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Improving Efficiency using a Hybrid Approach: Revising an IV/Blood Workshop in a Clinical Research Environment

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Abstract

Orienting to a new job can be overwhelming, especially if the nurse is required to develop or refine new skills, such as intravenous (IV) therapy or blood administration. At the National Institutes of Health Clinical Center Nursing Department, a group of nurse educators redesigned the IV/Blood Workshop to prepare nurses with skills needed when caring for patients on protocol in a research intensive environment. Innovative teaching strategies and a hybrid instructional approach were utilized along with a pre-workshop activity, skills lab practice, and follow up skill validation at the unit level to provide a comprehensive curriculum while decreasing resource utilization.

Background

Healthcare has become increasingly complex over the last several years and the need to provide safe, quality care is becoming progressively more challenging. Advancements in research and technology, as well as declining health care dollars, continue to drive changes in the healthcare industry (Kuramoto, 2014). Healthcare organizations need strategies in place to effectively manage these changes, especially when fewer resources are being directed towards education. Increased skill development and competency are frequently required as nurses advance in the clinical research nursing role. They work closely with protocol requirements involving IV administration and data points needing specimen collection, such as serial testing. The nurse educator in a research setting needs to follow a standardized educational approach to ensure consistency of practice, treatment fidelity, and protocol data quality.

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At the National Institutes of Health (NIH) Clinical Center, clinical research nurses (CRNs) receive current information about IV therapy, blood collection, and blood product administration by attending a training workshop shortly after hospital orientation. These skills are critical in this setting to ensure consistent practice, protocol data quality, and treatment fidelity. Workshop revisions were needed to streamline content and align the curriculum more closely with current policies, procedures, standards of practice (SOPs), and skill development, and to improve resource utilization with an innovative hybrid educational design. Hybrid learning or blended learning is a strategy that “combines face-to-face instruction with computer-mediated activities” (Rietschel & Buckley, 2014, p. 85). After several months of curriculum assessment, planning, and development, a successful pilot was implemented by professional development nurses. A hybrid learning approach was used which consisted of web-based learning, classroom education, and hands-on practice allowing participants to receive real-time feedback by educators and preceptors. Program evaluation data, course revisions and next steps will be discussed in this article.

A review of the literature was conducted to collect information about online delivery of education about intravenous therapy in order to understand current best practices using CINAHL Plus, Cochrane Library, and PubMed yielding 20 relevant articles to review. Key words and combinations of them for the search included: teaching, nurse, nursing, intravenous, research, online learning, nursing education, IV therapy, skills lab, IV skills, hybrid learning, infusion therapy, classroom education, and adult learning theory.

Learning in a blended instructional environment is well supported and provides the flexibility required for nurses working in a clinical research environment (Rietschel & Buckley, 2014; Tung & Chang, 2008). Developing online courses is not new to the healthcare environment; however, when nurse educators teach skill-based content there can be challenges with competency validation using the online approach. A single qualitative study demonstrated that, while a blended learning approach allows the nurse to be an active participant in his or her own learning, consideration must also be given to learning styles and relationships as well as the flexibility and accessibility of an online component (Glogowska, Young, Lockyer, & Moule, 2011). Depledge and Gracie (2006) point out that IV therapy nurses need knowledge as well as skills to effectively practice and, teaching alone is not sufficient to prove competency. On the other hand, technology by itself is not adequate for IV insertion education (Engum, Jeffries, & Fisher, 2003). A hybrid instructional approach allows for the integration of didactic content along with skill labs practice when teaching intravenous therapy, blood product administration, and laboratory testing, allowing for learner-centered education and opportunities for validation of competency.

Technology and Andragogy

When developing or revising any adult education program, the nurse educator must consider how the adult learns best and incorporate strategies to meet learning needs. Malcolm Knowles' Theory of Andragogy describes the characteristics and methods for effectively teaching the adult learner (Knowles, 1970). Knowles highlights that in order to understand characteristics and teaching methods of the adult learner, the instructor must be aware of

what motivates the learner and potential barriers to learning, such as lack of time and limited resources.

When the nurse educator incorporates adult learning principles into a blended learning environment such as providing a learner-paced review of online material and completion of a worksheet followed by six hours of interactive class time, the learner is able to meet his or her learning needs through use of the latest technology, while focusing on meeting course competency requirements. Expanding on this, Fidishun (2000) described six assumptions of andragogy, or education of adults, and how these assumptions are integrated into e-learning. When utilizing technology, it is essential to receive feedback from the learners regarding their personal needs and to integrate modifications as needed to ensure learner goal achievement (Suen, 2005). These principles were incorporated into the new IV/Blood Workshop design by clearly communicating the course purpose and rationale via the website, handouts and course introductory module; as well as by providing in-class opportunities during lectures and skill sessions. The learner is able to have his or her individual questions addressed, and the nurse educator is able to assess for gaps in knowledge or skill. Identified learning needs are addressed in real time, as needed, not only by expanding on concepts, but also by providing additional demonstrations and practice time for psychomotor skills.

Based on the adult learners need for self-direction, technology in the form of an organizational intranet webpage which includes a course overview with rationale; three sequential modules; links to organizational policies, procedures, and standards of practice; and downloadable handouts allows learners to direct their own path based upon their goals. In developing e-learning programs, the nurse educator must take into account that each learner has his or her own learning style and pace; and therefore, needs various strategies for learning information. Additionally, adults are task or problem-centered in their orientation to learning, therefore they need to know how the content will apply within their current setting. Utilizing technology allows for educational programs to bring real life situations into a flexible environment. To capitalize on the adult learner's lifetime of professional and personal experiences, the course design must incorporate learning strategies such as case studies or scenarios to promote problem solving, critical thinking and to provide the participant with the opportunity to reevaluate or refresh previously learned knowledge (Fidishun, 2000).

Drivers of a New Design

The process of redesigning the IV/Blood Workshop began with a review of the organization's policies, procedures, SOPs, and the Infusion Nurses Society Standards of Practice (2011). Three nurse educators conducted a needs assessment over several weeks through impromptu and formal stakeholder interviews (Table 1). Stakeholders included approximately 25 of the organization's executive leadership, nurse managers, unit based clinical educators, clinical nurse specialists, course instructors, and course coordinators. The Occurrence Reporting System outcomes were examined for additional information. These activities helped to determine the primary areas of focus of the curriculum. Organizational information, such as changes in staffing patterns and blood sampling quality assurance initiatives, provided further details to guide the development of the course. Together, this

data led to revised objectives which addressed a spectrum of concepts from types of equipment to management of complex problems that could occur with research care delivery.

New Program Design

In response to the assessment findings which revealed knowledge gaps and the need for additional skill development and practice documents; course objectives were revised towards organizational policies, procedures, and SOPs; competency requirements; and unit-specific CRN practice documents. The learning objectives focused on: 1) locating and understanding practice documents pertinent to IV therapy; 2) clinical and research blood collection; 3) blood product administration; 4) skill development; and, 5) application of new knowledge at the unit level. The course was redesigned into three modules: online self-paced learning (Module I), eight-hour group class (Module II), and individual competency validation on the unit with the preceptor (Module III).

Module I was an online pre-study activity to engage the learner in understanding the requirements of their research participant's IV and blood therapy needs required by the protocol. Prior to class attendance, the learner completed a mandatory two-page pre-workshop activity worksheet with questions as shown in Table 2. Completion of the worksheet required the learner to locate and review various organizational resources, including the research participant online master test guide. This exercise helped learners become familiar with the various blood tubes used for research blood collection. The strategy of completing a self-study on their unit during work time set the stage for self-paced learning, which averaged two to four hours. Additionally, learners were able to have discussions with preceptors that dealt with content specific to their program of care and research participant population. Preceptors were able to reinforce concepts and incorporate extra information valuable for future reference. Overall, this pre-study strategy decreased the in-class time by four hours, while establishing a unit-centered preparation tailoring content to the individual's work environment.

Module II consisted of an all-day in person IV/Blood Workshop (Table 3). Handouts were developed by nurse educators to supplement information presented in class and support independent, self-paced learning. Additionally, the learner could utilize the handouts after class to refresh details. A supply cart was assembled to give the participants hands-on experience with the supplies and equipment used in the clinical research setting. Additional hands-on practice time was incorporated into the workshop that provided tactile experience; reinforced information tailored to the research practice environment; increased learner confidence; oriented learners to clinical products; and offered skill achievement validation. Additional time was scheduled at the end of the workshop to allow for extra practice to meet learner needs if necessary. Once the skill was successfully performed on a manikin in the skills lab, the instructor signed off the learner on the validation checklist for documentation of skill achievement. The learner then returned to their patient care unit for further skill reinforcement and competency validation.

The new design element of incorporating hands on skills lab activities directly following the lecture created an engaging, active learning environment. This format gave learners the opportunity to use cognitive processes, leading to increased critical thinking and learning (Jeffries & Norton, 2005). This strategy also allowed for immediate feedback and skill clarification from the instructor and the opportunity to share ideas with peers.

Module III was completed on the patient care unit through competency validation, allowing for skill reinforcement and preceptor oversight. The primary competencies included *Blood Products* and *Intravenous Therapy, Blood Draws via a Venous Access Device (VAD) and Venipuncture*. An optional test was also made available for additional reinforcement of learning and evaluation in this module. These active learning techniques provided opportunities to apply what they learned in the clinical setting and receive immediate feedback from the instructor, which leads to a powerful and effective learning opportunity (Jeffries & Norton, 2005). Since two of the aims of revising the workshop were to incorporate more learner-centered activities and real-time mentorship with situational learning, the primary hands-on learning took place on the nursing care unit following completion of the course and during the competency validation process.

The new course design was accompanied by development of a comprehensive resource page on the Clinical Center Nursing Department intranet. The program website included: the course overview and goals, objectives, three training modules, evaluation, and resources (Figure 1). This new intranet page increased accessibility to course materials, facilitated training for new nursing personnel and their preceptors, and served as an ongoing resource for other CRNs after course completion. Following the revisions, the course was streamlined from one and a half days to one-day in length, saving institutional resources through decreased staffing and instructor time.

Evaluation Methodologies

Kirkpatrick's Model was utilized as a framework for evaluating the IV/Blood Workshop program (Kirkpatrick Partners, 2015). Level one or learner satisfaction was measured through written evaluation utilizing a Likert scale of one (lowest) to four (highest). An optional 38-question knowledge assessment was developed in collaboration with the unit clinical educators to reflect content learned, and also aligned with Kirkpatrick's second level of evaluation in providing learning data. Questions addressed content found within the several evidence-based Nursing Department SOPs, Policies and Procedures reviewed as part of the Pre-Activity. To strengthen validity, the knowledge assessment was taken by several clinical educators and revisions were made based on their input and feedback. Together, the knowledge assessment and competency evaluation provided a combined formative evaluation of learner skill and knowledge. In accordance with level four of Kirkpatrick's Model, an impact evaluation was also conducted to determine retention of knowledge and skills six months following workshop attendance. Each participant was emailed an invitation to provide feedback using an online survey. Learners were asked about activities that added to their knowledge or barriers to additional learning since the course. Information was addressed which pertained to understanding which components of the course were most and least useful to their clinical research nursing practice. Stakeholder satisfaction was measured

informally through solicited and unsolicited feedback. This later evaluation data revealed understanding about the impact of the redesigned IV/Blood Workshop on nursing practice.

Pilot Evaluation Findings

The new course design was piloted by 87 clinical research nurses. Once tabulated, their evaluation data was used to make further changes to the overall educational design. Revisions included the development of handouts to provide standardized teaching on the Alaris® and Gemstar® pumps. These handouts also served as a written resource for the CRNs. This teaching tool provided guidelines for programming the delivery pumps when administering standard and research drugs. The Pre-Workshop Activity Worksheet was also modified in response to unit stakeholder feedback and continues to be fine-tuned along with other components of the workshop as practice changes occur. Over time, the worksheet has lengthened as open-ended questions were replaced with questions requiring brief responses to address information specific to care of the IV site, such as frequency of dressing changes. A blood wrist band question was removed and incorporated into a skills activity during the class to insure consistency of practice. Directions at the top of the page were modified to include information directing the learner to discuss worksheet topics with his or her leadership to encourage dialog about unit-specific IV therapy and blood administration idiosyncrasies.

Evaluation results for the instructors have averaged a mean score between three and four (favorable) for meeting lecture objectives, knowledge of content, ability to engage the audience, and effective teaching strategies. Overall participant comments on evaluating specific speakers were captured through statements such as: “Hit important points and I learned new tricks,” “...wish I had this information years ago;” “Very engaging style”.

Participants commented the pre-activity motivated them toward a closer review of critical practice documents and protocol requirements, and encouraged them to find out more about the unit-specific practices and challenges they might not otherwise have discovered. The skills sessions were described as essential due to the opportunity for practicing with actual organizational supplies and unique research practices including the labeling of research specimens. Other comments highlighted participant appreciation for online access of materials, resources and information supporting the IV/Blood Workshop.

Impact Evaluation Findings

The online impact evaluation was sent to 116 nursing personnel with an over 30 percent (N=40) completion rate (Table 4). Overall, participant responses continued to be positive with no significant barriers reported for incorporating new knowledge into practice. The workshop topics were reported to be appropriate to the practice setting. There were limited requests for additional topics to be incorporated or deleted from the curriculum. Future impact evaluation data will be collected to ensure course quality and alignment with practice.

Recommendations for Improvement

Three key issues were identified as a result of the evaluation data. First, participants in the pilot were not completing the pre-workshop activity. This occurrence was traced back to poor communication; the new nurse was not being informed by the unit leadership of the requirement in enough time to complete the online pre-workshop activity. As a result, the CCND Orientation Coordinator began introducing the IV/Blood Workshop and pre-activity assignments during the new employee orientation along with descriptive handouts. Additionally, the workshop coordinator began tracking occurrences of incomplete Pre-Workshop Activity Worksheets. If a trend was noted, feedback was provided to the participant's unit leadership. This immediate feedback improved completion rates to approximately 95 percent.

Second, participant completion of a test taken on his or her unit is an optional part of Module III. Allowing the choice of incorporating a test creates flexibility in the evaluation process for the adult learner. Revisions to the test are ongoing based upon unit clinical educator feedback and practice trends, and changes to organizational SOPs, Policies, and Procedures. However, because a test is not completed by every participant, the data is not collected for this point in time. Perhaps making the test a required part of the educational initiative would generate evaluation figures about level of knowledge providing a more rounded data set.

Lastly, completion rates for the impact evaluation questionnaire were lower than expected. In order to increase the response rate, announcements were made at the start of each class to anticipate receipt of a follow up email. The time frame for delivering the impact evaluation was also shortened from six months to three months. This change improved the response rate from approximately 20 to 30 percent.

Conclusion

The revised IV/Blood Workshop yielded a more efficient and improved educational process through the integration of a hybrid learning approach and the incorporation of innovative teaching strategies, while conserving personnel and environmental resources with four fewer hours of class time. Through the program's hybrid design, the participants are able to assess their learning needs, apply information learned within the classroom, and bring course knowledge to the bedside. The workshop continues to run smoothly receiving favorable evaluations and outcomes. The end result is revealed in the additional time a new nurse is able to spend orienting to his or her unit; and, IV therapy and blood administration nursing practices consistent with organizational Policies, Procedures and Standards of Practice. The success of this program is reflected through ongoing outcome assessments and the incorporation of new information and technologies as they become available.

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Source: NIH Clinical Center

Figure 1.
IV/Blood Workshop Intranet Webpage

Table 1

Stakeholder Interview Questions

1. What recommendations do you have for improving IV therapy on your unit? ...other units?2. What problems are you encountering in relationship to IV therapy? ...to blood typing or blood administration?3. What changes would you recommend for the IV Blood Workshop?

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Table 2

Sample of Questions from Pre-Workshop Activity Worksheet

<p><u>Documentation</u></p> <p>1. According to the policy, IV therapies are documented Q_____ hours.</p> <p>2. What information is required for documentation after placement of a peripheral IV (PIV)?</p> <p>3. Idle PIVs are flushed and assessment documented Q _____ hours.</p>
<p><u>Assessments</u></p> <p>4. What is the frequency of assessment of IV therapies for pediatric, elderly or high risk research participants?</p> <p>5. What determines VAD (Vascular Access Device) patency?</p>
<p><u>Supply Changes</u></p> <p>6. When are caps changed on peripheral access devices?</p> <p>7. When are IV solutions changed?</p>

Table 3
Revised IV/Blood Workshop Agenda

7:30 -7:35 am	Introduction
7:35 - 9:15 am	Peripheral IVs and the Needle-less System <i>Skills: Peripheral IV Insertion; Blood Draw</i>
9:15 – 9:50 am	VAD Dressing Supply Review <i>Skills: Dressing Change</i>
9:50 -10:00 am	Break
10:00 -11:15 am	Blood and Blood Products Administration <i>Skills: Typenex® Band Application</i>
11:15 am-11:45 pm	Lunch
11:45 – 1:15 pm	Vascular Access Devices <i>Skills: Port Access/De-Access; TPA</i>
1:15 – 1:30 pm	Break
1:30 – 2:30 pm	Department of Laboratory Medicine
2:30 - 2:45 pm	Break
2:45 –3:45 pm	<i>Skills: Gemstar Pump ALARIS Pump</i>
3:45 - 4:00 pm	<i>Additional Skills Practice</i>

Table 4

Data Collected from Course Impact Evaluation

Question 1: Since attending the IV/Blood Workshop, how have you added to your knowledge and understanding of the content as a result of the following activities?	
# Responding (n= 40)	Activities Adding to Participant Knowledge
28 (70%)	Review of Nursing Department Standards of Practice or Procedures
19 (47.5%)	1:1 with venous access device nursing personnel
7 (17.5%)	In-services/rounds
5 (12.5%)	Researching topic/self-study
1 (2.5%)	Other
2 (5%)	Have not done any of these activities
Question 2: What barriers have you encountered in incorporating the information learned in this course into your practice?	
# Responding (n= 40)	Barriers to Incorporating New Information
1 or 2.5% (1)	Lack of familiarity with the needleless system
1 or 2.5% (1)	Different "techniques" on unit other than what was taught in class
1 or 2.5% (1)	Too busy on unit to review all the material