site.

Chart 3: Syringe driver compatibility for MORPHINE tartrate three drug admixtures

| | | | | | | | | | | | | |
|------------------------|----------------|-------------|-----------|-------------------|-----------------------|-----------------------|-----------|---------------|----------|------------|----------------|------------|
| MT + Metoclopramide | | | | | | | | | | | | |
| MT + Haloperidol | ✓ ® | | | | | | | | | | | |
| MT + Cyclizine | ✓ ® | ✓ ® | | | | | | | | | | |
| MT + Methotrimeprazine | ? | ? | ? | | | | | | | | | |
| MT + Hyoscine HBR | ? | ? | ? | ? | | | | | | | | |
| MT + Hyoscine BBR | ? | ? | ? | ? | ? | | | | | | | |
| MT + Midazolam | ✓ ® | ✓ ® | ✓ ® | ? | ? | ? | | | | | | |
| MT + Dexamethasone | ? | ? | ? | ? | ? | ? | ? | | | | | |
| MT + Ketamine | ? | ? | ? | ? | ? | ? | ? | ? | | | | |
| MT + Octreotide | ? | ? | ? | ? | ? | ? | ? | ? | ? | | | |
| MT + Phenobarbitone | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | | |
| MT + Clonazepam | ✓ ® | ✓ ® | ✓ ® | ? | ? | ? | ? | ? | ? | ? | ? | |
| | Metoclopramide | Haloperidol | Cyclizine | Methotrimeprazine | Hyoscine hydrobromide | Hyoscine butylbromide | Midazolam | Dexamethasone | Ketamine | Octreotide | Phenobarbitone | Clonazepam |

| Key | |
|-----|---------------------------|
| ✓ | Compatible |
| X | Incompatible |
| ? | Compatibility unknown |
| | Irrational drug admixture |
| MT | Morphine tartrate |
| HBR | Hydrobromide |
| BBR | Butylbromide |
| ® | CLICK for reference |

Note: Sodium chloride 0.9% is the recommended diluent for ketamine, and octreotide. For all other drugs the recommended diluent is water for injections because there is less chance of precipitation. As a general rule, dilute the drug volume by at least 100% (if necessary use a 20ml syringe) because this helps to reduce inflammation at the infusion site.

Chart 4: Syringe driver compatibility for miscellaneous three drug admixtures

| Drugs | Diluent | Compatibility | References |
|---|---------|--------------------------------|-----------------------|
| Clonazepam Haloperidol Metoclopramide | Water | √ visual/physical for 24 hours | Dickman A, et al 2002 |
| Cyclizine Dexamethasone Hyoscine butylbromide | Water | √ visual/physical for 24 hours | Dickman A, et al 2002 |
| Cyclizine Haloperidol Midazolam | Water | √ visual/physical for 24 hours | Dickman A, et al 2002 |
| Haloperidol Hyoscine butylbromide Midazolam | Water | √ visual/physical for 24 hours | Dickman A, et al 2002 |
| Methotrimeprazine Midazolam Hyoscine hydrobromide | Water | √ visual/physical for 24 hours | Dickman A, et al 2002 |
| Haloperidol Metoclopramide Cyclizine | Water | √ visual/physical for 24 hours | Lichter I, et al 1995 |

Note: Sodium chloride 0.9% is the recommended diluent for ketamine, and octreotide. For all other drugs the recommended diluent is water for injections because there is less chance of precipitation. As a general rule, dilute the drug volume by at least 100% (if necessary use a 20ml syringe) because this helps to reduce inflammation at the infusion site.

Syringe driver compatibility for **MORPHINE sulphate** two drug admixtures

| Drug | Diluent | Compatibility | Reference |
|-----------------------|--|--|--|
| Metoclopramide | Water | √ visual/physical for 24 hours | Lichter I, et al 1995 |
| | Dextrose 5% | √ visual/physical for 48 hours at room temperature (approx 22°C) under fluorescent light | Chandler SW, et al 1996 |
| | Dextrose 5%, Sodium chloride 0.9% | √ chemical/HPLC for 14 days at 22°C protected from light | Nixon AR, et al 1995 |
| | Not stated | √ chemical/HPLC for 1 week at room temperature protected from light | Bradshaw K 1992 Back to chart |
| Dexamethasone | Dextrose 5% | √ visual/physical for 48 hours at room temperature (approx 22°C) under fluorescent light | Chandler SW, et al 1996 Back to chart |
| Haloperidol | Dextrose 5% | √ visual/physical for 48 hours at room temperature (approx 22°C) under fluorescent light | Chandler SW, et al 1996 |
| | Dextrose 5%, Water, Sodium chloride 0.9% | X visual/physical and X chemical/HPLC precipitation of haloperidol occurred on mixing at room temperature (20-25°C), morphine remained in solution | LeBelle MJ, et al 1995 Back to chart |
| | Water | √ visual/physical for 24 hours | Lichter I, et al 1995 |
| Clonazepam | Water | √ visual/physical for 24 hours | Lichter I, et al 1995 Back to chart |
| Cyclizine | Water | √ visual/physical for 24 hours | Lichter I, et al 1995 Back to chart |
| | Not stated | √ visual/physical | Bradley K 1996 |
| Methotrimeprazine | Dextrose 5% | √ visual/physical for 48 hours at room temperature (approx 22°C) under fluorescent light | Chandler SW, et al 1996 Back to chart |
| Hyoscine hydrobromide | Dextrose 5% | √ visual/physical for 48 hours at room temperature (approx 22°C) under fluorescent light | Chandler SW, et al 1996 |
| | Water | √ chemical/HPLC for 14 days at room temperature and 37°C. Morphine not tested | Lawson WA, et al 1991 Back to chart |
| Hyoscine butylbromide | Not stated | √ chemical/HPLC for 1 week at room temperature protected from light | Bradshaw K 1992 Back to chart |
| Midazolam | Dextrose 5% | √ visual/physical for 48 hours at room temperature (approx 22°C) under fluorescent light | Chandler SW, et al 1996 |
| | Dextrose 5%, Water, Sodium chloride 0.9% | √ visual/physical and √ chemical/HPLC for 14 days at room temperature (20-25°C) protected from light | LeBelle MJ, et al 1995 |
| | Water | √ visual/physical for 24 hours | Lichter I, et al 1995 |
| | Dextrose 5% | √ visual/physical and √ chemical/HPLC for 3 hours at 24°C under fluorescent light | Vermeire A, et al 1999 Back to chart |
| Phenobarbitone | Dextrose 5% | √ visual/physical for 48 hours at room temperature (approx 22°C) under fluorescent light | Chandler SW, et al 1996 Back to chart |
| Ketamine | Not stated | √ visual/physical and √ chemical/HPLC for 24 hours at 21°C under fluorescent light | Lau M-H, et al 1998 Back to chart |
| Octreotide | Sodium chloride 0.9% | √ visual/physical for 48 hours at room temperature (22-30°C) | Mercadante S 1995 Back to chart |

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Syringe driver compatibility for **DEXAMETHASONE** two drug admixtures

| Drug | Diluent | Compatibility | References |
|-------------------|---------|--|--|
| Haloperidol | Water | X visual/physical | Dickman A, et al 2002 Back to chart |
| Methotrimeprazine | Water | √X precipitation at higher concentrations of dexamethasone | Dickman A, et al 2002 Back to chart |
| Midazolam | Water | √ visual/physical for 24 hours | Dickman A, et al 2002 Back to chart |
| Clonazepam | Water | √ visual/physical for 24 hours | Dickman A, et al 2002 Back to chart |

Syringe driver compatibility for **HALOPERIDOL** two drug admixtures

| Drug | Diluent | Compatibility | References |
|-----------------------|----------------------|--------------------------------|--|
| Hyoscine butylbromide | Water | √ visual/physical for 24 hours | Dickman A, et al 2002 Back to chart |
| Ketamine | Sodium chloride 0.9% | √ visual/physical for 24 hours | Dickman A, et al 2002 Back to chart |

Syringe driver compatibility for **MORPHINE tartrate** two drug admixtures

| Drug | Diluent | Compatibility | Reference |
|-----------------------|----------------------|--|--|
| Metoclopramide | Water | √ visual/physical for 24 hours | Lichter I, et al 1995 |
| | Not stated | √ visual/physical for 48 hours at room temperature in presence of light | Poggi GL 1991 |
| | Not stated | √ chemical/HPLC of morphine content after 48 hours at room temperature in presence of light, metoclopramide not tested | Poggi GL 1991 |
| | Not stated | √ chemical/HPLC for 1 week at room temperature protected from light | Bradshaw K 1992 Back to chart |
| Clonazepam | Water | √ visual/physical for 24 hours | Lichter I, et al 1995 Back to chart |
| Midazolam | Water | √ visual/physical for 24 hours | Lichter I, et al 1995 |
| | Sodium chloride 0.9% | √ visual/physical and √ chemical/HPLC for 13 days at 32°C in presence of light. Morphine not tested | Peterson GM, et al 1991 Back to chart |
| Cyclizine | Water | √ visual/physical for 24 hours | Lichter I, et al 1995 Back to chart |
| Haloperidol | Water | √ visual/physical for 24 hours | Lichter I, et al 1995 Back to chart |
| Ketamine | Sodium chloride 0.9% | √ visual/physical for 10 days at room temperature (<25°C), and 4°C protected from light | Ambados F, 1995 |
| | Not stated | √ visual/physical and √ chemical/HPLC for 24 hours at 21°C under fluorescent light | Lau M-H, et al 1998 Back to chart |
| Hyoscine butylbromide | Not stated | √ chemical/HPLC for 1 week at room temperature protected from light | Bradshaw K 1992 Back to chart |

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Syringe driver compatibility for **METHADONE** two drug admixtures

| Drug | Diluent | Compatibility | References |
|-----------------------|----------------------|--|--|
| Metoclopramide | Dextrose 5% | √ visual/physical for 48 hours at room temperature (approx 22°C) under fluorescent light | Chandler SW, et al 1996 Back to chart |
| Dexamethasone | Dextrose 5% | √ visual/physical for 48 hours at room temperature (approx 22°C) under fluorescent light | Chandler SW, et al 1996 Back to chart |
| Methotrimeprazine | Dextrose 5% | √ visual/physical for 48 hours at room temperature (approx 22°C) under fluorescent light | Chandler SW, et al 1996 Back to chart |
| Midazolam | Dextrose 5% | √ visual/physical for 48 hours at room temperature (approx 22°C) under fluorescent light | Chandler SW, et al 1996 |
| | Sodium chloride 0.9% | √ visual/physical for 24 hours | Dickman A, et al 2002 Back to chart |
| Hyoscine hydrobromide | Dextrose 5% | √ visual/physical for 48 hours at room temperature (approx 22°C) under fluorescent light | Chandler SW, et al 1996 Back to chart |
| Phenobarbitone | Dextrose 5% | √ visual/physical for 48 hours at room temperature (approx 22°C) under fluorescent light | Chandler SW, et al 1996 Back to chart |
| Clonazepam | Sodium chloride 0.9% | √ visual/physical for 24 hours | Dickman A, et al 2002 Back to chart |
| Haloperidol | Dextrose 5% | √ visual/physical for 48 hours at room temperature (approx 22°C) under fluorescent light | Chandler SW, et al 1996 Back to chart |

Syringe driver compatibility for **OCTREOTIDE** two drug admixtures

| Drug | Diluent | Compatibility | References |
|-------------------|---------|--------------------------------|--|
| Methotrimeprazine | Water | √ visual/physical for 24 hours | Dickman A, et al 2002 Back to chart |
| Metoclopramide | Water | √ visual/physical for 24 hours | Dickman A, et al 2002 Back to chart |

Syringe driver compatibility for **METOCLOPRAMIDE** two drug admixtures

| Drug | Diluent | Compatibility | References |
|-----------------------|------------|---|--|
| Hyoscine hydrobromide | Not known | √ visual/physical for 15 minutes at room temperature | Trissel LA 2001 Back to chart |
| Midazolam | Water | √ visual/physical for 4 hours at 25°C under fluorescent light | Forman JK, et al 1987 |
| | Not stated | √ visual/physical | Bradley K 1996 Back to chart |
| Dexamethasone | Not known | √ visual/physical for 48 hours at room temperature | Trissel LA 2001 |
| | Not known | √ visual/physical for 48 hours at 25°C | Trissel LA 2001 Back to chart |
| Cyclizine | Water | √ visual/physical for 24 hours | Lichter I, et al 1995 |
| | Water | √X concentration dependant compatibility | Dickman A, et al 2002 Back to chart |
| Methotrimeprazine | Not known | √ visual/physical for 15 minutes at room temperature | Trissel LA 2001 Back to chart |

Syringe driver compatibility for **MIDAZOLAM** two drug admixtures

| Drug | Diluent | Compatibility | Reference |
|-----------------------|----------------------|---|--|
| Hyoscine hydrobromide | Water | √ visual/physical for 4 hours at 25°C under fluorescent light | Forman JK, et al 1987 Back to chart |
| Haloperidol | Water | √ visual/physical for 24 hours | Lichter I, et al 1995 Back to chart |
| Ketamine | Sodium chloride 0.9% | √ visual/physical for 24 hours | Dickman A, et al 2002 Back to chart |

Syringe driver compatibility for **CYCLIZINE** two drug admixtures

| Drug | Diluent | Compatibility | References |
|-----------------------|-----------------------|--|---|
| Dexamethasone | | X physical/precipitation | Dickman A, et al 2002 Back to chart |
| Ketamine | | X physical/theoretical precipitation | Dickman A, et al 2002 Back to chart |
| Methotrimeprazine | | X physical/theoretical precipitation | Dickman A, et al 2002 Back to chart |
| Midazolam | | X physical/theoretical precipitation | Dickman A, et al 2002 Back to chart |
| Hyoscine butylbromide | | √X Concentration-dependant compatibility | Dickman A, et al 2002 Back to chart |
| Haloperidol | Sodium chloride 0.9% | X precipitation of cyclizine within 24 hours at 25°C | Fawcett JP, et al 1994 |
| | Water, Dextrose 5% | √ visual/physical for 24 hours at 25°C | Fawcett JP, et al 1994 Back to chart |

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Syringe driver compatibility for **MORPHINE sulphate** three drug admixtures

| Drugs | Diluent | Compatibility | References |
|-------------------------------------|----------------------|--|--|
| Haloperidol + Metoclopramide | Water | √ visual/physical for 24 hours | Lichter I, et al 1995 Back to chart |
| Cyclizine + Metoclopramide | Water | √ visual/physical for 24 hours | Lichter I, et al 1995 Back to chart |
| Cyclizine + Haloperidol | Water | √ visual/physical for 24 hours | Lichter I, et al 1995 Back to chart |
| Hyoscine hydrobromide + Haloperidol | Dextrose 5% | √ visual/physical for 24 hours | Dickman A, et al 2002 Back to chart |
| Midazolam + Metoclopramide | Water | √ visual/physical for 24 hours | Lichter I, et al 1995 Back to chart |
| Midazolam + Haloperidol | Water | √ visual/physical for 24 hours | Lichter I, et al 1995 Back to chart |
| Midazolam + Cyclizine | Water | √ visual/physical for 24 hours | Lichter I, et al 1995 Back to chart |
| Octreotide + Metoclopramide | Sodium chloride 0.9% | √ visual/physical for 48 hours at room temperature (22-30°C) | Mercadante S 1995 Back to chart |
| Octreotide + Haloperidol | Sodium chloride 0.9% | √ visual/physical for 48 hours at room temperature (22-30°C) | Mercadante S 1995 Back to chart |
| Octreotide + Hyoscine hydrobromide | Dextrose 5% | √ visual/physical for 24 hours | Dickman A, et al 2002 Back to chart |
| Clonazepam + Metoclopramide | Water | √ visual/physical for 24 hours | Lichter I, et al 1995 Back to chart |
| Clonazepam + Haloperidol | Water | √ visual/physical for 24 hours | Lichter I, et al 1995 Back to chart |
| Clonazepam + Cyclizine | Water | √ visual/physical for 24 hours | Lichter I, et al 1995 Back to chart |
| Midazolam + Hyoscine hydrobromide | Water | √ compatibility based on ADHB clinical experience | Palliative Care Team 2002 Back to chart |

Syringe driver compatibility for **MORPHINE tartrate** three drug admixtures

| Drugs | Diluent | Compatibility | References |
|------------------------------|---------|--------------------------------|--|
| Haloperidol + Metoclopramide | Water | √ visual/physical for 24 hours | Lichter I, et al 1995 Back to chart |
| Cyclizine + Metoclopramide | Water | √ visual/physical for 24 hours | Lichter I, et al 1995 Back to chart |
| Cyclizine + Haloperidol | Water | √ visual/physical for 24 hours | Lichter I, et al 1995 Back to chart |
| Midazolam + Metoclopramide | Water | √ visual/physical for 24 hours | Lichter I, et al 1995 Back to chart |
| Midazolam + Haloperidol | Water | √ visual/physical for 24 hours | Lichter I, et al 1995 Back to chart |
| Midazolam + Cyclizine | Water | √ visual/physical for 24 hours | Lichter I, et al 1995 Back to chart |
| Clonazepam + Metoclopramide | Water | √ visual/physical for 24 hours | Lichter I, et al 1995 Back to chart |
| Clonazepam + Haloperidol | Water | √ visual/physical for 24 hours | Lichter I, et al 1995 Back to chart |
| Clonazepam + Cyclizine | Water | √ visual/physical for 24 hours | Lichter I, et al 1995 Back to chart |

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