Evaluation of a Pilot Educational Program on Safe and Effective Insertion and Management of Peripheral Intravenous Catheters

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Abstract

Peripheral intravenous catheter (PIVC) insertion and subsequent care have been highlighted as areas for improvement in the management of intravascular devices; however, only the fundamentals of PIVC care are routinely taught to registered nurses in Australia. In 2013, a vascular access-focused elective postgraduate course, Peripheral Intravenous Access and Care (8035NRS) was commenced for students enrolled in any of the Griffith University master's degree programs. It was developed with the intent to translate research knowledge into practice by providing access to the latest research findings and current best practices in peripheral intravenous access. Topics covered preinsertion, insertion, and postinsertion care and were developed for the online environment, which is known to be conducive to individual student learning styles. Learning activities included viewing short videos delivered by local and international clinical researchers. This course is the first known university-provided, postgraduate academic course on this subject in Australia, and possibly 1 of the few available internationally. The course succeeded in its aim of increasing knowledge and skills about safe, evidence-based PIVC insertion and care to registered nurses. Its development and implementation at the postgraduate level may be regarded as a strategy to provide a greater understanding regarding scope and relevance for nursing practice and for informed decision making on optimum integration at the undergraduate level. This ultimately will increase positive patient outcomes and the patient experience of vascular access.

Keywords: *insertion and management of PIVCs, peripheral intravenous catheters, postgraduate education*

Background

Undergraduate bachelor's degree programs for registered nurses (RNs) in Australia provide only the fundamentals of peripheral intravenous catheter (PIVC) care. The repercussions of this shortfall should be considered in light of a recent prevalence study that underlined the deficits in clinical management of intravenous devices, particularly PIVC insertion and subsequent care.[1,2] The lack of training is not particular to this country: A current review found only a small number of effective courses for undergraduate vascular access training.[2] Undergraduate content can typically be covered over 1 or 2 weeks and includes basic anatomy accompanied by an overview of the technique and equipment required for PIVC insertion. It may be bundled with other content such as venipuncture and phlebotomy procedures. Ongoing education can be applied to improve the management of devices, but the few RNs who perform PIVC insertion in Australia do so only after additional employer-provided training. Practice is generally limited to specific departments such as emergency settings and intensive care. Formal credentialing using either professional organization endorsement or annual hospital-based assessment systems is possible but rarely undertaken or expected. Most cannulation in general hospital settings is undertaken by unskilled, rotating junior medical staff.[3] This is compounded with the fact that information in

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medical textbooks and even contemporary online media that could potentially assist with teaching infusion therapy and PIVC management is also lacking.[4,5] The practices associated with risk factors for PIVC failure could be reduced if larger numbers of appropriately skilled clinicians were able to care for PIVCs and manage this common procedure.[6]

In 2013, a vascular access-focused elective course, Peripheral Intravenous Access and Care (8035NRS) was commenced for Queensland students enrolled in any of Griffith University's master's degree programs.[7] This was a 10-credit-point course within an 80-credit-point (1 year full-time) program. It was developed with the intent to translate research knowledge into practice by providing students with access to the latest research findings and current best practices in peripheral intravenous access. It complemented and built upon the strengths of the Alliance for Vascular Access Teaching and Research group based at Griffith University.[8] The Alliance for Vascular Access Teaching and Research group is a respected independent research group specializing in undertaking highly credible scientific research. The group works with many health care and commercial industry partners, but is affiliated with no single organization. The administrative base is at Griffith University in Brisbane, Australia, but the group works in partnership with researchers from many other universities in Australia and internationally. This course offering was a new initiative of the group. It followed several years of researching the prevalence of complications with PIVCs and a desire to facilitate postgraduate nurses (often senior nurses in their workplace) to have a greater focus and seriousness of attention to PIVC care in local hospitals. Development and implementation at the postgraduate level had the added advantage of providing a strategy for greater understanding regarding scope and relevance of this field for nursing practice. It supported informed decision making toward potential optimum integration with a much larger and established student base at the undergraduate level. Recent local data showed that although PIVC-related bloodstream infections were rare, at <1 in 5,000 catheters, the rate of PIVC failure before completion of therapy was 26% to 38% of PIVCs due to infiltration/occlusion, accidental removal, and phlebitis.[6,9,10] This provided the impetus to improve nursing knowledge and skills around not just insertion but also maintenance care of these devices. To our knowledge, it is the first Australian university postgraduate course to provide students with comprehensive evidence-based knowledge and skills for safe and effective insertion and management of PIVCs.

The Course

The course consisted of weekly delivery of online content that was promoted and structured to correspond with the Infusion Nurses Society standards of practice for peripheral vascular access.[11] The approach was modeled upon similar recommendations for centrally placed catheter education.[12,13] The educational course was predominantly developed for the online environment with students able to work through modules at their own pace and flexibly in relation to their own work and personal commitments. Learning activities included viewing short videos delivered by local and international clinicians and researchers as well as online readings and reflection. A 1-day practicum was delivered early in the semester to provide students with additional hands-on demonstration and practice, and in-person assessment of cannulation in a simulated scenario using mannequin arms. This was necessary as a confirmatory starting point because postpracticum training these students were required to practice insertion skills in a clinic environment with at least 5 PIVC insertions and/or phlebotomy procedures undertaken and signed off by a local workplace mentor. The practicum had 2 elements: a short presentation where PIVC topics and questions related to equipment and processes were discussed and a facilitated workshop where PIVC insertion techniques were practiced. Both activities involved evidence-based justification of materials and processes. A guided instructional approach was used in the face-to-face setting. This was enhanced with guest presenters who were clinical experts, such as clinical nurse consultants or clinical nurses from vascular access surveillance teams. There were also a number of nurse educators who had an affiliation with various organizations in the vascular access industry. Each focused on the research aspects of various devices and described the background for how and why they were developed. Topics were free from active product promotion and potential conflicts of interest were declared before each presentation. A small trade display was available to demonstrate a range of products commonly found in Australian health-care facilities as well as new technologies such as vessel finders. Table 1 describes the learning outcomes that students were expected to obtain upon completion of the course.

Topics covered preinsertion, insertion, and postinsertion care, including some aspects of phlebotomy. Modules were delivered over the 13 teaching weeks of 1 semester. Module 1 incorporated the principles and practice of venipuncture and peripheral intravenous cannulation. Students explored the history and purposes of intravenous therapy and reviewed associated practices, including relevant anatomy and physiology. Principles of infection prevention and safety requirements as well as technology-assisted insertion were also addressed. Module 2 was designed to challenge students with tasks that critiqued the principles of PIVC management. Students were asked to critically appraise specific elements such as skin disinfection, dressings and securement, and approaches to flushing. Consideration of fluid and administration set care as well as assessment for complications of therapy were also posed for appraisal. The final module focused on evaluating and implementing evidence for vascular access practice. It was constructed to further develop student knowledge and skills to appraise literature and evidence for peripheral venipuncture and PIVC cannulation and care. Challenges and strategies for knowledge translation in the field were explored, including avenues to contribute to surveillance, quality, and research projects. Table 2 displays the weekly topics that were provided within the course material.

Assessment

There were 5 assessment items that culminated in an overall result for the course. They included a practical assessment of