

## MEDICINE PROGRAM PROCEDURE

**CATEGORY:** System-Level Clinical

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**SUBJECT:** **CENTRAL VENOUS ACCESS DEVICE –  
BLOOD SAMPLING THROUGH A CONNECTOR**

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<b>Approval:</b> Julie Trpkovski	<b>Date:</b>

### PURPOSE

To ensure that blood sampling through a central venous access devices (CVAD) follows established best practice guidelines.

### PROCEDURE

#### Special Instructions

- A certified nurse may draw blood specimens from a CVAD through a needleless connector.
- Blood specimens are best collected by venipuncture. When venipuncture is not feasible, CVAD may be used on the order of a physician.
- Positive identification of the patient using two client identifiers is the most important step in specimen collection. Refer to the corporate *Patient Identification* standard.
- Stop all infusions for 1 min prior to blood sampling unless contraindicated (notify laboratory and most responsible physician (MRP) if infusion was not stopped prior to blood sampling).
- Withdrawing a discard volume can help reduce the incidence of fluid/medication contamination of specimens. Discard at least 6 mLs of blood for adults and 3mLs for paediatric patients.
- Specimens intended for coagulation testing should not be collected from the same CVAD lumen in which anticoagulant medications (Heparin) are being infused.
- Specimens intended for drug levels should not be collected from the same catheter lumen being used for infusion of the drug.
- For triple-lumen non-tunnelled catheters the proximal and distal lumens are the lumens of choice for blood withdrawal.

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- If unable to withdraw blood, flush the catheter with 1 mL sterile NS (using a 10 mL syringe). Initially attempt blood withdrawal using a 3-5 mL syringe, then continue using a 10 mL syringe(s).
  - If using a multi-lumen CVAD, use the largest lumen for the blood sampling.
  - When using a syringe for blood withdrawal, use a blood transfer device to transfer the blood from the syringe to the vials/bottles.
  - Use a CVAD for drawing blood cultures only when the catheter is suspected of being the source of infection. Lab must draw a set of blood cultures from a peripheral vein either simultaneously with the CVAD sample or close to the time of CVAD draw in order to confirm the bloodstream infection (BSI) diagnosis and rule out a catheter line associated bloodstream infection (CLABSI).
  - When drawing blood cultures, draw blood cultures before all other samples. NOTE: a sample must be obtained from one lumen in addition to a peripheral sample.
  - Do not flush (if possible) and do not discard prior to blood culture sample. Do not draw blood cultures through existing connector – remove and replace connector before blood sampling.

### Method

**See Appendix A** for Standard Blood Sampling

**See Appendix B** for Blood Specimen Withdrawal (mixing, tube selection and order of blood withdrawal)

**See Appendix C** for Blood Culture Sampling

## EDUCATION AND TRAINING

### Definitions

1. Ice Slurry: A mixture of ice and water.

### References and Related Documents

Canadian Vascular Access Association (2019). *Canadian Vascular Access and Infusion Therapy Guidelines*. Pembroke, ON: Pappin Communications

CLSI Procedure for the Collection of Diagnostic Blood Venous Blood Specimens. 7th Edition; Approved Standard. CLSI GP41, April 2017.

Journal of Intravenous Nurses (INS), Infusion Therapy Standards of Practice, Vol. 44. No. 1S, January/February 2021.

Registered Nurses' Association of Ontario, Vascular Access Second Edition, RNAO Nursing Best Practice Guidelines, June 2021.

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## APPENDIX A

### Standard Blood Sampling

#### Equipment (increase according to additional lumens)



- Vacutainer luer-lok access device
- Required vacutainer collection vials/tubes for blood specimen(s) (see Appendix B)
- Mediatech label for vacutainer collection vials/tubes
- 2 x plastic waste discard vial/tube (each tube contains 3 mL) or
- 10 mL empty syringe for discard (if no discard vial/tube available)
- 3 x 10 mL sterile Normal Saline (NS) in a prefilled syringe
- Clean gloves
- Antiseptic swabs (alcohol or chlorhexidine)



- If drawing via syringe method use a blood transfer device (preferred) or (if already drawing blood cultures)
- 10 mL empty syringe for syringe draw method

#### Method

1. Wash hands and don clean gloves.
2. Using the patient's armband, identify the patient with two client identifiers (full name and date of birth).
3. Turn off all infusing IV fluids, medications or blood products associated with the CVAD being used for collection for 1 minute prior to specimen collection.
4. Unclamp the catheter (if clamp present).
5. Vigorously cleanse the diaphragm and sides of the connector with an antiseptic swab for at least 15-30 seconds and let dry for 30 seconds.
6. Flush the largest lumen with 5-10 mL NS to use for blood sampling.
7. Vigorously cleanse the diaphragm and sides of connector with an antiseptic swab for at least 15-30 seconds and let dry for 30 seconds.
8. Use either the plastic waste discard vial/tube or empty syringe for discard.
  - If using the syringe method, attach the empty syringe to the connector, pull back on the plunger and wait 2-3 seconds in order to give valves (if available) the ability to close. Collect the discard volume 6 mLs, detach the syringe, vigorously scrub the hub for at least 15-30 seconds and let dry for 30 seconds.
  - If using the discard vial/tube, attach the luer-lok access device to the cleaned connector and insert the discard tubes and discard a 6 mLs of blood.

#### Luer-lok access device for blood samples:

1. Once luer-lok access device is attached to clean connector, insert the vacutainer collection vials/tubes into the luer-lok access device and collect the blood samples. Ensure all tubes are filled adequately for testing, mix and sent to the Lab as soon as possible (may send via the pneumatic tube system) **(See appendix B)**.
2. Once all samples have been collected, remove the luer-lok access device from end of connector by turning it clockwise (once).
3. Vigorously cleanse the diaphragm and sides of the connector with an antiseptic swab for at least 15-30 seconds and let dry for 30 seconds.

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4. Connect 1<sup>st</sup> NS syringe and flush with 10 mL using the push/pause method. Vigorously cleanse the diaphragm and sides of the connector for at least 15-30 seconds between each syringe change. Repeat with 2<sup>nd</sup> NS prefilled syringe using a push/pause turbulent flush with a positive disconnect, giving a total 20 mL flush (or more until connector is clear of blood)

**Syringe method for blood samples:**

**NOTE:** Do not apply pressure to syringe plunger in order to prevent hemolysis of sample.

1. Attached empty 10 mL syringe to cleansed connector and withdraw amount of blood required for samples.
2. Attach blood filled syringe to end of blood transfer device - do not apply pressure to plunger when using syringe transfer method (to avoid hemolysis). Insert 1<sup>st</sup> vacutainer vial/tube to collect sample. Once tube filled adequately for testing, remove from blood transfer device and mix accordingly (see appendix B). Insert remaining vacutainer vials/tubes as required according to order of blood draw (may need to repeat steps 1-2 depending on amount of blood required for samples).
3. Once all samples have been collected, vigorously cleanse the diaphragm and sides of the connector with an antiseptic swab for at least 15-30 seconds and let dry for 30 seconds.
4. Connect 1<sup>st</sup> NS syringe and flush with 10 mLs using the push/pause method. Vigorously cleanse diaphragm and sides of connector for at least 15-30 seconds between syringe changes and repeat with 2<sup>nd</sup> 10 mL NS prefilled syringe using the push/pause turbulent flush method with a positive disconnect, giving a total of 20 mL flush (or more until connector is clear of blood).

**Labelling Tubes after Collection:**

1. Clearly write the date, exact collection time and Meditech mnemonic (legible) in the appropriate section of the label.
2. Affix the label on the tube so that the vacutainer lid is on the left of the upright label. The label must be straight (if the label is not straight or affixed upside down, the instrument cannot read the barcode and testing will not be performed)
3. Ensure that there is a window to see the blood in the tube.



Place the labelled blood samples in a lab specimen bag, then place the bag of samples in a second lab specimen bag, all samples sent via pneumatic tube must be double bagged. Place the extra labels in the bag pocket, then transport the specimens to the Lab as soon as possible via the pneumatic tube system.

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## APPENDIX B

Standard Blood Specimen Withdrawal

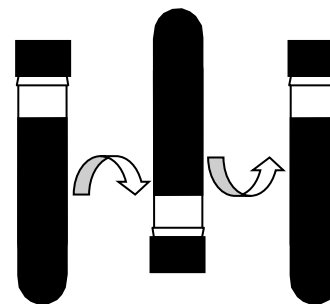
Most tubes contain an additive to be mixed with the blood sample to ensure the blood does not clot. If the specimen is not mixed properly, tubes with anticoagulants will clot and the specimen will often need to be redrawn.

**MIXING**

**How:** Holding the tube upright, gently invert 180° and back. Repeat movement as indicated.

**When:** Immediately after drawing.

**Improperly mixed tubes may result in a clotted specimen and will require recollection.**



= 1 Inversion

Vacutainer	Volume	Mix by Inverting	Colour
Plastic Waste	3 mL	Not required	Clear
Citrate	4.5 mL	3-4 times	Light Blue
Plastic Clot Activated	6 mL	5 times	Red
SST (Serum Separator)	3.5 mL	8-10 times	Yellow
PST (Plasma Separator)	3 mL	8-10 times	Light Green
Heparin	4 mL	8-10 times	Dark Green
EDTA	4 mL	8-10 times	Lavender
EDTA - BBK	10 mL	8-10 times	Lavender

**Waste Volumes**

Catheter Type	WITHOUT Coagulation Tests	WITH Coagulation Tests
Arterial	3 mL (1 waste tube)	5 mL (2 waste tubes)
Central	6 mL adults (2 waste tubes) and 3mLs paediatrics (1 waste tube)	6 mL (2 waste tubes) and 3mLs paediatrics (1 waste tube)
Vamp	5 mL (2 waste tubes)	5 mL (2 waste tubes)
Pulmonary Artery	7 mL (3 waste tubes)	7 mL (3 waste tubes)

**Stability Guidelines**

Test	Maximum Time Before Analysis	Instructions
Ammonia	20 minutes	Immediately place on ice slurry.
Blood Gas & ICA	30 minutes	Immediately place on ice slurry.
Folate & Folate RBC	2 hours	Protect from light.
INR & APTT	4 hours	
Lactate	15 minutes	Immediately place on ice slurry. Deliver immediately.
Potassium	1 hour	Separate immediately.
Vancomycin	2 hours	

**If name of specimen is not listed below, contact Laboratory for correct tube required.**

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1 Full PST	
Albumin	Iron
Alk Phos	LDH
ALT	LH
Amylase	Lipase
AST	Lipid
Bilirubin Conjugated	Magnesium
Bilirubin Unconjugated	Phosphorum
Bilirubin Total	Potassium
Calcium	Prolactin
Cholesterol	PSA
CK	Sodium
CO2	Testosterone
Cortisol	Triglycerides
Creatinine	Troponin I
Ethanol	TSH
Ferritin	PTH
HDL	
1 Full PST	
Renal Panel	Dialysis Panel
Chem Profile	Liver Profile

1 Full PST	
CA 125	CEA
HCGQ	

1 Full PST On Ice Slurry	
Lactate	Ammonia

Red Top Tube (serum.7, Clot.37)	
Digoxin	Lithium
Vancomycin	Phenobarbital

1 Full Citrate	
<b>*Check coagulation waste volume chart*</b>	
INR, PTT, Dimer	Coagulation Factors

1 EDTA for <u>Each</u> Test	
CBC/CBC Diff/Retic	Cyclosporin
FK506	HBA1c
Sed Rate (ESR)	RBC Folate

1 Full SST	
HIV	Ketone
ANCA	Serology - CMV
HBsAG	Hepatitis Screen
Anti-HBS	Anti-HAV IgM
Anti-HBC IgM	Hepatitis C
Lithium	CRP

Multiple SST	
Protein Electrophoresis x 2	
Immunoelectrophoresis/Para protein x 3	
Cytotoxic Antibodies x 3	

1 EDTA BBK (Large tube 10 mL)	
Transfusion Medicine Group and Screen	

Lithium Heparin Syringe On Ice Slurry	
Venous Blood Gas	Carbon Monoxide
Ionized Calcium	

Lithium Heparin Tube	
Acetaminophen	Salicylate
Carbamazepine	Tobramycin
Gentamycin	Valproic Acid

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## Order of blood withdrawal

Colour	Tube Name	
Clear		
Orange Blood Culture	BC	
Mint Green Blood Culture	BC	
Light Blue	CIT	
Red	SERUM.4 SERUM.7	
Yellow	SST SST.HIV SST.FREEZE	
Mint Green	PST PST.ICE	PST.ICE specimens are drawn on separate tube and sent on ice
Dark Green	HEPLI.ICE HEP.LI	HEPLI.ICE specimens are drawn on separate tube and sent on ice
Green Top Syringe	HEP.SYR1	Collect in separate syringe and send on ice
ABG SYRINGE (ON ICE SLURRY)		Patient demographic label used
Lavender	EDTA EDTA.2 EDTA.2WB EDTA.WB EDTA.ICE	EDTA.ICE specimens are drawn on separate tube and sent on ice
Lavender	EDTA.BBK10	
Dark Blue	TRA.EDTAP	



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## APPENDIX C

### Blood Culture Sampling

#### Equipment

- Clean gloves
- Chlorhexidine wipes (for cleansing CVAD and changing connector)
- 70% Alcohol wipes (for bottles)
- Needleless connector
- 2 x 10 mL syringe
- Anaerobic (orange top) and Aerobic (green top) culture bottles
- Mediatech blood culture labels
- Blood Transfer Device (btd)
- Increase culture bottles and blood transfer device if more than 1 lumen is requiring blood culture samples

#### Special Instructions

- Draw blood cultures before all other samples and prior to antibiotics being administered if possible.
- Do not discard the initial volume of blood or flush the line with saline prior to sampling.
- Use a CVAD for drawing blood cultures only when the catheter is suspected of being the source of infection. Lab must draw a set of blood cultures from a peripheral vein either simultaneously with the CVAD sample or close to the time of CVAD draw in order to confirm the bloodstream infection (BSI) diagnosis.
- Change needleless connector before obtaining blood sample.
- For paediatric patients, contact the Lab for weight-based blood volumes.
  - Less than 13 kg: Use a **yellow top paediatric Aerobic bottle**. There are no Anaerobic bottles for paediatric patients in this weight range.
  - 13-36 kg: Use a **green top adult Aerobic bottle**. There are no anaerobic bottles for paediatric patients in this weight range.

#### Method

1. Wash hands and don clean gloves.
2. Change connector on CVAD lumen to be used for blood cultures.
3. Remove the caps from the blood culture bottles. Cleanse the tops of all blood culture bottles with a 70% alcohol pad and let dry completely.
4. Draw up 10 mL of blood and attach blood filled syringe to end the blood transfer device. Remove the



inner piece of the btd and insert the blood transfer device into the Anaerobic (orange) bottle to transfer the blood up to the fill mark line (see fill to mark on next page).

5. Remove blood transfer device and invert the bottle 4-5 times to mix properly.
6. Using the second syringe, draw up 10 mL of blood and attach blood filled syringe to end of btd and insert blood transfer device into the Aerobic (green) bottle using the blood transfer device.
7. Remove the blood transfer device and Invert the bottle 4-5 times to mix properly.





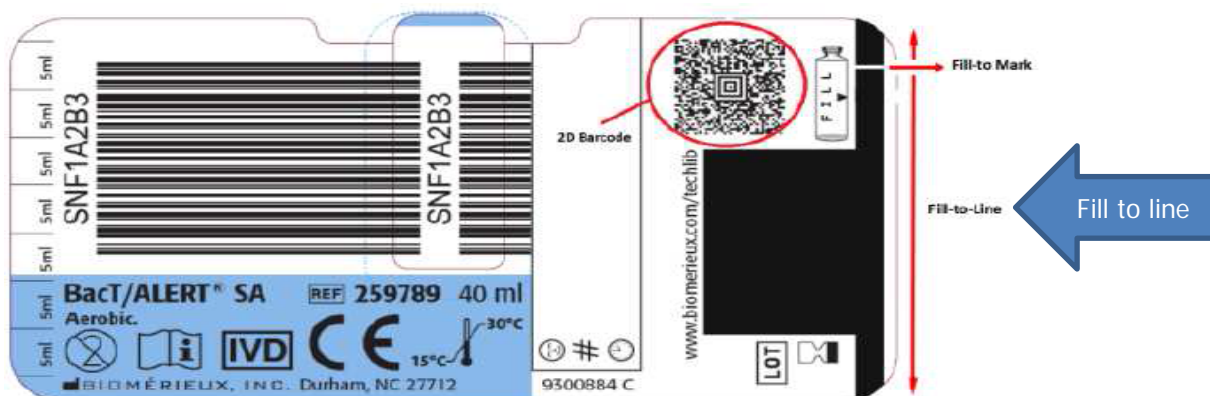
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8. Once all samples have been collected, vigorously cleanse the diaphragm and sides of the connector with an antiseptic swab for at least 15-30 seconds and let dry for 30 seconds.
9. Connect 1<sup>st</sup> NS syringe and flush with 10 mLs using the push/pause method. Vigorously cleanse diaphragm and sides of connector for at least 15-30 seconds between syringe changes and repeat with 2<sup>nd</sup> NS prefilled syringe using the push/pause turbulent flush method with a positive disconnect, giving a total of 20 mL flush (or more until connector is clear of blood).

### Fill to Feature

All blood culture bottles have increments of 5 mL on the side or a “fill to mark” feature. If the bottle is not filled to this line, the test will be run but there will be a disclaimer on the results indicating there is potential for a false negative result.



Place the labelled blood samples in a lab specimen bag, then place the bag of samples in a second lab specimen bag, all samples sent via pneumatic tube must be double bagged. Place the extra labels in the bag pocket, then transport the specimens to the Lab as soon as possible via the pneumatic tube system.