

Dr. Brearey's Comments	BAPM Response
I think there should be a comment regarding uniformity of practice within a neonatal network/ODN. The formal training package should led by the NICUs so that trainees in LNUs have all been trained in the same way. There should be a continuum of training between NICU and LNU, to avoid differing practices and the resultant risks.	Agree. The document will be amended to acknowledge the role of networks in this regard.
PICCs that have been correctly inserted often don't bleed back freely. Should this refer only to UVCs	Disagree. Though it is not possible to aspirate blood from 1Fr lines, it is possible to see flow of blood within the catheter itself if gentle negative pressure is applied to the line. This is possible even with wired lines.
"for PICCs regular documentation of the integrity of the dressing and insertion site." I would include checking the <u>whole limb</u> . I have witnessed 1 or 2 incidents when buttocks and thigh have been swollen but insertion site is fine.	Agree. The document will be amended to acknowledge the importance of checking the entire limb.
It is not clear or explained in the appendix pictures that both sutures have been inserted into the umbilicus?!	No change to document required. The appendix only shows one example of fixation technique.
I welcome this guidance. However, it is equally important to have a similar document for arterial line insertion. Ischaemic limbs are secondary to arterial line insertion and a major safety issue. Guidance regarding insertion, placement, monitoring and action if ischaemic changes occur are also needed.	No change to document required. Arterial line insertion issues lie outside the scope of this document.

Dr. Galu's Comments	BAPM Response
<p>UVC tip position: T8-T9, but not below T10 and outside the heart silhouette</p> <ul style="list-style-type: none"> - this might be challenging for the practitioner, - a source of debates within the team, - might trigger an elective removal of a otherwise functional catheter, therefore no patient benefit and loss of time/money 	<p>Disagree. No change to document required.</p> <p>The focus of this document is to minimise risk and improve safety around CVCs. Lower lying catheters appear overwhelmingly to be associated with an increased risk of complications, but it is up to individual teams to balance risk and benefit and record this thought process. Included is a caveat that these lower lines could be used in the short-term, but there should be documentation to justify the rationale for this. If the catheter is appropriately assessed as being correctly positioned by another modality, this can then be recorded as justification for using the catheter.</p>
<p>I welcome the 2 person technique:</p> <ul style="list-style-type: none"> - ideal learning through practice for the trainees; - in my opinion the only way to ensure good practice through: teaching the correct skills, practicing with support, safe for the patient (time and infection control management) - the document suggest a third person as observer: unfortunately might be impractical in the busy neonatal units. Could the assistant be the observer also? 	<p>No change to document required.</p> <p>Yes, the assistant could also be the observer.</p>
<p>The umbilical catheter fixation technique:</p> <ul style="list-style-type: none"> - might not be very safe: the catheter position depends only on the tape. Often the tape is exposed to moist: incubator humidification, blood, moist stump, urine, leak from the catheter etc I think the suture should be used as in standard surgical catheters and the tape added as an extra safety. This is very important for neonatal transfers also. 	<p>No change to document required.</p> <p>This method of fixation is promoted by the UK resuscitation Council but is used in this document as a single example only.</p>
<p>the variability in practice regarding the PICC lines is often due to:</p> <ul style="list-style-type: none"> - difficulties in vascular access - various insertion points - various catheter lengths - challenges during the final dressing - patient age, weight and morbidities etc <p>It might be useful to have a section dedicated to the pitfalls of this procedure and how to safely overcome them.</p>	<p>No change to document required.</p> <p>Further, more detailed, guidance in this regard is outside the scope of this document but would reasonably be considered part of a specific CVC insertion training package.</p>

Dr. Gibson's Comments	BAPM Response
Overall a very clear and concise document.	Thank you.
<p>Document does not address the issues of determining line tip position beyond "obtaining an X ray for confirmation." There are many well documented cases of extravasation and tamponade involving misrecognition of tip position on plain X ray. While no method is 100% fool proof, consideration needs to be made of the use of iv contrast when obtaining X rays, in particular when imaging small 1 Fr lines, or even using ultrasound when line tip remains unclear. Following a case of fatal tamponade from a 1Fr PICC line whose tip was in the right ventricle, but formally reported on plain X ray as lying outside the heart, we have had a policy of X raying all lines with contrast.</p>	<p>With regards to confirming line position, the document aims to minimise the chances of catheter complications on the basis of a literature review and consensus opinion. We did discuss the use of contrast and other modalities to confirm catheter position, but given the variation in catheters that are used (wired versus non-) and controversial issues including the timing of contrast and method of administration, and the lack of RCT evidence to show that routine contrast use decreases morbidity, we felt that we could not advocate its use in every situation. We agree that no method is 100% fool proof and even with routine contrast use malposition can still sometimes go unrecognised, and a catheter tip location can still sometimes be unclear. We have documented situations that should be avoided to minimise the chances of catheter malposition, as well as recommendations for "signing off" catheters as safe to use. Where doubt arises it has to be up to individual units to use the skills and investigations available to them to inform a clinical judgement as to the safety of the catheter.</p>

Dr. Nicholl's Comments	BAPM Response
<p>“All central catheters should allow free aspiration of blood in their final position, and this aspiration should be documented. (*)” don't think this is practical with smaller PICC lines</p>	<p>Disagree. Though it is not possible to aspirate blood from 1Fr lines, it is possible to see flow of blood within the catheter itself if gentle negative pressure is applied to the line. This is possible even with wired lines.</p>
<p>“Ascending lumbar vein (ALV) malposition is a relatively common complication of lower-limb placed PICCs but may often go unrecognised [14].” Only way to recognise is by using contrast which is rarely done these days</p>	<p>Disagree. While routine use of contrast is probably the most reliable way to identify this specific malposition, it is not the only way because in some cases the features may be suspected on a plain film alone by those who are familiar with the specific signs of this complication. Also, others have recently shown that use of a horizontal beam technique can also assist detection of ALV malposition [Berger TM et al., Arch Dis Child Fetal Neonatal Ed 2016;101:89]. The document has been amended to cover these points.</p>
<p>Agree need for UVC should be reviewed daily. However seems to be an urban myth (in some units) that UVC should be replaced asap with PICC line and that this is somehow “better”. It quite safe to leave UVC in situ for couple weeks. If still worried USS can detect thrombus quite easily:</p> <p>“A Randomized Trial Comparing Long and Short Term Use of Umbilical Venous Catheters in Premature Infants” Meggan Butler-O'Hara, RN, MSN□, Carol J. Buzzard, MD□, Linda Reubens, RN□, Michael P. McDermott, PhD†, William DiGrazio, BS‡, Carl T. D'Angio, MD□ □Strong Children's Research Center, †Department of Biostatistics and Computational Biology, and ‡ General Clinical Research Center, University of Rochester School of Medicine and Dentistry, Rochester, NY</p>	<p>Agree. No change to document required. There is conflicting evidence about optimal dwell times for CVCs. The document is not aiming to provide definitive guidance in this regard.</p>

Dr. Oddie's Comments	BAPM Response
<p>Reference 13 - Does not show what it is purported to show – ie that “abdominal extravasation are further reduced by avoiding low-lying umbilical venous catheters [13],”. I have looked at the reference. What does the guidance mean – “further reduced”? reduced compared to what?</p>	<p>Agree. Reference 13 has been replaced. Although there is no trial evidence from the literature to confirm avoidance of a low-lying UVC will reduce extravasation, there are 20 case reports including a total of 38 cases of hepatic injury and ascites where the UVC was in a low position at the time of extravasation.</p>
<p>Positioning hints - I think these are confusing – no very clear language describes a confident test that non neonatal specialists can use to be confident that UVC tips are in the IVC. Advice on avoiding the liver, and cardiac silhouette is given, for understandable reasons.</p> <p>I am unconvinced that sufficient evidence exists to support the mandating of a further XR after repositioning – if this is done carefully based on PACS images measured with callipers, I think that no repeat XR is always needed.</p>	<p>Disagree. No change to document required. The (unanimous) consensus view of the working group was that a repeat x-ray was required after repositioning. The statement in the document is based on a literature review, personal experience and reports from Coroners' Inquests.</p>
<p>I think the statement “Bundling of best practices has been shown to result in better outcomes” needs to be evidenced. I am not at all sure this is actually true, but at the very least evidence to this effect should be presented in the form of a reference.</p> <p>If this was true for central lines, it would be easier to make QI in CVC practice than it has in fact proved, to date.</p>	<p>Disagree. No change to document required. The framework already cites supporting references, including the cited review of Smulders et al. which found two studies in neonates that demonstrated a reduction in the central line-associated bloodstream infection rates after implementation of central line bundles. The working group's consensus view was that there is convincing evidence from adult studies of the effectiveness of bundles of best practice. There is also a growing literature of neonatal studies that shows improved outcomes with implementation of care bundles specifically aimed at central venous catheter care in neonates [see Sinha AK, et al. Prevention of Late Onset Sepsis and Central Line Associated Blood Stream Infection in Preterm Infants. <i>Pediatr Infect Dis J.</i> 2015 ePub Nov 30, and the other references this paper cites]</p>
<p>I am hesitant to agree that the recommendations on training will do the babies and professionals more good than harm. It would be excellent if BAPM were able to recommend an easily deliverable package of training on (in particular) UVC insertion.</p> <p>UVCs need to be inserted at times in all paediatric units, including the very smallest ones. Quite specifically, why does BAPM feel that all units where UVC insertion is carried out should own their own “robust” training package. Is this really deliverable? If deliverable training packages can be developed, that are robust, then why must training be delivered in every small neonatal unit in the land?</p>	<p>Disagree. The purpose of this framework is specifically to improve practice and thereby minimise risk to babies. Provided effective training and assessment systems are put into place to improve practice, patient safety will be enhanced.</p> <p>Agree. The document will be amended to acknowledge the role of networks in this regard.</p>

Dr. Power's Comments	BAPM Response
<p>'10. A UVC tip should ideally be sited at T8-T9 (assuming this lies outside the cardiac silhouette). A UVC tip sited below T10 carries a significantly higher risk of extravasation. It may be necessary to use these catheters in the short term, but they should be replaced at the earliest opportunity.'</p> <p>I feel that this (most important) paragraph in the document should read: 'A UVC tip sited at T10 or below carries a significantly...' We have seen a case of peritoneal extravasation this year in which the UVC tip was straight and maintained a position at mid-T10 vertebral body.</p>	<p>Agree. The document has been amended to read 'at or below T10'.</p>
<p>I also think the group should consider mentioning the issue of one lumen of the Vygon double-lumen UVC opening as a side-eye about 0.5cm from the tip. This needs to be considered when reviewing X-rays. We have just made it mandatory for TPN to be delivered only down the distal lumen in a double-lumen catheter. With the Vygon line, the distal hub is green, therefore our message is GREEN=GO for TPN. I have asked Vygon to consider introducing double-lumen UVCs whose lumens both open at the catheter tip. Apparently they are marketed in the US.</p>	<p>No change to document is required. Information about specific catheter-types and use of different infusions with various lumens lies outside the scope of this document. Units should liaise with line manufacturers and comply with their guidance in relation to specific catheters.</p>

Dr. Sleight's Comments	BAPM Response
<p>“UVC should not be positioned within cardiac border” – as the catheter diameter is much greater than with a PICC the potential for a “boring effect” leading to damage to pericardium is surely much lower. Surgical (broviac) lines are placed within RA. Completely agree about the need to have PICCs outside the heart</p>	<p>Disagree. No change to document is required. The unanimous view of the working group was that the tip of UVCs and PICCs should not be positioned within the heart.</p> <p>One of the four cases of pericardial effusion and cardiac tamponade the DH report from Greater Manchester was a case of a baby where the UVC tip was positioned in the heart. The catheter tip itself was found in the pericardium at post-mortem.</p>
<p>Double –gloving – mandating this is tricky – some of us have small hands and would find this difficult. Why not suggest double gloving OR replacing gloves at set time ? My hands would have got so sweaty under two sets that I'd have less manual dexterity!</p>	<p>No change to document is required. The checklist contained in the document is given as one example only.</p>
<p>Should we really be using 2% chlorhexidene on preemie skin??</p>	<p>No change to document is required. The checklist contained in the document is given as one example only.</p>

BAPS Comments	BAPM Response
<p>I do have problems with this recommendation about line position. Although most of our lines are PICC lines put in by the neonatal team and the tip is never in the atrium, we insist that surgically placed internal jugular lines MUST have the tip in the RA. This is because, particularly in small preterm infants, the distance between the venotomy and the RA is so short even slight movement will result in the line flipping out of the vein. This has happened several times with extravasation and the need for surgical revision, made more hazardous because of the extravasated PN. I think the document should reflect this issue and leave some leeway with regard to internal jugular lines via a risk assessment (the same issues have occurred with percutaneous double/triple lumen lines inserted by our PICU team when other access has failed and a surgical line would seem to be over the top as access is only anticipated for few days).</p>	<p>Agree. Document amended to recognise the fact that surgically-inserted, tunnelled, neck lines should be considered separately and lie outside this guidance. However, practice surrounding other lines (e.g. PICCs) inserted by surgeons using percutaneous or cut-down methods should be consistent with this recommendations in this document.</p>
<p>The document seems well thought through and has been written in response to a real problem. My only comment would be that central venous lines move with neck movements. Particularly in babies I have seen same line inside heart and in SVC according to baby's neck position. Suspect a lot of correctly placed lines will be subject to unnecessary revision if position is too prescriptive.</p>	<p>See above.</p>
<p>I am not sure surgeons follow the same rules - e.g. a gastroschisis with a PICC line would, in our institution, be left in the RA rather than SVC which, if true for all, means it must state that this is for neonatologists and their co-workers.</p>	<p>See above.</p>

Dr. Tinnion's Comments	BAPM Response
<p>While the document places appropriate emphasis on the tip position, and comments on 'short term use of low lying catheters' I would like to see more emphasis on aspirating all centrally placed lines before committing to use as this can be done from the smallest PICC to the biggest UVC and is proof of principle that the catheter lies in a blood vessel. I don't think lines which cannot be aspirated should really be used, and this could perhaps be emphasised more in the document if the working group are in agreement.</p>	<p>Agree. Though it is not possible to aspirate blood from 1Fr lines, it is possible to see flow of blood within the catheter itself if gentle negative pressure is applied to the line. This is possible even with wired lines.</p>
<p>With reference to Vygon field safety notice (FSN:1504/33989/00) dated 11/08/2015 and specifically because the BAPM draft document covers PICC insertion as well as UVC, I would ask the working group to consider the revising the suggestion for using steri-strips as a explicitly mentioned mode of fixation and use of 70% isopropyl alcohol for cleaning. Vygon has specifically referenced both of these techniques as potential causes for failure of integrity of PICC catheters (leading to rupture) and thus they could be considered a risk for <i>increasing</i> the incidence of extravasation and therefore best avoided in the context of a document wishing to reduce extravasation.</p>	<p>Disagree. No change to document is required. The safety notice highlights potential factors that might be implicated in catheter fracture and/or leakage. It is important to remember good practice around the use of antiseptics (e.g. allowing the alcohol solution to dry properly). Steri-strips are widely used and there is no convincing evidence that their use is causally associated with catheter-related complications.</p>