Vascular Sonography

1. Introduction

Candidates applying for certification and registration are required to meet the Professional Education Requirements specified in the *ARRT Rules and Regulations*. ARRT's *Vascular Sonography Didactic and Clinical Competency Requirements* are one component of the Professional Education Requirements.

The requirements are periodically updated based upon a practice analysis which is a systematic process to delineate the job responsibilities typically required of vascular sonographers. The result of this process is a task inventory which is used to develop the clinical competency requirements (see section 4 below) and the content specifications which serve as the foundation for the didactic competency requirements (see section 3 below) and the examination.

2. Documentation of Compliance

Verification of program completion, including Didactic and Clinical Competency Requirements and all degree-related requirements including conferment of the degree, will be completed on the Program Completion Verification Form on the ARRT Educator website after the student has completed the Application for Certification and Registration.

Candidates who complete their educational program during 2024 or 2025 may use either the 2021 Didactic and Clinical Competency Requirements or the 2024 requirements. Candidates who complete their educational program after December 31, 2025, must use the 2024 requirements.

3. Didactic Competency Requirements

The purpose of the didactic education requirement is to document that individuals have had the opportunity to develop fundamental knowledge, integrate theory into practice, and hone affective and critical thinking skills required to demonstrate professional competence. Candidates must successfully complete coursework addressing the topics listed in the ARRT Content Specifications for the Vascular Sonography Examination. These topics would typically be covered in a nationally recognized curriculum published by organizations such as Joint Review Committee on Education in Diagnostic Medical Sonography (JRC-DMS). Educational programs accredited by a mechanism acceptable to ARRT generally offer education and experience beyond the minimum requirements specified in the content specifications and clinical competency requirements.

4. Clinical Competency Requirements

The purpose of the clinical competency requirements is to document that individuals have demonstrated competence performing the clinical activities fundamental to a particular discipline. Competent performance of these fundamental activities, in conjunction with mastery of the cognitive knowledge and skills as documented by the examination requirement, provides the basis for the acquisition of the full range of procedures typically required in a variety of settings. Demonstration of clinical competence means that the candidate has performed the procedure independently, consistently, and effectively during the course of their formal education. The following pages identify the specific procedures for the clinical competency requirements. Candidates may wish to use these pages, or their equivalent, to record completion of the requirements. The pages do NOT need to be sent to the ARRT.

General Requirement: Remote scanning is not acceptable for completion of ARRT Clinical Requirements. The candidate must complete the examination or procedure at the facility where the patient and equipment are located. The candidate must be physically present during the examination or procedure.

4.1 General Performance Considerations

4.1.1 Patient Diversity

Demonstration of competence should include variations in patient characteristics such as age, gender, and medical condition.

4.1.2 Simulated Performance

The ARRT requirements specify that certain clinical procedures may be simulated as designated in the specific requirements below. Simulations must meet the following criteria:

- ARRT defines simulation of a clinical procedure routinely performed on a patient as the candidate completing hands-on tasks of the procedure on a live human being, using the same level of cognitive, psychomotor, and affective skills required for performing the procedure on a patient in a clinical setting standardized to mirror the physical facilities where practice occurs.
- ARRT requires that competencies performed as a simulation must meet the same criteria as competencies demonstrated on patients. For example, the competency must be performed under the direct observation of the program director or program director's designee and be performed independently, consistently, and effectively.

4.1.3 Elements of Competence

Demonstration of clinical competence requires that the program director or the program director's designee has observed the candidate performing the procedure independently, consistently, and effectively during the course of the candidate's formal educational program.

Remote scanning is not acceptable for completion of ARRT Clinical Requirements. The candidate must complete the examination or procedure at the facility where the patient and equipment are located. The candidate must be physically present during the examination or procedure.

4.2 Vascular Sonography Specific Requirements

As part of the educational program, candidates must demonstrate competence in the clinical activities identified below.
- Five mandatory patient care procedures and be BLS/CPR certified;
- Five mandatory scanning techniques;
- One mandatory equipment care activity;
- Nine mandatory imaging procedures; and
- Nine elective imaging procedures selected from a list of 18 procedures.

These clinical activities are listed in more detail in the following sections.

4.2.1 Mandatory Patient Care Requirements and Scanning Techniques, and Equipment Care Activities

Candidates are required to be BLS/CPR certified. They must also demonstrate competence in the remaining five patient care activities, five scanning techniques, and one equipment care activity. The activities should be performed on patients whenever possible, but simulation is acceptable if state or institutional regulations prohibit candidates from performing the procedures on patients.

Mandatory Patient Care Procedures	Date Completed	Competence Verified By
BLS/CPR certification		
Vital signs (blood pressure, pulse, respiration)		
Monitoring level of consciousness and respiration		
Standard Precautions		
Sterile technique		
Verification of informed consent		
Mandatory Scanning Techniques	**Date Completed**	**Competence Verified By**
Gray scale (2D)		
Color Doppler		
Power Doppler		
Spectral Doppler		
*Ergonomic evaluation		
Mandatory Equipment Care	**Date Completed**	**Competence Verified By**
Clean and disinfect transducer		

The candidate should be evaluated for appropriate ergonomic scanning techniques according to the following: "Industry Standards for the Prevention of Work Related Musculoskeletal Disorders in Sonography."

4.2.2 Vascular Sonographic Procedures

Candidates must demonstrate competence in the nine mandatory procedures listed in the following table. Candidates are also required to demonstrate competence for nine of the 18 elective procedures. Competency is limited to one procedure per patient or volunteer.

Where possible, all procedures should be performed on patients; however, up to three of the 12 procedures that are eligible for simulation may be performed on volunteers (simulated), as long as your institution has a policy that assures the protection of both the volunteer's and the institution's interests. Procedures identified as "Eligible for Simulation" on the chart below may be simulated.

The candidate's clinical education should include variation in patient characteristics, provide ample opportunity for demonstration of both normal and variant anatomy, as well as important pathologies and medical conditions. A variety of instructional methods may be useful for teaching the clinical skills identified in this document.

When performing the vascular sonography procedures, the candidate must demonstrate appropriate:

- patient preparation, including evaluation of requisition or medical record, preparation of exam room, identification of patient, infection control procedures, patient assessment, and instruction concerning the procedure;
- exam protocol, including patient positioning, sonographic technique, parameter selection, image display, image annotation and labeling, archiving, and documentation of procedure;
- image evaluation, including image quality, optimal demonstration of anatomic region and pathology, and exam completeness.

Those procedures marked with an * must include the required vessels listed in the Appendix.

Abdomen/Pelvic Vasculature					
Arterial and Venous	**Mandatory**	**Elective**	**Date Completed**	**Eligible for Simulation**	**Competence Verified By**
Mesenteric*		✓		✓	
Aorta*	✓				
Renal Artery with Duplex*	✓				
Liver Doppler/Vasculature*	✓				
TIPS*		✓			
Liver Transplant*		✓			
Kidney Transplant*		✓			
Upper Extremity Vasculature					
Arterial and Venous	**Mandatory**	**Elective**	**Date Completed**	**Eligible for Simulation**	**Competence Verified By**
Upper Extremity Arterial Doppler*	✓			✓	
Upper Extremity Venous Doppler*	✓				
Radial Artery Mapping		✓		✓	
Vein Mapping		✓		✓	
Lower Extremity Vasculature					
Arterial and Venous	**Mandatory**	**Elective**	**Date Completed**	**Eligible for Simulation**	**Competence Verified By**
Lower Extremity Arterial Doppler*	✓			✓	
Lower Extremity Venous Doppler*	✓				
Vein Mapping		✓		✓	
Lower Extremity Reflux Assessment		✓		✓	
Neck Vasculature					
	Mandatory	**Elective**	**Date Completed**	**Eligible for Simulation**	**Competence Verified By**
Carotid Ultrasound*	✓			✓	

4.2.2 Vascular Sonographic Procedures (continued)

Stress/Pressure Testing

	Mandatory	Elective	Date Completed	Eligible for Simulation	Competence Verified By
Segmental Pressures (upper extremities)		✓		✓	
Segmental Pressures (lower extremities)		✓		✓	
Ankle-Brachial Index (ABI)	✓			✓	
Pulse Volume Recording (PVR)		✓			
Photoplethysmography (PPG)		✓		✓	

Post Intervention Procedures

	Mandatory	Elective	Date Completed	Eligible for Simulation	Competence Verified By
Bypass Grafts		✓			
Post Catheterization Complications		✓			
Endografts		✓			
Dialysis Access Grafts/Fistulae		✓			
Stents		✓			

Interventional Procedures

	Mandatory	Elective	Date Completed	Eligible for Simulation	Competence Verified By
Pseudoaneurysm Treatment (compression or guided thrombin injection)		✓			

Total Mandatory exams required	9 of 9
Total Elective exams required	9 of 18
Total # Simulations allowed	3 of 12 eligible exams

Appendix

The following is a list of procedures along with the vessels to be included in each procedure. **REQUIRED** vessels listed must be included in the procedure to demonstrate clinical competence. Although **OPTIONAL** vessels are not required to be demonstrated, they may be included in the procedure, if appropriate.

PROCEDURE	REQUIRED VESSELS	OPTIONAL VESSELS
Aorta		
	aorta	inferior vena cava
	common Iliac artery	common iliac vein
Renal Artery with Duplex		
	aorta	common iliac artery
	renal artery	common iliac vein
	intrarenal artery	
	inferior vena cava	
	renal vein	
Liver Doppler/Vasculature		
	aorta	splenic artery
	hepatic artery	superior mesenteric vein
	inferior vena cava	
	portal vein	
	hepatic veins	
	splenic vein	
Mesenteric		
	aorta	inferior mesenteric artery
	celiac artery	splenic artery
	superior mesenteric artery	splenic vein
	inferior vena cava	
	superior mesenteric vein	
TIPS		
	hepatic artery	aorta
	hepatic veins	right portal vein
	portal vein	splenic vein
	left portal vein	
	TIPS shunt	
	inferior vena cava	
Liver Transplant		
	aorta	celiac artery
	hepatic artery	superior mesenteric vein
	inferior vena cava	
	portal vein	
	hepatic veins	
	splenic vein	

Kidney Transplant		
	external iliac artery	
	renal transplant artery	
	intrarenal artery	
	external iliac vein	
	renal transplant vein	
Upper Extremity Arterial Doppler		
	subclavian artery	brachiocephalic artery
	axillary artery	
	brachial artery	
	radial artery	
	ulnar artery	
Upper Extremity Venous Doppler		
	internal jugular vein	brachiocephalic vein
	subclavian vein	radial veins
	axillary vein	ulnar veins
	brachial veins	
	cephalic vein	
	basilic vein	
Lower Extremity Arterial Doppler		
	common femoral artery	tibioperoneal trunk
	profunda femoris artery	anterior tibial artery
	femoral artery	peroneal artery
	popliteal artery	
	posterior tibial artery	
	dorsalis pedis artery	
Lower Extremity Venous Doppler		
	common femoral vein	external iliac vein
	profunda femoris vein	small saphenous vein
	femoral vein	peroneal veins
	great saphenous vein	posterior tibial veins
	popliteal vein	anterior tibial vein
Carotid		
	common carotid artery	subclavian artery
	external carotid artery	
	internal carotid artery	
	vertebral artery	