



# Curriculum Outline for Vascular Surgery

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**SURGICAL COUNCIL ON RESIDENT EDUCATION**

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# INTRODUCTION

## EXPLANATION OF THE CURRICULUM OUTLINE

The **SCORE Curriculum Outline for Vascular Surgery (VSCORE®)** is a list of vascular and core surgery patient care topics to be covered in a vascular surgery training program. The curriculum includes vascular surgical diseases/conditions and operations/procedures and core surgical medical knowledge topics essential to the care of the vascular patient, as well as the Accreditation Council for Graduate Medical Education (ACGME) required topics on professionalism, interpersonal and communication skills, practice-based learning and improvement, and systems-based practice. It is designed to be relevant to five-year integrated training programs, as well as two-year fellowship programs.

The outline has been created with input from the Vascular Surgery Board of the American Board of Surgery, the Association of Program Directors in Vascular Surgery, the Society for Vascular Surgery and the Review Committee for Surgery (ACGME).

The Vascular Surgical Council on Resident Education (VSCORE) is a nonprofit consortium with the mission of improving the education of residents in vascular surgery. VSCORE Member Organizations include the American Board of Surgery-Vascular Surgery Board, the Association of Program Directors in Vascular Surgery, the Society for Vascular Surgery, and the Review Committee for Surgery (ACGME).

### Category 1: Atherosclerotic Cerebrovascular Disease

#### Diseases/Conditions

- Carotid Artery, Atherosclerotic – Asymptomatic
- Carotid Artery, Atherosclerotic – Symptomatic
- Innominate, Common Carotid, Subclavian Disease
- Vertebral Artery Disease – Atherosclerotic, FMD, Dissection

#### Operations/Procedures

- Carotid Artery Endarterectomy – Patch and Eversion
- Carotid Artery Stenting
- Great Vessel – Endovascular
- Great Vessel – Open
- Vertebral Artery Procedures – Open and Endovascular

### Category 2: Non-Atherosclerotic Cerebrovascular Disease

#### Diseases/Conditions

- Carotid Artery Dissection

- Takayasu and Giant Cell Arteritis
- Uncommon Carotid Conditions – FMD, Aneurysm, Carotid Body Tumor

### Category 3: Thoracic Aortic Disease

#### Diseases/Conditions

- Aortic Dissection – Including Variants of Penetrating Ulcer and Intramural Hematoma
- Atherosclerotic Thoracic Aortic Disease – Coral Reef/Shaggy Aorta
- Thoracic Aortic Aneurysm
- Thoracoabdominal Aneurysm

#### Operations/Procedures

- Suprarenal Aortic Aneurysm Repair – Open
- Thoracic Aortic Aneurysm – Open and Endovascular
- Thoracic Aortic Dissection Repair – Open and Endovascular
- Thoracoabdominal Aneurysm Repair – Open and Endovascular

### Category 4: Aorto-Iliac Aneurysms

#### Diseases/Conditions

- Abdominal Aortic Aneurysm – Infrarenal and Juxtarenal
- Aortic Aneurysm – Ruptured
- Genetic Aortic Diseases
- Mycotic Aneurysms

#### Operations/Procedures

- Abdominal Aortic Aneurysm (Infrarenal and Juxtarenal) Repair – Open
- Endovascular Abdominal Aortic Aneurysm Repair (EVAR) – Elective
- Endovascular Abdominal Aortic Aneurysm Repair (EVAR) – Rupture

### Category 5: Other Aneurysms

#### Diseases/Conditions

- Celiac, Hepatic and Mesenteric Artery Aneurysm
- Femoral and Popliteal Artery Aneurysm
- Renal Artery Aneurysm
- Splenic Artery Aneurysm

## **Operations/Procedures**

- Femoral Artery Aneurysm Repair
- Isolated Iliac Artery Aneurysm Repair – Open and Endovascular
- Popliteal Artery Aneurysm Repair – Open and Endovascular
- Renal Artery Aneurysm Repair – Open and Endovascular

## **Category 6: Visceral Artery and Venous Disease**

### **Diseases/Conditions**

- Celiac Compression Syndrome
- Mesenteric and Portal Vein Thrombosis
- Mesenteric Ischemia, Acute – Embolus, Thrombosis, NOMI
- Mesenteric Ischemia, Chronic
- Superior Mesenteric Artery Dissection

### **Operations/Procedures**

- Mesenteric Bypass/Endarterectomy
- SMA Stenting
- SMA Thrombectomy

## **Category 7: Renovascular Diseases**

### **Diseases/Conditions**

- Atherosclerotic Renal Artery Disease
- Nonatherosclerotic Renal Artery Disease
- Pediatric Renovascular and Abdominal Aortic Developmental Disorders
- Renal Vein Compression Syndrome
- Renovascular Hypertension

### **Operations/Procedures**

- Renal Artery Bypass – Aortorenal, Splenorenal, Hepatorenal

## **Category 8: Atherosclerotic Lower Extremity Disease**

### **Diseases/Conditions**

- Acute Lower Extremity Ischemia, Including Blue Toe Syndrome
- Chronic Limb-Threatening Ischemia – Rest Pain, Ulcer and Gangrene
- Claudication

### **Operations/Procedures**

- Aortobifemoral Bypass
- Axillobifemoral Bypass

- Common/Profunda Femoral Endarterectomy
- Femoral BK Popliteal/Tibial Bypass with Prosthetic/Vein
- Femoral Popliteal Artery Embolectomy
- Femoral PTA/Stenting
- Iliac Artery Stenting
- Popliteal-tibial and Pedal Bypasses
- Thrombolytic Therapy
- Tibial PTA/Stenting

## Category 9: Non-Atherosclerotic Lower Extremity Disease

### Diseases/Conditions

- Thromboangiitis Obliterans (Buerger Disease)
- Compartment Syndrome
- Diabetic Foot Ulcers and Infections
- Popliteal Artery Entrapment and Adventitial Cystic Disease

### Operations/Procedures

- Amputations – Foot (Toe, Ray, TMA, Chopart, Lisfranc, Symes)
- Amputations – Lower Extremity (AKA, Through the Knee, BKA)

## Category 10: Thoracic Outlet Syndromes & Upper Extremity Disease

### Diseases/Conditions

- Thoracic Outlet Syndrome – Neurogenic, Arterial, Venous
- Upper Extremity Occlusive Disease – Claudication, Rest Pain, Tissue Loss

### Operations/Procedures

- Carotid-Subclavian Artery Bypass
- First Rib Resection – Infraclavicular
- First Rib Resection – Transaxillary

## Category 11: Vascular Trauma

### Diseases/Conditions

- Posterior Knee Dislocation – Popliteal Injury
- Vascular Injury – Neck
- Vascular Injury – Chest
- Vascular Injury – Abdomen
- Vascular Injury – Extremities

### Operations/Procedures

- Abdominal Vascular Exposures

- Thoracic Aortic Injury (Blunt) Repair – Endovascular

## Category 12: Hemodialysis Access

### Diseases/Conditions

- Access-Related Ischemic Steal Syndrome
- Failing or Thrombosed Hemodialysis Access
- Hemodialysis Access Infection
- New Hemodialysis Access
- Nonmaturing Autogenous Arteriovenous Fistula
- Nonthrombotic Hemodialysis Access Complications

### Operations/Procedures

- Failing/Thrombosed Access – AVF and AVG Management
- Hemodialysis Access Catheter
- Nonthrombotic Access Complications Repair
- Peritoneal Dialysis Catheter Placement

## Category 13: Venous Insufficiency, Lymphatic Diseases & Malformations

### Diseases/Conditions

- Chronic Venous Insufficiency, Including Venous Leg Ulcer
- Lymphedema/Lymphangitis – Primary and Secondary
- Pelvic Congestion Syndrome
- Superior Vena Cava Syndrome
- Varicose Vein Disease
- Venous Malformations

### Operations/Procedures

- Sclerotherapy
- Varicose Vein Procedures

## Category 14: Venous Thrombosis

### Diseases/Conditions

- Acute Iliofemoral Deep Venous Thrombosis
- Lower Extremity Deep Venous Thrombosis
- Pulmonary Embolus
- Superficial Thrombophlebitis
- Vena Caval Obstruction/Tumors

### Operations/Procedures

- DVT (Acute) Treatments

- Vena Caval Filter Insertion and Removal
- Venous Obstructive Disorders Treatments

## Category 15: Complications

### Diseases/Conditions

- Abdominal Compartment Syndrome after Aortic Operation
- Aortic Graft Infections
- Aortocaval Fistula
- Chylous Ascites/Chylothorax
- Colonic Ischemia after Aortoiliac Operation
- Endovascular Complications: Contrast-Induced Nephropathy
- Endovascular Complications: Specific Complications of Endovascular Therapy
- Percutaneous Arterial Access Complications
- Peripheral Arterial Graft Infections
- Postrevascularization Leg Ischemia
- Postsurgical Groin Complications
- Spinal Cord Ischemia after Aortic Procedure
- Stroke after Carotid Intervention

### Operations/Procedures

- Anastomotic Aneurysm Repair
- Aortic Graft-Enteric Fistula/Erosion Removal – Extra-Anatomic vs In Situ Replacement
- Neo-Aortoiliac System Procedure
- Pseudoaneurysm Repair, Iatrogenic – Open vs. Injection

## Category 16: Imaging/Vascular Laboratory

### Vascular Laboratory (Registered Physician in Vascular Interpretation)

- Abdominal Vascular, Aortic Aneurysm and Post-EVAR Assessment
- Abdominal Vascular, Renal and Mesenteric
- Cerebrovascular, Carotid
- Cerebrovascular, Intracranial (TCD)
- Cerebrovascular, Intraoperative
- Evaluation of Venous Insufficiency
- Peripheral Arterial, Duplex Evaluation of Occlusive Disease
- Peripheral Arterial, Physiologic Testing
- Venous, Evaluation of Upper and Lower Extremity DVT

### Other Imaging

- CT/CT Angiography
- MR Angiography

### Fluoroscopy

- Fluoroscopy, Radiation, and Radiation Safety



# CORE SURGICAL CURRICULUM (SCORE)

## Category 17: Core Surgical Patient Care

### *Diseases/Conditions*

#### **Abdomen – General**

- Abdominal Pain – Acute and Chronic

#### **Abdomen – Hernia**

- Ventral Hernia

#### **Alimentary Tract – Stomach**

- Gastrointestinal Bleeding – Upper

#### **Alimentary Tract – Small Intestine**

- Paralytic Ileus
- Mesenteric Ischemia – Acute (Arterial, Venous, and Nonocclusive)
- Small Intestinal Obstruction

#### **Alimentary Tract – Large Intestine**

- C. difficile Colitis
- Colitis – Ischemic
- Colonic Volvulus and Obstruction
- Gastrointestinal Bleeding – Lower

#### **Endocrine**

- Pheochromocytoma

#### **Skin and Soft Tissue**

- Cellulitis
- Pressure Ulcer
- Necrotizing Soft Tissue Infections
- Soft Tissue Masses – Evaluation
- Surgical Site Infection

#### **Surgical Critical Care**

- Abdominal Compartment Syndrome
- Anaphylaxis
- Acute Respiratory Distress Syndrome (ARDS)
- Brain Death

- Cardiac Arrest
- Cardiac Arrhythmias – Common
- Cardiac Failure and Cardiogenic Shock
- Derangements of Electrolytes and Acid-Base Balance
- Endocrine Dysfunction
- Hepatic Failure and Hepatorenal Syndrome
- Hypovolemic Shock
- Neurogenic Shock
- Neurologic Dysfunction
- Pain, Agitation, and Delirium
- Renal Failure
- Respiratory Failure
- Sepsis and Septic Shock

### **Trauma**

- Brachial Plexus Injury
- Cardiac Tamponade
- Chest Wall, Pleura, and Diaphragm Injuries
- Frostbite and Hypothermia
- Geriatric Trauma
- Hepatic Injury
- Initial Assessment and Management of Trauma
- Pelvic Fractures and Retroperitoneal Hematoma
- Gastric and Small Intestinal Injury
- Splenic Injury
- Upper Urinary Tract Injuries

### **Thoracic Surgery**

- Pleural Effusion/Empyema
- Pneumothorax and Pleurodesis
- Chylothorax
- Superior Vena Cava Syndrome

### **Plastic Surgery**

- Complex Wound Closure
- Skin Grafting

### *Operations/Procedures*

#### **Abdomen – Spleen**

- Splenectomy

#### **Alimentary Tract – Small Intestine**

- Adhesiolysis

## **Skin and Soft Tissue**

- Skin/Soft Tissue Lesions – Excisional and Incisional Biopsy
- Soft Tissue Infections – Incision, Drainage, Debridement

## **Surgical Critical Care**

- Abdominal Exploration for Trauma
- Intubation and Difficult Airway
- Ultrasound Use for Intravascular Access
- Vascular Access

## **Trauma**

- Focused Assessment with Sonography for Trauma (FAST)

## **Thoracic Surgery**

- Tube Thoracostomy and Thoracentesis

## **Category 18: Core Medical Knowledge**

### **Anesthesia**

- Anesthesia, General – Agents and Techniques
- Anesthesia, Regional and Local – Agents and Techniques
- Choice of Anesthesia
- Conscious Sedation – Agents and Techniques
- Intraoperative Monitoring and Common Intraoperative Problems
- Nerve Blocks – Digital and Peripheral
- Pain, Acute – Management
- Pain, Chronic – Management

### **Biostatistics and Evaluation of Evidence**

- Clinical Trials
- Evaluating the Quality and Applicability of a Study
- How Data are Expressed and Summarized
- Levels of Evidence
- Outcomes
- Research Design in Outcome and Health Services Research
- Surveys and Qualitative Research
- Tests of Significance

### **Fluids, Electrolytes, and Acid-Base Balance**

- Hypokalemia and Hyperkalemia
- Hyponatremia and Hypernatremia

## **Geriatric Surgery and End-of-Life Care**

- Advance Directives, DNR Orders, and Power of Attorney
- Frailty
- Goal Setting with Elderly Patients and Families
- Palliative and Hospice Care
- Perioperative Management of Geriatric Patients

## **Immunology**

- Components of the Immune System
- Immune Response to Injury and Infection
- Surgery and Surgical Conditions in Immunocompromised Hosts

## **Infection and Antimicrobial Therapy**

- Antimicrobial Stewardship
- Diagnostic Approach to Infection
- Infections – Hospital-Acquired
- Infections – Opportunistic
- Intra-abdominal Infections
- Preoperative Assessment and Management of Coexisting Infection

## **Nutrition and Metabolism**

- Effect of Surgery, Illness, and Injury on Nutritional Requirements
- Nutritional Requirements

## **Preoperative Evaluation and Perioperative Care**

- Hypertension (VSCORE)
- Diabetes Mellitus (VSCORE)
- Hyperlipidemia Assessment and Management (VSCORE)
- Tobacco Use/Smoking Cessation Management (VSCORE)
- Evaluation of Surgical Risk
- Management of Perioperative Risk
- Antithrombotic Agents (VSCORE)
- Prophylaxis of Venous Thromboembolism
- Postoperative Pain Management
- Common Postoperative Problems

## **Transfusion and Disorders of Coagulation**

- Evaluation of Ongoing Bleeding and Laboratory Assessment of Coagulation
- Inherited and Acquired Disorders of Coagulation
- Normal Mechanisms of Hemostasis and Coagulation
- Transfusion – Indications, Risks, Type and Crossmatch, and Component Therapy

## **Wound Healing**

- Wound Closure and Postoperative Care
- Wound Healing

## **Category 19: Professionalism**

- Advance Directives
- Approaching Ethical Issues in Surgery
- Decision-Making Capacity
- Do Not Resuscitate
- Ethics in Global Surgery and Volunteerism
- Futility
- Informed Consent
- Medical Decisions for Pediatric Patients
- Surrogate Decision Making
- Wellness
- Withdrawing and Withholding Life-Sustaining Treatments

## **Category 20: Interpersonal and Communication Skills**

### **Non-Technical Skills for Surgeons (NOTSS)**

- Cognitive Skills (Situation Awareness and Decision Making)
- Social Skills (Communication, Teamwork and Leadership)

### **Surgical Professionalism and Interpersonal Communication Education (SPICE)**

- Admitting Mistakes – Ethical Choices and Reasoning
- Advanced Communication Skills for Surgical Practice – and The Challenge of Informed Consent
- Cultural Diversity – Working Through the Barriers of Language and Differing Customs
- Delivering Bad News – Your Chance to Become a Master Surgeon
- Giving and Getting Feedback
- Managing Your Career – Making the Professional and Personal Choices That Define You
- Medical Errors and Apology
- Safe Handoff of Patient Care Duties
- The Stress of Surgical Practice – The Signs of Stress, Depression, and Suicide in You and Your Surgical Colleagues
- Working with Professionals – Team Communication and Respect

## **Category 21: Practice-Based Learning and Improvement**

### **Quality Improvement**

- Inspiring a Healthy Culture for Patient Care
- Local Engagement in Quality Improvement

- Problem-Based Quality Improvement
- Understanding the Data and Methods to Evaluate Performance

## Category 22: Systems-Based Practice

### Systems-Based Practice

- Advocating for Quality Patient Care
- Coordinating Patient Care
- Cost Awareness and Risk-Benefit Analysis
- Identifying Systems Errors – Root Cause Analysis
- Working Effectively in Various Healthcare Delivery Settings and Systems
- Working in Interprofessional Teams