Cath Lab Digest

CCL RN EDUCATION

Advancing the Cardiac Cath Lab: Strategic Implementation of a National Novel Core Curriculum Didactic Education with Orientation and Competency Standards for Nurses

Sarah Davis-Arnold, MSN, RN, RCIS, EBP-C, NPD-C[1]; Jennifer Ballard-Hernandez, DNP, NP, FACC, FAHA, FAANP[2]; Cher Hagaman, MSN, GNP-BC, CCNS, CCRN, AACC[3]; Jessica Mullenix, MSN, AGPCNP, CEPS, CCK, FHRS[4]; Nicole Lewis, MSN, RN[5]

[1]Clinical Quality Program Specialist, National Clinical Nurse Advisor, Cardiology, San Francisco, California; [2]Cardiology Nurse Practitioner, VA Long Beach Healthcare System, Long Beach, California; [3]Heart Failure Nurse Practitioner, VA Long Beach Healthcare System, Long Beach, California; [4]Electrophysiology Nurse Practitioner, Durham VA Medical Center, Durham, North Carolina; [5]National Cardiology Nurse Manager, LTC Charles S. Kettles VA Medical Center, Ann Arbor, Michigan

The authors can be contacted via Sarah Davis-Arnold, MSN, RN, RCIS, EBP-C, NPD-C, at sdavisarnold@gmail.com.

Abstract

In response to increasing complexity in cardiovascular care and the urgent need for standardized, competency-based training, the authors developed and implemented the *Cardiac Catheterization Lab Nursing Orientation and Core Competencies Guidebook*. This initiative introduced a novel national curriculum designed to elevate the practice of cardiac catheterization lab (CCL) nursing through structured education, interprofessional collaboration, and evidence-based competency standards. Grounded in adult learning theory and experiential learning models, the curriculum comprises of 25 one-hour didactic course modules tailored to nurses and interprofessional staff transitioning into or advancing within CCL roles.

The curriculum was developed by a multidisciplinary panel of subject matter experts across cardiology and nursing, ensuring representation of diverse clinical expertise and practice settings. Evaluation data from more than 25 course modules demonstrated high learner satisfaction (average rating ≥4.02/5.0), self-reported knowledge gains, and increased confidence among participants. Learners consistently rated the material as relevant, well-structured, and conducive to practical application. These findings were complemented by qualitative feedback emphasizing the curriculum's accessibility and clinical impact.

The *Guidebook* further defines 12 domains of nursing core competencies specific to CCL practice. It integrates critical concept competency statements that standardize expectations across facilities while allowing for site-specific adaptation through the addition of unit or facility-specific competencies. This dual framework ensures foundational competence in high-risk, high-acuity settings, supports consistent onboarding, and promotes a culture of continuous professional development. The initiative not only enhances individual clinical performance but also strengthens interdisciplinary collaboration, patient safety, and workforce resilience in cardiac procedural care.

List of Figures and Tables Below

- Novice to Competent CCL Core Curriculum Didactic Courses: Table 1. Outlined courses implemented article.

- Competent to Expert CCL Core Curriculum Didactic Courses: Table 2. Outlined courses for future implementation.
- Core Course(s) Novice to Competent, Notable Comments and Field Notes: Table 3. Notable comments and field notes from each course.
- Core Competencies for Cardiac Catheterization Lab Nursing: Table 4. CCL Core Competencies are used to fortify the basic knowledge and skills required for a nurse professional to be a safe and effective member in the CCL environment. These critical concept competencies require the equipment and facility/unit specific competency development
- LIVE Course Structure Example: Figure 1.
- Standardized Learner Satisfaction Statements (Novice to Competent, 25 Courses): Figure 2.
- Overall Attendee Self-Reported Learning, (Novice to Competent, 25 Courses): Figure 3.

Introduction

Amid the constantly evolving healthcare landscape, the role of cardiac catheterization labs (CCLs) in diagnosing and treating cardiovascular diseases has become increasingly dynamic and complex. Within these high-stake environments, the competence and expertise of CCL nurses and interprofessional staff are indispensable factors in ensuring optimal patient outcomes through high-quality, safe nursing care.[1-5] Recognizing the critical importance of effective orientation and competency programs, we embarked on a 2022 journey to redefine and elevate the standards of CCL nursing education. This discussion serves as guidance for the path forward — an illustration of the dedication and innovation driving the evolution of CCL nursing practice through the novel *Veterans Health Administration (VHA) Cardiac Catheterization Lab Nursing Orientation and Core Competencies Guidebook*.

We delve into the depths of a groundbreaking initiative: the development and implementation of a novel Cardiac Cath Lab Core Curriculum for Orientation and Competency Standards tailored specifically for CCL nurses and interprofessional partners. By highlighting the core concepts, actionable strategies, and lessons learned through the operationalization of this curriculum, we aim to empower CCL leaders with the knowledge and insights necessary to nurture excellence in CCL through training, education and competency standards. Through collaboration, evidence-based practices, and a relentless commitment to quality, the core curriculum didactic and guidebook for orientation and competency standards presented herein represents a transformative force in healthcare education.

Background

Traditionally, the transition into a CCL nursing role has presented significant challenges for both new and experienced nurses. Without proper orientation and ongoing competency development, nurses may struggle to meet the demands of their roles, jeopardizing patient safety and quality of care. The Veterans Health Administration (VHA) is comprised of 170 medical centers that serve 9.1 million veterans.[6] The current-state organizational analysis revealed an opportunity to strengthen standardized practice and support clinicians. Supporting indications included non-existent specialty standards for competency and orientation for CCL nursing professionals, and inconsistent expectations for both the private and federal sectors concerning nursing education, training, and competence.

The absence of a standardized training curriculum for CCL registered nurses has resulted in significant variability in training, knowledge, and expertise across healthcare settings. Without a unified framework, nurses entering this specialized field receive inconsistent education and hands-on experience, leading to disparities in the quality of patient care. Furthermore, the lack of a professional society dedicated to advocating for CCL nurses exacerbates the issue, leaving them without a unified voice to support their professional development, establish best practices, and address industry-wide challenges.

Within the field of educational theory, the recognition of adult learning theory, transition programs, higher reliability principles, and experiential learning all illustrate how this need is even more imperative, and highlight the increasing importance of addressing the orientation training and competency standardization needs.[7-10] These components are required to guide an orientation that will protect and sustain safety, efficiency, and quality for patient outcomes, operational efficacy, and staffing stability in the CCL. These same concepts possess a noteworthy applicability to the practice of interventional procedures.

With increasingly higher patient acuity, case and program complexity, and operational cost, the discussion of why and how to orient individual team members to the CCL is more critical than ever. The 2020 pandemic exposed a delicate and quickly changing staffing ecosystem with experience-complexity gaps related to retirement, stress and burnout, and reallocation of

nursing talent due to travel oriented fiscal advancement.[11,12] Targeting actionable strategies, we leveraged these components to execute a tangible national strategy to support the largest healthcare system's delivery of cardiovascular procedural care.[13]

Methods

Continuing education (CE) is essential for sustaining clinical excellence and reducing complications.[14,15] Within the organization, we implemented a structured CE curriculum across 25 education modules that were 1 hour in duration to address "novice to competent" learning with core competencies, evaluated learner outcomes, and identified implications for practice and policy.

The core curriculum development workgroup consisted of a diverse group of subject matter experts in cardiology, selected by the National Field Advisory Committee for Cardiology with the Office of Nursing Service. The group included a dual-certified nursing professional development specialist, CCL experts, and cardiovascular nurse practitioners (NPs) with expertise in acute coronary syndromes, adult congenital heart disease, and heart failure, and CCL nursing leaders. The faculty had a wide range of expertise on cardiac implantable electronic devices, structural heart disease, peripheral vascular conditions, cardiovascular disease and prevention, electrophysiology, critical care cardiology, heart failure, and pre-, peri-, and post operative procedures. Faculty members represented a variety of geographic locations, academic and community-based practice settings, institution sizes, and career stages. Faculty embodied practice acumen and cardiology team model care expert knowledge.

In addition to the faculty, cardiologists and cardiology specialists as key presenters contributed to the 1-hour learning module presentations, forming an interprofessional partnership in the successful execution of the novice to competent (25 hours of CEs) core curriculum didactic modules. The project is ongoing with expansion of "competent to expert" didactic modules (19 hours of CEs). The integration of didactic courses into orientation and competency programs ensures a standardized approach to education, promoting consistency and quality across healthcare settings. By establishing clear learning objectives and performance expectations, the core curriculum courses help to streamline the onboarding process for new hires and facilitate ongoing professional development for experienced staff.

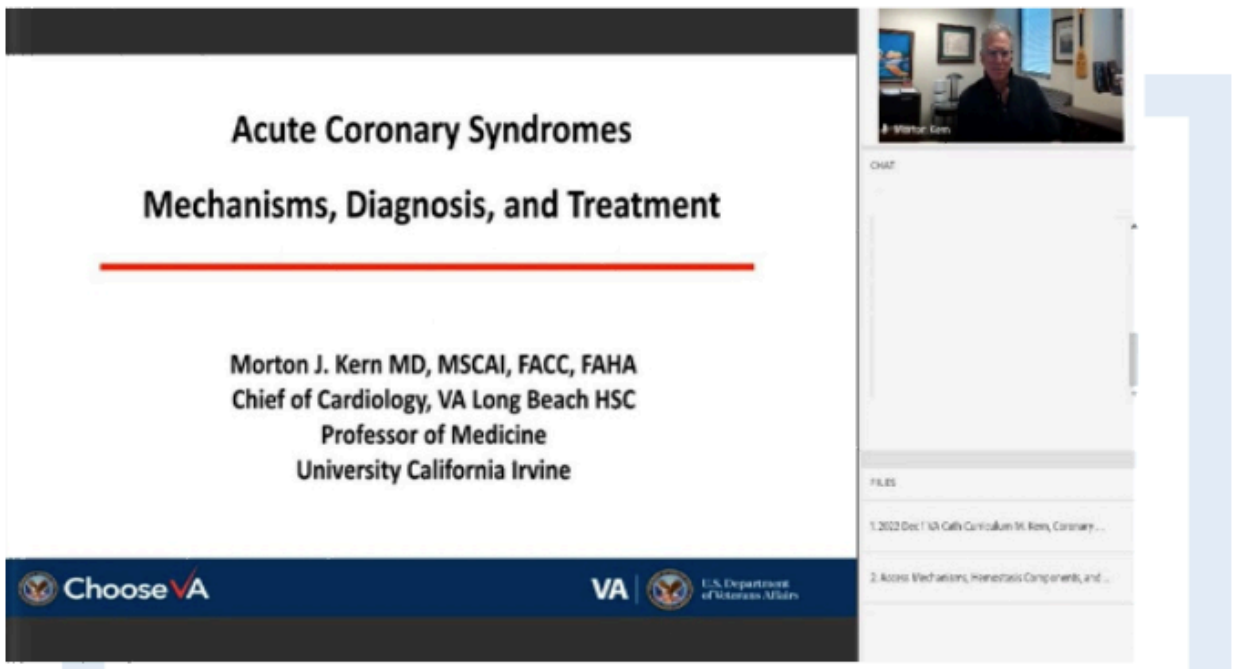

Figure 1. LIVE Course Structure Example.

The CCL core curriculum didactic courses form the cornerstone of the *VHA Cardiac Catheterization Lab Nursing Orientation and Core Competencies Guidebook*, laying the groundwork for nursing excellence in this specialized field. By investing in comprehensive education and training, healthcare organizations can ensure nursing staff are equipped to improve outcomes for patients with cardiovascular disease.

Refining past conversations *(We Need to Start an Educational Conversation: Frameworks for Orientation Success in the Cardiac Catheterization Lab [Part I] and Continuing an Educational Conversation: Functionality and Implementation for Orientation Success in the Cardiac Catheterization Lab [Part II]),* our team leveraged those foundational concepts with success. The core didactic courses consist of fundamental courses, layering foundational knowledge from basic cardiovascular anatomy and physiology intertwined with coronary artery disease pathology, up through advanced professional certification concepts (Tables 1-2). This discussion will expand on the results from the execution of the Novice to Competent CCL Core Curriculum Didactic Courses. Competent to Expert courses are being developed and executed.

Table 1. Novice to Competent CCL Core Curriculum Didactic Courses.

Novice to Competent Cardiac Catheterization Lab Core Curriculum Didactic Courses		
Course Sequential Number and Name		*#CE Hours*
1	Cardiac Anatomy and Physiology: Cardiac, Peripheral, and Cardiothoracic Principles for the Cardiac Catheterization Lab	*1*
2	Intracardiac Hemodynamics	*1*
3	Cardiovascular Disease Process, Classifications, and Clinical Implications	*1*
4	Overview of Structural Heart Abnormalities: Valvular and Congenital	*1*
5	Coronary Anatomy and Ischemia, Infarction Clinical Implications	*1*
6	Access Mechanisms, Hemostasis Components, and Closure Devices	*1*
7	Procedural Access Site Management and Vascular Complications	*1*
8	Preprocedural Considerations and Patient Preparation	*1*
9	Procedural and Perioperative Standards	*1*
10	Left Heart Catheterization Indications, Techniques, and Patient Outcomes	*1*
11	Right Heart Catheterization Theory and Application	*1*
12	Radiation Safety and Fluoroscopy Basics	*1*
13	Diagnostic Tools – Instantaneous Wave-Free Ration (iFR), Fractional Flow Reserve (FFR), Optical Coherence Tomography (OCT), and Intravascular Ultrasound (IVUS)	*1*
14	Cardiac Implantable Electrophysiology Device (CIED) Indications and Procedural Standards	*1*
15	Device Types and Settings	*1*
16	Transvenous Pacing	*1*
17	Pharmacology in the Cath Lab	*1*
18	Percutaneous Coronary Interventions: Angioplasty and Stenting	*1*
19	Intra-Aortic Balloon Counter Pulsation (IABP)	*1*
20	Left Ventricular Support Devices	*1*
21	Acute Coronary Syndrome and 12-Lead Recognition	*1*
22	Air Emboli, Respiratory Arrest, Contrast Anaphylaxis	*1*
23	Dissection, Perforation, Cardiac Tamponade, and Abrupt Closure in the Cardiac Cath Lab	*1*
24	Codes in the Cardiac Cath Lab	*1*
25	Emergency Management Standards in the Cardiac Cath Lab	*1*

Table 1. Novice to Competent CCL Core Curriculum Didactic Courses.

Table 2. Competent to Expert CCL Core Curriculum Didactic Courses.

Competent to Expert Cardiac Catheterization Lab Core Curriculum Didactic Courses		
Course Sequential Number and Name		*#CE Hours*
1	Sheaths and Access Needles	*1*
2	Wires: Indications, Uses, Characteristics, and Sizing	*1*
3	Angiographic Diagnostic and Guide Catheters	*1*
4	Balloons and Stents	*1*
5	Cardiac Output, Preload, Afterload	*1*
6	Right Heart Pressures and Obtaining Diagnostic Values	*1*
7	Heart Failure in the Cardiac Catheterization Lab	*1*
8	Foundations in Valvular Consideration in the Cardiac Catheterization Lab	*1*
9	Congenital Considerations and Shunting	*1*
10	Calculations in the Cardiac Catheterization Lab	*1*
11	Right Heart Catheterization Equipment	*1*
12	Shunting Recognition and Performing Oxygen Saturation Testing	*1*
13	Advanced Introduction to Structural Heart *(Optional Add-On)* Modules	*1*
14	Advanced Interventional Adjuncts and Treatment Modalities, Part One	*1*
15	Advanced Interventional Adjuncts and Treatment Modalities, Part Two	*1*
16	Vessel Identification and Advanced Angiography Views	*1*
17	Lesion Grading and Vessel Sizing	*1*
18	Quality Improvement in the Cardiac Catheterization Lab	*1*
19	Professional Development in the Cardiac Catheterization Lab	*1*

Table 2. Competent to Expert CCL Core Curriculum Didactic Courses.

These courses underpin the novel *VHA Cardiac Catheterization Lab Nursing Orientation and Core Competencies Guidebook*, a 60+ page orientation and competency standards guide for CCL leaders and professionals. The principal goal for Cardiac Catheterization Lab Core Nursing Competency statements within the *Guidebook* is to provide a framework for nursing professional development and CCL specialty clinical competency standards for the coordinated recognition and preservation of scope and standards of care delivery within the CCL nursing specialty.

The CCL core competencies provide the critical base for practice and baseline knowledge. The competency standards presented later in this discussion distinguishes the vital knowledge and skills required for CCL nursing professionals working in the CCL specialty, thereby supporting nurses in identifying learning needs and professional development opportunities. Acknowledgement of the specialized competency for CCL procedural care increases the understanding of the depth and role CCL nurses contribute within the specialty procedures cardiovascular team which in turn encourage and improve collaborative, high-quality, patient-centered care delivery.

Results

Participants in the core curriculum course learning were predominantly nurse attendees with less than 10% in each course being other interprofessional partners. Evaluation reports from the learning management system were reviewed, covering course modules 1–25 (Novice to Competent CCL Core Curriculum Didactic Courses). Each included standardized participant satisfaction metrics, self-assessed learning outcomes, and open-ended feedback. Descriptive statistics were used to calculate satisfaction rates, application to job performance, and self-reported learning.

Over the course of the didactic program, attendees consistently reported high levels of satisfaction with their learning experience. Through 1-hour didactic lectures, staff were provided with a dynamic, manageable, and consistent educational experience. The curriculum was designed to cater to staff with limited time for sessions and recorded material ensuring that staff could access after the “LIVE” presentation throughout the program and their learning schedules. Overall predominant feedback indicated that staff found the content relevant, informative, and well-presented, contributing to a positive overall learning environment.

One of the primary goals of the CCL core curriculum was to equip nurses with the knowledge and skills necessary to excel in their roles. The feedback from CCL leaders and staff via emails received following the course revealed significant gains in knowledge acquisition among participants, with nurses demonstrating a deeper understanding of cardiovascular base knowledge, procedural techniques, and patient care principles. Participants reported feeling more confident and competent in their abilities to perform their duties effectively following the completion of the program.

Most notably, the evaluation demonstrated exceptionally high levels of learner satisfaction with the cardiac cath lab core curriculum over the span of all 25 courses, averaging 4.02 (lowest reported average) of learner satisfaction out of a 5.0 rating system using standardized learner satisfaction statements.

Figure 2. Standardized Learner Satisfaction Statements (Novice to Competent, 25 Courses).

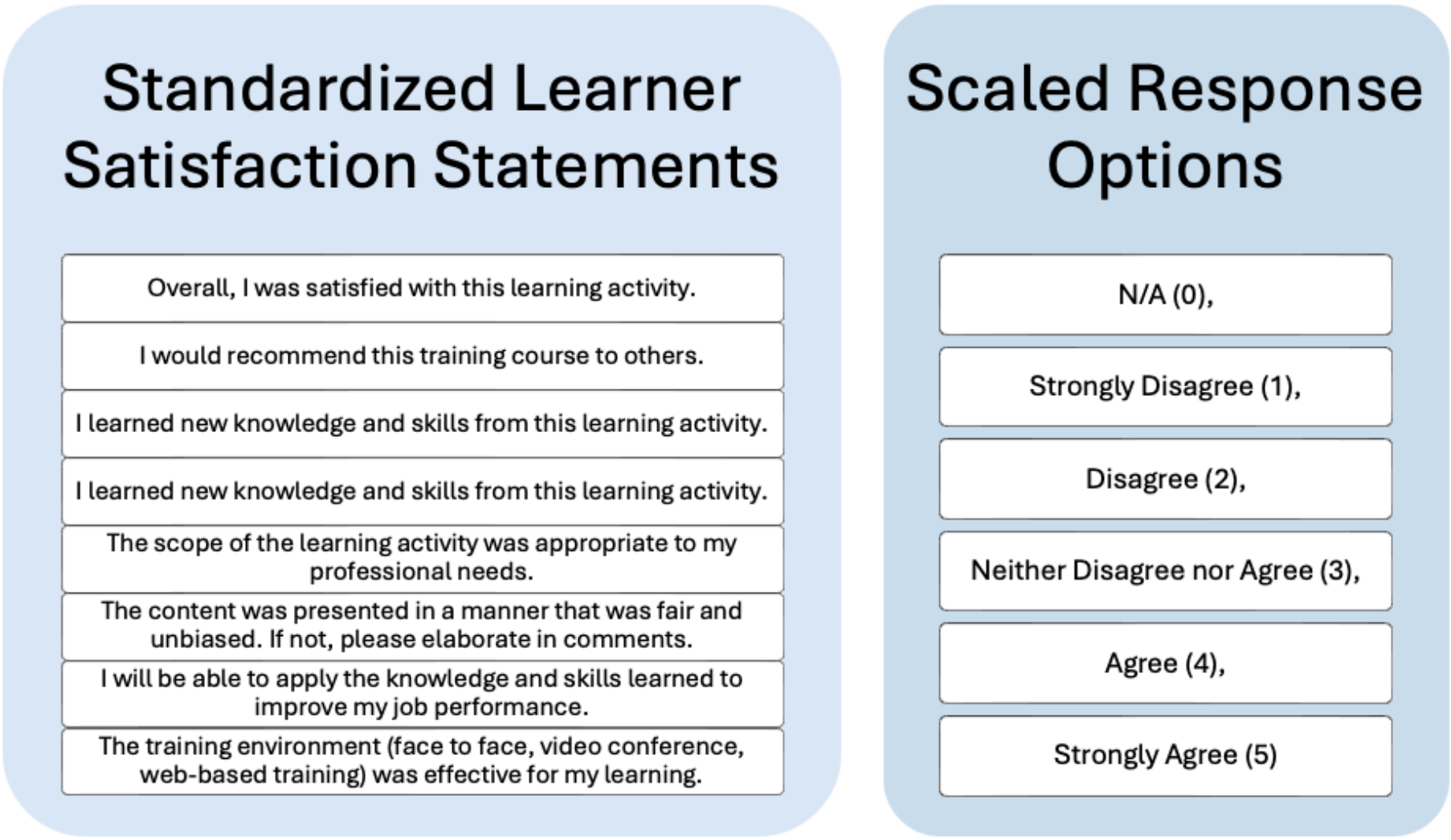

Figure 2. Standardized Learner Satisfaction Statements (Novice to Competent, 25 Courses).

Further, all 25 courses illustrated a consistent 60% of all attendee response of a “fair amount” (second highest self-reported learning) or “a great deal” (highest self-reported learning) to the standardized question “How much did you learn as a result of this CE program?” with less than 3% of all attendee responses reporting “very little” (lowest self-reported learning) or “little” (second lowest self-reported learning) across all courses.

Figure 3. Overall Attendee Self-Reported Learning (Novice to Competent, 25 Courses)

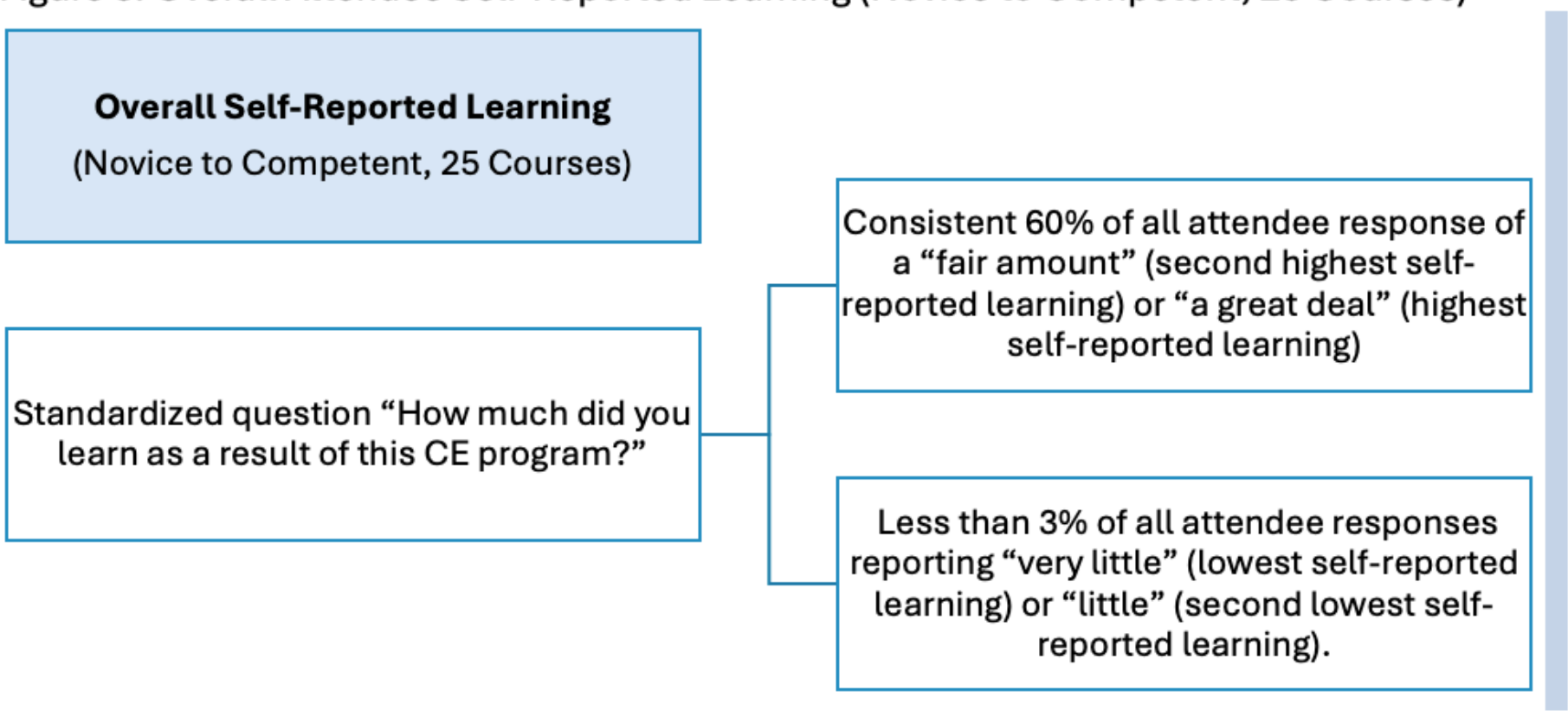

Figure 3. Overall Attendee Self-Reported Learning (Novice to Competent, 25 Courses).

Participants expressed appreciation for the quality and relevance of the educational content, as well as the expertise and support provided by instructors throughout the program. Additionally, attendees reported feeling valued and supported by the organization, which had invested in their professional development through participation in the curriculum. The overwhelmingly positive feedback from participants underscores the success of the program in meeting the needs and expectations of CCL nurses, possibly contributing to high levels of job satisfaction and retention within the nursing workforce. As we have discussed a high value-add learner experience, it is equally important to discuss notable comments and field notes from each course. To succinctly organize each of these, please see the below tables to see how each course possesses notable details.

Table 3. Core Course(s) Novice to Competent: Notable Comments and Field Notes

Course	Attendee Total	Notable Comments and Field Notes
1	339	• This course is phenomenal. It is very thorough, yet very easy to comprehend and put the pieces together. • Transcripts of audio would be helpful. • Please add closed captions. • Would prefer an in-person training vs watching the videos.
2	283	• Seemed a little rushed at the end. • Would like access to download PowerPoint and closed captioning of audio material.
3	292	• Transcripts and closed captioning would be appreciated.
4	270	• The speaker stayed on the same slide for a long period of time and I found myself losing interest.
5	305	• Cardiac nurse/cath lab for over 40 years, so review is great for newer nurses.
6	301	• None.
7	245	• None.
8	246	• Providers need to review this.
9	260	• To zero assist, transducer is on hand controller and where to hold it would have been nice to address.
10	269	• 2nd timeout for PCI is an excellent idea!
11	258	• Needed to show sampling of end expiratory waveform more clearly.
12	333	• Presenter audio/mic challenges (volume) for some participants.
13	241	• The instructor was amazing! the visualizations used to help understand the different systems was very helpful. I never had it explained to me in such a way.
14	262	• Notable presenter connectivity challenges (co-presenter stepped in to cover presentation during course execution).
15	236	• None.

Table 3, Part 1 of 2. Core Course(s) Novice to Competent: Notable Comments and Field Notes

Continued...

Table 3. Core Course(s) Novice to Competent: Notable Comments and Field Notes

7	245	• None.
8	246	• Providers need to review this.
9	260	• To zero assist, transducer is on hand controller and where to hold it would have been nice to address.
10	269	• 2nd timeout for PCI is an excellent idea!
11	258	• Needed to show sampling of end expiratory waveform more clearly.
12	333	• Presenter audio/mic challenges (volume) for some participants.
13	241	• The instructor was amazing! the visualizations used to help understand the different systems was very helpful. I never had it explained to me in such a way.
14	262	• Notable presenter connectivity challenges (co-presenter stepped in to cover presentation during course execution).
15	236	• None.
		•
16	285	• The instructor was amazing! the visualizations used to help understand the different systems was very helpful. I never had it explained to me in such a way.
17	251	• Presenter did an amazing job in explaining and giving resources. She taught in a way that was very easy to understand and follow along.
18	235	• None.
19	253	• Presenter confidence needed improvement. • It is a good refresher course.
20	227	• Presenter mic quality needed improvement.
21	443	• I loved the way the presenter explained the 12-lead ECG, it was super helpful and clear! • The only complaint that I have is the quality of the recording. It was hard to understand the instructor. It sounded like she was talking through a coffee can. I would love to hear more from this instructor. It truly was an amazing learning experience that I have never thought about until I got to the cath lab.
22	268	• This presenter is great, very knowledgeable! I look forward to her CEUs. • Best instructor of any TMS EVER!!! Engaging, knowledgeable, succinct, professional, real-world examples, a pleasure to learn from! • Two comments regarding audio challenges.
23	242	• Two comments regarding presenter audio challenges.
24	268	• People would get more out of attending a mock code blue in their lab, that way they know exactly what their flow is and what to do.
25	243	• None

Table 3, Part 2 of 2. Core Course(s) Novice to Competent: Notable Comments and Field Notes

In summary, the evaluation of the CCL core curriculum revealed a resoundingly positive impact on learner experience, knowledge acquisition, and learner satisfaction. By providing nurses and interprofessional staff with a comprehensive and engaging educational experience, the curriculum provided an avenue for enhanced clinical competence and fostered a culture of learning and professional growth within CCL settings. These findings highlight the importance of investing in robust orientation and competency programs to support the ongoing development of nursing staff and ultimately improve outcomes for patients with cardiovascular disease.

12 Domains of CCL Core Competency, Model for Standardization

The *VHA Cardiac Catheterization Lab Nursing Orientation and Core Competencies Guidebook* outlines 12 Domains of Nursing Core Competencies for Cardiac Catheterization Lab (CCL). This guidebook has several important implications for the field of CCL nursing, as well as for broader interprofessional and healthcare system practices. Within the *VHA CCL Nursing Orientation and Core Competencies Guidebook*, each domain contains critical concept competency statements. The critical concept competency is the foundational competency that must be met to support unit specific competencies (for example, industry-specific equipment management or facility-specific CCL emergency process). The CCL Core Competencies listed below are used to fortify the basic knowledge and skills required for a nurse professional to be a safe, effective member in the CCL environment. These critical concept competencies require the equipment and facility/unit-specific competency development, which articulate more detailed requirements for knowledge, skills, attitudes (KSAs) for professionals in the CCL to achieve and sustain.

12 Domains of Nursing Core Competencies for Cardiac Catheterization Lab	
Competency Verification Methods *that may be selected for each Critical Concept Competency:*	
• Test/Exam • Return Demonstration • Evidence of Daily Work • Simulation/Mock Event	• Case Study • Exemplar • Peer/Preceptor Review • Verbal/Discussion with Peer/Preceptor

Domain	Critical Concept Competency
1. **Cardiovascular A&P, Structural Principles, and Cardiac Disease**	• Identify the coronary arteries, regions of the heart supplied, chambers involved, SA node, and dominance determination. • Discuss the physiological changes related to cardiovascular disease and clinical indications. • Identify the components of the coronary from ostium to vessel intima and endothelium layer. • Recognize the treatment modalities used for cardiovascular disease, conduction, and cardiac structures related to disease progression.
2. **Access Mechanisms, Hemostasis Components, and Closure Devices**	• Identify the procedural access sites utilized in the CCL. • Discuss the steps for arterial and venous access and best practice for patient safety. • Recognize procedural site complications and management techniques. • Recognize the pharmacological and physiological factors related to access and hemostasis. • Contrast the difference of closure devices utilized in the CCL
3. **Cardiac Diagnostic Procedures and Therapeutic Applications**	• Discuss left and right heart catheterization and clinical indications. • Identify the coronary arteries and areas of correlating perfusion to cardiac tissue. • Identify potential complications of left and right heart catheterization and implications in the procedural setting. • Differentiate diagnostic tools: iFR, FFR, OCT, IVUS and criteria for escalation to intervention. • Discuss the principle of radiation and importance of radiation safety. • Discuss radiation protection principles and risks in the CCL. • Describe the angiography nomenclature and examples of utilization.

Table 4, Part 1 of 4. Core Competencies for Cardiac Catheterization Lab Nursing

	• Identify radiological views used during angiographic procedures and advantages of views. • Demonstrate ability to identify vessels in contrasting views based on angulation.
4. **Pharmacological Agents in the CCL**	• Differentiate the characteristics and mechanisms of action for pharmacologic agents utilized in radial access procedures. • Differentiate the characteristics and mechanisms of action for pharmacologic agents utilized in diagnostic procedures. • Differentiate the characteristics and mechanisms of action for pharmacologic agents utilized in interventional procedures. • Differentiate the characteristics and mechanisms of action for pharmacologic agents utilized in emergent situations. • Differentiate the characteristics and mechanisms of action for pharmacologic agents utilized in structural heart procedures. • Describe contraindications for each pharmacologic agent within the CCL. • Demonstrate safe Moderate Sedation and Reversal practices. • Describe use, administration, and mechanisms of action for: ▪ Anti-Thrombotic ▪ Antiplatelet Agents (IIb/IIIa receptor antagonists, P2Y12 inhibitors) ▪ Anticoagulants (Heparin and Low-Molecular-Weight Heparin) ▪ Direct Thrombin Inhibitors (Bivalirudin) ▪ Thrombolytics ▪ Contrast
5. **Conductivity Basics, Device Implantation, and Procedural Standards**	• Identify the conduction structures within the heart and electrical abnormalities that can occur. • Recognize the different devices implanted in the procedural setting. • Discuss device implantation procedural steps and clinical care standards. • Identify abnormalities in device implantation and potential complications.

Table 4, Part 2 of 4. Core Competencies for Cardiac Catheterization Lab Nursing

6. **Coronary & Endovascular Interventional Procedures and Pharmacological Adjuncts**	• Discuss coronary and endovascular percutaneous interventions indications and procedural steps in the CCL. • Identify intra-procedural pharmacological agents and mechanisms of action for intervention. • Differentiate interventional tools including angioplasty, stenting, and other interventional adjuncts including thrombectomy, thrombolysis, and atherectomy. • Identify potential complications and emergent treatment modalities in the procedural setting.
7. **Cardiac Cath Lab Complications and Emergency Management**	• Discuss the potential complications related to cardiac catheterization procedures. • Identify the intra-procedure treatment modalities, equipment, and steps for emergent conditions. • Recognize the roles and actions of interdisciplinary team members specific to the CCL during codes. • Discuss the mechanism of device and pharmacological hemodynamic support during emergencies. • Implement care escalation in coordination with Cardiovascular Operating Room (CVOR) when appropriate.
8. **Specialty Equipment: Wires and Catheters**	• Identify the appearance, properties, and uses of fundamental needles, wires, sheaths, and catheters used in the CCL. • Recognize the relationship of wire characteristics, needle gauge, catheter size and curvature, and sheath size. • Discuss selection of needle, catheter, wire, and sheath in practice related to diagnostic and interventional procedures.
9. **Hemodynamic Support Devices and Indications**	• Discuss clinical criteria and differences in IABP and the left ventricular support device. • Recognize contraindications to each device therapy. • Demonstrate an understanding of the intra-procedural equipment use and clinical application of insertion in stable and unstable patients. • Recognize potential complications associated with both devices and cascading treatments.
10. **Structural Heart Application for Diagnostic and Interventional Concepts**	• Identify conditions related to structural heart abnormalities. • Recognize valve waveforms (normal and abnormal) and values necessary for valve calculations.

Table 4, Part 3 of 4. Core Competencies for Cardiac Catheterization Lab Nursing

	• Compare and contrast valvular disorders and identify associated hemodynamic waveforms. • Discuss different interventional treatment modalities for structural heart in the procedural setting. • Discuss complications related to structural heart procedures and clinical care action.
11. **Interventional Therapy Adjuncts and Advanced Treatment Modalities**	• Describe clinical criteria for advanced percutaneous interventional equipment. • Classify lesion characteristics and complexity. • Identify complications related to each discussed interventional device. • Discuss advanced interventional components including left main equivalent, bypass grafts, chronic total occlusions (CTO), bifurcating lesions, and dissection.
12. **Professional Development – Specialty Certification**	• Discuss importance of professional development. • Describe specialty certification process and value. • Demonstrate foundational to advanced knowledge for nursing practice • Appraise veteran-centered care in professional practice and the critical components of safe procedural sedation and care delivery. • Design a professional development plan incorporating scholarship for the nursing discipline. • Implement systems-based practice and healthcare technologies effectively into clinical practice. • Construct an environment of interprofessional partnerships and professionalism in clinical practice.

Table 4, Part 1 of 4. Core Competencies for Cardiac Catheterization Lab Nursing

Standardization of practice across facilities through the core competency domains ensures consistency in nursing practice across CCLs, especially within large healthcare systems like the VHA. This minimizes variation in care delivery and promotes safe, high-quality outcomes. Standardization of foundational competencies provides an easier benchmark for performance and facilitates smoother adaptations when facing the evolving complexity of equipment and procedures performed in the specialty setting.

Second, establishing a stronger focus on foundational competency provides essential safety and effectiveness principles all nurses must master, irrespective of location or equipment differences. The essential safety implication ensures that all CCL nurses, even before learning facility-specific practices, understand life-saving protocols, patient monitoring, sterile techniques, and other non-negotiables. The need for both foundational competency domains and unit-specific competencies encourages ongoing professional development, bridging education and practice. As technology, techniques, and patient populations evolve, this approach fosters a growth mindset and prepares nurses to adapt to new challenges in interventional cardiology.

Lastly, clearly defined competencies enable CCL nurses to function more effectively in high-pressure interdisciplinary teams. CCL nurses often collaborate with several interprofessional partners in each procedural case. Competency clarity improves role understanding, communication, and team performance in critical situations. Further, new nurses or those transitioning into the CCL role have a clear, structured orientation path, reducing variability in onboarding experiences, resulting in faster, more efficient onboarding and improvement of staffing flexibility that helps mitigate the effects of workforce shortages. Nurses trained in these domains are more likely to apply evidence-based decision-making, because the competencies include critical thinking, safety, and clinical judgment.

Future Research and Implications

The development and implementation of the *VHA Cardiac Catheterization Lab Nursing Orientation and Core Competencies Guidebook* represent a substantial advancement in standardizing education and competency expectations across CCLs. However, future research is needed to longitudinally evaluate the impact of this curriculum on clinical outcomes, team efficiency, patient safety metrics, and workforce retention. Studies should also explore the scalability and adaptability of this model across non-federal healthcare settings and diverse practice environments.

The authors recognize that implementing a lengthy orientation program for CCL nurses presents several challenges for healthcare organizations. Extended training periods can delay nurse integration, potentially affecting staffing levels and workflow efficiency. However, the risks associated with inadequate training far outweigh these concerns, as patient safety remains the top priority. Additionally, prolonged orientation programs can be costly, demanding significant financial and personnel resources for instruction, materials, and mentorship. A rigid, extended program may also fail to accommodate varying experience levels, leading to frustration among seasoned nurses who feel their time is not being utilized effectively. Striking a balance between comprehensive training and efficiency is essential to ensure nurses are well-prepared while minimizing operational disruptions, an approach strongly supported by the Core Curriculum.

Further inquiry into interprofessional training integration, simulation-based competency assessments, and the use of emerging technologies such as virtual reality or artificial intelligence in cath lab education may yield valuable insights for evolving clinical education models. Additionally, qualitative research capturing the lived experiences of nurses undergoing the orientation can illuminate barriers, facilitators, and potential refinements to the program. The positive initial outcomes from this novel initiative underscore the need for ongoing investment in structured professional development frameworks to sustain excellence, build resilient interdisciplinary teams, and respond to increasing procedural complexity in cardiovascular care.

Acknowledgements.

Special gratitude to our now retired key faculty (Cathy Clark MS, RN, RCIS and Cynthia Wilson, RN) for their tireless dedication.

Special acknowledgements to the outstanding Core Curriculum SME presenters that dedicated their time and expertise to make this curriculum possible.

References

1. Yaqoob Mohammed Al Jabri F, Kvist T, Azimirad M, Turunen H. A systematic review of healthcare professionals' core competency instruments. *Nurs Health Sci.* 2021 Mar; 23(1):87-102. doi:10.1111/nhs.12804

2. Writing Committee; Bass TA, Abbott JD, Mahmud E, et al. 2023 ACC/AHA/SCAI Advanced Training Statement on Interventional Cardiology (Coronary, Peripheral Vascular, and Structural Heart Interventions): A Report of the ACC Competency Management Committee. *J Soc Cardiovasc Angiogr Interv*. 2023 Feb 16; 2(2): 100575. doi:10.1016/j.jscai.2022.100575

3. Liu Y, Aungsuroch Y. Current Literature Review of Registered Nurses' Competency in the Global Community. *J Nurs Scholarsh*. 2018 Mar; 50(2): 191-199. doi:10.1111/jnu.12361

4. Mrayyan MT, Abunab HY, Abu Khait A, Rababa MJ, Al-Rawashdeh S, Algunmeeyn A, Abu Saraya A. Competency in nursing practice: a concept analysis. *BMJ Open*. 2023 Jun 1; 13(6): e067352. doi:10.1136/bmjopen-2022-067352

5. Naidu SS, Abbott JD, Bagai J, et al. SCAI expert consensus update on best practices in the cardiac catheterization laboratory: This statement was endorsed by the American College of Cardiology (ACC), the American Heart Association (AHA), and the Heart Rhythm Society (HRS) in April 2021. *Catheter Cardiovasc Interv.* 2021 Aug 1; 98(2): 255-276. doi:10.1002/ccd.29744

6. Administration, V.H. *About VHA*. 2023; Available from: https://www.va.gov/health/aboutvha.asp.

7. Dickerson, P., *Core Curriculum for Nursing Professional Development*. 5th ed. 2017: Association for Nursing Professional Development (ANPD).

8. Duchscher JB, Windey M. Stages of Transition and Transition Shock. *J Nurses Prof Dev*. 2018 Jul/Aug; 34(4): 228-232. doi: 10.1097/NND.0000000000000461

9. Duchscher JE. Transition shock: the initial stage of role adaptation for newly graduated registered nurses. *J Adv Nurs*. 2009 May; 65(5): 1103-1113. doi:10.1111/j.1365-2648.2008.04898.x

10. Murray M, Sundin D, Cope V. Benner's model and Duchscher's theory: Providing the framework for understanding new graduate nurses' transition to practice. *Nurse Educ Pract.* 2019 Jan; 34: 199-203. doi:10.1016/j.nepr.2018.12.003

11. Kadavath S, Mohan J, Ashraf S, et al. Cardiac Catheterization Laboratory Volume Changes During COVID-19-Findings from a Cardiovascular Fellows Consortium. *Am J Cardiol*. 2020 Sep 1; 130: 168-169. doi:10.1016/j.amjcard.2020.06.009

12. Riley RF, Alasnag M, Batchelor WB, et al. The Ongoing National Medical Staffing Crisis: Impacts on Care Delivery for Interventional Cardiologists. *J Soc Cardiovasc Angiogr Interv*. 2022 May-Jun; 1(3): 100307. doi:10.1016/j.jscai.2022.100307

13. Le DE, Arora BL, Kelly FR, et al; ACC Federal Cardiology Leadership Council. The Quality of Veterans Healthcare Administration Cardiovascular Care. *JACC Adv*. 2025 Feb; 4(2): 101533. doi:10.1016/j.jacadv.2024.101533

14. (US), I.o.M., *Institute of Medicine (US) Committee on Planning a Continuing Health Professional Education Institute*. Redesigning Continuing Education in the Health Professions. 2010, Washington (DC): National Academies Press (US).

15. Zarei M, Mojarrab S, Bazrafkan L, Shokrpour N. The role of continuing medical education programs in promoting iranian nurses, competency toward non-communicable diseases, a qualitative content analysis study. *BMC Med Educ*. 2022 Oct 24; 22(1): 731. doi:10.1186/s12909-022-03804-x

Find More:

CLD Home

Renal Denervation Topic Center

Cardiovascular Ambulatory Surgery Centers (ASCs) Topic Center

News

Case Reports

Grand Rounds With Morton Kern, MD

Peripheral Artery Disease Topic Center

Watch: Cath Lab Live Videos

Podcasts: Cath Lab Conversations

Go to Cath Lab Digest's Current Issue

Go to the Journal of Invasive Cardiology Issue