

# INTRATHECAL ANALGESIA IN CANCER PAIN

A RESOURCE FOR HEALTH PROFESSIONALS



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# INTRODUCTION

The spinal cord is a major site for processing pain signals, and hence a target for drug therapy for pain management. Placement of an intraspinal catheter may be considered where all other means of pain relief have failed (oral, subcutaneous, transdermal, IV) or are not tolerated. Often this will be when opioid side effects, particularly sedation, are excessive.

The advantage of delivering drugs near the spinal cord is that high concentrations are achieved at the site of action with comparatively low doses. This achieves better pain relief with lower levels of side effects. Morphine, Bupivacaine and Clonidine are the most commonly used drugs. Ideally adequate analgesia should be possible with no or minimal leg weakness attributable to the local anaesthetic. Studies have shown that 24 hour doses of up to approximately 60mg of intrathecal Bupivacaine provide analgesia with no sensory or motor blockade.

Disadvantages of intraspinal analgesia relate to the need to have an intraspinal catheter inserted, the possibility of technical problems and infection, and the need for ongoing care to maintain the catheter and pump. Often, however, these catheters can be managed well in the patient's home with community nursing support.

Intraspinal catheters may be either intrathecal or epidural. Epidural infusions for analgesia may be used in selected cases where intrathecal catheter insertion is not feasible, or for particular pain states such as a segmental chest wall pain syndrome. The position of the catheter tip determines which spinal nerve roots are most exposed to the drugs infused. In general, intrathecal catheters are more suited to widespread pain problems or when dealing with multiple pain sites given that the drugs are infused into the CSF and can spread more widely. Most patients with cancer pain problems will be managed with an intrathecal catheter.

This Resource Document will cover only the usage of **intrathecal catheters** for cancer pain management. Refer to separate resource for information on epidural catheters for cancer pain management.

## ASSOCIATED RESOURCES

Available on the CDHB Palliative Care Service Website:

- BodyGuard 545™ PCA Pump for Intrathecal Pain Therapy Patient Information Resource
- Operations Manual for the BodyGuard 545™ PCA Pump
- Intraspinal Analgesia Infusion Prescription (C260036)
- Intraspinal Pump Delivery Record (C000751)
- Intraspinal Analgesia Pre-operative Assessment (C270127)
- Intraspinal Analgesia Nursing Checklist (C270129)
- Intraspinal Analgesia Audit Information (C270128)

## CATHETER PLACEMENT

The specific catheter type is selected by the Anaesthetist or Surgeon and will be inserted in the operating theatre, under sedation or general anaesthesia. A 0.2micron bacterial filter is attached to the catheter which is then attached to an infusion micro set containing a second 0.2 micron filter running from the medication bag to the catheter. This double filtering improves infection control.

The intrathecal catheter is placed through the dural sac into the CSF in the intrathecal (subarachnoid) space. The tip and first 10-15 cm of catheter are placed through the dural sac into the CSF.

The catheter is then tunnelled subcutaneously from the insertion site in the back around the flank to exit somewhere near the rib margin on the front where it can be easily seen and any necessary cares performed by patient and/or carer. Sometimes the catheter will be tunnelled up the back and over the shoulder to exit just below the collar bone. The catheter is secured by the adhesive dressings at the exit site.

Tunnelling of the catheter is done to minimise infection and to help reduce dislodgement. To further reduce the risk of dislodgement, an anchoring suture is often placed at the time of insertion in the deeper tissues at the exit from between the spinous processes. This is most likely with a longer term catheter. The insertion site on the spine and the tunnelling exit site on the abdomen both need to be monitored for infection or bleeding.

# NURSING PRE AND POST OPERATIVE CARE RESPONSIBILITIES

Patients are admitted to the neurosurgical ward at Christchurch Hospital for the insertion of an intrathecal catheter. Nursing staff are required to prepare the patient as per the CDHB standard for pre-operative care and documentation along with completion of the Intraspinal Analgesia Pre-operative Assessment form (C270127) and the Intraspinal Analgesia Nursing Checklist (C270129). The hospital Palliative Care Service will assist nursing staff with pre-operative preparation as well as supervise post-operative care. Standard CDHB post-operative care is used in conjunction with any additional clinician requests.

Nurses are required to document the progress in delivery of the intrathecal analgesia throughout the duration of use. Use the Intrathecal Pump Delivery Record (C000751) to document the number of boluses given and attempted as well as the basal rate infused. *This is vital in assisting titration of analgesia particularly in the first few days after initiation and checks will be undertaken four hourly.* Once analgesic requirements are stable this documentation may move to 24 hourly. Daily totals of analgesia used are recorded throughout use of intrathecal analgesia. The process used for reading and recording the daily total is outline below.

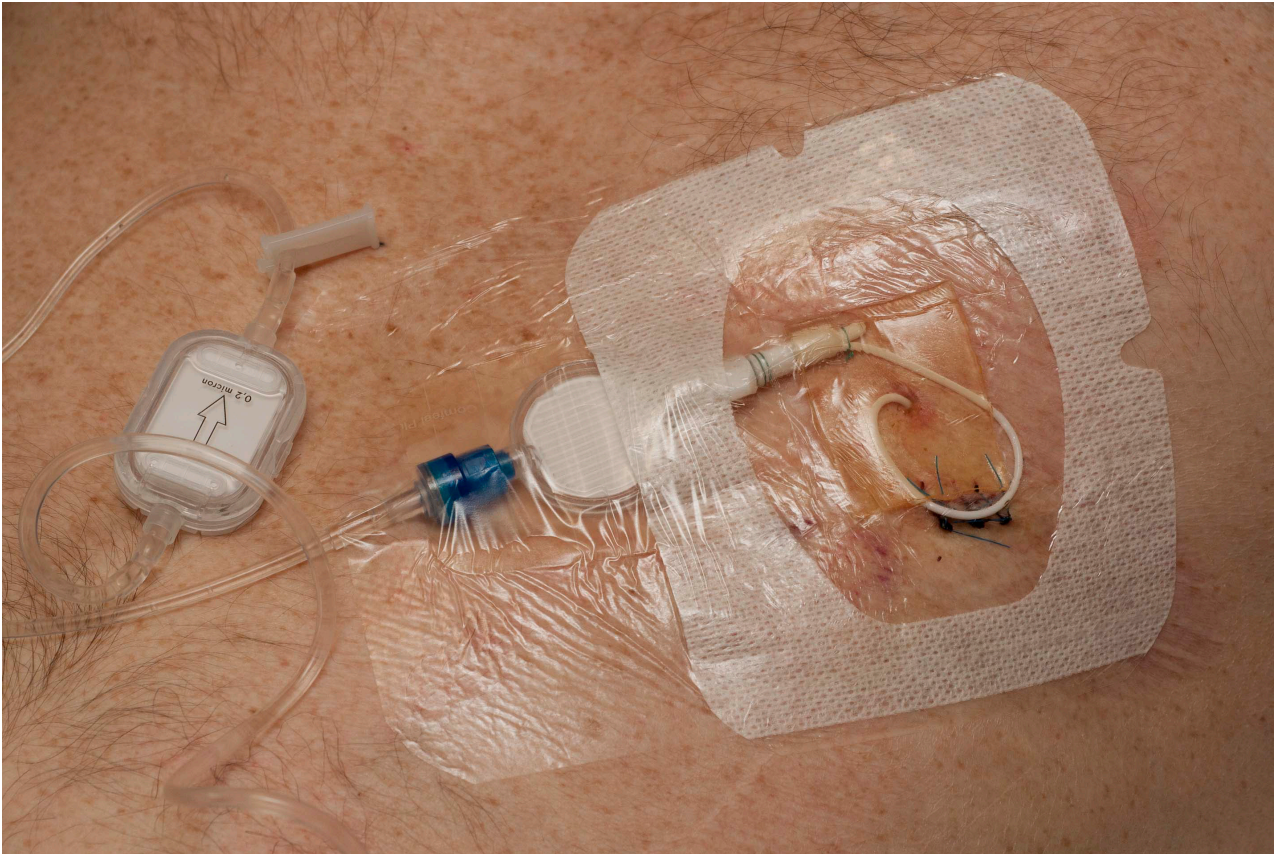
At each weekly dressing change it is necessary to 'zero' the pump, refer to **Appendix 1** for instructions.

## DAILY TOTALS

Every 24 hour period the number of boluses in total administered as well as the total attempted must be recorded on the Intrathecal Pump Delivery Record (C000751). The boluses are considered alongside the basal rate in order to titrate intrathecal analgesia successfully. This is most easily done by scrolling through the 'INFO' button. Refer to Operations Manual for instructions.

## MEDICATION DELIVERY AND CATHETER CARE

The prescribed medication is supplied in sterile bags made up in the Christchurch Hospital Pharmacy. Prescriptions are written in consultation with the Anaesthetist/Pain Specialist. Medication bag changes occur frequently during the titration phase and will then reduce to weekly in the stable phase. Catheter dressings and line changes are required **at least once a week** or if the site is soiled or the dressing is insecure. Dressing change is an aseptic procedure and requires two health professionals. See **Appendix 2** for this procedure.



**NOTE: Patients may shower but not bath** with an intrathecal catheter in place. As much catheter as possible should be protected by occlusive dressings and the pump should never be immersed in water. **Place the pump in a plastic bag and seal it to protect from water.**



## PUMPS

The Bodyguard 545™ ambulatory PCA infusion pump is currently in use at the CDHB. It is battery operated and has a clear digital screen. Access codes safeguard delivery of medications. The access codes are known by the provider.



The Bodyguard 545™ delivers a continuous infusion. It also allows patient-controlled intermittent bolus doses to be given as needed using the bolus cord. This has a lock-out facility to limit frequency of dosing. The prescribed medication is formulated in pharmacy and dispensed in a sterile bag of saline (100mL, 200mL or 500mL).

Before commencing the infusion for the first time, a specific programme for that patient will be created. This will include the background rate (in mls/hr), the bolus dose (in mls) and the lock-out time (in minutes). The volume of the drug reservoir bag needs to be confirmed every time a new bag is started as the pump keeps track of the volume remaining which is important so that the medication never runs out completely prior to a planned bag change. Most alarm problems relate to failure to confirm the pump settings before starting the pump.

When commencing a new drug reservoir bag, new tubing is required and this must be primed. Follow the priming instructions found in **Appendix 3** or the Operations Manual. Take particular care to exclude air from the tubing when priming. Air bubbles entering the infusion line are detected by the pump and are a relatively common cause of pump alarm activations.

A back-up pump is always available, located in the Oncology Ward for inpatient use, or at the Nurse Maude Hospice, after discharge into the community. Occasionally a standard syringe driver e.g. Niki T34 may be used as a temporary measure (e.g. in the case of pump failure) until a new pump is attached. Instructions for the use of the syringe driver are available in the [CDHB Fluid and Medication Manual](#) or from the [Christchurch Hospital Palliative Care Service website](#).

If the pump alarms, refer to “**Pump problems**”. For detailed instructions, refer to the Operations Manual. There is also a BodyGuard 545™ PCA Pump for Intrathecal Pain Therapy Patient Information Resource on the [Palliative Care Service website](#) which may be of assistance.



## DRUG PRESCRIBING

The Anaesthetist/Pain Specialist or Palliative Care Physician prescribes the medications for the infusion or gives direct advice in this regard to the attending medical officer. The [Intraspinal Analgesia Infusion Prescription \(C000812\) form](#) is used. A basal rate is charted plus dose and frequency of boluses (i.e. bolus dose and lock-out time) if appropriate. Fax prescription to Sterile Unit at Christchurch Hospital.

## DRUG PREPARATION

The prescribed drug mixture for the ambulatory infusion pump is made up in the sterile unit in Christchurch Hospital Pharmacy. It is important to contact the Oncology pharmacist or contact the sterile unit directly to organise new drug reservoir bags. These bags are routinely made up before 13.30 on weekdays only. If needed urgently outside these hours this **must** be discussed with the on-call pharmacist via switchboard. Refer to your local protocols for centres outside Christchurch.

## DRUGS FOR INTRATHECAL INFUSION

The most commonly used drugs are morphine, bupivacaine and clonidine. Often combinations of these drugs are more effective than single agents.

**Note:** Morphine, clonidine and bupivacaine can be infused via both intrathecal and epidural catheters. The key difference is that dose requirements for morphine and bupivacaine are approximately **ten times greater** when delivered by the epidural route compared to the intrathecal route. This is why it is potentially dangerous to infuse an epidural infusion prescription via an intrathecal catheter into the CSF.

## MORPHINE

The dorsal horn of the spinal cord is a major site of action for morphine. Morphine is a drug with high water and low lipid solubility. This allows it to form a reservoir in the CSF with relatively slow systemic absorption. Intrathecal morphine can produce all the common morphine side effects including sedation, respiratory depression, nausea, vomiting, sweating, constipation, pruritis (itching) and urinary retention. Myoclonus can occur at doses above 30mg/day.

1mg of morphine in the CSF has an equivalent potency to 100mg given systemically, which is about equivalent to 300mg given orally.

*Typical 24 hr doses of intrathecal morphine start in the range of 5-10mg.*

## BUPIVACAINE

Bupivacaine is a sodium channel blocker and a local anaesthetic agent. In low concentrations it is a relatively selective blocker for small diameter nerve fibres, which includes pain transmitting fibres. At higher concentrations, usually above 60mg/day, it can produce all the effects of a spinal anaesthetic, which include sensory numbness, motor weakness, and urinary retention and lowered blood pressure.

*Typical 24 hr doses of intrathecal bupivacaine start in the range of 10-20mg.*

## CLONIDINE

Clonidine is a  $\alpha_2$  agonist, which works by stimulating inhibitory neurones in the dorsal horn. It potentiates the actions of morphine, and is often effective for neuropathic pain. It can produce sedation and can lower blood pressure.

*Typical 24 hr doses of intrathecal Clonidine start in the range of 75 – 150 mcg.*

**The following drugs may occasionally be used:**

## BACLOFEN

Baclofen is an antispasmodic drug used for spinal injuries patients. It may be helpful intraspinally for some cancer patients with painful spasms caused by tumour invasion of major nerves.

## MIDAZOLAM

Midazolam is normally used as a sedative. It has some analgesic properties when used intrathecally. It is still regarded as an experimental drug in this role.

# EMERGENCIES AND COMPLICATIONS

**The following must be recognised and managed as a matter of urgency:**

## INFECTION

Infection either at the exit site, along the catheter track or within the CSF is always a potential risk. **FEVER MUST BE RESPONDED TO AS AN EMERGENCY.** If the patient presents either at the Emergency department or on the ward they must be triaged with the same priority as a patient presenting with neutropenic sepsis.

**NOTE:** Sepsis may not always be accompanied by fever. Sepsis or meningitis should be considered if the patient is systemically unwell or experiencing acute pain or confusion without clear cause.

- Examine the patient carefully and perform investigations as indicated
- If any part of the catheter tunnel or exit site appears infected or inflamed inform medical staff, record vital signs and take a exit site swab and send for micro/culture/sensitivity
- Check for fever and signs of systemic infection and meningitis - complete full septic screen; bloods, urine sample, CXR and review requirement for CSF culture.
- A sample of CSF can be taken from the intrathecal catheter under aseptic conditions (See **Appendix 4**). Remember to aspirate 1ml of fluid to empty the catheter dead space before taking the sample. After removing the sample, at least one clinician assisted bolus will be required to refill the catheter with medication.
- If there is evidence of infection, antibiotics will be required and the catheter may need to be removed. The risk of meningitis with an intrathecal catheter is approximately 3%.
- If there is site or tunnel infection but no evidence of systemic infection an appropriate IV or oral antibiotic should be started after swabs and culture have been taken. It may still be necessary to do a CSF culture but ideally this should be discussed with the Anaesthetist or Palliative Care Physician.

## CATHETER OCCLUSION

If the pump indicates an “occlusion alarm”, visually check the length of the catheter for kinks. If there is no obvious cause for the occlusion/obstruction to flow within the pump or catheter refer to “TROUBLESHOOTING” appendix in the operations manual.

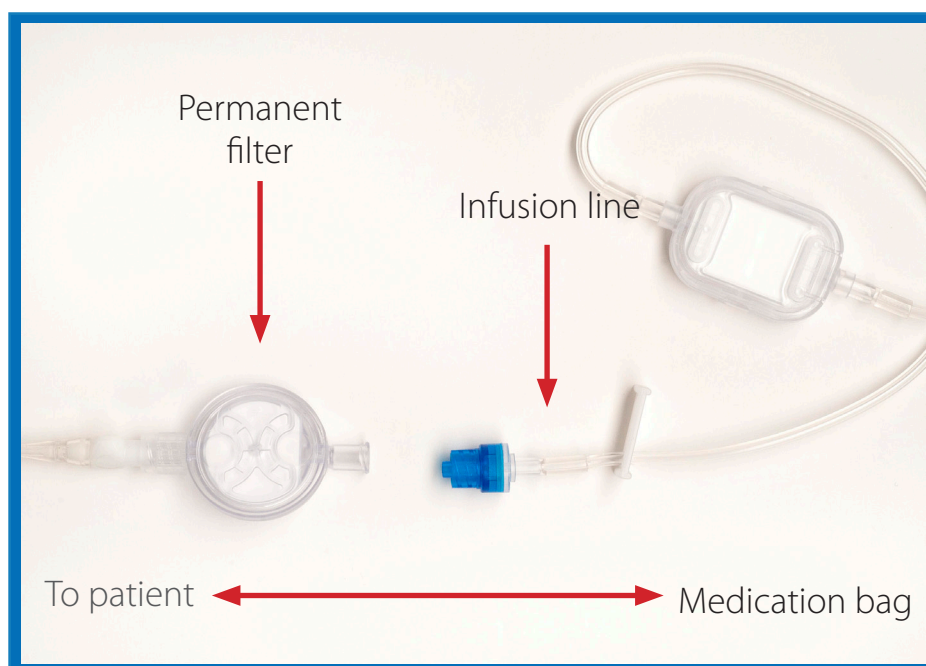
## CATHETER MIGRATION

Despite tunnelling, an intrathecal catheter can migrate. This is mainly due to the gradual incremental effects of normal body movements and spinal flexion and extension in an ambulant patient, leading to slow withdrawal of the catheter into the subcutaneous tissues.

Sometimes the catheter will be marked at a measured distance from the skin exit site, to help monitor any movement. Plain x-ray may also be helpful in determining the catheter tip position. If the intrathecal section of the catheter is completely extruded then analgesia will become inadequate, and the catheter will need to be replaced.

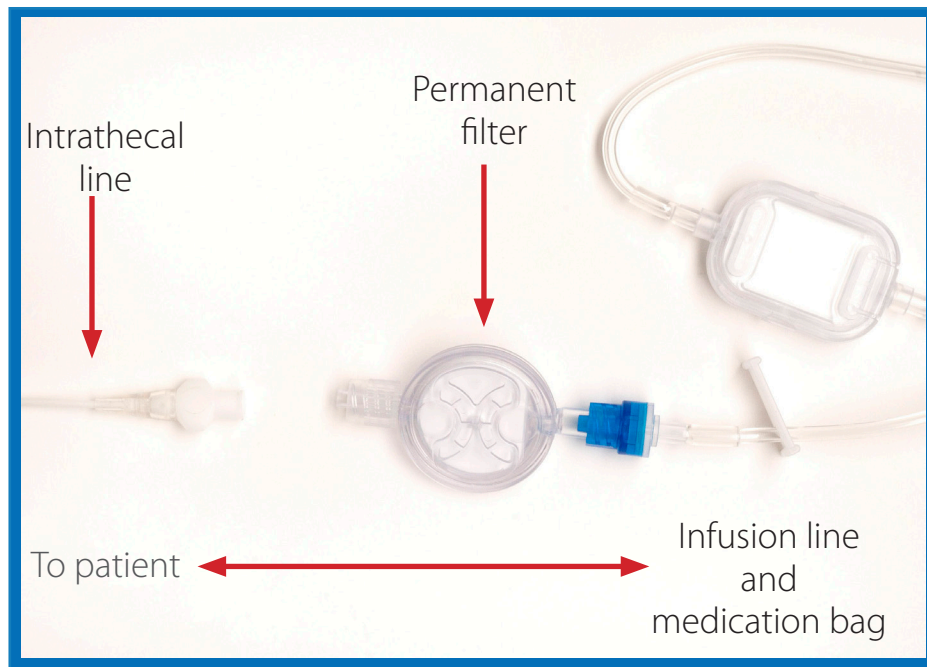
## DISCONNECTIONS

If there is an accidental disconnection of the infusion line upstream from the permanent filter (i.e. anywhere between the infusion bag and the permanent filter), put the pump on pause. If there is no obvious sign of contamination reconnect the line and start the pump.



If replacement equipment is on hand change immediately otherwise arrange for replacement of all disposable parts as soon as possible. Both filters (permanent one attached to the intrathecal catheter and the inline filter) need to be replaced.

If there is an accidental disconnection of the infusion line between the catheter (i.e. the patient) and the permanent filter, put the pump on pause. If there is no obvious sign of contamination remove the permanent filter only and reconnect the line and start the pump. There will temporarily be only one filter. Arrange for replacement of all disposable parts as soon as possible.



If there is obvious sign of contamination of any of the connecting parts do not reconnect. Secure the open end of the catheter with any sterile device such as a luer plug or small syringe or cap, to prevent loss of CSF. Inform the medical staff immediately. Alternative analgesics such as subcutaneous opioids will be needed until advice has been given regarding further catheter care.

## SPINAL FLUID LEAK

If clear fluid leaks around the site where the catheter exits from the skin it is likely to be a leak of cerebrospinal fluid from the hole created when the catheter punctures the dura mater (the sac holding the spinal cord and CSF). Usually this leak will not resolve itself. A CSF leak may be associated with a headache; however the leak could just be tissue/oedema fluid.

If the leak persists, there is an increased risk of meningitis. In addition, the lifting of the adhesive dressings increases the chances of the catheter being dislodged. Secure the dressings with sterile gauze to absorb the fluid, and additional occlusive dressings. Inform the medical staff that the leak has occurred so review can be arranged on a semi-urgent basis. They will assess if catheter needs reinsertion. Continue use of catheter as usual in the meantime.

## PIERCED BAG OR POTENTIALLY CONTAMINATED BAG OF MEDICATIONS

The infusion must be stopped immediately and a new bag of medications ordered urgently. In practice this could take several hours and PRN subcutaneous medications will be needed.



## PUMP PROBLEMS

Refer to the Operations Manual for ALL instructions and alarm interpretation.

Use of the security access code (patient lock-out feature) is strongly recommended so that inadvertent re-programming cannot occur. If the pump is dropped, programming must be checked as soon as practical to ensure that the pump is functioning correctly. If the patient is in the community this is done by contacting the Hospice (**03 375 4274**).

The pump has a rechargeable Li-ION battery and mains operation. Although the battery may last for several days after charging, it is suggested that the pump be placed in the charger each night while the patient is sleeping.

*"Pump alarms and nothing helps...."*

If you can find no obvious solution to an alarm status it may be worth trying the following sequence to exclude blockages and air locks as the cause of the problem.

1. Remove dressings from the catheter site and disconnect the infusion micro set using an aseptic technique.
2. Connect a endcap/bung or sterile syringe (2ml or 5ml) to the exposed permanent filter connection.
3. Re-prime the tubing as per instructions.
4. If no obvious problem is identified, place a sterile device on the end of the tubing to maintain sterility.
5. It is now necessary to check for catheter blockage and placement. This is done by drawing back and aspirating about 1 ml of CSF using the sterile syringe connected to the filter (as per instructions for taking CSF sample in **Appendix 4**). If CSF cannot be aspirated, maintain sterility and inform medical staff.
6. Remove the syringe (containing the CSF if some has been aspirated – do not re-inject the CSF) from the filter and reconnect to the tubing.
7. Carefully check that every pump setting is correct.
8. Restart pump.

# DISCONTINUATION OF AN INTRATHECAL INFUSION

If there is any concern about unusual sleepiness or difficulty waking the patient, the pump should be stopped or urgent consideration given to decreasing the rate of infusion or the drug dose(s). If there is any concern about numbness or weakness creeping up near the arms the pump should be paused. In both situations breathing should be assisted if necessary and help called for.

The infusion may need to be permanently discontinued if it has been deemed to be ineffective as a method of analgesia, if a serious complication has occurred and ultimately when the patient dies.

- Stop the pump
- Remove infusion giving set from the pump and discard with both filters. The tubing, dressing, and filters can be discarded
- The pump must **NOT** be discarded. The pump should be returned to the Palliative Care Service and sent to engineering for service before being used by another patient
- For a patient continuing with other therapy, or requiring a replacement intrathecal catheter, secure the catheter connector end with a sterile cap and ask for medical advice regarding removal. Do not attempt to remove the catheter.
- For a deceased patient, attempt to withdraw the catheter reasonable firmly. If the catheter comes out completely, it can be discarded. If the deep anchoring suture is firm, the catheter will stretch but not come out. With some stretch on the catheter, cut it off close to the skin, and allow the remaining catheter to recoil in to the patient's body. (There is **NO** metal left inside so no duty to inform the undertakers.)
- If the patient is in the community the pump can be placed into the bag of supplies and equipment that are to be collected by the Community Palliative Care Nurse. They will ensure that the pump is returned to the Hospice. The dressing, filters and tubing can be discarded.

ALL checklists, prescriptions and infusion documentation **MUST** be returned to the Christchurch Hospital Palliative Care Service (or your Centre's Palliative Care Service) either when the patient dies or if they no longer require the infusion. We suggest that you make copies of all these forms for your own records prior to mailing.

# APPENDIX 1

## ZEROING THE PUMP

Zero the pump with each weekly bag change:

1. Turn the pump off completely
2. Restart the pump
3. Select **new patient**
4. Then select the protocol for the patient the pump is attached to.

## APPENDIX 2

### PROCEDURE FOR INTRATHECAL DRESSING AND BAG CHANGE

Two health professionals should perform this procedure so one can maintain sterility of equipment. (Community based - preferably district nurse plus specialist palliative care nurse)

**ONLY** the inline filter is changed with tubing and dressing changes. The first filter is left permanently attached to the catheter.

#### EQUIPMENT

- |                                             |                                              |
|---------------------------------------------|----------------------------------------------|
| 1 dressing pack                             | 1 packet of (5) gauze squares                |
| 3 large (or 3 small) alcohol-chlorehexidine | 1 Pump tubing with 0.22 micron inline filter |
| 1 Tegaderm CHG 10x12 dressing               | Sterile gloves                               |
| Comfeel (if needed)                         |                                              |



| Sterile Nurse                                                                                                                                                             | Assistant                                                                                                                                                                                                                    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Wash hands and prepare sterile area.                                                                                                                                      | Open outer packets of gauze, Tegaderm CHG dressing, Comfeel and Tegaderm, pump tubing with inline filter and place on sterile area.                                                                                          |
| Use forceps to hold catheter in place then discard forceps.                                                                                                               | Carefully remove outer dressings ensuring the catheter is not withdrawn.                                                                                                                                                     |
| Clean exit site with alcohol-chlorehexidine swab sticks in circular motion working outwards allowing 30 seconds between swabs and cleaning.                               | Remove old tubing and bag from BodyGuard 545™ pump.                                                                                                                                                                          |
| Ensure filter end remains on sterile field.                                                                                                                               | Insert new bag and tubing in to pump as per pump instructions and prime tubing ensuring all air is removed from line (tap inline filter as it is priming). It may require two prime cycles. (See instructions in APPENDIX 3) |
| Place Tegaderm CHG™ dressing over exit site (follow numbered instructions on outside of packet.)                                                                          | Check prescription settings are correct on the pump with the sterile nurse.                                                                                                                                                  |
|                                                                                                                                                                           | Discard old filter and tubing.                                                                                                                                                                                               |
| Comfeel may be useful on abdominal wall where filters will lie to avoid pressure.                                                                                         |                                                                                                                                                                                                                              |
| In conjunction with second nurse change tubing once line is primed (disconnect old tubing and hand to second nurse and sterile nurse attaches new tube).                  |                                                                                                                                                                                                                              |
| Secure in place with Tegaderm.                                                                                                                                            |                                                                                                                                                                                                                              |
| Check prescription settings are correct on the pump with the second nurse.                                                                                                |                                                                                                                                                                                                                              |
| The filter attached to the intrathecal line does NOT need to be changed at each dressing change unless the thread becomes worn or CSF withdrawal is required (see below). |                                                                                                                                                                                                                              |
| Patient may require bolus after the dressing as the pump will have been turned off.                                                                                       |                                                                                                                                                                                                                              |

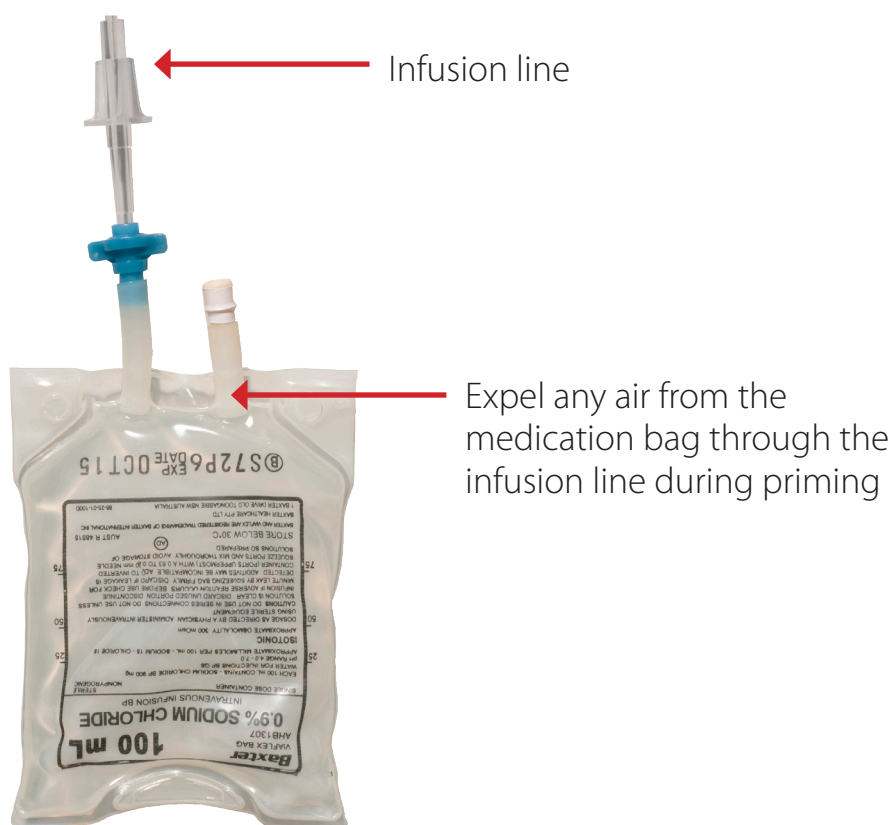
After the dressing is completed both nurses should ensure all clamps are off and the BodyGuard 545™ pump started and running correctly – Complete intraspinal pump delivery record C000751.

## APPENDIX 3

### PRIMING THE INFUSION SET

BodyGuard infusion sets cannot be primed by gravity due to the check valve in the set.

1. When connecting the new medication bag to the infusion set, the bag should be held vertically with the connection port at the top to exclude air entering the infusion line.



2. Load the infusion set into the BodyGuard pump.
3. Turn the BodyGuard pump on.
4. Press 'stop/no' for menu and/or enter Level 1 access code to open the main menu.



5. The infusion line filter should also be held vertically during priming to allow it to fill from bottom up.



Hold the filter with the arrow as indicated when priming the infusion set.

6. Select "prime" from the menu and press 'start/ok'. BodyGuard prompts you to ensure pump is disconnected from the patient.
7. Press 'start/ok' again to commence priming. You may stop priming at any stage by pressing 'stop/no' or repeat the last two steps if the infusion set is not completely primed after first attempt.
8. Pump returns to main menu and 'select protocol'. If all air is expelled from infusion set, connect to the patient. If not expelled repeat steps 3-5.

## APPENDIX 4

### PROCEDURE: TAKING A SAMPLE OF CEREBRO SPINAL FLUID (CSF)

To take a sample of CSF the dressing procedure should also be performed. Two staff are required to carry out this procedure.

Assemble the dressing equipment required plus:

- New 0.2 micron filter
- 2 x 1ml syringes
- Sterile specimen pottle

To take the CSF sample:

- Remove and discard existing permanent filter attached to catheter
- Attach 1ml sterile syringe directly to catheter connector.
- Gently withdraw 1 ml of fluid and discard
- Attach a new 1 ml sterile syringe and gently withdraw 1 ml of CSF and then attach new primed filter and tubing (with inline filter)
- Transfer CSF to appropriate culture jar and assistant can organise transfer of sample to the laboratory
- Complete dressing (refer to dressing change procedure, **Appendix 2**)
- Once the procedure is completed, the tubing is reattached to the catheter with a clean permanent filter attached and primed. The new filter must be attached and ready before the sample is collected. Ensure this new filter remains on sterile field and is only handled by sterile nurse during the procedure.
- Patient will require a clinician assisted bolus of 1ml to replace the medications in the catheter or they will have a delay in receiving medications of up to 2 hours

