

<b>Device</b>	<b>Indications for Use</b>	<b>Contraindications</b>
Midline Catheters	<ul style="list-style-type: none"> <li>• Indicated for short or long term peripheral access to the peripheral venous system for selected intravenous therapies and blood sampling. For blood therapy, it is recommended that a 4 French or larger catheter be used.(BAS Midline IFU)</li> </ul> <p style="text-align: center;"><b>Advantages</b></p> <ul style="list-style-type: none"> <li>• Utilize for alternate infusion therapy</li> <li>• Reduce repeated venipunctures which would compromise venous access<sup>i</sup></li> <li>• Therapy 2-4 weeks in duration</li> <li>• Infusion of antibiotics, hydration and pain medication</li> <li>• Venous sampling<sup>ii</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Presence of device related infection, bacteremia, or septicemia is known or suspected</li> <li>• Patient’s body size is insufficient to accommodate the size of the implanted device</li> <li>• Patient is known or suspected to be allergic to the materials contained in the device</li> <li>• Past irradiation of prospective insertion site</li> <li>• Previous episodes of venous thrombosis or vascular surgical procedures at the prospective placement site</li> <li>• Local tissue factors will prevent proper device stabilization or device access</li> <li>• Solutions with final glucose concentrations above 10%</li> <li>• Solutions with protein concentrations above 5%</li> <li>• Continuous infusion of vesicants<sup>iii</sup></li> </ul>

Device	Indications for Use	Contraindications
PICC Lines	<ul style="list-style-type: none"> <li>For short or long term peripheral access to the central venous system for intravenous therapy and blood sampling. For blood therapy, it is recommended that a 4 French or larger catheter be used.</li> </ul>	<ul style="list-style-type: none"> <li>Presence of device related infection, bacteremia, or septicemia is known or suspected</li> <li>Patient's body size is insufficient to accommodate the size of the implanted device</li> <li>Patient is known or suspected to be allergic to the materials contained in the device</li> <li>Past irradiation of the prospective insertion site</li> <li>Previous episodes of venous thrombosis or vascular surgical procedures at the prospective placement site</li> <li>Local tissue factors will prevent proper device stabilization or device access</li> <li>Preexisting skin infections</li> <li>Presence of severe peripheral edema</li> <li>When occupation involves being in water<sup>vii</sup></li> <li>High fluid-volume infusions</li> </ul>
	<p style="text-align: center;"><b>Advantages</b></p> <ul style="list-style-type: none"> <li>Administration of fluid, blood, medications in patients who lack suitable veins for repeated access</li> <li>Preservation of peripheral veins</li> <li>Decreased risk of phlebitis</li> <li>Lowest incidence of complications compared to other devices</li> <li>Reduced risk of infiltration</li> <li>Avoidance of discomfort and stress affiliated with multiple venipunctures</li> <li>Avoidance of risks associated with insertions in the neck and chest regions, such as pneumothorax and great vessel perforation</li> <li>Administration of chemotherapy and parenteral nutrition therapies</li> <li>Cost effectiveness</li> <li>No age barrier<sup>iv</sup></li> <li>Coagulopathies and bleedings disorders have been suggested as possible contraindications however these conditions may be viewed as distinct indications for a PICC. Carotid arterial puncture and subclavian puncture or vessel injury may result in uncontrolled bleeding, hematoma, or hemothorax which may have morbid and potentially morbid and potentially fatal consequences</li> <li>Radical neck dissection</li> <li>Immunocompromise</li> <li>Respiratory compromise/mechanical ventilation</li> <li>Chest injuries</li> <li>Inability to cooperate during subclavian insertion/undergo surgical procedure</li> <li>Neurologic conditions contraindicating changes in head position</li> <li>Physical disability for positioning, such as kyphosis</li> <li>Reduced risk of air embolism</li> <li>Time efficiency<sup>v</sup></li> <li>Can be used for CVP<sup>vi</sup></li> </ul>	<p style="text-align: center;"><b>Additional Considerations</b></p> <ul style="list-style-type: none"> <li>Rapid bolus injection</li> <li>Hemophoresis</li> <li>Hemodialysis</li> <li>Conditions requiring careful assessment are: contractures, mastectomy, existing thrombophlebitis, radiation therapy, pacemaker wires, crutch walking, and potential use of the limb for A-V fistula<sup>viii</sup></li> </ul>

**Note:** Some of the more serious complications of subclavian or jugular catheterization include pneumothorax, tension pneumothorax, hemothorax, hydrothorax, hydromediastinum, lymphatic fistula, tracheal puncture, arrhythmia, vessel perforation, and nerve injury. These complications increase morbidity and mortality, and they are also very costly. Venipuncture in the antecubital space significantly reduces the risk of insertion complications compared to the thorax because of the lack of vital structures in proximity to the superficial veins.<sup>ix</sup>

## Diagnosis:

### Midline Patient Candidates by Diagnosis:

DRG #	Diagnosis	LOS	Rationale
528	Cellulitis	N/A	Antibiotics <sup>x</sup>
130 478	Deep Vein Thrombosis	5.8 6.3	Heparin therapy / duration 5-7 day <sup>xi</sup>
089 079	Complicated Pneumonia	6.5 8.3	Antibiotics Hydration <sup>xii</sup>
127	Congestive Heart Failure	5.5	Diuretics <sup>xiii</sup>
164	Abscess / Appendectomy	8.8	Antibiotics <sup>xv</sup>
096	Chronic Bronchitis/asthma	5.2	Antibiotics, xanthines, steroids <sup>xiv</sup>
331	Glomerulonephritis	5.1	Antibiotics <sup>xv</sup>
296	Hypokalemia	5.4	Potassium <sup>xvi</sup>
320	Pyelonephritis	5.9	Antibiotics, analgesics, anti-emetics <sup>xvii</sup>
471	Osteoarthritis (hip replacement)	9.4	Steroids, antibiotics, analgesics, blood <sup>xviii</sup>

Midlines have been used for the following:

- pain control
- blood draws
- limited venous access on admission
- steroids
- fluid restricted patients
- IV drug abuse
- diabetics
- multiple drugs
- multiple hospital admissions
- obese patients
- low platelet count<sup>xix</sup>

Midlines have been used for the following drugs:

- All Cephalosporins
- Cefonocid pH 3.5 – 6.5
- Ceftazidime pH 5.5 - 8.0
- Cefuroxime pH 5.5 - 8.5
- ciprofloxacin\* pH 4.6
- hydration
- erythromycin\* pH 6.5 – 7.7
- potassium <40 meQ pH 4.0 - 8.0
- Ticarcillin pH 5.5 – 7.5
- Levofloxacin pH 3.8-5.8\*\*
- Cefotaxime pH 4.5 – 7.5
- Ceftriaxone pH 6.6 – 6.7
- Tobramycin pH 3.0 – 6.5
- ondansetron\* pH 3.3 - 4.0
- Gentamicin pH 3.0- 5.5
- Methylprednisolone pH 7 - 8.
- imipenem\* pH 6.5 – 7.5
- Amikacin pH 3.-5.5
- IVIG pH 4.0 – 7.2
- Cefazolin pH 4.5 – 7.0
- Cefoxitin pH 4.2 - 8.0
- Zithromax\*\*\*
- Heparin pH 5.0 - 8.0
- nafcillin\* hypertonic
- ampicillin\* pH 8.0 – 10
- Furosemide pH 8.0 – 9.3
- Clindamycin pH 5.5 - 7.0
- Cimetidine pH 3.8 - 6.0

\* Assess patient circulatory system carefully. Nafcillin, ampicillin, cipro should be considered for very short term infusion through a midline catheter

\*\*1998 Intravenous Medications pg 458

\*\*\*1996 AA Training Manual

### PICC Line Patient Candidates by Diagnosis:

DRG #	Diagnosis	LOS	Rationale
164	Abscess / Appendectomy	8.8	Antibiotics <sup>xx</sup>
490	AIDS	5.1	Pharmacologic therapy depends on type of opportunistic infection or malignancy
079	Pneumocystis Pneumonia	8.3	Antibiotic, Analgesia <sup>xxixxii</sup>
489			
127	Congestive Heart Failure	5.5	Peripheral vasodilators like Dopamine Diuretics like Lasix <sup>xxiii</sup>
475	Complicated Pneumonia	9.4	IV hydration
483	Medical – Ventilator support	41.9	Antibiotics <sup>xxiv</sup>
	Surgical - Tracheostomy		
460	Burns	5.6	Pain management, electrolytes, nutrition <sup>xxv</sup>
457		3.0	
144	Cardiomyopathy	4.5	Vasodilators (Dopamine) <sup>xxvi</sup>
014	Cerebral Anuerysm	6.4	Hypotensive agents, calcium channel blockers, aminophylline, corticosteriods, aminocaprioc, fibrinolytic inhibitor, albumin, plasmnate <sup>xxvii</sup>
001	Craniotomy	9.6	
014	CVA	6.4	Corticosteroids, analgesics, anticoagulants <sup>xxviii</sup>
027	Intracerebral Hematoma	9.8	
002		3.9	
480	Liver Transplant	27.1	Anti-emetics, antihistamines, hydration <sup>xxx</sup>
202	Cirrhosis	6.4	Anti-emetics, antihistamines, hydration <sup>xxxi</sup>
179	Crohn’s Disease	6.4	Corticosteroids, antibacterial agents, antidiarrheal agents, immunosuppressive, analgesics <sup>xxxii</sup>
148		12.2	
528	Cellulitis	N/A	Antibiotics <sup>xxxiii</sup>
296	Cystic Fibrosis	5.4	Antibiotics (are administered by heparin well, PICC line or central venous catheter in the hospital) <sup>xxxiv</sup>
421	CMV	4.0	Anti-viral medications (antibiotics) <sup>xxxv</sup>
271	Decubitis Ulcers	7.5	Nutritional support, antibiotics <sup>xxxvi</sup>
263		12.5	
300	Diabetes Insipidus	6.3	Vasopressin replacement <sup>xxxvii</sup>
397	Disseminated Intravascular Coagulation (DIC)	5.0	Plasma, cryoprecipitates, platelets, heparin <sup>xxxviii</sup>
148	Small and Large Bowel Procedures (Diverticulitis, intestinal obstruction)	12.2	Analgesics, anticholinergics, antibiotics, TPN, Electrolytes <sup>xxxix</sup>
088	Emphysema (COPD)	5.6	Bronchodilators, antibiotics, steroids <sup>xl</sup>
020	Encephalitis	8.2	Antivirals <sup>xli</sup>
135	Endocarditis	4.3	Antibiotics (4-6 weeks), analgesics, anti-inflammatory, corticosteroids <sup>xlii</sup>
105	Myocarditis	4.5	
104	Pericarditis	11.0	
144		15.2	
103		25.4	
537	Hyperemesis	N/A	Fluid and electrolyte replacement <sup>xlvi</sup>
473	Leukemia, Acute	9.3	Chemotherapy, antibiotics, blood, antivirals, antifungals <sup>xlvii</sup>
423	Lyme Disease	7.1	Antibiotics (10-20 days) <sup>xlviii</sup>
020	Meningitis	8.2	Antibiotics, corticosteriods <sup>xlx</sup>
021		8.4	
238	Osteomyelitis	9.1	Antibiotics (4-8 weeks) <sup>l</sup>
233		7.4	
203	Pancreatic Cancer	6.3	Chemotherapy, pain control, nutritional support, antibiotics <sup>li</sup>

DRG #	Diagnosis	LOS	Rationale
204 191	Pancreatitis	5.7 13.6	Fluid and electrolyte replacement, albumin, dopamine (for those who develop sepsis and shock), analgesics, insulin, antacids, histamine antagonists, anticholinergics, antibiotics <sup>lii</sup>
188 170	Peritonitis	4.9 9.8	Antibiotics, analgesics, nutritional support, fluid replacement <sup>liii</sup>
416 079	Septicemia/pseudomonas infection	6.9 8.3	Antibiotics <sup>liv</sup>
316 315	Renal failure, acute	5.9 6.0	Diuretics, electrolyte replacement, Sodium Bicarbonate, antihypertensives, antibiotics <sup>lv</sup>
242 210	Septic Arthritis	7.0 9.0	Antibiotics <sup>lvi</sup>
423	Toxoplasmosis	7.1	Antimicrobials <sup>lvii</sup>
188 148	Ulcerative Colitis	4.9 12.2	Steroids, antibiotics, anticholinergic agents, analgesics, immunosuppressive agents, fluid and electrolytes, blood, nutritional support <sup>lviii</sup>
884 892 894 884 890 879 875	wound infection post op and others	varies	Antibiotics <sup>lix</sup>

PICC catheters may also be used for:

- pain control
- blood draws
- limited venous access on admission
- steroids
- fluid restricted patients
- IV drug abuse
- diabetics
- multiple drugs
- multiple hospital admissions
- obese patients
- low platelet count
- incompatible medications<sup>lx</sup>

PICC catheters may also be used for irritant drugs such as:

- PPN & TPN--Hypertonic
- Dopamine pH 2.5 – 5
- Acyclovir pH 10.5-11.6
- Vancomycin pH 2.4
- Nafcillin--Hypertonic
- Ampicillin pH 8.0 -10
- 5 – FU® pH 9.2
- Amphotericin--irritant
- Doxycycline pH 1.8-3.3
- Erythromycin--irritant
- Phenytoin pH 12
- Bactrim® pH 10
- Ganciclovir pH 9-11
- Potassium pH 4.0
- Pentamidine pH 4.1 – 5.4
- Taxol® pH 4.4-5.6
- Ciprofloxacin pH 3.3 - 4.6

*Bactrim and 5 FU are registered trademarks of Roche Laboratories. Taxol is a registered trademark of Bristol Myers Oncology*

lxi lxii lxiii lxiv lxv  
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**Additional Considerations:** When considering device selection, these factors may affect vascular integrity:

- Diabetes mellitus (due to loss of subcutaneous fat, thin limbs, poor skin turgor)
- CHF (poor perfusion)
- COPD (decreased muscle mass, weight loss)
- IV drug abuse (lack of venous access)
- Steroids (fragile veins)

**Ports and Tunneled Catheter Patient Candidates by Diagnosis:**

<b>DRG #</b>	<b>Diagnosis</b>	<b>LOS</b>	<b>Rationale</b>
490 079 489	AIDS Pneumocystis Pneumonia	5.1 8.3	Pharmacologic therapy depends on type of opportunistic infection or malignancy Antibiotic, Analgesia <sup>lxvii, lxviii</sup>
239	Bone Cancer	6.8	Vesicant chemotherapy <sup>lxviii</sup>
274 257 260	Breast Cancer	5.9 3.5 1.9	Vesicant chemotherapy <sup>lxix</sup> Prednisone, Doxorubicin
296	Cystic Fibrosis	5.4	Antibiotics (are administered by heparin well, PICC line or central venous catheter in the hospital), TPN <sup>lxx</sup>
172 154	Esophageal Cancer	6.5 13.3	Chemotherapy <sup>lxxi</sup>
172 154	Gastric Cancer	6.5 13.3	Chemotherapy <sup>lxxii</sup>
403 401	Hodgkins Disease	7.4 9.2	Chemotherapy, prednisone, antiemetics <sup>lxxiii</sup>
064 482	Laryngeal Cancer	13.0 5.0	Chemotherapy, analgesics <sup>lxxiv</sup>
403	Chronic Leukemia	7.4	Chemotherapy, antibiotics, blood, analgesics, Bone marrow transplant, antifungals, antivirals <sup>lxxv</sup>
082 075	Lung Cancer	6.3 9.9	Chemotherapy, narcotics <sup>lxxvi</sup>
403 401	Malignant Lymphoma	7.4 9.2	Chemotherapy, antiemetics <sup>lxxvii</sup>
272 269	Malignant Melanoma	6.3 7.4	Chemotherapy <sup>lxxviii</sup>
366 357	Ovarian Cancer	5.9 8.9	Chemotherapy, analgesics <sup>lxxix</sup>
300	Malignant Pheochromocytoma	6.3	Chemotherapy, IV anti-hypertensives, analgesics <sup>lxxx</sup>
403	Polycythemia	7.4	Blood draws <sup>lxxxii</sup>
316 315	Renal failure, chronic	5.9 6.0	Diuretics, electrolyte replacement, antihypertensives, antibiotics, epogen, immunosuppressives, corticosteroids <sup>lxxxiii</sup>
395	Sickle Cell Disease	4.3	Analgesics, blood administration <sup>lxxxiii</sup>
346 338	Testicular Cancer	5.3 3.7	Chemotherapy <sup>lxxxiv</sup>
366 354	Uterine Endometrial Cancer	5.9	Chemotherapy <sup>lxxxv</sup>

## Drug Considerations \*

### List of Irritant Drugs

<b>Drug Name</b>	<b>Brand Name</b>	<b>Drug Name</b>	<b>Brand Name</b>
acyclovir	Zovirax®	gentamicin	Cidomycin® Jenamicin®
amikacin		nafticillin	Unipen®
amphotericin b	Fungizone®	tobramycin	Nebcin®
ampicillin sodium	Polycillin® Totacillin®	ticarcillin	
sulbactam sodium	Omnipen® Unaysn®	polymyxin	
aztreonam	Azactam®	levofloxacin	Levoquin®
azlocillin		foscarnet	
cefamandole	Mandol®	netilmicin	Netromycin®
cephradine		methicillin	
cefonicid	Monocid®	ofloxacin	
cefazolin	Ancef® Kefzol® Zolicef®	potassium 20 KCL	
ceftriaxone	Rocephin®	oxacillin	
cefuroxime	Kefurox® Zinacef®	penicillin	
cefoxitin	Mefoxin®	PPN	
ceftazidime	Ceptaz® Fortaz® Tazicef® Tazidime®	algrucerase	
cephalothin	Keflin®	aminocaproic acid	Amicar®
cephapirin	Cefadyl®	amobarbital	Amytal®
chloramphenicol	Chloromycetin®	dezocin	
ciprofloxacin		diltiazem	Cardizem®
clindamycin		morphine	
carboplatin		mannitol 10%	
bleomycin		bumetanide	Bumex®
carmustine		tolbutamide	
cytosine		propofol	Diprivan®
erythromycin		secretin	
pegaspargase	Oncaspar®	iron dextran	
5 FU	Fluorouracil®	lymphocyte immune globulin	
ifosfamide		immune globulin over 10%	
ganciclovir		flumazenil	
pentostatin		hemin	
azithromycin	Zithromax®	trovofloxacin	
imipenem	Primaxin®	levofloxacin	

\*Found in 1996 AA Training Manual

Vesicant drugs to consider infusing via a centrally placed catheter in non-emergent cases (Trissels or Gahart state to use large vein only and check for catheter patency before and after administration):

<b>Drug Name</b>	<b>Brand Name</b>	<b>Drug Name</b>	<b>Brand Name</b>
sulfamethoxazole	<b>Bactrim® Cotrimoxazole®</b>	calcium chloride	
carbenicillin		calcium cluconate	
dactinomycin		calcium clucephate	
doxycycline	<b>Vibramycin®</b>	Teniposide	<b>Vumon®</b>
metronidazole	<b>Flagyl®</b>	thiopental	
mechlorethamine	<b>Nitrogen Mustard®</b>	pentothal	
mitomycin	<b>Mutamycin®</b>	tromethamine	<b>Tham®</b>
plicamycin		promazine	<b>Sparine®</b>
streptozocin	<b>Zanosar®</b>	promethazine	<b>Phenergan®</b>
vinblastine		rocuronium	<b>Zemuron®</b>
vincristine	<b>Oncovin®</b>	secobarbital	
vindesine	<b>Eldisine®</b>	nitroprusside	<b>Nitropress®</b>
vinorelbine	<b>Navelbine®</b>	paraldehyde	
aldesleukin	<b>Proleukin®</b>	pentobarbital	<b>Nembutal®</b>
decarbazine		phenobarbital	<b>Luminal®</b>
daunorubicin		phenylephrine	<b>Neo-synephrine®</b>
sulfamethoxazole	<b>Bactrim® Septra®</b>	phenytoin	<b>Dilantin®</b>
doxorubicin		lorazepam	<b>Ativan®</b>
etoposide	<b>VP 16-213®</b>	metaraminol	<b>Aramine®</b>
pipecillin	<b>Zosyn®</b>	Methocarbamol	<b>Robaxin®</b>
rifampin		methoxamine	<b>Vaxoxyl®</b>
terramycin		midazolam	<b>Versed®</b>
vancomycin		norepinephrine	<b>Levophed®</b>
potassium over 40 KCL		doxapram	<b>Dopram®</b>
altepase		edetate disodium	<b>Endrate®</b>
dantrolene	<b>Dantrium®</b>	esmolol	<b>Brevoblic®</b>
dopamine		indomethacin	<b>Indocin®</b>
diazoxide	<b>Hyperstat IV®</b>	mezlocillin	
diazepam	<b>Valium®</b>	chlorothiazide	<b>Diuril®</b>
dextrose over 10%		potassium acetate over 40	
TPN		mannitol 20> 15%	
sodium bicarbonate			

<sup>i</sup> Josephson, Dianne L., **Intravenous Infusion Therapy For Nurses Principles and Practice**, Albany, NY, Delmar Publishers, 1998 pg 293

<sup>ii</sup> Weinstein, Sharon M. **Plumer's Principles and Practice of Intravenous Therapy**, Sixth Edition, Philadelphia, PA, Lippincott, 1997 pg 75

<sup>iii</sup> Bard Access Systems **Per-Q-Cath IFU (992R)**, pg 1

<sup>iv</sup> Josephson, Dianne L., **Intravenous Infusion Therapy For Nurses Principles and Practice**, Albany, NY, Delmar Publishers, 1998 pg 281

<sup>v</sup> Ryder, Marcia A., MSN, RN, CNSN, **Peripherally Inserted Central Venous Catheters, The Nursing Clinics of North America**, Volume 28 number 4, Philadelphia, PA, W.B. Saunders Co. 1993, pg. 939

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- xix Bard Access Systems **All about Midlines Brochure (AAM198)**, 1998
- xx Sawyer-Sommers, Marilyn, Johnson, Susan A., **Davis's Manual of Nursing Therapeutics for Diseases and Disorders**, Philadelphia, PA, F.A. Davis Company, 1997, pg. 113
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