Faculty In Charge Of Course: Michael H. Hines MD, FACS
Participating Faculty: William Douglas MD, Douglas Haase PA-C
Location: Children’s Memorial Hermann Hospital, HVI of Memorial Hermann Hospital
Offered: Monthly (Normally July thru May although a few students take electives in June.)
Max. # Students/Period: 1

Course Objective

Material Covered:

This elective will review the anatomy and basic physiologic principles of simple and complex cardiac defects, as compared to normal cardiopulmonary physiology, and as related to surgical repair and modification and manipulation of physiology. This elective will provide additional exposure and experience with complex surgery and physiology including the use of the heart lung machine, and including experience with surgical assisting and wound closure.

While there will be some specific one-on-one didactic-type instruction with the elective director on a regular basis, much of the teaching occurs on rounds, at bedside, in the operating room during the procedures; teaching directly by the faculty (Dr. Hines, Dr. Douglas and Mr. Haase). Additional exposure to cardiac cath lab, echo, etc. with the pediatric cardiology faculty will be available on an ad-hoc basis, depending on the needs of the patients that the student is following. Also, depending on individual student career goals, the elective may be modified to maximize the benefit of the educational experience. For example, a student interested in a career in anesthesiology, may frequently be pulled from routine morning rounds to observe the techniques of anesthesia specific for the complex congenital heart patient, whereas the student interested more in pediatric cardiology would be more likely to accompany a patient to the cath lab for his or her balloon septostomy. Additional exposure to ECMO is also available.

This elective is most appropriate for students with specific interests in surgery (pediatric, cardiac, other), pediatrics (cardiology or otherwise), and anesthesia or critical care. The objectives of the elective are as follows:

By the end of this elective the student will be able to:

1. Describe the anatomy and physiology of the 4 major classes of congenital heart disease: left to right shunts, right to left shunts, obstructive lesions and mixed complex lesions.
2. Perform auscultation of murmurs, rubs, etc. in patients with congenital heart disease, and describe how the sounds correlate with anatomic pathology
3. Describe, using patient cases, the many important principles of cardiovascular and pulmonary physiology including resistance, compliance, cardiac output and flow, shunting, oxygen delivery and consumption, gas exchange and respiratory physiology.

Skills Acquired:

By the end of this elective, the student will be able to:

1. Assess murmurs
2. Perform basic wound closure techniques
3. Perform basic principles of surgical assisting
4. Assess pediatric patients with critical illnesses and complex physiology

Activities Of Elective

1. Daily morning rounds with one of both pediatric CV surgeons, and the multidisciplinary team.
2. Operating room experience which occurs usually daily.
3. Clinic experience with pre and post op patients with direct faculty supervision and teaching.
4. Multidiscipline congenital heart conference (weekly)
5. Multidiscipline fetal conference (weekly, but selectively depending on patients being presented.
6. Eight one-two hours didactic sessions with elective director to cover the following 8 topics through the 4 week rotation. 1. Left to right shunts, 2. Right to left shunts, 3. Obstructive lesions and insufficiencies, 4. Mixed and complex lesions – single ventricles, 5. Principles of CPB (cardiopulmonary bypass) and ECMO (Extracorporeal Membrane Oxygenation), 6. Principles of ventilator support, 7. Principles of CV drug support: inotropes, vasodilators, Nitric Oxide, anticoagulation, etc., 8. Final topic based on student’s career goals as related to the elective.

Number Of New Patients/Student/Week: 4-8 average week for inpatient. 3-6 outpatient
Responsibilities Of Student For Assigned Patients:

1. Brief “pre-reading” prior to procedures, assigned individually based on defect and surgical procedure
2. Directed pre-operative history and physical prior to repairs. This is not a full documented H&P which is better served on more general electives, but rather an opportunity to apply the physical finding of CHD to the clinical physiology
3. The students have no formal call, and there is no expectation that they come in on the weekends or at night. However, they may be “invited” to participate if we do have an emergency surgery, transplant, etc. that would potentially provide a very unique learning experience. At the beginning of the elective it is made clear that this is purely elective, and that choosing not to come in, or even choosing not to be called for such opportunities will in no way be reflected in their evaluation and grading.
4. The elective is designed purely as an educational opportunity and exposure. The service functions fully without medical students, and there are no tasks or responsibilities that are solely theirs (i.e. no “scut”-work). However some tasks and responsibilities may be given to students who demonstrate the appropriate abilities and desire.

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<thead>
<tr>
<th>Does history/physical:</th>
<th>Yes (Directed H&amp;P for educational purposes only)</th>
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<tbody>
<tr>
<td>Who critiques:</td>
<td>Faculty</td>
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<td>Follows patients, with appropriate notes as needed:</td>
<td>Yes</td>
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<td>Who supervises:</td>
<td>Drs. Hines, Douglas, and Doug Haase PA-C (Faculty)</td>
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<td>Does student see ambulatory patients:</td>
<td>Yes</td>
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<tr>
<th>Procedures</th>
<th>Observe</th>
<th>Perform</th>
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<tr>
<td>Repair of a variety of congenital heart defects in infants, children and adults</td>
<td>X</td>
<td></td>
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<td>Assist in above surgery</td>
<td></td>
<td>X</td>
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<tr>
<td>Wound closure</td>
<td></td>
<td>X</td>
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<td>Patient pre- and post-op assessment</td>
<td>X</td>
<td>X</td>
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Scheduled Duties of Student:

- Frequency of rounds on patients: Daily morning team ICU rounds on cardiac patients, often usually afternoon rounds to check post-op patients
- Presents patients to preceptor or attending physician: No - Patients are presented on multidisciplinary rounds by the cardiology and PICU fellows, residents. Students may be asked to informally present their H&P findings to the faculty for both inpatients and outpatients.
- Weekly schedule of required teaching sessions: The students are given one-on-one education of a variety of related topics listed under objectives. These basic principles will be reinforced in the operating room and other topics will also be discussed outside the OR.

Describe Optional Rounds And Activities, If Any:

1. Weekly multidisciplinary pediatric CV, Cath conference (Mon-2 hours, Required)
2. Weekly multidisciplinary fetal conference (Tues-1 hr, Optional, selective weeks)

Other Required Activities:

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<th>Reading/review of current literature</th>
<th>Yes, selectively.</th>
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<td>Writing or presenting a paper</td>
<td>No.</td>
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<tr>
<td>Reading during elective</td>
<td>Cardiac Embryology chapter, Selected readings on congenital defects, Cardiopulmonary bypass, CV physiology</td>
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How Is Student Evaluated:

There is no written exam or formal oral exam. Each student will be evaluated by the faculty, (primarily the elective director), on two core criteria:
1) Their understanding and application of the basic anatomic and physiologic concepts demonstrated throughout the elective [Knowledge base, comprehension, application of concepts, etc.]
2) Their willingness and ability to participate as a team member in the OR, PICU and clinic environments [professionalism, reliability, effort, etc.]

Who Evaluates Students:

Faculty with input from other team members, and with final grade assigned by Elective Director

Unique Features Of This Elective:

This elective provides exposure to the extremely unique and specialized field of congenital heart surgery. And while the occurrence of the disease is relatively rare, the principles demonstrated in the diagnosis, assessment, operative repair, and postoperative management can be applied to almost all fields which care for critically or significantly ill patients.