American College of Radiology
ACR Appropriateness Criteria®

Central Venous Access Device and Site Selection

Variant 1: Device selection: Acutely ill patient requiring infusion of an irritant medication, hemodynamic monitoring, and frequent blood draws for 2 weeks or shorter.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Nontunneled central venous catheter	Usually appropriate	Moderate	N/A	N/A	8	8	0	0	0	0	0	3	2	7	4

References	Study Quality
13 (16100130)	M
12 (16970212)	M
14 (16865322)	4
15 (20857280)	1
11 (30095499)	Good

PICC	Usually appropriate	Strong	N/A	N/A	8	8	0	0	0	0	1	1	4	4	6

References	Study Quality
13 (16100130)	M
12 (16970212)	M
14 (16865322)	4
15 (20857280)	1
11 (30095499)	Good
17 (28665469)	4
16 (20574104)	1

Tunneled central venous catheter	May be appropriate	Limited	N/A	N/A	5	5	0	0	2	1	6	6	0	0	0

		References		Study Quality											
		12 (16970212)		M											
Midline catheter	May be appropriate	Strong	N/A	N/A	5	5	0	1	1	1	8	4	0	0	0
		References		Study Quality											
		9 (24811603)		1											
		10 (34553435)		2											
Chest port	Usually not appropriate	Limited	N/A	N/A	1	1	11	3	2	0	0	0	0	0	0
		References		Study Quality											
		8 (23739070)		2											
Arm port	Usually not appropriate	Limited	N/A	N/A	1	1	11	3	2	0	0	0	0	0	0
		References		Study Quality											
		8 (23739070)		2											

Variant 2: Device selection: Patient with acute renal failure requiring central venous access for renal replacement therapy, anticipated duration of therapy for 2 weeks or shorter.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Nontunneled dialysis catheter	Usually appropriate	Moderate	N/A	N/A	9	9	0	0	0	0	0	2	0	4	10
		References		Study Quality											
		11 (30095499)		Good											
		18 (29202728)		2											
Tunneled dialysis catheter	Usually appropriate	Limited	N/A	N/A	7	7	0	0	0	2	0	2	8	3	0
		References		Study Quality											
		18 (29202728)		2											

Chest port	Usually not appropriate	Expert Consensus	N/A	N/A	1	1	14	1	0	0	0	0	1	0	0
Arm port	Usually not appropriate	Expert Consensus	N/A	N/A	1	1	14	1	0	0	0	0	1	0	0
PICC	Usually not appropriate	Expert Consensus	N/A	N/A	1	1	14	1	0	0	0	0	0	1	0

Variant 3: Device selection: Patient with renal failure requiring central venous access for renal replacement therapy, anticipated duration of therapy for more than 2 weeks.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Tunneled dialysis catheter	Usually appropriate	Limited	N/A	N/A	9	9	0	0	0	0	0	1	1	2	12
		References		Study Quality											
		12 (16970212)		M											
		19 (30345873)		3											
Nontunneled dialysis catheter	May be appropriate	Limited	N/A	N/A	5	5	0	0	1	5	5	3	1	1	0
		References		Study Quality											
		12 (16970212)		M											
		19 (30345873)		3											
Chest port	Usually not appropriate	Expert Consensus	N/A	N/A	1	1	14	1	0	0	0	0	0	0	1
Arm port	Usually not appropriate	Expert Consensus	N/A	N/A	1	1	14	1	0	0	0	0	1	0	0
PICC	Usually not appropriate	Expert Consensus	N/A	N/A	1	1	14	1	0	0	0	0	1	0	0

Variant 4: Device selection: Patient with cancer diagnosis requiring central venous access for weekly chemotherapy infusion for more than 2 weeks.

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	Strong	N/A	N/A	9	9	0	0	0	0	0	0	1	3	12

References	Study Quality
28 (21652113)	3
27 (24218174)	M
23 (19179550)	1
20 (24005884)	1
24 (33788748)	3
22 (31005243)	1
26 (31044308)	Good
21 (31464692)	Not Assessed
25 (32479699)	Inadequate

Arm port	Usually appropriate	Strong	N/A	N/A	7	7	0	0	1	0	0	3	11	1	0

References	Study Quality
23 (19179550)	1
20 (24005884)	1
24 (33788748)	3
22 (31005243)	1
21 (31464692)	Not Assessed
25 (32479699)	Inadequate

Tunneled central venous catheter	May be appropriate	Strong	N/A	N/A	6	6	1	0	0	0	6	5	3	1	0

References	Study Quality
12 (16970212)	M
28 (21652113)	3
27 (24218174)	M
29 (26113804)	2

		26 (31044308)	Good												
		30 (2666137)	1												
PICC	May be appropriate	Strong	N/A	N/A	6	6	0	0	1	5	1	4	3	2	0
		References	Study Quality												
		12 (16970212)	M												
		20 (24005884)	1												
		29 (26113804)	2												
		22 (31005243)	1												
		21 (31464692)	Not Assessed												
		25 (32479699)	Inadequate												
Nontunneled central venous catheter	Usually not appropriate	Limited	N/A	N/A	3	3	4	4	6	1	1	0	0	0	0
		References	Study Quality												
		12 (16970212)	M												
		28 (21652113)	3												
		27 (24218174)	M												
		26 (31044308)	Good												

Variant 5: Device selection: Patient requiring continuous or very frequent intravenous administration of intravenous medications (excluding total parenteral nutrition) for more than 2 weeks.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Tunneled central venous catheter	Usually appropriate	Moderate	N/A	N/A	7	7	0	0	0	0	1	2	7	4	2
		References	Study Quality												
		12 (16970212)	M												
		28 (21652113)	3												
		27 (24218174)	M												
		26 (31044308)	Good												

PICC	Usually appropriate	Strong	N/A	N/A	7	7	0	0	0	0	6	0	6	2	2

References	Study Quality
12 (16970212)	M
20 (24005884)	1
22 (31005243)	1
21 (31464692)	Not Assessed
25 (32479699)	Inadequate

Chest port	May be appropriate	Limited	N/A	N/A	6	6	0	0	0	2	5	8	0	0	0

References	Study Quality
12 (16970212)	M
8 (23739070)	2
25 (32479699)	Inadequate

Arm port	May be appropriate	Limited	N/A	N/A	4	4	0	0	1	7	7	0	0	0	0

References	Study Quality
12 (16970212)	M
8 (23739070)	2
25 (32479699)	Inadequate

Nontunneled central venous catheter	Usually not appropriate	Limited	N/A	N/A	2	2	2	8	3	1	1	1	0	0	0

References	Study Quality
12 (16970212)	M
28 (21652113)	3

Variant 6: Device selection: Patient requiring long-term total parenteral nutrition and another indication for central access.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Tunneled central venous catheter double lumen	Usually appropriate	Limited	N/A	N/A	8	8	0	0	0	0	0	1	1	9	4

References	Study Quality
33 (19464090)	4
34 (29489708)	4
32 (28558699)	3
31 (32511768)	2

Double lumen PICC	Usually appropriate	Strong	N/A	N/A	7	7	0	0	0	1	2	3	3	3	4

References	Study Quality
33 (19464090)	4
34 (29489708)	4
32 (28558699)	3
35 (29148004)	2
31 (32511768)	2

Single lumen PICC	May be appropriate	Strong	N/A	N/A	6	6	0	0	0	0	5	4	5	1	0

References	Study Quality
33 (19464090)	4
34 (29489708)	4
32 (28558699)	3
35 (29148004)	2
31 (32511768)	2

Tunneled central venous catheter single lumen	May be appropriate	Limited	N/A	N/A	6	6	0	0	0	1	2	8	3	1	0

References	Study Quality
33 (19464090)	4
34 (29489708)	4
32 (28558699)	3

		31 (32511768)		2												
Chest port	May be appropriate	Limited	N/A	N/A	4	4	1	2	3	5	4	0	0	0	0
		References		Study Quality												
		32 (28558699)		3												
		31 (32511768)		2												
Arm port	Usually not appropriate	Limited	N/A	N/A	3	3	1	2	7	3	1	1	0	0	0
		References		Study Quality												
		32 (28558699)		3												
		31 (32511768)		2												

Variant 7: Device selection: Patient with chronic kidney disease requiring central venous catheter IV infusions for more than 2 weeks.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Tunneled central venous catheter single lumen	Usually appropriate	Limited	N/A	N/A	8	8	0	0	1	0	0	0	3	8	3
		References		Study Quality											
		46 (27647824)		3											
Tunneled central venous catheter double lumen	Usually appropriate	Limited	N/A	N/A	7	7	0	0	1	0	3	1	4	6	1
		References		Study Quality											
		46 (27647824)		3											
Chest port via internal jugular vein	May be appropriate	Strong	N/A	N/A	6	6	0	0	1	1	6	2	3	1	2
		References		Study Quality											
		38 (2314526)		2											
		39 (1754109)		2											

Chest port via subclavian vein	Usually not appropriate	Strong	N/A	N/A	3	3	6	1	3	4	1	0	1	0	0

References	Study Quality
38 (2314526)	2
39 (1754109)	2

Arm port	Usually not appropriate	Limited	N/A	N/A	2	2	8	3	2	1	1	0	1	0	0

References	Study Quality
37 (33116552)	3
36 (12616419)	2

PICC	Usually not appropriate	Strong	N/A	N/A	2	2	7	7	1	0	0	0	0	0	0

References	Study Quality
40 (15961840)	4
15 (20857280)	1
42 (29514546)	3
22 (31005243)	1
25 (32479699)	Inadequate
44 (32778223)	4
16 (20574104)	1
36 (12616419)	2
41 (11099241)	3
43 (22704142)	2
45 (-3195138)	4

Variant 8: Site selection: Patient with acute illness requiring central venous catheter for anticipated therapy for 2 weeks or shorter.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Right or left internal jugular vein	Usually appropriate	Strong	N/A	N/A	9	9	0	0	0	0	0	1	2	3	10

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9

References	Study Quality
56 (16280064)	2
58 (26398070)	1
52 (29992634)	3
62 (30231668)	3

Right or left subclavian vein	Usually appropriate	Strong	N/A	N/A	7	7	1	0	0	0	1	5	4	3	2

References	Study Quality
56 (16280064)	2
57 (11495620)	1
61 (22419292)	M
58 (26398070)	1
52 (29992634)	3
62 (30231668)	3

Upper extremity vein	Usually appropriate	Strong	N/A	N/A	7	7	0	0	0	0	3	3	3	2	5

References	Study Quality
13 (16100130)	M
12 (16970212)	M
14 (16865322)	4
15 (20857280)	1
11 (30095499)	Good
51 (29148000)	2

Right or left external jugular vein	May be appropriate	Limited	N/A	N/A	6	6	0	0	1	0	1	7	4	2	1

References	Study Quality
52 (29992634)	3

		53 (25198827)	4												
		54 (24306665)	2												
Right or left femoral vein	May be appropriate	Strong	N/A	N/A	5	5	1	0	0	2	6	6	1	0	0
		References	Study Quality												
		56 (16280064)	2												
		57 (11495620)	1												
		61 (22419292)	M												
		60 (8001386)	1												
		55 (9831940)	2												
		58 (26398070)	1												
		59 (29924154)	2												
		51 (29148000)	2												
Hepatic vein	Usually not appropriate	Limited	N/A	N/A	2	2	8	3	4	0	1	0	0	0	0
		References	Study Quality												
		47 (14514812)	2												
Inferior vena cava	Usually not appropriate	Limited	N/A	N/A	2	2	7	3	4	1	1	0	0	0	0
		References	Study Quality												
		49 (7747727)	2												
		50 (30281060)	3												
		48 (24190069)	4												

Variant 9: Site selection: Patient with chronic kidney disease or end-stage renal disease requiring central venous catheter.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
Right or left internal jugular vein	Usually appropriate	Strong	N/A	N/A	9	9	0	0	0	0	0	2	2	2	10

		References		Study Quality												
		61 (22419292)		M												
		38 (2314526)		2												
		39 (1754109)		2												
Right or left femoral vein	May be appropriate	Strong	N/A	N/A	6	6	0	0	0	0	3	10	2	1	0
		References		Study Quality												
		57 (11495620)		1												
		61 (22419292)		M												
		60 (8001386)		1												
		58 (26398070)		1												
		64 (30359982)		1												
Right or left external jugular vein	May be appropriate	Limited	N/A	N/A	6	6	0	0	0	0	4	9	2	0	0
		References		Study Quality												
		53 (25198827)		4												
Right or left subclavian vein	May be appropriate	Strong	N/A	N/A	4	4	0	3	1	8	3	0	0	0	0
		References		Study Quality												
		38 (2314526)		2												
		39 (1754109)		2												
Inferior vena cava	May be appropriate	Strong	N/A	N/A	4	4	0	1	4	5	5	0	0	0	0
		References		Study Quality												
		49 (7747727)		2												
		63 (33318464)		2												
		50 (30281060)		3												
		48 (24190069)		4												
Hepatic vein	Usually not appropriate	Limited	N/A	N/A	3	3	2	4	4	5	0	0	0	0	0
		References		Study Quality												

		47 (14514812)		2												
Upper extremity vein	Usually not appropriate	Strong	N/A	N/A	2	2	7	6	2	0	0	0	0	0	0

References	Study Quality
40 (15961840)	4
15 (20857280)	1
42 (29514546)	3
22 (31005243)	1
44 (32778223)	4
16 (20574104)	1
36 (12616419)	2
41 (11099241)	3
43 (22704142)	2
45 (-3195138)	4

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.**