



CLINICAL PRACTICE GUIDELINE

Arterial line: Management

This document should be read in conjunction with the [Disclaimer](#)

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Insertion

Key points

1. Consent shall be obtained by the Medical Officer performing the procedure.¹
2. Arteries that are preferred for cannulation and arterial monitoring are the radial, brachial, and dorsalis pedis, rather than femoral and axillary sites, to reduce infection risk.^{2, 3}
 - A maximum sterile barrier procedure should be used if femoral or axillary sites are used.^{2, 3}
3. The preferred site for arterial monitoring is the radial artery,¹ with easier access and a lower risk of complications.³ The Medical Officer performing the procedure may perform an Allen's test prior to insertion to assess distal blood flow.^{1, 3-6}
4. Outside of the operating theatre, the insertion site should remain in sight at all times⁴ and be checked at regular intervals (hourly) for warmth, sensation, colour and pulses.⁵
5. Alarms must be audible and set appropriately for all arterial line monitoring.^{1, 5}
6. No medication shall be administered via an arterial line.^{1, 4}
7. Blood samples should only be taken when clinically indicated.¹
8. Personal protective equipment (PPE) should be worn during the insertion and removal of an arterial line and for whenever the arterial line is accessed.^{1, 4}
9. Strict aseptic technique should be followed during insertion and management.^{1, 4, 6} Observe^{4, 7}:
 - Hand hygiene: Before and after any manipulation of vascular access devices or catheter sites.^{2, 4} See Infection Control Manual: [Hand Hygiene](#) and the [WHO Five Moments of Hand Hygiene](#).
 - An aseptic technique^{2, 4, 6}
 - Standard precautions.^{4, 7} See Infection Control Policy: [Standard Precautions](#).

Equipment

- 2% Chlorhexidine with alcohol solution⁶
- Transparent occlusive dressing^{2, 4}
- Needles: 19G, 23G, 25G⁴
- Arterial pressure transducer kit⁴
- Cap, mask,² & goggles^{3, 4}
- 0.9% Sodium chloride⁸ 500mL^{1, 4} (based on clinical risk, a heparinised solution may be ordered³ by the anaesthetist as an alternative. Refer to specific orders).
- Optional: Biopatch and suture material.
- Monitor with pressure cable⁴
- Lignocaine⁴ 2% 5mL
- Adhesive tape e.g. Fixomull^{®4}
- Arterial catheter⁴
- Sterile fenestrated drape^{2, 3}
- Sterile dressing pack⁴
- Line labels⁴
- Pressure bag
- Sterile gloves²⁻⁴
- Padded splint⁴

Note: The Medical Officer may request an alternate suture material or local anaesthetic.⁴

Procedure

1. Explain the procedure to the woman / relatives and/or carer, and obtain consent.^{1, 4}
2. Position the woman in the bed (if the radial artery is to be used, a rolled towel may be used to hyperextend the wrist to allow easier visualisation of landmarks).¹

Transducer setup

1. Assemble the pressure monitoring set. All assembled equipment should be prepared for use prior to line insertion.¹
2. Ensure that the flush system is free of air bubbles, and that all parts are primed with fluid.¹
3. Ensure the pressure bag is inflated to 300mmHg and that all priming caps are replaced with those provided by the manufacturer and connections are secure.¹
4. Following insertion of the catheter by the Medical Officer, attach the arterial transducer line using a non-touch technique.⁴
5. Label the line appropriately,⁹ including “ARTERIAL” close to the arterial blood sampling port.⁴
6. Ensure sampling port is in “ON” position, and that the transducer is attached to the pressure cable and monitor⁴ and that there is an identifiable trace line.¹
7. Once the arterial cannula has been secured, apply Biopatch[®] (optional) and the transparent dressing to the catheter over the insertion site.⁴
8. Ensure the flush line is secured to the woman with tape or the splint / Velcro strap from the transducer kit.⁴ Reinforce borders with tape e.g. Fixomull[®].⁴
9. Document the insertion in the woman’s notes and nursing care plan.⁴ Include the insertion date and time, site⁴ and dressing type.
10. Zero the arterial line.¹ See Flushing and Monitoring

Dressing of the insertion site

Key points

1. Observe ^{4,10}:
 - Hand hygiene before and after any manipulation of vascular access devices or catheter sites^{4,11} See Infection Control Manual: [Hand Hygiene](#).
 - An aseptic technique^{4,6,11}
 - Standard precautions^{10,4}. See Infection Control Policy: [Standard Precautions](#)
2. The dressing must allow close site monitoring⁴ for signs of arterial thrombosis, haematoma, arterial perforation, catheter kinking or dislodgement.¹²
3. Regular evaluation of the neurovascular status distal to the arterial insertion site is required.¹³ Tingling, paraesthesia, capillary refill >3 seconds, or a cool pale limb require urgent medical review to prevent neurovascular injury.¹³
4. The dressing is replaced every 96 hours (with transducer changes) and when it becomes damp, loosened or soiled.^{4,11}
 - The disposable transducers are replaced at 96-hour intervals,¹³ and all other components of the system including dressings⁴, administration sets, continuous flush device and fluids are also replaced at this time.^{13,14}
5. Women who are diaphoretic or with local oozing may require a sterile gauze dressing.¹¹ This should be changed at 48 hours.¹¹ In the event of local or systemic infection, exudate or site tenderness the dressing should be removed to allow direct inspection.¹¹
6. The peripheral arterial catheter is **not** routinely replaced.^{11,15}

Equipment ⁴

- Sterile dressing pack
- Non-sterile gloves
- Tape
- Sterile gauze
- Biopatch[®]
- Chlorhexidine 2% with 70% alcohol swab/ stick
- Sterile transparent semi permeable (TSM) dressing

Procedure

PROCEDURE	ADDITIONAL INFORMATION
1 Preparation	
1.1 Inform the woman ^{4,15} and gain verbal consent.	
1.2 Prepare equipment and perform hand hygiene.	If changing the transducer and line assemble the fluid, prime line and flush device.
1.3 Position the woman to allow adequate access. ⁴ Put on gloves and remove the dressing. ⁴ Discard gloves and perform hand hygiene. ⁴	An assistant may be required to ensure the cannula is not inadvertently dislodged on removal of dressing.

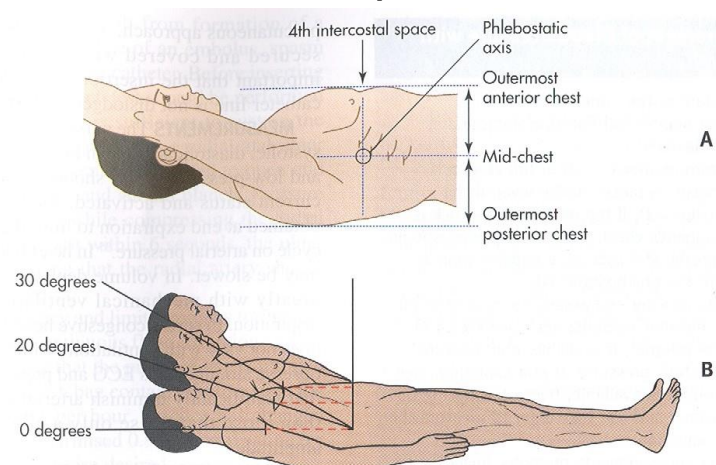
PROCEDURE	ADDITIONAL INFORMATION
Observe the insertion site ⁴ for excessive bleeding, inflammation or infection. ¹⁵	Observe the site & cannula carefully & report any concerns. If purulent discharge around catheter, take specimen as if a wound swab.
2 Technique	
2.1 Wearing gloves, clean around the cannula with the Chlorhexidine swab. ^{4,15} Allow to air dry for at least 60 seconds. If still moist dry with a one dab motion using the sterile gauze.	Clean from the insertion site outward in circles and allow to air dry. ⁴
2.2 If changing the administration set, close clamps and occluding cannula, change the transducer, fluid path and administration set. Ensure the Luer Lock is engaged. Open the clamps.	Zero the transducer and perform fast flush square wave test to check accuracy.
2.3 Using clean forceps, apply Biopatch [®] and apply a sterile transparent semi permeable dressing, ensuring the cannula is secure and the insertion site is visible. ⁴	Tape around the borders is required. ⁴ Ensure the site is visible at all times. ⁴
2.4 Position the limb to allow continuous monitoring.	Retape the transducer. The transducer is levelled to the reference point of the phlebostatic axis ¹⁵ – see Flushing and Monitoring
3 Post procedure	
3.1 Clear all equipment and perform hand hygiene ⁴	
3.2 Document the date and time of the dressing change on the dressing.	
3.3 Document the condition of the insertion site ⁴ and limb distal to the cannula in the: <ul style="list-style-type: none"> • Patient progress notes MR250 & • Adult Special Care Unit observation chart MR285, plus either: • Gynaecology nursing care plan MR286 or • Obstetric observation chart MR285. 	

Flushing and monitoring

Key points

1. Observe^{4,7}:
 - Hand hygiene before and after any manipulation of vascular access devices or catheter sites.^{2,4} See Infection Control Manual: [Hand Hygiene](#).
 - An aseptic technique^{2,4,6}
 - Standard precautions.^{4,7} See Infection Control Policy: [Standard Precautions](#)
2. Electronic monitoring requires an:
 - Indwelling arterial catheter attached to high-pressure tubing (non-distensible) - this reduces distortion between the intravascular device and transducer. This pressure is converted to electrical energy and recorded as a waveform¹⁶.
 - Transducer to convert the arterial pressure into an electrical signal.
 - Flush system to maintain patency. The flush fluid is maintained at a pressure of 300mmHg, to deliver a continual flow of approximately 3mL per hour.¹³
 - Recording device, amplifier and display monitor.
3. Accuracy is dependent on:
 - Levelling the transducer and **altering** this level with changes of the patient's position.
 - Measurements being taken with the patient supine or semi-recumbent to 45 degrees.
 - Zeroing the transducer to atmospheric pressure and fast flush wave testing.
 - The transducer is levelled to the reference point of the **phlebostatic axis** (at the intersection of the 4th intercostal space and the mid thoracic anterior-posterior diameter- see diagrams below).^{1,13,16} The phlebostatic axis is an external landmark used to identify the level of the atria in the supine patient.¹³

Identification of the phlebostatic axis¹³



5. The cannulated site should be visible⁴ and the catheter firmly secured. Access and visibility may be maintained by use of a splint (ventral surface of the forearm with dorsiflexion of the wrist).⁴

- 6 Monitor the access site and limb distal to the catheter for complications.¹³ Haematoma, thrombus, arterial spasm,¹ paraesthesia or tingling may indicate neurovascular problems.¹³ Symptoms require urgent review as potentially may lead to permanent impairment or loss of limb.¹³ Other potential complications include air embolism, accidental disconnection⁴, or accidental drug administration¹.
- 7 Transducers, pressure tubing¹⁴, catheter site, fluid and flush solution are changed every 96 hours⁴ to reduce infection risk.¹⁴

Equipment

- Pressure bag
- Monitoring system
- Mediswab
- Splint
- Sterile disposable transducer and administration set
- Tape
- Sterile gloves
- Flush solution – Sodium chloride 0.9%^{7,9} x500mL^{1,4}

Procedure

PROCEDURE	ADDITIONAL INFORMATION
1 Procedure	
1.1 Explain the procedure to the woman and gain verbal consent. ¹³ Position the patient supine or if appropriate at 45 degrees. ¹³	The first reading should be attended with the woman supine. Unless the woman is very sensitive to orthostatic changes, thereafter positions up to 45 degrees can produce similar results to supine positioning. ¹³
1.2 Position the stopcock nearest the transducer, level with the phlebostatic axis . ^{4,13}	It is recommended that the transducer be taped to the woman's chest at the phlebostatic axis. ¹³ If mounted on a bedside pole realign after any patient repositioning. ¹³
1.3 To zero the equipment: <ul style="list-style-type: none"> • Open the stopcock to room air (closed to the patient)^{6,13} and flush the system³ • Press the Zero button on the relevant pressure module^{1,4,13} • Observe the monitor for a flat line and a zero reading.^{1,13} • When the above occurs, close the 3-way tap and replace the cap.¹ 	Zeroing the transducer is required: <ul style="list-style-type: none"> • At set up¹³ or line changes⁷ • At insertion of the line^{1,13} • After disconnection of the transducer from the pressure cable⁷ • After disconnection of the pressure cable from the monitor¹³ • When the accuracy of the reading is questioned^{1,13} • As per manufacturers guidelines¹³ • At the commencement of each shift¹ • Following repositioning of patient.¹

PROCEDURE	ADDITIONAL INFORMATION
1.4 Observe and assess the quality of the monitor trace. ¹³ Perform a dynamic response test (fast flush square wave testing) every 8 to 12 hours, and when the system is opened to the air or when accuracy is questioned. ¹³	Checks the dynamic response of the monitor to signals from the blood vessel and on the subsequent haemodynamic pressure values. ¹⁶
1.5 The fast flush device within the system, when triggered, will produce a waveform on the monitor that rapidly rises and squares off before pressure drops back to baseline ¹⁶	This test is interpreted by the clinician for both speed and pattern.
1.6 Record the pressure measurements ¹³ on the Adult Special Care Unit observation chart MR285.	
1.7 Ongoing monitoring of the cannulation site and limb distal to the catheter is required and should be included in the woman's progress notes MR250.	

Changing the transducer of an arterial line

Key points

1. Observe^{4,7}:
 - Hand hygiene before and after any manipulation of vascular access devices or catheter sites^{4,11} See Infection Control Manual: [Hand Hygiene](#).
 - An aseptic technique^{4,6,11}
 - Standard precautions.^{4,7} See Infection Control Policy: [Standard Precautions](#)
2. Every 96 hours^{11,14}, or sooner if contamination is suspected or the integrity of the product or system has been compromised, change the⁴:
 - components of the closed system – administration set, sterile disposable transducer, pressure tubing and fluid^{11,13}
 - flush solution of sterile Sodium chloride 0.9%^{11,12,13}
 - dressing if appropriate.⁴
3. Replacing/securing the administration set should not impede evaluation of the cannulation site.⁴
4. Caution should be taken to prevent kinking or dislodgment of the catheter¹², this is a **two person procedure**.

Equipment

- Sterile arterial pressure transducer set¹
- Non-sterile gloves⁴, safety glasses/goggles¹
- Chlorhexidine 2% with 70% alcohol swab/ stick⁴
- Sodium chloride 0.9% 500mL¹
- Antibacterial patch e.g. Biopatch^{®4}
- Sterile transparent semi-permeable (TSM) dressing^{1,2}
- Tape¹
- Dressing pack¹

Procedure

PROCEDURE	ADDITIONAL INFORMATION
1 Preparation	
1.1 Inform the woman ^{1,2} and gain verbal consent. Position the woman to allow adequate access. ⁴	
1.2 Prepare the equipment, silence the monitor alarms, perform hand hygiene, and put on gloves and safety glasses. ^{1,2}	
2 Technique	
2.1 Using an aseptic technique assemble the administration set, prime the tubing, close the clamp and ensure all Luer Lock connections are secure. [Second person: Puts on gloves & removes the dressing from the arterial line site.] Observe the insertion site ⁶ for excessive bleeding, inflammation or infection. ⁷	Prime the transducer line with the sodium chloride 0.9% 500mL bag and inflate the pressure bag to 300mmHg. To avoid accidental dislodgement, remain with the woman while the dressing is off. ⁴
2.2 Clean the area ¹ with a Chlorhexidine swab. ⁴ Wipe the connection to the cannula with the Chlorhexidine and alcohol swab and let it dry.	Clean from the insertion site outward in circles and allow to air dry. ⁴
2.3 [Second person: Occludes the artery proximal to the insertion site.¹]	The waveform will become flattened when the occlusion is effective. ¹
2.4 While the artery is occluded unscrew the old flush line and remove. Immediately replace with the new line. ^{1,2} [Second person: Releases pressure from the artery⁴ & supports the new line and catheter to avoid dislodging the new line.¹]	

PROCEDURE	ADDITIONAL INFORMATION
2.5 Ensure the transducer is attached to the pressure cable and monitor, and that there is an identifiable arterial trace. ^{1,2}	
2.6 Using clean forceps, apply the Biopatch [®] and new transparent dressing to the catheter over the insertion site. ²	
2.7 The flush line is then secured to the woman with a Velcro strap from the transducer kit. ¹	Use a splint as necessary to immobilise the site. ⁴
2.8 Zero the transducer. ⁶	See also Flushing and Monitoring
2.9 Discard waste and perform hand hygiene. ⁶	
3 Post procedure	
3.1 Observe the limb, distal to the insertion site for warmth, sensation, colour and pulses if applicable. ^{1,14}	
3.2 Document ^{1,4} in patient progress notes MR250, Adult Special Care Unit observation chart MR285, and fluid balance chart MR741 the following:	
<ul style="list-style-type: none"> • Administration set change¹ • Dressing type¹ • Status of the cannulation site and limb distal to the insertion site. 	
3.3 Monitor the continuous flush system one to four hourly to maintain pressure level at 300mmHg. ¹⁴	Check the pressure in the pressure bag, the level of fluid remaining and that the flush rate is approximately 3mL/hour. ¹⁴

Removal of an arterial line

Key points

1. Observe^{4,7}:
 - Hand hygiene before and after any manipulation of vascular access devices or catheter sites^{4,11} See Infection Control Manual: [Hand Hygiene](#).
 - An aseptic technique^{4,11,6}
 - Standard precautions.^{4,7} See Infection Control Policy : [Standard Precautions](#)
2. When a peripheral arterial catheter is removed from the radial artery, digital pressure should be applied until haemostasis is achieved¹⁵ (5 to 15 minutes⁶). Digital pressure should be released slowly as a sudden release may cause undue pressure against the arterial wall and re-bleeding.¹²
A firmly applied sterile pressure dressing is required.¹⁵ Care is taken not to encircle the wrist or impede venous blood flow.
3. Anti-coagulated patients may require prolonged digital pressure.¹⁵
4. Femoral arterial catheters can on removal, result in significant occult bleeding¹⁵ into the retroperitoneal space.¹² On removal, these may require prolonged digital pressure and additional haemostatic measures.¹⁵ A sterile pressure dressing is applied in preference to a C- clamp.
5. The peripheral circulation distal to the access site should be assessed and documented in the patient notes.¹⁵

Equipment¹

- Sterile dressing pack
- Adhesive tape
- Sterile scissors
- Sterile gauze
- Stitch cutter
- Specimen container
- Gloves, safety glasses/goggles (PPE)
- Sterile transparent semi permeable (TSM) dressing
- Antiseptic solution/swab (e.g. 2% Chlorhexidine²)

Procedure

PROCEDURE	ADDITIONAL INFORMATION
1 Pre procedure	
1.1	Inform the woman ¹ and gain verbal consent.
1.2	Ensure the orders for the removal have been documented by the medical staff in the woman's progress notes (MR250). Check the woman's recent coagulation results if clinically indicated. ¹

- 1.3 Prior to removal notify the other members of the nursing / midwifery staff that you are intending to remove the cannula. Notifies the other members of the team that you will be unavailable to assist them until the procedure is completed.
- 1.4 Prepare the equipment.
- 1.5 Place the woman in a comfortable position with the arterial line easily accessible.¹ Reduces fatigue as this is a long procedure.
Where appropriate provide a seat for staff.
- 1.6 Silence the alarms, perform hand hygiene & put on gloves, safety glasses/ goggles/ PPE.¹
- 2 Technique**
- 2.1 Firmly close any administration set connections. Turn the 3 way tap off to the woman.¹
Deflate the pressure bag.¹
- 2.2 Expose the arterial site & loosen the anchoring dressing.
- 2.3 Wearing gloves, remove the remaining dressing.¹ If the catheter is suspected of causing an infection, the tip should be collected for testing.
Clean the site with antiseptic solution/ swab.¹ If purulent discharge around catheter, take specimen as if a wound swab.
Cut the suture if present.¹ Clean site with sterile saline and withdraw catheter with sterile forceps and with sterile scissors cut the last 2 - 3cm of the catheter and place this distal portion in a sterile container. If patient is febrile or septicaemia is suspected, collect blood cultures from another site.
While applying firm pressure to the entry site with a sterile gauze swab, remove the arterial catheter and apply a second gauze swab.¹
- 2.4 Continue to apply steady digital pressure¹⁵ long enough to prevent haematoma¹² formation. A minimum of 5 minutes.⁴ It will take 5 to 15 minutes for haemostasis to be achieved depending on the insertion site.⁶
- 2.5 Apply a clean sterile gauze and sterile transparent dressing.¹ Allows on-going visualisation of access site.
Ensure the insertion site is visible at all times and monitor for signs of a haematoma or bleeding.¹
- 2.6 Remove PPE, discard waste appropriately and perform hand hygiene.⁴
- 3 Post procedure**
- 3.1 Document removal^{1,4} and peripheral circulation status distal to the access site¹⁶ in the progress notes⁶ (MR250), Adult Special Care Unit Observation Chart (MR28) and Gynaecology Nursing Care Plan or Obstetric Observation Chart (MR285).

Arterial blood sample collection¹

Arterial blood gas sample collection- Quick Reference Guide

1. **Prepare [equipment](#)**, perform hand hygiene & don PPE.
2. **Explain [procedure](#)** to the woman, **silence alarms & turn 'off'** the 3 way tap to the woman.
3. **Remove cap** from the 3 way tap & **clean** exposed port with an alcohol swab.
4. **Collect at least 5mL of blood** by placing a 5 mL syringe on exposed port & turning 3 way **tap 'on'**.
5. **Turn 'off'** the 3 way tap to the woman, remove & **dispose of the syringe** appropriately.
6. **Aspirate 1mL of blood** by attaching the ABG syringe to the exposed port & turning **tap 'on'** to the woman.
7. **Turn 'off'** the 3 way tap to the woman, **remove & expel any air** from ABG syringe. **Replace cap** on tip of syringe.
8. **[Flush side port](#)**: Turn the 3 way tap so flush comes through the side port. Flush until clear.
9. **Flush line to woman**: Rotate the 3 way tap to enable the line to be flushed to the woman. Flush several times for no longer than 2 seconds at a time until the line is clear of blood.
10. **Clean** the side port with an alcohol swab & **replace cap**.
11. **Return** the 3 way tap to its original position & ensure the **arterial trace** is identifiable.
12. **Label** the woman's blood sample at the bedside:
 - Time and date of collection, patient name & MRN.
13. Place in laboratory specimen bag with appropriate pathology request form completed.

Key points

1. Observe^{4,10}:
 - Hand hygiene before and after any manipulation of vascular access devices or catheter sites^{4,11} See Infection Control Manual: [Hand Hygiene](#).
 - An aseptic technique^{4,6,11}.
 - Standard precautions.^{4,10} See Infection Control Policy: [Standard Precautions](#).
2. Arterial blood gas samples should only be taken when clinically indicated.¹
3. The arterial line is to be transduced at all times.⁴

Equipment^{1,17}

- 5mL syringe
- Chlorhexidine 2% and 70% alcohol swabs
- Gloves
- Safety glasses / goggles
- Arterial blood gas (ABG) syringe
- Sterile gauze.¹

Procedure¹

1. Perform hand hygiene.⁴ Don PPE, silence alarms and explain the procedure.
2. Turn the 3 way tap 'off' to the woman. Remove the cap from the 3 way tap.
3. Clean the exposed port on the 3 way tap with an alcohol swab.
4. Place the 5 mL syringe on the exposed port.



5. Turn the 3 way tap 'on' to enable blood to be drawn from the woman. (see photo above)



6. When 5 mL of blood has been aspirated turn the 3 way tap to 'off' to the woman, remove the 5mL syringe and dispose of it appropriately. (see photo above)



7. Attach the ABG syringe to the exposed port. Turn the 3 way tap 'on' in order to aspirate 1mL of blood from the woman. (see photo above)
8. Turn the 3 way tap to 'off' to the patient. Remove the ABG syringe, expel any air and replace the cap on the tip of the syringe.



9. Turn the 3 way tap to allow the flush to come through the side port. Flush until clear. (see above)
10. Rotate the 3 way tap to enable the line to be flushed to the patient. Flush several times for no longer than 2 seconds at a time until the line is clear of blood.
11. Clean the side port with an alcohol swab and replace the cap.
12. Turn the 3 way tap to its original position in order to obtain an arterial trace.



13. Ensure the arterial trace is identifiable.
14. At the bedside, label the woman's blood sample with the time and date of collection, patient name and MRN as per [Transfusion Medicine](#) guidelines.¹⁹
15. Place in a laboratory specimen bag with the appropriate pathology request form completed.¹⁹

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Related WNHS policies, procedures and guidelines

[Transfusion Medicine](#) guidelines

Infection Control Policy: [Standard Precautions](#); [Hand Hygiene](#).

Useful resources (including forms)

[WHO Five Moments of Hand Hygiene](#)

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