CONTRAST ADMINISTRATION VIA POWER INJECTOR: MEDICAL IMAGING

DOCUMENT TYPE: PROCEDURE

Site Applicability

Applicable to all areas within the Medical Imaging (MI) department at BCCH.

Practice Level/Competencies

Administering contrast media and connecting to a power injector requires contrast administration competencies, necessary knowledge, skill, and judgment and is considered a **specialized skill. ONLY** Registered Nurses and Radiologists working in MI will connect the power injector to a central venous line (CVL) approved for use with a power injector. MI Radiologists, MI fellows/residents, and/or MI technologists will administer the contrast media via power injector.

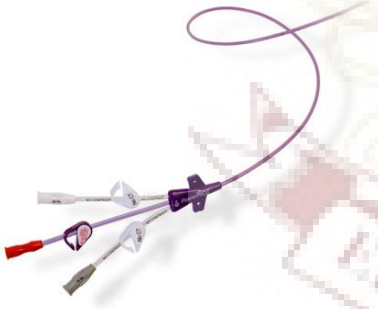
Required Competencies:

- Completed the MI Contrast Administration competencies
- Reviewed the Medical Imaging Contrast policies
- Attended the Vascular Access workshop – *nursing only*
- Completed the CVL validation tool at the bedside with the appropriate clinical support person (i.e., clinical nurse educator, clinical resource nurse, or competent RN) – *nursing only*

Policy Statement(s)

This document applies to the power injection systems used in the Medical Imaging department only. Please refer to the manufacturers' product manuals for information on operation of specific injection systems.

Excluding patients from BCWH, a physician **MUST** be present in the department whenever contrast is injected either by hand or by power injector.



Power injectors should **ONLY** be used with the following vascular access devices:

- Power PICCs – ensure device is approved by the manufacturer for use with a power injector
- Power Lines
- Power Ports
- Diffusics peripheral intravenous (PIV) catheter
- Minimum 22G PIV catheter or a larger bore (20G or 18G)

- Perform both pre- and post- topogram to verify tip placement
- Maximum pressure of power injector is **300 PSI**

POWER DEVICES	SMALL VEIN POWER PICC
Maximum recommended infusion rate is: **2.5 mL/s*** *unless a Radiologist has been consulted	Maximum recommended infusion rate is: • **1 mL/s** for 3 Fr catheter • **2.5 mL/s** for 4 Fr catheter

Equipment & Supplies

- Power injector
- MEDRAD Sterile Disposable Syringe Kit
- An approved power injectable CVL such as a Power PICC, or Power Port and Power Loc Safety Infusion Set Family, or Power Line **Refer to Appendix A: Product Specifications**
- PIV or a larger bore (20G or 18G) or Diffusics PIV
- Clean gloves
- Sterile saline syringes
- 2 x Chlorhexidine gluconate/alcohol swabs
- Contrast media
- 50ml Normal Saline Bag
- Syringe Warmers

Procedure

Patient Preparation	
STEPS	*RATIONALE*
1. **ENSURE** emergency equipment is readily available.	*Immediate intervention can be provided during an emergency event. In the case of an adverse event, access to emergency equipment is available.*
2. **IDENTIFY** patient and **EXPLAIN** procedure to patient and/or parent.	*Failure to correctly identify patients prior to procedures may result in errors.* *Reduces child and family's anxiety. Evaluates and reinforces understanding of previously taught information and confirms consent process.*
3. **WEIGH** patient.	*Patient weight (in kilograms) is necessary to calculate contrast media dose.*
4. **WASH** hands as per Hand Hygiene standard in Infection Control Manual. If patient has an established PIV, MI technologist or RN will **CHECK** for patency and function. If the patient does not have intravenous access, a PIV will be requested. Refer to document Initiating a Peripheral Intravenous (PIV)	*Proper hand hygiene is the first step in decreasing in catheter-related blood stream infections (CR-BSI).* *Minimizes the risk of contrast media extravasation or air embolism.* *Consider the type of imaging/body part being imaged when selecting PIV site*
5. If using an approved power injectable central venous line i.e.) Power PICC, RN will **CHECK** for device patency. **REFER** to the marking on the hub of the catheter to determine the maximum rate of injection and to choose the correct lumen for power	*Ensures the proper functioning of the injectable device. Central venous line patency is defined as brisk blood return from the catheter and ease of flushing.*

injection. PICC lines that are power injectable are clearly marked with "power injectable". Be **AWARE** of the external length of catheter. See insertion record or central venous line flowsheet. Refer to guideline Uncuffed Peripherally Inserted Central Catheter (PICC) Care Guidelines If abnormal resistance or discomfort is encountered, alternative venous access should be established.	 *Monitors for line migration.* *Minimizes the risk of contrast media extravasation or air embolism.*
Injector Preparation	
STEPS	*RATIONALE*
6. **REFER** to manufacturer's product manual for information on operation of specific injection system being used.	*Manuals must be readily available in the control room* *See Appendix A: Production Specifications*
7. **RETRIEVE** contrast from warmer in CT only.	*Contrast media used in CTshould be warmed to body temperature prior to power injection. Failure to warm contrast media to body temperature prior to power injection may result in catheter failure.*
8. **CHECK** the contrast media expiry date.	
9. **CLEAN** the top of the contrast vial with alcohol swab and using aseptic technique.	
10. **LOAD** syringe and **PREPARE** power injector system as per manufacturer instructions.	*Maintain aseptic technique during the loading and prime of power injector.* *Careful preparation of the power injector is essential to minimize the risk of contrast medium extravasation or air embolism.*
11. Contrast dose to be determined by modality technologist as per protocol, unless otherwise specified by the Radiologist.	
Contrast Administration	
STEPS	*RATIONALE*
12. MI Radiologist will review topogram prior to contrast administration in CT only.	*To assess tip placement.*
13. **CHECK** for 9 RIGHTS: Right patient, right indication, right drug, right route, right time, right dose, right documentation, right action, right form.	*Ensures safe and quality patient care at all times.*

14. **SET** contrast and saline flowrate as per protocol and in consultation with Radiologist.	*Refer to CT Protocol Binder located in CT control room*
15. If **CONNECTING** to a PIV: MI technologist or contrast administration competent RN, will **CONNECT** to the power injector. If **CONNECTING** to a CVL: i.e.) Power PICC, Radiologist or contrast administration competent RN will **CONNECT** to the power injector.	
16. **CLEAN** the injection port with alcohol swab and using aseptic technique, **CONNECT** the power injector tubing. **SCRUB** the needleless connector (cap) for 30 seconds with Chlorhexidine 2% in 70% alcohol swab and allow to dry for one minute. **NOTE**: If CVL has had a Swabcap™ on the needleless connector for >5 minutes you may remove the Swabcap™ and proceed to the next step without cleaning, if Swabcap™ has not been compromised.	*Routine infection control practices; reduces transmission of microorganisms.*
17. **VISUALIZE** the site during injection. **ASSESS** for pain, redness, swelling, bruising.	*Ensures patency of the injection site. If an interstitial IV or extravasation occurs, the injection should be aborted immediately and the site assessed.*
18. **MONITOR** patient for discomfort or signs and symptoms of contrast reaction. Refer to document Adverse Reaction to Intravenous Contrast Media	*Ensures proper and immediate intervention will be provided if a reaction occurs.*
19. **DISCONNECT** the power injector extension tubing from the IV upon completion of scan, flush the IV with normal saline. Saline lock IV or RN will re-establish IV infusion. If using an approved CVL i.e.) Power PICC, RN will either **RE-ESTABLISH** infusion or heparin lock the device as per document. Refer to document Heparin Locking Central Venous Lines (CVL)	

20. **DOCUMENT** procedure on BCCH Radiology Requisition or Dose Report and on patient's chart if inpatient. **PEEL** off lot number sticker from contrast vial and **PLACE** on the requisition in CT only.	
21. MI technologist will perform a topogram post-contrast administration and images will be reviewed by Radiologist in CT only.	*To assess tip placement or migration*

Documentation

Contrast dose, type, site, and route of administration documented on:

- BCCH Radiology Requisition
- Dose Report which will be uploaded into PACS
- Document completed procedure in patient's chart
- Nurse's Notes

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Definitions

Power PICC: a peripherally inserted central catheter indicated for short or long-term peripheral access to the central venous system for intravenous therapy, power injection of contrast media, and allows for central venous pressure monitoring. It is designed to withstand the high pressures associated with injection of contrast medium for imaging studies by power injector.

Power Injector: syringes are inserted on the injector head and then the technologist fills a syringe with contrast media and the other with saline. Plungers push the contrast media out of the syringes into tubing attached to a patient's vascular system. It can be mounted on a floor pedestal or from an overhead mount. There is a computer "control unit" in the control room, where flow rates and volumes are programmed and the injection is started and stopped.

Aseptic no touch technique (ANTT)**:** a standardized technique that is used during clinical procedures to identify and prevent microbial contamination of aseptic key parts and key sites by ensuring that they are not touched either directly or indirectly. A 'key part' is the part of the equipment that must remain sterile and must only contact other key parts or key sites or it is the area on the patient such as a wound, or IV insertion site that must be protected from microorganisms. Aseptic key parts can only contact other aseptic key parts/sites. If it is necessary to touch key parts/sites, sterile gloves are to be worn to ensure asepsis is maintained.

Catheter Related-Blood Stream Infection (CR-BSI): presence of bacteremia originating from an intravenous catheter. It is one of the most frequent, lethal, and costly complications of central venous catheterization and also the most common cause of nosocomial bacteremia.

Appendix

- Appendix A: Product Specifications

Developed By

Medical Imaging – CNE, RN

Version History

DATE	DOCUMENT NUMBER and TITLE	ACTION TAKEN
01-March-2025	C-05-12-60210 Contrast Administration Via Power Injector: Medical Imaging	Approved at: BCCH Best Practice Committee

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Appendix A: Product Specifications

Central Venous Catheters			
POWER PICC	Catheter Size (Fr)	Gauge	Max Flow Rate (mL/s)
	3	18	5
	4	18	5
	4	19/21	5
	5	18/18	5
SMALL VEIN POWER PICC	Catheter Size (Fr)	Gauge	Max Flow Rate (mL/s)
	3	20	1
	4	19/21	2.5

Peripheral Intravenous Catheters			
BD INSYTE AUTOGUARD	Color Code	Gauge	Max Flow Rate (mL/s)
	Blue	22	3.7
	Pink	20	4.3
	Green	18	5.5
BD NEXIVA	Color Code	Gauge	Max Flow Rate (mL/s)
	Pink	20	5.5
	Blue	22	3
	Green	18	7
BD NEXIVA DIFFUSICS	Color Code	Gauge	Max Flow Rate (mL/s)
	Yellow	24	3
	Blue	22	6.5
	Pink	20	10
	Green	18	15