

Overview of Goals and Objectives of Rotation: OHSU Medical Intensive Care Unit

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Training in Critical Care Medicine is intended to provide fellows with the necessary cognitive, technical, and ethical/social skills to manage the most complex of medical conditions. Under the direct supervision of Critical Care Specialists, fellows gain the opportunity to evaluate, manage, and coordinate the care of a diverse population of patients.

Medical Knowledge: *Residents are expected to demonstrate knowledge of established and evolving biomedical, clinical and social sciences, and the application of their knowledge to patient care and the education of others.*

Mechanical Ventilation:

Over the course of the training program, fellows will demonstrate knowledge of and/or appropriate application of the following:

First Year Fellow:

- Basic physiologic principles underlying mechanical ventilation- estimation of minute ventilation requirements, physiology of shunt
- Lung mechanics- Peak airway pressure, plateau pressure, interpretation of ventilator graphics
- Ventilator Strategies in ARDS-Low tidal volume ventilation, physiologic consequences of permissive hypercapnia
- Ventilator Strategies for Patients with Airflow Obstruction-Permissive Hypercapnia, development of dynamic hyperinflation
- Liberation from mechanical ventilation-Rapid-shallow breathing index, barriers to extubation

Senior Fellow:

- High Frequency Oscillatory Ventilation- Mechanisms of gas exchange, power-amplitude relationships, Hz-tidal volume relationships
- Airway Pressure Release Ventilation- Theoretical advantages of APRV, physiologic basis for determining P_{high}, P_{low} intervals
- Pathophysiology of Ventilator-Induced Lung Injury
- Physiology of LOPing and Proning

Hemodynamic Assessment/Management

Over the course of training, fellows will receive instruction in the technical aspects of pressure measurement and be expected to demonstrate familiarity with the following;

First Year Fellows:

- Principles of measurement/assessment of CVP, PAOP, MAP and cardiac output
- Derivation of SVR, PVR, LVSWI from measured variables
- Appropriate categorization of patients into hemodynamic subsets-Cardiogenic, Hypovolemic, Distributive and Obstructive shock
- Principles of Oxygen Transport
- Pathogenesis of vasodilatory shock

Senior Fellows:

- Limitations and sources of error in the acquisition of hemodynamic data
- PICCO Technology- Concepts of EVLW, Global EDVI, pulse contour analysis

- Pulse Pressure Variation as a measure of fluid responsiveness- Physiologic basis of response, areas of application
- SCCM guidelines for management of patients with hemodynamic instability

Infectious Diseases

Fellows are expected to develop expertise in recognition and management of sepsis and to be knowledgeable in the following areas:

First year Fellows:

- Epidemiology of sepsis, severe sepsis, septic shock
- Categorization of sepsis based on ACCP definitions
- The ATS/IDSA guidelines for CAP/HAP/VAP/HCAP
- The IDSA guidelines for recognition and management of catheter-related infections

Senior Fellows:

- Presentation of agents of bioterrorism and other emerging infectious disease such as MDRTB, SARS, Hantavirus, Group A Streptococcus
- CPIS scoring systems, invasive vs. noninvasive tools in assessing likelihood of nosocomial pneumonia

Sedation/Analgesia/Paralysis

While providing care in the Adult Intensive Care Units, fellows will demonstrate knowledge of action, routes of elimination, active metabolites, adverse effects and appropriate titration of the following agents based on SCCM guidelines

First Year Fellows:

- Sedatives- Lorazepam, midazolam, diazepam, diprivan
- Analgesics- Morphine, hydromorphone, fentanyl
- Paralytics- Succinylcholine, cis-atracurium, pancuronium, vecuronium
- Neuroleptics- Haloperidol, droperidol

Senior Fellows:

- Ketamine, dexmetomidine
- In addition, fellows at advanced level of training are expected to understand:
 - Principles of conscious and deep sedation
 - Impact of sedative practice on ventilator/ICU LOS and development of PTSD
 - Scoring systems used in the assessment of pain, agitation, and sedation.

Management of Fluid and Electrolyte Disorders/ Acute Renal Failure

Over the course of training in the intensive care environment, trainees are expected to develop expertise in the following areas:

- Physiology of Crystalloids and Colloids- Expected intravascular volume expansion in various disease states, expected acid-base derangements during large volume resuscitation, coagulopathies associated with product use, complications of excessive resuscitation
- Assessment of Acid-Base Status- Application of compensation formulae, understanding of Strong Ion Difference in development of saline expansion acidosis, estimation of buffering requirements based on the Henderson-Hasselbach equation
- Approach to Lactic Acidosis- Categorization of Type A and B lactic acidosis, epidemiology of LA, emerging causes of non-ischemic LA including HARRT therapy, propylene glycol infusion
- Pathogenesis of Hyper- and Hyponatremia- Expected volume deficits/ excesses and appropriate rates of correction based on chronicity, central nervous complications associated with management
- Management of Hyperkalemia- Effectiveness of various strategies in lowering potassium, medications associated with hyperkalemia

During the course of training, fellows will develop expertise in prevention, recognition, management, and consequences of acute renal failure. Areas of essential knowledge include:

First Year Fellows:

- Acute Tubular Necrosis- Epidemiology, associated complications
- Rhabdomyolysis- Estimation of risk for pigment-induced nephropathy, associated complications (e.g. compartment syndrome)
- Prevention/Prophylaxis of Nephropathy- Saline infusion, N-acetylcysteine, NaHCO₃
- Nephrotoxic medications-Immunosuppressive agents (CSA, FK506), anti-infective agents (antivirals, aminoglycosides, antifungals), NSAIDS

Senior Fellows:

- Treatment Modalities- IHD, CVVH, CAVH, CVVHD, SCUF, SLED

In providing care for critically ill populations, fellows will demonstrate a working knowledge of pathophysiology along with the ability to identify and manage acute illness and its complications in the following domains:

Endocrine Disturbances in the Critically Ill

- Complications of Diabetes/Hyperglycemia-Diabetic keto-acidosis, hyperosmolar states, stress/steroid induced hyperglycemia
- Adrenal Insufficiency- Relative hypoadrenalism of critical illness, administration of stress steroids in the peri-operative period/critical illness
- Diabetes Insipidus
- Syndrome of Inappropriate ADH

Clotting and Bleeding Abnormalities

- Thrombocytopenia- Drug-induced (HIT), TTP/HUS
- Disseminated Intravascular Coagulation
- Massive Transfusion and associated complications- Hypothermia, citrate toxicity, dilutional/ consumptive coagulopathy
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Gastrointestinal Disorders

- Upper Gastrointestinal Bleeding- Stress-induced gastritis, PUD, variceal hemorrhage
- Lower Gastrointestinal Bleeding
- Care of the Cirrhotic Patient-Hepatic encephalopathy, SBP, HRS, ascites management
- Pancreatitis
- Clostridium difficile colitis

Nutrition

- Total Parenteral Nutrition-Indications, complications, estimation of nutritional needs
- Enteral Nutrition-Indications, complications, specific formulations for patients with renal and hepatic dysfunction

Specific Content Areas:

During the Medical Intensive Care Unit experience, fellows will frequently encounter patients whose problems require highly specialized knowledge. Over the course of MICU rotations, fellows will demonstrate understanding of the problems unique to these populations and their appropriate management.

Care of the Bone Marrow Transplant Patient

First Year Fellows:

- Principles of empiric antibiotic/antifungal therapy during neutropenic fever
- Natural history/Timing of opportunistic/noscomial infections
- Prognosis in patients with respiratory failure, MODS, or prolonged vasopressor support

Senior Fellows:

- Recognition and treatment of non-infectious pulmonary processes including DAH and engraftment syndromes
- Non-pulmonary complications of transplant including veno-occlusive disease, acute and chronic GVHD, neutropenic enterocolitis
- Neurotoxicity of immunosuppressive/anti-infective therapy

Patient Care: *Residents are expected to provide patient care that is compassionate, appropriate and effective for the promotion of health, prevention of illness, treatment of disease and at the end of life.*

First Year Fellows:

- Demonstrate proficiency in use of information systems technology (such as LCR Web, PACS) to assist in patient care
- Use information technology (BICC, PubMed, National Guidelines Clearing House) to support patient care decisions and patient education
- Review history and physical findings with Junior Housestaff and confirm key elements
- Develop a primary, patient-specific management plan, with a reasonable alternate plan
- Develop and perform the skills required to 1) safely and sterilely place central venous and flow-directed pulmonary artery catheters 2) maintain an open airway and assist ventilation with a bag-valve mask 3) safely perform induction and oral ETT placement and 4) recognize and address complications of the above procedures
- Identify patients at high risk for a difficult airway and develop an appropriate management strategy
- Identify patients with ARDS/ALI and initiate appropriate ARDSnet strategies
- Identify patients with early sepsis, severe sepsis, septic shock and institute key components of the IHI sepsis & ventilator “bundles”
- Identify appropriate candidates and implement protocol for therapeutic hypothermia
- Use data from appropriate invasive and non-invasive monitoring devices to diagnose, treat & titrate patient therapy.
- Insure that all patients in the ICU receive appropriate prophylactic therapy based on perceived risk of developing complications associate with medical illness
- Participate in and direct the Rapid Response and Code Teams
- Triage with assistance potential unit admissions
- Identify patient care situations requiring complex management/arrange and participate in patient-centered care conferences
- With assistance, lead discussions regarding withdrawal or withholding of care
- Provide adequate and appropriate sedation and analgesia at the end-of-life

Senior Fellows:

- Defend management plan using EBM
- Triage ICU admissions with minimal assistance
- Demonstrates preparedness, vigilance and safety in intra and inter-hospital transport
- Ensure proper functioning of PICCO and Swan-Ganz monitors and demonstrate zeroing of transducers
- Detect and recognize potential problems with mechanical ventilation (i.e. pt-ventilator dyssynchrony) early, and correct in a proactive fashion
- Initiate alternative forms of mechanical ventilation in patients failing conventional ventilation-APRV, HFOV, LOPing, Proning

- Identify candidates for early extubation and insure adherence to sedation and analgesia guidelines
- Recognize potentially futile care based on available evidence and individual patient goals
- Lead independent discussions regarding withdrawal or withholding of care
- Organize and conduct rounds
- Oversee and staff all invasive procedures in the ICU insuring compliance with performance standards

Practice based Learning: Residents are expected to be able to use scientific evidence and methods to investigate, evaluate, and improve patient care practices.

Fellows at all levels of training are expected to 1) identify areas for improvement and implement strategies to enhance knowledge, skills, attitudes and processes of care 2) analyze and evaluate practice experiences and implement strategies to continually improve the quality of patient practice 3) develop and maintain a willingness to learn from errors and use errors to improve the system or processes of care and 4) use information technology or other available methodologies to access and manage information, support patient care decisions and enhance both patient and physician education. Requirements for this competency include;

First Year Fellows:

- Maintain a list of patients experiencing an untoward event (morbidity and mortality) during their ICU stay
- Review relevant literature surrounding occurrences and presenting findings to fellows and faculty at monthly M&M conference
- Provide limited “root cause” analysis of significant errors and developing relevant action plans
- Review key articles in the literature related to patient safety (see section on conferences) and presenting synopsis at M&M conference
- Demonstrate ability to access critical event and adverse drug reporting forms and participating in surveillance
- Use data from Administrative Quality Improvement projects (i.e. “Crystal report”) to analyze care, identify areas for improvement, and implement practice reform
- Support ongoing basic and clinical science protocols in the ICU by participating in candidate identification or in proposing future projects
- Contribute to and support process improvements in the ICU by meeting with nursing or physician staff to assess current practice (**see Prolonged ICU Care Multidisciplinary Rounds**)
- Participate in creating ICU specific data related to ventilator/ sepsis bundles and pulmonary improvement project
- Participate in development of protocols and guidelines pertinent to ICU care (i.e. VAP investigation and treatment approaches reflecting available University resources and local antibiogram)
- Participate and directing Multi-disciplinary rounds and be responsible for completion of daily goal sheets

Senior Fellows:

- Participate in ICU-related committee activities (if not already serving on other committees)

Professionalism: Residents are expected to demonstrate behaviors that reflect a commitment to continuous professional development, ethical practice, an understanding and sensitivity to diversity and a responsible attitude toward their patients, their profession, and society.

- Demonstrate respect, compassion, integrity, and altruism in relationships with patients, families, and colleagues

- Demonstrate sensitivity and responsiveness to the gender, age, culture, religion, sexual preference, socioeconomic status, beliefs, behaviors and disabilities of patients and professional colleagues
- Adhere to principles of confidentiality, scientific/academic integrity, and informed consent
- Recognize and identify deficiencies in peer performance
- Teach junior colleagues or peers
- Admit to and seek help in remedying errors
- Interact with nursing staff and other professionals as two-way educational opportunities when current approach does not appear to be effective

Interpersonal and Communication Skills: Residents are expected to demonstrate interpersonal and communication skills that enable them to establish and maintain professional relationships with patients, families, and other members of health care teams.

- Provide effective and professional consultation to other physicians and health care professionals and sustain therapeutic and ethically sound professional relationships with patients, their families, and colleagues.
- Demonstrate respect for and recognition of particular skill sets possessed by other CC practitioners, such as CC nurses, RT, PT, OT, dieticians, pharmacists.
- Counsel and educate patients and families
- Communicate effectively in times of dynamically changing conditions
- Communicates clearly, correctly, and concisely in a written report, stressing the important issues and an articulate plan.
- Use nomenclature and writing standards consistent with that of the institution
- Transfer care of the patient in a manner that ensures patients safety, comfort and continuity of care
- Use effective listening, nonverbal, questioning, and narrative skills to communicate with patients and families
- Display support & empathy to patients and their families, as witnessed by attending staff or reported to staff
- Considers ethical issues and patient wishes in treatment decisions

Systems-Based Practice: Residents are expected to demonstrate both an understanding of the contexts and systems in which health care is provided, and the ability to apply this knowledge to improve *and optimize health care*.

- Understand, access and utilize the resources, providers and systems necessary to provide optimal care
- Apply evidence-based, cost-conscious strategies to prevention, diagnosis, and disease management
- Collaborate with other members of the health care team to assist patients in dealing effectively with complex systems and to improve systematic processes of care
- Demonstrate the Critical Care Practitioner's role as patient/quality care advocate
- Participate actively in coordinated multidisciplinary patient care plans
- Participate actively in PCCM or multidisciplinary M&M or case conferences
- Recognize the Critical Care Practitioner's role in committees/policy and procedure development
- Recognize, describe and ensure compliance with institutional and unit policies and procedures as well as regulatory policies from accreditation agencies, regulators, and payers

Instructional Methods:

Introductory Lecture Series, Web-Based Curriculum (RICU), Weekly Critical Care Fellows Conference, Multidisciplinary ICU lecture Series.

Methods of Assessment:

- Competency-based staff evaluations
- Ancillary care provider evaluations
- Critical incident reporting
- Conference attendance and participation
- Structured evaluations of airway management, central line placement,
- Completion of PACEP / ATS Primer on Hemodynamic Monitoring (First year Fellows)
- Web-Based Instruction on Bioterrorism (Second Year Fellows)
- Participation in quality improvement project (Second Year Fellows)

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Acid-Base Disorders

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Severe Sepsis:

Activated Protein C:

Efficacy and safety of recombinant human activated protein C for severe sepsis. Bernard GR, et al NEJM 2001;344:699-709.

Epidemiology:

Incidence, Risk Factors, and Outcome of Severe Sepsis and Septic Shock in Adults, C. Brun-Buisson, et al, JAMA 1995;274(12):968-974

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General reviews;

The pathophysiology and Treatment of Sepsis, R. Hotchkiss, I. Karl, NEJM 2003;348(2):138-150

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Treating Patients with Severe Sepsis, A. Wheeler, et al, NEJM 1999;304(3):207-214

A multicenter randomized controlled clinical trial of transfusion requirements in critical care. Hebert P, et al, NEJM 1999;340:409-17.

Toxicology:

General Topics:

Adult Toxicology in Critical Care*Part I: General Approach to the Intoxicated Patient, Mokhlesi B, et al, Chest 2003;123:577-592

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Alcohol Withdrawal in the Surgical Patient: Prevention and Treatment, Spies C, et al, Anesth Analg 1999;88:946-954

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Prolonged ICU Care Multidisciplinary Rounds:

A weekly multidisciplinary conference has been developed to better address the needs of patients requiring long-term critical care. This patient-care oriented conference is held each Tuesday between 2:30-3:30 P.M. and is directed by MICU Fellow and if available PCCM Attending. Appropriate representatives from the Nursing, Dietary, Speech, Respiratory Therapy, Social Services, Palliative Care, and Psychiatric disciplines will be represented.

The focus of this meeting is to identify unique aspects of care that develop in the chronically critically ill and then develop multidisciplinary approaches to address these concerns. Fellows play a central role by 1) identifying patients with extended length of stay and 2) developing patient-centered clinical questions.

The following list of topics is meant to serve as a framework for discussion:

- Prognosis- particularly well defined groups (e.g. BMT, ESLD)
- Communication Issues (patient-family, patient/family and care providers, within the health care team)
- Early identification of need for tracheostomy/feeding tube/specialized nursing care
- Identification of emerging therapies in areas of nutrition, wound care, physical therapy, speech & swallowing, psychologic well being, family preparedness/counseling
- Identification of resources within the Institution, Community, Cyberspace
- Improving transition to lower levels of care
- Preventing/limiting risk of nosocomial complications

Information developed during the course of investigation of these issues will be utilized to develop uniform practice patterns and an on-site reference library.

Resources:

Webpages:

www.ohsu.edu/pccm, www.sccm.org

Journals:

Journal of Critical Care

Critical Care Medicine

Chest

American Journal of Respiratory & Critical Care Medicine

Heart & Lung

Guidelines For Communicating Patient Care Issues with MICU Attending Staff

The purpose of this document is to establish 1) communication guidelines between fellows and faculty in the Division of Pulmonary-Critical Care Medicine and 2) define standards regarding faculty involvement in the care of critically ill patients. "OHSU administration and the OHSUMG have embraced the concept of faculty driven care based on the belief that the faculty physician leadership is essential in the provision of high quality, cost effective care." *

For each patient, the faculty attending is directly responsible for the care being provided and residents and fellows will provide care under this faculty supervision. Communication with the attending staff should be determined by the experience of the individual resident or fellow and guided by circumstances as outlined below.

New Admissions:

- Hemodynamic instability after initial resuscitation attempts
- Situations requiring high level or multiple vasoactive medications
- Inability to gain vascular access in a timely manner
- Impending respiratory failure necessitating invasive ventilatory support
- Deteriorating oxygenation status requiring greater than 15 cm H₂O of PEEP, muscle relaxation, or non-conventional ventilatory support
- Acute deterioration in ventilatory status resulting in PaCO₂ greater than 65 mmHg despite conventional methods of ventilation
- Significant unanticipated escalation of care (e.g. emergent surgery, interventional radiology)
- Imminent death

Established Patients:

- Refractory hemodynamic instability
- Refractory oxygenation and/or ventilation disorders
- Significant unanticipated decline and/or escalation of care (e.g. emergent surgery interventional radiology)
- Unanticipated death

General Situations:

- Complex decision making exceeding the Fellow's comfort level
- High volume, high acuity situations necessitating additional provider support
- Situations involving complex administrative issues (e.g. patient placement, ethical concerns, difficult EOLC, & organ donation)

Supervision of Major Procedures

The attending faculty is responsible for evaluating resident capabilities and supervising accordingly. It is the joint responsibility of the faculty, fellow and residency program to assure that trainees have demonstrated competence in procedures before invasive procedures are done without supervision. Therefore, early in training, fellows are expected to contact Pulmonary-Critical Care or other appropriate faculty to assist in high risk, invasive procedures until competency has been demonstrated.

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OHSU HEALTH CARE SYSTEM CLINICAL POLICY MANUAL

Chapter One: General Patient Care-Faculty Supervision of Clinical Care (Clin 01-09 formerly R&R I-B), Last Reviewed Date: January 15, 2004