



**KENTUCKY BOARD OF NURSING**  
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**ADVISORY OPINION STATEMENT**

**PLACEMENT OF CENTRAL AND ARTERIAL LINES AND ARTERIAL BLOOD SAMPLING  
BY NURSES**

The Kentucky Board of Nursing is authorized by Kentucky Revised Statutes (KRS) Chapter 314 to regulate nurses, nursing education and practice, promulgate regulations and to issue advisory opinions on nursing practice, in order to assure that safe and effective nursing care is provided by nurses to the citizens of the Commonwealth.

The Kentucky Board of Nursing issues advisory opinions as to what constitutes safe nursing practice. As such, an opinion is not a regulation of the Board and does not have the force and effect of law. It is issued as a guideline to licensees who wish to engage in safe nursing practice, and to facilitate the delivery of safe, effective nursing care to the public.

**Opinion:** Placement of Central Lines and Arterial Lines and Arterial Blood Sampling by Nurses

**Approved Date:** 01/1991

**Revised:** 07/1997; 04/2001; 06/2004;  
02/2005; 10/2014; 12/2014;  
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**Reviewed:** 05/2011

**Accountability and Responsibility of Nurses**

In accordance with KRS 314.021(2), nurses are responsible and accountable for making decisions that are based upon the individuals' educational preparation and current clinical competence in nursing, and requires licensees to practice nursing with reasonable skill and safety. Nursing practice should be consistent with the *Kentucky Nursing Laws*, established standards of practice, and be evidence based.

**Rationale for Advisory Opinions**

The growth in the field of vascular access related to the changing needs of patients has resulted in the opportunity for the educationally prepared and clinically competent registered nurse to realize an expansion in his or her scope of practice in the placement of central and arterial lines for sampling and monitoring. Patients with complex health conditions often are not candidates for peripherally inserted central lines and the appropriate vascular access device may be the central venous catheter placed at an alternate site. The Board has received inquiries related to the scope of nursing practice in regard to the placement of central venous access devices and arterial lines for sampling and monitoring by registered nurses.

### **Advisory Opinion**

The following definitions have been adopted for this advisory opinion regarding central lines:

- Central catheters are radiopaque catheters, which are inserted in such manner that the distal tip is located in the superior vena cava. Central venous catheters (CVC) may be inserted in a variety of sites including but not limited to jugular, subclavian and femoral veins. Peripherally inserted central catheters are commonly referred to as "PICC lines."
- Midline catheters are catheters inserted in the peripheral venous system with the tip located in the proximal portion of the extremity.

In February 2005, the Board eliminated reference to "midclavicular" tip placement of CVC because published research reported high complication rates associated with midclavicular tip placement. Nurses should be familiar with current standards of practice and current literature addressing these findings.

### **Licensed Practical Nursing Practice**

It is the opinion of the Board that the peripheral insertion of a central or midline intravenous catheter is not within the scope of licensed practical nursing practice.

The licensed practical nurse can manage the care of and administer medications via central lines as stated in "201 KAR 20:490 Licensed practical nurse infusion therapy scope of practice." <https://apps.legislature.ky.gov/law/kar/201/020/490.pdf>

### **Registered Nursing Practice and Advanced Practice Registered Nursing Practice**

The insertion of a central, or midline intravenous catheter whether peripherally or centrally inserted is within the scope of registered nursing practice and advanced practice registered nurse for RNs or APRNs who possess substantial specialized knowledge in intravenous therapy and vascular access practice and who demonstrate competence in the performance of the procedure.

It is within the scope of registered nursing practice and advanced registered nursing practice for a RN or APRN qualified by specialized education and demonstrated competency to provide a preliminary interpretation of a chest x-ray for determining placement of the end of the CVC in the vena cava; authorizing the CVC for use; and reordering a chest x-ray, as needed. The nurse's practice should be consistent with the *Kentucky Nursing Laws*,<sup>1</sup> established standards of practice, and be evidence based. This advisory opinion is specific to verifying catheter tip placement for the CVC and does not extend to interpretation of x-rays for other purposes. The radiologist would provide the final read and report.

It is within the scope of registered nursing practice and advanced registered nursing practice for a RN or APRN qualified by specialized education and demonstrated clinical competency to verify placement of the tip of the CVC in the vena cava utilizing electrocardiogram/Doppler or electrocardiogram tip confirmation device. The nurse's practice should be consistent with the *Kentucky Nursing Laws*, established standards of practice, and be evidence based.

**Guidelines for the Insertion of Central Lines by Registered Nurses or Advanced Practice Registered Nurses**

The insertion of a central venous catheter whether peripherally or centrally inserted is within the scope of nursing practice for the registered nurse or advanced practice registered nurse who possesses substantial specialized knowledge in intravenous therapy and vascular access practice and demonstrates competence in the performance of the procedure when:

1. Insertion of central lines by RNs/APRNs is permitted by documented evidence-based institutional policy, procedures, and protocols.
2. Catheter placement is pursuant to a qualified provider's order for the procedure.
3. Provisions are in place for both the appropriate equipment and the immediate availability of personnel who are competent in managing complications related to central line placement. Examples of appropriate equipment include but are not limited to: an emergency cart with a defibrillator; chest tube and suction equipment; a portable positive pressure breathing device; and oxygen delivery system.
4. The institution or practice setting has in place written policies and procedures/protocols, developed in accordance with accepted standards of practice, to guide the RN or APRN in site selection and insertion of central lines. Policies and procedures/protocols should include but are not limited to:
  - Performance of a pre-insertion health assessment by the nurse inserting the central line.
  - Guidelines for site selection, ultrasound guided central line insertion and a plan for dealing with potential complications or emergency situations developed in accordance with currently accepted standard of practice.
  - Accessibility of emergency equipment and supplies.
  - Documentation and monitoring of physiologic measurements (e.g. blood pressure, oxygen saturation, cardiac rate and rhythm).
  - Documentation/evidence of education and training and continuing competence of the RN or APRN in the site selection and insertion of central lines.
5. The registered nurse or advanced practice registered nurse inserting the central line is able to demonstrate educational preparation and current clinical competence as evidenced by:
  - a) Completion of a course of instruction including but not limited to:
    - i. Knowledge of anatomy and physiology of the vasculature and adjacent structures of the neck, chest, femoral artery, veins, nerves, and groin structures.
    - ii. Indications and contraindications of central lines
    - iii. Insertion site selection
    - iv. Sterile technique
    - v. Maximum barrier precautions
    - vi. Insertion and management techniques

- vii. Anchoring/suturing
  - viii. Potential complications, unexpected outcomes and management including femoral sheath removal
  - ix. Nursing responsibilities
- b) Documentation of education, proctored clinical practice, and validation in vascular access ultrasound technology maintained by the RN or APRN and on file with employer/facility.
  - c) Vascular access experience.
  - d) Central line placement using ultrasound technology.
  - e) Advanced Cardiac Life Support (ACLS), Pediatric Advanced Life Support (PALS) course completion for age specific population.
  - f) If interpreting x-ray or ECG for tip placement: has completed an instructional program and has validated competency per facility policy.
  - g) If placing femoral catheters, has obtained education and validation to include insertion, maintenance, complications, and removal of femoral sheaths.
6. The institution or practice setting has in place an education/competency validation mechanism that includes a process for evaluating and documenting the RN's/APRN's demonstration of the knowledge, skills, and abilities related to site selection and the placement of central lines. Evaluation and documentation of competence occurs on a periodic basis according to institutional policy. The nurse is responsible for maintaining documentation of continued competency.
7. The RN or APRN inserting the central line should have no other responsibilities that would leave the patient unattended or compromise care.
8. X-ray imaging technologies, electrocardiogram, or electrocardiogram/Doppler verification is used to assure proper placement of the catheter when the distal tip is positioned beyond the axillary vein.

**Further, the Board advises that:**

It is the responsibility of facilities to determine their own policy and procedures regarding central line placement. The Board advises the RN or APRN to use caution, however, in deciding whether or not he or she has the competence to insert a central line as ordered by a physician or APRN. With regard to this issue the Board recommends the RN also take into consideration his/her individual knowledge, skills, and competence to rescue the patient from unintended complications using advanced life support procedures and techniques or the immediate availability of another healthcare provider(s) who can meet these requirements. (Review Scope of Practice Determination Guidelines)

In view of the proliferation of various catheter products available for placement, the registered nurse must be knowledgeable about the manufacturer's recommendations and precautions concerning the specific catheter product utilized, and should review product information on a frequent basis.

The use of a stylet and/or guidewire is not without potential risk to the patient. The decision as to whether or not a stylet and/or guidewire is used for insertion purposes is based upon the registered nurse's or APRN's educational and experiential preparation, the registered nurse's competence in the performance of the procedure, the patient's condition, and the policies of the

facility in which the procedure is performed. Such policies should establish clinical criteria governing catheter selection and insertion procedures (including use of a stylet and/or guidewire).

### **Arterial Lines**

Arterial Catheters are used for continuous monitoring of blood pressure, assessment of cardiovascular effects of vasoactive drugs and frequent arterial blood gas and laboratory sampling. In addition, arterial catheters provide access to blood samples that support the diagnostics related to oxygen, carbon dioxide and bicarbonate levels (oxygenation, ventilation and acid-base status).<sup>2</sup>

While the preferred artery for arterial catheter insertion is the radial arterial, as the radial artery is more superficial and can be more easily be stabilized during the procedure, the brachial and femoral arteries may be selected if the radial artery cannot be accessed. The dorsalis pedis and posterior tibial arteries are typically avoided; however may be considered because they are supported by collateral circulation. In adults, in order to reduce the risk of infection, the use of the radial, brachial, or dorsalis pedis sites is preferred over the femoral or axillary sites of insertion. In the selection of an arterial site, the healthcare provider requires knowledge as to the risk and benefits of site selection<sup>2</sup>

The most recent Association for Vascular Access position statement (2019) regarding vascular access is as follows<sup>3</sup>:

The Association for Vascular Access supports:

- An expanded scope of practice for vascular access specialists and other healthcare clinicians who are qualified to perform advanced vascular access procedures. This includes insertion of peripheral arterial catheters.
- Approved hospital policy and procedure, which includes the discipline, procedure, education and minimum requirements. Policies are also to include the insertion procedures applicable to the insertion site, device utilized, and patient/procedure selection criteria.
- Minimum competency requirements, including a detailed, documented training process and preceptorship for each insertion site being practiced.
- Utilization of a detailed training plan, which includes ongoing competency assessment, a minimum number of demonstrated successful insertions, and procedures for device monitoring and troubleshooting.
- The vascular access specialist, or other healthcare clinicians, must meet the education and clinical practice requirements by the designated professional board within their state of practice.
- Establishing a data collection process to ensure quality and outcome metrics which align with organizational goals. Such data should be used for ongoing competency and

assessment of organizational processes and to implement additional changes based on quantitative analysis.

The Infusion Nurses Society, Infusion Therapy Standards of Practice (2016) Section 5 Vascular Access Device (VAD) Selection and Placement, states:

- I. To ensure patient safety, the clinician is competent in the use and placement of vascular access devices (VADs), including knowledge of anatomy, physiology, and appropriate infusion therapies for each type of VAD.
- II. Indications and protocols for VAD selection and placement are established in organizational policies, procedures, and/or practice guidelines and according to manufacturers' directions for use." (Journal of Infusion Nursing. (2016) 39. 1S. S51.)

### **Licensed Practical Nursing Practice**

It is not within the scope of practice of a licensed practical nurse (LPN) to place arterial lines for monitoring and sampling purposes.

### **Registered Nursing and Advanced Practice Registered Nursing Practice**

It is with the scope of practice of a registered nurse (RN) and the advanced practice registered nurse (APRN) who is educationally prepared and clinically competent, to place arterial lines for monitoring and sampling purposes.

Additionally, the following advisory opinions from AOS #6 The Performance of Arterial Puncture by Registered Nurses have been added to the additional advisory opinion regarding arterial lines:

#### **Licensed Practical Nursing Practice**

The performance of arterial puncture is not within the scope of licensed practical nursing practice.

#### **Registered Nursing Practice**

The performance of an arterial puncture, as ordered by an advanced practice registered nurse, physician assistant, or physician to obtain a specimen is within the scope of registered nursing practice.

Registered nurses who perform arterial puncture should be educationally prepared and clinically competent to perform said acts as required by KRS314.021(2), and have documented evidence of educational preparation and clinical competence in the performance of such procedure. The registered nurse is responsible for documentation of educational preparation and for maintaining continuing competency. In the performance of arterial puncture, the registered nurse should:

1. Perform the procedure in accordance with the established written agency policies and procedures that are consistent with the definition of "registered nursing practice" as stated in KRS 314.011(6).
2. Be knowledgeable of the potential complications and adverse reactions that may result from the procedure, and take appropriate nursing intervention as needed

### **Determining Scope of Practice**

KRS 314.021(2) holds all nurses individually responsible and accountable for the individual's acts based upon the nurse's education and experience. Each nurse must exercise professional and prudent judgment in determining whether the performance of a given act is within the scope of practice for which the nurse is both licensed and clinically competent to perform. In addition to this advisory opinion statement, the Kentucky Board of Nursing issued Advisory Opinion Statement #41 RN/LPN Scope of Practice Determination Guidelines which contains the KBN Decision-Making Model for Determining Scope of Practice for RNs/LPNs, and published the APRN Scope of Practice Decision Making Model providing guidance to nurses in determining whether a selected act is within an individual nurse's scope of practice now or in the future. Copies of Advisory Opinion Statement #41 RN/LPN Scope of Practice Determination Guidelines and the APRN Scope of Practice Decision Making Model may be downloaded from the Board's website <http://kbn.ky.gov>.

### **Applicable Statutes From the Kentucky Nursing Laws<sup>1</sup>**

KRS 314.021(2) states:

All individuals licensed or privileged under provisions of this chapter shall be responsible and accountable for making decisions that are based upon the individuals' educational preparation and experience in nursing and shall practice nursing with reasonable skill and safety.

KRS 314.011(8) defines "advanced practice registered nursing practice" as:

... The performance of additional acts by registered nurses who have gained advanced clinical knowledge and skills through an accredited education program that prepares the registered nurse for one (1) of the four (4) APRN roles; who are certified by the American Nurses' Association or other nationally established organizations or agencies recognized by the board to certify registered nurses for advanced practice registered nursing as a certified nurse practitioner, certified registered nurse anesthetist, certified nurse midwife, or clinical nurse specialist; and who certified in at least one (1) population focus. The additional acts shall, subject to approval of the board, include but not be limited to prescribing treatment, drugs, devices, and ordering diagnostic tests. Advanced practice registered nurses who engage in these additional acts shall be authorized to issue

<sup>1</sup>Kentucky Nursing Laws, [www.kbn.ky.gov](http://www.kbn.ky.gov).

<sup>2</sup>Wigand, D. L. (2017) *American Association of Critical-Care Nurses (AACN) Procedure Manual for High Acuity, Progressive, and Critical Care*. 7<sup>th</sup> Edition. Elsevier.

<sup>3</sup>Association for Vascular Access. (2019). Position paper: Central venous access device insertion by qualified vascular access specialists or other applicable healthcare clinician. Retrieved from

[https://cdn.ymaws.com/www.avainfo.org/resource/resmgr/files/position\\_statements/Non\\_Physician\\_CVC\\_Spencer.pdf](https://cdn.ymaws.com/www.avainfo.org/resource/resmgr/files/position_statements/Non_Physician_CVC_Spencer.pdf)

<sup>4</sup>Arterial Blood Sampling. In WHO Guidelines on Drawing Blood: Best Practices in Phlebotomy. Retrieved from <https://www.ncbi.nlm.nih.gov/books/NBK138661/2>

prescriptions for and dispense nonscheduled legend drugs as defined in KRS 217.905 and to issue prescriptions for but not to dispense Schedules II through V controlled substances as classified in KRS 218A.020, 218A.060, 218A.080, 218A.100, and 218A.120 under the conditions set forth in KRS 314.042 and regulations promulgated by the Kentucky Board of Nursing on or before August 15, 2006. ...The performance of these additional acts shall be consistent with the certifying organization or agencies' scopes and standards of practice recognized by the board by administrative regulation.

KRS 314.011(6) defines "registered nursing practice" as:

...The performance of acts requiring substantial specialized knowledge, judgment, and nursing skill based upon the principles of psychological, biological, physical, and social sciences in the application of the nursing process in:

- a) The care, counsel, and health teaching of the ill, injured or infirm.
- b) The maintenance of health or prevention of illness of others.
- c) The administration of medication and treatment as prescribed by a physician, physician assistant, dentist, or advanced practice registered nurse and as further authorized or limited by the board, and which are consistent either with American Nurses' Association Scope and Standards of Practice or with standards of practice established by nationally accepted organizations of registered nurses. Components of medication administration include, but are not limited to:
  1. Preparing and giving medication in the prescribed dosage, route, and frequency, including dispensing medications only as defined in subsection (17)(b) of this section;
  2. Observing, recording, and reporting desired effects, untoward reactions, and side effects of drug therapy;
  3. Intervening when emergency care is required as a result of drug therapy;
  4. Recognizing accepted prescribing limits and reporting deviations to the prescribing individual;
  5. Recognizing drug incompatibilities and reporting interactions or potential interactions to the prescribing individual; and
  6. Instructing an individual regarding medications.
- d) The supervision, teaching of, and delegation to other personnel in the performance of activities relating to nursing care: and
- e) The performance of other nursing acts which are authorized or limited by the board, and which are consistent either with American Nurses' Association Standards of Practice or with Standards of Practice established by nationally accepted organizations of registered nurses.