

GUEST EDITOR:

MARCIA RYDER MS, RN, CNSN

University of California San Francisco, San Francisco, California, USA

Device Selection: A Critical Strategy in the Reduction of Catheter-Related Complications

MARCIA RYDER MS, RN, CNSN

University of California San Francisco, San Francisco, California, USA

Medical science has made dramatic strides in the use of innovative drug therapies.

and solutions, and cost containment is a priority. A decision must be made between

tems.² The osmolarity and pH of the drug admixture and the chemical structure of

nesses. As new therapies have evolved, the transition of care from hospital to home and cost competition forced the home infusion industry to find safe, cost-effective methods to deliver parenteral therapy. Medical device technology has met the challenge with several new device alternatives. Almost at the same time, three new peripheral device options were introduced: the midline catheter, the peripherally inserted central venous catheter (PICC), and the peripheral port.

catheters (catheter tips terminating in periphery), peripherally inserted central venous catheters, thoracic percutaneous catheters, tunneled catheters, implanted chest ports, or implanted peripheral ports. The multiple alternatives and issues require a more sophisticated approach to device selection than simply the parameter of short- or long-term needs, and it is no longer justifiable to destroy the peripheral vasculature with painful, repeated venipunctures.

ery.³⁻⁵ A recent analysis of descriptive correlation of thrombophlebitis and catheter-related thrombosis with tip position. The incidence of thrombosis increases significantly as the tip is positioned more proximal in the superior vena cava and outside the vena cava irrespective of catheter type or therapy. Recent studies raise concern regarding the consequences of upper extremity and axillo-subclavian thrombosis.⁸⁻¹¹ The peripheral approach offers a mini-

safe, cost-effective methods for delivery of parenteral therapy, confusion exists regarding the appropriate use, care and management among the various access

algorithmic approach to the multifaceted and now complex process of device selection. It is a self-guided tool and instructions for each step are provided. The

the vessels of the forearm and antecubital space are visible or palpable, and rare injury to non-vital adjacent structures is of minor consequence. Existing data suggest

Traditionally, device selection was

in making the best device choice, for the

ated with a lower risk of catheter-related

nous catheters were used until venipuncture was no longer possible. Central ve-

cation, both in the insertion and the use of the device. The decision parameters

nificant in the critically ill patient and other immunocompromised patients

when parenteral nutrition or chemotherapy required prolonged access, or when peripheral veins were exhausted. Now the issues are different; multiple drug regimens are administered in alternate care settings with variable lengths and frequencies of drug administration, multiple device alternatives, and associated avoidable risks. Non-medical caregivers pro-

phlebitis or infection, and post-operative infection and thrombosis. The first two columns are directed at determination of the position of the catheter tip. Continuous or repeated exposure of the endothelial lining of the vessel wall to caustic drug admixtures disrupts the subendothelial layer to initiate the in-

ality rather than increased morbidity. Low complication rates in several patient populations suggest that the peripheral approach should be considered first for central venous catheterization.¹³⁻¹⁷ The final decision among the resulting choices is made after careful assessment of the individual patient. Careful consideration



Vascular Access Device Selection



FIG. 1. Vascular access device selection algorithm. (Copyright © 1994, Marcia Ryder, with permission). A demonstration of this algorithm as a part of a continuous quality improvement process can be reviewed on the Internet @ <http://www.wc.com>.

cal setting where the care and management of the catheter is less controlled.

A home health agency received orders to place a midline catheter for

out. The patient was successfully treated and returned home after

ments, and costs. It is important to consider not only the cost of the device, but the cost of the insertion of the catheter, costs associated with care and maintenance related to that device

catheter was inserted into the basilic vein of the antecubital space. Medicare would not reimburse for the drug (Monocid 500 mg) was to

of device selected; however, making the best choice for the best outcome at the least cost is a critical strategy in the

of vascular access teams by specially trained nurses and (interventional) radiologists.^{18,19}

instead of a midline. The patient re-

feeding formulations as: implementing nursing interventions collaboratively with other health care professionals to ensure that the individual receives the prescribed therapy in a safe, accurate, and cost-effective manner using an appropriate delivery system and access device.²⁰

reposition malpositioned catheters. The insertion of tunneled or implantable devices is usually accomplished more cost-effectively in the radiology department

[sic] office visits to monitor the catheter and perform dressing changes. On the third day, the patient complained of pain at the tip of the catheter. On evaluation of the syringe admixture, it was determined that the osmolarity of the drug was almost 2000 mOsm/L. Ar-

dition, specialty vascular nutrition support nurses have a unique opportunity to educate, coordinate, facilitate, and directly participate in device selection and manage-

The implications of inappropriate device selection are often unappreciated and unrecognized. In the face of healthcare "redesign" and "restructuring" many ill-thought attempts at cost reduction may result in higher costs and poor outcomes. The following is an exemplar to this effect

more severe infection, however, they continued to administer the concentrated mixture. A resulting severe chemical phlebitis necessitated re-

This introductory column is the first of a series to be devoted to issues related to nutrition support nursing. Since vascular access is a primary focus of most nutrition support nurses, future articles will address topics related to vascular access devices and the delivery of parenteral nutrition in

hours later the patient was admitted to the hospital with chest pain. Diagnostic exams demonstrated femoral, coronary and cerebral arterial emboli. An echocardiogram demonstrated a septal defect allowing passage of venous thrombus. Lower

Upper extremity deep venous thrombosis: underdiagnosed and potentially lethal. Chest 1993;103(6):1887

et al. The upper arm approach for placement of peripherally inserted central catheters for protracted venous access. AJR 1992; 158:427

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