

# CLINICAL EXPERIENCE II: STUDENT EVALUATION MM

Student: \_\_\_\_\_ Faculty: \_\_\_\_\_  
 Date: \_\_\_/\_\_\_/199\_\_ Procedure: \_\_\_\_\_ Surgeon: \_\_\_\_\_

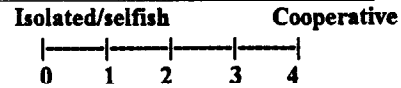
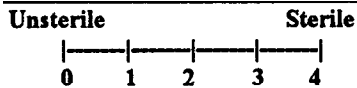
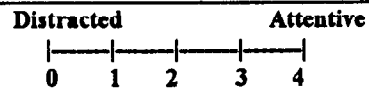
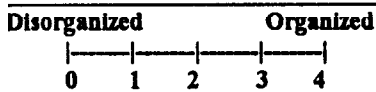
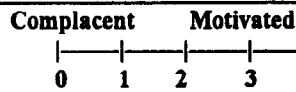
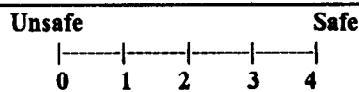
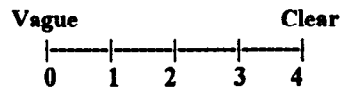
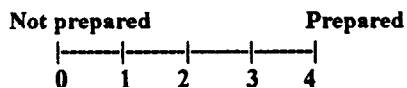
ITEM	SCORE	ITEM	SCORE
History		9. Prime Selection	
Physical		10. Assembly	
Congenital Anomaly		11. Priming	
Lab Report		12. Backer	
Cath/ECHO Report		13. Tertiary	
Perfusion Record		14. Capabilities	
Surgical Procedure/Protocols		15. Attendance	
Component/Equipment Selection		16. Communication	

4 - student exceeds the standard; 3 - student meets the standard w/o faculty assistance; 2 - student meets the standard with help from faculty; 1 - student did not meet the standard; 0 - student makes critical error that will endanger the patient

Comments [refer to item #]

*Student met with faculty for post-case conference:*  yes  no

*Mark the point on the following continuums that represents the performance of the student during the clinical procedure. Please comment under each line.*



Student Signature \_\_\_\_\_

Faculty Signature \_\_\_\_\_

Student's Comments:

Student: \_\_\_\_\_

Faculty: \_\_\_\_\_

Date: \_\_\_\_/\_\_\_\_/199\_\_

Procedure: \_\_\_\_\_

Surgeon: \_\_\_\_\_

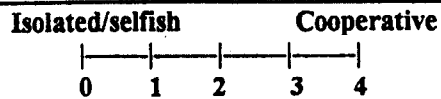
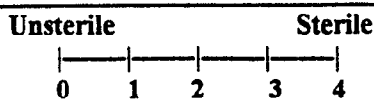
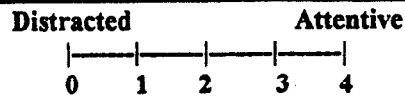
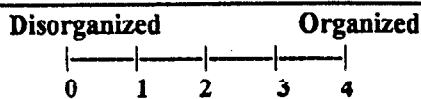
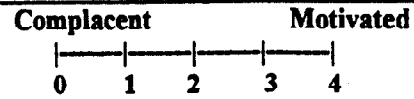
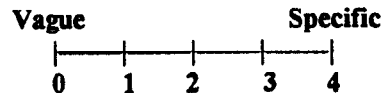
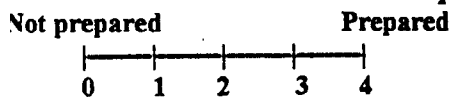
ITEM	SCORE	ITEM	SCORE
1. History / physical / lab report		13. Hemodynamics and pharmacology	
2. Cath - ECHO report		14. BGA, O <sub>2</sub> Sat, SMA-7, hematocrit	
3. Perfusion record		15. Surgical procedure awareness	
4. Surgical Protocols		16. Safety / emergency procedures	
5. Component / Prime selection		17. Termination of CPB	
6. Assembly / Priming		18. Post CPB awareness / ECC volume	
7. Monitoring equipment		19. Coagulation / hemostasis	
8. Checklist		20. ECC Volume/Clean -up	
9. Prebypass awareness/Table Lines		21. Paperwork	
10. CPB initiation		22. Capabilities	
11. Anticoagulation		23. Attendance	
12. Temperature		24. Communication	

4 - student exceeds the standard; 3 - student meets the standard without faculty assistance; 2 - student meets the standard with help from faculty; 1 - student did not meet the standard; 0 - student makes critical error that will endanger the patient

Comments [refer to item #]

Student met with faculty for post-case conference:  yes  no

Mark the point on the following continuums that represents the performance of the student during the clinical procedure. Please comment under each line.



Student Signature

Faculty Signature

STUDENT EVALUATION OF FACULTY TEACHING PERFORMANCE: please circle one

SIGNIFICANT DEFICITS

BELOW AVERAGE

AVERAGE

ABOVE AVERAGE

OUTSTANDING

t: \_\_\_\_\_

Faculty: \_\_\_\_\_

/ / 1996

Procedure: \_\_\_\_\_

Surgeon: \_\_\_\_\_

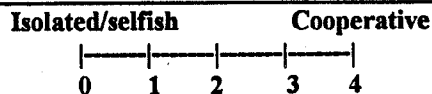
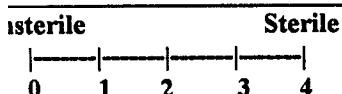
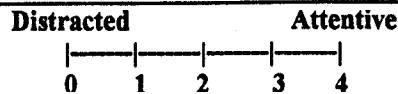
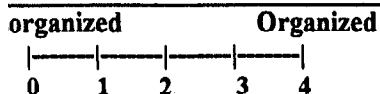
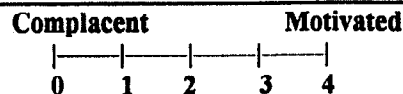
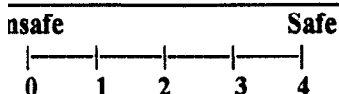
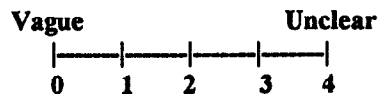
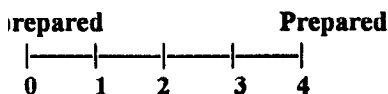
ITEM	SCORE	ITEM	SCORE
History / physical / lab		14. Hemodynamics and pharmacology	
Pre-op report		15. BGA, O <sub>2</sub> Sat, SMA-7, hematocrit	
Infusion record		16. Charting	
Surgical procedure		17. Surgical Procedural Awareness	
Component / prime selection		18. Safety/Emergency Procedures	
Assembly / priming/ table lines		19. Termination of CPB	
Monitoring equipment		20. Post CPB awareness/ECC volume	
Checklist		21. Coagulation/hemostasis	
Bypass awareness		22. ECC Volume/Clean-Up	
B initiation		23. Paperwork - Databasing	
Anticoagulation		24. Capabilities	
Temperature		25. Attendance	
Paralysis Management		26. Communication	

4 = student exceeds the standard; 3 = student meets the standard without faculty assistance; 2 = student meets the standard with help from faculty; 1 = student did not meet the standard; 0 = student makes critical error that will endanger the patient

Comments [refer to item #]

Student met with faculty for post-case conference:  yes  no

Mark the point on the following continuums that represents the performance of the student during the clinical procedure. Please comment under each line.



Student Signature

Faculty Signature

TEACHER EVALUATION OF FACULTY TEACHING PERFORMANCE: please circle one

SIGNIFICANT DEFICITS

BELOW AVERAGE

AVERAGE

ABOVE AVERAGE

OUTSTANDING

## STUDENT PERFORMANCE STANDARDS

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### *PATIENT WORK UP*

#### 1. History

The student should be able to:

- a. Evaluate the patient's disease process including origin, progress, treatment prognosis.
- b. Identify any problems which might relate to the conduct of cardiopulmonary bypass.
- c. Identify any abnormal findings including known allergies.
- d. List and define the action of all medications the patient is receiving currently and in the recent past. Describe how these medications may influence cardiopulmonary bypass management.
- e. Discuss any other significant diagnostic findings and their relationship to cardiopulmonary bypass such as MUGA, EKG, and radiology.

#### Physical

The student should be able to:

- a. Describe the organ systems reviewed and explain any abnormal findings.
- b. Relate how these abnormalities affect the diagnosis and the conduct of cardiopulmonary bypass.
- c. Describe any other abnormal findings not related to the diagnosis and relate how these findings might affect cardiopulmonary bypass.

#### Laboratory report

The student should be able to:

- a. Identify the patient's hemoglobin, hematocrit, blood gases, coagulation profile, electrolytes, blood type, and other pertinent lab values.
- b. Identify those values that vary from normal and the significance of these variations in terms of cardiopulmonary bypass.
- c. Identify other lab work done such as cardiac enzymes and cultures that are significant to the case. Discuss the significance of variations.

2. Catheterization/Echocardiography Report  
The student should be able to:
  - a. Present cath and/or ECHO lab findings.
  - b. Discuss anatomical involvement.
  - c. Identify the patient's cardiac output, cardiac index, ejection fraction and discuss the significance of any variation from the norm.
  - d. Discuss the significance of the chamber pressures, resistances and any gradients present
  
3. Perfusion record  
The student should be able to:
  - a. Generate the initial calculations on the perfusion record.
  - b. Generate the initial work-up information on the perfusion check list.
  - c. If charting responsibilities are resumed ... comply with MUSC Life Support Charting Standards Protocol.
  - d. Review and complete the pump record prior to filing in patient's chart.
  
4. Surgical Protocols  
The student should be able to:
  - a. Describe the operative procedure the patient will undergo.
  - b. Exhibit knowledge of and compliance with the surgeon, anesthesiologist and perfusion faculty protocols.

### ***EXTRACORPOREAL CIRCUIT***

5. Component selection  
The student should be able to:
  - a. Select the appropriate capital and disposable equipment for the procedure including but not limited to: pumps, gas flowmeters, disposable holders, blenders, temperature control systems, safety devices, oxygenator, tubing pack, connectors, heat exchangers, filters, cardioplegia delivery systems, hemoconcentrators, RBC salvager and monitoring systems.

- b. Describe the operational characteristics and specifications of the equipment selected.

Prime selection

The student should be able to:

- a. Estimate the lowest, safest priming volume of the circuit.
- b. Select the appropriate prime and calculate anticipated hematocrit, fibrinogen, COP and heparin concentration at cardiopulmonary initiation.

6. Assembly

The student should be able to:

- a. Assemble the circuit in a logical fashion that is consistent one day to the next, with previous thought given to what items need to be assembled first in an emergency.
- b. Assemble the circuit without kinks or lines on the floor.
- c. Assemble the circuit so that all components are in the proper holder and adjusted for the correct position for proper and safe conduct of CPB.
- d. Assemble circuit so that all monitoring lines and safety devices are attached.
- e. Assemble the tubing so that the tubing is run neatly from place to place so it is easy to evaluate the function of each segment.
- f. Set occlusions on all roller pumps.
- g. Set up the complete circuit within 25 minutes.

Priming

The student should be able to:

- a. Check the heat exchanger for leaks.
- b. Place clamps appropriately for CO<sub>2</sub> flush and cardiotomy or venous reservoir prime.
- c. CO<sub>2</sub> flush using sterile technique and isolate arterial filter.
- d. Initiate gas flow when appropriate.
- e. Prime cardiotomy and/or VR with heparinized solution.
- f. Prime the circuit in a logical and expedient manner.

- g. Prime the arterial filter appropriately with no bubbles on the outlet side of the filter.
- h. Prime sample and monitoring lines appropriately.
- i. Prime entire circuit within 10 minutes.
- j. When necessary with faculty approval obtain checked in blood components.
- k. Displace crystalloid prime with blood/normalize prime.
- l. Adjust prime to maintain 2.5 to 3.5 u/ml heparin after initiation bypass.
- n. Complete set up and prime of circuit for CPB initiation within 35 minutes.

7. Monitoring equipment

The student will be able to:

- a. Check and set up all monitoring equipment to include pressure monitoring, expired CO<sub>2</sub>, in line blood gases and saturations, temperatures, oxygen analyzer and bubble and level detectors.
- b. Explain and test the operating parameters, limitations and importance of all monitoring equipment.

***PRE BYPASS***

8. Checklist

The student will be able to:

- a. Complete the checklist with the faculty before the possibility of initiating bypass exists.
- b. Check the appropriate area associated with each item on the checklist.
- c. Explain the importance and consequence of each item on the checklist and justify any N/A entries.

9. Prebypass awareness

The student will be able to:

- a. Communicate with the faculty and other students when leaving the room once the patient is in the operating room.
- b. Note and be aware of any circumstances including hemodynamic status or complications of the operative procedure that might necessitate bypass.

- c. Note and be aware of hemodynamic status referring to cardiac output, arterial blood pressure, PAP, CVP and PCWP prebypass for comparison post bypass.
- d. Note and be aware of any lab or hemodynamic changes that might necessitate changes in the circuit or prime. This might include addition of blood components, medications, ultrafiltration or dialysis.
- e. Note and be aware of the patient's anticoagulation status and its appropriateness for that stage in the procedure. ( i.e. during cannulation)
- f. Initiate cardiotomy suction when appropriate, maintaining safety of circuit.
- g. Communicate with field and appropriately assist with cannulation, volume infusion, and exsanguination.
- h. Explain the importance of prebypass awareness.

Table Lines

The student will be able to:

- a. Anticipate the table line hand-off.
- b. Receive table lines without contamination, delay or lack of communication.
- c. Debubble table lines efficiently.
- d. Communicate appropriately with the field during this time.

***CONDUCTION OF PERFUSION***

10. Initiation

The student should be able to:

- a. Communicate with the operative field regarding bypass initiation.
- b. Minimally preload patient and check line pressure before taking clamp off the venous line.
- c. Using the reservoir level and pressure monitor achieve a mechanically and physiologically smooth, safe initiation.
- d. Achieve desired blood flow or oxygen delivery while maintaining an empty heart.
- e. Maintain a safe level in the venous reservoir and communicate with the operative field when d. and e. are not compatible.



- f. Adjust gas flow and note color of blood in arterial and venous lines.
  - g. Open arterial purge line, if appropriate to patient's flows.
  - h. Assure and maintain integrity of extracorporeal circuit.
  - i. Demonstrate knowledge of the physician's protocols regarding bypass initiation.
  - j. Explain the importance of 16.a through 16.i and document any deviation experienced during the procedure.
11. Anticoagulation  
The student should be able to:
- a. Describe the coagulation process and role of heparin,  $Ca^{++}$ , ATIII, etc. in this process.
  - b. Monitor and record anticoagulation during bypass by monitoring ACTs, Heparin Assay, TEG's and/or AT III levels in timely fashion.
  - c. Calculate additional heparin doses required using dose response method or heparin assay.
  - d. Demonstrate knowledge of other conditions that may affect ACT. (i.e. ATIII deficiency)
  - e. Demonstrate knowledge of effects of certain pharmacologic agents (i.e. aprotinin) on ACTs.
12. Temperature  
The student should be able to:
- a. Describe the advantages and disadvantages of hypothermia.
  - b. Describe the affects of temperature gradients.
  - c. Maintain proper temperature gradients per protocol.
  - d. Cool and rewarm patient by protocol and communicate with the surgeon.
  - e. At the initiation of warming and cooling monitor and document the water and arterial blood temperatures.
  - f. Maintain desired temperature by heater cooler adjustments thereby making temperatures and the heater cooler status part of the scan.
  - g. Anticipate and prepare heater-cooler(s) for next temperature requirement during CPB.

13. Hemodynamics

The student should be able to:

- a. Maintain blood flows, pressures and systemic vascular resistances in compliance with protocols and without large changes in blood flow or large boluses of medications.
- b. Discuss the physiologic phenomenon associated with the patients hemodynamic status.
- c. Understand the significance of an elevated CVP or PAP and take appropriate action.

Pharmacology

The student should be able to :

- a. Describe actions and doses of all drugs used during CPB.
- b. Administer the appropriate drug at the appropriate dose at the appropriate time.

14. Hematocrit

The student should be able to:

- a. Monitor hematocrit in timely fashion.
- b. Determine desired hematocrit by protocol and patient oxygen consumption status.
- c. Maintain desired hematocrit and COP by anticipating, cell saving, Plasmapheresis, ultrafiltrating, adding blood or crystalloid, or facilitating urine output.
- d. Justify all actions in adjusting hematocrit.

Blood gases and oxygen saturations

The student should be able to:

- a. Monitor blood gases and oxygen saturations in a timely fashion.
- b. Determine what acceptable limits are for the parameters by examining normal limits and the patient's status.
- c. Maintain standards on pH, pCO<sub>2</sub>, pO<sub>2</sub>, SaO<sub>2</sub> and SvO<sub>2</sub>.
- d. Explain the importance and interrelationship of pH, pCO<sub>2</sub>, pO<sub>2</sub>, SaO<sub>2</sub> and SvO<sub>2</sub>.
- e. Determine the potential cause of acid-base imbalance.

- f. Respond appropriately to acid base imbalance by appropriate adjustments of ventilation, flow, and/or addition of drugs.

SMA-7

The student should be able to:

- a. Decide the appropriateness of running an SMA-7 or any of it's components.
- b. Appropriately treat any abnormalities.
- c. Communicate the selected treatment with appropriate OR PERSONNEL.

15. Procedural awareness during bypass

The student should be able to:

- a. Anticipate surgical teams' requests and upcoming events.
- b. Respond to surgical teams' requests in an appropriate and timely fashion.
- c. Report and describe stage of operative procedure.
- d. Be aware of any volume changes in the reservoir.
- e. Be aware of why these changes might have occurred and communicate appropriately with the surgical field.
- f. Be aware and correct air locks in the venous line.

16. Safety

The student should be able to:

- a. Identify potential hazards in the procedure.
- b. Identify precautions to avoid these hazards.
- c. Attach, periodically check and recognize all safety devices and alarms in the system.
- d. Perform his/her duties in a responsible matter maintaining the patient's well being as first priority.

Knowledge of emergency procedures

The student should be able to:

- a. Identify potential emergency situations during CPB.

- b. Explain and justify the appropriate response.

17. Termination

The student will be able to:

- a. Correct all acid base abnormalities prior to termination of bypass.
- b. Communicate with anesthesia on ventilation and other readiness.
- c. Have adequate volume in reservoir or readily available for transfusion.
- d. Wean off bypass per physician's protocol.
- e. Monitor reservoir level and patient hemodynamics while communicating with the surgeon and anesthesia.
- f. Note any abnormalities and potential treatment such as IABP.

***POST BYPASS***

18. Post bypass awareness

The student should be able to:

- a. Monitor the patient's hemodynamics and EKG, communicating any changes to team.
- b. Monitor communication in the room regarding the patient's status.
- c. Be prepared to take action.

Circuit volume

The student should be able to:

- a. Infuse volume post cessation of venous return exercising all precautions and communicating appropriately.
- b. Identify when appropriate portions of the circuit may and should be emptied to process blood for anesthesia.
- c. Select appropriate processing for pump blood.
- d. Process blood efficiently without diverting attention or wasting blood.
- e. Communicate with anesthesia regarding the processed blood.

19. Coagulation

The student should be able to:

- a. Calculate protamine dose by the dose response or alternative method in a timely fashion.
- b. Be aware of protamine infusion and the potential hazards to the patient and the circuit. Report any potential reaction prospectively.
- c. Take the appropriate precautions to avoid protamine in the circuit.
- d. Obtain post protamine ACT, Heparin Assay, and/or TEG and communicate appropriately.

20. Clean up: **Please note that #20 should read Clean-Up only.**

The student should be able to:

- a. Participate in the clean up process while still monitoring the patient.
- b. Not compromise the circuit integrity before the lines are handed back.
- c. Manage the clean up process to clean the pump of the circuit as quickly as possible once lines are handed down and patient chest is closed.
- d. Explain the significance of b and c.

21. Paperwork

The student should be able to:

- a. Complete the pump record.
- b. Manage all charges.
- c. Distribute paper work appropriately and enter case in computer system.
- d. Utilize incident reports liberally and file appropriately.

***PERSONAL/PROFESSIONAL***

22. Capabilities

The student will demonstrate the ability to:

- a. Organize his/her thoughts in a logical matter.

- b. Approach problem solving in a logical fashion.
  - c. Communicate with the clinical coordinator, ECTfaculty, and other health care professionals.
  - d. Function as a team member.
  - e. Present an appearance that is appropriate to the clinical assignment.
23. Attendance  
The student will:
- a. Report to the operating room and the instructor at the appropriate time.
  - b. Contact the clinical coordinator if he/she is unable to report to the clinical assignment.
24. Communication  
The student will:
- a. Use appropriate language, grammar, and tact when communicating inside and outside the clinical area.
  - b. Address the faculty, surgical team and anesthesia team in an appropriate and professional manner and timely fashion.

The second portion of the grading sheet is comprised of eight areas that will be evaluated using a continuum that represents the performance of the student during the clinical procedure. These should be following by a brief comment or discussed in a post case conference.

The third section of the grading sheet is an evaluation of the clinical instructor during the clinical case being graded. It is important to the process that this section be completed by each student and that the comment area be utilized.