College of Health Professions
Department of Health Sciences
The Medical University of South Carolina
Cardiovascular Perfusion
Clinical Instructor Manual

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Dear Clinical Instructor,

The Medical University of South Carolina (MUSC) Cardiovascular Perfusion Program extends our sincerest appreciation for your commitment to providing excellent clinical instruction for our students. We value your time and energy in preparing the future of our perfusion profession. We realize that you have a choice in clinical education affiliations, and appreciate your dedication and involvement with the MUSC CVP Program.

This Clinical Education Instructor Manual was created to serve as a resource during student clinical rotations. I have also attached our course syllabi to familiarize you with the resident program.

Again, thank you for your support and commitment.

Sincerely,

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Mission and Philosophy

Medical University of South Carolina Mission Statement

The Medical University of South Carolina (MUSC) is a public institution of higher learning. The underlying goal of the university is to preserve and optimize human life in South Carolina and beyond. MUSC provides an interprofessional environment for learning and discovery through the education of health care professionals and biomedical scientists, research in the health sciences, and provision of comprehensive health care. The university is committed to fulfillment of its core responsibilities:

- Educate students to become caring, compassionate, ethical, proficient health care professionals, and creative biomedical scientists.
- Promote teamwork competencies to be applied in a collaborative, interprofessional health care delivery and research setting.
- Recruit and develop dedicated, scholarly educators who inspire their students to lifelong learning in the service of human health.
- Offer educational opportunities to graduates, faculty and staff; to other biomedical scientists and practicing health professionals; and to the public.
- Seek and welcome students, scholars, and staff regardless of gender, race, age, nationality, religion, or disability, while emphasizing the benefits of diversity.
- Conduct research in the health sciences, advancing knowledge and encouraging new responses to health care needs, including interprofessional delivery of health care.
- Provide excellence in patient care in an environment that is respectful of others, adaptive to change, accountable for outcomes, delivered by coordinated interprofessional teams, and attentive to the needs of underserved populations.
- Advance economic development by introducing new technology and fostering research links with industry and other academic institutions.
- Optimize the use of all resources, including the financial support from the state and revenues generated from research, clinical operations, and philanthropy.
- Provide leadership to the state in efforts to promote health and prevent disease.
- Serve as a state resource in health policy, education, and related matters for other institutions and the general public.

The Mission of the Medical University of South Carolina's College of Health Professions

Value Proposition

As a college dedicated to educating a diverse range of health professionals, we benefit our students, the university, and community through our synergistic approach to creating new knowledge and expertise. Through interprofessional collaboration and innovation, we enrich the learning environment, increase our capacity to conduct research, and augment our ability to provide service. We are a dynamic and responsive college that generates solutions and contributes to the overall health and well-being of the citizens of our state and beyond.

Vision

The College of Health Professions seeks to achieve national distinction in Health Professions' education, research and service.

Cardiovascular Perfusion Program Mission Statement

The mission of the Medical University of South Carolina's College of Cardiovascular Perfusion:

To prepare autonomous, compassionate, competent, and ethical entry-level perfusionist who are able to evaluate and utilize scientific literature in order to provide competent patient client management, with sensitivity to diversity and culture.

Cardiovascular Perfusion Program Vision

The Cardiovascular Perfusion program seeks to achieve national distinction in its education, research and service.

MUSC CVP Program Faculty

Laura Dell'Aiera, DHSc, MHA, CCP

Division Director

David Fitzgerald, DHA, MPH, CCP

Associate Professor

William Dauch, MS, CCP

Assistant Director/Clinical Coordinator

Mary Dooley, PhD

Research Coordinator

The Role of the Clinical Instructor

The clinical instructor provides learning opportunities within the clinical environment for the student to gain knowledge, skill and experience in the management of cardiac surgical care.

Qualifications for instructor and clinical rotation site include the following criteria:

1. American Board of Cardiovascular Perfusion certification or equivalent.
2. Knowledgeable and effective in communicating clinical expectations with students.
3. Supportive of the mission and vision of MUSC perfusion education.

Instructor duties vary depending on the type of rotation and specialty of the preceptor. Some examples of responsibilities and activities include:

- Determining the student's work schedule and clinical assignments
- Appropriately supervising student**.**
- Reviewing and discussing student progress with the student and CVP faculty on a regular basis during the clinical rotation.
- Informing the Program Clinical Coordinator if a student must be removed from the rotation or if the student is in jeopardy of failing to meet educational objectives.
- Apprising the Program Clinical Coordinator of student absence(s), tardiness, and concern regarding professional conduct.
- Notifying the program immediately in the event of any potential medical liability incidents.
- Providing input into determination of the student's mid-term and final grades through the evaluation tools provided.
- Providing a safe and effective environment in which to learn and develop.

The Role of the Student

Once assigned to a clinical facility the student responsibilities include:

I. Initial Contact

The student is instructed to contact the facility 6-8 weeks prior to the clinical experience. The student should introduce him/herself and request information as needed. This may include housing information, work schedules, special learning experiences (if this has been previously discussed with the ACCE), etc. Students are aware that facilities may be unable to accommodate unique learning experiences.

II. Work Schedule

The student is instructed to follow the work schedule established by the clinical facility. The student is also reminded that proper etiquette includes recognizing opportunities to help their Clinical Instructor (CI) and/or other staff members, and avoiding requests for special schedule accommodations. Additional opportunities for learning may occur during the evening or weekends. These activities may be an integral part of the clinical experience; thus, the student should be aware of this when he/she selects the clinical facility. The academic institution does not require the student to work on a weekend. However, the facility may require this as part of the clinical practicum.

III. Attendance

The student is required to be present every weekday during their clinical rotation. There are no personal days allotted. If a student wants to request a personal day off, then he/she notify the CI well in advance, and they must determine how the missed time will be recovered. If a student is sick for one or two days, the requirement to make up this time is at the discretion of the CI. Lost clinical time can be made up by either extending the student's hours during the week or by scheduling the student on a weekend. If the student is sick for more than 2 days, the MUSC Clinical Coordinator should be contacted to help formulate a plan for recovering missed time.

IV. Holidays

If the clinical facility is closed for a holiday that occurs during the clinical affiliation, then the student is not expected to make up that day. The student is expected to be present if the facility is open.

V. Tardiness

The student is expected to be punctual. If the student is unable to report at the designated time, the CI is to be notified at least 15 minutes before the scheduled beginning of the workday.

VI. Dress Code

Dress is always expected to be neat and clean, and should be comfortable and non-restrictive. Business casual is preferred

- A student nametag is required when in the clinic or when performing related duties.
- Shoes should be leather and closed toed for student protection. Hosiery or socks should be worn.
- Jewelry should be kept to a minimum.
- A watch with a second hand or one that displays the seconds is desired.
- Hair should be neat and clean and should not interfere with the performance of patient care activities.
- Conservative make-up is appropriate for the clinic.
- Perfumes or aftershaves should not be worn, as these may be objectionable to some patients/clinicians.
- Fingernails should be short and polish should be neutral or clear.

VII. Professional Conduct

The students are expected to demonstrate professional behavior at all times. The following behaviors are essential in all clinical settings:

- It is the student's responsibility to seek additional information in order to comply with the departmental policies and procedures.
- The student is responsible for promoting patient dignity and safety.
- The student must maintain patient confidentiality, consistent with all institutional HIPAA policies. Patient records or identifying information should not leave the facility. Information related to any patient's condition should never be discussed with individuals not involved with the care of that patient. Any information obtained for case studies or research must not contain any patient identifiers.
- The student is expected to adhere to all applicable ethical standards of practice.
- The student should never accept any gratuities offered by their patients.
- The student must be discreet when asking questions in front of the patient, especially related to prognosis.
- The student is expected to display common courtesy at all times. Tactful communication is essential to the development of good interpersonal relationships with the CI, patients, physicians and peers.

VIII. Patient Rights

Patients have the right to refuse treatment from a student.

IX. Faculty/Student/Clinician Relationships

Upon admission, if a student is already involved in a relationship with a faculty member, clinical instructor, or any other person who could be in a supervisory position, it is the responsibility of the student to immediately inform the Program Administrator. If possible, accommodations will be made to prevent situations of authority. This will include but is not limited to, the student withdrawing from a course or clinical site taught by the faculty member, transfer of the student to another course or section, or assumption of the position of authority by a qualified alternative faculty member.

Syllabus Clinical Experience I
(CVP 760) Summer Semester

COURSE DESCRIPTION: This course is designed to give the perfusion student an introduction to the clinical environment. The student will learn the diagnostic work-up procedures for cardiovascular diseases and other organ systems. The student will integrate their knowledge of anatomy, physiology, and pathophysiology into the assessment and management of the patient undergoing cardiac surgery. Additionally, the student will learn how to select proper circuitry and priming components, set-up, prime, and conduct cardiopulmonary bypass.

Clinical Experience I is the first clinical rotation for perfusion students. Clinical Experience I (CVP 760) is offered during the Summer Semester (3rd semester). The experiences gained during Clinical Experience I will provide a foundation for external rotations during Clinical Experiences II & III.

INSTRUCTIONAL METHODS: This course has (3) components:

- Clinical Rotations in the Cardiac OR
- Animal Lab and Simulator lab Rotation
- Clinical Site Electives Rotation that consist of:
  - Surgery
  - Anesthesia
  - Intensive Care
  - Cardiac Catheterization laboratory (Adult and Pediatric)
  - Dialysis
  - Respiratory
  - CT scan Radiology
  - Blood Bank
  - Echocardiogram
  - ECMO

METHODS OF EVALUATION: This is a pass/fail course. Although students will receive numerical grades, a final grade of 70% or greater is necessary to receive a passing mark.

OVERALL GOALS & OBJECTIVES: By the end of the course the student will:

1. Explain perfusion protocols for adults, pediatrics, infants, and neonates
2. Identify the appropriate protocols for each respective surgeon and surgical approach.
    a. Select the proper equipment and disposables for each case
3. Analyze the monitoring equipment used during cardiac surgery.
4. Appraise blood chemistry, co-oximetry, coagulation, and other parameters to optimize patient care and outcome.
5. Describe various methods of cardiac evaluation, including all invasive and non-invasive techniques.
6. Apply the findings of various diagnostic techniques to the cardiac diagnoses.
7. Calculate all relevant formulas for the management of CPB.
8. Demonstrate proficiency in assembling and priming the perfusion circuit and related equipment in a safe and timely fashion.

Expectations for Grading:

Each section will be evaluated as follows:

N/A: The student was not evaluated on this aspect

1 –5 The degree in which the faculty observed the student successfully completing the objectives for each category evaluated.

Faculty should use the comment fields to justify scores of less than (3) on any evaluation measure.

1. History
    a. Evaluate the patient's disease process including origin, progress, and treatment.
    b. Identify any concerns that might relate to cardiopulmonary bypass.
    c. Identify any abnormal physiological findings.
    d. Classify all medications used to treat the patient.
    e. Describe how these medications may influence cardiopulmonary bypass management.
    f. Discuss significant diagnostic findings and their relationship to cardiopulmonary bypass such as MUGA, ECHO, and radiography.

2. Physical
    a. Describe the organ systems reviewed and explain any abnormal findings.
    b. Discuss how these abnormalities affect the diagnosis and cardiopulmonary bypass.
3. Congenital Anomaly (Pediatric cases)

a. Describe the patient's congenital anomaly.
b. Summarize the development of the atrial, ventricular, and the aorta-pulmonary septa.
c. Describe the origin of the valves and the major blood vessels.
d. Explain how this patient's deviations in the embryological development of the heart may have produced the anatomical anomaly.

4. Laboratory report
    a. Identify the patient's hemoglobin, hematocrit, blood gases, coagulation profile, electrolytes, and blood type.
    b. Identify abnormal laboratory values and their effect on CPB management.
    c. Identify other relevant perioperative laboratory assays.

5. Catheterization/ECHO report
    a. Present Cath/ECHO lab findings.
    b. Discuss anatomical involvement.
    c. Identify the patient's cardiac output, cardiac index, and ejection fraction.
    d. Discuss the significance of the chamber pressures, resistances and gradients across the structures.

6. Perfusion record
    a. Perform all necessary calculations on the perfusion record.
    b. Complete and document all steps on the perfusion check list.
    c. If charting responsibilities are assumed by the student - comply with MUSC Life Support Charting Standards Protocol.
    d. Review the pump record for completion prior to adding it to the patient's complete medical record.

7. Surgical procedure/protocols
    a. Describe the operative procedure.
    b. Demonstrate knowledge of the surgical and perfusion facility protocols.

Syllabus Clinical Experience II
(CVP 762/763) Fall Semester

Syllabus and Performance Standards

Course Goals

Clinical Experience II (CE II) is the first external clinical course for senior Perfusion students. Students will have successfully completed Clinical Experience I, and established a solid foundation for advancing their clinical acumen. CE II will begin developing the student's skills in management of the patient before, during, and after CPB. To follow are the policies, objectives, duties, responsibilities, scheduling and grading of this course.

Course Objectives

By the end of this course the student will:

1. Demonstrate applied clinical skills acquired from CE I.
2. Be proficient and competent at the set-up and prime of the all perfusion circuits.
3. Demonstrate skill at managing CPB.
4. Demonstrate skill at initiating and terminating CPB.
5. Demonstrate skill at coordinating clinical activities and supply and perfusion equipment management.

The student enrolled in Clinical Experience II will begin advanced training in the operation of life support equipment and patient management. The student will not participate in any patient management activities without the permission and presence of their assigned or designated clinical instructor. Patient safety is learned, practiced and respected by the student but the patient's welfare is the primary responsibility of the attending certified and/or licensed professionals.

Students enrolled in the clinical courses shall never be employed to take the place or assume the responsibilities of clinical staff perfusionists at MUSC or its clinical affiliates. While in clinical rotations performing patient-care activities, students will always be supervised by program clinical instructors. A student operating heart-lung support devices must receive one-to-one supervision by a clinical instructor.

Students are limited to the patient-care competencies outlined in this syllabus. Specific perfusionist professional tasks such as drawing up and administering medications, or co-checking in donor blood products remain the primary responsibility of the clinical instructors in the patient care areas. This limitation would apply even if the student possesses a license as a registered nurse or physician. Students should not perform ancillary perfusion procedures, such as IABP, ATS or ECMO without direct instructor supervision.

Should a student find that he or she is assigned to or performing patient care activities without instructor supervision, the student should immediately cease activity, consult the attending perfusionist, and notify the Course Director.

The Aspect of PROFESSIONALISM

As explained in CE I, professionalism is an essential part in the appropriation of care. A professional code of conduct has been established and is published in the College Bulletin. The CVP department complies with that policy. Violation of that policy may result in a Professional grade of unsatisfactory (US). Professional conduct applies to all aspects of patient, physician, faculty, staff and student interaction as a representative of the program.

A lack of professionalism can infringe on patient care, safety and is defined as the following:

- Insubordination
- Failure to complete assignments
- Not prepared for clinical assignment
- Inappropriate attire or appearance
- Lack of cleanliness or hand washing
- Lack of or inappropriate communication with any professional staff or patients
- Failure to respond to on call pages and/or inappropriate response time
- **When students exhibit a lack of professionalism, they may be dismissed and receive a failing grade for the case.**

Syllabus Clinical Experience III
Spring Semester

Syllabus and Performance Standards

Clinical Experience III (CE III) is the final clinical course for students enrolled in the Cardiovascular Perfusion Program at MUSC. In CE III, the student will continue to refine applied technical and patient management skills during CPB. In addition, the students should continue to expand their experiences to other clinical duties such as IABP, ECMO, Liver Transplantation, dialysis and autotransfusion.

The course objectives, expectations, and grading criteria for each course are listed below.

Course Objectives:

1. Reinforcement of the objectives from CE I, CE II and previous didactic courses.
2. Improve and refine the skills of setting up and priming the pump-oxygenator.
3. Become proficient and competent at managing CPB with minimal instructor intervention.
4. Demonstrate skill at initiating and terminating CPB.
5. Demonstrate management and leadership skills by participating in the clinical rotation.
6. Develop an understanding of the procedures in the operative field.
7. Demonstrate the knowledge of Equipment & Instrumentation, Perfusion, Pharmacology, Physiology, and Anatomy by passing the CVP comprehensive written practical exam.

Entry Level Perfusion Skills
Summer Semester CVP 760

The following are ENTRY level skills that the perfusion student should demonstrate **(By the end of the First 5 weeks):**

The student **SHOULD** be able to:

1. Identify the different components of the Heart Lung Machine
2. Describe the Manufacturer Specifications for all of the disposable equipment:
    - Oxygenator
    - Reservoir
    - Suction tubing
    - Cardioplegia Device
    - Hemoconcentrator
    - Filters (Arterial, Oxygen, Cardioplegia, Blood, Reservoir)
    - Heart Lung Machine
    - Vacuum Regulator
    - Heater – Cooler Machine
    - Vaporizer
    - Cell Saver
3. Describe the Gas Exchange for the oxygenator
    - Identify the Heat Exchange Values for the oxygenator, Cardioplegia device and Heater-Cooler
    - Identify the Filtration capability and the Micron filtration size
    - Identify the Flow Characteristics for each oxygenator
    - Identify the Flow dynamics of the Hemoconcentrator
4. Successfully complete the Pre-bypass checklist with NO assistance.
5. Discuss the Surgeon's protocol for the cardiac procedure
6. Maintain the Perfusion Record
7. Document at least every 15 minutes, including lab and gas values.
8. Maintain clear and legible perfusion record
9. Monitor Hemodynamic changes.

10. Perform all CPB calculations correctly
11. Perform closed-loop communication with the surgical team.
12. Complete post-bypass check list
13. Clean and Restock equipment
14. Transport patient to ICU with Faculty member

By the End of the Summer Semester (CVP 760) the Perfusion Student should be able to:

1. Provide a complete patient history and physical report to the CI.
2. Describe the pathophysiology of the disease and the etiology
3. Describe the diagnostic process of the disease.
4. Discuss the diagnostic process (Cardiac Cath Lab, Echocardiogram, CT Scan, etc.)
5. Identify all the medications in the patient's history. The student should know the indication and actions of all drugs being taking by the patient. The student should know all drugs (MOA) given by the anesthesiologist.
6. Describe the patient's laboratory findings. The student should identify normal and abnormal values.
7. Discuss the significance of the abnormal laboratory findings.
8. Identify potential concerns or considerations that are relevant for the conduction of CPB.
9. Identify the patient's cardiac output, cardiac pressures, and ejection fraction values
10. Identify the patients cardiac valve disease, etiology and indications for surgery
11. Understand EKG rhythms and abnormal findings
12. Perform all relevant CPB calculations, including Cardiac Index, hemodilution, Hematocrit (HCT), Heparin and Protamine dosages, and calculated sweep gas rate.
13. Identify the anesthetic agents that the patient will be receiving, their mechanism of actions and their effect on CPB and termination of CPB.
14. Follow the sequence of events

    - The Student should be able to select the correct equipment for each case.
    - Assemble the Heart-Lung Machine without assistance

- Check the heater-cooler and water test
- Check the Blender, Gas Source and Oxygen Supply
- Co2 flush the circuit
- Calibrate the CDI sensor
- Set occlusions on all the pumps: Cardioplegia, Arterial and Suctions
- Check calibration on all tubing sizes
- Check ISTAT Monitor
- Verify expiration dates for CPG solutions prior to hanging, and verify solution mixture.

15. Prime the circuit using sterile technique

16. Prime the circuit in a reasonable, safe, efficient and precise manner without assistance.

17. Effectively de-air the entire CPB Circuit: arterial filter, oxygenator, tubing and the cardioplegia device.

18. Initiate CPB per MUSC protocol

19. Monitor the conduct of CPB.

20. Student may or may not have the opportunity to terminate CPB. Student should observe weaning and termination prior until they feel comfortable with the weaning process.

21. The student should be able to dismantle and clean up the CPB circuit without assistance.

22. The following grading sheet has been incorporated to evaluate the student's performance prior to operation of the heart lung machine. All evaluations should be submitted through ELMS by CORE (www.corehighered.com).

Clinical Experience I CVP 760 Scoring Rubric

Clinical Work up Grade

- Student called faculty at appropriate time
- Student was able to give a patient history and physical summary, complete with all CPB calculations

Clinical Setup Grade

- Correct equipment selected
- Water lines appropriately attached & tested
- CDI sensors calibrated
- Autotransfusion device assembled correctly, flush and wash solutions correct & in proper place, proper mode chosen, clamps closed appropriately.
- Heart-Lung Machine assembled correctly.
- CO_2 flush performed correctly (if applicable)
- Circuit appropriately primed and de-aired
- Sterile technique maintained.

Communication Grade

- Student communicated effectively during procedure.
  Announcements of ACT and suckers on, Initiation of CPB, Control of CPG, Problems during CPB, Termination of CPB, Protamine dosage
- Surgeon's protocol followed

Charting/Documentation Grade

- Student completed and signed perfusion checklist
- Student completed and signed perfusion clinical record.

Attitude/ Professional Conduct Grade

- Student was on time and prepared for duty.
- Student had appropriate materials for case (pens, calculators, protocols)
- Student maintained a professional attitude & appearance.
- Student acted responsibly and conducted case professionally.

<u> Likert Scale for evaluation</u>**

N/A. Not Observed

5. Excellent-Performed task with more than acceptable speed & quality. Took initiative & was able to adapt to special situations.

4: Good-Performed task without assistance.

3: Satisfactory-Performed task with minimal assistance.

2: Unsatisfactory-Performed task but requires constant assistance.

1: Critical Error-Performed a critical error (fail)*

* <u>NOTE</u>: Two or more "critical errors" will result in a failing grade.

Intermediate Competency Skills Level Guidelines

Fall Semester Clinical Experience II (CVP 762/763)

Clinical Experience II is considered the Intermediate Skill Level for the senior perfusion student.

Students will expand upon their knowledge from Clinical Experience I (CVP 760). CE II will develop the student's skills in creation of a medical care plan for the patient. This semester will consist of (2) eight-week clinical rotations. The student has been given the opportunity to select their elective clinical experience sites. Every attempt will be made to offer student the clinical site of their choice. However, this will be based on opportunity and availability.

All students will be expected to have met the skill level from the previous last semester and built upon these skills this semester.

The intermediate student skill level student should be able to operate the Heart-Lung Machine with the clinical preceptor's direct supervision and assistance. The aim is to enhance the student's knowledge of the operative procedure and expand their clinical skills performance.

Clinical Experience II will focus on clinical skills and professional development for the perfusion student. Each student will be in the clinical setting 5 days a week.

The following milestones are intermediate goals for the perfusion student for completion of their fall semester (CVP 762/763):

1. Assembly of the Heart-Lung Machine without assistance.
    - The student should be able to successfully assemble the heart lung machine circuit
    - Maintain sterility
    - Water test the circuit (both CPG and Oxygenator)
2. Demonstration of proper priming technique
    - CO2 flush
    - De-airing of Art filter, tubing, oxygenator and CPG device
    - Sterile Technique
3. Initiation of CPB
    - Initiate the start timer as indicated
    - Set appropriate FiO2 and sweep gas flow.
    - Verify arterial line pressure prior to the initiation of CPB. Recognize abnormal arterial line resistance.
    - Perform a smooth initiation of CPB
    - Perform closed-loop communication with surgeon and anesthesiologist with initiation of CPB

- Maintain adequate blood volume in reservoir with initiation of CPB and removal of venous line clamp.
- Maintain patient's mean arterial pressure according to protocol.
- Identify any problems and take appropriate action or ask for assistance.
- Set suction pump speed appropriately.

4. Delivery of Cardioplegia
    - Pharmacological understanding of the Cardioplegia solution.
    - Deliver of the Cardioplegia solution appropriately through proper monitoring of patient's pressures and perfusion pressures.
    - Maintain appropriate thermal management of Cardioplegia solution.
    - Proper communication skills with delivery of Cardioplegia (times, amount, temperature).
5. Monitor Blood Gas status of patient
    - Maintain adequate arterial and venous PO2 delivery as described in surgeon's protocol
    - Maintain desired PCO2 levels as described in departmental protocol
    - Differentiate acidosis and alkalosis, as well as therapies to correct abnormal values.
6. Management of Thermal Regulation
    - Demonstrate the principle operation of the heater-cooler machine
    - Describe thermal regulation with regard to metabolic status and acid –base changes.
    - Demonstrate the maintenance of proper temperature gradients on CPB
    - Describe the differences with mild, moderate and profound hypothermia management.
7. Management of Coagulation Status
    - Describes the anticoagulation management protocol.
    - Demonstrates use of all Point of Care measuring devices (iSTAT, Hemochron, Hepcon machine, etc)
    - Appropriate sample time drawn and analyzed at appropriate stages of surgery.
    - Identification of therapeutic results and ranges.
    - Prescribes therapies to address abnormal coagulation results
8. Conduct of Cardiopulmonary Bypass
    - Manages patient's hemodynamics according to institutional protocol during CPB.
    - Describes the physiologic principles that augment blood pressure, including pharmacological support, flow rate, vascular resistance, and blood volume.
    - Demonstrates safe venous reservoir level management.
9. Effective Communication Skills

- Maintains effective communication skills among patient care providers.
- Maintains professional communication with operating room staff.
- Demonstrates clear and concise communication with surgeon's directives
- Verbalizes clinical variances observed during patient care to preceptors and appropriate personnel.

10. Demonstration of successful weaning skills from cardiopulmonary bypass
    - Exercises effective communication with surgeon during weaning process
    - Identifies appropriate physiologic parameters to safely wean from CPB support. This includes acid-base balance, laboratory assays, temperature, and ventilator status.
    - Implements the proper transfer of patient's volume (preload management) from the ECC to the patient before weaning arterial flow.
    - Describes the relationship of preload and after load and patient's hemodynamic performance.
    - Turns off all purge lines and oxygen supply, anesthesia agents and timers.
11. Post Bypass Awareness
    - Monitoring of patient status (cardiac filling and arterial pressures)
    - Coordinates post-CPB autotransfusion.
    - Completes all documentation.
    - Removes and discards all disposables when instructed by the clinical preceptor.
    - Cleans and disinfects hardware.

MUSC Advance Skills Guidelines

Spring Semester Clinical Experience III (CVP 764/765)

Clinical Experience III is considered the most advanced skill level for the senior perfusion student. This is the final course for clinical exposure of the perfusion student. The students will further reinforce their knowledge from Clinical Experience I (CVP 760) and Clinical Experience II (CVP 762/763). This semester will consist of (2) eight-week clinical rotations.

CEIII students should be able to operate the heart-bypass with minimal assistance after the initial orientation period. The goal of these rotations is to focus on the continued clinical development, surgical awareness, and professional responsibilities.

Students in CEIII should be able to demonstrate the following applied skills:

1. Improved control of blood pressure management during CPB
2. Management of metabolic status
3. Calculate oxygen transport, consumption, and delivery.
4. Identifies the oxygen transfer of membrane oxygenator
5. Operates the Intra-Aortic Balloon Pump (IABP).
6. Demonstrates the proper timing of the balloon, identification of triggers, and pumping frequency.
7. Identifies all medications used during CPB.
8. Describes the mechanism of action, indications, and contraindications for all medications used.
9. Calculates the heparin induction dose for CPB, heparin concentration, heparin dose response, and protamine calculation.
10. Demonstrates competency with the following ancillary devices:
    - IABP
    - Autotransfusion devices
    - Hemoconcentrators/dialyzers
    - Paracorporeal and Implantable VADs
    - ECMO
11. Independent completion of the CPB record and documents
12. Professional Development:
    - The student presents a professional image on the campus.
    - Adheres to the institutions professional code of ethics.
    - Respects patient and employee values and cultural characteristics.

- Maintains and protects confidentiality all of patient/clinical care.
- Applies the principles of the biomedical sciences to clinical practice.

Clinical Instructor Evaluation Tool

Clinical Preceptors will evaluate the performance of the MUSC student through ELMS by CORE (www.corehighered.com). Each Clinical Instructor will be assigned a username and password to access the case evaluation tool. The evaluation criteria for a student procedure is the following:

The score is based on a 1-5 rating scale. Please see the value listed for the appropriate scoring.

1= Critical Error
2= Unsatisfactory
3= Satisfactory
4= Good
5= Excellent
NA = Not Applicable

A score of 1 reflects a critical error was performed. It can also mean the patient could have been at risk for a bad outcome had you not intervened. The student will fail the case if they perform (2) or more critical errors.

A score of 2 is considered unsatisfactory. The student can perform the task, but requires constant assistance.

A score of 3 is considered satisfactory. The student can perform the task with minimal assistance.

A score of 4 is considered good. The student can perform the task without assistance.

A score of 5 is considered excellent. The student can perform the task with more than acceptable speed and quality. The student took initiative and was able to adapt to special situations.

The total number of categories graded is calculated and it is expected that as the rotation progresses the student will receive a higher % of graded categories. If this is not occurring then you can put a score of (2) in those categories particularly if you are not seeing progression of skills as the student becomes more familiar with your practice. Please do not hesitate to call your rotation liaison if you experience any problems with the grading process. As always we appreciate your input and willingness to share in the educational process of our students.

Each section is graded on a scale of 1-5 as noted above.

Patient Work up (10%)

Obtains complete and accurate history, able to identify important findings, shows knowledge of major and minor issues, has essential data for history and physical, is well organized, clinical problems are well defined, understands impact of abnormal findings, and summarize or explains clinical data. Independently identifies and explains pathophysiological concepts related to defect. **(1-5)**

Demonstrates a good understanding of drugs used during CPB procedures. Able to discuss indications and contraindications of commonly used cardiac drugs. Is capable of consistently selecting appropriate drugs and dosages even in unfamiliar situations. Uses appropriate consultation with instructor prior to administration of drugs into the ECC

Able to independently describe operation required, exhibits knowledge of surgeon, anesthesia and perfusion protocols. Perfusion care plan reflects comprehensive understanding of the patient requirements **(1-5)**

Able to calculate needed parameters with accuracy and in a timely manner. Can explain significance of values. Able to recite drug dosages

Preparation of Circuit (20%)

Consistently is aware of sterile technique and performs duties without compromising sterility. **(1-5)**

Able to differentiate between circuit components required, discusses best option for selection, and exhibits good judgment for final selection. Articulates performance characteristics of circuit components (**1-5**)

Is prepared for circuit set-up, has all supplies available and works efficiently. Routinely checks equipment/disposables for sterility and good function prior to set-up, reports that set up was completed with appropriate attention to sterility and observation of component integrity. Performs set up in logical organized fashion, able to complete setup within 15 minutes continually progressing toward faster set-up times. Primes and de-bubbling circuit independently. **(1-5)**

Completes Pre-bypass Checklist accurately and completely within required time, no omission or inaccurate reporting of items. **(1-5)**

Initiation of Bypass (10%)

Demonstrates ability to initiate CPB within the time expected by surgical team and is able to do so without considerable change in patient status/ hemodynamics. Initiation of CPB should be with the appropriate steps of protocol. Initiates gas flow to the oxygenator and begins timing

perfusion procedures. Successfully initiates alarms and safety devices at appropriate times during the procedure and communicates well and respectful to surgeon and staff. **(1-5)**

Consistently able to synthesize data from monitoring devices, identify and prioritize problems even in complex -multi problem scenarios. Student should be able to "multi-task" during initiation of bypass, and demonstrates an overall awareness of monitoring parameters required to safely initiate CPB. **(1-5)**

Conduct of Bypass (30%)

Consistently incorporates all available information to critically evaluate the adequacy and appropriateness of all monitored pressures. Selects appropriate actions needed to maintain within standard of practice. **(1-5)**

Demonstrates the ability to systematically analyze data from blood gases and manage electrolyte. Recognizes abnormalities and interprets them appropriately. Able to explain related pathophysiology. **(1-5)**

Temperature management following acceptable practices for cooling and rewarming to the desired temperature. **(1-5)**

Proficient in performance of anticoagulation management and assessment of anticoagulation status, independently determines patient's anticoagulation needs according to standard of practice. **(1-5)**

Follows appropriate procedures for cardioplegia administration throughout the procedure. Quick to assess when changes are needed to insure appropriate delivery. Shows comprehensive understanding of temperature, route of administration, and flow/pressure relationships during all phases of the procedure. **(1-5)**

Demonstrates surgical awareness by assessing adequacy of venous return, and consistently maintains vigilance to a safe operating level. Is able to articulate problems with decreased venous return. Performs and exhibits surgical awareness by continuous scanning of the perfusion circuit. Is able to synthesize information received during the scan and evaluate/ modify perfusion technique. **(1-5)**

Properly maintains perfusion record and charts appropriately per protocol. Perfusion record is free from errors and omissions. Charting is independently accomplished according to standard. **(1-5)**

Termination of Bypass (10%)

Follows appropriate steps for terminal of CPB. Accurately assesses venous reservoir volume and is able to communicate the need for additional volume when appropriate. Consistently maintains

vigilance to a safe operating level. Demonstrates understanding of the pressure flow volume relationships by successfully weaning from bypass independently.

Independently assess patient's health status and monitors circuit during termination of CPB. Demonstrates ability to terminate CPB within the time expected by the surgical team. Able to terminate CPB without considerable change in patient status/hemodynamics. **(1-5)**

Professionalism (10%)

Is able to communicate effectively with the surgical team. Communication is respectful and courteous, and appropriate. **(1-5)**

Demonstrates a professional attitude. Is prompt, punctual, reliable, and dependable. Student establishes and maintains an atmosphere of mutual respect and dignity with co-workers. They are an active member of the team and work well with others. Student is respectful and courteous to all operating room personnel. **S**tudent assumes the appropriate share of the workload, accepts work requests, volunteers, and follows through. Is motivated to provide "best patient care". **(1-5)**

Independently assess significant factors affecting patient's post-bypass health status and communicates changes to faculty when appropriate. Restocks perfusion supplies without reminders from faculty. Disposes of circuit without increased exposure to bloody waste. All equipment is cleaned appropriately per protocols. Completes all required paperwork **(1-5)**

Non-Technical Skills (10%)

Possesses and demonstrates situational awareness by understanding the dynamic events within the OR **(1-5)**

Exercises well informed and strategic decision-making skills by diagnosing, evaluating, and acting efficiently **(1-5)**

Demonstrates leadership and task management skills with high standards of quality, professionalism, and clinical care **(1-5)**

Works with the perfusion and surgical team by demonstrating skills of teamwork **(1-5)**

It is strongly recommended to discuss the performance of the student after every procedure. Evaluation scores should be entered into the ELMS by CORE (www.corehighered.com) at the clinical preceptor's earliest convenience. Results are reviewed by the MUSC Clinical Coordinator and released to the student for review. Minimizing delays in discussing procedures and entering results help accelerate student learning.

Affiliate Clinical Coordinators (or designated Clinical Managers) will complete a mid-term and final evaluation for the student's rotation. Mid-term evaluations are conducted at the 4-week point of the rotation. Final evaluations are submitted at the end of the clinical rotation.

Americans with Disabilities Act Requirements

Due to ADA privacy requirement, the Academic Coordinator of Clinical Education is prohibited from discussing any disability with the clinical site without authorization from the student. Thus, it is recommended that the student discuss all relevant information regarding any disabilities which may have a bearing on their clinical performance, time management skills, schedules or any other clinically-related issues with their clinical instructor during a private meeting at the beginning of their experience. If they are unable to reach an agreeable expectation level for the student, the coordinator should be contacted. If requested and written permissions provided, the clinical coordinator will discuss the disability and implications with the clinical instructor prior to the student's arrival at the assigned facility.

MUSC Affiliation Agreement

The written affiliation agreement (contract) between the clinical education facility and the College describes the roles and responsibilities of MUSC College of Health Professions and the facility.

The contract language is designed to safeguard all involved parties with respect to liability and to clarify the responsibilities of each party. Prior to student assignments at a clinical facility, a current affiliation agreement, signed by the Dean of the College of Health Professions (CHP) and the administrator or director of the facility, must be on file in the MUSC Department of Health Professions. The College Agreement has been developed to adhere to the laws of South Carolina and the requirement of MUSC. When a clinical facility amends the agreement, or substitutes their own agreement, these changes must be forwarded to the MUSC Legal Department for approval. If approved, the contract is returned to the facility to obtain appropriate signatures. If changes are deemed necessary, our College will contact the facility to notify of necessary changes. A signed copy of the Agreement is kept on file with the Department of Health Profession, Clinical Education, and one is kept at the clinical facility.

All agreements are reviewed on a regular basis as specified in the document. Contract review dates and processes may be specified in the contract. Ongoing contracts are periodically reviewed by the Department of Health Profession, the Deans' office for continues pertinence of goals and the missions of the division.

Student Packet Information

Prior the student's first day of their clinical practicum, a packet of information will be sent to the clinical site with the following information and documentation:

1. Liability Insurance: Each student is required to maintain malpractice insurance coverage; Student policies will maintain professional liability coverage consistent with the requirements set forth by the affiliate institution.
2. Medical Insurance: Each student is required to have proof of his/ her own medical insurance policy.
3. Worker's Compensation Insurance: A copy of the MUSC's Worker Compensations Coverage is included.
4. Measles Immunization: Students are required to show evidence of measles immunity or to have (2) doses of the measles vaccine prior to the beginning of their clinical affiliation.
5. Rubella Immunization: Students are required to show evidence of rubella immunity or to have a rubella titer prior to the beginning of their clinical affiliation.
6. Hepatitis B Immunization: Students are required to have the Hepatitis B vaccine series complete prior to beginning their clinical affiliations.
7. Tuberculosis Testing: Students are required to have a one-step Mantoux TB test each academic year. Students are responsible for determining if the specific clinical facility requires a two-step test.
8. Cardiopulmonary Resuscitation: Students are required to maintain a current CPR certification in American Heart Association BLS for the healthcare provider.
9. OSHA: The MUSC Hospital Risk Management Department provides the students with a presentation on OSHA. Each student is required to provide a certificate of participation.
10. Health Information Portability and Accountability (HIPPA): The student will complete MUSC's computerized training program on HIPPA.
11. Criminal Background Checks: A basic criminal background check is performed on all students upon their entry into the CVP program.
12. Syllabus: A copy of the appropriate syllabus will be included in the packet.

Incident Report

The MUSC CVP program recommends that the following procedure is followed if the student is a participant in ANY incident that potentially violates the highest clinical and ethical standards:

- The student should immediately notify the MUSC CVP Clinical Coordinator and MUSC CVP Program Director of the incident.
  The student should notify the external site instructor and follow the facilities procedural steps regarding reporting and documentation.

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