

## Local Guideline and Procedure



John Hunter  
Children's Hospital  
CHILDREN, YOUNG PEOPLE AND FAMILIES



Health  
Hunter New England  
Local Health District

## Administration of medications via Continuous Subcutaneous infusion. -Niki Syringe driver T34 -CADD-Legacy PCA Pump

<b>Sites where Local Guideline and Procedure applies</b>	Paediatric inpatients in the JHCH.
<b>This Local Guideline and Procedure applies to:</b>	
1. Adults	No
2. Children up to 16 years	Yes and young people who have not yet transitioned to adult services
3. Neonates – less than 29 days	Yes (in consultation with the paediatric palliative care service)
<b>Target audience</b>	Medical and nursing staff
<b>Description</b>	All clinical staff providing care to paediatric patients that may require a subcutaneous infusion.

[Hyperlink to Procedure](#)

<b>Keywords</b>	Subcutaneous, sub cut, subcutaneous infusion, pain relief, Nikki, CADD, paediatric palliative care, pain, paediatrics, JHCH
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<b>Registration number and dates of superseded documents</b>	JHCH 13.12
<b>Related Legislation, Australian Standard, NSW Ministry of Health Policy Directive or Guideline, National Safety and Quality Health Service Standard (NSQHSS) and/or other, HNE Health Document, Professional Guideline, Code of Practice or Ethics:</b>	
<ul style="list-style-type: none"> <li>• <a href="#">NSW Health Policy Directive 2007_079 Correct patient, Correct procedure, correct site</a></li> <li>• <a href="#">NSW Health Policy PD 2005_406 Consent to Medical Treatment</a></li> <li>• <a href="#">NSW Health Policy Directive PD 2007_036 Infection Control Policy</a></li> <li>• <a href="#">NSW Health Policy Directive 2014_036 Clinical Procedure Safety</a></li> </ul>	
<b>Prerequisites</b>	There needs to be a current prescription /medication order for the patient.
<b>Local Guideline and Procedure note</b>	<p>This document reflects what is currently regarded as safe and appropriate practice. The guideline section does not replace the need for the application of clinical judgment in respect to each individual patient but the procedure/s <b>requires mandatory compliance</b>. If staff believe that the procedure/s should not apply in a particular clinical situation they must seek advice from their unit manager/delegate and document the variance in the patient's health record.</p> <p>If this document needs to be utilised in an outpatient area please liaise with the Paediatric Palliative Care Service to ensure the appropriateness of the information contained within the Guideline and Procedure.</p>
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## RISK STATEMENT

The subcutaneous infusion pumps within this guideline are used infrequently which means that clinical staff are often unfamiliar with the working and management of these devices. This guideline will inform the safe and effective administration of continuous subcut infusions via ambulatory syringe driver and pump. This will minimise the risk to patient and staff. If staff require further information or support they can contact the Paediatric Palliative Care Service.

**Risk Category:** Clinical Care & Patient Safety

## GLOSSARY

Acronym or Term	Definition
subcut	Subcutaneous

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**GUIDELINE**

This Guideline does not replace the need for the application of clinical judgment in respect to each individual patient.

**Continuous Subcutaneous Infusions**

Continuous Subcutaneous (subcut) Infusions may be required for symptom management in paediatric patients and are often used in paediatric palliative care. They provide continuous administration of medication via a subcutaneous route to enable effective symptom control when other routes are inappropriate or no longer effective. The Paediatric Palliative Care service at the JHCH use both the NIKI T34 syringe driver and CADD-legacy PCA pump which are both portable battery powered devices.

A continuous subcutaneous infusion delivers relatively constant drug plasma levels for a variety of medications. Pain is the most common symptom for which control is sought. The syringe driver can also be used in controlling other symptoms such as nausea, vomiting, breathlessness and agitation. It allows the combination of opioids with other agents such as antiemetic’s, anxiolytics, corticosteroids and antipsychotics.



**Niki T34 Syringe driver**

**CADD-legacy PCA pump**

[www.cme-infusion.com](http://www.cme-infusion.com)

## **Indications for use**

- Difficulty taking oral medications
- Dysphagia
- Severe oral lesions
- Severe nausea and vomiting
- Poor absorption of oral medications
- Poorly controlled pain or other distressing symptoms are not responding to usual oral regimes

## **Advantages**

- Steady plasma drug concentrations without peaks and troughs
- Allows management of multiple symptoms using a combination of medications via one route
- Repeated injections and oral medications may be reduced or no longer necessary
- More comfortable than intramuscular injections and less invasive
- The CADD- Legacy pump has a PCA option available
- Ability for mobile patients to remain mobile/independent
- Patients may be able to be managed in their home

Initiating use of a subcutaneous infusion device may be perceived by the patient and family as an indicator of deterioration or poor prognosis. Where appropriate, families should be reassured that use of the subcut infusion device is merely another treatment option which may be more effective, more convenient or better tolerated. The goals of administering medication via a subcut infusion device need to be discussed and any concerns/fears addressed. Often subcut infusion devices are used in the community setting, so practical aspects such as safety and care of the syringe driver need to be discussed.

If the syringe driver is used for palliative care needs the Paediatric Palliative care team can be contacted for advice/support.

## **Medication and prescribing considerations**

Medications given are symptom specific and comfort orientated.

Commonly 2-3 medications can be combined for subcutaneous infusion. The more agents mixed together, the greater the risk of precipitation and reduced efficacy.

**\*\*Before mixing any medications together for a subcutaneous infusion, stability information must be checked. Compatibility should be confirmed with a hospital pharmacist\*\***

Sources of compatibility/stability information include:

1. Micromedex IV compatibility (accessed via CIAP)
2. Andrew Dickman and Jennifer Schneider (2011) The Syringe Driver – Continuous subcutaneous infusions in palliative care 3<sup>rd</sup> Ed

If there is no stability data for combined medications, it must be assumed they are not compatible. If there is an issue with compatibility, consider the use of a second syringe driver or regular subcutaneous injections.

Common medications given by the subcutaneous route include:

- Morphine
- Midazolam
- Metoclopramide

Chlorpromazine, Prochlorperazine and Diazepam are examples of medications contraindicated for subcutaneous route as they are irritants and can cause severe reactions at the injection site.

Infusions should be prescribed for 24 hours. The patient must be reviewed daily so that medication doses can be adjusted according to their needs.

### **Consider:**

- The patient's medicine requirement for 24hours.
- The choice of diluent. Sodium Chloride 0.9% (Normal saline) is the most commonly used diluent. The use of Water for Injection has been linked to pain (due to hypotonicity) and thus is used less often. Compatibility of medications must be checked prior to dilution.
- Additional doses of medication that may be required for breakthrough symptoms – PRN medication needs to be available for immediate use.
- The compatibility of the medicines required to manage symptoms (see sources above). Solutions must be checked regularly for signs of incompatibility such as discolouration or precipitation.
- A luer lock syringe should always be used in the NIKI T34 syringe pump and for bolus doses via the side port to avoid any risk of disconnection.
- The NIKI T34 does have drug volume limitations. Please see the below table

#### **Syringe size & dilution:**

Volume of undiluted, prepared drug(s):

**≤10ml:** 10ml syringe can be diluted with up to 10ml volume

**≤20ml:** 20ml syringe can be diluted with up to 18ml volume

**>20ml:** 30ml syringe can be diluted with up to 22ml volume

*50ml syringe can be diluted with up to 33ml volume but will not fit inside lock box.*

**\*\*Please discuss bolus doses to be given via the y junction of the BD-Saf-T-Intima with the Paediatric Palliative care team. For Palliative care patients under multiple teams please contact the Paediatric Palliative care team for syringe driver management. \*\***

- The first syringe of a new prescription (NIKI T34) will lose some of the solution when the line is primed; therefore the infusion will not run for a full 24 hours.
- An initial bolus dose may be required via the side port as a loading dose to manage the patient's symptoms for the initial hours of syringe driver use, until the medication in the infusion reaches effective blood plasma levels.
- In oedematous children or those with poor circulation consider the use of an intravenous infusion in preference to the subcutaneous route.

## **Selection of sub-cutaneous infusion site**

SAF-T-Intima Catheters are used to reduce local site reactions and therefore increase longevity and reduce needle stick injuries. These Catheters can remain insitu for 7 days if no sign of infection, inflammation or pain at site. They are recommended for continuous subcutaneous infusions and for the administration of breakthrough doses.



[http://www.gp-palliativecare.co.uk/files/guidelines\\_yellow\\_24\\_gauge.pdf](http://www.gp-palliativecare.co.uk/files/guidelines_yellow_24_gauge.pdf)

## **Subcutaneous siting of the Saf-T Intima**

Physical assessment of the patient is required to select an insertion site. Select and use sites on a rotating basis. Avoid skin folds, line of clothes or broken skin. Where possible choose an area with a good depth of subcutaneous fat. The choice of site may be influenced by a number of factors including patient preference, their level of mobility and the patient's condition.

### **Preferred sites for insertion are;**

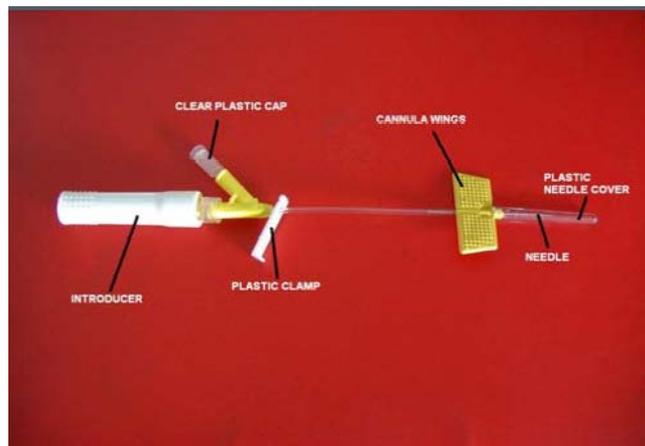
- The anterior aspect of the thighs
- The abdomen, this may be preferred if the patient is cachectic.
- The chest, specifically the upper anterior chest wall above the breast, away from the axilla
- The upper arm may be used but it makes it difficult for the patient to lie on their side and may lead to problems such as bruising.



[www.pennmedicine.org/health\\_info/images/19209.jpg](http://www.pennmedicine.org/health_info/images/19209.jpg)

These sites are preferred because they are easily accessible, both for initial insertion and for monitoring and are often less oedematous than other areas. Ensure the cannula site chosen is appropriate for the child's activity level and needs.

The procedure needs to be discussed with the patient and family. You may apply local anaesthetic cream, or ice to the site prior to procedure. Where appropriate administer oral sucrose (25%) for babies 3 months and under. After waiting for the appropriate length of time commence insertion. If the patient has a reduced level of consciousness this may not be required.



[http://www.gp-palliativecare.co.uk/files/guidelines\\_yellow\\_24\\_gauge.pdf](http://www.gp-palliativecare.co.uk/files/guidelines_yellow_24_gauge.pdf)

## PROCEDURE

**This procedure requires mandatory compliance.**

### **Patient Preparation**

It is mandatory to ensure that the patient has received appropriate information to provide informed consent and, that patient identification, correct procedure and correct site process is completed prior to any procedure.

### **Staff Preparation**

It is mandatory for staff to follow relevant: "Five moments of hand hygiene", infection control, moving safely/safe manual handling, documentation practices and to use HAIDET for patient/carer communication: **H**and hygiene **A**cknowledge, **I**ntroduce, **D**uration, **E**xplanation, **T**hank you or closing comment.

If you need assistance please contact the Paediatric Palliative Care Service

### **Equipment Required**

- Alcohol based hand rub
- Personal Protective Equipment
- BD Saf-T Intima
- Transparent occlusive dressing and tape to secure
- Infusion device
- Current medication order and medication
- Tubing for appropriate pump
- Syringes

(Most equipment available from Paediatric Palliative Care Team)

### **Procedure Steps**

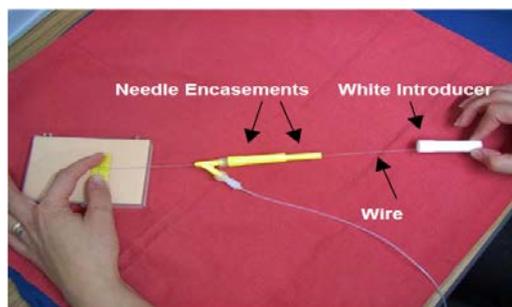
## **Insertion of Saf-T-Intima**

1. Attend hand wash and apply gloves.
2. Clean the selected site with an alcohol swab and allow to dry
3. Open the package by pulling the paper lid from the plastic package.
4. Remove small plastic cap from the "Y" junction of the device and attach a luer lock bung.
5. Using this bung flush the tubing with normal saline. The dead space is 0.2ml.
6. Locate appropriate site.
7. Grip ridged yellow wings of the cannula between thumb and index finger so that the bobbled surface is as shown.



[http://www.gp-palliativecare.co.uk/files/guidelines\\_yellow\\_24\\_gauge.pdf](http://www.gp-palliativecare.co.uk/files/guidelines_yellow_24_gauge.pdf)

8. Remove clear plastic needle cover and insert needle into the subcutaneous space at a 20-45 degree angle. This should be done in one quick, smooth movement. If unsuccessful use another cannula.
9. Release wings and stabilise with a transparent dressing.
10. Whilst holding the wings of the cannula firmly pull back on the introducer and remove in one single movement. This will leave you with a bung. Remove provided bung and attach a luer lock bung.



[http://www.gp-palliativecare.co.uk/files/guidelines\\_yellow\\_24\\_gauge.pdf](http://www.gp-palliativecare.co.uk/files/guidelines_yellow_24_gauge.pdf)

11. Dispose of needle encasement/introducer in the sharps bin.
12. Stabilise with extra tape if needed.

## **Site maintenance**

The cannula should be rotated to a different site after a maximum of 7 days (sooner if complications occur). Possible complications include infection, discomfort and blockage. Factors that cause site reactions include: the tonicity of the medication, the pH of the solution, infection and prolonged presence of a foreign body. Signs and symptoms that may be exhibited; redness, inflammation, exudate, bruising, pain and leakage. If removal is necessary a new cannula should be inserted in a new site.

## **NIKI T34 Syringe Driver**

### **Setting up the syringe driver**

1. Prepare medication in relevant syringe and attach infusion line- **do not attach infusion to patient and do not prime line**. Minimum volume extension sets are used and can be accessed from the Paediatric Palliative Care team.
2. Insert a 9V battery into the battery compartment.
3. Turn on **NIKI T34** by pressing down **ON/OFF** button.
4. The version of the software will flash on the screen. The screen will then flash 'Pre-loading', wait for the pump to pre load. It calibrates itself during this process. During the pre-loading phase a summary will show on the screen.



[www.cme-infusion.com](http://www.cme-infusion.com)

5. The screen will then show 'Load syringe'



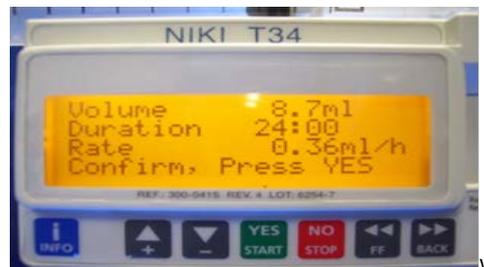
[www.cme-infusion.com](http://www.cme-infusion.com)

6. Check the battery by pressing the **INFO** key. When it shows Battery Level select **YES**. Ensure there is enough battery percentage for the patient's needs.
7. Measure the drawn up syringe against the NIKI T34 and hold down the **FF** or **Back** button to align the actuator (see below picture) with the syringe plunger.



[www.cme-infusion.com](http://www.cme-infusion.com)

8. Raise clamp and place syringe in, if the syringe is loaded incorrectly the screen will remain at load syringe. Check syringe placement and try again
9. Use ▲▼ to select syringe brand. Select YES for correct syringe.
10. The syringe driver automatically calculates and displays the deliverable volume, rate and duration of an infusion. Check and review this data on screen. **If the program lock has been set by the Palliative care team it will be set to a default of 24hours. You will not be able to make any changes; the driver will automatically calculate syringe volume and will calculate for 24hours.** If you need to make changes please contact a member of the Paediatric Palliative care team.
11. To confirm press YES. The screen will show a summary.



[www.cme-infusion.com](http://www.cme-infusion.com)

12. Display will read 'Start Infusion? **Do not start infusion if this is a new or amended infusion order as the line requires priming.**
13. Prime infusion line by pressing the FF key. **Ensure syringe not connected to patient.** The Screen will show 'Purge, Disconnect from patient' Press YES to confirm, hold the FF key until volume needed for line shows on screen. The minimum volume extension sets have priming volumes written on the packet.
14. Press YES to confirm syringe again. Press YES to Resume.
15. Display will now show new volume and new duration after priming, the rate will remain constant. Press YES to confirm volume, duration etc. (The First syringe will run for less than the 24 hours due to the priming volume).
16. Complete and attach an additive label to line.
17. Wipe subcutaneous catheter bung with alcohol wipe and attach subcutaneous infusion line.
18. Press YES to start infusion.
19. Screen will show Time remaining and rate in ml/h and will say 'pump delivering'.
20. Place the pump in the allocated locked box and ensure it is locked. Place inside the protective pouch. Keep the key with the nursing drug cupboard keys

## Please Note:

- For Second and subsequent infusions for a patient on the same medication doses the Line will not need to be re-primed.
- The BD Saf-T-Intima™ cannula has a dead space of 0.2ml. When a medication is given via the side port the patient will receive a bolus of the infusing medication. When a flush is given it means the line will have diluent in the dead space which will delay the infusion of medication via the syringe. This is dependent on the medication concentration and infusion rate. **For this reason Bolus doses need to be discussed with the Paediatric Palliative care team.**
- Advise the patient and family that the pump must not get wet. A protective plastic bag should be used in the shower.
- If someone has activated the keypad lock, hold down the **INFO** key until a bar is displayed that moves from left to right and says keypad lock. Hold down until bar reaches 'OFF'.



## To stop the infusion

1. A "NEAR END" message displays 15 minutes before the end of the infusion
2. When the infusion is completed the syringe driver stops automatically and an alarm will sound.
3. To stop the infusion before the syringe is empty press the **STOP** button then press and hold the **ON/OFF** button (wait for the beep).

## Changing the Battery

Discard the battery if less than 20 % life is remaining. The average battery life, starting at 100 %, is approximately 3-4 days depending on use. Open the battery compartment at the back of the driver and replace with a new 9 volt battery. It is important to keep a supply of 9 volt batteries on the ward. If you stop the infusion to change the battery you will need to check the program and 'resume' the syringe.

## Observations

1. Assess symptom management
2. Check insertion site for leakage, irritation, inflammation, and displacement
3. Check syringe and infusion set for precipitation or crystallisation.
4. Check the screen for rate and time remaining
5. Press **INFO** key once for volume to be infused and volume infused.
6. Press **INFO** key twice for battery remaining.
7. Document in patient notes.

## **CADD-Legacy PCA pump- Model 6300**



CADD pump and accessories are available where appropriate from the Paediatric Palliative Care team



CADD medication cassette reservoir

### **Filling the CADD medication Cassette**

Using aseptic technique fill a syringe with the desired volume of medication and diluent. It may be necessary to fill two syringes depending on volume required. If the cassette is 100ml then you need to make sure you have 100mls of medication and diluent combined.

1. Remove and discard protective end cap from tubing
2. Attach syringe to luer and fill medication bag (inside cassette) until about half full.
3. Tilt and rotate cassette to collect all air bubbles into one large bubble. Aspirate air.
4. Hold syringe with tip pointing downwards and inject remaining fluid into cassette reservoir. Close tubing clamp. Make sure that medication and diluent are properly mixed and that there is no air.
5. Disconnect syringe from luer. Cap luer with red non-vented stopper provided or attach to extension set.

The following is a video that shows how to fill a cassette and remove air.

<http://www.smiths-medical.com/education-resources/videos/cassette-medication/3/index.html>

### **How to start the CADD pump**

To turn on the machine press the ON/OFF button and hold. When you turn on the CADD pump it will automatically go through the program settings and then when finished say 'STOPPED'.

## Attaching a cassette

1. Ensure all tubing is clamped.
2. Obtain and load a new cassette with medication as above. Check medication order.
3. Ensure batteries have enough life for length of infusion
4. On the top of the new cassette there are two hooks on one side and a catch on the other. The two hooks fit into the left-hand side of the CADD pump and act as a hinge. The catch locks into the recess on the right hand side near the key lock.
5. Place the pump upright on a firm flat surface. Press down on the cassette so it fits tightly against the pump. Ensure you feed the line through the air sensor on the left hand side of the pump.
6. Using the key insert the key into the lock, push in and turn counter clockwise until the line on the lock lines up with the arrow on the side of the pump and you feel the lock click into place.

## Lock Levels

1. To be able to change a setting the machine must be set on '**LLO**'. To do this stop the infusion by pressing '**STOP**'.
2. Press the '**LOCK**' button
3. The current lock level will appear. .
4. Use the arrow buttons until it says '**LLO**', then press the '**LOCK**' button
5. **Code 0** will be displayed - use the arrows till '63' appears. Press the '**LOCK**' button. You can now change settings.

## Programming the machine for a new cassette

1. Press the '**NEXT**' button. It will say '**RESERVOIR VOLUME**'. Press the clear button or use the arrows to change this to 100ml (for 100ml cassettes) and press '**ENTER**'
2. Press the '**NEXT**' button again and '**UNITS**' will be displayed on the top line. On the bottom line it should say '**Millilitre's**' if it does, press '**NEXT**' if not use the arrows until it is displayed and then press '**ENTER**' again.
3. The words '**CONTINUOUS RATE**' will be displayed. Use the arrows to ensure the rate/ml is as ordered. Press '**ENTER**'
4. '**DEMAND DOSE**' should now be displayed. Check the demand dose against your medication order. If correct press the '**NEXT**' button if not correct with arrows, press '**ENTER**' then '**NEXT**'. This is only used to set up the PCA function of the pump.
5. '**DOSE LOCKOUT**' will now be displayed. This will say '**00 hours and 10 minutes**'. Do not change this press the '**NEXT**' button.
6. '**DOSES PER HOUR**' will be displayed. This gives the number of times the patient controlled button can be pressed each hour. It should say '**6**' or as per medication order. If it does press the '**NEXT**' button. If not change using arrows and press '**ENTER**' then '**NEXT**'
7. '**DOSES GIVEN**' is displayed which tells you how many doses the patient has had in total. Press the '**ENTER/CLEAR**' button to restore number to zero. When attaching a new cassette this process can be repeated for "**DOSES ATTEMPTED**" and "**GIVEN**".

8. Next '**AIR DETECTOR**' is displayed ignore this and press '**NEXT**' do the same when '**UPSTREAM DETECTOR**' is displayed. The sequence is now ended and the word '**STOPPED**' appears on the screen.

### **Priming the tubing using the pump**

**WARNING-** do not prime the fluid path with the tubing connected to the patient. This could result in over delivery of medication or air embolism, which could result in death or serious injury.

1. Using aseptic technique you will need to connect the filled medication cassette reservoir to the CADD extension set.
2. Remove the end cap and connect extension set Luer (**with blue cap**) to the end fitting on your filled medication cassette reservoir.  
NOTE: if you connect the anti-siphon valve (clear cap) to the medication cassette reservoir a high pressure alarm will sound when you try to start the pump.
3. Remove end cap and open clamps.
4. Press and hold the '**PRIME**' button- after you see the 3 sets of dashes appear release.
5. Press and hold '**PRIME**' again to fill the fluid path and to eliminate air bubbles. The screen displays '**Priming...**' and you will hear a short beep each time the pump goes through a delivery cycle
6. Once the tubing is primed press '**NEXT**' to return to the main screen.

### **Locking the machine**

1. The machine must be relocked before use. Press '**LOCK**' the screen will display '**LLO**'. Use the arrows to change this to '**LL2**'
2. Press the '**LOCK**' button.
3. The screen the displays '**CODE 0**' using the arrows change this to **63** and press '**LOCK**' button. The pump is now safely locked.

### **To commence infusion/enable PCA**

1. Connect to patient via the subcut device (BD-Saf-T-Intima)
2. Unclamp the extension tubing and cassette tubing and press the '**START**' button. Press and hold the '**ON**' button for 3 seconds
3. The pump will automatically go through the current settings. Wait for this to finish. The pump will now read '**RUN**' and display reservoir volume.

If the machine alarms and says '**AIR IN LINE**' check the cassette and press the tubing on the side of the machine in more tightly.

***\*Please contact the Paediatric Palliative care team if you need further assistance with the above devices.***

## **Implementation and Monitoring Compliance**

The Paediatric Palliative care (PPC) team is available for any information or education regarding the use of the devices in this guideline/procedure document.

As the devices are used infrequently they are kept with the PPC team and education can be provided at the bedside on a needs basis. Education on the use of the devices will also be done via in service and skills workshops.

Due to the small number of cases the management of these devices will be monitored for effectiveness and compliance of this guideline will be reviewed via case review. OUR PPC team death review also allows for discussion and review of problems with equipment/management.

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## **FEEDBACK**

Any feedback on this document should be sent to the Contact Officer listed on the front page.

## **CONSULTATION**

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## **APPROVAL**

CPGAG – 18<sup>th</sup> February 2016.

JHH QUM – 11<sup>th</sup> May 2016.

JHCH CQ & PCC – 24<sup>th</sup> may 2016.