# Vascular Sonography

## 1. Introduction

ARRT requires candidates applying for certification and registration under the primary eligibility pathway 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.

ARRT periodically updates the requirements based on 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

After the candidate submits the *Application for Certification and Registration*, the program director (and authorized faculty member if required) will verify that ARRT requirements were met using the Program Verification Form on the ARRT Educator website. The verification includes confirming the applicant has completed the educational program, including the ARRT Didactic and Clinical Competency Requirements and conferment of a degree meeting ARRT requirements. Candidates who complete their educational program during 2028 or 2029 may use either the 2024 Didactic and Clinical Competency Requirements or the 2028 requirements. Candidates who complete their educational program after December 31, 2029, must use the 2028 requirements.

## 3. Didactic Competency Requirements

The purpose of the didactic education requirement is to document that individuals had the opportunity to develop fundamental knowledge, integrate theory into practice, and hone affective and critical thinking skills required to demonstrate professional competency. 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 documents.

## 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.

For vascular sonography clinical competency requirements procedures, the program director or the program director's designee must directly observe the candidate performing the procedure. The observation must occur in person, with both the candidate and the program director or designee physically present at the same location. Remote observation or virtual presence is not acceptable for verification of clinical competency procedures.

## 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~~ or ACLS 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~~ 19 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~~ or ACLS 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 or ACLS~~/CPR certification~~ certified | | |
| 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** |
| Grayscale (2D) | | |
| Color Doppler | | |
| Power Doppler | | |
| Spectral Doppler | | |
| *Ergonomic evaluation | | |
| **Mandatory Equipment Care** | **Date Completed** | **Competence Verified By** |
| Clean and disinfect transducer | | |

*The program director or the program director's designee evaluates the candidate for appropriate ergonomic scanning techniques in accordance with *"Industry Standards for the Prevention of Work Related Musculoskeletal Disorders in Sonography."*

### 4.2.2 Vascular Sonography Procedures

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

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

The candidate's clinical education should include variation in patient characteristics, provide ample opportunity ~~for~~ to demonstrate~~ion~~ of both normal and variant anatomy, ~~as well as~~ and incorporate important pathologies and medical conditions. A variety of instructional methods

~~may be useful for teaching~~ can support instruction in the clinical skills ~~identified in~~ this document identifies.

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

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

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

| **Abdominal ~~en/~~and Pelvic Vasculature with Duplex** | | | | | |
|---|---|---|---|---|---|
| ***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* | ✓ | | | | |
| Predialysis ~~Radial~~ Artery Mapping | | ✓ | | ✓ | |
| Vein Mapping | | ✓ | | ✓ | |
| Thoracic Outlet Syndrome (TOS) | | ✓ | | ✓ | |

| **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~~* | ✓ | | | ~~✓~~ | |
| **~~Stress/~~Pressure Testing** | | | | | |
| Segmental Pressures (upper extremities) | | ✓ | | ✓ | |
| Segmental Pressures (lower extremities) | | ✓ | | ✓ | |
| Ankle-Brachial Index (ABI) | ✓ | | | ✓ | |
| Toe-Brachial Index (TBI) | | ✓ | | ✓ | |
| Pulse Volume Recording (PVR) | | ✓ | | ✓ | |
| Photoplethysmography (PPG) | | ✓ | | ✓ | |
| **Post-Interventional Studies~~Procedures~~** | | | | | |
| Bypass Graft~~s~~ | | ✓ | | | |
| Post-procedure ~~Catheterization~~ Complications and Treatments (e.g., arteriovenous fistula [AVF], pseudoaneurysm) | | ✓ | | | |
| Endograft~~s~~ | | ✓ | | | |
| Dialysis Access Graft~~s~~ or ~~/~~Fistula~~e~~ | | ✓ | | | |
| Stent~~s~~ | | ✓ | | | |
| ~~**Interventional Procedures**~~ | | | | | |
| ~~Pseudoaneurysm Treatment (compression or guided thrombin injection)~~ | | ~~✓~~ | | | |
| | | | | | |
| **Total Mandatory Procedures~~Exams~~ Required** | 9 of 9 | | | | |
| **Total Elective ~~Exams~~ Procedures Required** | 9 of 19~~18~~ | | | | |
| **Total # Simulations Allowed** | 3 of 13~~12~~ eligible exams | | | | |

## Appendix

The following table ~~is a~~ lists ~~of~~ procedures ~~along with~~ and specifies the vessels to be included in each procedure. To demonstrate clinical competence, candidates must include all **REQUIRED** vessels ~~listed must be included~~ in the procedure ~~to demonstrate clinical competence~~. Although candidates do not need to demonstrate **OPTIONAL** vessels, ~~are not required to be demonstrated,~~ they may ~~be~~ included ~~them~~ in the procedure~~, if~~ when appropriate.

| PROCEDURE | REQUIRED VESSELS | OPTIONAL VESSELS |
|---|---|---|
| **Aorta** | | |
| | aorta | inferior vena cava |
| | common ~~l~~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 | superior mesenteric vein |
| | hepatic artery | splenic artery |
| | inferior vena cava | |
| | portal veins | |
| | 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~~ |
| | main portal vein | splenic vein |
| | left and right portal veins | |
| | TIPS shunt | |
| | inferior vena cava | |

| | | |
|---|---|---|
| **Liver Transplant** | | |
| | aorta | celiac artery |
| | hepatic ~~artery~~arteries | superior mesenteric vein |
| | inferior vena cava | |
| | portal veins | |
| | ~~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 veins |
| | | gastrocnemius veins |

| **Carotid** | | |
|---|---|---|
| | common carotid ~~artery~~arteries | subclavian ~~artery~~arteries |
| | external carotid ~~artery~~arteries | |
| | internal carotid ~~artery~~arteries | |
| | vertebral ~~artery~~arteries | |