Fellowship Director: Toan Huynh, MD FACS FCCM
Director, Surgical Intensive Care Unit
Director, Trauma Research
F.H. “Sammy” Ross Jr. Trauma Center
Carolinas Medical Center
1000 Blythe Blvd
PO Box 32861
Charlotte, NC 28232-2861
Voice: (704) 355-8449
Fax: (704) 355-7833
E-mail: toan.huynh@carolinashealthcare.org

Fellowship Coordinator: Diane Winters
F.H. “Sammy” Ross Jr. Trauma Center
Carolinas Medical Center
1000 Blythe Blvd
MEB, Suite 202
Charlotte, NC 28232
Voice: (704) 355-3807
Fax: (704) 355-7730
E-mail: diane.winters@carolinashealthcare.org
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<thead>
<tr>
<th>Table of Content</th>
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<td>8</td>
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<tr>
<td>Number of Positions</td>
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<tr>
<td>Actively Enrolled Fellows (NA)</td>
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<td>Skills and Competencies</td>
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<td>49-50</td>
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<tr>
<td>Surgical Critical Care Log</td>
<td>51-52</td>
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<tr>
<td>Administrative Experience</td>
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<td>Research Experience</td>
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## PRIMARY SITE

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<tr>
<th>Field</th>
<th>Details</th>
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<tbody>
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<td>Name</td>
<td>Carolinas Medical Center</td>
</tr>
<tr>
<td>Address</td>
<td>PO Box 32861</td>
</tr>
<tr>
<td>City, State, Zip Code</td>
<td>Charlotte, NC 28232-2861</td>
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<tr>
<td>Clinical Site?</td>
<td>(X) YES ( ) NO</td>
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<tr>
<td>Type of Rotation (select one)</td>
<td>Elective ( ) Required (X) Both ( )</td>
</tr>
<tr>
<td>Length of Fellow Rotations (in months)</td>
<td>12</td>
</tr>
<tr>
<td>CEO/Director/President’s Name</td>
<td>Michael C. Tarwater</td>
</tr>
<tr>
<td>Joint Commission Accredited? (X) YES ( ) NO</td>
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</table>
## B. Faculty / Resources

### 1. Program Director Information

<table>
<thead>
<tr>
<th>Name: Toan H. Huynh, MD, FACS, FCCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title: Program Director, Surgical Critical Care Fellowship; Director, Surgical Intensive Care Unit</td>
</tr>
<tr>
<td>Address: Carolinas Medical Center, PO Box 32861</td>
</tr>
<tr>
<td>City, State, Zip code: Charlotte, NC 28232-2861</td>
</tr>
<tr>
<td>Telephone: 1-704-355-8449  FAX: 1-704-355-7833  E-mail: <a href="mailto:Toan.Huynh@carolinashealthcare.org">Toan.Huynh@carolinashealthcare.org</a></td>
</tr>
<tr>
<td>Date First Appointed as Program Director: 8-7-2009</td>
</tr>
<tr>
<td>Principal Activity Devoted to Fellow Education?</td>
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<tr>
<td>Term of Program Director Appointment: 2 years</td>
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<tr>
<td>Date first appointed as faculty member in the program: 9/1/1998</td>
</tr>
<tr>
<td>Number of hours per week Director spends in:</td>
</tr>
<tr>
<td>Clinical Supervision: 30  Administration: 10  Research: 5  Didactics/Teaching: 19</td>
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<td>Primary Specialty Board Certification: ABS  Most Recent Year: 2007</td>
</tr>
<tr>
<td>Subspecialty Board Certification: Surgical Critical Care  Most Recent Year: 2008</td>
</tr>
<tr>
<td>Number of years spent teaching in this subspecialty: 12 years</td>
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### 2. Physician Faculty Roster

<table>
<thead>
<tr>
<th>Name (Position)</th>
<th>Degree</th>
<th>Specialty</th>
<th>Board (Y/N)†</th>
<th>Certification Date</th>
<th>Years Practice</th>
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<tbody>
<tr>
<td>A. Britton Christmas</td>
<td>MD</td>
<td>Surgery</td>
<td>Yes</td>
<td>2/26/2007</td>
<td>3</td>
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<td></td>
<td></td>
<td>Trauma and SCC</td>
<td>Yes</td>
<td>10/1/2007</td>
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<tr>
<td>Susan L. Evans</td>
<td>MD</td>
<td>Surgery</td>
<td>Yes</td>
<td>2/15/2005</td>
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<td></td>
<td>Trauma and SCC</td>
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<td>9/26/2005</td>
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<tr>
<td>John M. Green</td>
<td>MD</td>
<td>Surgery</td>
<td>Yes</td>
<td>10/30/2007</td>
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<td></td>
<td>Trauma and SCC</td>
<td>Yes</td>
<td>10/30/2007</td>
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<tr>
<td>Michael W. Haley</td>
<td>MD</td>
<td>Internal Medicine</td>
<td>Yes</td>
<td>2002</td>
<td>4</td>
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<td></td>
<td></td>
<td>CCM</td>
<td>Yes</td>
<td>2005</td>
<td></td>
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<tr>
<td>Alan C. Heffner</td>
<td>MD</td>
<td>EM</td>
<td>Yes</td>
<td>2001</td>
<td>9</td>
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<tr>
<td>(PD) Toan T. Huynh</td>
<td>MD</td>
<td>Surgery</td>
<td>Yes</td>
<td>12/5/2007</td>
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<td>10/3/2008</td>
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<tr>
<td>David G. Jacobs</td>
<td>MD</td>
<td>Surgery</td>
<td>Yes</td>
<td>12/29/2008</td>
<td>14</td>
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<td></td>
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<td>Trauma and SCC</td>
<td>Yes</td>
<td>10/19/2001</td>
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<tr>
<td>Kevin W. Lobdell</td>
<td>MD</td>
<td>Surgery</td>
<td>Yes</td>
<td>10/2002</td>
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<td></td>
<td>Thoracic Surgery</td>
<td>Yes</td>
<td>06/2006</td>
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<td>SCC</td>
<td>Yes</td>
<td>11/2004</td>
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<tr>
<td>William S. Miles</td>
<td>MD</td>
<td>Surgery</td>
<td>Yes</td>
<td>10/18/2002</td>
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<td></td>
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<td>Yes</td>
<td>10/2003</td>
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<tr>
<td>Gamal Mostafa</td>
<td>MD</td>
<td>Surgery</td>
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<td>12/12/2005</td>
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<td>9/26/2006</td>
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<tr>
<td>Geoffrey Rose</td>
<td>MD</td>
<td>IM</td>
<td>Yes</td>
<td>2002</td>
<td>12</td>
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<td></td>
<td></td>
<td>Cardiology</td>
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<td>Testamur, ASE exam</td>
<td>Yes (Echo)</td>
<td>1997</td>
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<tr>
<td>Lynette M. Schiffern</td>
<td>MD</td>
<td>Surgery</td>
<td>Yes</td>
<td>3/20/2006</td>
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<td></td>
<td></td>
<td>Trauma and SCC</td>
<td>Yes</td>
<td>9/26/2006</td>
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<td>Ronald F. Sing</td>
<td>DO</td>
<td>Surgery</td>
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<td>10/17/2003</td>
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<td>10/26/2004</td>
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<tr>
<td>Jaspal Singh</td>
<td>MD</td>
<td>Internal Medicine</td>
<td>Yes</td>
<td>08/2002</td>
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<tr>
<td>Dimitrios Stefanidis</td>
<td>MD, PhD</td>
<td>Surgery</td>
<td>Yes</td>
<td>2/14/2005</td>
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<td></td>
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<td>MI Surgery and Bariatric Surgery</td>
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<tr>
<td>Michael H. Thomason</td>
<td>MD</td>
<td>Surgery</td>
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<td>Yes</td>
<td>10/20/2000</td>
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<tr>
<td>Name (Position)</td>
<td>Degree</td>
<td>Specialties</td>
<td>Years Practice</td>
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<tr>
<td>Otwell Timmons</td>
<td>MD</td>
<td>Pediatrics</td>
<td>20</td>
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<td>PCCC</td>
<td>05/30/1996 (Exp 12/31/2011)</td>
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<tr>
<td>Edwin S. Young</td>
<td>MD</td>
<td>Pediatrics</td>
<td>18</td>
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<td>PCCC</td>
<td>08/2006</td>
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† Certification for the primary specialty refers to ABMS Board Certification. Certification for the subspecialty refers to ABMS sub-board certification.
### 3. Non Physician Faculty Roster

<table>
<thead>
<tr>
<th>Name (Position)</th>
<th>Degree</th>
<th>Specialty</th>
<th>Role In Program</th>
<th>Years Teaching</th>
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<tbody>
<tr>
<td>Ian H. McKillop Research Director</td>
<td>PhD</td>
<td>Research</td>
<td>Instruction/assistance with research projects</td>
<td>10 years</td>
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<tr>
<td>General Surgery Research</td>
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<tr>
<td>H. James Norton Director of Biostatistics</td>
<td>PhD</td>
<td>Biostatistics</td>
<td>Instruction/assistance with the statistical analysis of research data</td>
<td>19 yrs</td>
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<tr>
<td>Lance K. Stell Medical Ethicist</td>
<td>PhD</td>
<td>Medical Ethics</td>
<td>Instruction/assistance with issues related to medical ethics</td>
<td>19 years</td>
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</table>
4. Program Resources

Attending rounds with the critical care fellow will take place daily in all ICUs in which the fellow rotates. The fellow will be an integral part of these rounds and will assume a gradually increasing responsibility for directing rounds during the year.

We have incorporated faculty education time into the fellow’s rotations that will allow time for specific clinical teaching and also provide didactic education, mentoring, research, and simulation laboratory education. A newly constructed simulation laboratory at Carolinas Medical Center will allow the faculty to interact with the critical care fellow in a simulation setting. The critical care fellow will be an integral part of administrating and learning through simulation training. We have given protected faculty time to provide administrative and practical simulation training.

The critical care faculty is heavily integrated into the intensive care administrative structure at our institution. The fellow will be mentored in the organizational structure and management of running an ICU. He/she will be a member of the ICU advisory committee, the STICU advisory committee, the surgical critical care outcomes committee, the trauma outcomes committee, and the ICU infection control committee. The critical care faculty will be able to mentor the fellow through this administrative education process.

Morning rounds in the ICU are a structured process, and the fellow will organize morning report. This will be followed by formal attending teaching rounds in the ICU. A didactic educational lecture will follow attending rounds on Mondays and Fridays. The fellow will be mentored in standard practice guideline development and will be responsible for the maintenance of the standard practice guideline meeting.

The program director will monitor the fellow’s clinical time and assure that educational time is being promoted.

The Department of General Surgery journal club meets the 4th Thursday of each month. A recent critical care/trauma article is one of the publications discussed at every meeting. The critical care fellow will be responsible for presenting this article with mentoring from a critical care faculty member and the institutional biostatistician.

a) Educational and clinical resources available for fellow education.

Many clinical resources are available to the surgical critical care fellow at Carolinas Medical Center. These include multiple adult and pediatric multi-specialty ICUs that admit thousands of critically ill patients a year to this quaternary teaching center. The fellow rotates through 5 of the main intensive care units: surgical, trauma, medical, pediatric, and cardiothoracic. Additionally, we have a large, newly constructed, simulation laboratory with physiologic monitoring and simulation procedure modules.
The fellow will be exposed to and participate in many administrative-based conferences including the ICU advisory committee, the surgical trauma ICU advisory committee, and process improvement outcomes committees. The fellow will attend and participate in mandatory critical care conferences. A required reading materials list for each rotation will be provided to the fellow. During the rotations, each ICU has a library with hard-back critical care texts and specific journals. These all are accessible to the fellow.

In addition, there is a large medical library on campus (the AHEC medical library) that has full support for reference materials, journals, and texts. The fellow is given full password access to all online reference materials including MDConsult, Up-To-Date, and drug references. Access to the AHEC digital library includes all medical journals held at many medical schools in North Carolina including the University of North Carolina and Duke University. The fellow will be given access to a PDA and a computer (located in the MD administrative office adjacent to the TICU) for clinical, administrative, and research needs. Carolinas Medical Center has an electronic medical record system and digital radiographic viewing. The fellow will be given full password access to these electronic medical records. A computer loaded with Microsoft Office and EndNote® reference software will be provided to the surgical critical care fellow.

The fellow will attend 1 CME national conference funded by the hospital during the year and will have support for abstract/research presentations given throughout the year. A full-time medical editor employed by the Department of Surgery is available to the fellow for editorial support and assistance with manuscript preparation and submission. The MD office adjacent to the TICU administrative area has library materials and computer access. The fellowship program coordinator will provide administrative support for the fellow.
C. FELLOW APPOINTMENTS

1. **Number of Positions** (for the current academic year): One

2. **Actively Enrolled Fellows**

<table>
<thead>
<tr>
<th>Name</th>
<th>Start Date</th>
<th>Completion Date</th>
<th>PGY Year</th>
<th>Specialty training</th>
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<tr>
<td>Lindsay Fairfax</td>
<td>July 1, 2010</td>
<td>June 30, 2011</td>
<td>4</td>
<td>General Surgery</td>
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</table>
D. **Skills and Competencies**

The fellow will be given a hard copy and an electronic version of the fellow’s handbook, which includes the assignments and duties throughout the fellowship. In addition, the fellow will also be given the goals and objectives for all rotations at the beginning of the year. The fellow will discuss his/her progress with the program director at quarterly meetings. At the beginning of every rotation, the fellow will meet with the specific unit director and faculty members and discuss the goals of learning for that rotation.

The general educational goals, skills, and competencies of the Carolinas Medical Center’s surgical critical care fellowship program are focused on facilitating the fellow to:

1) Develop a sound understanding of the pathophysiology of critical illness

2) Acquire an in-depth knowledge of the management of critically ill and critically injured patients including the literature supporting various clinical approaches

3) Master the use of various technologies for monitoring in the critical care unit

4) Attain competence in the therapeutic interventions employed in the intensive care setting

5) Develop the administrative skills necessary to direct a surgical intensive care unit

6) Acquire a basic understanding of design and conduct of basic and clinical research

7) Develop sound clinical decision making and professional demeanor

8) Acquire the fundamental core competencies as described by the ACGME

At the end of the fellowship year, the surgical critical care fellow will be able to demonstrate that he/she has attained these skills and competencies. This will be documented in a summative evaluation as part of the fellow’s permanent record.

E. **Grievance Procedures**

Issues or concerns regarding education, call schedule, work hours, interpersonal relationships, etc. that develop during the surgical critical care fellowship should be addressed in a professional manner. The critical care faculty is committed to the education and well being of the resident/fellows and to excellence in the care of our patients. Standard, professional procedure in conflict resolution calls for:

1. A clear and concise expression of the issue at hand.

2. Appropriate attempt to find a resolution to the problem.

These steps should be undertaken with the involved parties first. In almost all situations, the individuals immediately responsible for an issue should be given the opportunity to rectify the situation before others are involved. If full resolution cannot be attained, then the issue must be put forth to those in supervisory roles in a “real-time” manner. Retrospective conflict resolution is fraught with problems and is frequently inaccurate. The critical care fellow, while on ICU rotations, functions as the immediate supervisor for more junior surgery residents with regard to organizational and patient management issues in the ICU.
If a full resolution of an issue is not obtained to everyone’s satisfaction, then it must be communicated to program director. Dr. Huynh, or his designee, will make every effort to resolve the conflict to the satisfaction of all parties. If further redress is needed, progression along established supervisory lines and/or policies delineated in the Medical Education policies should be followed.

Confidentiality may be somewhat awkward due to the small size of the fellowship program; however, the program director will ensure that fellow complaints or concerns can be expressed in the appropriate forum and that the fellow will be free from retaliation or intimidation. Should the fellow have any issues concerning the program director, the trauma/critical care division director will be responsible for monitoring the situation and preventing potential retaliation or intimidation.

If there are significant concerns that the fellow must raise, he/she has an “open door” policy for discussion with the program director, the trauma/critical care division director, and/or the D.I.O. of Carolinas Medical Center. These concerns will be appropriately addressed in a rapid, organized manner that is confidential and protective of the surgical critical care fellow. There will be documented steps taken to minimize fear of intimidation and prevent any potential retaliation.

If there is a grievance that must be addressed concerning the fellow’s educational progression or potential termination, then the policy on grievance and termination must be followed. See: Surgical Critical Care Fellow Policy on Conflict Resolution (Appendix, page 127), Surgical Critical Care Fellow Policy on Grievance (Appendix, pages 133-135), and Surgical Critical Care Fellow Policy on Disciplinary Action (Appendix, pages 128-129).

F. EVALUATION (FELLOWS, FACULTY, PROGRAM)

The surgical critical care fellowship program as a specialty provides an ideal model for the acquisition of skills and knowledge to fulfill the six core competencies. These specialties mandate that 1) practitioners achieve high levels of medical knowledge and skills 2) practice is highly systems-oriented and collaborate with multiple groups 3) practice is driven by evidence-based medicine 4) physicians can communicate very efficiently and effectively to families regarding critical illness and death and to multiple team members to ensure appropriate direction of care 5) physicians have well developed PI/QA systems to achieve highest level of care for this very complex patient group.

The critical care faculty is trained regarding the ACGME core competencies or has a long standing experience in assessing trainees using these. All attendings are required to attend a session on evaluating residents and fellows that is presented by the Department of Surgery. In addition, the critical care faculty members discuss the assessment of core competencies at the beginning of the fellowship year and during faculty meetings, per the module presentation that was created by the ACGME. The non-surgical critical care faculty is required to review the ACGME module on assessment of the core competencies (http://www.acgme.org/outcome/e-learn/e_powerpoint.asp). The topic of training faculty to evaluate residents/fellows is included in the faculty development program.

All of the evaluations of the fellow are based on the core competencies. The program director and the fellow’s mentor review these evaluations monthly; any inconsistencies are subsequently discussed with the evaluators; any further training of faculty assessors that is necessary is initiated by the program director. The attendings are also involved with general surgery resident
assessments based on the core competencies. All of these methods provide ample education to the evaluators on the assessment methods for the six competencies so that the fellows are evaluated fairly and consistently.

The performance criteria used to evaluate the fellow will be based on the core competencies as well as acquiring the medical knowledge and skills necessary to be independent practitioners. These will be discussed with the fellow at orientation before he/she begins the fellowship. In addition, at the beginning of the fellowship year, he/she will be given a fellow’s handbook (in electronic and hardcopy forms) that includes all of the fellowship expectations, examples of the evaluations, and the performance criteria for the year. This also will apply to all of the elective rotations in the MICU, PICU, CVICU, and research/elective/echocardiography.

At the beginning of each rotation, the fellow will meet with the director of the ICU unit and discuss the goals of learning for that rotation. During this meeting the performance criteria on which the fellow will be evaluated will also be discussed.

The fellow will review his/her monthly evaluations with his mentor and quarterly with the program director. The fellow can discuss ways to improve his/her performance at that time. In addition, the fellow will take the MCCKAP exam in the spring of the fellowship year. The MCCKAP is used to assess how fellows perform in relation to a national evaluation.

Of particular benefit in developing skills to appraise and assimilate evidence from scientific studies will be the weekly surgical critical care fellow conference, which will follow the 1:00 p.m. Friday faculty meeting. During this conference, the fellow and faculty members will discuss a scientific study on a topic related to a patient currently on the critical care service.

The Department of General Surgery journal club meets the 4th Thursday of each month. A recent critical care/trauma article is one of the publications discussed at every meeting. The critical care fellow will be responsible for presenting this article with mentoring from a critical care faculty member and the institutional biostatistician. Dr. James Norton, director of biostatistics, conducts a 3-day lecture series on statistics in medical research at the beginning of the academic year, which the fellow will attend.

In addition, the fellow will be given journal articles to review, appraise, and discuss during teaching rounds on the ICU rotations. The fellow will be encouraged to keep a reference file of pertinent journal articles and discussions for future use.

The fellow will be responsible for organizing and running the standard practice guideline committee for the surgical critical care and trauma division. At this weekly conference, guidelines are developed and revised using evidence-based medicine. The fellow will be mentored in appraising and assimilating this evidence, based on pertinent scientific studies and in the process of implementing the guidelines. Our division is committed to standards of practice in critical care. Through this method, the guidelines are developed, implemented, and monitored after they are put into practice. The surgical critical care fellow will also observe how guidelines (using evidence-
based medicine) can help correct management problems and improve processes by attending and participating in the process improvement committees (i.e., trauma outcomes, surgical critical care outcomes, mortality and morbidity conferences). Using these multiple methods during the fellowship year, the fellow will develop skills to locate, appraise, and assimilate evidence from scientific studies related to patients’ health issues.

1. Semiannual evaluations of fellows (e.g., who meets with the fellows and how the results are documented in fellow files).

Through an integrated program, fellows will attain knowledge and expertise to 1) satisfy the six core competencies outlined by the ACGME, 2) obtain a certificate of added qualifications in surgical critical care, and 3) become administratively and academically successful in their careers.

The formal mechanism of fellow evaluation by faculty will include monthly written evaluations of the surgical critical care fellow by each of the critical care faculty members. This will also include the 360-degree evaluations by representatives of the nursing and ancillary staff for the various ICUs. In addition, we have developed a ROCA (Resident Objective Clinical Assessment) form to offer concentrated, real-time evaluation and feedback to the fellow. Evaluations will be collected and summarized by the program director and discussed in the divisional faculty meeting. Quarterly, the program director will provide a summation to the surgical critical care fellow in a scheduled, confidential meeting. During these quarterly meetings, the fellow will also be asked to offer observations regarding his/her progress. A written summation of these quarterly reviews will be shared with the fellow and entered as a part of the fellow’s permanent file.

**Evaluation Criteria**

Written evaluations cover several dimensions that include the following:

- Patient care
- Medical and cognitive knowledge
- Practice-based learning and improvement
- Interpersonal and communication skills
- Professionalism
- System-based practice

The informal evaluation process is an important, “real-time” process that allows fine-tuning of clinical skills, knowledge base, behavioral issues, etc. These micro-evaluations typically take place in the clinical setting, as close in time as possible after specific behaviors (desirable or undesirable) are observed which warrant comment. The importance of these informal evaluations is that, to be effective, feedback should be given immediately after the behavior that is to be modified. To assist with the evaluation of the acquisition of cognitive knowledge, the Adult Multidisciplinary Critical Care Knowledge Assessment Program examination will be given each year to help the fellow prepare for the examination for the certificate of added qualifications in surgical critical care. Performance will be reviewed, and didactic educational initiatives will be adjusted as needed.
2. System for evaluating faculty performance as it relates to the educational program.

The CMC surgical critical care program takes seriously the evaluations of faculty members as they relate to participation in the educational program. Faculty in the fellowship program, regardless of the division, will be evaluated by the surgical critical care fellow monthly. These evaluations will be tabulated, and the results will be known only by the program director. In addition, the results of the biannual Monkey Survey evaluations of faculty by ancillary personnel, consulting services, and fellows will be collated, and the aggregate information will be used in the formal monthly faculty evaluations. (Monkey Survey is an on-line program that can be used to create anonymous evaluations with the administrator viewing responses as a group but not responses identifiable to individuals).

Faculty members for the surgical critical care fellowship program that are under a different medical education division will also have the monthly fellow evaluations and a 360-degree evaluation that will include a faculty evaluation section. These will be collated, and the aggregate results will be discussed with the medical directors of the specific intensive care units and the individual faculty members at a specified time.

Annually, the program director will meet with all faculty members and discuss the aggregate results of the multiple evaluations. Any issues that require reconciliation or improvement will be reviewed. If needed, the program director will formulate an action plan for improvement and will monitor the progress of the plan closely.

Although we will have only one surgical critical care fellow and the ability to remain anonymous is difficult at best, the program director will ensure that there will be no retribution for comments made in the monthly evaluations.

3. Mechanisms used for program evaluation, including how the program uses aggregated results of the fellows’ performance and/or other program evaluation results to improve the program.

Multiple mechanisms will be used by the CMC surgical critical care fellowship program to improve the educational delivery and process. These will include but will not be limited to: organizational structure, monthly faculty and fellow programmatic evaluations, the MCCKAP annual exam, and an organized program evaluation that is anonymous except to the program director. Program quality begins with the managerial structure of the program.

To ensure a coordinated training model that will provide broad training and exposure and will achieve concordance with each major clinical discipline, an oversight committee will provide direction and managerial support. This oversight committee will consist of Dr. Huynh in his role as Medical Director of the SICU and program director of the fellowship, Dr. William Miles, Medical Director of the Trauma ICU, Dr. David Jacobs, Associate Director of Trauma, Dr. Michael Thomason, Medical Director of the Division of Trauma and Critical Care. The fellow will be a part of the oversight committee when discussing future changes of program structure.

In addition to regularly scheduled meetings of the fellowship oversight committee and faculty
business meetings, input regarding the fellowship program will be obtained from all members of
the trauma and surgical critical care division through weekly divisional faculty/business meetings
(the fellow will be in attendance).

To accomplish the educational goals and objectives outlined, the CMC surgical critical care
fellowship program will be organized into four general components including:

A. Clinical
B. Educational
C. Administrative
D. Research

Each of these program components will be directed from within the trauma and surgical critical
care division. This division runs the surgical intensive care unit and multidisciplinary surgical critical
care service (approximately 1,000 admissions/year), a busy trauma service (~3,000 adult trauma
admissions/year and ~1,700 operative procedures/year). Under the purview of this division resides
a 14-bed trauma ICU and a 15-bed multidisciplinary surgical ICU. The division maintains a very
active clinical and basic sciences research program including industry and externally sponsored
multi-center clinical trials. The surgical critical care fellow will participate in all aspects of the
trauma and surgical critical care division including the patient care, administrative, and research
components. The degree with which each fellow functions independently, and subsequently in
supervisory roles, will increase over his/her tenure, subject to periodic evaluations of his/her
abilities.

The fellow’s educational achievements will be monitored and evaluated based on these 4
components. Rotation evaluations will be completed monthly by the fellow and the various
rotational faculty evaluators. These will be kept by the program director. The results of these as
well as the fellow’s evaluations will be aggregated and reviewed by the oversight committee
quarterly. In addition, a biannual, 360-degree program evaluation survey (Survey Monkey) will be
distributed to physicians, nurses, ancillary health personnel, ICU administration, and other
consultant services. These results will be reviewed by the oversight committee, and then
substantive changes to the program will be made depending on the ACGME requirements and
programmatic needs. The program’s educational changes and achievements will be documented in
the minutes of the oversight committee’s minutes as well as the overall goals and objectives.

G. Fellow Duty Hours

1. Faculty supervision of fellows in patient care activities.

All patients on CMC’s critical care services are seen in consultation and are staffed by the critical
care faculty on rotation (daytime) or the on-call attending (nighttime). Faculty members round daily
with the critical care team and are available for all patient care issues. The critical care faculty is
notified when any of the following occur:

• New consultations and admissions to the ICU for patients who are unstable. When a patient
being evaluated is unstable and a faculty member is not present, the faculty member should be notified immediately

- Any time the established plan of care cannot be completed
- Any significant decline in any consult patient’s clinical status (unless decline is anticipated and previously included within an established plan of care)
- The death of any consult patient (planned or unplanned)
- Any time invasive procedures must be performed on a consult patient

The surgical critical care fellow on the critical care services will be supervised by faculty members on the basis of progressive autonomy. A critical care faculty member is present in the hospital 24 hours a day except for Friday and Saturday nights when the faculty member is reachable by phone and available on-site if needed. The surgical critical care fellow will make rounds with the faculty and will be supervised in his/her plan of care, discussions with family members, and in all invasive procedures. The policy on notification and involvement of faculty will be used as a guide for when to notify the faculty.

Occasionally, the fellow on the critical care service may be asked to assist in the management of a patient without formal consultation. This may be appropriate when the patient is hemodynamically stable. The critical care faculty should still be notified and the case discussed as soon as possible. Involvement of the critical care service fellow in invasive procedures mandates notification of the critical care faculty before initiating such procedures. In the event that circumstances dictate that care must be rendered to unstable patients without the presence of supervising faculty, the fellow will proceed, using good clinical judgment, to ensure the patient’s safety and best interests.

2. Compliance with the ACGME duty hour standards.

The call schedule for the critical care fellow will be designed to optimize his/her education while being observant of the duty hour restrictions. The critical care fellow’s call responsibilities will be approximately 1:5, with 1 day free each week. This will be monitored closely by the program director.

The ACGME fellow duty hours are taken seriously at CMC’s surgical critical care fellowship program. The fellow will be required to document his/her work hours via the online resident/fellow tracking system MedHub. This includes not only total hours worked in a week but also rest between duty shifts and days free each week. This will be monitored by the program director. In addition, the weekly critical care attending will be responsible for discussing the duty hours with the critical care fellow.

Moonlighting is not allowed during the fellowship.

3. Monitoring of fellow duty hours.

The surgical critical care fellow will be required to document his/her duty hours in Med-Hub. These hours will be reviewed each week by the program director and discussed at the critical care faculty
meeting. Work hours will be reviewed with the surgical critical care fellow at the quarterly program director’s evaluation meeting.

The critical care faculty will assess the critical care fellow weekly and will report any duty hour violations to the program director. The program director will address all duty hour violations.

4. Fellow duty hour violations

Duty hours will be assessed by the program director weekly, violations will be reviewed, and the issues responsible for the violation will be discussed with the critical care fellow. As part of the core competencies, a plan of action will be drafted and enacted. We realize that occasionally teaching situations will occur and the fellow will want to work over the duty hour limit. If this happens, the fellow will be responsible for notifying the program director and will be allowed to adjust future on-call time to comply with the 80-hour weekly limit as necessary. If the situation is caused by a problem in the call schedule, a change in vacation or a violation by a faculty member, the program director will discuss this with the specific faculty member or the oversight committee and correct the problem with input from the critical care fellow.
H. Facilities and Resources

1. Carolinas Medical Center.

The only site for surgical critical care fellow education will be Carolinas Medical Center (CMC). CMC is the flagship facility of Carolinas HealthCare System and is a not-for-profit hospital overseen by a Board of Commissioners with a dedicated administration and a Division of Medical Education. CMC provides primary, tertiary, and quaternary services to a population of approximately 1.5 million people in the greater Charlotte area. This patient population is comprised of individuals having full coverage by major third party insurance carriers and patients who are in the underserved area of the region with no economic support. As one of North Carolina's largest hospitals, CMC serves as the regional referral center for western North Carolina and northern South Carolina. The hospital is one of only five facilities in North Carolina designated as an Academic Medical Center Teaching Hospital and a Level I Trauma Center. It operates a number of specialized centers and institutes, bringing together some of the finest medical personnel in the country to treat patients with specific diagnoses. It operates 894 beds with 127 ICU beds.

Levine Children's Hospital, located on the campus of CMC, is the largest children's hospital between Washington, DC and Atlanta. The 240,000-foot hospital opened in 2007 and is home to the region's only dedicated children's emergency department operating 24 hours a day, 7 days a week. With more board-certified physicians in more pediatric specialties than any other hospital in the region, Levine Children's Hospital provides a level of care unparalleled in this area of the southeastern United States.

2. ABS/SCC certified faculty to fellow ratio in each unit

STICU  9:1  
TICU  9:1  
CVICU  1:1  
PICU  8:1  
MICU  16:1

3. Outline how the 12-month surgical critical care residency is compliant with advanced educational and clinical activities related to the care of the critically ill patients and to the administration of critical care units.

Carolinas Medical Center’s surgical critical care fellowship is intended to prepare graduates for a career in academic or private practice surgical critical care. The educational philosophy of the program is to provide a comprehensive matrix upon which to:

- Develop a scientifically sound, evidence-based medicine approach to cost-effective management of the critically ill patient using the latest technologies and innovations
- Facilitate interpersonal skills in physician-patient and physician-family communication especially with regard to end-of-life and other ethical issues
- Promote effective and productive teaching abilities
- Encourage and develop intensive care unit leadership and hospital administrative skills through
mentorship
• Foster an interest in and aptitude for scientific research, statistics, and critical thinking.

Each fellow will be trained according to the recommended guidelines set forth by the Society of Critical Care Medicine to ensure a comprehensive exposure to all aspects of critical care practice (Guidelines for Advanced Training for Physicians in Critical Care, Crit Care Med 1997; 25:1601-1607). Our ultimate goal is to fully prepare our graduates to be superb clinicians and excellent academicians and thoughtful leaders in their future institutions.

Our comprehensive educational program in surgical critical care will include a 12-month clinical rotation schedule (see table below) and a lecture series by the critical care faculty addressing the "basics" of critical care management.

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<td>TICU</td>
<td>TICU</td>
<td>CVICU</td>
<td>Research/ Elective</td>
<td>SICU</td>
<td>SICU</td>
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<th>January</th>
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<tr>
<td>MICU</td>
<td>TICU</td>
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<td>PICU</td>
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<td>SICU</td>
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The fellows will be trained in the fundamentals of critical care support. The concepts introduced will then be reinforced at the patient’s bedside during daily patient teaching rounds. Following the initial lecture series, we will focus on developing the fellow's advanced clinical skills as well as administrative skills and scholarly pursuits. Weekly evidence-based medicine guideline development conferences will be held and administratively run by the fellow. These will also be enhanced with monthly research conference and monthly "professional development" lectures. These advanced skills conferences will take place in addition to a weekly critical care lecture series, which will address a variety of critical care topics throughout the year.

The ACGME requires that no more than 25% of the fellowship time be devoted to direct operative care. We consider this fellowship to be "non-operative" in that the surgical critical care fellow does not have operative responsibilities outside of the critical care unit. The fellowship is oriented to promote the development of advanced skills in the diagnosis and management of the critically ill, using the latest technology, instrumentation, and medications. This advanced knowledge and expertise in clinical patient care, unit administration, and research activity is possible because of not having outside general surgery operative responsibilities. The fellow will do bedside tracheostomies, IVC filters and endoscopic procedures on a regular basis as part of routine patient care. Occasionally, the fellow may assist the general surgery faculty or residents with emergent bedside abdominal decompression in the critical care unit.

4. The ICU units where residents are assigned.

SICU: The surgical ICU is a 15-bed component ICU incorporated into the overall STICU at CMC with over 1,000 multispecialty critically ill surgical patient admissions per year. The surgical critical care
service is a consultant service for this unit.

TICU: The trauma ICU is a 14-bed component ICU incorporated into the overall 29-bed STICU. The trauma service has more than 3,200 yearly admissions to CMC with more 1,000 yearly admissions to the TICU. It has a full complement of trauma-related support specialties including orthopedic trauma, neurosurgical, plastic surgery, urology, and ENT.

MICU: The medical ICU s a 29-bed multispecialty ICU with a dedicated pulmonary intensive care medical service. It is a consultant service managing all critically ill and ventilated patients on the medical services.

PICU: The pediatric ICU is a 16-bed ICU, staffed by board certified pediatric intensivists, which recently opened with the Levine Children’s hospital. It is the critical care services at Levine Children’s Hospital. This unit has over 800 admissions per year and manages a full multispecialty pediatric population including ECMO and cardiothoracic congenital diseases.

CVICU: The cardiovascular ICU is a 14-bed specialty ICU with over 800 admissions per year. It is the central ICU for the region’s largest cardiovascular group, which participates in more than 1,000 surgeries per year.

5. Directors of the ICU’s.

**SICU:** Toan H. Huynh, MD, FACS, FCCS, Trauma/Surgical Critical Care and Acute Care Surgery, Director, Surgical Intensive Care Unit

**TICU:** William S. Miles, FACS, FCCS, Trauma/Surgical Critical Care and Acute Care Surgery, Medical Director, Trauma Intensive Care Unit and Director of Surgical Critical Care

**PICU:** Edwin S. Young, MD, Pediatric Critical Care, Director, Pediatric Critical Care

**MICU:** Alan C. Heffner, MD, Internal Medicine Critical Care, Medical Director, Medical Intensive Care Unit

**CVICU:** Kevin W. Lobdell, MD, Director, Cardiovascular Critical Care, Cardiothoracic Intensive Care Unit

6. Fellow to patient ratio in each unit.

The following is the maximum possible fellow to patient ratio in each ICU.

- Surgical ICU: 1:15
- Trauma ICU: 1:14
- Medical ICU: 1:15
- Pediatric ICU: 1:16
- Cardiovascular ICU: 1:14
However, the fellow will not be permitted to follow more than 12 patients at any time to ensure adequate time for teaching and other educational activities.
II. Special Trainees and Other Residents

1. Number and type of fellows, special trainees, or residents from other critical care programs on the SCC units.

There are no other critical care fellows at this medical center.

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<thead>
<tr>
<th>Type</th>
<th>Number</th>
<th>Objectives</th>
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<tr>
<td>Medical ICU</td>
<td>Maximum 4 to 5 (1st or 2nd year) medicine, family medicine or emergency medicine residents</td>
<td>The surgical critical care fellow will have a supervisory role.</td>
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<tr>
<td>Pediatric ICU</td>
<td>Maximum 2 to 3 pediatric, emergency medicine, family medicine residents</td>
<td>The surgical critical care fellow will have a supervisory role.</td>
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<tr>
<td>Trauma ICU</td>
<td>Maximum of 3 surgery (2nd or 3rd year) or emergency medicine (2nd year) residents</td>
<td>The surgical critical care fellow will have a supervisory role.</td>
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<tr>
<td>Surgical ICU</td>
<td>No residents; nurse practitioners only</td>
<td>The surgical critical care fellow will work directly with the critical care attending.</td>
</tr>
<tr>
<td>Cardiovascular ICU</td>
<td>No thoracic fellows and no residents</td>
<td>The surgical critical care fellow will work directly with the critical care attending.</td>
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2. Educational relationship of the SCC residents to the chief surgery residents.

The surgical critical care fellow will collaborate with the chief surgery residents and provide insight into the critical care management of patients. The surgical critical care fellow will not compete with the primary team regarding making operative decisions but will provide recommendations for critical care treatment.
III. GOALS AND OBJECTIVES

The CMC critical care fellow must demonstrate knowledge and application of the pathophysiology and epidemiology of the diseases listed below. The goals and objectives are linked closely with the ACGME core competencies. The following are the specific education goals for the surgical critical care fellows as it pertains to the acquisition of knowledge in surgical critical care.

Each trainee should achieve provider and/or instructor status in one or more of the following:
1. Advanced Cardiac Life Support (ACLS)
2. Advanced Trauma Life Support (ATLS)
3. Pediatric Advanced Life Support (PALS) or Advanced Pediatric Life Support (APLS)
4. Fundamentals of Critical Care Support (FCCS)

Medical Knowledge and Patient Care:

A. CARDIOVASCULAR

1. Hemodynamic monitoring
   a. Indications
   b. Assessment
   c. Therapy
   d. Available technology
   e. Technical aspects
   f. Site selection
   g. Methodology
   h. Complications
   i. Diagnosis
   j. Treatment

2. Adequacy of cardiac output/assessment of function
   a. Evaluation of perfusion
   b. Categorization of low flow states
   c. Oxygen supply/demand balance
   d. Myocardial oxygen supply/demand balance
   e. Evaluation of preload, afterload, and contractility
   f. Reproduce and use formulae for RVEDV, SVR, PVR, R&LVSWI

3. Treatment: Gain understanding and describe management of:
   a. Hypoperfusion, including pressors/volume and rationale
   b. Hypertension, including pharmacology of treatment
   c. Acute myocardial infarction, including risk factors, diagnosis, preoperative assessment, anesthesia techniques, and acute management
   d. Dysrhythmias: diagnosis and treatment of atrial, ventricular, and nodal tachycardia, bradycardia, and heart blocks including pharmacologic and electrical management
   e. Heart failure: diagnosis and pharmacologic and mechanical (including assist devices) treatment

4. Critical care skills:
   a. Demonstrate proficiency in cardiopulmonary resuscitation, cardioversion/pacing, insertion and interpretation of data from arterial, central venous, and pulmonary artery catheter.
B. PULMONARY

1. Define the differences between respiration and ventilation.
2. Discuss lung and chest wall mechanics, including total lung capacity, tidal volume, functional residual capacity, vital capacity, critical closing volume.
3. Define ventilatory failure and discuss the various categories of ventilatory failure.
4. Define other pertinent measurements in the ventilated patient: peak airway pressure, pulmonary compliance (static and dynamic), minute ventilation.
5. Recognize the harmful effects of excessive O2 concentrations, volume, and peak airway pressure. Be able to balance ventilation parameters in complicated patients to minimize pulmonary damage. Outline protective ventilation strategies.
7. Discuss the action, mechanism, dosage and side effects of medications whose primary site of action is the lung. Discuss the side effects of other medications which may affect the lung.
8. Explain the impact of nutrition on respiration and ventilation.
9. Discuss the salient features, characteristic radiographic findings and treatment strategies for: obstructive and restrictive pulmonary disease, ARDS, pulmonary embolism, aspiration, bronchopleural fistula, respiratory tract infections, empyema, inhalation injury, pulmonary contusion, pneumothorax, and hemothorax.
10. Mechanical ventilation
   a. Define basic parameters of ventilation: PEEP, TV, FiO2, rate, pressure support, continuous positive airway pressure, IMV, CMV, volume control, and PRVC.
   b. Define BIPAP, static and dynamic compliance, pressure control ventilation, inspiratory pressure, I/E ratio.
   c. Discuss the various modes of mechanical ventilatory support, along with their advantages and risks.
   d. Discuss extreme modes of ventilation along with advantages and risks (i.e., APRV, HFOV, etc.).
11. Interpretation of arterial and mixed venous blood gases
   a. State normal values for arterial and mixed venous pH, PC02, P02, percent saturation and bicarbonate
   b. Identify and discuss respiratory acidosis and alkalosis. Explain the relationship between minute ventilation, PC02 and pH.
12. Endotracheal Intubation
   a. Describe the sequence for patient intubation, including the use of paralytic and sedative agents and proper tube placement.
   b. Describe the procedure for emergency cricothyroidotomy.
   c. Discuss the pros and cons of tracheostomy in the ICU patient. Discuss the relative merits of open tracheostomy, cricothyroidotomy and percutaneous tracheostomy, and appropriate times for implementation of the various surgical airways.
   d. Discuss the complications of intubation, including tracheomalacia, sinusitis, barotrauma and others.
13. Weaning
   a. Describe methods for weaning a patient from mechanical ventilation.
b. Discuss parameters which indicate readiness to extubate an individual patient.
c. Discuss weaning of patients with restrictive and obstructive airways disease, myasthenia gravis.

14. Discuss suspicion for and diagnosis of ventilator associated pneumonia.
a. Rational for quantitative cultures.
b. Importance of and rational for the selection of appropriate empiric therapy

15. Critical Care Skills: demonstrate proficiency in
a. Endotracheal intubation
b. Bronchoscopic techniques, and qualitative and quantitative cultures
c. Surgical airway establishment
d. Familiarity with ventilator modes
e. Be able to discuss abnormal blood gases with regards to pathophysiology, other organ interactions and treatment strategies.

C. NEUROLOGIC

1. Demonstrate understanding of the metabolic requirements of the brain O2 consumption, glucose utilization, cerebral blood flow, the relationships of ICP, CVR and MAP, the relationship of CBF to cerebral functions, and the factors affecting ICP

2. Pathophysiology
a. Intracranial hypertension
   i. Intracranial blood volume
   ii. Increased CSF volume
   iii. Cerebral edema (cytotoxic vs. vasogenic edema)
   iv. Growing mass lesion (i.e., tumor, hematoma)
   v. Loss of CNS autoregulation
b. Spinal cord impairment
   i. Functional and physiological consequences of anatomical disruption
   ii. Spinal cord lesions, cord syndromes, and loss of sympathetic tone
c. Discuss advantages of various methods of measuring intracranial pressure
d. Describe management algorithms for intracranial hypertension and cerebral perfusion pressure, and discuss the relative advantages and liabilities of different treatment strategies.

3. Non-trauma neurologic skills. Be able to:
   • List the various herniation syndromes and their respective neurologic features
   • List the criteria necessary for determination and certification of brain death
   • Describe the metabolic & hemodynamic management of the potential organ donor
   • Understand the indications/contraindications for urgent systemic / intra-arterial thrombolysis in ischemic CVA
   • Describe the natural history, risk factors and management options for “malignant MCA infarcts”
   • List the common causes/locations of intra-parenchymal hemorrhage
   • Describe the natural history of ICH along with the role of early surgical, interventional, and medical treatment (i.e. BP & glucose control, rVIIa)
   • Describe the pathophysiology and management of the hypo-/hyponatremia in neurosurgical patients
• Understand the causes and management of hyperthermia in the neuro-intensive care population
• Understand the pharmacodynamic/pharmacokinetic properties of sedative and paralytic agents along with their principle toxicities
• List the major causative organisms of community-acquired & nosocomial meningitis / ventriculitis / abscesses along with preferred antibiotic agents
• Describe the pharmacodynamic/ pharmacokinetic principles influencing CNS antibiotic activity
• Understand the natural history of CNS infections and the role of 1) persistent parenchymal infection 2) vessel thrombosis and 3) raised intracranial pressure in determining outcome
• Review the indications for and dosages of steroids in central nervous system infections
• List the imaging techniques/signs used to identify acute intracranial hemorrhages, mass lesions, arterial and venous lesions, and ischemic penumbras / infarcts
• Distinguish imaging characteristics of SAH, epidurals, subdural, intraparenchymal hemorrhage and relate to anatomic structure
• Describe the common aneurysm locations leading to SAH
• Understand the clinical and radiographic grades of SAH
• Describe the methods used to detect cerebral vasospasm & strategies to prevent secondary ischemic stroke
• Understand the indications for temporary external ventricular drains / permanent shunts
• List the common cardio-pulmonary complications of SAH and describe their management
• Understand the natural history/ expression of seizure disorders in the ICU (prolonged status, nonconvulsive status, increased ICP)
• Describe the priorities in management of status epilepticus
• Review the conventional agents and dosages of antiepileptic drugs
• Identify thrombolytic candidates and monitor for complications of treatment
• Identify cardio-pulmonary complications in patients suffering SAH and initiate appropriate support strategies
• Identify appropriate candidates and implement protocol for therapeutic hypothermia

D. RENAL

1. Demonstrate understanding of applied physiology, including glomerular filtration, tubular absorption, renal blood flow and autoregulation, renin-angiotensin system, role of catecholamines, eicosanoids and other vasoactive substances, measurement of renal blood flow.
2. Demonstrate understanding of the assessment of renal function, including the use of: GFR, creatinine clearance, serum creatinine, serum urea nitrogen, sodium balance and ECF, water balance, acid-base balance, and potassium balance.
3. Demonstrate understanding of the pathophysiology of acute renal failure, including diagnosis, etiology, and differentiation from pre, renal and post-renal types, and differentiation from chronic renal failure.
4. Discuss a clinical algorithm for approaching “renal failure”
5. Discuss the prevention, treatment, and prognostic considerations in acute renal failure.
6. Demonstrate familiarity with indications for and relative advantages of renal replacement modalities, including hemodialysis, peritoneal dialysis, hemofiltration, CVVH, CVVHD.
7. Demonstrate understanding of and ability to manage the changes in drug metabolism and excretion which take place during renal failure.
8. Outline a plan of nutritional management for a patient in acute or chronic renal failure.

E. GASTROINTESTINAL

1. Discuss the etiologies of upper gastrointestinal bleeding in the critically ill patient. Demonstrate familiarity with the pathogenesis, diagnosis, management, and prevention of stress gastritis. Discuss the relationship of prevention strategies to nosocomial pneumonia.
2. Discuss the acute management of variceal bleeding, and the treatment of elevated portal pressure: vasopressin alone and with nitrates, octreotide, emergent transjugular portosystemic shunts.
3. Understand the diagnosis and management of the spectrum of antibiotic associated colitis and colonic complications of ulcerative colitis, from simple diarrhea to fulminant colitis and toxic megacolon.
4. Understand and discuss the risk factors, pathophysiology, diagnosis and treatment of: osmotic diarrhea, secretory diarrhea, exudative diarrhea, hypermotility states, and high filtration states.
5. Understand and discuss gut mucosal barrier function, particularly its role in multiple organ system dysfunction syndrome.
6. Discuss the role of enteral nutrition, role of essential gut nutrients and selective gut decontamination.
7. Understand the diagnosis, etiology, and pathophysiology, stratification of risk and severity, and management of acute pancreatitis.
8. Hepatobiliary Disease
   a. Cirrhosis: understand the pathophysiology and management of ascites, ascitic leaks, ascitic infection, encephalopathy, and the hepatorenal syndrome
   b. Postoperative acute cholecystitis: discuss the incidence, risk factors and pathophysiology, diagnosis and management
9. Critical Care Skills: demonstrate the ability to
   a. Evaluate the abdomen in the ICU using physical examination and diagnostic testing modalities
   b. Use gastrointestinal intubation and endoscopic techniques in the management of the critically ill patient.

F. INFECTIOUS DISEASE

1. Understand the factors predisposing the critically ill patient to infections, including immunosuppression, breakdown of normal barriers, iatrogenic procedures.
2. Discuss the immunosuppression of critical illness, and the roles of malnutrition, humoral immune deficiency, cellular immune deficiency, granulocytopenia, and immunosuppressive disease states.
3. Understand the importance and techniques of prevention of nosocomial infections, including hand washing, body substance isolation, and indications for patient and personnel
isolation. Discuss methods of:
   i. Reducing the colonization of devices, fluids, catheters, and ventilators, and approaches to the analysis of outbreaks in an ICU.
4. Discuss the nature, timing, appropriate indications and agents used for antibiotic prophylaxis.
5. Discuss the identification, diagnoses, and management of infections, including specimen collection and transport, culture methods, and sensitivity testing for bacterial, viral, and atypical infections.
6. Demonstrate familiarity with the selection of and pharmacokinetics of antibiotics for infections commonly encountered in the ICU. Discuss common and uncommon complications of antibiotic therapy.
7. Understand the role that HIV plays in the ICU setting, including identifying the high risk patient, the legalities of HIV testing, immunologic identification of HIV positivity, management of HIV positive and AIDS patients, awareness of the CDC recommendations for universal precautions, management of the healthcare personnel exposed to the AIDS virus, and the ethical aspects of AIDS management.
8. Discuss the indications for prophylaxis, presumed or empiric therapy for fungal and viral infections.
9. Discuss antibiotic prophylaxis for special conditions: prosthetic valves, grafts, and immunosuppression.
10. Be familiar with indications and results of hyperbaric oxygen therapy for anaerobic infections.
11. Critical Care Skills:
   a. Demonstrate proficiency in techniques of isolation
   b. Identification and management of outbreak of resistant strains
   c. Infection control procedures
   d. Monitoring, collecting and analyzing the incidence of infections
   e. Administering process improvement for ICU infections.

G. METABOLISM AND NUTRITION

1. Demonstrate the ability to assess nutritional status, including nutritional history, physical examination, and laboratory studies.
2. The relationship of the following should be appreciated in regard to theory of test, time period assessed by the test, means of obtaining the test, confounding factors, and efficacy as a nutritional status monitor: allergy skin testing, hematocrit/hemoglobin, red cell morphology, total lymphocyte count, albumin, pre-albumin, retinol binding protein, transferrin, nitrogen balance, blood glucose, glycohemoglobin A-1C, magnesium, phosphorus, calcium, prothrombin time, liver enzymes, acute phase proteins, anthropometrics, and calorimetry.
3. Define normal nutritional needs in terms of caloric needs and composition of nutritional sources, vitamins, minerals and trace elements, and dietary formulation.
4. Discuss ways to estimate resting energy expenditure (REE) using the Harris-Benedict equation and indirect calorimetry.
5. Demonstrate the ability to assess a nutritional regimen using nitrogen balance and REE and RQ measurements.
6. Discuss the significance of dietary omega-3, omega-6 fatty acid intake, and long and medium chain triglycerides.
7. Discuss the proper roles, indications and contraindications for, and complications of oral diets, gastric feeding, jejunostomy feeding, peripheral vein feeding, and central vein feeding.
8. Critical Care Skills: Perform a nutritional assessment, formulate and execute a nutritional support plan for each of the following patient types:
   a. Patients with organ failure/dysfunction including renal, hepatic, respiratory and cardiac dysfunction;
   b. Patients with special nutritional problems, including morbid obesity, pregnancy, major burn injury or trauma, alcohol dependence, and diabetes mellitus.

H. HEMATOLOGY AND COAGULATION

1. Demonstrate familiarity with the basic science of coagulation, including the coagulation cascade, endothelial vasoactive response, platelet kinetics and function, fibrinolysis and inhibition of coagulation
2. Know the indications for and complications associated with component transfusion
3. Demonstrate familiarity with the management and complications of massive transfusion.
4. Discuss blood salvage techniques.
5. Discuss the complications associated with transfusion, including red-cell and non red-cell related hemolysis, allergic reactions, febrile reactions, anaphylactoid reactions, pulmonary hypertension, graft vs. host disease, and post-transfusion purpura.
6. Discuss the infectious complications associated with transfusion, including bacterial contamination, viral infections (HIV, CMV, EBV, and hepatitis).
7. Be familiar with the immunosuppressive effect of transfusion.
8. Critical Care Skills: Demonstrate proficiency in diagnostic evaluation of hemostatic integrity, criteria for administration of all components, diagnosis and treatment of transfusion reactions, and safety practices regarding handling of blood components and exposure to blood.

I. ENDOCRINE

1. Demonstrate an understanding of the pathophysiology and management of diabetes mellitus in the critically ill patient.
2. Demonstrate an understanding of the pathophysiology, diagnosis and management of thyroid storm and myxedema coma in the critically ill patient.
3. Demonstrate an understanding of the pathophysiology, diagnosis and management of acute and chronic adrenal failure in the critically ill patient, and the role for perioperative steroid coverage.
4. Discuss the diagnosis and management of a patient in the ICU with pheochromocytoma, including preoperative and postoperative considerations.
5. Discuss the pathophysiology, evaluation and management of states of insufficiency and excess of the posterior pituitary, including SIADH and diabetes insipidus.
6. Importance of glucose control in critically ill.

J. MUSCULOSKELETAL SYSTEMS AND THE SKIN
1. Be aware that alterations in mental status must be considered in evaluation, and the most common complications of musculoskeletal injury are neurologic or vascular injuries.
2. Demonstrate examination of the extremities, with attention to assessment of movement, sensory and motor nerve function, and peripheral vascular examination.
3. Discuss the pathogenesis, physiologic derangements, diagnosis (including measurement of compartment pressures) and management of complications seen in patients with rhabdomyolysis.
4. Demonstrate understanding of the management of skin surrounding wounds, drains, fistulas or stomas.
5. Discuss the pathogenesis, prevention, and management of pressure sores, including wound management and the use of special beds for patients at risk for pressure sores and the morbidly obese.
6. Discuss ICU associated myopathy and neuropathy.

K. IMMUNE SYSTEM

1. Discuss the physiology of the immunologic response to critical illness, in terms of normal host defenses, barriers, humoral defenses, cellular mechanisms, mediators and cytokines, and the major histocompatibility antigens.
2. Discuss mechanisms of immune dysfunction in the critically ill patient, including tissue injury, GI bacterial translocation, stress hormones, mediators, suppressor factors, suppressor cells, hypoxia, ischemia, nutritional deficiency, and sepsis syndromes/SIRS.
3. Discuss the role of immunomodulation in the critically ill patient, including nutritional pharmacotherapy (arginine, glutamine, etc.) immunologic blockade, antiendotoxin, eradication of septic focus, mediator inhibition, anti-TNF strategies, IL-1 receptor antagonist, IL-6 antibodies, strategies directed to neutrophil and endothelium, leukocyte receptor antagonist, oxygen radical strategies, antiproteases, and no inhibition.

L. OBSTETRIC AND GYNECOLOGIC ISSUES

1. Be familiar with physiologic responses to pregnancy, including changes in the following systems:
   a. Respiratory
   b. Cardiovascular
   c. Hepatic
   d. Renal
   e. Central nervous system
   f. Smooth muscle
   g. Connective tissue
   h. Hormonal changes
   i. Hematologic
   j. Immunologic

2. Demonstrate familiarity with stabilization and resuscitation of the pregnant patient, especially with respect to respiratory and cardiac function
3. Demonstrate familiarity with hypertensive disorders in pregnancy, including chronic hypertension, preeclampsia/eclampsia
4. Demonstrate familiarity with obstetric concerns, including placental abruption, placental previa, uterine rupture, postpartum hemorrhage, premature labor, fetal distress and puerperal sepsis.

M. TRAUMA, THERMAL, ELECTRICAL AND RADIATION INJURIES

1. Demonstrate understanding of the epidemiology, and pathophysiology of trauma as a disease, including the current epidemiology of blunt and penetrating trauma, the concept of trauma systems, and general concepts of funding for trauma management and education.
2. Demonstrate proficiency in the initial and secondary surveys.
3. Demonstrate the ability to initiate ongoing resuscitation and evaluation of the multiply injured patient.
4. Understand basis for controversies in management, (evaluation of abdominal trauma by serial observation or lavage, the role of CT in retroperitoneal injuries, early fixation of pelvic fractures), newer concepts in trauma management: staged celiotomy, 'damage control', vascular shunts, etc. Demonstrate the ability to manage drug and alcohol withdrawal, and pain and sedation in the trauma patient.
5. Discuss injury severity indices in the trauma patient (AIS, ISS, ATI, TS, and RTS), TRISS methodology, and the limitations of APACHE scores in trauma patients.
6. Be familiar with the pathophysiology and management of thermal injury, and smoke inhalation syndromes, including fluid support, escharotomy, and recognition and management of burn wound infections. Discuss special considerations for the burned pediatric patient.
7. Demonstrate familiarity with wound management techniques in burned patients, including methods and timing for skin grafting.
8. Discuss definitions, prevention, pathophysiology, diagnosis, and treatment of hypothermia and frostbite.
9. Discuss the incidence, pathophysiology (surface, internal current), factors determining the outcome (voltage, amps, resistance, type of current, duration, and pathway), clinical presentation and management of electrical injuries, including lightning injuries.
10. Discuss management of skin contamination, radiation skin burns, acute radiation syndromes and injury, internal contamination, and prevention of contamination of healthcare providers.

N. MONITORING AND MEDICAL INSTRUMENTATION

1. The fellow should know when the clinical assessment is more (or less) reliable than data obtained from medical monitoring devices.
2. The cellular basis for production of electrical membrane changes which are monitored as signals should be fully understood as are the different techniques used in monitoring various physiologic states.
3. Clinical/laboratory use of specific monitoring devices should be understood in regard to: theory of device operation and calibration, common sources of error during clinical use, checks of data reliability, proposed clinical use (indications), and evidence of efficacy.
4. Understand the technical features and limitations of monitoring physiologic parameters, including ECG, EEG, temperature, pulse and heart rate, blood pressure, twitch monitoring of
neuromuscular blockade, blood flow, blood and tissue oximetry, capnography, gastric tonometry.

5. Discuss clinical scoring instruments for documenting neurologic status, severity of illness or injury. The underlying theory, method of scoring, limitations, and efficacy for use, should be understood for each of the following:
   a. Acute Physiologic and Chronic Health Evaluation (APACHE)
   b. Glasgow Coma Scale (GCS)
   c. Injury Severity Score (ISS)
   d. Ramsay Sedation Score
   e. Revised Trauma Score (RTS)
   f. Therapeutic Intervention Score (TIS)

6. Critical Care Skills:
   a. Calibrate and use as many of the above-noted transducers, amplifiers, recorders and scoring instruments as possible throughout your training.
   b. Realize that there are few isolated data points on which a diagnosis can be made with certainty. The clinical use of monitoring involves an appreciation of information trends, which suggest development of favorable or unfavorable physiologic states. Regardless of the monitoring system employed, there remains a continuing need to verify the reliability of clinical data so misinterpretations can be avoided.

O. CRITICAL PEDIATRIC SURGICAL CONDITIONS
   1. Respiratory: Most arrests are respiratory and in-hospital (vs. adult). May be due to upper airway obstruction from mechanical (foreign body aspiration) or inflammatory (epiglottis) causes. Lower causes include status asthmaticus.
   2. Describe the special needs of children with respect to size of support and monitoring devices, drug, blood product, and fluid dosages.
   3. Discuss the special psychological needs of children, especially with respect to age differences and family interactions.
   4. Critical Care Skills
      a. The critical care fellow should understand the differences in management between children and adult intensive care patients as necessitated by size, organ maturity, usual absence of chronic disease, and age-related disorders. These differences should be incorporated into intensive care management plans for children.

P. PHARMACOKINETICS AND EVALUATION OF DRUG METABOLISM AND EXCRETION

   1. Discuss the drug use and selection process
   2. Demonstrate familiarity with basic pharmacokinetic principles
      a. Enteral, pulmonary and topical administration of drugs - absorption
      b. Parenteral administration of drugs
      c. Distribution
         i. Calculating the volume of distribution
         ii. Concept of volume of distribution
         iii. Using volume of distribution to calculate dosage
         iv. Compartmental models of drug distribution
      d. Elimination/metabolism
3. Demonstrate familiarity with drugs requiring special pharmacokinetic considerations
4. Demonstrate understanding of the impact of special patient considerations on drug dosing and metabolism
5. Critical Care Skills:
   a. Establish and monitor drug therapy to achieve therapeutic goals while minimizing toxicity.
   b. Identify expected changes in absorption, metabolism and excretion in clinical situations noted above.

Q. ETHICAL & LEGAL ASPECTS OF SURGICAL CRITICAL CARE

1. Demonstrate an understanding of the basic principles of medical ethical models
2. Demonstrate an understanding of the role of legal issues in critical care decision making.
3. Critical Care Skills: Demonstrate understanding of and the ability to obtain informed consent and refusal, participate in end-of-life decision-making, Do-not Resuscitate orders, establishing futility, withholding and withdrawing life support, establishing brain death, counseling patient & family, and request for organ donation

R. BIOSTATISTICS & EXPERIMENTAL DESIGN

1. Experimental design and evaluation of literature
   a. Analysis of existing articles
   b. Objective and hypothesis testing
   c. Study design
   d. Validity, bias and power
2. Fundamentals of Biostatistics in Medical Research
   a. Descriptive statistics
   b. Statistical Inference
   c. Analyzing diagnostic tests
      i) Sensitivity: ability of a test to detect a disease.
      ii) Specificity: test negative when the disease is not present.
      iii) The positive predictive value is the chance of having the attribute if the test is positive.
      iv) Negative predictive value: exclude the attribute if the test is negative.
   d. Confidence intervals (limits)
   e. Common regression analyses
   f. Research funding
   g. Applying for grants
   h. Corporate sponsorships
   i. Contract negotiations
   j. Animal rights issues
   k. Writing proposal for institutional review board
   l. Manuscript preparation
   m. Abstract submission
   n. Slide preparation
   o. Lecture technique
S. TRANSPANTATION

1. Demonstrate understanding of the principles and practice of organ transplantation.
2. Learn the fundamentals, mechanisms and indications/contra-indications for immunosuppression.
3. Familiarize with the principles of organ procurements, recovery and donation.
4. Demonstrate knowledge in selection criteria for organ transplantations.
5. Understand the physiologic and pathophysiologic alterations after organ transplantation.

Assessment
Monthly core competency-based evaluations will be used by the surgical critical care faculty to evaluate the fellow. Also collective faculty feedback is given to the fellow quarterly when the program director discusses strengths and weaknesses, and ways for improvement. In addition, the fellow will participate in the annual MCCKAP exam, which will be an assessment of his/her medical knowledge and management of patient care.

IV. Practice Based Learning
Objectives
The fellow must be able to investigate and evaluate his/her patient care practices, appraise and assimilate scientific evidence, and improve patient care practices. The fellow will be expected to develop skills and habits to be able to:

- Identify strengths, deficiencies and limits in one’s knowledge and expertise
- Set learning and improvement goals
- Incorporate formative evaluation feedback into daily practice
- Use information technology to optimize learning
- Systematically analyze practice, using quality improvement methods, and implement changes with the goal of practice improvement
- Locate, appraise, and assimilate evidence from scientific studies related to their patients’ health problems
- Participate in the education of patients, families, students, residents and other health professionals, as documented by evaluations of the fellow’s teaching abilities by faculty and/or learners
- Identify the best practice patterns to facilitate care of the critically ill patient from Carolinas Medical Center within the system of Carolinas Healthcare’s operating procedures and patient interactions.
- Interpret, critique, and evaluate medical literature. Discuss biostatistics and debate experimental design.
- Demonstrate motivation for:
  - Improvement of medical knowledge and patient care skills through participation in all educational activities including core lecture series, educational workshops, educational modules, journal club, grand rounds, research conferences, and quality improvement conferences.
  - Improvement of procedural skills by completion of mandatory procedure forms verifying satisfactory performance with endotracheal intubation, central venous, pulmonary artery and arterial catheter insertion and tube thoracostomy insertion.

p. Computer literacy
• Demonstrate self-evaluation of patient care skills and medical knowledge by identifying specific sub-optimal patient outcomes on daily rounds, describing the care received by the patient, and comparing the care received to the current standard of care.
• List and describe the barriers to incorporation of evidence-based practices into patient care.

Teaching Methods
The fellows will be encouraged to develop an individualized learning plan and will be assigned a mentor to determine if the goals are being achieved. The mentor, along with program director at the quarterly review, will guide the fellow to incorporate self-assessment and feedback of others as part of his/her learning. The fellow will also get departmental lectures on quality improvement methodology as well as online research tools available at the medical library. A monthly journal club will be used to teach and promote use of evidence-based medicine principles. The fellow also will receive a departmental lecture on research methodology and will be encouraged to apply the principles of research methodology and statistical analysis to his/her research projects. Case presentations by the fellow at morbidity and mortality conferences allow analysis practice, using evidence-based medicine and quality improvement methods.

Assessment
Monthly core competency-based evaluations will be used by faculty to evaluate the fellow. Also collective faculty feedback will be given quarterly where the surgical critical care program director meets with the fellow and discusses the fellow’s strengths and weaknesses, and ways for improvement. A semi-annual 360-degree evaluation via Monkey Survey is used to assess achievement of this competency. (Monkey Survey is an on-line program used to create anonymous evaluations with the administrator viewing responses as a group but not responses identifiable to individuals).

Systems Based Practice
Objectives
The fellow must demonstrate an awareness of and responsiveness to the larger context and system of healthcare, as well as the ability to call effectively on other resources in the system to provide optimal healthcare. The fellow will be expected to:

• Work effectively in various healthcare delivery settings and systems, including private offices of surgeons
• Coordinate patient care within the healthcare system
• Incorporate considerations of cost awareness and risk-benefit analysis in patient care
• Use system resources to advocate for quality patient care and optimal patient care systems
• Work in inter-professional teams to enhance patient safety and improve patient care quality
• Participate in identifying systems errors and in implementing potential systems solutions
• Describe the role of critical care medicine within the Carolinas Medical Center and within the larger context of Carolinas Healthcare System
• Evaluate and demonstrate cost-effectiveness of care for critically ill patients
• Develop proper documentation and billing skills.
• Demonstrate enthusiasm for expansion of global medical knowledge through participation in quality improvement projects and clinical trials occurring on patients in the ICU.
• Demonstrate consultation skills by identifying a specific need or question and contacting the appropriate medical, surgical, or support service to provide efficient and effective patient care.
• Demonstrate awareness of the role of the Carolinas Medical Center in regional healthcare delivery through compliance with standard operating procedures and participation in quality improvement
initiatives.
• Orchestrate the pre- and inter-hospital transportation of critically ill patients.
• Participate in departmental QI conferences

Critical Care Skills:
Demonstrate proficiency in the following skills:
• Establish lines of communication with ICU attending, primary attending, and chief surgical resident
• Establish plan for conflict resolution, understanding that attending of record has ultimate authority
• Establish triage plan, and identify resource personnel for triage with admission and discharge authority must be clearly defined
• Develop algorithm for “full unit policy”, with coverage for ICU boarders and criteria for readmission to primary unit
• Develop strategies for common efficiencies, including tools such as critical paths, equipment standardization, cost-effective analyses, and research protocols

Teaching Methods
The fellow will have exposure to the issues of healthcare finance and cost-effective resource allocation, as well as on different healthcare delivery systems to help understand the financial underpinnings of various insurance models. He/she will also participate in discussions of medical errors or “near-miss” events at the process improvement conferences. There is a lecture on patient safety and medical liability for fellows to better understand provision of quality patient care. The fellow will be mentored in this administrative/ICU management component of his/her education by the critical care faculty and the program director.

Assessment
Monthly core competency-based evaluations are used by surgical critical care faculty to evaluate the fellow. Also, collective faculty feedback is given semi-annually where all the attendings discuss individual fellow’s strengths and weaknesses, and ways for improvement. The 360-degree evaluation provided to the multi-professional ICU teams and nursing administration will be uses in a semi-annual assessment of the fellow’s performance.

Professionalism Objectives
The fellow must demonstrate a commitment to carrying out professional responsibilities and an adherence to ethical principles.
He/she must demonstrate:
• Compassion, integrity and respect for others, including accountability to patients and society, and professional commitment to excellence.
• Adherence to ethical principles by practicing patient-centered care that encompasses confidentiality, respect and autonomy via appropriate informed consent and shared decision making.
• Cultural competence, by being sensitive and responsive to a diverse patient population as well as colleagues, including but not limited to diversity in gender, age, culture, race, religion, disabilities, and sexual orientation.
• Demonstrate the practice of ethical principles in relation to patient care and confidentiality, including obtaining informed consent, implementing “Do Not Resuscitate” orders, withholding or withdrawing life support, and clarifying goals of care from advance directives or patient surrogates.
• Demonstrate ethical interactions with pharmaceutical representatives and be unbiased in
prescribing habits.

**Teaching Methods**
Professionalism is taught:
- Primarily during clinical experiences where residents observe and adopt the behavior of critical care faculty
- By assigning mentors who are positive role-models
- Using departmental lectures at conferences by a member of the hospital ethics committee and risk management team
- By giving an institutional lecture on cultural sensitivity and diversity.

**Assessment**
A global 360-degree multi-rater evaluation will be used to assess fellow performance with respect to professionalism and interpersonal and communication skills. These are completed anonymously by ICU healthcare professionals, including nurses, and by the faculty and residents on the consulting services. The fellow also will be assessed at quarterly meetings with the program director, where he/she gets collective faculty assessment and feedback about professionalism and interpersonal and communication skills, in addition to other competencies.

**Interpersonal and Communication Skills**

**Objectives**
The fellow must demonstrate interpersonal and communication skills that result in the effective exchange of information and teaming with patients, their families and professional associates. He/she must demonstrate that he can:
- Communicate effectively with patients and families across a broad range of socioeconomic and cultural backgrounds
- Communicate effectively with physicians, other health professionals, and health related agencies
- Work effectively as a member or leader of a healthcare team
- Demonstrate effective communication with all multi-professionals at Carolinas Medical Center including nursing staff, peers, attending and referring physicians, consultants, organ recovery representatives, and other healthcare professionals including respiratory therapists, nutritionists, pharmacists, physical therapy, and study technicians.
- Establish a collegial rapport with patients and families and demonstrate patient and attentive listening to their concerns.
- Demonstrate effective discussion of patient diagnoses, prognosis, and management plan (including risks, benefits, and side effects) with patients and families using simple, easily understood language.
- Demonstrate proper written and verbal techniques for transfer of care both within and between services.
- Develop teaching skills through instruction of medical and procedural aspects of critical care medicine to rotating interns and residents, University of North Carolina (Chapel-Hill) medical students, and other healthcare professionals through bedside teaching as well as formal didactic sessions.
- Demonstrate effective communication with nurse managers in order to establish ICU admission and discharge plans for critically ill patients.
- Demonstrate the ability to orchestrate care with other medical and surgical services.
- Maintain comprehensive, timely and legible medical records
Teaching Methods
Interpersonal and communication skills are taught primarily during clinical experiences where the fellow observes the critical care faculty and participates in delivering bad news, holding family meetings to discuss ongoing care, educating patients and their families, and resolving conflict. These skills are also taught by daily meetings with social workers and case managers, as well as conversations with consultants, which refine the skill of communication with other healthcare professionals to provide better patient care. Communication with colleagues is encouraged by having a standardized method of handoff between junior and senior residents to help reduce medical errors and promote continuity of care. The fellow will participate in administrative committees and process improvement conferences that help develop effective communication skills. The fellow will actively teach using Power Point lectures and mortality & morbidity conferences. These conferences help develop effective lecture and teaching skills, as the fellow communicates effectively to colleagues by presenting cases, associated complications and data, as well as teaching the medical students. The fellow will be given a talk on research methodology and biostatistics and will be encouraged to present scholarly work via presentations, abstracts, or publications. In addition, the fellow’s rotations on other ICU services allow interaction with other critical care professionals. This will sharpen the fellow’s ability to communicate with colleagues in other specialties.

Assessment
Monthly core competency-based evaluations will be used by faculty to evaluate fellows, and collective faculty feedback will be given to the fellow at the quarterly with the surgical critical care program director. Semiannually, all the critical care attendings meet to discuss individual fellow strengths and weaknesses and ways to correct potential shortcoming with regard to professionalism, interpersonal and communication skills in addition to other competencies. A global 360-degree multi-rater evaluation will be used to assess fellow performance with respect to professionalism and interpersonal and communication skills. These will be completed anonymously by healthcare professionals, including nurses and colleagues.

Goals and objectives of the surgical critical care residency program and for each resident assignment or unit assignment:
MEDICAL ICU ROTATION GOALS AND OBJECTIVES
Faculty: Alan C. Heffner, MD

A. Medical Knowledge
To be familiar with the epidemiology and risk factors for commonly encountered critical care conditions including the systemic inflammatory response syndrome (SIRS), sepsis and multiorgan dysfunction, common causes of shock and hemodynamic instability, acute lung injury, ARDS, acute renal failure, nosocomial infections, acute bleeding. Knowledge of epidemiology also includes:

• Relative prevalence rates and risks for individuals based on previous clinical conditions, type of surgical or procedural interventions, demographics such as age, gender
• General statistics of ICU related morbidity, mortality, and costs to society and the healthcare system
• Precise knowledge of advanced cardiac life support and ability to direct emergent/code scenarios in a variety of clinical settings
• Advanced management of specialized patient populations including post-cardiotomy, mechanical support devices including extra-corporeal life support (ECMO), solid organ transplantation
• To have a comprehensive understanding of the pharmacology of all commonly used medications in an ICU and other monitored clinical settings including:
  • Sedative, analgesic and muscular relaxant drugs
  • Hemodynamic support with vasoconstrictors, inotropic agents and antihypertensive agents
• Other specialized medications that are commonly only used in monitored settings including insulin drips, thrombolytics, some anti-rejection induction agents, anti-arrhythmic agents
• To understand the role, principles and limitations of physiologic monitoring, diagnostic laboratory and radiological tests commonly used in the critical care setting including
• Indications, techniques for placement, complication recognition and management of invasive intravenous catheters including arterial lines, central lines, introducers, cavity drains and thoracostomy tubes
• Knowledge of common chest radiographic interpretation especially for location of intravenous/arterial catheters and airway tubes
• Knowledge of common laboratory tests including blood chemistries, microbiology interpretation
• To be familiar with current guidelines and standards of care developed by relevant medical organizations such as the Society of Critical Care Medicine, the American Boards of Anesthesiology and Surgery
• To understand the role of ICU management in HIV-related conditions
• To review the role of management of COPD in ICU conditions
• To understand the management of decompensated COPD
• To understand the diagnosis, pathophysiology, prevention, and management of
pulmonary emboli.

- To review the pathophysiology of pulmonary-renal syndromes

Assessment
Monthly core competency-based evaluations will be used by medical ICU faculty to evaluate the fellow; collective faculty feedback will be given quarterly at a meeting with the surgical critical care program director when strengths, weaknesses, and methods for improvement will be discussed. In addition, the fellow will participate in the annual MCCKAP exam, which will be an assessment of the fellow’s medical knowledge and management of patient care.

CARDIAC SURGERY CRITICAL CARE ROTATION CURRICULUM
Faculty: Kevin W. Lobdell, MD

1. Educational Goals
To offer a direct care experience in the management of patients admitted to a cardiovascular intensive care unit.

2. Educational Objectives
A. Knowledge
a. Pathophysiology and treatment of stenotic coronary artery disease, valvular disease, and great vessel maladies
b. Concepts of hemodynamic stabilization in acute and chronic myocardial failure, inotropes, fluids, mechanical (aortic balloon pump, ventricular assist devices, and ECMO)
c. Pathophysiology and drug/electrophysiological management of cardiac arrhythmias
d. Understand diastolic vs. systolic dysfunction
e. Infection of valves and myocardium
f. Understanding the role of transesophageal echocardiography in the diagnostic and therapeutic management of the cardiac ICU patient

B. Practice Skills
a. Examination and recognition of patients in shock, establishment and evaluation of fluid status
b. Recognize and differentiate shock from myocardial dysfunction, tamponade, fluid disturbances
c. To understand coronary artery anatomy and basic pathologic lesions in coronary angiography
d. Participate in management of post-op cardiac surgery via consultation
e. Participate in transesophageal echocardiography procedures in the diagnosis of cardiovascular diseases in these patients

C. Technical Skills
a. Initial experience in placement and management of aortic balloon pump
b. Proficiency in Swan-Ganz catheterization
c. Proficiency in emergency placement of flotation pacing catheter
d. Proficiency in urgent pericardiocentesis
e. Rudimentary M mode ECHO interpretation of effusion, valvular dysfunction
f. Conduct a stress exercise test
g. Interpret a coronary angiogram with high-grade occlusion of proximal LAD, right circumflex artery, identify important arterial branches to SA and AV nodes and conducting branches. The critical care fellow will function as an integral part of the cardiovascular team which includes a faculty attending, nurse practitioner and cardiothoracic fellows. Learning will result from direct patient care responsibility as well as rounding with the attending intensivist. There will be no night call responsibility, but the fellow will be expected to be present for week end rounds on a rotational basis. The fellow will be free to attend required conferences in the surgical critical care division.

3. Educational environment
Cardiovascular Recovery Unit at Sanger Heart and Vascular Institute (Carolinas Medical Center)

4. Curriculum
The fellow will be expected to read extensively during this time. *The ACC/AHA Task Force Report on Guidelines For The Early Management Of Patients With Acute Myocardial Infarction* will be provided. In addition, recommended references include the most recent MKSAP Self Assessment Program in Cardiovascular Medicine as well as the *Textbook of Advanced Cardiac Life Support*, second edition, which include the most recent changes in the guidelines. Another recommended reference is *Cardiac Surgery in the Adult*, Lawrence H. Cohn. Appropriate literature references will be provided by the cardiology attending throughout the month as well as informal teaching sessions on topics relevant to patients on the cardiology service.

PEDIATRIC ICU ROTATION GOALS AND OBJECTIVES
Faculty: Edwin Young, MD

Pediatric Critical Care
Competency Based Goals and Objectives

1. Medical Knowledge
Understands the scope of established and evolving biomedical, clinical, epidemiological and social-behavior knowledge needed by a pediatrician; demonstrates the ability to acquire, critically interpret and apply this knowledge in patient care.

   1. Demonstrate efficient access to the knowledge base needed for effective care of critically ill children (e.g., information on the web, in the literature, text books, or PDAs)
   2. Recognize the limits of one’s knowledge and expertise by seeking information needed to answer clinical questions and using consultants and referrals appropriately. Use this process to guide life-long learning plans
   3. Know oxygen delivery systems, indications for/types of artificial airways
   4. Define respiratory failure/potential failure; demonstrates how to adjust ventilator parameters and know extubation criteria; noninvasive interventions (BiPAP, heliox and NO)
   5. Know indications for/demonstrates expertise of parenteral/enteral nutrition, transfusion of blood products, renal replacement therapies
   6. Manage respiratory compromise (positioning, oral/nasal/ airways, oxygen,
bronchodilators, when/how to intubate), increased intracranial pressure, status
epilepticus/seizures, circulatory insufficiency.

7. Know evaluation/differential of altered mental status; appropriate
assessments/interventions; indications for pain/sedative/paralytic; different classes of
analgesics/sedative risk/benefits.

8. Recognize cardiovascular insufficiency by evaluating pulses, refill, dysrhythmia, blood
pressure; knows interventions and methods of monitoring.

9. Is familiar with ethical and medical-legal considerations: futility, withdrawal and
withholding of care, brain death, organ donation, ethics consultation, coroners office.

Assessment
Monthly core competency-based evaluations will be used by faculty to evaluate the fellow. Also
collective faculty feedback will be given quarterly when the surgical critical care program director
discusses strengths and weaknesses, and ways for improvement. In addition, the fellow will participate
in the annual MCCKAP exam, which will be an assessment of the fellow’s medical knowledge and
management of patient care.

ECHOCARDIOGRAPHY ROTATION
GOALS AND OBJECTIVES
Faculty: Geoffrey Rose, MD

Patient Care
The surgical critical care fellow will be expected to gain experience in transesophageal
echocardiography in patients who are critically ill as well as those with a wide variety of cardiothoracic
illnesses.

1. The fellow should perform an appropriate chart review and be able to present each
   patient to the attending in an organized manner.
2. The fellow will be expected to perform pre-surgical and post-surgical exams and be able
to appropriately interpret them.
3. The fellow will be expected to take advantage of the materials (articles, texts, video clips)
in the echo library in furthering knowledge.
4. Each fellow will be expected to deliver a concise, 30-minute presentation on the basics of
echocardiography.
5. The fellow will be expected to become proficient regarding the perioperative use of
echocardiography in patients undergoing cardiothoracic surgery.
6. The fellow should be able to gather and synthesize appropriate information, perform and
appropriately interpret transesophageal echocardiography on critically ill patients.
7. The fellow will be expected to demonstrate appropriate technical skills regarding
insertion of the transesophageal echocardiography probe and its manipulation to obtain
appropriate images.
8. The fellow will be expected to make appropriate, thoughtful, timely, and adaptable
decisions regarding how information obtained via echocardiography alters patient
management.
Medical Knowledge

1. The fellow will be expected to fully understand mechanisms of disease and the scientific basis for appropriate use of echocardiography in patients undergoing cardiothoracic surgery.

2. The fellow will be expected to access and critically evaluate appropriate current medical information and scientific evidence and be able to appropriately apply this knowledge when using echocardiography in patients.

3. The fellow will be expected to display appropriate intellectual curiosity and clinical flexibility regarding unique clinical situations.

Areas of specific knowledge required:

- Normal cardiac physiology/abnormal cardiac physiology
- Physical properties of ultrasound
- Physical properties regarding Doppler analysis
- Standard echocardiographic views
- Assessment of preload via echocardiography
- Assessment of contractility via echocardiography
- Assessment of myocardial ischemia via echocardiography
- Assessment of valvular function via echocardiography
- Assessment of vascular system via echocardiography
- How echocardiographic information alters surgical management
- Pitfalls in echocardiographic interpretation
V. Evaluation

1. The program uses the following evaluation tools:

   a) Focused assessment of residents performed by the faculty.
   
   b) In-training examination
VI. SUPERVISION

1. The SCC residents are provided with progressive responsibility in patient care:
   a) In OR .............................................................................................................. (X) YES ( ) NO
   b) In management of complex cases.................................................................. (X) YES ( ) NO
   c) In SICU ......................................................................................................... (X) YES ( ) NO

2. The residents write orders:
   a) In the medical records on their patients....................................................... (X) YES ( ) NO
   b) On inpatients ................................................................................................ (X) YES ( ) NO
   c) On SICU patients .......................................................................................... (X) YES ( ) NO
   d) On outpatient surgery patients ...................................................................... ( ) YES (X) NO
VII. **ACADEMIC COMPONENT**

1. **Organization of conference schedule.**

Numerous educational conferences are available for the fellow’s educational experience. These are outlined in the table below. Attendance at divisional conferences is mandatory and at departmental conferences is highly encouraged.

<table>
<thead>
<tr>
<th>Divisional Conferences</th>
<th>Date</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multidisciplinary Trauma Conference</td>
<td>3rd Friday</td>
<td>7:00 a.m.</td>
</tr>
<tr>
<td>Trauma Morbidity &amp; Mortality</td>
<td>Tuesday</td>
<td>10:30 a.m.</td>
</tr>
<tr>
<td>Surgical Critical Care Outcomes Committee</td>
<td>4th Monday</td>
<td>4:00 p.m.</td>
</tr>
<tr>
<td>Pulmonary Critical Care Conference</td>
<td>Tuesday</td>
<td>12:30 p.m.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Departmental Conference</th>
<th>Date</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgery Morbidity &amp; Mortality</td>
<td>Thursday</td>
<td>7:00 a.m.</td>
</tr>
<tr>
<td>Surgery Specialty Board Journal Club</td>
<td>4th Thursday</td>
<td>8:00 a.m.</td>
</tr>
<tr>
<td>Surgery Basic Science Series</td>
<td>Thursday</td>
<td>9:00 a.m.</td>
</tr>
<tr>
<td>Simulation Laboratory</td>
<td>Thursday</td>
<td>10:00 a.m.</td>
</tr>
</tbody>
</table>

The fellow assigned to each critical care unit will attend conferences specific for that unit’s service as appropriate. Attendance at the critical care educational conferences of other units is optional but encouraged as time permits.

Another significant component of the fellow’s education is their attendance of divisional faculty and research conferences. The fellow is encouraged to attend all divisional faculty meetings and research conferences.

<table>
<thead>
<tr>
<th>Divisional Meetings</th>
<th>Date</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trauma Faculty Meeting</td>
<td>Friday</td>
<td>12:00 p.m.</td>
</tr>
<tr>
<td>Critical Care Fellow Conference</td>
<td>Friday</td>
<td>1:00 p.m.</td>
</tr>
<tr>
<td>Trauma Research</td>
<td>Friday</td>
<td>7:00 a.m.</td>
</tr>
<tr>
<td>Liver Journal Club</td>
<td>4th Friday</td>
<td>9:00 a.m.</td>
</tr>
</tbody>
</table>
The texts provided to SCC residents for learning include:


2. The SCC residents have protected time to attend the scheduled conferences.
VIII. BASIC SCIENCE CURRICULUM

The critical care fellow is expected to develop a basic understanding of the following areas:

1. Regulation of gene expression
2. Role of neutrophils in health and diseases
3. Macrophage function
4. Endothelial function
5. Lung epithelial function
6. Lymphocyte functions after injury
7. The coagulation cascade during homeostasis and acute inflammation
8. The complement system during acute stress
9. Cytopathic hypoxia, role of mitochondrial function and dysfunction
10. Oxidative lung injury
11. Apoptosis during physiologic and pathophysiologic states
12. Cellular signaling
13. Receptor mechanisms
14. Products of arachidonic acids during health and diseases
15. Nitric oxide
16. Carbon monoxide and heme oxygenase 11
17. Molecular and biochemical monitoring
18. Genetics of critical illness

In addition, surgical critical care fellows are expected to demonstrate knowledge in biostatistics and experimental design as follows:

1. Experimental design and evaluation of literature
   a. In-depth analysis of existing articles
   b. Familiarity with hypothesis testing
   c. Study design
   d. Validity, bias and power
2. Fundamentals of statistics in biomedical research
   a. Descriptive statistics
   b. Statistical inference
   c. Analyzing diagnostic tests:
      i) Sensitivity: ability of a test to detect a disease
      ii) Specificity: test negative when the disease is not present
      iii) The positive predictive value is the chance of having the attribute if the test is positive
      iv) Negative predictive value: exclude the attribute if the test is negative
   d. Confidence intervals (limits)
   e. Common regression analyses
   f. Research administrative skills:
      i) Learn of resources for accessing research funding
      ii) Familiarize with grant preparation
      iii) Corporate sponsorships and their implications
      iv) Contract negotiations
v) Animal rights issues
vi) Understanding methods of writing proposals for the Institutional Review Board.
vii) Manuscript preparation
viii) Abstract submission
ix) Slide preparation
x) Lecture technique
xi) Computer literacy
IX.  CLINICAL COMPONENT

A. Topic Outline and Teaching Methods

All Surgical Critical Care residents/fellows must be provided with a structured curriculum in the following areas.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Patient Management</th>
<th>Conference/Lectures</th>
<th>Self-directed study</th>
<th>Computer/AV</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiorespiratory resuscitation</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>Simulation Lab</td>
</tr>
<tr>
<td>Physiology &amp; pathophysiology of major organ systems</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Metabolic &amp; coagulation disorders</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Hematologic &amp; coagulation disorders</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Critical obstetric and gynecological disorders</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Trauma, thermal, electrical &amp; radiation injuries</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>Simulation Lab</td>
</tr>
<tr>
<td>Inhalation and immersion injuries</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Monitoring and medical instrumentation</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>Simulation Lab</td>
</tr>
<tr>
<td>Critical pediatric surgical conditions</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Drug metabolism and excretion in critical illness</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Ethical and legal aspects of SCC</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Principles of administration and management</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>Mentoring</td>
</tr>
<tr>
<td>Biostatistics and experimental design</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td></td>
</tr>
</tbody>
</table>

B. Clinical Skills Required

All SCC residents must be provided with supervised clinical educational experiences in the following skills. Confirm which are provided:

1. Airway management – Endoscopy ................................................................. ( X ) YES ( ) NO
2. Circulatory
Invasive monitoring ................................................................. (X) YES ( ) NO
Non-invasive monitoring ........................................................... (X) YES ( ) NO
Transesophageal and pericardial ultrasound ................................ (X) YES ( ) NO
Transvenous pacemaker ............................................................ (X) YES ( ) NO
Cardiac output ........................................................................ (X) YES ( ) NO
Systemic and pulmonary vascular resistance ................................ (X) YES ( ) NO
Electrocardiogram .................................................................. (X) YES ( ) NO
Cardiac assist devices ............................................................... (X) YES ( ) NO

3. Neurological
Complete neurological examination ............................................ (X) YES ( ) NO
Intracranial pressure monitoring ................................................ (X) YES ( ) NO
Electroencephalogram ............................................................... (X) YES ( ) NO
Hypothermia in cerebral trauma ................................................ (X) YES ( ) NO

4. Renal
Evaluation of renal function ...................................................... (X) YES ( ) NO
Peritoneal dialysis and hemofiltration ........................................ (X) YES ( ) NO
Hemodialysis ........................................................................... (X) YES ( ) NO

5. Gastrointestinal
GI intubation ............................................................................. (X) YES ( ) NO
Endoscopic techniques .............................................................. (X) YES ( ) NO
Enteral feeding .......................................................................... (X) YES ( ) NO
Stoma, fistula and percutaneous catheter drainage ...................... (X) YES ( ) NO

6. Hematologic
Autotransfusion ......................................................................... (X) YES ( ) NO
Coagulation status ..................................................................... (X) YES ( ) NO
Component therapy ................................................................... (X) YES ( ) NO

7. Infectious disease
Isolation technique ................................................................. (X) YES ( ) NO
Drug therapy with organ failure ................................................ (X) YES ( ) NO
Nosocomial infections ............................................................... (X) YES ( ) NO
Hyperbaric oxygen therapy ....................................................... (X) YES ( ) NO

8. Nutritional
Parenteral & enteral .................................................................. (X) YES ( ) NO
Assessing metabolism and nutrition .......................................... (X) YES ( ) NO

9. Monitoring
Use & calibration of transducers, amplifiers and recorders .......... (X) YES ( ) NO
X. SURGICAL CRITICAL CARE LOG

Essentials in Critical Care Management
Select the patients who best represent all the essential aspects of intensive care unit management. Each resident is to develop a Surgical Critical Care Index Case (SCCIC) log of twenty patients who best represent the full breadth of critical care management. At least two out of the seven categories listed below should be applicable to each chosen patient. The completed SCCIC log should include experience, with at least one patient, in each of the following essential categories: ventilator dependent, hemorrhage, hemodynamic lability, multiple organ failure, dysrhythmia, and nutritional support.

Our critical care program has in place the following policy:
Surgical Critical Care Fellow Policy on Maintaining Index Case Log and Operative Log.

1. Diagnosis Pick list by ICD 9/10 Code

2. Ventilator ...........................................................................................................(X) YES ( ) NO

3. Hemorrhage ....................................................................................................(X) YES ( ) NO

4. Hemodynamic lability requiring vasoactive/inotropic agents ..........................(X) YES ( ) NO

5. Organ failure
   a. Renal ...............................................................................................................(X) YES ( ) NO
   b. Hepatic ..........................................................................................................(X) YES ( ) NO
   c. Endocrine ......................................................................................................(X) YES ( ) NO
   d. CNS ..............................................................................................................(X) YES ( ) NO

6. Dysrhythmia .....................................................................................................(X) YES ( ) NO

7. Invasive monitors
   a. Pulmonary Artery Catheter ...........................................................................(X) YES ( ) NO
   b. Central Venous Line ......................................................................................(X) YES ( ) NO
   c. Arterial line ...................................................................................................(X) YES ( ) NO
   d. Intracranial Pressure monitor/continuous EEG/LICOX/Jugular Bulb oximetry .................................................................................................................(X) YES ( ) NO

8. Nutritional support
   a. Enteral ...........................................................................................................(X) YES ( ) NO
   b. Parenteral .....................................................................................................(X) YES ( ) NO

9. Procedures (ICU-specific)
   a. Airway management
      i. Endotracheal intubation ..............................................................................(X) YES ( ) NO
      ii. Percutaneous Tracheostomy .....................................................................(X) YES ( ) NO
      iii. Open Tracheostomy ..............................................................................(X) YES ( ) NO
   b. Placement of vascular lines
      i. Central Venous Line ...................................................................................(X) YES ( ) NO
ii. Pulmonary Artery Catheter .........................................................(X) YES ( ) NO
iii. Peripheral Artery Catheter .........................................................(X) YES ( ) NO
c. Tube thoracostomy ........................................................................(X) YES ( ) NO
d. Bronchoscopy ................................................................................(X) YES ( ) NO
e. Enteral access
   i. Transnasal gastric feeding tube ....................................................(X) YES ( ) NO
   ii. Transnasal small bowel feeding tube ..........................................(X) YES ( ) NO
   iii. Endoscopically assisted small bowel feeding tube access ..........(X) YES ( ) NO
   iv. Percutaneous endoscopic gastrostomy/jejunostomy ....................(X) YES ( ) NO
XI. Administrative Experience

The fellowship provides in-depth experience in regional trauma system development, as well as exposure to the administrative responsibilities involved in the quality assurance program of the trauma center and the surgical critical care service. In addition, the fellow will work with the Trauma Service registry personnel to gain knowledge in trauma registry and database maintenance. As Carolinas Medical Center is part of the Metrolina Regional Trauma Advisory Committee, the fellow will have an opportunity to observe first hand the various components the regional trauma network, from pre-hospital care to transport policies and acceptance procedures at Trauma Centers. Since the fellow is encouraged to engage in research, these experiences allow ample of opportunities to examine these issues as they relate to patient care and clinical outcomes.

XII. Research

The fellow is strongly encouraged to participate in research. At Carolinas Medical Center, research opportunities span from basic science level, to clinical trials and database analyses. Our faculty clinicians and scientists have on-going active research projects in varying disciplines that the fellow can choose to be involved in. Alternatively, if the fellow chose to test his/her hypothesis, the faculty can provide appropriate mentoring to allow the project to come to fruition.