Trauma Surgery & Surgical Critical Care

Resident Handbook

2018 – 2019

Section on Trauma/Critical Care
Division of General Surgery
Department of Surgery
University of Kentucky College of Medicine

INTRODUCTION

The University of Kentucky Chandler Medical Center, located in Lexington, is an American College of Surgeons-verified Level I trauma center serving Central and Southeastern Kentucky. UK offers a one- or two-year fellowship in Trauma and Surgical Critical Care. The Surgical Critical Care portion is accredited by the American College of Graduate Medical Education. The Trauma and Surgical Critical Care fellowship consists of 10 months Critical Care and 2 elective months. Clinical and/or basic science research is strongly encouraged. Publication and/or presentation at a national meeting is expected but not required.

MISSION STATEMENT

The overall mission of the postgraduate Critical Care program at the University of Kentucky is that a comprehensive educational environment, structured didactic program, and close mentoring will provide the framework for successful post-graduate training in the management of critical illness. These Fellows will attain knowledge and expertise to satisfy the six core competencies outlined by the ACGME, obtain a Certificate of Added Qualifications in Surgical Critical Care, manage the most complex trauma and emergency general surgery cases, and become administratively and academically successful in their careers.

Name	Position
Cynthia L. Talley, MD, FACS	Program Director
Henrik Berdel, MD	Full time faculty
Andrew Bernard, MD, FACS	Full time faculty
Anthony J. Bottiggi, MD	Full time faculty
Joshua Judge, MD	Full time faculty
Jessica Reynolds, MD	Full time faculty
Oscar Moreno, MD	Full time faculty
Brian K. Tucker, DO	Part time faculty

SURGICAL CRITICAL CARE FELLOWS

Name	Months in Program	Date Completed
Margaret M. Griffen, MD	24	1998-2000
Gonzalo Rendon-Cardona, MD	8	2000-2001
Andrew C. Bernard, MD	12	2002-2003
Stephen L. Barnes, MD	12	2003-2004
Phillip K. Chang, MD	12	2004-2005
Anthony J. Bottiggi, MD	12	2005-2006
Jeffrey P. Coughenour, MD	12	2006-2007
Brian J. Sonka, MD	12	2007-2008
Matthew E. Simpson, MD	12	2008-2009
Erik A. Hasenboehler, MD	12	2009-2010
Fadi R. Makhoul	12	2011-2012
Christopher L. Culpepper, MD	12	2012-2013
Jesse Goddard, MD	12	2013-2014
Oscar Moreno Ponte, MD	12	2013-2014
Cherry Song, DO	12	2014-2015
Mack Drake, DO	12	2015-2016
Katie Petersen, MD	12	2015-2016
Alexandra Edwards, MD	12	2016-2017
Charlie Harris, MD	12	2016-2017
Lauren Dudas, MD	12	2017-2018
Jack Wecowski, MD	12	2017-2018

TRAUMA FELLOW/CLINICAL INSTRUCTOR

Name	Months in Program	Date Completed
Christopher Culpepper, MD	12	June 30, 2014
Andrew DeRoo, MD	12	June 30, 2014
Jesse Goddard, MD	12	June 30, 2015
Cherry Song, DO	12	June 30, 2016
Mack Drake, DO	12	June 30, 2017
Charlie Harris, MD	12	July 31, 2018

COMPETENCIES

The Critical Care Fellows will obtain competencies in the 6 areas below to the level expected of a new practitioner. Toward this end, the University of Kentucky will define the specific knowledge, skills, and attitudes required and provide educational experiences as needed in order for the Critical Care Fellow to demonstrate:

1. Patient Care that is compassionate, appropriate, and effective for the treatment of health problems and the promotion of health

2. Medical Knowledge about established and evolving biomedical, clinical, and cognate (e.g. epidemiological and social-behavioral) sciences and the application of this knowledge to patient care

3. Practice-Based Learning and Improvement that involves investigation and evaluation of their own patient care, appraisal and assimilation of scientific evidence, and improvements in patient care

4. Interpersonal and Communication Skills that result in effective information exchange and teaming with patients, their families, and other health professionals

5. Professionalism, as manifested through a commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to a diverse patient population

6. Systems-Based Practice, as manifested by actions that demonstrate an awareness of and responsiveness to the larger context and system of health care and the ability to effectively call on system resources to provide care that is of optimal value

CLINICAL ROTATION OVERVIEW

There are seven different intensive care units:

24-bed Trauma, Acute Care Surgery (7th floor)
24-bed Cardiothoracic ICU (8th floor)
48-bed Medical ICU (9th and 10th floor)
12-bed Neurosurgical ICU (6th floor)

Over a one year period, the Critical Care Fellow will be assigned to the Surgical Critical Care service for at least 6 months split between Trauma and Emergency General Surgery ICU teams. The service is also responsible for providing mandatory critical care consultations for orthopedics, OB/Gyn, urology, plastic surgery, and other general surgery services. Optional critical care consultations are frequently provided for vascular surgery and CT surgery as requested.

Additional monthly rotations include CTICU, NSICU, and MICU during which the fellow will work under supervision of anesthesia and pulmonary critical care services.
1 month is an elective rotation that is fashioned to the specific needs and interests of the Critical Care Fellow which may include additional critical care months.

ROTATION OBJECTIVES

The Critical Care fellowship year seeks to successfully complete the following objectives:

1. To educate the Critical Care Fellows with respect to the basic pathophysiology of critical illness and its application to modern critical care management. This specifically addresses the following core competencies: patient care, medical knowledge, practice-based learning and professionalism

2. To educate the Critical Care Fellows to a high level of competence in the clinical management of the critically ill. This specifically addresses the following core competencies: patient care, medical knowledge, practice-based learning and professionalism.

3. To expose the Critical Care Fellows to the current key research topics in critical care and provide opportunities for participation in both basic and clinical research. This specifically addresses the following core competencies: medical knowledge, and professionalism.

4. To educate the Critical Care Fellows with respect to the administration of an intensive care unit (ICU), including personnel issues and the implementation of multi-disciplinary ICU protocols. This specifically addresses the following core competencies: practice-based learning, interpersonal and communication skills, professional and system-based practice.

5. To expose the Critical Care Fellows to new and current technology for the diagnosis and management of critically ill patients. This specifically addresses the following core competencies: medical knowledge and professionalism.

6. To provide opportunities for interactions with patients and their families and to build a competence in complex treatment decisions, limits on care, and end of life decisions. This specifically addresses the following core competencies: interpersonal and communication skills and professionalism.

2018 – 2019 MONTHLY ROTATIONS

Fellow 1	Fellow 2	Chief Resident	Rotators
TEE/Subs	Trauma	EGS	
Trauma	TEE/Subs	EGS	MFM
US/Elective	EGS	Trauma	
CTICU	Trauma	EGS	
EGS	CTICU	Trauma	ACC 1
NSICU	EGS	Trauma	ACC2 / PCC 1
Trauma	US/Electives	EGS	PCC 2
MICU/PC	Trauma	EGS	PCC 3
EGS	NSICU	Trauma	PCC 4
Elective	EGS	Trauma	
Trauma	MICU/PC	EGS	
EGS	Elective	Trauma	

FELLOW OPERATIVE EXPERIENCE

The Critical Care Fellows may perform operative procedures on critical care patients during their SCC rotation. The operative experience will be tracked through ACGME case logging and will be reviewed at each CCC meeting. Bedside procedures performed on any rotation will be recorded in the ACGME case log system.

FELLOW CALL RESPONSIBILITIES

One Critical Care Fellow will take in-house call Thursday night and leave Friday morning after hand-over (no later than 10am) which is in compliance with work hour restrictions as below. This Fellow is then free of clinical duty from 10am Friday until Monday morning with the entire weekend off twice a month. This fellow will serve as the primary physician for new consults, admissions, and other patient care with direct supervision available. This experience enhances the progression of autonomy with available direct supervision. Any operative cases require direct supervision from the on-call critical care faculty.

The other Critical Care Fellow will take home call Friday night through Monday morning. There is an in-house critical care faculty member available for admissions and operative cases.

The Fellows will alternate weekend coverage to ensure two weekends a month free of clinical duty for each fellow.

FELLOW CLINICAL RESPONSIBILITIES

Surgical Critical Care (Trauma and EGS) Fellow Clinical Responsibilities

The Critical Care Fellows will direct daily rounds including patient evaluation and management in collaboration with rotating students, interns, residents, advanced practice providers and the assigned attending. Coordinating the completion of the daily plan will be the responsibility of the Critical Care Fellows.

For the consult patients, there is an established communication etiquette and collaborative practice with each of the primary services and critical care nursing staff. The Critical Care Fellow is also responsible for timely notification of the primary service regarding any changes in patient condition and the need for specific intervention(s). Under the latter circumstances, specific care will be directed and initiated by the Critical Care Fellow in conjunction with the primary service and the critical care attending.
Emergency department and ICU treatment protocols have been established based upon evidence-based medicine and will service as a guideline in the evaluation and management of patients by the Critical Care Fellow.

A supervising attending is assigned to the ICU at all times.

Cardiothoracic ICU Fellow Clinical Responsibilities

The Critical Care Fellow will spend one month rotation on the CTICU service (split between the cardiac and the thoracic teams). The fellow will participate in multidisciplinary daily rounds with the Anesthesia Critical Care team including ACC faculty, anesthesia residents, CT fellow, pharmacy resident and bedside nurses followed by in-depth bedside rounds. The patient population for this team includes ECMO patients, VAD patients, heart/lung transplant patients, elective and emergent cardiothoracic patients. The fellow will attend ACC conferences mainly in the afternoon and may present a topic for this conference. The fellow will attend the monthly ACC journal club. During this rotation, the fellow will participate in regular call responsibilities with SCC as above. There are no additional call nights specifically for this rotation. The ACC faculty will each provide evaluations of the fellows at the end of the rotation. See Appendix A for goals and objectives. The supervisor for this rotation is Annette Rebel, MD.

Neurosurgical ICU Fellow Clinical Responsibilities

The Critical Care Fellow will spend one month rotation on the NSICU service. The fellow will participate in multidisciplinary daily bedside rounds with the Anesthesia Critical Care team including ACC faculty, anesthesia residents, pharmacy resident, NS residents, and bedside nurses. The patient population for this team includes hemorrhagic strokes, elective neurosurgery ICU patients, isolated brain trauma patients, and transplant patients (liver/pancreas/kidney) in the ICU. The fellow will attend ACC conferences mainly in the afternoon and may present a topic for this conference. The fellow will attend the monthly ACC journal club. During this rotation, the fellow will participate in regular call responsibilities with SCC as above. There are no additional call nights specifically for this rotation. The ACC faculty will each provide evaluations of the fellows at the end of the rotation. See Appendix B for goals and objectives. The supervisor for this rotation is Annette Rebel, MD.

Medicine ICU Fellow Clinical Responsibilities

The Critical Care Fellow will spend one month rotation on the MICU/PCC service. The fellow will participate in multidisciplinary daily bedside rounds with the Pulmonary Critical Care team including PCC faculty, pulmonary residents, pulmonary fellow, pharmacy resident and bedside nurses. The patient population for this team includes pulmonary, GI, ID, and general medicine patients. The fellow will attend PCC core conferences on Monday and Tuesday and may present a topic for this conference. The fellow may attend the Wednesday radiology review conference. During this rotation, the fellow will participate in regular call responsibilities with SCC as above. There are no additional call nights specifically for this rotation. The PCC faculty will each provide evaluations of the fellows at the end of the rotation. See Appendix D for goals and objectives. The supervisor for this rotation is Rolando Berger, MD.

Ultrasound Rotation Fellow Clinical Responsibilities

The Critical Care Fellow will spend a 2-week rotation in Ultrasound with the Emergency Medicine Department under the supervision of Dr. Matt Dawson, an ultrasound fellowship trained ER physician. The primary objective of the Fellow rotation is to provide a comprehensive experience in ultrasound imaging of various bodily locations. This includes the indications for ultrasound, including emergency indications, the basic properties of ultrasound imaging, and the normal anatomy and most common/important pathologic states associated with ultrasound studies that are encountered in the emergency and critical care setting.

TEE Fellow Clinical Responsibilities

The Critical Care Fellow will spend a 2-week rotation in Transesophageal Echocardiography (TEE) with the Cardiac Anesthesia group supervised by Dr. Oksana Klimkina. The overall goal of this rotation is to educate clinicians in the performance and interpretation of perioperative transesophageal echocardiography. The rotation provides ample opportunity for hands-on training in the use of TEE under supervision in the operating room.

Palliative Care Fellow Clinical Responsibilities

The Critical Care Fellow will spend a 2-week rotation in Palliative Care under the supervision of Dr. Jessica McFarlin. This rotation provides experience and teaching on the provision of inpatient palliative medicine in an academic tertiary care center. The goals of this rotation are for fellows to develop expertise in symptom management, communication, interdisciplinary teamwork and teaching in the setting of a busy academic inpatient palliative medicine consultation service. Approximately 1/3 of consults come from the intensive care units at University of Kentucky, including the Medical, Cardiac, Neurology, and Surgical ICUs.

Critical Care Subspecialties Fellow Clinical Responsibilities

The Critical Care Fellow will spend one week with Nutrition Services under the supervision of Dr. Barbara Magnuson (Woodward) and one week with Wound Care under the supervision of Dr. Cori Matsakis. Both of these weeks will include assisting and learning from these teams regarding critical care applications.

Elective Rotation

For one month of the year, the critical care fellow may arrange elective months to enhance their professional niche, fill any personal educational deficits, or expand their clinical competencies. Examples of rotations may include: Blood Bank, Ultrasound, Echo, pediatric ICU, etc. The fellow will notify the program director by December of elective rotation preferences. The fellow and program director will then identify a supervisor and develop a curriculum with goals and objectives for the rotation.

SURGICAL CRITICAL CARE

GENERAL SURGERY RESIDENT CLINICAL RESPONSIBILITIES

PGY-1 residents have a one-month rotation where they serve as an intensivist on the EGS ICU team. These residents may come from the departments of emergency medicine, or general surgery. Procedural skills and light clinical responsibilities are introduced with heavy direct and indirect supervision from the residents and Critical Care Fellow primarily.

PGY-2 residents have a 2-month rotation where they serve as the consult junior for the ICU care. The procedural skills are sharpened and clinical responsibilities are increased with appropriate senior level resident and faculty supervision.

PGY-3 residents have two 2-month rotations. The first is the ICU rotation where they serve in the EGS ICU as the leader of the resident complement coordinating the call schedule and other administrative needs. They are involved in teaching the junior residents and increasing their clinical knowledge and management skills. The second ICU rotation is with the trauma as the consult junior.

The PGY-4 and PGY-5 chief residents rotate among the EGS floor and the ICU teams. The chief residents will work on the team opposite the fellow but will be available as back-up support to the entire team.

2ND YEAR FELLOWSHIP

The second year fellowship occurs after the completion of an accredited surgical critical care fellowship either just prior to the second year fellowship or during a general surgery residency.

The fellow will become credentialed at the University of Kentucky and Veterans Administration hospitals including operative and admitting privileges. The fellow will be appointed a one-year faculty position as Instructor of Surgery for the privileges above.

CLINICAL

The instructor will serve as the attending for service weeks alongside other trauma and acute care surgery faculty. Over one year, service responsibilities will include:

12 weeks trauma
12 EGS floor or ICU
12 weeks elective surgery/clinic
6 admin weeks
6 night weeks
3 weeks of vacation plus holidays

The instructor will serve a patient population consisting of surgical ICU patients, trauma patients, and emergency general surgery patients allowing the instructor to have a full-breadth of experience with acute care surgery.

During the weeks of service, the instructor will have a back-up faculty member assigned to assist with complex medical decision-making, intraoperative consultation, and any administrative/logistics difficulties. See the Appendix E for a list of mandatory indications which require notification of the back-up faculty member.

ADMINISTRATIVE

The instructor will obtain board certification in general surgery and have time allotted to complete the examinations if not already done. The instructor will take the surgical critical care board exam in September for the additional board certification. The instructor will notify the program director if any time for review courses are desired.
The instructor will attend all conferences as above for the 1st year fellow. The instructor will also attend any section meetings planned by the section chief. The instructor will complete full documentation of patient care delivered as a faculty member and code for services with submission to the billing office. The instructor will receive a report regarding RVU generation monthly.

DIDACTICS

Trauma and Critical Care Conference is a twice-weekly conference in which pathophysiology, diagnosis, and treatment of critically-ill patients are discussed with the resident team. Dr. Brian Tucker is responsible for the curriculum and the critical care fellow may deliver some of topics. Attendance is highly suggested.

Hernia Conference is a monthly conference that focuses on the operative management of complex hernias. This is a forum for case presentations and open discussion regarding options for both operative and peri-operative management. Attendance is encouraged and is tracked with a sign-in sheet.

Fellows' Journal Club Conference is a monthly conference in which recent publications are reviewed in conjunction with historical perspectives. The curriculum consists of mainly critical care topics. A description is included in the Appendix. Attendance is mandatory and is tracked with a sign-in sheet.

Fellows' Operative Conference is a weekly conference in which recent operative cases performed by the fellows and instructors are presented. Surgical options and alternatives are discussed by the group. The curriculum design is included in the Appendix. Attendance is mandatory and is tracked with a sign-in sheet.

Multidisciplinary Fellows' Conference is a weekly conference in which critical care topics are reviewed with a varied audience including pulmonary critical care, anesthesia critical care, and surgical Critical Care fellows. Attendance is mandatory and is tracked with a sign-in sheet.

General Surgery Grand Rounds is a weekly conference organized by the Department of Surgery with frequent visiting professors discussing a variety of surgical topics. Attendance is mandatory.

General Surgery Morbidity & Mortality Conference is a weekly conference organized by the Department of Surgery. The Blue service cases are presented by the chief residents in consultation with the Critical Care Fellow. Attendance is mandatory.

Kentucky Trauma Symposium is an annual state-wide conference where trauma topics are reviewed, new innovations and ideas are discussed, and state-wide protocols are developed. Attendance is encouraged.

Other available conferences include: Weekly Vascular Conference, Weekly Tumor Board.

REQUIRED READING

Civetta, Taylor, & Kirby's Critical Care Medicine, 5th Edition (book provided)
"Trauma Protocol Manual" on CareWeb online or http://uktraumaprotocol.blogspot.com
"Burn Protocol Manual" on CareWeb online or http://uktraumaprotocol.blogspot.com

REFERENCE BOOKS ONLINE ACCESS

Trauma by Moore et al.
"Selected Readings in General Surgery"

RESOURCES

The Fellows are provided with a desktop computer and has access to medical center library e-journals, PubMed, Society of Critical Care Medicine, etc.

ADMINISTRATION

ADMINISTRATIVE CONFERENCES

Trauma Patient Care Committee (TPCC) is a monthly conference that the Critical Care Fellows are required to attend.

Interdepartmental Trauma Quality Assurance Committee (IDTQA) is a monthly multidisciplinary process that reviews policies and procedures relative to trauma patients. The Critical Care Fellows are required to attend.

EGS Morbidity and Mortality is a weekly conference to review the cases from the previous month. The fellows may be asked to present cases.

ADMINISTRATIVE PROGRAMS

Transition to Care: ICU Dispo Meeting is a daily multidisciplinary process that reviews the inpatient ICU census to determine and strategize disposition needs. Utilization Review, Finance, PT/OT, Social Work, PM&R personnel, as well as Acute Care and LTAC liaisons occasionally participate in this meeting which is led by the SCC Fellow.

Acute Care Facility Tour is a program provided to the fellows and instructors to visit a facility where the majority of the UK patients requiring inpatient acute rehab are discharged. The fellows will meet the providers and inventory the services provided as well as any limitations to care. In 2018, this facility is Healthsouth Cardinal Hill Rehab.

Long-Term Acute Care Facility Tour is a program provided to the fellows and instructors to visit a facility where the majority of the UK patients requiring LTAC are discharged. The fellows will meet the providers and inventory the services provided as well as any limitations to care. In 2018, this facility is Select Rehab.

Prehospital Care:

EMS Ride-a-long is a program arranged with local ground EMS crew and area air EMS crew for at least 2 shifts each of ride-a-longs. The fellow participates as an observer. The goal is to observe the coordination of transportation of patients to area facilities, to observe the environment of patient care delivered en route to a facility, to observe hand-offs with scene/hospital EMS for patient pick-up and the hand-offs during delivery of the patient to the area hospital.

Lexington EMS: Lt Chris Martin at 859-231-5639 martinc@lexingtonky.gov

Air Methods: Will Scott-Smith at 859-555-5555 william.scott@airmethods.com

PHI: Charles Williams at 859-555-5555 cmwilliams@phiairmedical.com

Task: Get at least 2 ground and 2 air shifts and try for each air service.

RESEARCH

There are a number of clinical and basic science research opportunities for the Critical Care Fellows. Please arrange to meet with Joy Kimbrough jidiaz0@uky.edu.

CLINICAL SCIENCE

The Fellows are strongly encouraged to complete at least one clinical research project. The project can be chosen by the Fellow or assigned from a list of ongoing projects developed by the Section of Acute Care Surgery, Trauma and Critical Care. The General Surgery Research Program staff and a sponsoring faculty member will assist the Fellow with the project. Presentation at a national meeting is desirable but not required. Manuscript presentation and submission to a national or international journal is required. The UK Center for Clinical and Translational Sciences (CCTS) offers a Certificate Program and/or Master's Degree in Clinical and Translational Sciences for Fellows desiring a formal education in research conduct. The CCTS offers coursework (Research Methodologies, Research Ethics, Multidisciplinary Protocol Design, Seminar in Translational Research, etc), pilot funding, mentoring, networking opportunities and regulatory support.

For a list of previous fellows' productivity see Appendix J

EVALUATIONS

Evaluations of the Critical Care Fellows are completed by each of the supervising Critical Care faculty member(s) from each rotation. Residents and medical students also complete objective evaluations at the end of their respective rotations. The critical care nursing staff will provide objective evaluations at the completion of each Critical Care Fellow ICU rotation. An objective evaluation utilizing General Surgery Milestones (see Appendix K) is compiled by the Clinical Competency Committee and reviewed semi-annually with the Critical Care Fellow providing constructive feedback. These evaluations are completed in Medhub.

Faculty Evaluations

The Critical Care Fellows, house staff, and medical students complete objective evaluations for all of the teaching staff. Faculty evaluations are sent out from the GME office quarterly via Medhub. They are released in batches and are anonymous. The completed evaluations are returned to the GME; a summary report, along with individual reports by faculty member is then sent to chairpersons and program directors. Faculty performance reviews are mandatory and performed annually for all academic faculty members.

Rotation Evaluations

The Critical Care Fellows will be asked to complete a rotation evaluation at the end of each rotation. These evaluations are distributed and completed in Medhub.

Program Evaluations

The Critical Care Fellows, as well as the Critical Care faculty complete an anonymous, written confidential evaluation of the program each year (April-May). Due to the small size of the program, the General Surgery PGY 4-5 Chiefs that rotated on Blue/Trauma/Surgical Critical Care will be asked to complete the program evaluation along with the Critical Care Fellows.

Self-Evaluations

The Critical Care Fellows will be expected to complete a self-assessment on their progress. Self-assessments will be completed twice a year. They are completed in Medhub.

SURGICAL CRITICAL CARE CLINICAL COMPETENCY COMMITTEE

Committee Members: All SCC Faculty

1. Fellows in Surgical Critical Care will be evaluated no less that twice yearly by the Clinical Competency Committee (CCC). Fellows who are identified as having poor clinical performance, or otherwise poor evaluations, or experiencing other difficulties will undergo more frequent review.
2. Composition of the CCC
    a. The CCC will be comprised of Surgical Critical Care faculty and the fellowship program coordinator.
    b. The Program Director will appoint the Clinical Competency Committee. At a minimum the CCC must be composed of three members of the program faculty.
    c. Faculty members of the committee will serve a term of at least three years. At the end of the term, the Fellowship Director can reappoint members.
    d. The Chairperson of the CCC will be a designated faculty member engaged in fellow education.
    e. The Surgery Coordinator(s) will attend the meeting to assure that needed information/material are provided to the CCC members and will take minutes of the proceedings. They will not have voting rights.
    f. All members are expected to maintain strict confidentiality.
3. Clinical Competency Committee Proceedings
    a. The CCC will meet semi-annually
    b. Each fellow will be reviewed in detail at least semi-annually
    c. Information to be reviewed will include (but not limited to)
        i. Rotation evaluations
        ii. 360 evaluations
        iii. Conference attendance
        iv. Operative log information
        v. Unsolicited information (both positive and negative as provided to the PD, Division Chief, Chief Fellows, faculty)
        vi. Fellow CVs
        vii. Progress toward achieving expertise in milestones
    d. The CCC will summarize the fellow's progress and performance to date in each of the major competencies as being "Lower than Expected", "Expected" or "Higher than Expected" and will include an "Overall" assessment. (See CCC Assessment Form)
    e. A written letter summarizing the CCC's evaluation will be sent to each fellow by the Program Director. A copy of the letter will be returned to the Surgery Education Office, signed by the fellow to attest that s/he has seen and understands the evaluation.
    f. Any fellow who is found to be "Lower than Expected" in any area will meet with the Program Director.

g. The CCC may determine that a Fellow's lack of progress requires more than a "Lower than Expected" rating. In these circumstances the CCC may recommend:
    i. Formal mentorship with a faculty member
    ii. Letter of Concern
    iii. Repeating a year of training
    iv. Academic Probation
    v. Other action

All such actions will require an explanation by the CCC and this information will be communicated to the fellow.

h. The Department of Surgery abides by the University of Kentucky Graduate Medical Education policies regarding all formal disciplinary actions. These can be found in the GME Policies and Procedures Manual : https://gme.med.uky.edu/sites/default/files/GME%20Policy%20and%20Procedure%20Manual.pdf

i. The CCC Chairperson and/or the Program Director will make reports to the Surgical Critical Care faculty at scheduled Faculty Meetings at least twice yearly. These reports will include any disciplinary actions taken and concerns raised by the CCC regarding lack of progress in fellows, and will allow feedback from the faculty.

CCC Assessment Form

Resident Name: _____ PGY training year: _____

PATIENT CARE	
a. Patient Care — Respiratory Failure	
b. Patient Care — Nutritional Support	
c. Patient Care — Shock/Resuscitation	
d. Patient Care — Acute Kidney Injury	
e. Patient Care — Trauma and Burns	
f. Patient Care — Cardiac Disorders of Critically-Ill Patients	
g. Patient Care — Neurologic Disorders of Critically-Ill Patients	
h. Patient Care — Gastrointestinal (GI) Disorders of Critically-Ill Patients	
i. Patient Care — Infectious Diseases of Critically-Ill Surgical Patients	
j. Patient Care — Procedural Competence*	
MEDICAL KNOWLEDGE	
a. Medical Knowledge — Respiratory Failure (Ventilator-Associated Events)	
b. Medical Knowledge — Nutritional Support	
c. Medical Knowledge — Shock/Resuscitation	
d. Medical Knowledge — Acute Kidney Injury	
e. Medical Knowledge — Trauma and Burns	
f. Medical Knowledge — Cardiac Disorders of Critically-Ill Patients	
g. Medical Knowledge — Neurologic Disorders of Critically-Ill Patients	
h. Medical Knowledge — GI Disorders of Critically-Ill Patients	
i. Medical Knowledge — Infectious Diseases of Critically-Ill Surgical Patients	
SYSTEMS-BASED PRACTICE	
a. Systems-Based Practice — Administrative Responsibility	
b. Systems-Based Practice — Coordination and Transitions of Care	
PRACTICE-BASED LEARNING AND IMPROVEMENT	
a. Practice-Based Learning and Improvement — Improvement of Care	
b. Practice-Based Learning and Improvement — Teaching	
c. Practice-Based Learning and Improvement — Self-Directed Learning	
PROFESSIONALISM	
a. Professionalism — Professionalism and Personal Behavior	
b. Professionalism — Ethical Issues in Critically-Ill Patients	
c. Professionalism — Personal Responsibility	
d. Professionalism — Healthy Work Environment	
INTERPERSONAL AND COMMUNICATION SKILLS	
a. Interpersonal and Communication Skills — Effective Communication with Patients and Families	
b. Interpersonal and Communication Skills — Effective Communication with the Health Care Team	

Surgical Critical Care
Semi-Annual PD Fellow Evaluation

Date of Review:
Fellow:
PGY:
Review Period: ( ) First Half Year

The following areas were reviewed:
( ) Evaluations
( ) Duty Hours
( ) Critical Care Case Volume, Breadth and Complexity
( ) Maintaining Required Written Records
( ) Conference Attendance
( ) Projects/Publications
( ) Ride-A-Longs
( ) Career Plans

Concerns:

_____
_____
_____
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Recommendations and individual educational plan:

_____
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_____

_____
Cindy Talley, Program Director Date

( ) The items indicated above have been discussed and I have received a copy of this review.

_____
Fellow Signature Date

FELLOW APPOINTMENT

Eligibility Criteria

Applicants for the UKMC Surgical Critical Care Residency must meet or exceed the ACGME approved requirements.

Applicants must submit a complete application via SAFAS.

An interview is required. Candidates are selected for interview after review of the application by the program director and faculty.

Selection Criteria

Candidates are then selected through the NRMP Surgical Critical Care match. Candidates are ranked for the match based on their interview, letters of recommendation, and curriculum vitae. Every effort is made to select a candidate that fits the personality of the program.

Completion Criteria

Fellows will be evaluated regularly throughout the academic year (generally after each rotation or quarterly) for progress toward achieving the programs stated educational goals and objectives.

After successfully completing the fellowship, the Critical Care Fellow will have demonstrated sufficient competence to enter practice without direct supervision.

Before the end of the program, the Critical Care Fellow must develop and submit a Surgical Critical Care Index Case (SCCIC) log of twenty patients (appendix O) and a list of operations by CPT code for all operations and bedside procedures performed by the Critical Care Fellow.

The Critical Care Fellow must develop a Process Improvement project and submit final presentation of results and process prior to completion of the fellowship. See Appendix L for prior fellows' PI projects.

FELLOW POLICIES

DUTY HOURS - ACGME Duty Hour Restrictions

In General

- 80 Hours per week averaged over a 4-week period
- 1 day in 7 free from all educational and clinical responsibilities averaged over a 4-week period
- 8 hours free of duty between scheduled duty periods
- No more than 24 continuous hours of in-house call, but may remain on site an additional 4 hours to accomplish transitions of care – this is NOT averaged

In-house call

- No more than every third night averaged over a 4 week period
- Continuous on-site duty cannot exceed 24 hours
- May stay for additional 4 hours for transfer of patient care, continuity of care, outpatient clinics, didactics
- No new patients in these 4 hours

Home call

- Not subject to every third night restriction
- Not subject to 28 hour restriction unless you are in house for 28 hours
- If called into the hospital, time spent in-house is counted toward the 80 hour limit
- 1 day in 7 free averaged over a 4 week period still applies "cannot be excessive"

UK Rules

- Must leave the hospital before 28 hours is up
- Must enter duty hours online (MedHub)
- Must be mindful of your own hours in order to stay under 28/80 hours

VIOLATIONS

If there is an episode of extension of continuous duty hours beyond 28 hrs total, the Critical Care Fellow must document a justification for extension. The only acceptable justifications are continuity of care for a severely-ill or unstable patient, academic importance of the events transpiring or humanistic attention for the needs of a patient or family. Each submission will be reviewed by the Program Director who will track both individual Critical Care Fellow violations and program violations. Violations in the 80 hour restrictions are the Fellow's responsibility and he or she must explain in writing to the Program Director the reasons for such violations.

TRANSFER OF CARE

In order to minimize errors during transitions of care and to facilitate continuity of care and patient safety, we have a structured handover process. For the transitions of the surgery resident staff, there is a written census of patients including their diagnosis, condition, and treatment plan that is physically passed off at morning and evening rounds together with a verbal discussion on each patient.
By observation of the attending physician initially, we will ensure that the Critical Care Fellow is competent in communicating with team members in the handover process. The Critical Care Fellows obtains education regarding handovers during orientation with a PowerPoint presentation, during Grand Rounds presentation annually, and SBAR laminated pocket cards, SAIFER flyers at checkout locations.
The schedules of call and service responsibilities are posted electronically for immediate availability and review by all health care providers.

FACULTY INVOLVEMENT REQUIREMENTS / NOTIFICATIONS

Both electronic written and verbal communications are required to the attending physician regarding changes in patients' condition such as an acute clinical deterioration, patient/family grievance, adverse events, ICU transfers, and end of life decisions (DNR).
A Notification policy for which they receive education during orientation is included in the Appendix N.

GRIEVANCE PROCEDURES

In the normal course of working together on a day-to-day basis, problems in connection with the working relationship can be expected to arise. In most cases, the problem can and should be resolved at the first level of supervision, if not the house officer should go to the Program Director, then the Department Chair then the Ombudsman. However, when a mutually satisfactory solution cannot be arranged, the house officer should be given an opportunity to appeal the decision without fear of prejudice.

The Grievance Procedure for House Officers is outlined in UK AR ii-7.0-5 and is available in the GME office or on the UK web page. Should a grievance be filed, the Assistant Dean and/or the Director of GME will be available both to the program and to the trainee for administrative assistance as needed.

WORK ENVIRONMENT

Fellows on duty in the hospital will be provided adequate and appropriate food services and sleeping quarters.

Patient support services, such as intravenous services, phlebotomy services, and laboratory services, as well as messenger and transporter services, are provided in a manner appropriate to and consistent with educational objectives and patient care.
An effective laboratory and radiologic information retrieval system is in place to provide for appropriate conduct of the educational programs and quality and timely patient care.
A medical records system that documents the course of each patient's illness and are is available at all times and is adequate to support the education of Fellows, quality-assurance activities, and provide a resource for scholarly activity.
Appropriate security and personal safety measures are provided to fellows in all locations including but not limited to parking facilities, on-call quarters, hospital and institutional grounds, and related clinical facilities (e.g., medical office building).

MOONLIGHTING

The Surgical Critical Care Fellow has as his/her primary responsibility their own training and development as an independent clinician and leader, as well as the care of the critically ill patients under his or her care. Insomuch as the Surgical Critical Care Residency is rigorous in regards to clinical and academic demands, additional time for clinical practice outside the residency is limited. According to the guidelines put forth by the ACGME regarding work hours, with which this program is in complete compliance, the Program Director is responsible for assuring that such practice outside the residency (moonlighting, which is not required) does not interfere with the clinical duties or didactic education of the Fellow. Therefore, moonlighting is generally discouraged and is only allowed on an individual basis with a prospective, written statement of permission from the program director and must be placed in the Fellow's file. When moonlighting does occur, the Fellow's performance will be monitored for the effect of moonlighting activities and adverse effects may lead to withdrawal of permission.

RESIDENT FATIGUE

Fellows are required to adhere to the ACGME duty-hours restrictions to ensure adequate rest between duty periods.

The Critical Care Fellow and faculty learn to recognize resident fatigue, sleep deprivation, and potential negative effects on patient care through oral presentations at orientation, annual grand rounds lecture, and video-based instruction.
Should resident fatigue be identified during a duty period, the clinical faculty member would make that assessment and implement a rest period for the resident. There are call rooms available for use during the rest period.
Should resident fatigue be identified during an operation or during any patient care activities, the Critical Care Fellow will notify the supervising attending who will take over the responsibilities of the Critical Care Fellow until adequate rest is achieved.

SUPERVISION

The Critical Care Fellow will have progressive responsibilities of patient care and faculty supervision that transition from direct supervision to indirect supervision to oversight such that the Critical Care Fellow will be ready for independent practice at the completion of the fellowship. The level of supervision and oversight are defined below.

Direct supervision: The supervising physician is physically present with the fellow and patient.

Indirect supervision with direct supervision immediately available: The supervising physician is physically within the hospital or other site of patient care and is immediately available to provide direct supervision.

Direct supervision available: The supervising physician is not physically available within the hospital or other site of patient care but is immediately available by means of telephonic and/or electronic modalities and is available to provide direct supervision by coming to the hospital.

Oversight: The supervising physician is available to provide review of procedure / encounters with feedback provided after care is delivered.

The Critical Care Fellow conducts all operative cases under the direct or indirect supervision of a clinical faculty member from the Division of General Surgery.

The Critical Care Fellow provides patient care in the ICU with daily direct, indirect, or oversight supervision by the assigned ICU attending as outlined by the progression of faculty supervision above.

LEAVE POLICIES

(Human Resources Policy and Procedure Manual – 80.0 – 89.0)
(http://www.uky.edu/HR/policies/hrpp080.html)

PURPOSE: To comply with institutional policy and American Board of Surgery requirements regarding housestaff leave.

POLICY: Per the contract: Housestaff at the PGY2 and above levels are provided 3 weeks of vacation. All housestaff are given 4 bonus days, usually assigned in the last three weeks of December. While the contract also provides for 8 holidays (9 during a presidential election year), the program cannot assure that each resident will be off for these holidays. Therefore, in lieu of these holidays, each resident will be given an additional week of vacation resulting in four (4) weeks for PGY 2 and above. (It should be noted that if a resident is not on call on a holiday, s/he is free to leave the hospital when his/her clinical responsibilities have been completed.) These vacation days are provided in order to meet University policy and to be in compliance with American Board of Surgery requirements. Housestaff are to request and take the vacation time in week-long blocks (Monday through Sunday).

Bonus days normally occur in December. Again, patient care demands and educational requirements may require that a house officer work any or all of those days. Should that occur, the house officer will be given an in-lieu day (or days) and allowed to take the "bonus day (or days)" on another day (or days). Vacations, holidays and bonus days are to be scheduled with the appropriate individual(s) in the program; and are to be approved by the program director. In most cases, **vacation time should not be taken during the Surgical Critical Care month**. Vacations, holidays and bonus days are to be taken within the contract year, and will not be carried forward if not used.

Requests for vacation time should be submitted through Medhub. Vacations will be taken in blocks of a week. Changes to the vacation schedule will be made only in extenuating circumstances and any request must be made with the Program Director.
Only one resident will be absent from the Surgical Critical Care service at any time.

Any requested changes are subject to approval of the Program Director and are contingent upon the needs for the delivery of appropriate clinical care. Requests must be submitted to the Program Director in writing not less than four (4) weeks prior to the desired change.

Temporary Disability (Sick) Leave

In conjunction with Human Resources Policy and Procedure Number 82.0, house officers will earn one day per month sick leave. The sick leave must be earned before it can be used. Unused sick leave carries over into the next contract year for house staff. Unused sick leave allowances will not be paid upon completion of the residency, termination or resignation.

Funeral Leave

Per Human Resources Policy 84.0, residents are allowed five days for immediate family, i.e., father, mother, spouse, brother, sister, child or other relatives for whom the resident is directly responsible. In cases requiring extensive travel time, individuals may be granted up to a total of seven days. In cases of death of a grandparent, grandchild, aunt, uncle, niece, nephew, or in-law, funeral leave with pay is two days. In cases requiring extensive travel time, individuals may be granted up to a total of four days. For other relatives or close associates or friends, up to one-half working day is allowed.

Maternal and Paternal Leave

It is the responsibility of the resident to inform the program director of a pregnancy as soon as possible to allow the program director to make necessary changes in the schedule. Leave will comply with American Board of Surgery and ACGME training requirements and UK Hospital policy.

The American Board of Surgery requirements state that one year of approved residency toward the ABS requirements must be 52 weeks in duration and must include at least 48 weeks of full-time surgical experience. ABS applicants must have obtained no fewer than 48 weeks of full-time surgical experience in each residency year. **For documented medical problems or maternity leave,** the ABS will accept 46 weeks of surgical training in one of the first three years and 46 weeks of training in one of the last two years, for a total of 142 weeks in the first three years and 94 weeks in the last two years. Unused vacation or leave time cannot be applied to reduce the amount of full-time surgical experience required per year.

In accordance with University of Kentucky Human Resources Policy and Procedure 82.0 – temporary disability leave for childbearing purposes normally shall not exceed thirty (30) working days (six calendar weeks). Such leave in excess of accrued vacation and/or sick leave will be considered leave without pay.

Maternity and Paternity Leave (5 days of paternity leave is given) arrangements must be made with the program director and the Administrative Chief Resident so that clinical coverage can be arranged.

Family Medical Leave **(FML)**

University of Kentucky employees (applies to house staff as well) are entitled to take up to 12 weeks of paid/unpaid, job-protected leave for certain family and medical reasons. To be eligible, one must have worked at UK for at least one year, and over the previous 12 months, have worked at least 1250 hours. FML shall be granted for any of the following reasons: to care for an employee's child after birth; the placement of a child for adoption or foster care; to care for an employee's spouse, son or daughter, or parent who has a serious medical condition; for a serious health condition that makes the employee unable to perform the employee's job; in order to care for a service member with a serious illness or injury if the employee is the spouse, son, daughter, parent, or next of kin of the service member; or because of a qualifying exigency arising out of the fact that the

employee's spouse, son, daughter, or parent is on active duty in the National Guard or Reserves (or has been notified of an impending call or order to active duty) in support of a contingency operation. FML request forms are available in the GME office, and should be submitted prior to taking the leave whenever possible. If approved, all paid leave must be taken before entering a leave-without-pay status. Temporary disability (sick) leave must be exhausted before vacation leave. Any time remaining in the approved FML period will then be taken as unpaid leave.

Conference Travel

Travel for professional activities is limited to 1 activity per year. Fellows may attend (1) one national conference or review course with the approval of the Program Director. Arrangements are to be made far in advance. Both surgical critical care residents cannot be away at the same time.

Written approval from the Program Director is required prior to departure. Post facto approvals will not be given and in such instances, the time taken will be considered leave without pay. The traveling resident must provide their own coverage for their absence. This leave time, if unused, will not accrue annually and cannot be applied toward vacation time.

APPENDIX

Appendix A - CTICU Rotation Goals and Objectives

Appendix B - NSICU Rotation Goals and Objectives

Appendix C - TEE and Ultrasound Rotation Goals and Objectives

Appendix D - Palliative Care Rotation Goals and Objectives

Appendix E -Nutrition Rotation Goals and Objectives

Appendix F - MICU Rotation Goals and Objectives

Appendix G - SCC Rotation Goals and Objectives

Appendix H - Fellows' Conference (Journal Club)

Appendix I - Fellows' Operative Conference

Appendix J - Previous Fellows' Productivity

Appendix K -Fellow Milestones Evaluation

Appendix L - Previous Fellows' PI Projects

Appendix M - Resident/Fellow Notification Policy

Appendix N - Instructor Notification Policy

Appendix 0 - Surgical Critical Care Index Log

Addendum – SCCPDS Point of Care Ultrasound Program

Appendix A: CTICU Rotation Curriculum

Upon completion of training, the fellow should be able to:

Competency 1: Patient Care

- Demonstrate knowledge and competency in the interpretation and application of data from noninvasive and invasive, diagnostic, and monitoring techniques (eg, echocardiography, arterial catheters, central venous pressure monitors, pulmonary artery catheter, tissue perfusion monitors, and other methods for measuring cardiac performance)
- Demonstrate competency in the appropriate selection and effective use of different inotropic and vasoactive agents in patients with different types of shock (cardiogenic, neurogenic, septic, or mixed)
- Display a logical approach towards goal directed resuscitation and optimization of tissue oxygen delivery in patients with shock
- Display competency in selecting and using appropriate mechanical support devices in patients with cardiogenic shock (eg, ventricular assist device, intra-aortic balloon pump) or poor oxygenation (extra corporeal membrane oxygenation)
- Demonstrate an ability to interpret radiographic studies, including chest X-rays, computed tomography (CT) scans, arteriograms, and magnetic resonance studies, and apply the data to the management of patients with cardiovascular diseases
- Develop competency in performing cardiovascular procedures, including:
    - Ultrasound to diagnose pericardial tamponade
    - Pericardiocentesis
    - Closed and open cardiac compression
    - Placement of arterial and venous catheters for hemodynamic monitoring and/or delivery of therapies
    - Placement of temporary pacemakers
- Demonstrate knowledge and competency in the diagnosis and management of cardiac arrhythmias and ischemic events
- Demonstrate knowledge and competency in the appropriate application of advanced cardiac support (ACLS) guidelines
- Demonstrate competency in diagnosis and management of arterial diseases due to various etiologies (eg, thrombotic, embolic, arthrosclerosis, aneurismal)
- Competency in appropriate control of high blood pressure in various patient populations (eg, aortic aneurysm, dissections, intra-cerebral bleeding)
- Demonstrate competency in the diagnosis and management of various venous diseases, including deep venous thrombosis (DVT), venous insufficiency, venous ulcers/gangrene
- Demonstrate appropriate selection and application of various prevention strategies for thromboembolic events, including sequential compression devices, drugs, and vena caval filters

Competency 2: Medical Knowledge

- Demonstrate competency in the interpretation of cardiac data obtained from electrocardiograms (ECGs), catheterization, echocardiography, and various monitoring devices
- Demonstrate an understanding of the application of various arterial and venous diagnostic studies

- Describe the different etiologies, diagnostic workup, and management strategies for different types of shock
- Demonstrate an understanding of the concepts of oxygen content, delivery, and consumption, and develop a logical approach towards their correction in critically ill patients
- Cite the risk factors for perioperative myocardial adverse events and describe specific strategies for decreasing their incidence
- List the most common causes of acute and chronic cardiac failure and their treatment
- Describe the different types of cardiac arrhythmias and their appropriate treatment
- Describe the different types of cardiac valve diseases and appropriate strategies for diagnosis and treatment
- Cite the different causes of arterial insufficiency and/or occlusion and describe appropriate treatment
- Cite the different types of arterial aneurysms/dissections and various treatment options
- Describe the causes of venous insufficiency and their treatment
- Describe the etiologies of thromboembolic events and different strategies for their prevention and treatment
- Describe the rationale and the appropriate use of different cardiovascular tools, including:
    - Hemodynamic monitoring devices
    - Ultrasound and echocardiography
    - Pacemakers
    - Cardiac assist devices
    - Cardiopulmonary bypass and extracorporeal membrane oxygenation (ECMO) equipment
- Describe techniques for weaning patients from mechanical cardiac support/ECMO, and for titrating cardiac drugs
- Demonstrate familiarity with new literature related to cardiovascular diseases in critically ill surgical patients

Competency 3: Practice-Based Learning and Improvement

- Demonstrate familiarity with effective strategies for the prevention, diagnosis, and treatment of perioperative adverse cardiac events
- Demonstrate familiarity with protocols for the prompt diagnosis and treatment of cardiac arrhythmias
- Cite evidence-based recommendations for the management of patients with shock
- Demonstrate familiarity with strategies for the prevention, diagnosis, and treatment of thromboembolic complications

Competency 4: Interpersonal and Communication Skills

- Demonstrate effective communication skills with nurses, technicians, and physicians that are involved in the care of patients with cardiovascular diseases
- Develop effective management plans in collaboration with the surgeons and other consulting services for patients with cardiovascular diseases

Competency 5: Professionalism

- Develop effective relationships with consultants, surgeons, nurses and other health care providers

- Demonstrate sound ethical principles in the care of critically ill patients that refuse cardiovascular support, and/or request withdrawal of care
- Develop compassionate and effective methods for communicating with patients and their family members

Learning Objectives	Evaluation Methods	ACGME Competencies
Demonstrate the ability to provide patient care that is compassionate, appropriate, and effective for critically-ill cardiothoracic surgical patients	**PE**	**PC, P**
Demonstrate the ability to make informed decisions about diagnostic and therapeutic interventions based on patient information and preferences, relevant scientific evidence and clinical evidence	**PE**	**PC**
Demonstrate the ability to counsel and educate patients and their families regarding disease processes and treatments	**PE**	**PC, ICS**
Demonstrate the ability to implement a multi-modal approach to early extubation and "fast-tracking" of patients following cardiopulmonary bypass	**PE**	**PC**
Demonstrate the ability to coordinate the specialized care of critically-ill cardiothoracic surgery patients that may involve cardiac pacing therapy, intra-aortic balloon pump counterpulsation, extracorporeal life support, and advanced heart failure support devices (including left, right and biventricular devices)	**PE**	**PC**
Demonstrate the ability to effectively supervise procedures performed by residents and assign or perform these procedures as appropriate within the clinical care of each patient	**PE, PL**	**PC, SBP**
Demonstrate the ability to appropriately perform procedures, interpret hemodynamic data, manage fluids including blood products, and apply pharmacological knowledge as appropriate for the cardiothoracic surgery patient	**PE**	**PC, MK**
Describe the role of echocardiography in the diagnosis and management of critically-ill cardiothoracic surgery patients	**MCQ Exam, PE**	**PC, MK**
Perform routine post-operative management of the cardiothoracic surgery patient	**MCQ exam, PE**	**PC, MK**
Diagnose and implement an effective care plan for the most common postoperative complications seen in critically-ill cardiothoracic surgical patients, including hemorrhage, cardiac tamponade, hemodynamic instability, respiratory insufficiency, myocardial dysfunction, cardiac dysrhythmia, central nervous system (CNS) dysfunction and acute renal injury	**MCQ exam, PE**	**PC, MK**
Effectively manage the care of critically-ill heart or lung transplantation patients including the use and complications of commonly-used immunosuppressive agents, acute graft rejection, and the specialized mechanical and pharmacologic therapies commonly used after transplantation	**MCQ exam, PE**	**PC, MK**
Effectively manage the use of intravascular volume expanding agents, diuretics, and renal vasodilator therapies, alone and in combination, to protect renal function in critically-ill cardiothoracic surgery patients	**MCQ exam, PE**	**PC, MK**
Appropriately utilize inotropes, vasopressors, and vasodilators in the management of hemodynamic instability in critically-ill cardiothoracic surgery patients	**MCQ exam, PE**	**PC, MK**
Appropriately utilize procoagulants and anticoagulants as indicated in the perioperative management of CTICU patients	**MCQ exam, PE**	**PC, MK**
Demonstrate knowledge of the mechanisms by which intraaortic balloon counterpulsation exerts a beneficial physiologic effect, as well as the function of an intraaortic balloon	**MCQ exam, PE**	**MK**
Perform regular self-assessment and seek feedback in order to identify knowledge and skill deficiencies and set improvement goals along with faculty mentor	**PE**	**PBLI**
Demonstrate proficient use of the medical literature, web-based searches, textbooks and expert consultations to improve knowledge and understanding of specific clinical problems, and apply this information in	**PE**	**PBLI, PC, MK**

critical care clinical decision making		
Perform real-time investigation of pertinent patient care-related problems	**PE**	**PBLI**
Demonstrate the ability to modify and correct management plans on the basis of newly acquired knowledge and/or experience	**PE, CR**	**PBLI, PC**
Facilitate the learning of residents, students, nurses, and other health care professionals	**360^{o} Evaluation, PE**	**PBLI, ICS**
Coordinate integral patient care within the clinical setting	**PE**	**SBP**
Recognize and incorporate considerations of cost, feasibility and risk-benefit analysis in the development and implementation of the management plan, including utilizing laboratory testing/diagnostic imaging in a cost conscious manner	**PE**	**SBP**
Work effectively within the interprofessional team in order to facilitate the efficient admission, care and transfer of critically ill patients, including deciding when consultation is indicated	**360o Evaluation, PE**	**SBP, ICS**
Understand ICU billing codes and required documentation	**PE, CR**	**SBP**
Demonstrate respect and compassion for patients and families, including sensitivity to end-of-life issues	**PE**	**P**
Demonstrate an understanding of ethical issues in the care of patients and be prepared to discuss ethical principles with attending physicians, residents and medical students as ethical dilemmas arise	**PE**	**P**
Demonstrate a commitment to ethical practices including confidentiality of patient information, informed consent, and equal treatment	**PE**	**P**
Demonstrate respect for patient autonomy during discussions about options for treatment and decision making on medical care and throughout the process of obtaining informed consent	**PE**	**P**
Demonstrate sensitivity to patients' culture, age, gender, race, religion, sexual orientation and disabilities	**PE**	**P**
Adhere to hospital policies on infection control and hand-washing	**PE**	**P**
Maintain clear and concise notes that convey an accurate description of the patient's condition and of the implementation of the current therapeutic plan	**PE, CR**	**ICS**
Communicate medical orders that are complete, understandable and that need no further clarification	**PE, 360o Evaluation**	**ICS**
Communicate effectively with peers, supervisors and all others on the patient care team both in routine medical care and during medical emergencies	**360o Evaluation, PE**	**ICS**
Communicate effectively with patients and families and provide education and counseling that is respectful, clear and complete	**PE**	**ICS**
Demonstrate the ability to effectively lead discussions during teaching rounds	**PE**	**ICS**

Evaluation Methods Legend:
PE = Performance Evaluation, MCQ Exam = Multiple Choice Question Exam, CR = Chart Review, PL = Procedure Log
ACGME Competencies Legend:
PC = Patient Care, MLK = Medical Knowledge, ICS = Interpersonal and Communication Skills, P = Professionalism, SBP = Systems Based Practice, PBLI – Practice-based Learning and Improvement

Appendix B: NSICU Rotation Curriculum

Upon completion of training, the fellow should be able to:

Competency 1: Patient Care

- Demonstrate appropriate and timely evaluation and management of acute neurologic decompensation
- Demonstrate appropriate utilization and interpretation of brain and spinal cord imaging
- Demonstrate an understanding of algorithms for clinical clearance of spine injuries
- Demonstrate appropriate understanding and interpretation of information from monitors of intracranial pressure (ICP), neurophysiology (including electroencephalography and evoked potentials), brain tissue oxygenation, and cerebral blood flow
- Demonstrate appropriate management of extracerebral parameters to minimize risk of secondary brain injury
- Demonstrate knowledge and competency in the evaluation and nonoperative management of severe closed head injury
- Demonstrate appropriate and timely evaluation and management of patient with anoxic encephalopathy
- Demonstrate knowledge of the diagnosis and treatment of abnormalities of sodium homeostasis related to neurologic diseases, including diabetes insipidus, syndrome of inappropriate antidiuretic hormone (SIADH), and cerebral salt wasting
- Demonstrate proper assessment and management of the patient with a stroke (both ischemic and hemorrhagic)
- Demonstrate proper assessment and management of the patient with subarachnoid hemorrhage, including prevention and management of cerebral vasospasm
- Demonstrate the proper assessment and management of patients with intracranial hypertension, including evaluation of data from intracranial pressure monitors or extraventricular drains
- Demonstrate proper assessment and management of patients with spinal cord injury, including airway and hemodynamic management
- Demonstrate appropriate consultation with consultants in physical medicine and rehabilitation and with rehabilitation facilities
- Demonstrate proper performance of brain death certification
- Demonstrate basic principles of support for potential organ donors

Competency 2: Medical Knowledge

- Cite the etiology and pathophysiology of severe closed head injury and intracranial hypertension
- List the risks, benefits, indications, and contraindications for ICP monitoring or extraventricular drain placement, and describe the possible limitations and complications of these devices
- Cite the etiology and pathophysiology of patients with spinal cord injury

- Explain the importance of physical therapy, occupational therapy, and rehabilitation in optimizing patient outcomes from central nervous system and spinal cord injury
- Cite the risk factors for blunt cerebrovascular injury, describe its clinical presentations, and explain strategies for evaluating and treating these patients
- Describe the initial evaluation and management of patients with suspected meningitis, and cite the most likely causal organisms
- Describe predictive and outcome scales used to assess neurologic diseases
- Describe the etiology and pathophysiology of imminent brain death, and explain the criteria for identifying potential organ donors
- Describe the indications, limitations, and general process of brain death evaluation and certification, list the adjunctive tests for determining brain death, and describe the indications and limitations of their use

Competency 3: Practice-Based Learning and Improvement

- Identify the best practice patterns to facilitate care of the critically ill patient with severe neurological injury or dysfunction from operating procedures and patient interactions.

Competency 4: Interpersonal and Communication Skills

- Demonstrate effective communication with staff, peers, attending and referring physicians, consultants, and representatives from the local organ procurement organization
- Establish a collegial rapport with patient and family
- Demonstrate effective discussion of patient diagnoses, prognosis, and management plan (including end-of-life decisions) with patient and family by using simple, easily understood language

Competency 5: Professionalism

- Demonstrate the practice of ethical principles in relation to patient care, including obtaining informed consent, implementing “Do Not Resuscitate” orders, withholding or withdrawing life support, and clarifying goals of care from advance directives

Competency 6: Systems-Based Practice

Demonstrate consultation skills by identifying a specific need or question when communicating with palliative care or ethics consultants and the organ procurement organization.
Demonstrate awareness of the role of the ICU, organ procurement organizations, and the transplantation service

RESIDENT ASSESSMENT

Competencies will be assessed by the following methods:

1. Attending discussions with residents of ICU patients will be used to assess patient care, medical knowledge, and interpersonal and communication skills.

2. The attending of record will review ICU charts for legibility, organization, and completeness (communication skills).

3. A global rating form will be used at the end of the month to evaluate the resident on the six competencies based on direct observation and feedback from the ICU staff, other physicians who interact with the resident, and anesthesiology critical care attending.

Appendix C: TEE and Ultrasound Rotation Curriculum

Upon completion of training, the fellow should be able to:

Competency 1: Patient Care

- Demonstrate competency in the use of general critical care ultrasonography (GCCU) technology to evaluate and manage critically ill patients

Competency 2: Medical Knowledge

- Demonstrate an understanding of the fundamental principles of ultrasound physics as they relate to obtaining high-quality images and recognizing image artifacts
- Demonstrate competency in interpreting high-quality images and recognizing image artifacts
- Demonstrate familiarity with typical machine controls and transducer manipulation to perform the ultrasound examination at bedside
- Distinguish between normal and abnormal ultrasound anatomy, and recognize the pathophysiologic implications of the imaged abnormality
- Demonstrate competency in interpreting images for relevant clinical applications
- Cite the specific technical and interpretive limitations of ultrasonography with respect to the technology and the technician
- Demonstrate understanding that ultrasonography may yield an indeterminate finding instead of a definitive positive or negative result
- Demonstrate understanding of the appropriate follow-up after an indeterminate finding

Competency 3: Practice-Based Learning and Improvement

- Demonstrate the ability to incorporate the ultrasound into daily practice
- Demonstrate competency in the appropriate use of echocardiographic evaluation, including:

    - Global left ventricular size and systolic function
    - Wall motion abnormalities
    - Global right ventricular size and systolic function
    - Assessment for pericardial fluid/tamponade
    - Basic color Doppler assessment for severe valvular regurgitation
    - Demonstrate competency in the appropriate use of hemodynamic evaluation
    - Inferior vena cava size and respiratory variation
    - Cardiac superior vena cava size estimation
    - Central venous pressure estimation
    - Detection of aortic dissection
    - Pulmonary edema
    - Demonstrate competency in the appropriate use of lung and pleural ultrasonography
    - Presence or absence of pneumothorax
    - Detection of pleural effusion
    - Diaphragmatic dysfunction
    - Pulmonary edema
- Demonstrate competency in the appropriate use of abdominal ultrasonography
- FAST examination
- Extended FAST examination
- Demonstrate competency in the appropriate use of vascular ultrasonography for guidance of vascular access
- Demonstrate competency in the appropriate use of vascular ultrasonography for diagnosis of venous thrombosis

Competency 4: Interpersonal and Communication Skills

- Demonstrate effective team communication between nurses, respiratory therapists, pharmacists, and physicians to plan for patient care by using ultrasonographic exam results
- Develop an effective plan of care with surgeons and nurses for patients with problems diagnosed by ultrasound

Competency 5: Professionalism

- Develop effective relationships with consultants, surgeons, nurses, pharmacists, and respiratory therapists

Competency 6: Systems-Based Practices

- Evaluate the role and cost-effectiveness of using ultrasound protocol in critically ill patients
- Demonstrate awareness of the role of the radiologist and cardiologist in the management of patients when ultrasound results are inconclusive
- Evaluate the outcome and cost-effectiveness of using ultrasound in the ICU for patient management

Appendix D: Palliative Care Rotation Curriculum

Upon completion of training, the fellow should be able to:

Competency 1: Patient Care

- Demonstrate awareness of own feelings, attitudes, and beliefs about death and dying
- Demonstrate ways to integrate ethics and palliative care into curative care
- Demonstrate empathy to patients during critical illness
- Demonstrate management of pain and other symptoms during critical illness
- Demonstrate understanding of determining goals of care
- Demonstrate understanding of advanced care planning, specifically roles of decision-maker and advance care directives
- Demonstrate skills required to resolve conflicts between and amongst families and medical care- givers
- Demonstrate effective concern over patient privacy
- Demonstrate effective communication to patients and their families
- Demonstrate understanding of traditions, beliefs and practices among major religions, cultures, and ethnic groups and their effect on medical decision-making
- Demonstrate an understanding of end-of-life issues

Competency 2: Medical Knowledge

- Explain the trajectories of the dying process and how surgical disease affects this process
- Explain the guidelines used to determine prognosis
- Define medical futility
- Explain how to determine goals of care
- Explain the nonpharmacological and pharmacological management of pain and other associated end-of-life symptoms (eg, nausea, dyspnea, cough, excessive secretions)
- Explain the difference between “hospice” and “palliative care”
- Explain the difference between euthanasia and physician-assisted suicide
- Explain the methods of pronouncing a patient dead
- Define the manifestations of normal grieving

Competency 3: Practice-Based Learning and Improvement

- Identify the best practice patterns to facilitate care of the terminally ill

Competency 4: Interpersonal and Communication Skills

- Demonstrate appropriate understanding and effective communication with patients and their families
- Demonstrate effective communication with all members of the medical care team

Competency 5: Professionalism

- Demonstrate proper performance of all expected professional responsibilities related to end of life decision making

Competency 6: Systems-Based Practice

- Evaluate and demonstrate cost-effectiveness of diagnostic and management individualized to each critically ill patient
- Evaluate and define the roles of various health care professionals when providing end-of-life care
- Demonstrate effective and appropriate utilization of hospital-based resources for conflict resolution in the care of critically ill (eg, optimal care/ethics committees)
- Demonstrate consultation skills by identifying specific patient needs or concerns for which social work, a palliative care service, or clergy would be appropriate

Appendix E: Nutrition Rotation Curriculum

Upon completion of training, the fellow should be able to:

Competency 1: Patient Care

- Demonstrate competency in the evaluation and assessment of the nutritional needs of critically ill surgical patients
- Demonstrate competency in the management of enteral and parenteral nutrition
- Demonstrate competency in the placement of nasogastric and nasointestinal feeding tubes
- Demonstrate competency in the placement of percutaneous endoscopic gastrostomies, open and laparoscopic gastrostomies, and jejunostomies

Competency 2: Medical Knowledge

- Explain the catabolic and anabolic phases of the response to injury, including the mediators involved in these responses
- Explain the methods of determining resting caloric needs for patients, including the Harris-Benedict equation and indirect calorimetry
- Explain the factors that increase caloric requirements of critically ill surgical patients, including surgical stress, trauma, cancer, sepsis, and previous nutritional status
- Explain estimates of protein stores and protein requirements, including measurement of specific serum proteins and determination of nitrogen balance.
- Compare and contrast the risks and benefits of enteral nutrition versus parenteral nutrition
- Explain the potential electrolyte and glycemic complications of enteral and parenteral nutrition
- Explain the risks involved in placement of enteral access devices, including transnasal, endoscopic, and surgical devices

- Understand the potential use of nutritional support for specific organ system dysfunction
- Understand the principles involved in immuno- or pharmaco-nutrition
- Explain the importance of nutritional status with respect to wound healing

Competency 3: Practice-Based Learning and Improvement

- Assess the effectiveness of the prescribed nutritional support by following the parameters of nutritional status

Competency 4: Interpersonal and Communication Skills

- Demonstrate effective communication with nutritionists, respiratory care, and nursing staff to determine the patients' nutritional needs and to implement the plan of care

Competency 5: Professionalism

- Demonstrate proper performance of all expected professional responsibilities

Competency 6: Systems-Based Practice

- Evaluate and demonstrate cost-effectiveness of nutritional support in critically ill patients
- Demonstrate consultation skills by identifying specific patient needs or questions for which nutritionist consultation would help and provide efficient and effective patient care

Appendix F: MICU Rotation Curriculum

Description of Service

The Medical Intensive Care Unit provides an experience in the management of critically ill medical patients to the Internal Medicine and the subspecialty resident.

During this rotation the subspecialty residents are exposed to a group of extremely ill patients. Under the supervision of a fully trained attending they learn to provide comprehensive medical care, interact with patients and families, and work with the interdisciplinary group of professionals that provide care to the critically ill.

Educational Purpose

1. To become skilled at the assessment of a critically ill medical patient.
2. To become comfortable with the use of common critical care related medications.
3. To develop comfort with the indications and contraindications for, and performance of invasive procedures in the critically ill medical patient.
4. To become comfortable with the collection of hemodynamic data, interpretation of laboratory and radiologic information in the critically ill medical patient.

5. To develop competence in dealing with ethical issues surrounding the care of the critically ill medical patient.
6. To develop comfort in communicating with patients and families of critically ill medical patients.
7. To develop an appreciation of the value of different medical disciplines and supportive health care workers.

Assessment Summary

The subspecialty resident will be evaluated during and at the end of the rotation. The evaluations that are specific to the activities of this rotation are listed in the core competency grids below. Other evaluations that occur periodically during the program will cross many rotations. These are outlined in the general competency grids that precede the rotation descriptions. The evaluations specific to this rotation include:

- Performance evaluations – verbal and written
- Portfolio with evidence

Expectations

During this rotation the subspecialty resident is expected to manage critically ill medical patients in the intensive care unit, consult on critically ill patients in other intensive care units, the regular nursing floor, and the emergency department. All patient care will be performed under the supervision of a board certified staff physician. Responsibilities include information gathering, note writing, interpretation of lab and radiographic testing, the performance of procedures, communication with consulting services, other healthcare professionals, the patient and their family.

Orientation

The subspecialty resident will be oriented to this rotation at the beginning of the academic year and on the first day of the rotation, the first time they rotate on this service.

Supervision
The subspecialty resident is supervised by a board certified Critical Care staff. All bronchoscopy procedures and any procedures the subspecialty resident has not achieved competence in are supervised by the same staff.

Mix of Diseases and Patient Characteristics (refer to this section when "critically ill medical patients" are mentioned in the grids below)

The subspecialty residents will participate in the care of adult male and female individuals of all educational, social, and ethnic backgrounds. They may have one or a combination of pulmonary, cardiovascular, renal, gastrointestinal, hematologic, neurologic, oncologic, rheumatologic, surgical, dermatologic, psychiatric, or immunologic diseases. They will be exposed to diseases including but not limited to:

- Exacerbations of obstructive lung diseases

- Acute abdominal catastrophes
- Liver failure and gastrointestinal bleeding
- Acute and chronic renal failure and electrolyte abnormalities
- Shock of all forms
- Respiratory failure including that from ARDS, obstructive and restrictive lung diseases, neuromuscular disease, pulmonary hypertension, pneumonia, pulmonary edema, and hemorrhage
- Acute coronary syndromes, arrhythmias, valve abnormalities, and hear failure
- Neurologic abnormalities including seizures, coma, cerebral vascular accidents, neuromuscular disease, and mental status changes
- Obstetric and gynecologic emergencies
- Oncologic emergencies
- Complications of an immunosuppressed state
- Anaphylaxis and allergic reaction
- Trauma, poisoning and overdose
- Psychosocial and emotional conditions
- Multi-system organ dysfunction
- Coagulation abnormalities
- Complications of invasive and medical management of patients

Procedures and Services

The subspecialty resident will gain experience in the following procedures and assist in the provision of the following services:

- Arterial blood gas sampling and arterial line insertion
- Endotracheal intubation
- Insertion of central venous catheters including pulmonary artery catheters
- Thoracentesis, paracentesis, and lumbar puncture
- Interpretation of information obtained from invasive hemodynamic monitoring
- Interpretation of radiologic studies: chest radiograph, CT scan of chest, sinus and abdomen, ultrasounds of abdomen, chest and veins, pulmonary angiogram, nuclear medicine studies
- Interpretation of laboratory, electrocardiography, and echocardiogram results
- Communication with patients and family members
- The establishment of a patent airway in intubated as well as non-intubated patients
- Support of ventilation
- Catheter and chest tube placement in the pleural space
- Cardioversion
- Assessment of respiratory mechanics, gas exchange, and respiratory drive
- Performance and interpretations of results from flexible fiber optic bronchoscopy in the intubated and non-intubated patient
- Calibration and operation of the hemodynamic recording system

Department Conferences

Departmental conferences that address topics pertinent to this rotation include: didactics, case-based discussions, CPC conference, journal club, research in progress, multidisciplinary ICU conference, and visiting professor lectures. The subspecialty resident is expected to attend all of these conferences.

Educational Resources

Computer access is provided for literature searches on Medline or PubMed. Access is also provided to print and online textbooks as well as Up-To-Date. A series of current review articles on the spectrum of topics covered by Pulmonary medicine is available on the Pulmonary share drive. Similarly, all articles reviewed as part of Journal Club are available on the Pulmonary share drive.

Significant emphasis is given to the role of the Intensivist as a part of a multidisciplinary team. The subspecialty resident learns from all members of a team that includes nurses, respiratory therapists, social workers, pharmacist, ethicist and nutritionists.

Core Competency Overview

Patient Care - By the end of the time rotation the subspecialty resident will be able to provide patient care that is compassionate, appropriate, and effective for the treatment of health problems in critically ill medical patients.

OBJECTIVES	TEACHING METHODS	EVALUATION METHODS
Demonstrate caring and respectful behaviors when interacting with critically ill medical patients and their families. *All years*	Clinical teaching Clinical experiences Performance feedback Role modeling Reflective practice	Performance evaluations Observed patient care Portfolio with evidence
Gather essential and accurate information about critically ill medical patients. *All years*	Clinical teaching Clinical experiences Performances feedback Role modeling Patient centered reading Reflective practice	Performance evaluations Observed patient care Portfolio with evidence
Make informed decisions about diagnostic and therapeutic interventions for critically ill medical patients. Year 1-Diagnostic interventions Year 2 and 3 – Diagnostic and therapeutic interventious	Clinical teaching Clinical experiences Performances feedback Role modeling Patient centered reading Reflective practice	Performance evaluations Portfolio with evidence
Develop and carry out patient management plans for the critically ill medical patient population.	Clinical teaching Clinical experiences Performance feedback Role modeling	Performance evaluations Portfolio with evidence

All years	Patient centered reading Reflective practice Multi-disciplinary rounds	
Counsel and educate critically ill medical patients and their families. *All years*	Clinical teaching Clinical experiences Performance feedback Role modeling Reflective practice	Performance evaluation Observed patient care Portfolio with evidence
Perform competently all medical and invasive procedures considered essential in the management of the critically ill medical patient. All years as above	Clinical teaching Clinical experiences Performance feedback Role modeling Reflective practice	Performance evaluation Procedure log Procedure evaluations Portfolio with evidence
Work with health care professionals, including those from other disciplines, to provide patient-focused care in the medical intensive care unit. *All years*	Clinical teaching Clinical experiences Performance feedback Role modeling Reflective practice Multidisciplinary rounds	Performance evaluation Portfolio with evidence

Medical Knowledge – By the end of the spent on this rotation the subspecialty resident must demonstrate knowledge about established and evolving biomedical, clinical, and cognate sciences and be able to apply this knowledge to the care of critically ill medical patients.

OBJECTIVES	TEACHING METHODS	EVALUATION METHODS
Develops detailed knowledge of the critical care literature. All years	Clinical teaching Clinical experiences Patients centered reading	Performance evaluations Portfolio with evidence
Demonstrate and ability to apply the critical care literature to clinical situations Years 2 and 3	Clinical teaching Clinical experiences Patient centered reading	Performances evaluations Portfolio with evidence
Critically evaluate new critical care knowledge. Year 2 and 3	Clinical teaching Patient centered reading	Performances evaluations Portfolio with evidence
Develops detailed knowledge of the critical care literature. All years	Clinical teaching Clinical experiences Patients centered reading	Performance evaluations Portfolio with evidence

Interpersonal and Communication Skills – By the end of the time spent on this rotation the subspecialty resident must be able to effectively exchange information with critically ill medical patients, their families, and other health care professionals.

OBJECTIVES	TEACHING METHODS	EVALUATION METHODS
Develop effective relationships with critically ill medical patients and their families. All years	Clinical experiences Performance feedback Role modeling Reflective practice	Performance evaluation Portfolio evidence
Provide information and families at a level appropriate for their disease and level of understanding. All years	Clinical experiences Performance feedback Role modeling Reflective practice	Performance evaluation Observed patient care Portfolio evidence
Work well with other members of the medical intensive care unit team. All years	Clinical experiences Performance feedback Role modeling Reflective practice	Performance evaluation Portfolio evidence
Clearly organize, present, and document information about critically ill medical patients. All years	Clinical experiences Performance feedback Role modeling Reflective practice	Performance evaluation Portfolio evidence
Present critical care topics to colleagues in a manner that fosters learning. Year 2 and 3	Performance feedback Role modeling Reflective practice	Portfolio with evidence Peer assessment

Practice-Based Learning and Improvement - By the end of the time spent on this rotation the subspecialty resident must be able to investigate evaluate and improve their patient care practices.

OBJECTIVES	TEACHING METHODS	EVALUATION METHODS
Analyze the critical care practice experience, identify opportunities for improvement activities. Year 2 – identify opportunities Year 3 – perform improvement activities	Clinical Teaching Clinical experiences Performance feedback Role modeling Patient centered reading Reflective practice Multidisciplinary rounds	Performance evaluation Portfolio with evidence
Use information technology to locate and manage information; appraise and assimilate the information that's found. All years	Clinical Teaching Clinical experiences Performance feedback Role modeling Reflective practice	Performance evaluation Portfolio with evidence
Facilitate the learning of students and other healthcare professionals. Years 2 and 3	Performance feedback Role modeling Reflective practice	Peer feedback

Professionalism – The subspecialty resident must demonstrate a commitment to their professional responsibilities, adhere to ethical principles, and be sensitive to the diverse patient population seen in the Medical Intensive Care Unit.

OBJECTIVES	TEACHING METHODS	EVALUATION METHODS
Demonstrate respect, compassion, integrity, honesty, accountability, and a commitment to professional development. All years	Clinical experience Performance feed back Role modeling Reflective practice	Performance evaluation Portfolio with evidence
Demonstrate a commitment to maintaining the ethical standards surrounding end-of-life care, patient confidentiality, and informed consent. All years	Clinical experience Performance feed back Role modeling Reflective practice	Performance evaluation Portfolio with evidence
Demonstrate sensitivity to patients' culture, age, gender, and disabilities. All years	Clinical experience Performance feed back Role modeling Reflective practice	Performance evaluation Portfolio with evidence

Systems-Based Practice – During this rotation the subspecialty resident must be aware of and responsive to the system of health care involved in the care of critically ill medical patients. They must be able to effectively use system resources to provide optimal care in the role of an intensivist.

OBJECTIVES	TEACHING METHODS	EVALUATION METHODS
Demonstrate the effective use of system resources to improve the care of critically ill patients. Years 2 and 3	Clinical teaching Clinical experience Role Modeling Reflective practice Multidisciplinary rounds	Performance evaluation Portfolio with evidence
Demonstrate and understanding of the interplay between the care of a critically ill patient and the health care system. Years 2 and 3	Clinical experience Multidisciplinary rounds Reflective practice	Performance evaluation Portfolio with evidence
Practice cost effective care in the intensive care unit without compromising the quality of care. Years 2 and 3	Clinical teaching Clinical experience Role Modeling Reflective practice	Performance evaluation Portfolio with evidence

Appendix G: SCC Rotation Curriculum and Global Curriculum

SURGICAL CRITICAL CARE (EGS AND TRAUMA) CURRICULUM

1. Administration and Quality Improvement

Upon completion of training, the fellow should be able to:

Competency 1: Patient Care

- Demonstrate competency in the implementation of different clinical protocols to the care of critically ill patients
- Demonstrate competency in the implementation of institutional quality improvement protocols to the care of critically ill patients
- Demonstrate competency in the implementation of methods for monitoring patient outcomes and reporting complications

Competency 2: Medical Knowledge

- Demonstrate knowledge of the difference between a protocol and guideline, and demonstrate competency in their development and implementation
- Demonstrate familiarity with the standards of critical care practice for physicians
- Demonstrate familiarity with critical care nursing standards of care
- Describe institutional and regional disaster management protocols
- Demonstrate an understanding of financial management of the intensive care unit, including the monitoring of costs, charges, appropriate coding, billing, and collection
- Demonstrate an understanding of appropriate federal and state regulations and laws that apply to critical care practice, and develop a basic understanding of the medicolegal aspects
- Demonstrate an appreciation for equitable, logical, ethical and fair allocation of limited resources
- Cite the criteria used for faculty recruitment and advancement
- Cite the criteria used for recruitment and retention of nursing staff and ancillary personnel

Competency 3: Practice-Based Learning and Improvement

- Demonstrate an understanding of the importance of multimodality care
- Demonstrate an appreciation for the role of effective communication strategies, and leadership skills
- Cite the different styles and roles of critical care practice in open, closed, and consultative units
- Demonstrate an understanding of the role of critical care units in the health system

Competency 4: Interpersonal and Communication Skills

- Communicate effectively with members of multi-modality critical care team
- Develop and demonstrate strategies for conflict resolution
- Demonstrate leadership skills

Competency 5: Professionalism

- Develop effective relationships with consultants, surgeons, nurses, and other health care providers
- Demonstrate sound ethical principles
- Demonstrate an understanding of the need for the enforcement of quality control measures

Competency 6: Systems-Based Practice

- Demonstrate an understanding of the need for developing and implementing effective patient safety protocols
- Demonstrate an understanding of the need for developing and implementing quality improvement measures
- Demonstrate an understanding of the need for developing and implementing tools for tracking clinical outcomes
- Demonstrate an understanding of the need for developing and implementing methods for ensuring physician training, maintenance of skills, credentialing and testing
- Participate actively in quality improvement activities
- Demonstrates understanding of the National Surgical Quality Improvement Program (NSQIP) and Trauma Quality Improvement Program (TQIP).

2. Burn Care

Upon completion of training, the fellow should be able to:

Competency 1: Patient Care

- Demonstrate knowledge and competency in the initial evaluation and management of the patient with thermal injury (eg, early airway management, burn severity)
- Demonstrate knowledge and competency in the evaluation of burn size (using Rule of 9's and Lund-Browder charts) and depth
- Demonstrate knowledge and competency in the management of the patient with inhalation injury, including physical examination, analysis of arterial blood gas and carboxyhemoglobin data, airway management, application of hyperbaric oxygen, and interventions (including bronchoscopy)
- Demonstrate knowledge and competency in selection and rate of administration of resuscitation fluids and application of other therapies in resuscitation
- Demonstrate knowledge and competency in wound care and selection of appropriate wound care modalities

- Demonstrate knowledge and competency in prevention of early burn-associated complications, including eschar-related respiratory insufficiency and the appropriate use of escharotomy
- Demonstrate knowledge and competency in the appropriate management of patients with electrical burns, including arrhythmias, tissue injury, compartment syndrome, and rhabdomyolysis
- Demonstrate knowledge in the appropriate management of patients with chemical burns, including prevention of absorption, and recognition of potential pulmonary and renal toxicities
- Demonstrate knowledge and competency in the management of the patient with burn-related hypermetabolism
- Demonstrate knowledge in the evaluation and management of patients with Stevens-Johnson syndrome, toxic epidermal necrolysis syndrome (TENS)
- Demonstrate knowledge and competency in the evaluation of burn wound etiology and the consideration of intentional injury

Competency 2: Medical Knowledge

- Describe the pathophysiology of inhalational injury and demonstrate competence in its diagnosis and management including ventilator strategies and use of adjunct measures
- Describe the pathophysiology and differences between partial and full-thickness burns and minor and major burns
- Describe the different wound management strategies (early versus delayed excision, various topical measures) and cite their relative strengths and weaknesses
- Describe the early and long-term metabolic effects of major burns and strategies to address this including appropriate use of pharmacology, wound management, temperature control, and nutritional therapies
- Describe the different etiologies of electrical injuries (AC, DC, lightning) and associated injury patterns and complications
- Demonstrate an understand of the significance of different types of chemical exposure (acid versus alkali, petrochemical absorption) and strategies for managing topical and systemic effects
- Cite the causes of Stevens-Johnson syndrome and TENS and appropriate diagnosis and treatment strategies

Competency 3: Practice-Based Learning and Improvement

- Describe measures and techniques for improving quality of care and patient and family satisfaction
- Review published information critically to understand current evidence-based information to optimize resuscitation, (eg, fluid selection), problem-specific management (eg, TENS, chemical injury)

Competency 4: Interpersonal and Communication Skills

- Demonstrate effective communication with nurses, pharmacists, respiratory therapists, speech therapists, occupational and physical therapists, and consulting services for collaborative management of the thermally injured patient
- Demonstrate effective communication with patients and family members (both listening and conveying information with appropriate degree of complexity)

Competency 5: Professionalism

- Demonstrate respect, compassion, integrity, and responsiveness to the needs of the patients and their families
- Approach and discuss ethical issues, including advanced directive and end-of-life issues
- Demonstrate accurate self-assessment, knowledge of professional limits, and an ongoing desire for self-improvement

Competency 6: Systems-Based Practice

- Serve as an advocate for quality patient care, with due attention to costs and resources in a complex health care system, including acceptance of transfers and arranging repatriation
- Partner appropriately with other health care providers, including consulting physicians, nurses, pharmacists, respiratory therapists, and physical and speech therapists
- Collaborate with other health care providers, including consulting physicians, nurses, and social workers, to evaluate and refer issues related to intentional injury

3. Cardiovascular Physiology, Pathophysiology and Therapy

Upon completion of training, the fellow should be able to:

Competency 1: Patient Care

- Demonstrate knowledge and competency in the interpretation and application of data from noninvasive and invasive, diagnostic, and monitoring techniques (eg, echocardiography, arterial catheters, central venous pressure monitors, pulmonary artery catheter, tissue perfusion monitors, and other methods for measuring cardiac performance)
- Demonstrate competency in the appropriate selection and effective use of different inotropic and vasoactive agents in patients with different types of shock (cardiogenic, neurogenic, septic, or mixed)
- Display a logical approach towards goal directed resuscitation and optimization of tissue oxygen delivery in patients with shock
- Display competency in selecting and using appropriate mechanical support devices in patients with cardiogenic shock (eg, ventricular assist device, intra-aortic balloon pump) or poor oxygenation (extra corporeal membrane oxygenation)

- Demonstrate an ability to interpret radiographic studies, including chest X-rays, computed tomography (CT) scans, arteriograms, and magnetic resonance studies, and apply the data to the management of patients with cardiovascular diseases
- Develop competency in performing cardiovascular procedures, including:
    - Ultrasound to diagnose pericardial tamponade
    - Pericardiocentesis
    - Closed and open cardiac compression
    - Placement of arterial and venous catheters for hemodynamic monitoring and/or delivery of therapies
    - Placement of temporary pacemakers
- Demonstrate knowledge and competency in the diagnosis and management of cardiac arrhythmias and ischemic events
- Demonstrate knowledge and competency in the appropriate application of advanced cardiac support (ACLS) guidelines
- Demonstrate competency in diagnosis and management of arterial diseases due to various etiologies (eg, thrombotic, embolic, arthrosclerosis, aneurismal)
- Competency in appropriate control of high blood pressure in various patient populations (eg, aortic aneurysm, dissections, intra-cerebral bleeding)
- Demonstrate competency in the diagnosis and management of various venous diseases, including deep venous thrombosis (DVT), venous insufficiency, venous ulcers/gangrene
- Demonstrate appropriate selection and application of various prevention strategies for thromboembolic events, including sequential compression devices, drugs, and vena caval filters
- Describe the different etiologies, diagnostic workup, and management strategies for different types of shock

Competency 2: Medical Knowledge

- Demonstrate competency in the interpretation of cardiac data obtained from electrocardiograms (ECGs), catheterization, echocardiography, and various monitoring devices
- Demonstrate an understanding of the application of various arterial and venous diagnostic studies
- Demonstrate an understanding of the concepts of oxygen content, delivery, and consumption, and develop a logical approach towards their correction in critically ill patients
- Cite the risk factors for perioperative myocardial adverse events and describe specific strategies for decreasing their incidence
- List the most common causes of acute and chronic cardiac failure and their treatment
- Describe the different types of cardiac arrhythmias and their appropriate treatment
- Describe the different types of cardiac valve diseases and appropriate strategies for diagnosis and treatment
- Cite the different causes of arterial insufficiency and/or occlusion and describe appropriate treatment
- Cite the different types of arterial aneurysms/dissections and various treatment options

- Describe the causes of venous insufficiency and their treatment
- Describe the etiologies of thromboembolic events and different strategies for their prevention and treatment
- Describe the rationale and the appropriate use of different cardiovascular tools, including:
  - Hemodynamic monitoring devices
  - Ultrasound and echocardiography
  - Pacemakers
  - Cardiac assist devices
  - Cardiopulmonary bypass and extracorporeal membrane oxygenation (ECMO) equipment
- Describe techniques for weaning patients from mechanical cardiac support/ECMO, and for titrating cardiac drugs
- Demonstrate familiarity with new literature related to cardiovascular diseases in critically ill surgical patients

Competency 3: Practice-Based Learning and Improvement

- Demonstrate familiarity with effective strategies for the prevention, diagnosis, and treatment of perioperative adverse cardiac events
- Demonstrate familiarity with protocols for the prompt diagnosis and treatment of cardiac arrhythmias
- Cite evidence-based recommendations for the management of patients with shock
- Demonstrate familiarity with strategies for the prevention, diagnosis, and treatment of thromboembolic complications

Competency 4: Interpersonal and Communication Skills

- Demonstrate effective communication skills with nurses, technicians, and physicians that are involved in the care of patients with cardiovascular diseases
- Develop effective management plans in collaboration with the surgeons and other consulting services for patients with cardiovascular diseases

Competency 5: Professionalism

- Develop effective relationships with consultants, surgeons, nurses and other health care providers
- Demonstrate sound ethical principles in the care of critically ill patients that refuse
- cardiovascular support, and/or request withdrawal of care
- Develop compassionate and effective methods for communicating with patients and their family member

Competency 6: Systems-Based Practice

- Demonstrate an understanding of the role and cost-effectiveness of cardiac ischemic event prevention protocols in the intensive care unit
- Demonstrate an understanding of the role and cost-effectiveness of DVT/pulmonary embolism (PE) prevention protocols in the intensive care unit

- Demonstrate an understanding of the role and cost-effectiveness of surveillance protocols for the early diagnosis and treatment of DVT/PE in critically ill patients

4. Endocrine disorders

Upon completion of training, the fellow should be able to:

Competency 1: Patient Care

- Demonstrate knowledge and competency in the evaluation and management of critically ill patients with thyroid, parathyroid, pancreatic, and adrenal disorders
- Demonstrate knowledge and competency in the evaluation and management of postoperative complications for thyroid, parathyroid, pancreatic, and adrenal operations, including acute airway emergencies associated with neck exploration, hypocalcemia from parathyroid operations, and fluid collections and fistulas associated with pancreatic and adrenal operations
- Demonstrate knowledge and competency in the evaluation and management of hyperglycemia and diabetes
- Demonstrate knowledge in the evaluation and management of endocrine insufficiencies secondary to pituitary operations

Competency 2: Medical Knowledge

- Explain the neuroendocrine axis in response to stress
- Discuss the hemodynamics associated with hypothyroidism, hyperthyroidism, and adrenal insufficiency
- Describe a thyroid storm and its therapy
- Discuss the role of thyroid replacement in euthyroid sick syndrome
- Explain the components of multiple endocrine neoplasia (MEN) I and II syndromes
- Discuss therapy for hypercalcemia
- Explain the postoperative complications of thyroid and parathyroid operations
- Describe the role of hemoglobin A1c in operative patients
- Describe the treatment of diabetic ketoacidosis and hyperglycemic coma
- Contrast the pros and cons of glucose control in the intensive care unit (ICU)
- Explain therapy for pheochromocytoma
- Debate the issues of steroid replacement for adrenal insufficiency in the critically ill

Competency 3: Practice-Based Learning and Improvement

- Measure the effectiveness of glucose control
- Observe the effectiveness of steroid replacement strategies
- Review evidence-based recommendations for steroid and glucose control

Competency 4: Interpersonal and Communication Skills

- Demonstrate effective team communication between nurses, pharmacists, and physicians (including endocrinologists) to manage glucose control in patients
- Develop an effective plan of care with surgeons, endocrinologists, and nurses for patients with endocrine conditions

Competency 5: Professionalism

- Develop effective relationships with consultants, surgeons, nurses, and pharmacists

Competency 6: System-Based Practices

- Evaluate the role and cost-effectiveness of glucose control protocol in critically ill patients
- Demonstrate awareness of the roles of the intensivists, endocrinologists, and clinical pharmacists
- Evaluate the outcome and cost-effectiveness of steroid replacement

5. Ethics and Palliative Care

Upon completion of training, the fellow should be able to:

Competency 1: Patient Care

- Demonstrate awareness of own feelings, attitudes, and beliefs about death and dying
- Demonstrate ways to integrate ethics and palliative care into curative care
- Demonstrate empathy to patients during critical illness
- Demonstrate management of pain and other symptoms during critical illness
- Demonstrate understanding of determining goals of care
- Demonstrate understanding of advanced care planning, specifically roles of decision-maker and advance care directives
- Demonstrate skills required to resolve conflicts between and amongst families and medical care- givers
- Demonstrate effective concern over patient privacy
- Demonstrate effective communication to patients and their families
- Demonstrate understanding of traditions, beliefs and practices among major religions, cultures, and ethnic groups and their effect on medical decision-making
- Demonstrate an understanding of end-of-life issues

Competency 2: Medical Knowledge

- Explain the trajectories of the dying process and how surgical disease affects this process
- Explain the guidelines used to determine prognosis
- Define medical futility

- Explain how to determine goals of care
- Explain the nonpharmacological and pharmacological management of pain and other associated end-of-life symptoms (eg, nausea, dyspnea, cough, excessive secretions)
- Explain the difference between "hospice" and "palliative care"
- Explain the difference between euthanasia and physician-assisted suicide
- Explain the methods of pronouncing a patient dead
- Define the manifestations of normal grieving

Competency 3: Practice-Based Learning and Improvement

- Identify the best practice patterns to facilitate care of the terminally ill

Competency 4: Interpersonal and Communication Skills

- Demonstrate appropriate understanding and effective communication with patients and their families
- Demonstrate effective communication with all members of the medical care team

Competency 5: Professionalism

- Demonstrate proper performance of all expected professional responsibilities related to end of life decision making

Competency 6: Systems-Based Practice

- Evaluate and demonstrate cost-effectiveness of diagnostic and management individualized to each critically ill patient
- Evaluate and define the roles of various health care professionals when providing end-of-life care
- Demonstrate effective and appropriate utilization of hospital-based resources for conflict resolution in the care of critically ill (eg, optimal care/ethics committees)
- Demonstrate consultation skills by identifying specific patient needs or concerns for which social work, a palliative care service, or clergy would be appropriate

6. Gastrointestinal disorders

Upon completion of training, the fellow should be able to:

Competency 1: Patient Care

- Distinguish upper from lower gastrointestinal (GI) bleeding sources
- Demonstrate how to resuscitate patients with GI bleeding
- Describe the indications for urgent or emergent endoscopy for upper GI bleeding
- Describe the various endoscopic techniques for control of upper GI bleeding as they apply to the various causes of upper GI bleeding
  - Injection
  - Sclerosis

    - Heater probe
    - Clips/banding
- Cite the indications for bleeding scans and arteriography for localization of GI bleeding
- Demonstrate familiarity with potential interventional techniques that can be performed during arteriography (eg, catheter-based infusions and embolization) for control of GI bleeding
- Describe the causes and medical management of liver failure
- Describe the causes and treatment of hepatic encephalopathy
- Cite the indications for a Sengstaken-Blakemore tube for bleeding esophageal varices and demonstrate its placement
- Know the acute medical management of bleeding varices
- Know the complications and management of splenic vein thrombosis and left-sided portal hypertension
- Cite the indications and complications for the placement of a transjugular intrahepatic portosystemic shunt (TIPS)
- Demonstrate an ability to manage hepatorenal syndrome
- Cite the causes, differential diagnosis, and management of ileus
- Describe the workup and indications for the neostigmine challenge for colonic pseudo- obstruction
- Describe the workup and management of patients with bowel ischemia
- Identify patients at risk for acalculus cholecystitis and describe its workup and management
- Cite the signs, symptoms, and management of ascending cholangitis
- Demonstrate a thorough knowledge of the management of pancreatitis, including interpretation of CT scan findings, signs of pancreatic necrosis and abscess, indications for needle aspiration, controversies regarding prophylactic antibiotics, and indications and timing of surgical debridement of the pancreas

Competency 2: Medical Knowledge

- Cite the most common causes of upper GI bleeding
- Explain the role of various systemic agents in the control of upper GI bleeding
- Cite the most common causes of lower GI bleeding
- Cite the incidence, epidemiology, and indications to treat *Helicobacter pylori* infection
- Describe the pathophysiology and medical and surgical treatment of stress gastritis and Cushing's ulcers
- Describe the pathophysiology and management of Mallory-Weiss tears and Dieulafoy lesions
- Cite the etiologies of bowel ischemia and describe different strategies for its management
- Describe the epidemiology, treatment, and infectious disease precautions for *Clostridium difficile* infection
- Describe the pathophysiology, management, and surgical indications of colonic pseudo-obstruction and toxic megacolon

- Cite the causes and types of hepatorenal syndrome
- Cite the causes of pancreatitis and the cellular pathophysiology of the disease process

Competency 3: Practice-Based Learning and Improvement

- Demonstrate familiarity with controversial gastrointestinal topics described in the critical care literature
- Demonstrate the ability to base treatment on best evidence-based practices available for patients with gastrointestinal illness
- Demonstrate familiarity with best demonstrated practices for stress ulcer prophylaxis
- Establish protocols relevant to stress ulcer prophylaxis in the ICU environment
- Describe an ICU "bundle" and the recommended standards of care as they pertain to GI medicine

Competency 4: Interpersonal and Communication Skills

- Demonstrate an understanding of the role of the surgical intensivist as a GI consultant
- Develop open lines of communication with the primary team regarding patient status and necessary treatments and interventions
- Demonstrate an understanding of the importance of nursing concerns, and incorporate nursing input into a team-building ICU environment

Competency 5: Professionalism

- Demonstrate how effective leadership skills on the part of the surgical intensivist can broaden the scope of GI practice in the ICU environment
- Demonstrate broad-based knowledge of gastroenterology and interact with effectively with nursing and other ancillary personnel to enhance their understanding of treatment and patient care.

Competency 6: Systems-Based Practice

- Describe the factors that govern the availability of critical resources (eg, the GI laboratory and skilled personnel) and demonstrate understanding that these factors are often institution- specific
- Demonstrate an understanding that surgical intensivists and GI physicians may have similar scopes of practice and that these services can complement each other in improving patient care
- Explain how standardized care plans and ICU policies improve outcomes and encourage consistent referral patterns
- Use skills laboratories and courses effectively to learn various endoscopic techniques

7. Hematologic disorders

Upon completion of training, the fellow should be able to:

Competency 1: Patient Care

- Demonstrate knowledge and competency in the evaluation and assessment of white blood cell (WBC), red blood cell (RBC), and platelet disorders that affect critically ill patients
- Demonstrate knowledge and competency in the evaluation and management of bleeding and clotting disorders in critically ill patients
- Demonstrate knowledge and competency in the management of critically ill patients with WBC, RBC, and platelet disorders
- Describe the clinical presentation of heparin-induced thrombocytopenia and thrombosis (HITT)

Competency 2: Medical Knowledge

- Explain normal hemostasis and the clotting cascade
- Discuss common abnormalities and effects of common medications on hemostasis and the clotting cascade
- Explain the difference between surgical bleeding and coagulopathy
- Review laboratory tests used for evaluating bleeding and clotting abnormalities and demonstrate familiarity with the use of thromboelastographs in the assessment of coagulopathy
- Describe massive transfusion, its complications, and therapy
- Explain the benefits and risks of transfusion
- Explain the risks and benefits of epoietin and recombinant factor VIIa
- Explain the etiology and management of HITT and alternatives to heparin
- Compare the pharmacology of medications for anticoagulation

Competency 3: Practice-Based Learning and Improvement

- Demonstrate familiarity with the effectiveness of transfusion protocol and literature regarding transfusion ratios of packed RBCs to fresh frozen plasma (FFP) and platelets

Competency 4: Interpersonal and communication skills

- Demonstrate effective communication with the surgeon, ICU team, blood bank, and hematologist

Competency 5: Professionalism

- Demonstrate the importance of obtaining informed consent for transfusions
- Demonstrate ethical principles in the care of patients who refuse to accept blood transfusions

Competency 6: Systems-Based Practice

- Evaluate the cost-effectiveness of transfusion triggers
- Describe the importance of a quality improvement system for a massive transfusion protocol

8. Infectious Diseases

Upon completion of training, the fellow should be able to:

Competency 1: Patient Care

- Demonstrate a working knowledge of the workup of the febrile patient in the surgical ICU
- Demonstrate an understanding of the diagnosis, management and differences between sepsis, systemic inflammatory response system (SIRS), and septic shock
- Demonstrate an understanding of the workup of ventilator-associated pneumonia (VAP)
- Demonstrate an understanding of the diagnosis and treatment of invasive line infections
- Demonstrate a working knowledge of the care and treatment of the patient with necrotizing soft tissue infection
- Demonstrate an understanding of invasive burn wound sepsis and infections occurring in patients with thermal injury
- Demonstrate an understanding of the diagnosis and management of primary, secondary, and tertiary peritonitis
- Demonstrate an understanding of the pathophysiology, diagnosis, and management of acalculous cholecystitis
- Demonstrate an understanding of the etiologies, diagnosis, and management of intra-abdominal abscesses
- Demonstrate an understanding of the diagnosis and management of meningitis
- Explain the difference between and indications for prophylactic, empiric, and therapeutic antibiotic choices, as well as appropriate drug selection for specific clinical situations
- Demonstrate the ability to monitor antibiotic levels and appropriate dose adjustment
- Demonstrate knowledge of the workup of nonbacterial sources of infections (eg, fungal, viral, and other unusual pathogens) in ICU patients
- Demonstrate an understanding of the special considerations in patients who are immunosuppressed by disease processes (e.g., HIV infection, diabetes, and cirrhosis) and medications (e.g., steroids, chemotherapy, and anti-rejection medications)

Competency 2: Medical Knowledge

- Cite the etiology and the pathogenesis of septic shock in the surgical ICU patient, including potential causative organisms
- Explain the principles of antibiotic management in detail, including antibiotic selection, potential adverse affects of treatment, and appropriate length of treatment

- List the risk factors for ventilator-associated pneumonia and potential preventative strategies based on evidence-based guidelines
- Discuss the risk factors for line sepsis and develop a management strategy using evidence based guidelines to evaluate and treat patients with line infections
- Cite the risk factors and the care of the patient with complex necrotizing soft tissue infection
- Cite the risk factors for peritonitis and describe its management
- Evaluate and treat patients with intra-abdominal abscesses in the ICU
- Discuss the risk factors for development of urinary tract infections in the ICU patient
- Evaluate the risk factors for central nervous system (CNS) infection patients with brain injury, including the specific issues associated with invasive brain monitoring devices
- Discuss the risk factors for fungal and viral infections in the ICU patient

Competency 3: Practice-Based Learning and Improvement

- Recognize when a patient is not responding to treatment and when the antibiotic strategy should be changed, including stopping antibiotic treatment when appropriate

Competency 4: Interpersonal and Communication Skills

- Demonstrate the ability to communicate with infectious disease consultants in a clear and concise fashion
- Demonstrate the ability to appropriately order microbiological tests and interpret the results

Competency 5: Professionalism

- Demonstrate broad-based knowledge of infectious disease and interact effectively with nursing and other ancillary personnel to enhance their understanding of preventative measures and treatment.

Competency 6: Systems-Based practice

- Demonstrate knowledge of standard infection control procedures
- Demonstrate knowledge of the specific antibiotic resistance patterns at the hospital and in the ICU setting
- Demonstrate knowledge of resistance patterns in the patient population
- Demonstrate the ability to make cost-effective antibiotic selections

9. Monitoring and Bioengineering

Upon completion of training, the fellow should be able to:

Competency 1: Patient Care

- Demonstrate knowledge of the indications for central venous catheter placement, including monitoring and venous access

- Demonstrate competency in central venous catheter placement
- Demonstrate knowledge of the indications for pulmonary artery catheter monitoring
- Demonstrate competency in pulmonary artery catheter placement
- Demonstrate understanding of the mechanics of measurement of cardiac output
- Demonstrate understanding of oxygen delivery and consumption and therapeutic implications of abnormalities in these parameters as well as appropriate therapeutic interventions
- Demonstrate knowledge of the indications for arterial catheter monitoring
- Demonstrate competency in arterial catheter placement
- Demonstrate knowledge of the technical aspects of hemodynamic monitoring, including setting up and troubleshooting a pressure transducer line

Competency 2: Medical Knowledge

- Cite the complications (immediate and subsequent) of central venous access and demonstrate competence in recognizing and managing these complications
- Cite the complications of invasive arterial access and demonstrate competence in recognizing and managing these complications

Competency 3: Practice-Based Learning and Improvement

- Demonstrate the ability to learn from complications related to vascular access procedures.

Competency 4: Interpersonal and Communication Skills

- Demonstrating effective communication with nursing staff and other ancillary medical professionals when setting up and troubleshooting monitoring devices

Competency 5: Professionalism

- Demonstrate an understanding of the need for the enforcement of quality control measures to prevent complications from vascular access procedures.

Competency 6: Systems-Based Practice

- Demonstrate knowledge of the controversies and literature-based evidence regarding the use of pulmonary artery catheters
- Demonstrate knowledge of developing hemodynamic monitoring technologies in the care of the critically ill patient

10. Neurology

Upon completion of training, the fellow should be able to:

Competency 1: Patient Care

- Demonstrate appropriate and timely evaluation and management of acute neurologic decompensation
- Demonstrate appropriate utilization and interpretation of brain and spinal cord imaging
- Demonstrate an understanding of algorithms for clinical clearance of spine injuries
- Demonstrate appropriate understanding and interpretation of information from monitors of intracranial pressure (ICP), neurophysiology (including electroencephalography and evoked potentials), brain tissue oxygenation, and cerebral blood flow
- Demonstrate appropriate management of extracerebral parameters to minimize risk of secondary brain injury
- Demonstrate knowledge and competency in the evaluation and nonoperative management of severe closed head injury
- Demonstrate appropriate and timely evaluation and management of patient with anoxic encephalopathy
- Demonstrate knowledge of the diagnosis and treatment of abnormalities of sodium homeostasis related to neurologic diseases, including diabetes insipidus, syndrome of inappropriate antidiuretic hormone (SIADH), and cerebral salt wasting
- Demonstrate proper assessment and management of the patient with a stroke (both ischemic and hemorrhagic)
- Demonstrate proper assessment and management of the patient with subarachnoid hemorrhage, including prevention and management of cerebral vasospasm
- Demonstrate the proper assessment and management of patients with intracranial hypertension, including evaluation of data from intracranial pressure monitors or extraventricular drains
- Demonstrate proper assessment and management of patients with spinal cord injury, including airway and hemodynamic management
- Demonstrate appropriate consultation with consultants in physical medicine and rehabilitation and with rehabilitation facilities
- Demonstrate proper performance of brain death certification
- Demonstrate basic principles of support for potential organ donors

Competency 2: Medical Knowledge

- Cite the etiology and pathophysiology of severe closed head injury and intracranial hypertension
- List the risks, benefits, indications, and contraindications for ICP monitoring or extraventricular drain placement, and describe the possible limitations and complications of these devices
- Cite the etiology and pathophysiology of patients with spinal cord injury

- Explain the importance of physical therapy, occupational therapy, and rehabilitation in optimizing patient outcomes from central nervous system and spinal cord injury
- Cite the risk factors for blunt cerebrovascular injury, describe its clinical presentations, and explain strategies for evaluating and treating these patients
- Describe the initial evaluation and management of patients with suspected meningitis, and cite the most likely causal organisms
- Describe predictive and outcome scales used to assess neurologic diseases
- Describe the etiology and pathophysiology of imminent brain death, and explain the criteria for identifying potential organ donors
- Describe the indications, limitations, and general process of brain death evaluation and certification, list the adjunctive tests for determining brain death, and describe the indications and limitations of their use

Competency 3: Practice-Based Learning and Improvement

- Identify the best practice patterns to facilitate care of the critically ill patient with severe neurological injury or dysfunction from operating procedures and patient interactions.

Competency 4: Interpersonal and Communication Skills

- Demonstrate effective communication with staff, peers, attending and referring physicians, consultants, and representatives from the local organ procurement organization
- Establish a collegial rapport with patient and family
- Demonstrate effective discussion of patient diagnoses, prognosis, and management plan (including end-of-life decisions) with patient and family by using simple, easily understood language

Competency 5: Professionalism

- Demonstrate the practice of ethical principles in relation to patient care, including obtaining informed consent, implementing "Do Not Resuscitate" orders, withholding or withdrawing life support, and clarifying goals of care from advance directives

Competency 6: Systems-Based Practice

- Demonstrate consultation skills by identifying a specific need or question when communicating with palliative care or ethics consultants and the organ procurement organization.
- Demonstrate awareness of the role of the ICU, organ procurement organizations, and the transplantation service

11. Nutrition

Upon completion of training, the fellow should be able to:

Competency 1: Patient Care

- Demonstrate competency in the evaluation and assessment of the nutritional needs of critically ill surgical patients
- Demonstrate competency in the management of enteral and parenteral nutrition
- Demonstrate competency in the placement of nasogastric and nasointestinal feeding tubes
- Demonstrate competency in the placement of percutaneous endoscopic gastrostomies, open and laparoscopic gastrostomies, and jejunostomies

Competency 2: Medical Knowledge

- Explain the catabolic and anabolic phases of the response to injury, including the mediators involved in these responses
- Explain the methods of determining resting caloric needs for patients, including the Harris-Benedict equation and indirect calorimetry
- Explain the factors that increase caloric requirements of critically ill surgical patients, including surgical stress, trauma, cancer, sepsis, and previous nutritional status
- Explain estimates of protein stores and protein requirements, including measurement of specific serum proteins and determination of nitrogen balance.
- Compare and contrast the risks and benefits of enteral nutrition versus parenteral nutrition
- Explain the potential electrolyte and glycemic complications of enteral and parenteral nutrition
- Explain the risks involved in placement of enteral access devices, including transnasal, endoscopic, and surgical devices
- Understand the potential use of nutritional support for specific organ system dysfunction
- Understand the principles involved in immuno- or pharmaco-nutrition
- Explain the importance of nutritional status with respect to wound healing

Competency 3: Practice-Based Learning and Improvement

- Assess the effectiveness of the prescribed nutritional support by following the parameters of nutritional status

Competency 4: Interpersonal and Communication Skills

- Demonstrate effective communication with nutritionists, respiratory care, and nursing staff to determine the patients' nutritional needs and to implement the plan of care

Competency 5: Professionalism

- Demonstrate proper performance of all expected professional responsibilities

Competency 6: Systems-Based Practice

- Evaluate and demonstrate cost-effectiveness of nutritional support in critically ill patients
- Demonstrate consultation skills by identifying specific patient needs or questions for which nutritionist consultation would help and provide efficient and effective patient care

12. Obstetrical disorders

Upon completion of training, the fellow should be able to:

Competency 1: Patient Care

- Demonstrate knowledge regarding the management of the pregnant patient with critical illness unrelated to pregnancy
- Demonstrate knowledge of pregnancy-related conditions, including pre-eclampsia/eclampsia, HELLP (hemolysis, elevated liver enzymes, low platelets) syndrome, gestational cardiomyopathy, amniotic fluid embolism, peripartum hemorrhage (placenta previa, placental abruption), and pulmonary edema
- Demonstrate the ability to appropriately select radiographic studies to maximize maternal and fetal well-being when managing the pregnant patient who is critically ill
- Demonstrate an understanding of strategies for managing obstetrical hemorrhage, including coagulopathy, disseminated intravascular coagulopathy (DIC), and massive transfusion

Competency 2: Medical Knowledge

- Describe the physiologic changes (including respiratory, cardiovascular, renal, and gastrointestinal) associated with pregnancy, delivery, and the immediate postpartum period
- Explain how the physiologic changes of pregnancy influence critical care management, including hemodynamic and pulmonary monitoring, pharmacologic concerns, and selection of imaging studies
- Describe the pathophysiology of fetal oxygenation and appropriate monitoring strategies
- Explain the pathophysiology, diagnosis, and management of pregnancy-related conditions that potentially require critical care intervention, including pre-eclampsia and eclampsia, HELLP syndrome, gestational cardiomyopathy, amniotic fluid embolism, peripartum hemorrhage (placenta previa, placental abruption), and pulmonary edema
- Cite the risks for fetal demise related to maternal diagnosis and condition

- Explain how pregnancy and postpartum states influence the appropriate selection of different pharmacological agents

Competency 3: Practice-Based Learning and Improvement

- Describe measures and techniques for improving quality of care and patient and family satisfaction
- Demonstrate the ability to critically review published literature, and demonstrate familiarity with current evidence-based information regarding pregnancy-specific conditions (pre- eclampsia, eclampsia) and those complicating pregnancy (septic shock, thromboembolic disease)

Competency 4: Interpersonal and Communication Skills

- Demonstrate effective communication with obstetrical colleagues, nurses, respiratory therapists, and consulting services for collaborative management of the peripartum patient
- Demonstrate effective communication with patients and family members, both listening and conveying information with appropriate degree of complexity

Competency 5: Professionalism

- Demonstrate respect, compassion, integrity and responsiveness to the needs of the patients and their families, particularly with regard to potential pre-term delivery or fetal demise
- Demonstrate accurate self-assessment, knowledge of professional limits, and an ongoing desire for self-improvement

Competency 6: Systems-Based Practice

- Serve as an advocate for quality patient care with due attention to costs and resources in a complex health care system
- Collaborate with other health care providers, including consulting physicians, nurses, pharmacists, respiratory, and physical and speech therapists, to develop and implement ICU protocols for the obstetrical patients

12. Renal Failure

Upon completion of training, the fellow should be able to:

Competency 1: Patient Care

- Demonstrate appropriate management of oliguria in the critically ill
- Demonstrate appropriate management of electrolyte concentrations, intravascular volume status, and drug dosing in patients with acute renal failure
- Describe the nutritional requirements of patients with acute and chronic renal failure in the ICU

- Describe the relative and absolute indications for renal replacement therapies
- Understand the principles of the different modes of dialysis and solute transport

Competency 2: Medical Knowledge

- Explain the basic physiology and anatomy of the kidney.
- Define the different manifestations of acute renal failure, including anuric, oliguric, and high- output renal failure
- Describe the causes of acute oliguria, including prerenal, intrinsic, and postrenal causes
- Explain the pathogenesis and cellular mechanisms of acute tubular necrosis (ATN)
- Describe the blood flow distribution and oxygen tension in the renal cortex and outer and inner medulla, and explain how these factors affect susceptibility during ischemic insult
- Demonstrate familiarity with the pathologic changes that occur in the tubule from insult to recovery
- Describe the phases of ATN.
- Describe the incidence, risk factors, prevention strategies, and treatment of contrast-induced nephropathy.
- Explain the relationship between acute renal failure and mortality rates in the ICU

Competency 3: Practice-Based Learning

- Describe the controversies between conventional hemodialysis and continuous renal replacement therapy in the ICU environment

Competency 4: Interpersonal and Communication Skills

- Coordinate care between the dialysis staff and critical care nursing
- Develop a treatment plan for dialysis in coordination with the renal medical service and other patient care issues
- Use effective strategies for communicating patient prognosis to family members with respect to degree of organ failure

Competency 5: Professionalism

- Coordinate the management of ICU patients with acute renal failure

Competency 6: Systems-Based Practice

- Explain potential staffing issues unique to ICU patients who require dialysis or continuous renal replacement therapy
- Explain the pros and cons of performing dialysis in the ICU versus in the dialysis unit

16. Respiratory Disorders

Upon completion of training, the fellow should be able to:

Competency 1: Patient Care

- Demonstrate competency in interpreting and applying arterial blood gas data
- Demonstrate competency in using appropriate ventilator settings and modes in mechanically ventilated patients based on specific patient needs
- Demonstrate familiarity with troubleshooting the ventilator to ensure that patients are adequately ventilated and oxygenated
- Demonstrate the ability to interpret radiographic data, including chest X-rays and CT scans, and to apply these data to clinical management plans
- Demonstrate competency in performing respiratory system–related procedures, including intubation, tracheostomy/cricothyodotomy, bronchoscopy, and pleural drainage
- Demonstrate knowledge of difficult airway characteristics and advanced methods for intubation of the difficult airway
- Demonstrate competency in diagnosing and managing patients with pulmonary infections, including pneumonia, ventilator-associated pneumonia, empyema, lung abscess, and tracheobronchitis
- Demonstrate competency in diagnosing and managing pulmonary dysfunction in critically ill patients
- Demonstrate competency in the appropriate application of various weaning strategies to mechanically ventilated patients

Competency 2: Medical Knowledge

- Demonstrate competency in the interpretation of radiographic studies of the chest
- Explain the significance of the different components of pulmonary function tests
- Differentiate the etiologies, diagnostic workup, and management strategies for acute lung injury
- (ALI) and acute respiratory distress syndrome (ARDS)
- Describe methods for preventing, diagnosing, and treating pneumonia
- Explain the causes of acute respiratory failure, hypoxia, and hypercarbia
- Demonstrate an understanding of the appropatie selection and implementation of appropriate ventilator modalities, including non-invasive positive pressure ventilation, continuous positive airway pressure (CPAP), pressure support, synchronized intermittent mandatory ventilation (SIMV), assist-control, pressure control, bi-level, controlled minute ventilation and inverse I:E ratio ventilation, airway pressure release ventilation (APRV), and high frequency, oscillatory ventilation
- Demonstrate an understanding of the use of adjunctive therapies for patients with acute respiratory failure, including inhaled nitric oxide, prone positioning, and extracorporeal membrane oxygenation
- Describe methods for weaning patients from mechanical ventilation and the rationale behind selecting the appropriate strategy

Competency 3: Practice-Based Learning and Improvement

- Describe effective strategies for the prevention of pneumonia and ventilator-associated pneumonia in critically ill patients
- Explain the effectiveness of different ventilator weaning strategies
- Cite evidence-based recommendations for managing patients with ARDS, including the role of pharmacologic agents
- Cite evidence-based recommendations for the diagnosing, treating, and preventing pulmonary infections

Competency 4: Interpersonal and Communication Skills

- Demonstrate effective communication with nurses, respiratory therapists, and physicians who are involved in the management of patients with respiratory failure and/or pulmonary infections
- Develop an effective management plan in collaboration with the surgeons and other consulting
- services for patients with respiratory failure and/or pulmonary infections

Competency 5: Professionalism

- Develop effective relationships with consultants, surgeons, nurses, and respiratory therapists
- Demonstrate sound ethical principles in the care of critically ill patients that refuse respiratory support, or request withdrawal of care
- Develop compassionate and effective methods for communicating with patients and their family members

Competency 6: Systems-Based Practice

- Describe the role and cost-effectiveness of pneumonia prevention protocols in the ICU
- Understand the role and cost-effectiveness of early diagnosis and aggressive treatment of pneumonia in critically ill patients
- Explain the rationale behind developing and implementing protocols for weaning mechanical support in ventilated patients
- Demonstrate awareness of the role of the respiratory therapists in the management of patients with respiratory failure

17. Statistics

Upon completion of training, the fellow should be able to:

Competency 1: Patient Care

- Demonstrate an understanding of the importance of evidence-based medicine

- Demonstrate an understanding of the skills required to critically evaluate new knowledge
- Demonstrate the ability to critically evaluate medical literature
- Demonstrate an understanding of the epidemiology of surgical disease process and how this affects patient care
- Demonstrate an understanding of morbidity and mortality and how these affect cost and outcome
- Demonstrate an understanding of the variables used to calculate and the application of severity of illness scoring systems.
- Demonstrate an understanding of the importance of various prediction models.

Competency 2: Medical Knowledge

- Explain the principles of evidence-based medicine
- Demonstrate understanding of the differences between retrospective, prospective, randomized, and blinded clinical trials
- Explain how to grade and evaluate evidence
- Explain basic statistical comparisons, including *t*-tests, chi-square ($\chi 2$), and analysis of variance
- Explain logistic regression modeling and the association between factors

Competency 3: Practice-Based Learning and Improvement

- Apply statistical methodology to the interpretation and understanding of evidence-based practice
- Demonstrate the ability to select statistically valid evidence from the literature to improve the care of critically ill patients

Competency 4: Interpersonal and Communication Skills

- Demonstrate appropriate understanding and effective communication of evidence-based practice

Competency 5: Professionalism

- Demonstrate a willingness to avoid conflict between personal biases and the practice evidence based medicine

Competency 6: Systems-Based Practice

- Demonstrate an understanding of how evidence-based practice plays a role in the management of critically ill patients
- Explain how to incorporate high quality data into practice change for patient care

18. Transplantation

Upon completion of training, the fellow should be able to:

Competency 1: Patient Care

- Demonstrate competency in managing patients with acute and chronic liver failure, including hepatic encephalopathy, GI bleeding, infections, hepatorenal and hepatopulmonary syndromes, and large volume ascites production
- Demonstrate competency in managing patients with portal hypertension, including indications for and complications of portal-systemic shunts, including transjugular intra-hepatic portal- systemic shunts
- Demonstrate knowledge of the management of patients with variceal bleeding, including placement of esophagogastric balloon tamponade devices
- Cite unique surgical challenges encountered in patients with liver failure, including chronic malnutrition, delayed wound healing, electrolyte derangements (eg, hyponatremia, hyperaldosteronism), and the effects of chronic steroid and/or immunosuppressant use
- Demonstrate appropriate and titrated pre- and postoperative care for the patient with fulminant hepatic failure, with specific focus on the management of encephalopathy, intracranial pressure, and oxygen delivery to the brain
- Demonstrate appropriate management of infection and surgical decision-making in the immunocompromised patient

Competency 2: Medical Knowledge

- Describe pathophysiologic changes in acute and chronic liver failure
- Describe the long-term effects of steroid and/or immunosuppressant use, including chronic malnutrition and electrolyte derangements (eg, hyponatremia, hyperaldosteronism)
- Describe the cardiovascular and hemodynamic consequences of end-stage liver disease
- Describe the various etiologies and pathophysiology of liver failure-related organ dysfunction (eg, hepatic encephalopathy, hepatorenal syndrome, and hepatopulmonary syndrome), and demonstrate appropriate management and monitoring strategies for these patients
- Describe the pathogenesis of altered cerebral blood flow and intracranial hypertension in fulminant hepatic failure, and explain appropriate diagnostic monitoring and management strategies
- Describe key considerations for managing patients who have undergone liver, kidney, pancreas, small bowel, or multivisceral abdominal transplant surgery or placement of portal-systemic shunts, and explain how outcomes for these patients should be evaluated
- Compare and contrast diagnostic evaluations and treatment plans for potential infections in patients who are immunocompetent versus those who are immunosuppressed

- List the opportunistic infections that can occur in patients who have undergone liver transplantation, and cite appropriate diagnostic testing strategies for these infections
- Describe the mechanisms of action and major toxicities of immunosuppressive agents used in solid organ transplantation

Competency 3: Practice-Based Learning

- Explain how to utilize liver failure scoring systems, and describe how organs are allocated

Competency 4: Interpersonal and Communication Skills

- Demonstrate effective team leadership strategies in communicating with families, nursing staff, and organ procurement organizations

Competency 5: Professionalism

- Demonstrate professional interactions with members of organ procurement organizations

Competency 6: Systems-Based Practice

- Demonstrate familiarity with the organ procurement and organ distribution system

19. Trauma

Upon completion of training, the fellow should be able to:

Competency 1: Patient Care

- Demonstrate competency in the initial assessment, triage, and resuscitation of injured patients
- Demonstrate competency in airway assessment and management, including rapid sequence intubation (RSI) and cricothyroidotomy
- Demonstrate competency in recognizing and managing thoracic injury, including simple and tension pneumothorax, [massive] hemothorax, rib fractures and flail chest, pulmonary contusion, and great vessel injury
- Demonstrate familiarity with such procedures as needle chest decompression and tube thoracostomy
- Demonstrate competency in appropriate performance of emergency department thoracotomy
- Demonstrate familiarity with appropriate use of crystalloids and blood products for resuscitation
- Demonstrate competency in implementing massive transfusion protocol
- Cite the advantages and disadvantages of endpoints of resuscitation, including vital signs and other physical examination findings, base deficit, lactate levels, and global oxygen delivery and consumption variables

- Demonstrate familiarity with the type and placement of vascular access and the use of massive transfusion devices
- Demonstrate competency in diagnosing intra-abdominal injury, including the use of focused assessment with sonography in trauma (FAST) examination and diagnostic peritoneal lavage
- Demonstrate competency in recognizing and managing abdominal compartment syndrome and temporary abdominal closure techniques
- Demonstrate competency in the diagnosis and management of pelvic fractures, including recognition of associated injuries
- Demonstrate competency in the management of patients with traumatic brain injury, spinal
- cord injury, and blunt cerebrovascular injury, including the selection and use of intracranial pressure monitoring devices and other brain monitoring devices
- Demonstrate competency in appropriate timing and selection of radiographic studies in the evaluation of the injured patient
- Demonstrate the ability to interpret radiologic and laboratory data to develop comprehensive
- management plans
- Demonstrate knowledge and competency of specific trauma patient populations (eg, pediatric, geriatric, and obstetric)

Competency 2: Medical Knowledge

- Explain the significance of mechanism of injury in the care of the injured patient
- Differentiate between blunt and penetrating mechanisms of injury
- Explain the specific concerns in the care of the injured pediatric, geriatric, or obstetric patient
- Cite the principles of initial trauma evaluation and management
- Describe the different types of thoracic injury and appropriate management strategies for each, including initial and subsequent interventions
- Cite the principles and practice of nonoperative management of solid abdominal organ injury, including injury grading scales
- Describe the causes and pathophysiology of elevated intra-abdominal pressure and abdominal compartment syndrome, as well as principles and complications of temporary abdominal closure
- Describe the pathophysiology of various types of traumatic brain injury (including epidural,
- subdural, intraparenchymal hemorrhage, diffuse axonal injury), and explain techniques for preventing secondary brain injury
- Describe the pathophysiology of intracranial hypertension and its management, including the use of ICP monitoring devices, extraventricular drains, and operative intervention
- Cite key considerations in the management of patients with CNS injury, including fluid selection, nutrition, management of coagulopathy, DVT prophylaxis, and such complications as diabetes insipidus, cerebral salt wasting, and the syndrome of inappropriate antidiuretic hormone release.

- Describe the mechanisms and clinical signs and symptoms of blunt cerebrovascular injury, and and explain potential treatment strategies for these patients
- Explain the pathophysiology of spinal cord and spinal column injury and its clinical presentation, and describe management considerations (including complications) for these patients
- Describe clinical issues associated with spinal cord injury (eg, cardiovascular and ventilator considerations, tracheostomy, DVT prophylaxis, skin integrity, and contracture)
- Demonstrate competency in managing extremity fractures, including optimal timing of fracture fixation, recognition of associated vascular and neurologic injuries, and recognition and prevention of compartment syndrome
- Cite the complications associated with extremity injuries, including rhabdomyolysis, fat embolism syndrome, and compartment syndrome
- Explain key considerations in evaluating and managing the patient with a mangled extremity, including the use of appropriate scores and adjunctive measures
- Explain the significance of different types of pelvic fractures, and demonstrate competency in management of associated injuries (eg, urethral trauma and open fractures)
- Cite the indications for and complications of blood component therapy and application of massive transfusion principles

Competency 3: Practice-Based Learning

- Describe measures and techniques for improving trauma system performance, including review of specific indicators (eg, delay to operative intervention)
- Review published information critically to understand current evidence-based information to optimize resuscitation (eg, fluid selection, blood pressure control), select appropriate radiographic imaging, and tailor care to specific problems (eg, thoracic aortic injuries or prevention of secondary brain injury)

Competency 4: Interpersonal and Communication Skills

- Demonstrate effective communication with emergency medicine colleagues, nurses, respiratory therapists, and consulting services for collaborative management of the injured patient
- Demonstrate effective communication with patients and family members, both listening and conveying information with appropriate degree of complexity
- Develop collaborative relationships with consulting services for optimizing the timing of interventional procedures

Competency 5: Professionalism

- Demonstrate respect, compassion, integrity and responsiveness to the needs of the patients and their families
- Approach discussions of ethical issues (including advanced directive and end-of-life issues) with sensitivity

- Demonstrate accurate self-assessment, knowledge of professional limits, and an ongoing desire for self-improvement

Competency 6: Systems-Based Practice

- Demonstrate an understanding of the impact of a trauma system on regionalization of trauma care
- Demonstrate understanding of cost-effective patient care in a tertiary care hospital setting
- Participate actively in triage decision-making in the setting of multiple casualties
- Serve as an advocate for quality patient care with due attention to costs and resources
- Partner appropriately with other health care providers, including consulting physicians, nurses, pharmacists, respiratory therapists, and physical and speech therapists
- Demonstrate understanding of the role of discharge planning and selection of appropriate discharge venue (rehabilitation facility vs skilled nursing facility vs home

20. Ultrasound Imaging and TEE

Upon completion of training, the fellow should be able to:

Competency 1: Patient Care

- Demonstrate competency in the use of general critical care ultrasonography (GCCU) technology to evaluate and manage critically ill patients

Competency 2: Medical Knowledge

- Demonstrate an understanding of the fundamental principles of ultrasound physics as they relate to obtaining high-quality images and recognizing image artifacts
- Demonstrate competency in interpreting high-quality images and recognizing image artifacts
- Demonstrate familiarity with typical machine controls and transducer manipulation to perform the ultrasound examination at bedside
- Distinguish between normal and abnormal ultrasound anatomy, and recognize the pathophysiologic implications of the imaged abnormality
- Demonstrate competency in interpreting images for relevant clinical applications
- Cite the specific technical and interpretive limitations of ultrasonography with respect to the technology and the technician
- Demonstrate understanding that ultrasonography may yield an indeterminate finding instead of a definitive positive or negative result
- Demonstrate understanding of the appropriate follow-up after an indeterminate finding

Competency 3: Practice-Based Learning and Improvement

- Demonstrate the ability to incorporate the ultrasound into daily practice
- Demonstrate competency in the appropriate use of echocardiographic evaluation, including:
  - Global left ventricular size and systolic function
  - Wall motion abnormalities
  - Global right ventricular size and systolic function
  - Assessment for pericardial fluid/tamponade
  - Basic color Doppler assessment for severe valvular regurgitation
- Demonstrate competency in the appropriate use of hemodynamic evaluation
  - Inferior vena cava size and respiratory variation
  - Cardiac superior vena cava size estimation
  - Central venous pressure estimation
  - Detection of aortic dissection
  - Pulmonary edema
- Demonstrate competency in the appropriate use of lung and pleural ultrasonography
  - Presence or absence of pneumothorax
  - Detection of pleural effusion
  - Diaphragmatic dysfunction
  - Pulmonary edema
- Demonstrate competency in the appropriate use of abdominal ultrasonography
  - FAST examination
  - Extended FAST examination
- Demonstrate competency in the appropriate use of vascular ultrasonography for guidance of vascular access
- Demonstrate competency in the appropriate use of vascular ultrasonography for guidance of vascular access
- Demonstrate competency in the appropriate use of vascular ultrasonography for diagnosis of venous thrombosis

Competency 4: Interpersonal and Communication Skills

- Demonstrate effective team communication between nurses, respiratory therapists, pharmacists, and physicians to plan for patient care by using ultrasonographic exam results
- Develop an effective plan of care with surgeons and nurses for patients with problems diagnosed by ultrasound

Competency 5: Professionalism

- Develop effective relationships with consultants, surgeons, nurses, pharmacists, and respiratory therapists

Competency 6: Systems-Based Practices

- Evaluate the role and cost-effectiveness of using ultrasound protocol in critically ill patients
- Demonstrate awareness of the role of the radiologist and cardiologist in the management of patients when ultrasound results are inconclusive
- Evaluate the outcome and cost-effectiveness of using ultrasound in the ICU for patient management
- Demonstrate competency in the appropriate use of vascular ultrasonography for diagnosis of venous thrombosis

Competency 4: Interpersonal and Communication Skills

- Demonstrate effective team communication between nurses, respiratory therapists, pharmacists, and physicians to plan for patient care by using ultrasonographic exam results
- Develop an effective plan of care with surgeons and nurses for patients with problems diagnosed by ultrasound

Competency 5: Professionalism

- Develop effective relationships with consultants, surgeons, nurses, pharmacists, and respiratory therapists

Competency 6: Systems-Based Practices

- Evaluate the role and cost-effectiveness of using ultrasound protocol in critically ill patients
- Demonstrate awareness of the role of the radiologist and cardiologist in the management of patients when ultrasound results are inconclusive
- Evaluate the outcome and cost-effectiveness of using ultrasound in the ICU for patient management

Appendix H: Fellows' Conference (Journal Club)

Goal:

1. Review the recent journal articles relating to surgical critical care topics.
2. Review the relevant historical articles for reference.
3. Provide an interactive discussion.
4. Integrate evidence-based medicine and tenets of article review with the fellow(s).

Audience: SCC fellow(s) and blue surgery faculty.

Time: Once a month, Monday evening.

Assessment: The quarterly evaluation of the SCC fellow(s) will include an assessment of practice-based learning. The SCC fellow(s) will evaluate the didactics of the fellowship annually including the journal club.

Selection of Articles: The faculty will select relevant critical care journal articles from most recent publications from journals including JOTACS, CCM and others. This will keep the fellows and faculty up-to-date on the most recent research findings. SCC faculty will contribute paired historical articles as applicable.

Appendix I: Fellow's Operative Conference

Goal:

1. Review recent operative cases by the Instructors
2. Discuss advanced operative techniques
3. Review process improvement opportunities
4. Discuss related evidence-based medicine research

Time: Every Monday at 4pm
Attendance by fellows is mandatory

Resources: Advanced Trauma Operative Management, Top Knife

Format:

1. The list of cases will be published by email to the faculty group by the trauma/EGS ICU fellow on Monday morning.
2. The fellow(s) will present a recent operative case for which they were the operating surgeon.
3. The group will discuss surgical options and advanced operative techniques for the case presented.
4. The instructor(s) will present a pre-determined operative technique topic from the resources above.

The instructor(s) will present relevant evidence-based medicine research for the operative topic discussed above.

Appendix J: Previous Fellows' Productivity

Fadi R. MAKHOUL, MD 2011-2012

Yates JL, **Makhoul FR**, Skinner SC, Shashidhar H. Laparoscopic imaging of pancreatic agenesis with congenital absence of the gallbladder. J Pediatr Gastroenterol Nutr. 2012 Jan 19. [Epub ahead of print]

Erik HASENBOEHLER, MD 2009-2011

Proctor LD, Korosec R, Kearney PA, Chipko PP, Boulanger BR, Chang PK, Bottiggi A, **Hasenboehler** E, Zwischenberger JB, Bernard AC. Acute Care Surgery is a Profitable Service Line: Implications for Surgeon Shortage and Access. JACS (Accepted)

Hasenboehler E, Bottiggi A, Tucker B, Bernard AC, Chang PK, Boulanger BR, Kearney PA. Treatment of traumatic flail chest with a muscle sparing open reduction and internal fixation technique: Description of Surgical Technique J Trauma. 2011 Aug;71(2):494-501

Proctor LD, Korosec R, Kearney PA, Chipko PP, Boulanger B, Chang PK, Bottiggi A, **Hasenboehler** E, Zwischenberger JB, Bernard AC. Acute Care Surgery is a Profitable Service Line: Implications, Surgeon Shortage and Access. 69th Annual Meeting of the American Association for the Surgery of Trauma, September 22-25, 2010, Boston, MA.

1. Full /Prospective/ Multi-center IRB# 09-0961-F2L
Randomized, Prospective Trial of Open Reduction Internal Fixation versus Non-operative Management of Closed Displaced Clavicle Fractures

Brian SONKA, MD 2007-2009

Procter L, Bernard A, Fryman L, Kearney P, **Sonka** B, Chang P, Boulanger B, Ginn G, Pienkowski D. Plank Fence Penetration into Auto-Implications for Prevention Initiatives. Academic Surgical Congress, Ft. Myers, Florida February 2009.

Perry J, Kearney P, **Sonka** B, Chang P, Boulanger B, Bottiggi T, Bernard AC. Acute care surgery rotation contributes significant operative volume to residency training compared to other rotations. American Association for the Surgery of Trauma September 2009, Pittsburg, PA.

Jeffrey COUGHENOUR, MD 2006-2008

Bernard AC, Overall P, Meier CF, May J, Lock D, Kasten M, **Coughenour** J, Chang P, Boulanger B, Kearney PA. Cytolysis Enhances Packed Red Blood Cell (PRBC) Consumption of Arginine by Arginase-A Novel RBC Storage Lesion. Eastern Association for the Surgery of Trauma. January 2008, Amelia Island, Florida.

Lee C, Bernard A, Fryman L, **Coughenour** J, Costich J, Boulanger B, Chang P, Kearney P. Factors that may contribute to delay in transfer of trauma victims. Kentucky Committee on Trauma Resident Paper Competition, November 2007.

Overall P, Bernard A, Meier C, May J, Lock D, Kasten M, **Coughenour** J, Chang P, Boulanger B and P Kearney. Packed red blood cell (PRBC) cytolysis enhances arginine consumption by arginase-A novel mechanism for failure of transfusion to enhance oxygen delivery in patients with acute coronary syndrome. Gill Heart Symposium, Lexington, Kentucky, October 19, 2007.

Lee C, **Coughenour** J, Chang P, Fryman L, Boulanger, B, Kearney P, Bernard AC. Imaging that May Delay Inter-Facility Transport of Trauma Victims: A Survey Study of Referring Physicians. Accepted for presentation, American Association for the Surgery of Trauma, September, 2007, Las Vegas, NV

Bernard AC, Meier C, **Coughenour** J, Chang P, Boulanger B, Kearney PA. T-cell CD3 and Zeta Chain Expression are Suppressed by Red Blood Cell Arginase. Accepted for presentation, American Association for the Surgery of Trauma, September, 2007, Las Vegas, NV.

Kasten M, Meier C, May J, Manning E, Adams W, **Coughenour** J, Chang P, Kearney, PA, Boulanger B, Bernard AC. Packed Red Blood Cell Mediated Arginine Depletion and the Effect on Human T-Cell Proliferation. Kentucky Chapter, American College of Surgeons, September 2006.

Lee CY, Bernard AC, Fryman L, **Coughenour** J, Costich J, Boulanger B, Chang P, Kearney PA. Imaging may delay transfer of rural trauma victims: a survey of referring physicians. J Trauma. 2008 Dec;65(6):1359-63.l

Appendix K: Fellow Milestones Evaluation

Appendix L: Previous Fellows Process Improvement Projects

2017 PI project - Charlie Harris, MD:
Guidelines for Splenic Angiography

UK problem:

The treatment of choice for blunt splenic injury has traditionally been splenectomy. However, in the late 1990s, studies began showing that 65% of blunt splenic injuries could be managed non-operatively with a 98% success rate. EAST first published practice management guidelines for non-operative management of blunt splenic in juries in 2003, and updated those guidelines in 2012. Splenic angioembolization (SAE) has become an important consideration in splenic preservation after blunt trauma, and requires coordination between the trauma section and Interventional Radiology. Unfortunately, the perception is that it is often difficult to get appropriate patients to IR in a timely fashion. This is due to several factors, one being that communication may be difficult due to a lack of standardization of SAE indications between departments. Currently, there are no protocols that exist at the University of Kentucky to facilitate when IR evaluation for SAE would be appropriate, potentially leading to delays and even the withholding of SAE and splenic salvage from patients to whom it would have provided a benefit. The purpose of this PI project is to create an evidence-based protocol for SAE in blunt spleen trauma to facilitate intra-departmental communication and expedite care.

Plan to change:

An evidence-based SAE protocol and algorithm will be developed with collaboration from Interventional Radiology.

Involved personnel:

Trauma and Interventional Radiology faculty

Implementation:

A literature review was performed and relevant articles obtained, including the most recent EAST practice management guidelines and the WTA's algorithm for management of blunt splenic injury. Published algorithms from other centers were also reviewed. From these resources, an algorithm for management of blunt splenic injury was developed. This was extrapolated into an evidence-based written protocol and circulated among the leadership of the trauma section.

The proposed protocol was then submitted to Dr. Krohmer, division chief of vascular and interventional radiology. It was then reviewed with Dr. Krohmer and Dr. Raissi, and accepted without changes. During discussion with the Interventional Radiology, the IR faculty provided important feedback regarding relevant concerns from their point of view

in getting patients to the IR suite in a timely fashion. Their concerns were relayed to the appropriate leaders of the trauma program for a separate review.

Evaluation/Outcome:

The protocol will be made available in the UK trauma manual and published on the UK trauma blog. It will be made available to trauma and radiology faculty, residents and APPs. Coordinating care between departments should speed up the rate at which cases are evaluated and treatment plans finalized. Unfortunately, no objective measure of the success or failure of this goal has been agreed upon. If there are any further concerns within either department on the timeliness of angiographical intervention, it would be prudent to formally review on a case-by-case basis, with the Department of Interventional Radiology appropriately represented, at the Inter-Departmental Trauma Quality Assurance committee meeting.

2016 PI project - Alex Edwards, MD:
Improvement Of Pregnant Trauma Protocol And Creation Of Maternal Code Protocol

Problem:

Trauma is the leading non-obstetric cause of maternal death. UK has experience in dealing with bluntly injured pregnant women, however a recent trauma code related to penetrating trauma in a pregnant woman brought some issues to light. Firstly, we had never had a trauma code involving a pregnant woman who was viable based on gestational age. Secondly, the OB literature regarding indications for cesarean after trauma code is sparse and the literature regarding the utility of cesarean in cardiopulmonary code resuscitation is robust. Lastly, simultaneous assessment of the fetus and mother is feasible, but was not routinely part of ATLS.

Plan to change:

Improve work flow of pregnant trauma victims through ATLS with the addition of OB assessment within the primary survey. Improve ease of use of pregnant trauma protocol with grid format. Create a maternal code algorithm

Involved personnel:

Trauma team and obstetrics teams

Implementation:

During meetings with trauma and MFM, decision made to allow fetal heart tone assessment during primary survey. This is to be done simultaneously by the obstetric team and not to disrupt the ongoing ATLS resuscitation of the patient. Following this, patient will be placed on the monitor during secondary survey if viable. A determination between trauma and obstetrics of the maternal and fetal status respectively will help develop a plan of care. To simplify the workflow, a grid was created where intersecting

the maternal and fetal status will give the next general course of action. A maternal code algorithm was created separately from the pregnant trauma protocol.

Evaluation:

Protocols were reviewed and evaluated by trauma and obstetrics committees.
Outcome:

Protocol reviewed and accepted by trauma and obstetrics in May with minor changes. Maternal code protocol will be undergoing review by obstetrics safety committee during June.

2015 PI Project – Cherry Song, DO:
Improvement of Pressure Ulcer Documentation

UK Problem:

UK has a wound care team who takes care of most all pressure ulcer development in the hospital. However, since the wound team functions independently, this result in lack of physician documentation of development and awareness of pressure ulcer. This affects patient care with lack of follow up, and Impairs sign out communication between facilities. At the same time it also impairs ability to bill without proper documentation.

Plan to Change:

Plan on improving documentation on the physician part to increase awareness of pressure ulcer and to meet the criteria for billing.

Involved personnel:

Wound care team/nurses and IT department.

Implement/Timeline:

Discussion between wound care/IT and physician had been started since April 2015. Attempts of meeting up with physicians on a weekly basis had been made though without much result seen.

The active problem list had been used as part of the billing process. Since physicians generally are not aware of the wound and will not know to list as active problem, decision was made to allow the wound care nurses to enter the active problem list. This has started in June 2015.

Hopes are that it had been emphasized to the physicians to use the active problem lists to generate their plans for progress note, that this would become part of their daily note once they see the diagnosis in the active problem list.

Evaluation:

Chart audit will be performed in October 2015. At which time we will discuss with billing department to see if we have met the documentation goal. Will also obtain feedback from the wound care team to see if improvement have been made to decrease the incidence of pressure ulcer with increasing awareness.

Outcome:

The general incidence of pressure ulcer has improved especially with device related pressure ulcer per monthly pressure ulcer record. As for documentation, a total of 71 records were audited with 4 excluded due to 2 were still inpatient status, and 2 were pending final coding. Even though the wound care team is able to update the active problem list, the physicians are still only capturing about 70% of the documentation (47/67 times) in their notes. This also results in only 51% (34/67) that were able to be properly coded in billing. There continues to be obvious need for improvement in physician documentation and awareness. This process will continue on to the next step of discussion with the wound care team to utilize snapshot in the SCM to prompt the physicians to look for wound care documentation, versus generating a separate template of wound care note for physicians to complete.

2013 PI Project – Chris Culpepper, MD:
UK Burn Program Protocol Manual

(manual can be found on CareWeb or http://uktraumaprotocol.blogspot.com)

A clear and irrefutable problem within the Department of Trauma Surgery and Surgical Critical Care was identified at the University of Kentucky. No organization in the care of the traumatically burned patient was evident. This problem was identified early in my fellowship year.

Beginning the academic year of 2012-2013, burn trauma was disorganized, resulting in chaotic care between the trauma and plastic surgery services. It was never clearly stated *who* admits the patient, *who* the nurses call, *when* patients were operated, and most importantly, *how* to critically review the care of burn patients. An obvious need existed to organize and revamp the burn program at UK.

A burn quality improvement taskforce was created. Members included: a staff trauma surgeon, the surgical critical care fellow, a staff plastic surgeon, a plastic surgery resident assigned to the burn rotation, a pharmacist and nutritionist, the burn unit nurse managers, all of the burn unit nurses, and representatives from physical therapy and occupational therapy. Each member of this team agreed there was a problem in burn patient care. A plan was set into motion in order to completely overhaul the program.

Quality improvement meetings were established on a monthly basis, i.e. the first Tuesday of each month. The goal and focus of these meetings were to first establish a Burn Manual to lay a protocol for the care of the burned patient at UK. The protocol manual was based on the American Burn Association practice guidelines. Once agreed upon by

all members, the Burn Manual was added to the UK Trauma Manual, easily accessible online for ED physicians, Surgery Residents, nurses, etc. to reference in order to troubleshoot questions and to formalize care.

As the year progressed, the monthly meetings shifted focus from establishing a process to evaluating the effectiveness of implementation. Early on, as a part of this evaluation, there was a clear need for weekly multidisciplinary burn rounds. This required all team members (surgeons, nurses, PT/OT, RT, pharmacy) to formally round on the burn patients together to identify daily/weekly/monthly issues and goals of care for the patients and family members. The weekly multidisciplinary round became an obvious necessity and integral part of the system overhaul.

Along with monthly QI meetings, a monthly morbidity and mortality conference was created. This allowed the team to formally review each morbidity and mortality in an effort to improve our care and examine on a case-to-case basis what went wrong, what could have been done better, etc. Again, members included all surgeons and nurses involved as well as all of the QI team members.

Overall, there was a clear need for improvement of the burned patient at UK. A taskforce team was established, a protocol manual was written, and meetings were set to implement and evaluate progress. Undoubtedly, the care of the traumatically burned patient improved as a result of this program.

2012 PI Project – Fadi Makhoul, MD:
PEG Tube PMG

Indications for PEG tube placement include:	Contraindications to the <u>placement</u> of PEG access:
-Oncological disorders: stenosing tumors in the Head and Neck region or the upper gastrointestinal tract; - Neurological disorders: - Dysphagia after stroke or cranio-cerebral trauma, - Cerebral tumors, - Bulbar paralysis, -Parkinson's disease, - Amyotrophic lateral sclerosis. - Cerebral palsy. - Palliative drainage of gastric juices with chronic gastro- intestinal stenosis or ileus <u>Less common indications include:</u> - Wasting in AIDS, - Short bowel syndrome, - Reconstructive facial surgery wth inability to eat, - Prolonged coma, - Polytrauma,	- Serious coagulation disorders (INR> 1.5, PTT>50s, platelets< 50.000/mm3), - Interposed organs (e.g. liver, colon), - Marked peritoneal carcinomatosis, - Severe ascites, - Peritonitis, -Anorexia nervosa, - Severe psychosis, -Clearly limited life expectancy, -Hemodynamic instability, -Sepsis, - Abdominal wall infection at the selected site, - Gastric outlet obstruction (if PEG tube is being placed for feeding), - Severe gastroparesis (if PEG tube is being placed for feeding), -History of total gastrectomy, - Lack of informed consent for the procedure.

- Crohn's disease with poor appetite, - Cystic fibrosis with progressive weight loss, - Chronic renal failure with waisting. - Congenital abnormalities, e.g. tracheo-oesophageal tis- tula.	Relative contraindications: - Presence of oropharyngeal or esophageal malignancy (potential risk of seeding of the PEG tract) - Portal hypertension with gastric varices -History of prior abdominal surgeries (possible presence of adhesions and bowel interposition) -Ventral hernia - Peritoneal dialysis - History of partial gastrectomy
Complications: -Cardiopulmonary compromise associated with overseda tion - Allergic reaction to the sedatives or antibiotic adminis- tered - Aspiration -Infection of the stoma site (most common) - Peristomal leakage -Bleeding -Pneumoperitoneum (common; self-limiting if without evidence of peritonitis) -Transient gastroparesis or, rarely, ,leus -Inadvertent perforation of the colon or small intestine -Gastric outlet obstruction caused by internal bumper mi- grating distally - Gastric wall ulceration with long-standing PEG tubes -Inadvertent PEG tube removal (by an agitated or con- fused patient) - Buried bumper syndrome - Necrotizing fasciitis - Colocutaneous fistula (becomes apparent at time of PEG tube replacement) - PEG tract tumor seeding - Peritonitis□□<u>Post Procedure Care</u>	<u>Post Procedure Care</u> - The first change of dressing should be performed the morning after PEG placement and then daily until the tract granulates (7days). - In order to avoid buried bumper Syndrome. the tube should be pushed approximately 2-3 em into the stomach and carefully pulled back up to the resistance of the internal fixation flange. -After feed or medication administration the tube should be flushed with about 40 ml of drinking or mineral water. -The patient and his/her relatives may need to be trained in care of the tube and administration of the feed. - The C-clamp should be repositioned daily or preferably left open if not needed. - It is recommended that the PEG tube should not be re- moved within the first 10 days after placement.

Appendix M: Resident/Fellow Notification Process

ICU (Notify Fellow or Chief):

Persistent Hypoxia
Arrhythmia with Hypotension
Persistent or Worsening Lactic Acidosis
New and Unresponsive Oliguria / Anuria
Increasing Ventilator Needs
Significant Worsening of Physical Exam, Laboratory / Radiographic Test, Vital Signs
Consideration of Another Service Consult

Floor (Notify Chief):

All of the above for ICU, plus:
Requests for AMA
Rapid Response Calls
Persistent Nursing Calls on a Single Patient
Difficult Family Interaction

All (Notify Attending):

Call: Major Family Conflict
Transfer to ICU
Missed Injury

Change in disposition from OR/ED (planned to ICU but now PACU)
New Admissions / Consults
Conflicts with Consult Services
Procedure Complications
New, Refractory Organ Failure

Code
Death (if not DNR, WOC)

Text: Death (if DNR/WOC)
Consult Service procedures/operations
Before Invasive Procedures
Pt leaving AMA
Transfer from Floor to Progressive Care

Appendix N: Back-up Attending Notification for Instructors

While fellows have a graded progression of autonomy and decision-making during their first year with exposure to complex ICU patients, trauma resuscitations, and operative management, there are situations for which the instructor should notify critical care faculty for assistance.

Fellows are mandated to involve back-up faculty for the following situations:
− adverse outcome or death is anticipated
--instructor experience is limited
− multiple operative cases are anticipated
--multiple trauma reds and an operative procedure occurring simultaneously
--any critically ill or highly complex trauma or acute care surgery patients

Appendix O: Surgical Critical Care Log

Experience Report							
Abbreviation Key for types of Care Provided: HM = Hemodynamic Monitoring; VS = Ventilatory							
Support; CR = Cardiac Resuscitation; D/H = Dialysis/Hemofiltration; NS = Nutritional Support							
ID	**Age**	**Principal Diagnoses**	**Length of Stay**	**Operations**	**Role**	**Type of CC**	**Outcome**
1	37	Multisystem blunt force trauma, respiratory failure, feeding difficulty	22		ICU Consultant	HM:Yes VS: Yes CR:Yes D/H:No NS:Yes	Died in ICU
1	84	Closed head injury, Respiratory failure, renal failure	34	placement of ingerior vena cava filter	ICU Consultant	HM:Yes VS:Yes CR:Yes D/H:Yes NS:Yes	Left ICU alive, Alive in hospital

ADDENDUM

Point of Care Ultrasound Program for Surgical Critical Care Fellows
Surgical Critical Care Program Directors Society (SCCPDS) Ultrasound Committee

Co-Chairs:
Jay Doucet
Paula Ferrada

Members:
Dennis Ashley
Amy Christie
Alison Fecher
Timothy Novosel

Background

The use of ultrasound (including general and cardiac) as an extension of the physical examination when treating the critically ill, was born out of necessity; a need for informed decisions regarding real-time anatomic and physiologic information, especially when guiding therapy of a hypotensive patient. The route of education for ultrasound has been different for every specialty, each with barriers and opportunities for enhanced collaboration between disciplines.

There is ample evidence that both general and cardiac critical care ultrasound can be performed and interpreted accurately by intensive care physicians. Recently, guidelines for the appropriate use of bedside general and cardiac ultrasound for the evaluation of critically ill patients27, as well as international consensus statements regarding the training standards for achieving competency in both general critical care ultrasound (GCCUS) and critical care echocardiography (CCE basic and CCE advanced) have been published.25

The following document is a suggestion for surgical critical care fellowship training programs to standardize training in this emerging bedside technique. These suggestions are for training in CCE, referring to high yield anatomic and physiologic information to guide clinical conduct on a critical care patient. 2

The suggested curriculum consists of the following components:

- At least one surgical critical care faculty member should be skilled in critical care ultrasound to coordinate fellow training in this modality.
- The faculty responsible for ultrasound training of fellows should at least complete a formal ultrasound course and demonstrate proficiency in the subject of ultrasound as well as in teaching.
- All training programs should have access to a dedicated ultrasound machine with high quality 2-D imaging and full Doppler capability on a 24-hour basis in the intensive care unit (ICU). The machine should have capabilities for image saving and storing.

- A course including didactics and hands-on skill stations for performing and interpreting bedside ultrasound.
- Maintenance of a fellow logbook documenting critical care ultrasound examinations.
- Twenty five examinations per organ system with proctoring.
- Supervision and proctoring entails monitoring the real-time image acquisition and interpretation of the test.
- It is desirable for educational programs to have a system for saving images and clips for quality improvement evaluation of both fellow interpretation and quality of image acquisition.

Course:

- We suggest a course that divides critical care ultrasound into GCCUS and CCE-Basic with both didactic lectures and image-based training specific to the designated topic.

Suggested objectives of the GCCUS course:

By the end of the course the trainee will be able to:

- Identify normal lung and pleura
- Identify hemothorax, pneumothorax, and lung consolidation
- Identify arteries and veins for vessel cannulation and recognition of deep vein thrombosis (DVT)
- Identify the components screened during the Extended Focused Assessment with Sonography for Trauma (E-FAST)
- Demonstrate adequate image acquisition for all general systems involved
- Demonstrate adequate skills for ultrasound-guided intravascular catheter insertion

Suggested objectives of the CCE-Basic course:

- Identify normal cardiac anatomy, including each chamber, valves, papillary muscles, etc.
- Identify and acquire the following cardiac views: parasternal long axis view, parasternal short axis view, apical four chamber view, apical two chamber view, subxiphoid four chamber view, and subxiphoid inferior vena cava (IVC) view
- Qualitative assessment of left ventricular (LV) size and LV systolic function
- Qualitative assessment of global right ventricular (RV) size and function
- Measurement of IVC size and respiratory variation (both in spontaneous breathing and on positive pressure ventilation)
- Identify cardiac pathologies including, but not limited to, hypovolemic and cardiogenic shock, LV failure, RV failure, cardiac tamponade, pulmonary embolus, severe valvular regurgitation
- Recognize when a formal study by an echocardiographer may be indicated

For programs that are equipped **with transesophageal echocardiography (TEE) capability,** suggested objectives of a one-day course on Basic TEE are as follows:

- Review the clinical indications and scenarios in which placement of a TEE probe may be useful in the hemodynamic monitoring of a mechanically ventilated ICU patient
- Review safe insertion techniques for TEE probe placement in an intubated patient
- Identify three limited TEE views for the purpose of hemodynamic monitoring: superior vena cava (SVC) view, midesophageal four chamber view, and transgastric short axis view (papillary muscle level)
- Qualitative assessment of global LV and RV size and function, as well as identification of fluid responsiveness
- Be able to obtain quantitative measurements: SVC collapsibility index, LV and RV end-diastolic area (LVEDA and RVEDA), and calculate RVEDA/LVEDA ratio
- Identify cardiac pathologies including, but not limited to, hypovolemic and cardiogenic shock, LV failure (both global and heterogeneous), RV failure, cardiac tamponade, pulmonary embolus
- Recognize when a formal TEE study by an echocardiographer may be indicated

In order to attest to the fellow's capacity to perform bedside critical care ultrasound upon graduation, the following requirements are suggested:

For each area, we suggest obtaining **25 images reviewed by supervising attending (**25 for lung, 25 for heart, 25 for abdomen, 25 for vascular)

<u>Limited Bedside Echocardiogram</u>

- Clip of parasternal long axis view
- Clip of parasternal short axis view at level of mid-ventricle
- Clip of apical four chamber view
- Clip of apical two chamber view
- Clip of subxiphoid long axis view
- Clip of IVC during inspiration/sniff

<u>Extended Focused Assessment with Sonography for Trauma</u>

- Clip of bilateral sliding lungs
- Clip of hepatorenal interface showing the costophrenic angle and liver tip
- Clip of subxiphoid long axis view
- Clip of splenorenal interface showing subphrenic space and costophrenic angle
- Clip of pelvic rectovesical interface

<u>Limited Bedside Venous Ultrasound</u>

- Clip of compression of proximal femoral vein
- Clip of compression of superficial femoral vein
- Clip of compression of popliteal vein

Limited Bedside Thoracic Ultrasound

• Clip of bilateral sliding lungs
• Clip of bilateral upper and lower lung looking for B-lines (4 separate clips)
• Clip of bilateral costophrenic angles

Procedural Ultrasound

• Clip of needle in vein (peripheral or central) OR
• Clip of main portion of whatever bedside procedure being performed (thoracentesis, thoracostomy tube placement, etc.)

Limited Transesophageal Echocardiography (for programs with TEE capability)

• Clip of SVC view
• Clip of midesophageal four chamber view
• Clip of transgastric short axis view (papillary muscle level)

Particularly for bedside echocardiography, we suggest 3 levels of proficiency

Level 1 requirements:

• Perform the basic echocardiographic examinations safely and accurately, acquiring all standard views. The ideal windows are parasternal long axis (PLAX) view, parasternal short axis (PSAX) view, apical four chamber (A4CH) view, subxiphoid long axis (SLAX) view, and subxiphoid IVC (SIVC) view.
• Recognize and differentiate between normal and abnormal cardiac anatomy and physiology (presence of a pericardial effusion, global decrease of LV or RV function, severe hypovolemia)
• Recognize when a second opinion is indicated
• Describe the relationship between echocardiographic images and other diagnostic techniques
• 25 proctored transthoracic echocardiography (TTE) examinations

Level 2 requirements:

• Perform the echocardiographic examinations safely and accurately and acquire all standard views
• Recognize and correctly diagnose life-threatening conditions within the cardiovascular system (severe hypovolemia, cardiac failure, pulmonary emboli, cardiac tamponade, severe valvular regurgitation)
• Understand and perform M-mode and color flow Doppler
• 25 proctored TTE examinations, and additional 10 TTE proctored examinations with pathology, as well as demonstrating competency in performing M-mode and color Doppler, 50 TTE logged examinations, and one-day CCE course
• *For programs with TEE capability, 25 proctored TEE examinations, 10 of these proctored TEE examinations with pathology, a total of 50 TEE logged examinations

Level 3 requirements: (Advanced Critical Care Echocardiography)

- Perform accurately and safely all the TTE windows
- Understand and perform M-mode, color flow Doppler, tissue Doppler, can obtain LV stroke volume (LVSV) assessment using direct measurement of LV outflow tract area [LVOT(A)], and can obtain diastolic function measurements. Can assess RV size comparing RVEDA/LVEDA ratio, measure RV systolic pressure (RVSP) utilizing continuous wave Doppler, and evaluate for tricuspid annular plane systolic excursion (TAPSE)
- Must also obtain competence in basic TEE
- Teach echocardiography at all levels
- Know and follow the evolution of echocardiography
- List of suggested number of examinations:
    - 25 proctored TTE examinations in normal
    - 25 proctored TTE examinations with pathology
    - 10 TTE examinations demonstrating proficiency in above measurements
    - 150 TTE total logged examinations
    - 50 proctored TEE examinations
    - 100 logged TEE examinations

Suggested Articles

(1) Kendall JL, Hoffenberg SR, Smith RS. History of emergency and critical care ultrasound: the evolution of a new imaging paradigm. Crit Care Med 2007; 35(5 Suppl):S126-S130.
(2) Pershad J, Myers S, Plouman C, Rosson C, Elam K, Wan J et al. Bedside limited echocardiography by the emergency physician is accurate during evaluation of the critically ill patient. Pediatrics 2004; 114(6):e667-e671.
(3) Sloth E, Larsen KM, Schmidt MB, Jensen MB. Focused application of ultrasound in critical care medicine. Crit Care Med 2008; 36(2):653-654.
(4) Sloth E. Echocardiography in the ICU. Intensive Care Med 2006; 32(8):1283.
(5) Ferrada P, Anand RJ, Whelan J, Aboutanos MA, Duane T, Malhotra A et al. Limited transthoracic echocardiogram: so easy any trauma attending can do it. J Trauma 2011; 71(5):1327-1331.
(6) Mateer J, Plummer D, Heller M, Olson D, Jehle D, Overton D et al. Model curriculum for physician training in emergency ultrasonography. Ann Emerg Med 1994; 23(1):95-102.
(7) Manasia AR, Nagaraj HM, Kodali RB, Croft LB, Oropello JM, Kohli-Seth R et al. Feasibility and potential clinical utility of goal-directed transthoracic echocardiography performed by noncardiologist intensivists using a small hand-carried device (SonoHeart) in critically ill patients. J Cardiothorac Vasc Anesth 2005; 19(2):155-159.
(8) Gunst M, Sperry J, Ghaemmaghami V, O'Keeffe T, Friese R, Frankel H. Bedside echocardiographic assessment for trauma/critical care: the BEAT exam. J Am Coll Surg 2008; 207(3):e1-e3.
(9) Fedson S, Neithardt G, Thomas P, Lickerman A, Radzienda M, DeCara JM et al. Unsuspected clinically important findings detected with a small portable ultrasound

device in patients admitted to a general medicine service. J Am Soc Echocardiogr 2003; 16(9):901-905.
(10) Yim ES, Gillis EF, Ojala K, MacDonald J, Basilico FC, Corrado GD. Focused transthoracic echocardiography by sports medicine physicians: measurements relevant to hypertrophic cardiomyopathy. J Ultrasound Med 2013; 32(2):333-338.
(11) Vignon P, Dugard A, Abraham J, Belcour D, Gondran G, Pepino F et al. Focused training for goal-oriented hand-held echocardiography performed by noncardiologist residents in the intensive care unit. Intensive Care Med 2007; 33(10):1795-1799.
(12) Ho AM, Critchley LA, Leung JY, Kan PK, Au SS, Ng SK et al. Introducing Final-Year Medical Students to Pocket-Sized Ultrasound Imaging: Teaching Transthoracic Echocardiography on a 2-Week Anesthesia Rotation. Teach Learn Med 2015; 27(3):307-313.
(13) Frederiksen CA, Juhl-Olsen P, Andersen NH, Sloth E. Assessment of cardiac pathology by point-of-care ultrasonography performed by a novice examiner is comparable to the gold standard. Scand J Trauma Resusc Emerg Med 2013; 21:87.
(14) Via G, Hussain A, Wells M, Reardon R, ElBarbary M, Noble VE et al. International evidence-based recommendations for focused cardiac ultrasound. J Am Soc Echocardiogr 2014; 27(7):683.
(15) Ferrada P, Wolfe L, Anand RJ, Whelan J, Vanguri P, Malhotra A et al. Use of limited transthoracic echocardiography in patients with traumatic cardiac arrest decreases the rate of nontherapeutic thoracotomy and hospital costs. J Ultrasound Med 2014; 33(10):1829-1832.
(16) Ferrada P, Evans D, Wolfe L, Anand RJ, Vanguri P, Mayglothling J et al. Findings of a randomized controlled trial using limited transthoracic echocardiogram (LTTE) as a hemodynamic monitoring tool in the trauma bay. J Trauma Acute Care Surg 2014; 76(1):31-37.
(17) Ferrada P, Vanguri P, Anand RJ, Whelan J, Duane T, Aboutanos M et al. A, B, C, D, echo: limited transthoracic echocardiogram is a useful tool to guide therapy for hypotension in the trauma bay--a pilot study. J Trauma Acute Care Surg 2013; 74(1):220-223.
(18) Ferrada P, Vanguri P, Anand RJ, Whelan J, Duane T, Wolfe L et al. Flat inferior vena cava: indicator of poor prognosis in trauma and acute care surgery patients. Am Surg 2012; 78(12):1396-1398.
(19) Ferrada P, Anand RJ, Whelan J, Aboutanos MA, Duane T, Malhotra A et al. Qualitative assessment of the inferior vena cava: useful tool for the evaluation of fluid status in critically ill patients. Am Surg 2012; 78(4):468-470.
(20) Pearlman AS, Gardin JM, Martin RP, Parisi AF, Popp RL, Quinones MA et al. Guidelines for optimal physician training in echocardiography. Recommendations of the American Society of Echocardiography Committee for Physician Training in Echocardiography. Am J Cardiol 1987; 60(1):158-163.
(21) Cahalan MK, Abel M, Goldman M, Pearlman A, Sears-Rogan P, Russell I et al. American Society of Echocardiography and Society of Cardiovascular Anesthesiologists task force guidelines for training in perioperative echocardiography. Anesth Analg 2002; 94(6):1384-1388.
(22) Ryan T, Armstrong WF, Khandheria BK. Task force 4: training in echocardiography endorsed by the American Society of Echocardiography. J Am Coll Cardiol 2008; 51(3):361-367.

(23) Neri L, Storti E, Lichtenstein D. Toward an ultrasound curriculum for critical care medicine. Crit Care Med 2007; 35(5 Suppl):S290-S304.
(24) Mayo PH, Beaulieu Y, Doelken P, Feller-Kopman D, Harrod C, Kaplan A et al. American College of Chest Physicians/La Societe de Reanimation de Langue Francaise statement on competence in critical care ultrasonography. Chest 2009; 135(4):1050-1060.
(25) International expert statement on training standards for critical care ultrasonography. Intensive Care Med 2011; 37(7):1077-1083.
(26) Soucy ZP, Mills LD. American Academy of Emergency Medicine Position Statement: Ultrasound Should Be Integrated into Undergraduate Medical Education Curriculum J Emerg Med 2015; 49(1): 89-90.
(27) Frankel HL, Kirkpatrick AW, Elbarbary M, Blaivas M, Desai H et al. Guidelines for the Appropriate Use of Bedside General and Cardiac Ultrasonography in the Evaluation of Critically Ill Patients-Part1: General Ultrasonography. Critical Care Medicine 2015; 43(11): 2479-2502.

Surgical Critical Care Orientation

I have reviewed the Trauma Surgery & Surgical Critical Care handbook.
I understand and agree to abide by its contents.

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Signature Date