

Annotated Bibliography Midline Catheters

Anderson RN. Midline Catheters: the Middle Ground of Intravenous Therapy Administration. *J Infus Nurs.* 2004 Sep-Oct;27(5):313-21.

The author discusses the challenges of a small 110 bed community hospital in providing infusion therapy for patients for whom a short peripheral catheter and PICC were inappropriate. The midline catheter appeared to answer their needs. A literature search for midline catheters yielded only four published articles; only one of which was related to outcomes. This article examines the management of those patients.

Comment: This is one of few published articles that discusses the implementation of a midline infusion program and its results.

Conn C. The Importance of Syringe Size When Using Implanted Vascular Access Devices. *J Vasc Access Nurs.* Winter 1993;3:11-18.

Conn reviews the practices of 136 nurses and syringe sizes used for accessing IVAD (Implanted Vascular Access Devices). The survey showed that the selection of syringe size was primarily based on policies and procedures (54%) or personal preferences (56%) and not on manufacturer's recommendations. The majority of nurses knew (51%) that smaller syringes generated higher psi, but 76% did not know the maximum rating for the IVAD and 82% used a smaller size syringe than what was recommended.

Comment: Gives syringe size recommendations associated with specific IVADs and the amount of pressure needed to activate a syringe plunger.

Crnich CJ, Halfmann JA, Crone WC, Maki DG. The Effects of Prolonged Ethanol Exposure on the Mechanical Properties of Polyurethane and Silicone Catheters Used for Intravascular Access. *Infection Control Hosp Epidemiol* 2005 Aug;26(8):708-14.

The authors research indicated that exposure to a 70% ethanol lock solution does not appreciably alter the integrity of selected commercial polyurethane and silicone catheters. They further stated that given the greatly expanded use of alcoholic solutions with intravascular devices of all types, they believe that manufacturers would be well advised to subject their catheters and other intravascular devices to formal testing of the type employed in this study.

Comment: Practitioners should check with individual manufacturers for their specific recommendations before using alcohol.

Danek GD, Noris EM. Pediatric IV Catheters: Efficacy of Saline Flush. *Pediatric Nursing.* 1992;18:111-113.

Prospective, randomized, blinded study tested the efficacy of NSS as flush solution to maintain catheter patency in 22 and 24 gauge intermittent access catheters. Patient population was age 0 to 18 years. Even though all catheter sizes were used, only data analysis was completed for the 22 and 24 gauge catheters. This metric was determined to be part of the study design. Results showed that normal saline was less effective than dilute heparin solution in 24 gauge catheters in maintaining catheter function (n=120).

Comment: Statistics used: Univariate analysis of 22 and 24 gauge catheter longevity (in hours) with both NSS and dilute heparin was calculated; Log rank and Wilcoxon (nonparametric) and survival curves using Kaplan-Meier estimates. A p value of .05 or

less was accepted.

Guideline for Hand Hygiene in Health-Care Settings 2002

The hand hygiene guidelines were developed by the CDC's Healthcare Infection Control Practices Advisory Committee (HICPAC), in collaboration with the Society for Healthcare Epidemiology of America (SHEA), the Association of Professionals in Infection Control and Epidemiology (APIC), and the Infectious Disease Society of America (IDSA). The hand hygiene guidelines are part of an overall CDC strategy to reduce infections in health care settings to promote patient safety.

Comment: <http://www.cdc.gov/handhygiene/> Website contains free download of the Hand Hygiene Guidelines and a link to the Hand Hygiene Resource Center which contains educational resources.

Also published as: Guideline for Hand Hygiene in Health-Care Settings: recommendations of the Healthcare Infection Control Practices Advisory Committee and the HICPAC/SHEA/APIC/IDSA Hand Hygiene Task Force. *Infect Control Hosp Epidemiol.* 2002 Dec;23(12 Suppl):S3-40.

Intravenous Nurses Society (INS). Midline and Midclavicular Catheters. JIN. July/August 1997;20:175-178.

The article is a 1997 position paper developed by INS to address the controversies and inconsistent practices involving non central catheters. It defines midline and midclavicular and gives the appropriate catheter tip location for each catheter. It also discusses the necessary professional qualifications needed to insert them as well as patient assessment and indications for use.

Comment: Intravenous Nurses Society (INS) is now Infusion Nurses Society. INS does not reference this position paper on their current website (2007) and 2006 Infusion Nursing Standards of practice does not mention a midclavicular catheter, but discusses Midline catheters in detail.

Macklin D. What's Physics Got to Do with It? JVAD. Summer 1999:7-10.

This article reviews the physical principles of fluid administration. Macklin explains the relationship between resistance and pressure and how they impact flow through a catheter or through a patient's vein. Two tables are presented; one identifying the amount of pressure generated using various size syringes with different pressures applied to the plunger and the other describing the amount of force to withdraw a liquid without creating a vacuum.

Comment: The explanations are direct and easily understood. Formulas and diagrams assist in the explanations.

Maki DG, Kluger DM, Crnich CJ. The Risk of Bloodstream Infection in Adults with Different Intravascular Devices: a Systematic Review of 200 Published Prospective Studies. Mayo Clin Proc. 2006; 81:1159-1171.

The authors did a systematic review of 200 published prospective studies (1996 to 2005) to better understand the risk of bloodstream infection associated with intravascular devices. They listed the number of studies by patient care units and/or patient characteristics.

Comment: Out of 200 studies reviewed, there were only 3 studies with a total of 514

midline catheters or 9251 IVD (intravascular device) days listed. Infection rate for midline catheters was 0.4% or 0.2 per 1000 catheter days. This article lists 239 references.

National Association of Vascular Access Networks. Tip Location: NAVAN Position Statement. J.Vas. Access Devices. 1998;3:8-10.

The 1998 position statement recommended that “the most appropriate location for the tip of peripherally inserted central catheters (PICCs) is the lower one-third of the SVC (superior vena cava), close to the junction of the SVC and the right atrium. This tip location allows the catheter to float freely within the vein lumen and lie parallel to the vessel wall, resulting in a considerable reduction in such complications as thrombosis and infection. The catheter tip should not extend into the right atrium, as cardiac complications may develop with such a placement. Insertion sites in the lower extremity of pediatric and neonatal patients should result in a tip location in the inferior vena cava above the level of the hemidiaphragm.”

Comment: NAVAN (National Association of Vascular Access Networks) is now AVA (Association for Vascular Access). The position statement is located on the AVA website and is free to download.

<http://www.avainfo.org/website/article.asp?id=1441>

Occupational Exposure to Bloodborne Pathogens; Needlestick and Other Sharps Injuries. 66 Federal Register 5317 (2001)(Codified at 29 CFR~1910.1030).

This is the final ruling to the revision of the 1991 Blood Borne Pathogens standards which includes the Needlestick Safety and Prevention Act.

Comment: The document can be retrieved in its entirety from <http://www.gpoaccess.gov/fr/retrieve.html>; choose Federal Register # 66 and type in page 5318 which will take you to the first page of the document.

Ryder MA. Peripherally Inserted Central Venous Catheters. Nursing Clinics of North America. 1993;28:937-971.

Ryder did an extensive review of peripherally inserted central venous catheters (PICCs) literature; the associated anatomy; indications for use; catheter design and the potential complications associated with their use. She also looked at a model for PICC program quality improvement.

Comment: The article contains a Vascular Access Device Selection table that assists the clinician in choosing the right device for the right patient; the right setting and for the right infusion therapy and the specific duration. The table also includes midlines.

Sansuvero GE. Venous Anatomy and Physiology. J of Intravenous Nursing. September/October 1998;21(55);S107-S114.

The author reviews the anatomy and physiology associated with central venous access by way of the peripheral veins of the upper extremities. She identifies patient assessment parameters to be considered in choosing the device and which vein(s) to be utilized.

Comment: The article contains a number of tables; one summarizes co-morbid conditions that may impede conventional vascular access placement and another gives anthropometric measurements for the upper extremity veins.

Tomkins DP, Van Der Walt JH. Needleless and Sharp-Free Anaesthesia. *Anaesthesia and Intensive Care*. 1996;24:164-7.

The authors discuss the risks of sharps injuries as an occupational hazard within the anesthesia profession. They describe 6 specific situations which place them at risk and encourage their colleagues to adopt universal precautions and safe practices.

Comment: The authors are Australian.

Black IH, Blosser SA, Murray WB. Central venous pressure measurements: peripherally inserted catheters versus centrally inserted catheters. *Critical Care Medicine* 200 Dec; 28(12): 3833-6.

They concluded that the PICCs can be used to measure central venous pressure and to follow trends in a clinical setting. Pressure infusion devices need to be used to overcome the natural resistance of the PICC. Central venous pressure recorded via PICCs is slightly higher than that of a CICC but the difference is clinically insignificant.

The authors conducted a bench evaluation and a prospective, non-blinded clinical comparison to determine whether central venous pressure measurements taken from a peripherally inserted central catheter (PICC) correlate with those from a centrally inserted central catheter (CICC).

Comment: During the bench part of the evaluation, a simple manometer system was set up to test the catheters. During the clinical study, measurements of central venous pressure were recorded from patients who had an indwelling CICC and PICC concomitantly. Positions of the catheter tips in the chest were verified by radiography.