

STANDARDIZED PROCEDURE
NEONATAL / PEDIATRIC PERIPHERAL ARTERIAL LINE INSERTION
(Neonatal, Pediatric)

I. Definition

To place an indwelling artery catheter for the purposes of:

1. Arterial blood sampling.
2. Arterial blood pressure monitoring.
3. Exchange transfusions (removal of blood)

II. Background Information

A. Setting:

Inpatient neonatal / pediatric patients or outpatient during Emergency Transport of neonatal / pediatric patients.

If appropriate, implement procedural support, if available- make sure Child Life is involved, and use age appropriate language and age appropriate developmental needs with care of children

B. Supervision

The necessity of the procedure will be determined by the Advanced Health Practitioner (AHP) in verbal collaboration with the attending physician or his/her designee. Direct supervision is necessary until competency is determined and the minimum number of procedures is successfully completed, as provided for in the protocol. After that time, the attending physician or his/her designee must be available.

Designee is defined as another attending physician who works directly with the supervising physician and is authorized to oversee the procedures being done by the AHP.

C. Indications

1. Monitoring of arterial blood pressure.
2. Frequent monitoring of blood gases or other laboratory tests.
3. When preductal oxygenation measurement is required.
4. For removal of blood in exchange transfusions.

D. Precautions/Contraindications

1. Bleeding disorder that cannot be corrected
2. Pre-existing evidence of circulatory insufficiency in limb being used for cannulation.
3. Evidence of inadequate collateral flow
4. Local skin infection
5. Malformation of the extremity being used for cannulation
6. Previous surgery in the area (especially cutdown)

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Note: Prior to using the axillary artery, or wiring an arterial catheter, a discussion must take place with the Attending, who must agree with the plan. Ulnar catheterization is not permitted.

The AHP will notify the physician immediately under the following circumstances:

1. Patient decompensation or intolerance to the procedure
2. Outcome of the procedure other than expected

III. Materials

1. Morphine Sulfate or other pain medication
2. 22 or 24 G angiocath
3. T-connector
4. Armband
5. Tape
6. Heparinized normal saline flush solution
7. Chloraprep
8. 3-way stopcock
9. Sterile gloves
10. Opsite or tegaderm

IV. Neonatal / Pediatric Peripheral Arterial Line Insertion

A. Pre-treatment evaluation

1. Premedicate patient for pain control and/or sedation as needed. Assess need for further medication throughout the procedure.
2. Confirm adequate circulation to the extremity being used by doing the Allen Test.
 - a. Compress both the patient's ulnar and radial arteries firmly using both hands, if planning to cannulate radial or ulnar artery, or compress the dorsalis pedis and posterior tibial arteries if using either of those arteries.

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- b. Release the ulnar artery and observe the hand pink up. This will indicate adequate circulation in the ulnar artery.
- c. Repeat step 1a.
- d. Release the radial artery and observe the hand pink up. This will indicate adequate circulation in the radial artery.
- e. If there is not adequate circulation in both arteries, DO NOT USE the arteries in that hand, as ischemia of the hand may result.
- f. If using the dorsalis pedis or the posterior tibial artery, then do the Allen Test as above on those arteries.

B. Set up (if applicable)

1. Gather necessary supplies

C. Patient Preparation

If time permits, inform the patient/family of the treatment plan, otherwise notify them after the procedure is completed.

1. The patient should be supine and supportive care, e.g. oxygen, assisted ventilation, should be given as necessary.
2. For neonates, place in an environment to support his/her temperature. A Portawarm mattress may be placed under the baby if required. A radiant heat source must be used if infant is removed from an isolette for the procedure. Skin temperature should be constantly monitored and kept between 36.5 C and 37.5 C.
3. The patient should be suitably restrained for the procedure. Flaccid patients may require no restraint. More active patients need to have legs and arms restrained for the procedure.

D. Procedure

1. Perform time out with all appropriate steps.
2. Extend the wrist to 45 degrees over a soft gauze pad and secure the hand and arm to an arm board, or foot and leg if using lower extremity. Tape in such a manner that the tips of all five fingers or toes are exposed for visual inspection.
3. Don sterile gloves
4. Cleanse wrist with ChloroPrep. Allow to dry

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5. Palpate the point of maximal pulsation of the artery over the distal end.
6. Make a small skin incision with a #22 gauge needle, if desired.
7. Insert a #22 or #24 angiocath through the skin while palpating the artery. Advance the angiocath directly towards the area of maximum pulsation. Attempt to puncture the center of the artery through the anterior wall of the artery at an angle of 10-30 degrees (depending on type of catheter).
8. Once a flashback of blood is seen, advance needle slightly, then hold needle still and advance the catheter. Remove needle. There should be pulsatile blood flow. If catheter is not fully inserted, attempt to advance the catheter farther into the artery. If a hematoma formation occurs, do not continue to advance; it is probable that the artery was not punctured centrally.
9. An alternate technique is the guidewire assisted method. This is accomplished by advancing a guidewire (Cook Fixed Core Straight Wire Guide, 0.15 x 15 cm) into the artery after arterial puncture is confirmed by a flashback of blood. The catheter is held in place while the needle is removed, and the guidewire is advanced into the artery. Then the catheter is advanced over the guidewire. After the catheter is successfully advanced into the artery, the guidewire is removed. This method should be used only when placing a new line. Already placed peripheral arterial lines should not be rewired and replaced unless directed by an ICN or PICU Attending physician.
10. After advancing the catheter, connect to T-connection with extension tubing for measurement of arterial pressure and infusion of fluid (heparinized saline).
11. Tape the hub and T-connection in place.
12. Examine all 5 fingers or toes for adequate blood flow. If ischemic, loosen tape. If ischemia continues, remove catheter.
13. If blood pressure tracing is dampened, or artery is thought to be in spasm, consider adding Lidocaine to IV fluid per unit protocol.

E. Follow-up treatment

1. Continue to examine fingers or toes for adequate blood flow, as well as watch for any blanching or ischemia of extremity.

F. Termination of treatment

1. Arterial catheter no longer needed.
2. Cannula related infection

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3. Evidence of thrombosis or occlusion of the artery.
4. Evidence of inadequate blood flow to extremity

G. Potential Complications:

1. Thromboembolism/vasospasm/thrombosis
 - a. Blanching of extremity and partial loss of digits
 - b. Gangrene of extremity tips
 - c. Ischemia / necrosis of extremity
 - d. Skin ulcers
 - e. Cerebral emboli
 - f. Reversible occlusion of artery
2. Infiltration
3. Hemorrhage
4. Hematoma
5. Infection
6. Damage to peripheral nerves
7. Air embolism

IV. Documentation

A. Documentation is in the electronic medical record

1. Documentation of the pretreatment evaluation and any abnormal physical findings.
2. Record the time out, indication for the procedure, procedure, type and size of catheter used, method used, EBL, the outcome, how the patient tolerated the procedure, medications (drug, dose, route, & time) given, complications, and the plan in the note.

B. All abnormal findings are reviewed with Attending or supervising physician

V. Competency Assessment

A. Initial Competence

1. The AHP will observe the procedure in its entirety at least once. Under the direct supervision of the attending physician the AHP will perform neonatal/pediatric

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peripheral arterial line insertion successfully **three** times and will be evaluated for competence and technical skill.

2. The AHP will demonstrate knowledge of the following:
 - a. Medical indication and contraindications of neonatal / pediatric peripheral arterial line insertion.
 - b. Risks and benefits of the procedure
 - c. Related anatomy and physiology
 - d. Consent process (if applicable)
 - e. Steps in performing the procedure
 - f. Documentation of the procedure
 - g. Ability to interpret results and implications in management.
 - h. The AHP will ensure the completion of competency sign off documents and send them directly to the medical staff office.

B. Continued proficiency

1. The AHP will demonstrate competence by successful completion of the initial competency.
2. Each candidate will be initially proctored and signed off by an attending physician. AHPs must perform this procedure at least **three** times per year. In cases where this minimum is not met, the AHP must demonstrate skill with this procedure in a simulation or skills lab, or the attending, must again sign off the procedure for the AHP. The AHP will be signed off after demonstrating 100% accuracy in completing the procedure.
3. Demonstration of continued proficiency shall be monitored through the annual evaluation.
4. A clinical practice outcomes log is to be submitted with each renewal of credentials. It will include the number of procedures performed per year and any adverse outcomes. If an adverse outcome occurred, a copy of the procedure note will be submitted.

VII. RESPONSIBILITY

Questions about this procedure should be directed to the Chief Nursing and Patient Care Services Officer at 353-4380.

VIII. HISTORY OF POLICY

Initial policy approved 1986 by CIDP and EMB

Revised 4/89, 1/93, 5/01, 7/03, 12/05, 6/08, 2/11

Revised most recently July 2012 by Subcommittee of the Committee for Interdisciplinary Practice

Reviewed most recently July 2012 by the Committee on Interdisciplinary Practice

Approved most recently July 2012 by the Executive Medical Board and the Governance Advisory Council.

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