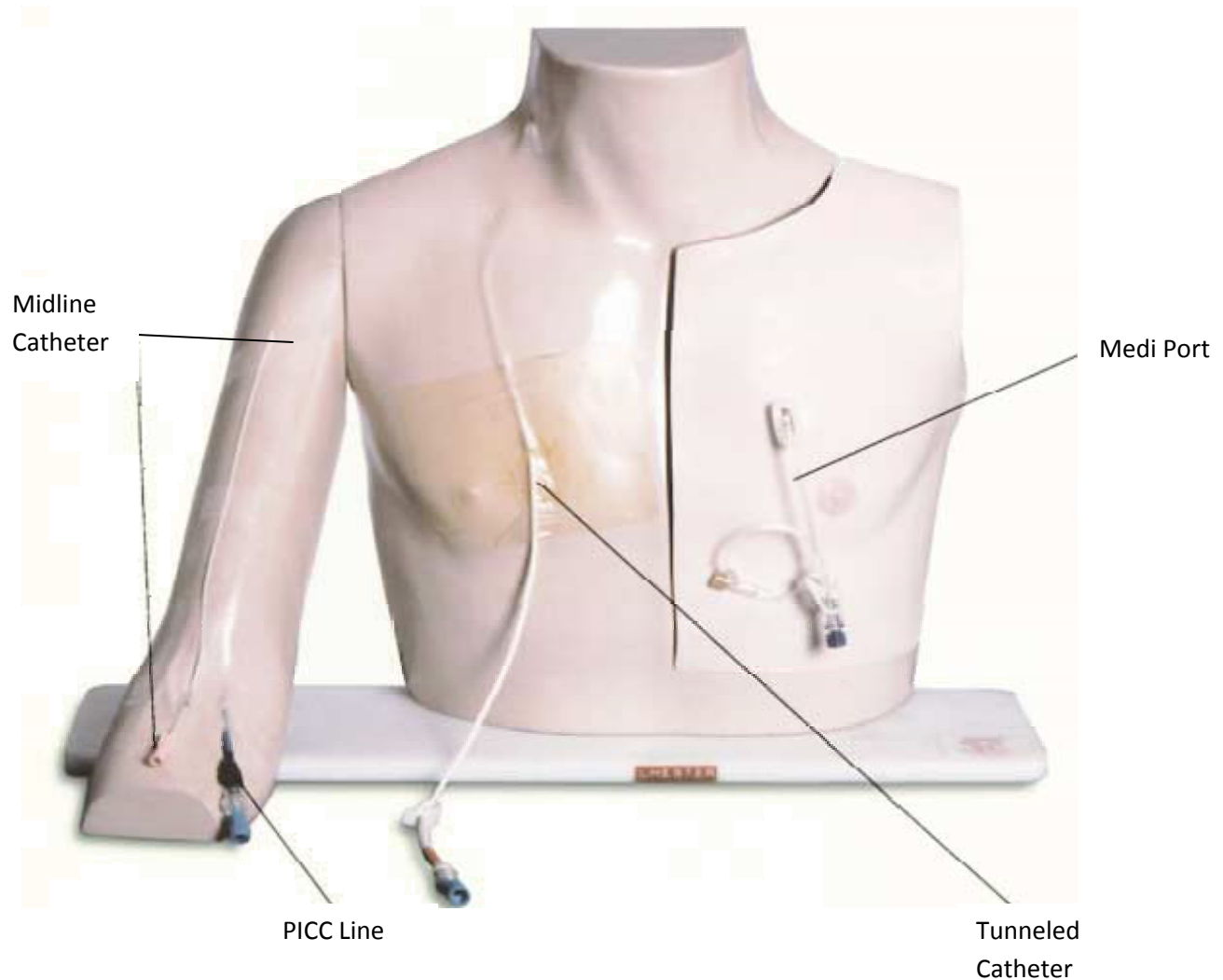


## Choosing An Effective And Safe Central Venous Catheter...



**An Evidence Based Approach!**

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## **Background**

Central venous lines (CVLs) are routinely used for monitoring and the administration of total parenteral nutrition (TPN) and medications in almost all critical / intensive care units (CCUs). Central venous access is normally obtained by cannulation of the internal jugular, the subclavian, or the femoral veins. Central venous access may also be obtained from more distal sites, typically the basilic and brachial veins, using a peripherally inserted central catheter (PICC). However, intravascular catheters are often associated with serious complications, such as catheter-related bloodstream infection. \*

## **The objective of this report...**

The objective of this report focuses on comparison of different major types of central venous catheters (CVCs) to analyze and evaluate the salient features, risks and benefits associated with each type. The evidence-based findings could then be used to propose a CVC that would provide the most efficient and safe means for usage in critical care settings.

\* Maki DG. *Infections due to infusion therapy*. In: Bennett JV, Brachman PS, eds. *Hospital Infections*. Boston: Little Brown; 1992:849-898.

# TYPES OF CENTRAL LINES USED IN CRITICAL CARE SETTINGS

## Central line catheter types based on the design

For the sake of easy understanding, CVCs can be divided into the following four major types based on their design:

### 1- Non-tunneled catheters

Non-tunneled catheters, the first central catheters on the market, are inserted into the internal jugular, subclavian, or femoral vein by direct venipuncture into the vein. Nontunneled catheters are inserted by a physician and placed only in an acute care setting, either in surgery or at the patient's bedside. The risk of pneumothorax or other insertion complications is sufficiently serious that catheter placement needs to be in a setting that has emergency intervention immediately available. Similarly, the risk of infection is higher for non-tunneled catheters than for any other central catheter design. This is partly due to the method of insertion and enhanced by the fact that the bacterial count on the skin in these areas is much higher than elsewhere on the body. Therefore, despite cautious cleaning technique, bacteria are more likely to be present at the insertion site, and they can migrate easily from the catheter into the vein. As with all CVCs, careful monitoring of the patient is essential, and the catheter should be removed as soon as it is no longer considered necessary for therapy. Immediate removal is recommended if infection is suspected.

### 2 -Tunneled catheters

Tunneled catheters are designed from nonrigid material such as polyurethane or silicone. These materials are less likely to traumatize the intima of the vein than the rigid polyethylene used for non-tunneled catheters. A tunneled catheter is inserted into a vein at one location (neck, chest or groin), and tunneled under the skin to a separate exit site, where it emerges from underneath the skin. It is held in place by a Dacron cuff, just underneath the skin at the exit site. The exit site is typically located in the chest, making the access ports less visible than if they were to directly protrude from the neck. In other words, a tunneled catheter enters the venous system through a major vein, usually the subclavian, and is threaded to the vena cava. However, instead of exiting the body at the venipuncture site, the catheter is tunneled under the skin and exits the body several inches away from the vein. Two points nevertheless make such catheters unfavorable: because they are external, their presence is hard to disguise and they require daily care. For many chronic patients, the presence of external catheters serves as a constant reminder of illness.

### **3-Implanted ports**

This type is similar to a tunneled catheter but is left entirely under the skin (there is no exit site). Implanted ports are designed with the same types of material as tunneled catheters. The port is sutured to the fascia, and a pocket of skin is sutured over it. To access the port, a special noncoring needle, usually referred to as a Huber point needle, is inserted through the skin into the septum. The needle is designed to ensure that the 2 points of the bevel enter the septum at exactly the same spot, thus preventing coring. When properly placed, this needle makes contact with the back of the port and allows fluid to flow into the catheter. The most common location for implanting the port is the chest. However, placement in the leg is occasionally seen. A slightly different catheter design, known as a peripheral access system, or PAS port, is implanted in the upper arm. Ports are placed in surgery usually using local anesthesia and removed in surgery as well.

### **4- Peripherally inserted central catheters (PICCs)**

A PICC is a flexible tube about 55cm (20 inch) long. It is usually made of silicone or polyurethane. Peripherally inserted central catheters are peripherally placed using the medial, more commonly these days, the basilic vein at the medial upper arm. The catheter is threaded along the vein, into the subclavian, and eventually into the vena cava, where the tip lies immediately above the right atrium. Although the catheter is percutaneously placed in the same manner as nontunneled catheters, the risk of infection is much less because fewer bacterial colonies populate the insertion area.\*

*\*LYNDA S. COOK, Home Healthcare Nurse, September 2007, Volume 25 Number 8, Pages 523 - 531*

## **Major central line catheter types based on the sites of insertion**

Although the tip location of all central lines is the same, the insertion sites vary among the designs. The first three CVC designs mentioned all are inserted in the central section of the body via the internal jugular, subclavian, or femoral vein.

### **1-Catheter in internal jugular vein**

Central line catheterization in internal jugular vein is usually done because of one or more of the following indications:

- Central venous, Pulmonary artery, Pulmonary artery wedge pressure monitoring
- Access for hemodialysis/ultrafiltration, fluid resuscitation, pressors, inotropes, etc. that cannot be performed through a peripheral line
- Lack of peripheral access
- Frequent laboratory monitoring (relative)

### **2-Catheter in right Subclavian vein (Infraclavicular approach)**

Central line catheterization of subclavian vein can be performed in presence of one or more of the following indications:

- Central circulation and intracardiac access
- Maintenance of venous access
- Hemodialysis and plasmapheresis

### **3-Catheter in right femoral vein**

Catheterization of right femoral vein is usually done when one of more of the following indications are present:

- Central venous pressure monitoring
- Access for hemodialysis/ultrafiltration, fluid resuscitation, pressors, inotropes, etc. that cannot be performed through a peripheral line
- Lack of peripheral access
- Frequent laboratory monitoring (relative)

#### **4- Catheter in peripheral vein (PICC)**

Peripherally inserted central catheters (PICCs) are frequently used to obtain central venous access for patients in acute care, home care and skilled nursing care. PICCs may also be used for any infusate, regardless of osmolarity, pH, or other chemical properties of the solution or medication. PICCs are also indicated for short-term infusions for patients with limited venous access and for therapies that will continue over long periods of time. A PICC is often the central VAD of choice, due to the lower incidence of infection compared with subclavian and internal jugular percutaneous catheters, and because there is no risk of pneumothorax with the PICC insertion procedure. New generation of PICC's provide a broad range of usage such as enhanced catheter flow rates, hemodynamic monitoring as well a power injectable capabilities. PICC Lines are recently available in triple lumens making them more versatile for patients requiring multiple infusions.\* Because of their usage in variety of conditions and settings, safety and reliability, PICCs will be discussed in detail in this report.

*\*The Role of Peripherally Inserted Central Catheters in the Treatment of the Critically-ill*

### **Complications of CVCs - How grave is the threat?**

***“Each year, an estimated 250,000 cases of central line-associated (i.e., central venous catheter-associated) bloodstream infections (BSIs) occur in hospitals in the United States, with an estimated attributable mortality of 12%-25% for each infection.”\****

***The Centers for Disease Control and Prevention (CDC) also estimate that annual US prevalence of central line-associated bloodstream infections result in approximately 30,000 to 62,000 deaths and about \$2 to \$3 billion in excess costs per year. \****

***“Central line-associated blood stream infections are the third most common health-care-associated infections (after ventilator-associated pneumonia and catheter-associated urinary tract infections) reported by medical/surgical ICUs participating in the NNIS system.”\*\****

***“Each year in the United States, approximately 80,000 CVC-associated bloodstream infections (BSIs) occur in patients in ICUs.”\*\*\****

References:

*\*CDC. Guidelines for the prevention of intravascular catheter-related infections. MMWR 2002;51(No. RR-10).*

*\*\* Richards MJ, Edwards JR, Culver DH, Gaynes RP. Nosocomial infections in combined medical-surgical intensive care units in the United States. Infect Control Hosp Epidemiol 2000;21:510-5.*

*\*\*\*O'Grady NP, Alexander M, Dellinger EP, et al, for the Centers for Disease Control and Prevention. Guidelines for the prevention of intravascular catheter-related infections. MMWR. 2002;51(RR-10):1-29.*

For the purpose of convenience and differentiation, the complications associated with various types of central venous catheters can be divided into two main categories:

**1-Complications associated with Non-peripherally inserted CVCs**

**2-Complications associated with PICCs**

We will first discuss the complications caused by first three types of CVCs (i.e. Internal jugular, femoral and subclavian vein catheters) followed by those that may result after PICC use.

**1-Complications associated with Non-peripherally inserted CVCs**

More than 15% of patients undergoing CVC experience some sort of complication. Arterial puncture, hematoma, and pneumothorax are the most common mechanical complications of CVC. Venous thrombosis and catheter-related infections are also common and can be life threatening.

	<b>Complication</b>	<b>Internal jugular vein catheterization</b>	<b>Femoral vein catheterization</b>	<b>Subclavian vein catheterization</b>
1-	<b>Infections</b>	Associated with the moderate risk of infections *	Associated with the highest risk of infections *	Associated with fewer catheter-related infections than the internal jugular or femoral sites
2-	<b>Venous thrombosis</b>	Reported association with venous thrombosis approximately four times greater than that of subclavian vein cannulation **	Venous thrombosis has been reported in as many as 21% of femoral vein catheterizations **	Subclavian venous catheterization carries the lowest risk of catheter-related thrombosis***
3-	<b>Arterial puncture (common carotid artery)</b>	More likely to be associated with arterial puncture **	Shows highest frequency of arterial puncture **	Less likely to be associated with arterial puncture **
4	<b>Pneumothorax and hemothorax</b>	Rarely associated with pneumothorax and hemothorax than the internal jugular site **	More commonly associated with pneumothorax and hemothorax than the internal jugular site **	More commonly associated with pneumothorax and hemothorax than the internal jugular site **

\* Rogier et al., *Pediatr Crit Care Med.* 2005;6(3):329-339.

\*\* Robert W. Taylor, MD; Ashok V. Palagiri, MD, *Crit Care Med.* 2007;35(5):1390-1396.

\*\*\* David C. McGee, M.D., and Michael K. Gould, M.D., *NEJM*, Volume 348:1123-1133

## **2-Complications associated with peripherally inserted CVCs (PICCs)**

Based on clinical evidence and scientific data, PICCs are less likely to incur major complications compared with central catheters placed in the subclavian or internal jugular veins. \*

### **1-Infections**

The documented infection rate for PICCs is 0.75 infections per 1000 catheter days, compared with short-term (non-medicated) central venous catheters at 2.51 infections per 1000 catheter days.\*\*

*\*Deborah A. Schwengel et al., Anesth Analg 2004; 99:1038-1043*

*\*\* Carrico R, ed. APIC Text of Infection Control and Epidemiology, 2nd ed. Washington, DC: Association for Professionals in Infection Control and Epidemiology; 2005.*

### **2-Deep venous thrombosis**

With any indwelling venous catheter there is a risk for thrombous formation. A literature review published in the American Journal of Medicine found the risk for DVT from indwelling PICC lines ranging from 31% to 73% based on 15 published clinical trials. (Kirkpatrick, A, et al, American Journal of Medicine).

Other research has concluded that the risk of indwelling PICC-related DVT is anywhere between 0% and 56%. (Paauw, J.D., et al, Journal of Parenteral and Enteral Nutrition)

The wide range in reported incidences is likely due to the wide range of study conditions, researchers have said.

No studies were found comparing DVT on PICC lines vs Non Peripherally Insetered CVC. The research on avoiding the risk of DVT with an indwelling PICC is mixed, with some research showing a lowered risk of DVT with prophylactic anticoagulants in some patients, while other researchers have found the anticoagulants made no difference.

### **Other complications of peripherally inserted central catheters**

While PICCs have a relatively low complication rate, there are some complications related to their use such as:

- Air embolus
- Catheter embolus
- Arterial puncture (during insertion)
- Cardiac arrhythmia
- Nerve injury or irritation

- Inability to advance catheter to desired tip termination
- Catheter malposition (can occur during insertion, or after insertion)
- Phlebitis
- Difficult removal of PICC

## PICCs – Analysis as an efficient & safe CVC of choice

Based on the above discussion regarding complications and complication rates associated with different types of CVCs, PICCs do emerge as a relatively safe and compliant choice for the patients admitted in critical care settings. However, let's adopt a closer evidence-based approach to discover various features, benefits and safety aspects associated with the consistent use of PICCs.

### Indications of PICC use

**1-When recommended:** The Centers for Disease Control and Prevention recommends consideration of a peripherally inserted central catheter (PICC) for therapies longer than 1 week.\*

**2-Long Term drug / chemotherapy:** The PICC line is ideal for this purpose and can be used for a few weeks, months and up to one year with proper care before it is discontinued. PICC line can be used for both short infusions or continuous infusions of the chemotherapeutic medications.

**3-Hyperalimentation:** In CCUs where most of the patients are in need of parenteral nutrition for care and control, PICCs seem to provide reliable means of the same especially for long-term use.

**4-Administration of Blood or Blood Products:** Patients with blood disorders, such as anemia, low platelet counts, or coagulation disorders, may require repeated blood or blood products. PICC lines can serve this purpose as they can stay for a longer time avoiding repeated catheter insertion. In addition, most have large gauge lumens necessary to accommodate blood administration. However, as a precautionary measure, PICCs should not be used for “frequent” intermittent access or for blood sampling. Because a PICC is very long and thin, it is not advisable to insert it “solely” for the purpose of obtaining blood for laboratory analysis. Each blood draw increases the risk of occluding the catheter. A risk-benefit analysis should be done to determine the value of using a PICC for drawing blood. Manufacturers’ directions for use should be consulted carefully when making this decision.

\*O'Grady NP, Alexander M, Dellinger EP, et al. Guidelines for the prevention of intravascular catheter-related infections. *MMWR Recomm Rep.* 2002;51:1-29.

**5-Measurement of Central Venous Pressure:** Central venous pressure monitoring is often obtained in patients with cardiovascular disturbances, especially those undergoing treatment in ICU. Since the tip of the PICC line is advanced near the heart, it can be used to measure the central venous pressure.

**6-Short term infusion:** PICCs are also indicated for short-term infusions for patients with limited venous access. In fact, PICCs may be used for any infusate, regardless of osmolarity, Ph, or other chemical properties of the solution or medication.

**7-In poor candidates of surgery / anesthesia:** PICCs are also indicated in poor candidates for a surgical procedure and/or the anesthesia required for placement of a tunneled central venous access device.

**8-Outpatient IV therapy:** PICC placement may be indicated in individuals requiring IV access who desire outpatient IV therapy (*Ryder, 1993; Stovroff & Teague, 1998*).

## **Drugs that can be infused through PICCs or CVCs**

The Infusion Nurses Society Standards of Practice (2006) state that drugs which have a pH less than 5 and greater than 9 should be infused through a Central Line. Certain drugs are venous irritants regardless of pH or concentration.

## **Contraindications of PICC use**

Following are the conditions when PICC use should be avoided:

**Upper extremity / subclavian thrombosis:** The presence of upper extremity or subclavian thrombosis is another contraindication for bedside PICC insertion, whether or not ultrasound is used. These patients also may be referred to interventional radiology to have a PICC inserted under fluoroscopy.

**Chronic renal failure / end stage renal disease:** The need to preserve peripheral veins for future dialysis fistulas is a critical issue for these patients. Insertion of any catheter in the upper extremity or the subclavian veins can cause thrombus formation and scarring that could reduce the probability for successful fistula development.

## Preventive measures to ensure safe and efficient use of PICCs

As an effort to reduce the incidence of blood related infections and other complications, various interventions have been used. These include:

- Different antibacterial skin preparations – Chloro prep vs Betadine
- The type of dressing at the site of catheter insertion – Bio Patch and other antimicrobial dressings.
- Experience of staff members inserting as well as caring and maintaining..
- In addition, nurses caring for patients with PICCs must be properly educated in device use, site care, of CVC and about CLABSI Prevention, as well as recognition of complications. \*
- Require healthcare personnel to complete an educational program including a post education test to ensure their knowledge and competency before being allowed to insert or care for CVCs. \*\*

*\*A. Lodha; A.D. Furlan; H. Whyte; A.M. Moore J Perinatol. 2008;28(8):526-533.*

*\*\*S22 infection control and hospital epidemiology october 2008, vol. 29, supplement 1  
supplement article: shea / idsa practice recommendation  
Strategies to Prevent Central Line–Associated Bloodstream  
Infections in Acute Care Hospitals*

## Studies focused on CRBSI

### Pittsburgh Regional Healthcare Initiative

In 2001, CDC was invited by the Pittsburgh Regional Healthcare Initiative (PRHI) to provide technical assistance for a hospital-based intervention to prevent central line-associated blood stream infections among intensive care unit (ICU) patients in southwestern Pennsylvania. The intervention was designed collaboratively and led by infection-control professionals and medical staff from the participating hospitals. During a 4-year period, blood stream infection rates among ICU patients declined 68%, from 4.31 to 1.36 per 1,000 central line days. The results suggest that a coordinated, multi-institutional infection-control initiative might be an effective approach to reducing health-care-associated infections.

The 32 Pennsylvania hospitals that participated in this regional patient-safety intervention reduced BSI rates by 68% in 4 years, suggesting that coordinated infection-control initiatives among health-care facilities in a region might be an effective way to reduce catheter-associated events such as BSIs.

*Morbidity & Mortality Weekly Report. 2005;54(40):1013-1016.*

## Sutter Roseville Medical Center

Sutter Roseville Medical Center is a 180 bed acute care community based facility with 32 critical care beds. In December 2005 a Vascular Team was developed taking ownership of the insertion and maintenance of all vascular access devices. The strategy focused on improving patient care and reducing CRBSI rates. The study focused on a 15 month period from January 2006 thru March 2007. The results were zero occurrences of CRBSI with an increase usage of PICC Lines. This study demonstrates that a specialized team monitoring the VAD and supporting and educating primary care nurses an increase in PICC lines may reduce CRBSI rates.

*Sophie A. Harnage, BSN, RN, JAVA vol 12 No 4, 2007; (218-224) Achieving Zero Catheter Related Blood Stream Infections: 15 Month Success in a Community Based Medical Center.*

## Impact of Peripherally Inserted Central Catheters on Catheter-Related Bloodstream Infection in the Intensive Care Unit

A collaborative effort was made to determine if using PICC's in the intensive care would decrease CRBSI. A four year study from January 2000 to December 2003, in a 20 bed ICU and a 10 bed intermediate care unit. A specialized team and standardized procedures were implemented. The results yielded a total of 6210 central inserted catheter-days and 15,709 PICC catheter-days. The data was analyzed and an increase in PICC Lines usage and decrease in CICC was obvious, with a significant decrease in rate of CRBSI by the end of the study. The study suggests early insertion of PICC Lines with a specialized vascular team will effectively reduce the rate of CRBSI's in the ICU.

*Bhavesh M. Petel, MD, FRCP©, Corinna J. Dauenhauer, RRT, Mohamed Y. Rady, MD, PhD, FCCM, Joel S. Larson, MS, Tonya R. Benjamin, RN, aniel J. Johnson, MD, and Richard A. Helmer, MD, jPatient Saf, Vol 3 No3, September 2007*

All the above studies demonstrate five consistent components:

**1-Promotion of targeted, evidence-based catheter insertion practices:** use of maximum sterile barrier precautions during insertion, use of chlorhexidine for skin disinfection before catheter insertion, avoidance of the femoral insertion site, use of recommended insertion-site dressing care practices, and removal of catheters when no longer indicated);

**2-Promotion of an educational module:** about central line-associated infections and strategies for their prevention;

**3-Promotion of standardized tools:** for recording adherence to recommended catheter insertion practices; kits that include all supplies required to adhere to recommended insertion practices.

**4-Measurement of central line-associated infection rates and distribution of data:** to participating hospitals in confidential quarterly reports, allowing comparison of individual unit-specific rates with pooled mean rates from other participating ICUs in the region and pooled mean rates from all other U.S. hospitals participating in the National Nosocomial Infection Surveillance (NNIS) system, stratified by type of ICU.

**5-Specialized Vascular Teams:** Teams that are responsible for the insertion as well as care and maintenance can monitor insertion sites, insure integrity while continually educating staff nurses on proper infusion practices.

### An at-a-glance comparison of centrally inserted VCs and PICCs

Feature	Centrally inserted VCs	PICCs
<b>Usage time</b>	They are recommended for short term use only. E.g. Midlines may be used for up to 4 weeks	PICC lines may be used for up to a year
<b>Suitability for blood sampling &amp; chemotherapy</b>	Not every centrally inserted venous catheter is suitable for drawing blood or infusing chemotherapy	With a PICC line you may also get blood and chemotherapy
<b>Convenience of insertion</b>	CVCs, although reliable, often require placement in the operating room with anesthesia.	PICCs can be placed at the bedside by a registered nurse. This avoids the need for general anesthesia and a surgical procedure.
<b>Cost-effectiveness</b>	Requirement of general anesthesia makes their use less appealing to some patients and significantly adds to the cost of treatment.	As they can be inserted without general anesthesia and at bedside, the associated costs are significantly less than those associated with CVCs.
<b>Sites of insertion</b>	Most other central lines might be inserted in areas such as the neck or groin.	The insertion site of a PICC, typically, is the upper arm. This area is cleaner than areas where

<p><b>Dwell time:</b> The maximum expected duration considered appropriate for a given type of device.</p> <p><b>(Long term venous access)</b></p>	<p>Central venous catheters placed in the neck or groin last longer at every one to two weeks but pose more risk for infection and complications.</p>	<p>There is no established dwell time for PICCs but if the therapy is expected to last longer than 1 year, a more permanent type of central access device should be considered, such as a tunneled catheter or implanted port.*</p>
<p><b>Accessibility</b></p>	<p>Central veins are not always easily accessible.</p>	<p>Peripheral veins are readily accessible. **</p>
<p><b>Patient compliance</b></p>	<p>As they are not usually indicated for long term use, it's often not advisable for the patient to go home with a centrally inserted catheter in place.</p>	<p>Patient can go home with the PICC in and it can be left in for weeks or months. This makes it possible for him / her to have the treatment without having to have needles frequently inserted into the veins. This may be particularly helpful if patient's veins are hard to find or have been hardened by previous chemotherapy treatment.</p>

\*O'Grady NP, Alexander M, Dellinger EP, et al. Guidelines for the prevention of intravascular catheter-related infections. *MMWR Recomm Rep.* 2002;51(RR-10):1-29.

\*\* Robert W. Taylor, MD; Ashok V. Palagiri, MD, *Crit Care Med.* 2007;35(5):1390-1396.

## PICCs – Features & benefits

	<b>Feature</b>	<b>Benefit</b>
1	<b>Long term venous access</b>	An ideal venous access device for patients with chronic diseases requiring long term intravenous therapy such as, for example, antibiotics or nutrition.
2	<b>High blood flow around tip:</b> With central tip termination, the blood flow around the catheter is high, usually 2 L or more per minute.	This provides immediate dilution of the infusate and helps protect the vessel walls from chemical irritation by the prescribed therapy
3	<b>Low risk for infection</b>	Lesser therapy costs, enhanced patient mortality and morbidity
4	<b>Facility of blood sampling:</b> PICCs can be used to draw blood samples required for the vast array of blood tests to diagnose and treat virtually all diseases or illnesses.	Increased patient satisfaction  Repeated skin pricks for blood sampling, therefore, can be avoided. This decreases the potential for infection and reduces the sufferings of the patients
5	<b>Possibility of at-home care:</b> A PICC line can be cared for at home by health care agencies, patient families, infusion centers or other outpatient facilities.	Early Patient Discharge: a patient requiring, for example, a six week regimen of IV antibiotics no longer has to remain in the hospital to receive all required treatments.
6	<b>Versatility:</b> PICC lines, with their multi lumened IV access are versatile IV access lines.	Can be used to administer antibiotics, blood and blood products, anti-cancer drugs, intravenous fluids and nutrients.

## Evidence-based recommendations on PICC usage

### Recommendation for PICC use in parenteral therapy

***“The majority of published data about PICC lines is in the area of chemotherapy or antibiotic infusion. Our study supports the use of PICC lines in patients receiving a variety of solutions, primarily parenteral nutrition. With an experienced, team approach to catheter placement and maintenance, PICC lines provide reliable, cost-effective venous access and reduce many of the complications of central venous access in a variety of clinical settings.”***

LOUGHRAN S. C. BORZATTA M., *Journal of parenteral and enteral nutrition* 1995, vol. 19, no2, pp. 133-136 (36 ref.)

### Recommendation on PICC safety

***“Conventional placement of central venous catheters and surgical tunneling of catheters and ports, however, are not without risk. Peripherally inserted central venous catheters are less invasive and far less expensive and have lower morbidity and mortality. They have a lower risk at initial placement and no risk of pneumothorax and are easy to remove.”***

John M. Racadio, et al., *Radiology*. 1999; 210:858-860

### Effective in variety of populations

Peripherally inserted central catheters (PICCs) have proven to be an effective means of IV delivery in a variety of populations.

***“An evaluation of the effectiveness of the use of PICCs for patients at a CF center in New England was conducted over a 25-consecutive month period. The purpose of this investigation was to evaluate the effectiveness of using PICCs for the delivery of antibiotics for children and adults with cystic fibrosis. During this time, 61 PICCs were placed in 32 patients with CF requiring IV antibiotics. The catheters were in place for a median of 15 days (range 1-155 days). The total number of catheter days in this series was 1,139.***

***No serious complications were encountered. No long-term sequelae resulted, and the rate of IV antibiotic completion with this mode of IV access was high. As a result of the evaluation, PICC access remains the standard of care at this institution for patients with CF requiring IV antibiotics for pulmonary exacerbations.”***

Concettina Tolomeo, Wendy Mackey, *Pediatr Nurs*. 2003;29(5)

## **Recommendation on safety & reliability**

PICCs are a reliable alternative to short-term central venous catheters with lower potential for complications than short-term central venous catheters<sup>[1-4]</sup>. Early assessment of hospitalized patients is essential to assure that individuals who will benefit the most from a PICC receive one as soon as possible in their treatment. However, it doesn't mean that PICCs are appropriate for every patient. Indications, contraindications, and potential complications must be considered prior to insertion of a PICC.

1-O'Grady NP, Alexander M, Dellinger EP, et al. Guidelines for the prevention of intravascular catheter-related infections. *MMWR Recomm Rep*. 2002;51(RR-10):1-29.

2-Skiest DJ, Abbott M, Keiser P. Peripherally inserted central catheters in patients with AIDS are associated with a low infection rate. *Clin Infect Diseases*. 2000;30:949-952.

3-Ng PK, Ault MJ, Ellrodt AG, Maldonado L. Peripherally inserted central catheters in general medicine. *Mayo Clin Proc*. 1997;72:225-233. [Abstract](#)

4-Hadaway, LC. Major thrombotic and nonthrombotic complications. *J Intraven Nurse*. 1998;21(5 suppl):S143-160.

## **Decisive conclusion**

It is clear from the above discussion that PICCs can provide central venous access for administration of any type of infusate. They can actually be considered as a "hybrid" between conventional peripheral venous access devices and central venous catheters as it performs the function of a central venous catheter with the safety of a conventional peripheral venous catheter.

They are less invasive and have fewer potential complications than percutaneous central venous catheters, and can be left in place for an extended period of time. While not appropriate for every patient, PICCs offer an excellent alternative to frequent venipunctures and the routine use of other higher-risk, short-term central catheters. Early assessment of venous access needs can facilitate PICC insertion as soon as possible in the patient's hospitalization and help prevent discomfort and repeated venipuncture.

PICC are long lasting, better tolerated, allow repeated blood sampling, have few complications and may facilitate home care for some patients. Therefore, PICC should be the vascular access of choice for adults and children requiring intermediate-term vascular access. However, like with other types of central venous lines, whenever there is a potential risk of complications, it should be balanced against intended benefits when deciding to insert a PICC line.