Advancing the Scope of Nursing Practice: Hepatic Arterial Catheter Removal

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A delay in hepatic artery infusion catheter removal may prolong patient discomfort and lead to additional complications. As a result, this article evaluated the effectiveness of shifting the responsibility of catheter removal from advanced practice or medical staff to nurses. Overall, patients were satisfied, felt comfortable, and experienced minimal pain irrespective of whether their catheter was removed by a nurse, physician, or advanced practice staff. Nurses also were satisfied and felt they had enhanced their ability to provide quality patient care.

With hepatic artery infusion (HAI), cytotoxic agents are delivered directly into the hepatic artery, which allows for prolonged levels of the agents in tumor cells with relative sparing of normal liver parenchyma (Power, Healey-Bird, & Kemeny, 2008). The main advantages of this route are lower systemic exposure, fewer side effects, and higher drug concentration at the tumor site than that achievable by systemic therapy (Barber, Mavligit, & Kurzrock, 2004). An interventional radiologist places the HAI catheter subcutaneously through the common femoral artery while the patient is in a supine position. The patient’s hip joints are immobilized to facilitate accurate placement and prevent migration of the catheter, which is not affixed to the arterial wall. The placement of the HAI catheter can be an arduous process for the patient, who must remain immobile.

The process of accurate catheter placement and transportation of the patient from interventional radiology to the hospital room can take from two to four hours, after which the chemotherapeutic agent is administered by a nurse. Depending on the pharmacokinetics and adverse effects of the agent, the infusion time may range from two hours to three days following the protocol.

To minimize the risk of catheter dislodgement during the chemotherapy infusion and to decrease the risk of bleeding at the catheter site, the patient remains recumbent and maintains immobility of the hip joint ipsilateral to the femoral arterial catheter-insertion site for up to an additional six hours following catheter removal. Given that patients must remain in a supine, immobile state for the duration of the catheter placement plus the period following catheter removal, patients may spend up to two to three days under those conditions. Catheter removal could be completed only by approved healthcare providers (physicians, nurse practitioners, and physician assistants) in accordance with the University of Texas MD Anderson Cancer Center and the policy of the Texas Board of Nursing (TBON).

Despite the staff’s best efforts to improve the timeliness of the catheter placement process, chemotherapy infusion, and catheter removal, infusion in many cases was completed well into the evening after the primary team had left for the day. To minimize the risk of thrombosis when approved healthcare providers are unavailable to remove the catheter, one liter of normal saline with 5,000 units of heparin is infused at 50 ml/hour through the HAI catheter until at least one hour before catheter removal. Under those circumstances, the patient is required to
remain immobile while the catheter stays in the hepatic artery for an additional period. Anecdotal evidence reflected that an overwhelming majority of patients adhere to instructions to remain supine and immobile during the process of HAI chemotherapy. However, many also have expressed discomfort, pain, and anxiety related to prolonged immobility.

Since the inception of the regional hepatic chemotherapy program in 2005, an average of 160 patients are seen annually, and the number continues to increase. To reduce patient discomfort and anxiety and enhance the quality of care for patients with HAI catheters, the authors conducted a performance improvement initiative to evaluate the safety and efficiency of shifting the responsibility for HAI catheter removal to trained RNs on a specialty unit. This article provides an overview of the regulations that define the scope of nursing practice and determines the feasibility of having RNs remove HAI catheters. In addition, the processes for the preparation and implementation of this practice change and its impact on patient outcomes is discussed.

Scope of Nursing Practice

The boundaries of the scope of nursing practice are evolving constantly, given advances in technology and changes in politics and health care. Historical perspectives acknowledge and illustrate the blurring, creeping, overlapping nature and evolution of the scope of nursing practice. In the past, nurses were not permitted to use thermometers and interpret results (Sandelowski, 2000), measure blood pressure and interpret readings (Mee, 2006; Sandelowski, 2000), perform pulmonary artery wedge measurements (Mee, 2006), remove peripheral arterial sheaths (Capasso, Codner, Nuzzo-Meuller, Cox, & Bouvier, 2006), or read chest x-rays after peripherally inserting central catheters (Davidson, Bloomberg, & Burnell, 2007; Royer & Earhart, 2007). However, all of those activities, for the most part, are considered within the scope of practice for a variety of specialty nurses today.

As with any potential practice change, evidence must support the adoption. However, evidence is not the sole component in any evidence-based practice model (LoBiondo-Wood & Haber, 2010). Nurses must consider the statutes of the Nursing Practice Act (NPA) (TBON, 2007), the rules and regulations of each state’s board of nursing, institutional policies and procedures, and standards recommended by professional organizations, with respect to educational preparation, clinical competence, practice setting and environment, and patient preferences. Most states have algorithms that determine the activities that fall within the general scope of nursing practice, such as the Six-Step Decision-Making Model for Determining Nursing Scope of Practice (TBON, 2010).

After consulting with the TBON, the authors’ institution determined that the removal of HAI catheters was not within the scope of nursing practice but may be covered by the guidelines under “Delegated Medical Acts” (TBON, 2011). In conducting physicians’ orders, RNs may perform activities that are not considered to be within their scope of practice. Those tasks are delegated medical acts and are supervised by physicians. Delegated acts also are covered by the Texas NPA under “Rules Regarding Delegation of Certain Medical Acts” (TBON, 2007). The corresponding activity for physicians is delineated by the Texas Medical Board (2007) rules, specifically under “Standing Delegation Orders.” The TBON (2011) addressed five criteria necessary for a nurse to perform a delegated medical act (see Figure 1). Because of the large number of procedures nurses can perform, the NPA does not list specific procedures individually, but instead emphasizes nurses’ responsibility “to provide safe and effective nursing care” (TBON, 2011). In addition, if a nurse is concerned about whether a specific act is within the scope of practice, then he or she should review the Six-Step Decision-Making Model (TBON, 2010) (see Figure 2).

When evidence to support a change in practice is lacking or nonexistent, professional nurses must exercise caution to ensure the safety of their patients. The process that determines whether an act is within the scope of practice, provides a safe and effective environment to perform the act in accordance with regulations (within legal parameters), and adopts the act is not clear. As a result, this performance improvement project provided an evidence-based approach undertaken by a group of unit-based staff nurses at MD Anderson Cancer Center to expand their scope of practice to include HAI catheter removal.

The nurse has received appropriate education with supervised practice, is competent to perform the procedure safely, and can respond appropriately to any untoward effects or complications.

The nurse’s education and skills assessment are documented in his or her personnel folder.

Nursing and medical staff collaborate to develop policies and procedures or practice guidelines for delegated acts, and these are available to nursing staff and reviewed annually.

The procedure has been ordered by an appropriate licensed practitioner.

Appropriate medical and nursing backup is available.

Scope of practice is dynamic, responsive, evolving, and bidirectionally influenced by many factors that include research, technology, regulations, credentialing requirements, organizational structures, outcome evaluation, and performance improvement (Hamric, 2005). Nurses are regulated by boards of nursing that delineate the NPA and the scope of nursing practice. This regulation, delegated by state legislature, is in place to protect and promote the public welfare (Loquist, 2004). For an activity to be within the scope of practice, it must be consistent with the NPA, appropriately authorized with a valid order and in accordance with institutional policies and procedures, and supported by research or national professional organizations. In addition, the nurse must demonstrate competency to perform the activity, the activity must be within the accepted standard of care that would be provided by a prudent nurse in the same situation, and the nurse must be prepared to assume accountability for providing safe care and managing outcome. Foremost, a nurse must ensure a safe environment for the patient, regardless of the setting or practice (TBON, 2011).

Literature Review

The authors conducted a systematic literature review including research protocols, journal articles, position statements,
and information from professional and regulatory agencies including the TBON, the Texas Medical Board, and the Oncology Nursing Society. A search using electronic databases (CINAHL®, MEDLINE®, Scopus, and PubMed) did not yield any citations on HAI catheter removal by RNs. Likewise, position statements and information from professional organizations regarding HAI catheter removal by RNs were lacking. The authors determined that HAI catheter removal was not addressed by national professional organizations as a scope of practice issue and, therefore, must be considered a delegated medical act.

When performing delegated acts, nurses must ensure a safe environment for patients and be able to manage complications such as bleeding. Similar to femoral arterial sheath removal, which has become a delegated medical act, homeostasis is achieved by compression of the artery against the pelvic bone when removing an HAI catheter. The potential complications of sheath removal include retroperitoneal bleeding, which requires surgical repair. That is not considered a direct result of the nursing action, as the potential exists regardless of who removes the catheter (D. Benbow, personal communication, October 22, 2007). Nurses removing HAI catheters must be able to manage bleeding at the site, which is the most common complication. However, bleeding that would require surgical repair may occur from another internal site. Femoral arterial sheath removal likely started as a delegated medical act, but has been adapted over time to be within the scope of practice for RNs and, therefore, is a nursing responsibility (Capasso et al., 2006; Chlan, Sabo, & Savik, 2005; Schiks, Schoonhoven, Verheugt, Aengevaeren, & van Achterberg, 2007).

Program Development and Implementation

The authors’ goal was to develop a quality HAI program that would meet the learning needs of staff nurses, provide safe care that would support knowledge and skill acquisition, and adopt HAI catheter removal as a delegated medical act. The nurse practitioners, physician assistants, physicians, and nursing staff identified key areas for education and developed a module that would address those needs. The first section of the education program reviewed the NPA and the Delegated Medical Acts as they pertained to the performance improvement initiative. In addition to the legal aspects of care, the module included components listed in Figure 3.

Additional specific education about the procedure itself included information on early detection of vascular complications, neurovascular checks of lower extremities, maintenance of patency of peripheral IV access, heparin discontinuation two hours prior to catheter removal, and education of patients and their families.

Outcomes

After completion of the educational program, selected nursing staff members initiated the HAI catheter removal program. All patients whose HAI catheters had been removed after program initiation were assessed for complications and satisfaction. During the follow-up period, a total of 125 HAI catheters were placed: 54 were removed by the prepared nurses, 55 by physicians, 31 by physician assistants, and 5 by nurse practitioners. Complications for all patients were minor irrespective of who removed the HAI catheter, and all were remedied quickly. Complications included pain (two reports in the nurse group and four in the other practitioner groups); minor bleeding, which ceased with pressure (three reports, all in the nurse group); hypotension (one report in the other practitioner group); and hypertension (one report in the nurse group).

A review of the time from HAI completion to catheter removal demonstrated that when the physician was available, the mean time to removal was 68 minutes. When the physician was not available, the mean time to removal was 99 minutes for the nurses, 147 minutes for the nurse practitioners, and 153 minutes for the physicians’ assistants. Pain, comfort, and satisfaction measures during the removal procedure were routinely gathered by the nurses. On a scale from 0–10, with 10 being the most comfortable and satisfied, scores for comfort and patient satisfaction in all groups ranged mostly from 9–10. Pain during removal in all groups ranged from mainly no pain to low levels.

Overall, patients were satisfied, felt comfortable, and experienced minimal pain irrespective of which healthcare provider removed the catheter. The nurses who were prepared to remove the catheter also were satisfied and felt they had
a greater ability to provide their patients comfort from an otherwise uncomfortable procedure.

**Conclusion**

The quality of care for the authors’ patients has been improved by the nurses who expanded their scope of practice to include HAI catheter removal. Those nurses have demonstrated the ability to remove the catheters in a safe and timely fashion without major complications. Future potential directions for the project include assessing the length of immobility time needed after removal. The findings suggest that other institutions can advance practice in selected areas through education and a collaborative approach. An interdisciplinary team of nurse leaders, educators, physicians, and clinical specialists in this initiative was imperative for content expertise and resources.

The components that made the initiative successful were the educational lectures given by expert speakers, patient feedback, and a customer service focus. In retrospect, one area of improvement would be to have additional certified medical staff on hand to educate nursing staff, thus allowing more clinical nurses to become competent in a shorter time frame.

The authors continue to track outcomes on this project and will audit the process on a continued basis. The team will provide monthly updates on the performance improvement initiative in staff meetings. Additional plans include increasing collaborative efforts with intervention radiologists, expanding the competency education with the unit-based staff nurses, and allowing nurses to assume the full responsibility of removing all HAI catheters at the bedside on the unit in the near future. A continued need exists to educate additional unit-based nursing staff to meet the needs of patients who require HAI catheter removal during the nights and weekends as the team strives to expand its process-improvement initiative. Patients have requested this service, and the team feels obligated to expand its services to meet patient needs and to prevent potential complications in this population.

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**References**


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