Inappropriate use of central venous catheters results in one in ten complications

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For more than a year, the American Association of Nurse Anesthetists and 16 other professional organizations have actively participated in the Central Venous Catheter Working Group (CVC-WG), hosted by the U.S. Food and Drug Administration. Jeffery M. Beutler, CRNA, MS, AANA deputy executive director, is chairman of the CVC-WG Subcommittee on Short Term Strategies. The following article was developed by the Subcommittee.

The Food and Drug Administration (FDA), as well as the Canadian Health Protection Branch (HPB), has become aware of an appreciable increase in the number of complications associated with the use of central venous catheters (CVCs).

A multidisciplinary health care task force consisting of physicians, nurses and manufacturing representatives has concurred that individual health care providers, professional medical and nursing associations and health care facilities need to address the proper placement procedure, follow-up and care associated with these devices. (A list of participants appears at the end of this article.)

The American Association of Nurse Anesthetists is represented on this task force by Jeffery M. Beutler, CRNA, MS, AANA deputy executive director. The task force is investigating long-term solutions such as changes in CVC labeling, developing instructional material (including videotapes) and monitoring procedure quality by the Joint Commission on Accreditation of Healthcare Organizations (JCAHO). Some aspects of the CVC complications are well understood, and the task force wishes to publicize this information in an expeditious manner.

**Recommendations made by task force**

Reports received by the FDA and the HPB regarding CVC complications include, but are not limited to: infection, pneumo-/hemo-/hydro-/thorax, vessel and cardiac perforation, cardiac tamponade secondary to pericardial effusion, dysrhythmia, air embolus and sheared catheters. Many of these complications are related to technique and are associated with substantial mortality. The current literature indicates that the number of CVC-related problems is conservatively estimated as high as 10 percent of the approximately 3 million CVCs used annually in the U.S. The following recommendations were made by the task force to help reduce or prevent these complications.

- Central venous catheterization should be performed only when the potential benefits appear to outweigh the inherent risks of the procedure.
- Except for pulmonary artery catheters, the catheter tip should not be placed in, or allowed to migrate into, the heart.
- Catheter tip position should be confirmed by x-ray or other imaging modality and be rechecked periodically.
- Central venous catheterization must be per-
formed by trained personnel who are well-versed in anatomical landmarks, safe technique and potential complications. Users in training must be closely supervised by qualified personnel to assure their technical expertise prior to independent performance of these procedures. Ongoing monitoring of experienced trainees should be undertaken to assure continued competence.

- Those placing CVCs should be familiar with the specific equipment utilized as well as the proper selection of insertion site and catheter type, size and length.
- Those caring for patients with indwelling central venous catheters should be well informed of the appropriate care and associated complications of CVCs.
- Manufacturers should include specific labeling to address the potential complications of CVC use. Therefore, users should read all manufacturers' labels, instructions and warnings, as these contain important and useful information essential for the safe and effective placement of the catheter.
- Except in emergencies, catheterization should be performed with full aseptic technique to include handwashing, sterile gloves, masks, hats, gowns, drapes and proper use of a suitable skin antiseptic.
- Catheters placed in less than sterile fashion should be replaced as soon as medically feasible.

As the use of central venous catheters has increased in recent years, so has the prevalence of their associated complications. By following these recommendations the incidence of these complications and resulting sequelae should be substantially reduced. Users and institutions should review and monitor this clinical activity to assure that the process and outcomes are consistent with high quality patient safety standards.

**Multidisciplinary health care task force**

Participants in the CVC-WG include:

- American Academy of Pediatrics
- American Association of Critical Care Nurses
- American Association of Nurse Anesthetists
- American College of Cardiology
- American College of Chest Physicians
- American College of Emergency Physicians
- American College of Radiology
- American College of Surgeons
- American Society of Anesthesiologists
- Anesthesia Patient Safety Foundation
- Armed Forces Institute of Pathology, Department of Cardiovascular Pathology
- FDA, Center for Devices and Radiological Health, Office of Training and Assistance
- Health Protection Branch, Bureau of Radiation and Medical Devices—Canada
- National Institutes of Health, National Heart, Lung, and Blood Institute
- Oncology Nursing Society/Bay Area Vascular Access Network
- Society of Critical Care Medicine
- Society of Thoracic Surgeons

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