Injector Pump: Single Use Syringe Set-Up
Medrad Stellant, MRXperion or Spectris Solaris Injectors

Purpose

This procedure provides a step-by-step process for medical imaging staff to safely set-up the Medrad Stellant, MRXperion and Spectris Solaris power injector using single use syringes for patients undergoing contrast enhanced examinations.

Site Applicability

This procedure applies to all Medical Imaging departments within Lower Mainland Medical Imaging (LMMI) that use the Medrad Stellant, MRXperion or Spectris Solaris power injector to administer contrast media.

Practice Level

Profession	Skill
Medical Radiation Technologists (MRT) certified in Radiology Technology and/or Nuclear Medicine	With education and where the following core competencies and expectation of the role met: • Hand hygiene • Injector training and competency assessment • Delegation for contrast media administration. • Delegation for peripheral IV insertion

Need to Know

- Consistent with the infection control practices the reuse of these products is not approved.
- Only MRTs who have documented training and have been evaluated on their performance will be authorized as users of the injector system. See Competency Assessment: Injector Pump Single Use Syringe Set-Up.
- Cleaning and disinfecting the injector head is performed at the beginning of the shift, following disconnection/use for any patients on isolation precaution, and whenever the injector is visibly soiled or suspected of being contaminated by blood or body fluids. See Appendix I.
- Patient injury or death could result from air embolism. Expel all trapped air from the syringe, transfer set, and extension tubing.
- Patient injury or death could result from contamination of the injector set-up due to the transmission of nosocomial infections. Follow proper hand hygiene and aseptic technique during set-up and loading, connecting to patients, and disconnecting from patients.
- Once loading of the injector has commenced, it must be completed in its entirety. Incomplete loading of syringes left unattended with exposed luer lock connections must be assumed contaminated and discarded.

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- The safe practice of injector set-up and prevention of nosocomial infections is achieved with maximal attention to detail, appropriate hand hygiene, and careful aseptic technique that ensures the sterile connections of supplies are not contaminated during handling.
- Contrast media bottles will only be punctured once.
- The time and MRT's initials should be noted on the contrast syringe. The complete injector system including syringes and tubing must be disposed of within 4 hours after set-up.
- Authorized injector users will be in compliance with this standard at all times.
- Any noted malfunctioning of the system or failure to follow recommended procedures must be reported immediately to the site co-coordinator and/or modality supervisor.
- In the event any of the open luer lock ends is contaminated by incidental contact: discard contaminated products.

Exceptions

This protocol does not include power injectors from other vendors or Medrad injectors not listed.

Equipment and Supplies:

1. Sterile Syringe kit (e.g. Medrad® Stellant SSS-CTP-SPK 200 ml Sterile Disposable Syringe) or equivalent.
2. Iodinated or Gadolinium-based contrast media (select the most appropriate size to minimize waste)
3. Normal Saline 0.9% (select the most appropriate size to minimize waste)
4. 70% isopropyl alcohol swab
5. Gloves – non sterile
6. Indelible marker

Procedures

Single Head Injector

Single Head Injector Set-Up:

1. Visually inspect injector for blood or body fluid contamination. Clean injector as needed.
2. Perform hand hygiene.
3. Confirm the piston is fully retracted into the base of the injector. Adjust pistons manually as needed.
4. Open the injector syringe package and install syringe directly onto the injector base.
5. Allow the injector to automatically advance the piston to expel all air from the syringe.
6. Remove the luer lock cap from the syringe, ensuring sterility of the connections is maintained.
7. Remove the female luer cap from each the vented spike and connect to the end of the syringe, ensuring sterility of the connections is maintained.
8. Remove cap from top of contrast bottle. (Select the most appropriate contrast bottle size based on estimated volume of contrast needed for the patient)
9. Disinfect the contrast container membrane with a 70% isopropyl alcohol swab using a friction rub technique and allow to **completely** dry.

10. Remove cap from spike and insert fully into the centre of the stopper of the contrast bottle at a 90 degree angle (to prevent coring the rubber stopper).
11. Fill syringe with desired volume of contrast.
12. Remove the vented spike from the loaded contrast syringe.
13. Remove the female luer lock cap from the tubing set and attach to the contrast filled syringe, ensuring sterility of the connections is maintained.
14. With the injector head pointing up, expel any residual air bubbles from the syringe and prime the extension tubing line with contrast.

> ***WARNING – Residual Air:***
> *Do not apply blunt force using a hand or instrument to the syringe to free residual air bubbles. This action may damage the injector.*
> *Reverse the piston 3 – 5 mL, then gently rock the injector head on the pivot with the syringe pointing up to gather and accumulate the small bubbles.*

15. To ensure other authorized users on shift know the injector and tubing set is ready for use:
    a) Tip the injector head down
    b) Leave the tubing coiled with luer lock cap in place to protect from contamination.
    c) Activate the "Check for Air" button on the injector head (turns blue).
    d) Write the time (HH:MM) the set up was complete and the MRT initials on the syringe barrel using an indelible marker.
        Note: if injector set-up is completed in the presence of the patient for which the contrast is intended, authorized users are not required to write the time on the syringe barrel.
    e) Observe Fluidot™ Indicators on OEM syringes for the presence of contrast and saline.
        Note: Fluidot™ Indicators on the syringe barrels are elliptical in shape when syringe is filled with air. When the syringe is loaded with contrast or saline the Fluidot™ indicator will appear round.
16. Leave the male luer lock cap on the distal end of the coiled patient tubing until ready to connect to the patient for the contrast injection.
17. Dispose of any unused volume of contrast media from the bottle immediately after loading the injector. Empty plastic contrast media bottles may be recycled.
18. Clean and disinfect injector head using approved cleaning agent after each use.

Connecting Injector Tubing to Patient Using a Single Head Injector:

1. Perform hand hygiene.
2. Disinfect the needleless connector of the power compatible extension set connected to the patient's peripheral intravenous catheter (PIV) using 70% isopropyl alcohol swab.
3. Connect a 10ml pre-filled syringe with 0.9% sodium chloride to the needleless connector on the patients' PIV.

4. Flush the patients' PIV using the start-stop technique to assess for patency and ensure it is:
    a) free from complications,
    b) not pinched or clamped along the extension set,
    c) able to have free flow blood return upon aspiration,
    d) able to be flushed without resistance,
5. Remove the male luer lock cap from the distal end of the coiled patient tubing when ready to connect to the patient for the contrast injection.
6. Connect the distal end of the coiled tubing to the needleless connector on the patients' PIV.
7. Perform hand hygiene.

Disconnecting Injector Tubing from Patient Using a Single Head Injector:

1. Perform hand hygiene.
2. Disconnect the distal end of the coiled tubing from the patients' venous access device and let the patient connection hang down.
3. Perform hand hygiene
4. With the injector head pointing down, disconnect the used contrast syringe along with the tubing set and dispose of in an appropriate waste receptacle.
5. Clean and disinfect injector head using approved cleaning agent after each use.
6. Perform hand hygiene.

Dual Head Injector

Dual Head Injector (Medrad Stellant, MRXperion or Spectris Solaris) Setup:

1. Visually inspect injector for blood or body fluid contamination. Clean injector as needed.
2. Perform hand hygiene.
3. Confirm both pistons are fully retracted into base of the injector. Adjust pistons manually as needed.
4. Open the injector syringe package and install syringes directly onto their respective base.
5. Advance the injector pistons to expel all air from both syringes.
    Note: Medrad Stellant and MRXperion injectors - pistons advance automatically to expel air.
    Note: Medrad Spectris Solaris injector pistons must be manually advanced to expel the air.
6. Remove cap from top of contrast bottle. (Try to select the most appropriate contrast bottle size based on estimated volume of contrast needed for the patient)
7. Disinfect the contrast container membrane with a 70% isopropyl alcohol swab using a friction rub technique and allow to **completely** dry.
8. Remove cap from spike and insert fully into contrast bottle at a 90 degree angle (to prevent coring the rubber stopper) into the centre of the stopper.
9. Remove the luer lock cap from the contrast syringe ensuring the sterility of the connections is maintained.
10. Remove the female luer caps from each the vented spikes and connect to the end of the contrast and saline syringe, ensuring the sterility of the connections is maintained.
11. Remove cap from bottom of saline bag spike port.
12. Remove cap from vented spike and insert fully into saline bag spike port.

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13. Fill contrast syringe with desired volume as required.
14. Fill saline syringe with desired volume as required.
15. Remove the contrast and saline containers and vented spikes from the loaded syringes.
16. Remove the female luer lock cap from the tubing set (short end) and attach to the contrast filled syringe, ensuring the sterility of the connections is maintained.
17. Remove the female luer lock cap from the tubing set (long end) and attach to the saline filled syringe, ensuring the sterility of the connections is maintained.
18. With the injector head pointing up, expel any residual air bubbles from the syringes and prime the extension tubing line with saline.

WARNING – Residual Air:
Do not apply blunt force using a hand or instrument to the syringe to free residual air bubbles. This action may damage the injector.
Reverse the piston 3 – 5 mL, then gently rock the injector head on the pivot with the syringe pointing up to gather and accumulate the small bubbles.

19. To ensure other authorized users on shift know the injector and tubing set is ready for use:
    a) Tip the injector head down
    b) Leave the tubing coiled with the luer lock cap in place.
    c) Activate the "Check for Air" button on the injector head (turns blue).
    d) If loaded power injector is not immediately used after priming, write the time (HH:MM) the set up was complete and the MRT initials on the syringe barrel using an indelible marker.
    e) Observe Fluidot™ Indicators on OEM syringes for the presence of contrast and saline.
        Note: Fluidot™ Indicator are elliptical in shape when air fills the syringe. When the syringes are loaded with contrast and or normal saline the Fluidot™ Indicator appear round.
20. Leave the male luer lock cap on the distal end of the coiled patient tubing until ready to connect to the patient for the contrast injection.
21. Dispose of any unused contrast media in the bottle and normal saline in the bag immediately after loading injector.
    a) If infection control is maintained, the vial of Gadolinium contrast along with the vented spike can be multi-dosed within 24 hours of initial puncture.
22. Clean and disinfect injector head using approved cleaning agent after each use.

WARNING – Contamination:
In the event any of the open luer lock ends is contaminated by incidental contact, discard contaminated products.

Connecting Injector Tubing to Patient Using a Dual Head Injector:

1. Perform hand hygiene.
2. Disinfect the needleless connection of the patients' power compatible extension set connected using 70% isopropyl alcohol swab.
3. Connect a 10ml pre-filled syringe with 0.9% sodium chloride to the needleless connection on the patients' peripheral venous access device.
4. Flush the patient's PIV catheter using the start-stop technique to assess for patency and ensure it is:
    a) free from complications,
    b) not pinched or clamped along the extension set,
    c) able to have free flow blood return upon aspiration,
    d) able to be flushed without resistance,
5. Remove the male luer lock cap from the distal end of the coiled patient tubing when ready to connect to the patient for the contrast injection.
6. Connect the distal end of the coiled tubing to the needleless connector on the patients' PIV.
7. Perform hand hygiene.

Disconnecting Injector Tubing from Patient Using a Duel Head Injector:

1. Perform hand hygiene.
2. Disconnect the distal end of the coiled tubing from the patients' venous access device and let the patient connection hang down.
3. With the injector head pointing down, disconnect the used contrast and saline syringes along with the tubing set and dispose of in the appropriate waste receptacle.
4. Clean and disinfect injector head using approved cleaning agent after each use.
5. Perform hand hygiene.

Resources

LMMI

Cleaning and Disinfecting between Medical Imaging Patients

CT_Injector_Bayer_Covid19_Disinfecting_Guide_Interactive

LMMI Multidosing_Clinical_Practice_Standard

LMMI Competency Assessment – Injector Pump Single Use Syringe Set-Up

VCH Hand Hygiene Policy_D-00-11-30061

Multiple Health Authorities

Learning Hub Course: Infection Prevention and Control Practices for Direct/Professional Clinical Care Providers.

Definitions

Aseptic Technique: is the purposeful prevention of the transfer of germs from one person to another by keeping the microbe count to a minimum, and for assuring that cross-contamination does not occur.

OEM: Original Equipment Manufacturer

References

Ministry of Health letter to Dr. David Ostrow Re: Safe Administration of Computed Tomography Contrast Media to Patients, 882388, June 17, 2011

Provincial Infection Control Network (PICNet) of British Columbia, An Evaluation of Multi-Use Contrast Media Injector Sets and Vials for Computerized Tomography in BC Hospitals: A Discussion Paper, Version: Final, March 2011

Medrad Stellant® CT Injection System, Operation Manual, Catalog # SOM 700 EN.201071 Rev. D. 2004, Medrad Inc.

Medrad Stellant® with Certegra™ Workstation CT Injection System, Certegra Operation Manual, Catalog # SCT 310 EN DF 117709, Rev. 03 2012, Medrad Inc.

Vancouver Coastal Health. Regional Infection Control Guidelines (2007)
http://www.vcha.ca/programs_services/infection_control/guidelines/guidelines/_docs/guidelines/binary_10354.pdf

FH Pulse, Infection Control Manual
http://fhpulse/clinical_programs/residential_care_and_assisted_living/resources/Pages/InfectionControlManual.aspx

Infection Protection and Control: Routine Practices and Additional Precautions in Acute Care

Appendix I: Contrast Media Injector Cleaning and Disinfecting

1. Cleaning and disinfecting the injector head is performed at the beginning of the shift, following disconnection / use from any patients on isolation precaution, and whenever the injector is visibly soiled or suspected of being contaminated by blood or body fluids.
2. Select an approved cleaning and disinfecting agent as per manufactures recommendations for usage.
3. All external surfaces of the injector pump will need to be cleaned and disinfected, including the pivot hinge, arm and cabling.
4. Cleaning and disinfecting the injector is a two-step process.
   Note: Do not use cleaners in a spray pump to apply cleaning agents directly on the injector. Use pre-moistened wipes or dampen a cloth and then wipe the surfaces of the injector pump from a clean to dirty.

   Step One (Cleaning): wipe from clean to the soiled area in a single motion using friction until all visible contaminant is removed and allow to **completely** dry. (Cleaning the injector may take several applications of the cleaning agent/wipes to remove all visible contaminant before the first step is complete)

   Step Two (Disinfecting): once all the visible contaminant is removed, use a second application of the cleaning agent to disinfect the injector head and allow to **completely** dry.

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