INTRODUCTION TO VENOUS ACCESS AND CVAD POLICIES FOR ANAESTHETIC TRAINEES

Background

Venous access forms a significant part of the Anaesthetic Department workload at RCH Melbourne. In addition to simple CVCs inserted for routine perioperative care, central venous access devices (CVADs) are requested for difficult venous access, medium-long term antibiotics, TPN, blood products and chemotherapy.

The RCH Anaesthesia website contains a comprehensive amount of information on CVADs: line choice, booking, insertion, management, documentation and competency training.

- Link to this http://www.rch.org.au/anaes/index.cfm?doc_id=778 for intranet resources (some of these links are being developed in early 2012 but the essential information is in this document).

RCH Melbourne has CVAD policies and procedures, with compulsory hospital wide training on insertion and maintenance for any staff member involved with inserting or accessing CVADs

- Link to this: http://www.rch.org.au/cvad/index.cfm?doc_id=1892 for more information

Due to the success of these policies in reducing infection and other line complications, insertion time and waiting time for lines, staff, parents and patients are all acutely aware of how their CVADs (CVCs, ports, Hickmanns, PICCs and midlines) are to be inserted, accessed and cared for. Paediatric lines are also "precious" due to increased insertion difficulty, and the requirement for a general anaesthetic for insertion. A complication of any of these lines due to incorrect insertion or access can cause significant morbidity (infection, thrombosis, malfunction) and mortality, usually results in a delay of days – weeks without a line, and a repeat general anaesthetic for replacement.

If a member of the Anaesthetic Department is seen to be the source of the complication due to incorrect insertion or access, the treating staff, patients and their carers are usually forthcoming in pointing this out. The Anaesthetic Department requests that you take this into account and adhere to the policies while you are working at RCH Melbourne.

Sterile insertion "bundles" and CVAD related infection

Healthcare Associated Infections (HAI) are a significant and growing burden on the healthcare system. In Australia approximately 150,000 Healthcare Associated Infections contribute to 7,000 deaths each year. In both paediatric and adult patients, 20 - 40% of these infections are associated with Central Venous Access Devices (CVAD).

In 2007 the CVAD infection rate was 4.5/1000 (line days) in the RCH Neonatal Unit and 4.0/1000 in the RCH Intensive Care Unit, which translates to approximately 30 individual episodes of line-related infections per annum. The mortality rate varies with the causative organism but is in the order of 10%.

Surveillance data from our ICU and NNU and Oncology and General Medical Wards have shown that we have a measurable problem with CVAD-related infections. RCH introduced standardized recommendations for central venous access devices (CVADs) insertion, maintenance and access in 2009 and this initiative has seen a decrease in infection rates.

The most effective means of reducing CVAD-related infections is the application of a group of evidence-based interventions known as **"bundles"**. These initially proved to be successful in the adult intensive care setting where infection rates were reduced to zero for many months. More recently these bundles have been modified for use in the paediatric environment and have proven to be equally effective.

ESSENTIAL CVAD INFORMATION FOR TRAINEES

Online CVAD insertion and maintenance education package and quiz

- Link to this http://www.rch.org.au/cvad/edu/index.cfm?doc_id=1894
- You should complete these prior to, or at the start of your time at RCH. Please give the completed quiz forms to Dr Liz Prentice, Dr Billy Browne, or Dr Ian Smith.

Which lines are suitable for trainees to insert

- A trainee needs to have completed the CVAD online education and quiz for insertion and maintenance prior to line insertion at RCH Melbourne.
- It is assumed that by the third year of training, registrars will have gained basic skills and competency with the use of ultrasound for insertion of adult CVCs.
- Once a third year registrar has demonstrated adequate knowledge of venous anatomy and competency with the use of ultrasound, it is up to the discretion of the supervising anaesthetist to let the trainee undertake supervised insertion of a simple CVC in a patient older than 4yo.
- Fellows in Paediatric Anaesthesia, after demonstrating competency in simple CVC insertion, will be supervised to insert CVCs in children <4yo, and infants for cardiac surgery. They may also, after having demonstrated skills in ultrasound enough to access small arteries and veins be supervised to insert PICC lines in children over 4yo.
- Paediatric PICC lines are difficult and have a low success rate and high complication rate in inexperienced hands. If any of the predictors of difficultly are present (age <2yo, weight <15kg, previous difficult lines, multiple previous lines) an anaesthetic consultant should insert the line
- Lines not generally suitable for trainees include: awake midline catheters in chronic patients and tunnelled lines.

Booking process

- All lines apart from CVCs inserted as part of an anaesthetic for perioperative care are discussed with and booked with the in-charge or vascular access anaesthetist, and often the inserting anaesthetist is chosen in advance depending on anticipated complexity of the line.
- The **blue venous access request form** for all upcoming lines is filed in a CVAD folder in the incharge office, and should be referred to prior to inserting the line.
- To guide in line insertion there are **Venous access decision path diagram** and the **Choosing an appropriate venous access device CPG**
- Additional guidelines are on the Anaesthesia website for **Venous access for cystic fibrosis "tune-ups"** and **requesting "awake" difficult peripheral IV access**

Sterile insertion guidelines

- The basic 4 steps are

1.one minute hand-wash 2.Mask, hat, gloves, gown 3.30 second skin prep 4. 80-100% patient draped

- The Anaesthetic Department at RCH provides a sterile insertion pack that has all the components necessary for full barrier precautions.

SmartSite™ bungs

- It is hospital policy for all CVADs and midline catheters to have a SmartSite™ bung attached directly to the distal end of the device. These are changed weekly, and require a sterile pack, sterile gloves and alcohol chlorexidine prep to be removed and changed.

Choosing the correct PICC and CVC size

CVC sizes		
Age	**weight**	**CVC size**
0 - 6mths	< 10kg	4 Fr
6mths - 4yrs	10 – 20kg	4.5 Fr – 5 Fr
4yrs – 12yrs	20 – 40kg	5 Fr
> 12yrs	> 40kg	7 Fr

PICC sizes		
Weight	**Size**	Note: 3Fr PICCs are not commonly used at RCH due to ↑ complications – use a tunnelled CVC
< 10kg	3 Fr	
> 10kg	4 Fr	
Adult Size > 50kg	5 Fr	

Use **smallest size and smallest number of lumens** clinically required
↑ size → ↑ complications ***and*** ↑ lumens → ↑ complications

Dressing and securement devices for PICCs and midline catheters

Suggested securement of PICC lines

- Attach a SmartSite™ bung to end and flush with heparin 10 IU/ML
- Apply suture-less dressing close to site (refer to poster from manufacturer)
- If the exit site is bleeding apply gauze to stop the securement device becoming blood soaked
- Cover the exit area with a large transparent dressing (such as Tegaderm™)
- Reinforce with Hypafix™ as shown

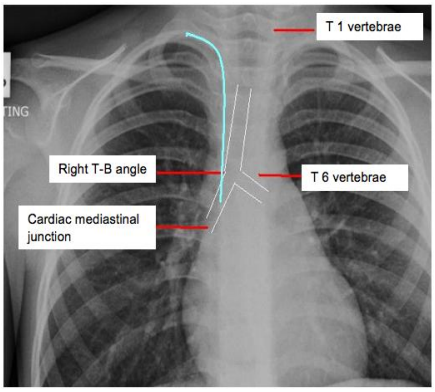
Suggested securement of midline catheters

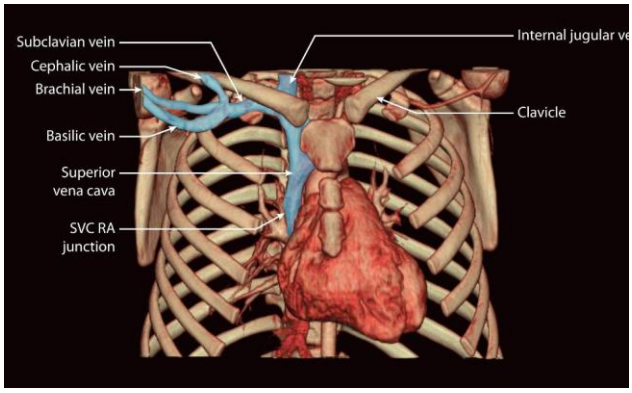
- Attach a SmartSite™ bung to end and flush with heparin 10 IU/ML
- Apply suture-less dressing close to site (refer to poster from manufacturer)
- Cover the exit area with a large transparent dressing (such as Tegaderm™)
- Reinforce with Hypafix™ as shown

CVAD tip positioning upper venous system CVADs

Refer to "CVAD tip positioning and xraying CVADS" for more information including image intensifier pitfalls and lower venous system CVADs.

- The ideal tip position is the lower SVC
- A tip left in any other position is more likely to result in complications.
- The end of the catheter should lie parallel to SVC wall: tips positioned high in the SVC abutting the wall can cause erosion, perforation & predispose to thrombosis
- If positioned too high the catheter can flick out of the SVC and upwards into the neck with patient arm movement
- Tips positioned too low can enter the heart, and risk perforation and arrhythmias
- The most reliable anatomical landmark for the lower SVC in children is one vertebral body below the carina (consensus from RCH Interventional Radiology Department and available paediatric literature)





X-raying CVADS inserted peri-operatively

Simple CVCs inserted for intra-operative use

May be used prior to imaging provided the majority of the following criteria are met

- uncomplicated insertion with no concerns re line position
- ultrasound used for insertion of IJV lines
- transduced pressure wave confirms placement in SVC
- ventricular ectopic beats on ECG with wire placement
- free aspiration of blood from all three lumens

An x-ray must be performed at the end of the case; this can be done in theatre, recovery or PICU/ NNU. Tip position needs to be documented on the CVAD sticker in the anaesthetic chart
NOTE: if there is any doubt that the CVC is in a central vein an x-ray should be taken prior to use
If re-positioning the CVAD will require a second anaesthetic or sedation it is highly recommended that the x-ray be performed whilst the patient is still anaesthetised

PICCs and tunnelled CVCs

- Require on table image intensifier to confirm position

Use of radioopaque contrast during CVAD insertion

- 1-2 ml of Isovue 300 used undiluted can be used during insertion of the CVAD if difficulty is encountered defining the exact tip location using image intensifier.
- Refer to "Use of radioopaque contrast during CVAD insertion" for more information

Documentation after insertion

- The details of all lines insertions need to be entered onto the anaesthesia record by the anaesthetist inserting the line
- Of note it is necessary to have an assistant witness the disposal of all wires used to ensure no wire is left insitu in the patient
- A simple sticker is available in all operating theatres which can be attached to the top right side of the anaesthesia record
- If a midline catheter is inserted without anaesthesia, this sticker should be attached in the patient progress notes
- It is recommended for more complicated line insertions such as PICC lines or tunnelled lines that an ORMIS operating note be recorded. There are templates for these on the ORMIS system under anaesthesia

CVAD RECORD ☐ PICC ☐ Vascath	Asepsis: ☐ gloves ☐ mask ☐ gown
CVC: ☐ Percutaneous ☐ Tunnelled	☐ full drape ☐ 30sec Alc-Chlorhex
☐ Midline *(dilute drugs as per peripheral IV)*	No. wires used ___ No. wires discarded ___
Brand: _____	X-ray: ☐on table ☐recovery / ICU
Size: _____ No. Lumens: _____	Tip position: _____
Site: _____	Heparin flush: ☐ 10 u/ml ☐ 100 u/ml
Length at skin: _____cm	Inserter : name_____sign _____
Securement ☐ suture ☐ Grip/Statlock	Assistant: name_____sign _____

Audit

- All lines apart from the CVC s inserted as part of the anaesthetic for perioperative care are audited. If you put in a CVC not associated with an operation (ie as the sole operative procedure), a PICC, midline, tunnelled line, difficult IV access on the ward, the audit form needs to be completed and left in the CVAD folder at the in-charge office. The audit form for each patient is printed *on the back of* their **blue venous access request form**

Accessing CVADs

- For injection of drugs during the perioperative period, a sterile no touch technique is used, with care to flush the line with a minimum of 20ml of 0.9% saline.
- After use the line needs to be "locked"
    - 0.9% saline for next access in < 6 hours
    - Weak heparin lock 10 IU /ml for next access in <24 hours
    - Strong heparin lock 100 IU/ml for next access >24 hours
- SmartSite bungs should not be removed, or blood taken, unless a full sterile technique is used
- If an IV line is disconnected, it usually has to be discarded, and a new clean setup prepared.

- Please follow these links in the intranet to learn how to access CVADs

Choosing the right technique: http://www.rch.org.au/emplibrary/cvad/POSTER_1_090722.pdf
Preparation: http://www.rch.org.au/emplibrary/cvad/POSTER_2_090722.pdf
Medication administration: http://www.rch.org.au/emplibrary/cvad/POSTER_3_090722.pdf
Changing IV bags and syringes: http://www.rch.org.au/emplibrary/cvad/POSTER_4_090722.pdf
Changing IV lines: http://www.rch.org.au/emplibrary/cvad/POSTER_5_090722.pdf
Taking blood samples: http://www.rch.org.au/emplibrary/cvad/POSTER_6_090722.pdf