American College of Radiology
ACR Appropriateness Criteria®

Radiologic Management of Central Venous Access

Variant 1: Device selection. Adult or child 13 years of age. Intravenous access for long-term total parenteral nutrition and intermittent intravenous antibiotics.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Chest port	Usually appropriate		N/A	N/A	8	n/a	0	0	0	0	0	0	0	0	0
Arm port	May be appropriate		N/A	N/A	5	n/a	0	0	0	0	0	0	0	0	0
Single lumen PICC	Usually not appropriate		N/A	N/A	3	n/a	0	0	0	0	0	0	0	0	0
Double lumen PICC	May be appropriate		N/A	N/A	5	n/a	0	0	0	0	0	0	0	0	0
Tunneled small bore central venous catheter single lumen	May be appropriate		N/A	N/A	4	n/a	0	0	0	0	0	0	0	0	0
Tunneled small bore central venous catheter double lumen	Usually appropriate		N/A	N/A	8	n/a	0	0	0	0	0	0	0	0	0

Variant 2: Device selection. Adult or child 13 years of age. Sickle cell anemia requires intravenous access for the treatment of recurrent sickle cell crisis.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Chest port	Usually appropriate		N/A	N/A	8	n/a	0	0	0	0	0	0	0	0	0

Arm port	May be appropriate		N/A	N/A	5	n/a	0	0	0	0	0	0	0	0	0
Single lumen PICC	May be appropriate		N/A	N/A	5	n/a	0	0	0	0	0	0	0	0	0
Double lumen PICC	May be appropriate		N/A	N/A	5	n/a	0	0	0	0	0	0	0	0	0
Tunneled central venous catheter	May be appropriate		N/A	N/A	6	n/a	0	0	0	0	0	0	0	0	0
Nontunneled central venous catheter	May be appropriate		N/A	N/A	4	n/a	0	0	0	0	0	0	0	0	0

Variant 3: Device selection. Adult or child 13 years of age. Stage 3 chronic kidney disease requires central venous access for 6 weeks of antibiotic treatment.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Chest port	Usually not appropriate		N/A	N/A	3	n/a	0	0	0	0	0	0	0	0	0
Arm port	Usually not appropriate		N/A	N/A	3	n/a	0	0	0	0	0	0	0	0	0
Single lumen PICC	Usually not appropriate		N/A	N/A	3	n/a	0	0	0	0	0	0	0	0	0
Double lumen PICC	Usually not appropriate		N/A	N/A	3	n/a	0	0	0	0	0	0	0	0	0
Tunneled small bore central venous catheter single lumen	Usually appropriate		N/A	N/A	8	n/a	0	0	0	0	0	0	0	0	0
Tunneled small bore central venous catheter double lumen	May be appropriate		N/A	N/A	6	n/a	0	0	0	0	0	0	0	0	0

Variant 4: Device selection. Adult or child 13 years of age. Intensive care unit (ICU) patient with sepsis and acute renal insufficiency requires intravenous access for approximately 7 to 10 days.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Chest port	Usually not appropriate		N/A	N/A	2	n/a	0	0	0	0	0	0	0	0	0
PICC	May be appropriate		N/A	N/A	5	n/a	0	0	0	0	0	0	0	0	0
Tunneled small bore central venous catheter	Usually not appropriate		N/A	N/A	3	n/a	0	0	0	0	0	0	0	0	0
Nontunneled central venous catheter	Usually appropriate		N/A	N/A	8	n/a	0	0	0	0	0	0	0	0	0

Variant 5: Site selection. Adult or child 13 years of age. Head and neck surgery. Central venous access required for adjuvant chemotherapy.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Arm port	Usually appropriate		N/A	N/A	8	n/a	0	0	0	0	0	0	0	0	0
PICC	Usually appropriate		N/A	N/A	7	n/a	0	0	0	0	0	0	0	0	0
Chest port via internal jugular/subclavian vein	Usually appropriate		N/A	N/A	7	n/a	0	0	0	0	0	0	0	0	0
Tunneled small bore catheter via internal jugular/subclavian vein	May be appropriate		N/A	N/A	6	n/a	0	0	0	0	0	0	0	0	0

Variant 6: Site selection. Adult or child 13 years of age. Sepsis in a patient with stage 4 chronic kidney disease, requires 7 to 10 days of intravenous antibiotic therapy.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
PICC	Usually not appropriate		N/A	N/A	3	n/a	0	0	0	0	0	0	0	0	0
Nontunneled central venous catheter via the left internal jugular vein	Usually appropriate		N/A	N/A	7	n/a	0	0	0	0	0	0	0	0	0
Nontunneled central venous catheter via the right internal jugular vein	Usually appropriate		N/A	N/A	8	n/a	0	0	0	0	0	0	0	0	0
Nontunneled central venous catheter via the subclavian vein	Usually not appropriate		N/A	N/A	3	n/a	0	0	0	0	0	0	0	0	0

Variant 7: Site selection. Adult or child 13 years of age. ICU patient with sepsis. The patient receives hemodialysis via nontunneled catheter placed via the right internal jugular vein. Multilumen central venous access required.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Arm PICC	Usually not appropriate		N/A	N/A	3	n/a	0	0	0	0	0	0	0	0	0
Femoral vein nontunneled central venous catheter	May be appropriate		N/A	N/A	4	n/a	0	0	0	0	0	0	0	0	0
Right internal jugular vein nontunneled central venous catheter	Usually appropriate		N/A	N/A	8	n/a	0	0	0	0	0	0	0	0	0
Subclavian vein nontunneled central venous catheter	May be appropriate		N/A	N/A	4	n/a	0	0	0	0	0	0	0	0	0
Left internal jugular vein nontunneled central venous catheter	Usually appropriate		N/A	N/A	8	n/a	0	0	0	0	0	0	0	0	0

Variant 8: Site selection for permanent hemodialysis catheter. Adult or child 13 years of age. End stage renal disease has undergone creation of a left arm arteriovenous fistula. The fistula has not yet matured.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Right internal jugular vein	Usually appropriate		N/A	N/A	9	n/a	0	0	0	0	0	0	0	0	0
Right subclavian vein	May be appropriate		N/A	N/A	4	n/a	0	0	0	0	0	0	0	0	0
Left internal jugular vein	May be appropriate		N/A	N/A	6	n/a	0	0	0	0	0	0	0	0	0
Left subclavian vein	Usually not appropriate		N/A	N/A	3	n/a	0	0	0	0	0	0	0	0	0
Right or left femoral vein	May be appropriate		N/A	N/A	4	n/a	0	0	0	0	0	0	0	0	0

Variant 9: Immunocompromised patient. Adult or child 13 years of age. Has a tunneled small-bore catheter placed via right internal jugular vein. Patient is pancytopenic (ANC 300/µL, PLT 32,000/µL) and presents with fevers and malaise.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Immediate removal of the tunneled catheter, culture of the catheter tip and placement of a nontunneled central venous catheter via different site	May be appropriate		N/A	N/A	6	n/a	0	0	0	0	0	0	0	0	0
Retain the catheter and commence empiric antibiotics once peripheral and central blood cultures have been drawn	May be appropriate		N/A	N/A	5	n/a	0	0	0	0	0	0	0	0	0

Catheter should be removed if positive blood cultures are confirmed	Usually appropriate		N/A	N/A	8	n/a	0	0	0	0	0	0	0	0	0
Catheter salvage may be considered even after positive blood cultures are acquired	May be appropriate		N/A	N/A	5	n/a	0	0	0	0	0	0	0	0	0

Variant 10: Thrombotic complications. Adult or child 13 years of age. Chest port placed via right internal jugular vein is being used for chemotherapy. The infusion nurse can infuse saline but is unable to aspirate blood from the catheter.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Continue to use the port for administering drugs but use peripheral access for blood draws	May be appropriate		N/A	N/A	5	n/a	0	0	0	0	0	0	0	0	0
Catheter removal and placement of alternative venous access	May be appropriate		N/A	N/A	4	n/a	0	0	0	0	0	0	0	0	0
Chest radiograph	Usually appropriate		N/A	N/A	8	n/a	0	0	0	0	0	0	0	0	0
Interrogate the port with patient and/or patient arm in different positions	Usually appropriate		N/A	N/A	7	n/a	0	0	0	0	0	0	0	0	0
Instill a thrombolytic agent into the port	Usually appropriate		N/A	N/A	7	n/a	0	0	0	0	0	0	0	0	0
Contrast study of the catheter	Usually appropriate		N/A	N/A	8	n/a	0	0	0	0	0	0	0	0	0
Catheter exchange	May be appropriate		N/A	N/A	5	n/a	0	0	0	0	0	0	0	0	0
Catheter stripping	May be appropriate		N/A	N/A	6	n/a	0	0	0	0	0	0	0	0	0

Variant 11: Thrombotic complications. Adult or child 13 years of age. Permanent hemodialysis catheter placed via the right internal jugular vein. Poor flows are documented at hemodialysis via both lumens.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Catheter removal and placement of a new catheter from a different site	Usually appropriate		N/A	N/A	7	n/a	0	0	0	0	0	0	0	0	0
Catheter exchange	Usually appropriate		N/A	N/A	7	n/a	0	0	0	0	0	0	0	0	0
Contrast study of the catheter	Usually appropriate		N/A	N/A	7	n/a	0	0	0	0	0	0	0	0	0
Fibrin sheath stripping	Usually appropriate		N/A	N/A	7	n/a	0	0	0	0	0	0	0	0	0
Fibrin sheath disruption	Usually appropriate		N/A	N/A	7	n/a	0	0	0	0	0	0	0	0	0
Attempt to perform dialysis with patient arm in a different position	Usually appropriate		N/A	N/A	7	n/a	0	0	0	0	0	0	0	0	0

Variant 12: Thrombotic complications. Adult or child 13 years of age. Arm swelling secondary to extensive thrombus surrounding a triple lumen PICC placed via left Basilic vein. The catheter is being used for long-term parenteral nutrition and intermittent intravenous antibiotics. The catheter is functioning.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Immediate catheter removal	May be appropriate		N/A	N/A	4	n/a	0	0	0	0	0	0	0	0	0
Commence anticoagulation and continue to use the catheter	Usually appropriate		N/A	N/A	7	n/a	0	0	0	0	0	0	0	0	0

Catheter-directed thrombolysis	May be appropriate		N/A	N/A	5	n/a	0	0	0	0	0	0	0	0	0
Systemic thrombolysis	Usually not appropriate		N/A	N/A	2	n/a	0	0	0	0	0	0	0	0	0
SVC filter placement	Usually not appropriate		N/A	N/A	2	n/a	0	0	0	0	0	0	0	0	0
Catheter downsize for a single/double lumen PICC	Usually not appropriate		N/A	N/A	3	n/a	0	0	0	0	0	0	0	0	0

Variant 13: Infectious complications. Adult or child 13 years of age. Preventive measures to reduce catheter-related bloodstream infections when placing a nontunneled central venous catheter in ICU patient.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Antibiotic impregnated catheters	May be appropriate		N/A	N/A	6	n/a	0	0	0	0	0	0	0	0	0
Upper body insertion site	Usually appropriate		N/A	N/A	8	n/a	0	0	0	0	0	0	0	0	0
Heparin-bonded catheter	May be appropriate		N/A	N/A	5	n/a	0	0	0	0	0	0	0	0	0
Prophylactic antibiotics prior to catheter placement	May be appropriate		N/A	N/A	4	n/a	0	0	0	0	0	0	0	0	0
Antimicrobial lock therapy (not ethanol lock)	May be appropriate		N/A	N/A	6	n/a	0	0	0	0	0	0	0	0	0
Routine guide-wire catheter exchanges	Usually not appropriate		N/A	N/A	2	n/a	0	0	0	0	0	0	0	0	0

Variant 14: Infectious complications. Adult or child 13 years of age. Therapeutic measures to manage catheter-related bloodstream infections.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Catheter should be removed immediately	May be appropriate		N/A	N/A	6	n/a	0	0	0	0	0	0	0	0	0
Catheter should be removed in the setting of Staphylococcus Aureus bacteremia	Usually appropriate		N/A	N/A	8	n/a	0	0	0	0	0	0	0	0	0
Catheter should be preserved in clinically stable patients	May be appropriate		N/A	N/A	6	n/a	0	0	0	0	0	0	0	0	0
Catheter exchange in conjunction with systemic antibiotics can be considered in patients with coagulase-negative Staphylococcal bacteremia	May be appropriate		N/A	N/A	6	n/a	0	0	0	0	0	0	0	0	0
Exit site infections may be treated with antibiotics alone	May be appropriate		N/A	N/A	4	n/a	0	0	0	0	0	0	0	0	0
Catheter salvage and concomitant antibiotic therapy are appropriate in patients with limited venous access	Usually appropriate		N/A	N/A	7	n/a	0	0	0	0	0	0	0	0	0

Appendix Key

A more complete discussion of the items presented below can be found by accessing the supporting documents at the designated hyperlinks.

Appropriateness Category: The panel's recommendation for a procedure based on the assessment of the risks and benefits of performing the procedure for the specified clinical scenario.

SOE: Strength of Evidence. The assessment of the amount and quality of evidence found in the peer reviewed medical literature for an appropriateness recommendation.

- **References:** The citation number and PMID for the reference(s) associated with the recommendation.
- **Study Quality**: The assessment of the quality of an individual reference based on the number of study quality elements described in the reference.

RRL: Relative Radiation Level. A population based assessment of the amount of radiation a typical patient may be exposed to during the specified procedure.

Rating: The final rating (1-9 scale) for the procedure as determined by the panel during rating rounds.

Median: The median rating (1-9 scale) for the procedure as determined by the panel during rating rounds.

Final tabulations: A histogram showing the number of panel members who rated the procedure as noted in the column heading (ie, 1, 2, 3, etc.).

Additional supporting documents about the AC methodology and processes can be found at **www.acr.org/ac.**