

CURRICULUM ON CRITICAL CARE MEDICINE

Denver Health Internal Medicine Residency Program

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I. Educational Purpose and Goals

Management of critically ill patients is essential for training and practice in Internal Medicine. The critical care rotation exposes residents to a variety of patients with unstable, life-threatening medical illnesses. Residents will learn the basic tenets of stabilization of critically ill patients and understand the differential diagnoses and appropriate diagnostic evaluation of such patients. They will function within multidisciplinary teams to provide care that is timely, appropriate, and considerate of patient or family preferences.

II. Principle Teaching Methods

A. Supervised direct patient care activities:

1. Resident teams participate in daily management rounds with two supervising attendings [a board-certified Cardiologist managing all patients with cardiac problems and a board-certified Intensivist (i.e., primarily Pulmonary and Critical Care Medicine specialists) managing all other patients]. Residents assume primary responsibility for the management and coordination of care for their patients, including performance of necessary procedures (described further below).
2. Teaching/Work rounds are conducted daily seven days/week. Preferentially performed at the bedside rounds are completed in a timely fashion to enable housestaff attendance at morning report and conferences. Teaching/work rounds emphasize fundamental skills pertaining to taking histories and doing physical examinations, appropriate diagnostic testing and other management issues, discussion of resource utilization, patient education and end-of-life care, and include short didactic discussions of the conditions encountered focusing on the differential diagnosis and appropriate evaluation.
3. Discharge planning is conducted on a daily basis via phone and personal contact with Social Workers, Visiting Nurse Representatives, Respiratory Therapists, Rehabilitation Therapists, and Utilization Review personnel. Formal multi-disciplinary discharge planning rounds are held weekly.

B. Didactics:

1. Conferences:

- a. Morning Report is held five days/week at 7:00AM and is attended by all PGY-2s and PGY-3s, the Chief Medical Resident, and a faculty member (the Chief of Medicine on most days). It begins with a chest x-ray reading exercise (10 minutes) followed by a discussion of any problems that developed during the past 24 hours or the weekend. One or two patients are then discussed with the admitting resident presenting the case as an unknown. One session per week is led by a Nephrologist who focuses the discussion on disorders of acid-base or metabolism, hypertension, or other kidney diseases. All other sessions are led by the chief medical resident.
 - b. Noon conference is held four days/week from 12:00 to 1:00 PM. On Mondays and Tuesdays attendings provide lectures addressing selected topics included in the system-wide Internal Medicine Curriculum. During the last quarter of each year the conferences are given by PGY-3s on topics of their choice. Medicine Grand Rounds, held at the University of Colorado Health Science Center and televised to Denver Health, occurs on Wednesday. The Friday conference is a Clinical Pathological Case (CPC) discussion based on a Denver Health patient.
 - c. Additional conferences include a monthly Systems-Based Critical Care Morbidity and Mortality conference and a weekly Interdisciplinary Critical Care conference. Ethics are discussed during teaching rounds and in the Morbidity and Mortality conference, CPC and Interdisciplinary conference.
2. Small group discussions: Residents and attending physicians conduct combined teaching and work rounds seven days/week. In addition, residents participate in twice weekly discussions on critical care Cardiology and daily discussions on a variety of medical critical care topics,
 3. Critical Care Bibliography: A web-based compendium of selected readings in critical care has been developed. Residents are expected to be familiar with literature from this collection that is pertinent to their patients.

III. Educational Content

- A. Mix of diseases: Residents on the Critical Care Service encounter patients with acute respiratory and/or ventilatory failure, the adult respiratory distress syndrome, multi-organ dysfunction syndrome, diabetic ketoacidosis as well as a variety of other types of acute metabolic and respiratory acid-base disorders, drug overdoses and ingestions, gastrointestinal bleeding severe enough to cause hemodynamic instability, acute hepatic failure, pneumonia severe enough to result in respiratory failure, sepsis, hypertensive emergencies, acute coronary syndromes, congestive heart failure, life-threatening arrhythmias, acute medical neurologic emergencies, and acute renal failure.
- B. Patient Characteristics: Patients admitted to the Denver Health Medical Intensive Care Unit come from the general population of the City and County of Denver and the other surrounding counties. The large majority is admitted from the Emergency Department. The patient population at Denver Health is 50% female, 50% Latino and approximately 20% African American. Many patients come from Mexico and Central America and smaller numbers come from Russia and a number of countries in Africa.
- C. Learning Venues:
1. Facility: The Medical Intensive Care Unit at Denver Health is a 24 bed unit that opened in July, 2003. Each room accommodates a single patient and is equipped with full bedside monitoring and a computer linked to a Physician Order Entry system and Lifetime Clinical Record that contains all in-patient and out-patient records for all patients cared for in the Denver Health system, all laboratory results ever obtained, access to copies of dictated radiology, pathology, ECG, echocardiogram heart catheterization and operative reports, and internet access to numerous web-based medical information sources (e.g., UpToDate, Medline, Pubmed) from every computer in the hospital. This access includes all on-line journals available at the Dennison Medical Library at the University of Colorado Health Sciences Center, drug information programs, electronic textbooks, secured e-mail for inter-system notification of primary care physicians when their patients are admitted and discharged, and a variety of patient education materials.
 2. Procedures: Residents insert central venous lines, pulmonary artery catheters, temporary transvenous pacemakers, arterial lines, nasogastric tubes and endotracheal tubes and have the opportunity of performing paracenteses, thoracenteses, lumbar punctures, and arthrocenteses. Residents also interpret all imaging studies and laboratory tests. Digitized images are available for all patients in the MICU. Printed images of older films are available in the Radiology Department.

3. Physician Order Entry and Standardized Order Sets: All care orders are placed through a computer order entry system. The system includes more than forty-five standardized order sets with additional order sets under development. Each was prepared internally using an evidence-based medicine approach.
4. Ancillary Services: Residents interact with subspecialists in Hematology/Oncology, Gastroenterology/Hepatology, Nephrology, Neurology, Surgery, Neurosurgery, Rheumatology, Endocrinology, Infectious Disease, and Dermatology, and with Respiratory Therapists, Critical Care Nurses, and Clinical Pharmacists who attend daily work rounds. Residents also have daily access to a designated Social Worker who is assigned to the MICU and frequently attends morning work rounds.
5. Structure of the Rotation
 - a. Teams: The Service consists of four PGY-1s, four PGY-2s or 3s, one senior Pulmonary and Critical Care Fellow, one Clinical Pharmacist, one Critical Care Respiratory Specialist, one Attending, and the patient's Critical Care Nurse.
 - b. Duty Hours: All schedules are structured to limit duty hours to < 80 hours per week, each week, and ≤ 30 consecutive hours the day residents admit. One PGY-1 and one PGY-3 admit from 7:00 AM to 7:00 AM the following day, every fourth day. They are expected to leave the hospital no later than 1:00 PM the afternoon after admitting. Every resident is given one day off each week. The Chief of Medicine reviews each resident's compliance with these mandates on a monthly basis (see attachment).
 - c. Rounds: R-1s begin work at 7:00 AM, seeing their patients and collating data collected over the previous 12 hours. PGY-2s and PGY-3s attend Morning Report. Attending work/teaching rounds begin at 8:00 AM and are held at the bedside. Rounds (including viewing of all radiological studies with the attending) continue until all patients are seen or until 11:00 AM, giving time for the residents to attend noon conference. MICU checkout rounds are conducted daily beginning at 4:00.
 - d. Clinics: Residents do not attend continuity clinics during this rotation.

IV. Curriculum

Didactic sessions on Ventilator Management, Sepsis, Respiratory Failure, the Adult Respiratory Distress Syndrome, Hemodynamic Monitoring, Sedation and Paralysis, Cardiac Arrhythmias, and the Acute Coronary Syndrome are given during each month-long rotation. Other topics discussed are selected on the basis of the specific patients admitted.

V. Methods of Evaluation

- A. Resident Performance: Faculty meet monthly with the Chief of Medicine, the Denver Health Residency Director, and the Chief Medical Resident to discuss and fill out a standardized resident evaluation form (see attached). The evaluation is sent to the residency office for review and placement in the Resident's file where it is used to formulate the semiannual performance review with the Director of the Residency program.
- B. Procedures: Residents submit written documentation of all procedures performed during the rotation to the Medicine Residency Office.
- C. Program and Faculty Performance: The Residents meet monthly with the Chief of Medicine, the Director of the DH Residency Program, and the Chief Medical Resident during which time a structured evaluations form is filled out. Copies of the forms are returned to each Attending, to the Division Heads of Cardiology and Pulmonary and Critical Care Medicine, and to the Chief of Medicine where they are kept in the Attending's personnel file and used in their annual evaluations.

VI. Institutional Resources

- A. Strengths: Denver Health is the only Public Hospital in the City and County of Denver and is the regional Level One trauma center. It also serves as the tertiary referral center for the Community Health Center of Denver, the first Community Health Center in the country. Accordingly, the patient base cared for is extraordinary. Sixty percent of the Pulmonary and Critical Care Medicine Attendings, and 70% of the Cardiology Attendings have NIH funding for research, much of which involves clinical research occurring in the MICU. The faculty have won numerous system-wide awards for teaching excellence. Over the past several years the Divisions of Pulmonary and Critical Care Medicine, Rheumatology, Neurology, and/or Nephrology have been listed in the U.S. News and World Report as being in the top 50 programs in the country.
- B. Weaknesses: Denver Health has no organ transplant program and does not do open heart surgery. In addition, the Cardiac Catheterization lab currently does not do invasive procedures. New Cardiac Cath and Electrophysiology labs are currently under construction and will open in

February 2005 and plans are to begin an invasive cardiology program in July, 2005.

VII. Rotation Specific Competency Objectives

A. Patient Care

1. History taking. Residents at all levels of training will obtain a thorough history by soliciting patient information and consulting other sources of primary data in a logical and organized fashion. History taking will be hypothesis driven and be adapted to the instability of the patient and the available time. The resident will inquire about the emotional aspects of the patient's or family's experience and about end-of-life issues while demonstrating flexibility based on patient need and reception to these questions. Residents will recognize verbal and nonverbal cues from the patient.
2. Physical Exam. Residents at all levels of training will perform a comprehensive physical examination describing the physiological and anatomical basis for normal and abnormal findings. Performance of the physical examination will also be hypothesis driven and adapted to the instability of the patient and the available time.
3. Charting. Residents at all levels of training will record data in a legible, thorough, systematic manner.
4. Procedures.
 - a. PGY-1s and PGY-2s will demonstrate knowledge of procedural indications, informed consent, contraindications, necessary equipment, specimen handling, patient after-care, and risk and discomfort minimization. They will correctly identify the meaning of test results. PGY-1s will initially observe and then perform procedures prior to the completion of the first training year.
 - b. PGY-3s will demonstrate extensive knowledge and facility in the performance of procedures while minimizing risk and discomfort to patients. They will assist their junior peers in skill acquisition.
5. Medical Decision Making, Clinical Judgment, and Management Plans. All residents will demonstrate improving skills in assimilating information that they have gathered from the history and physical exam.
 - a. PGY-1 residents will be able to identify patients' problems and develop a prioritized differential diagnosis. Abnormal findings will be

related to altered physiology. They will understand their limitation of knowledge and seek the advice of more advanced clinicians. PGY-1 residents will begin to develop therapeutic plans that are evidence- or consensus-based. Residents will establish an orderly sequence of testing based on their history and exam findings. Specific organ dysfunction will be anticipated based on known side effects of therapy. Residents will also understand the correct administration of drugs, be familiar with drug-drug interactions, and with expected outcomes.

- b. PGY-2 residents will also integrate medical facts and clinical data while weighing alternatives and patient preferences. They will regularly incorporate risks and benefits when considering testing and therapies. They will present up-to-date scientific evidence to support their hypotheses. They will consistently monitor and follow-up patients appropriately, develop plans to avoid or delay known treatment complications and be able to identify when illness has reached a point where treatment no longer contributes to improved quality of life.
- c. PGY-3 residents will demonstrate the above and, in addition, will demonstrate appropriate reasoning in ambiguous situations. Residents at this level of training will not overly rely on tests and procedures. PGY-3 residents will continuously revise assessments in the face of new data.

6. Patient counseling

- a. PGY-1 residents will be able to describe the rationale for a chosen therapy and major medication side effects in terms understandable by the patient. They will assess patient/family understanding and provide more information when necessary.
- b. PGY-2 residents, in addition to the above, will be able to explain the pros and cons of competing therapeutic interventions. PGY-2 residents will be expected to counsel patients regarding adverse habits, and educate patients and families for enhanced compliance. They will be able to effectively communicate with critically ill patients and engage patients and families in end of life discussions.
- c. PGY-3 residents, in addition to the above, will effectively communicate with patients making life-style modifications.

B. Medical Knowledge.

1. PGY-1 residents will consistently apply current concepts in the basic sciences to clinical problem solving. They will use information from the literature and other sources including electronic databases. PGY-1 residents will demonstrate satisfactory knowledge of common medical conditions sufficient to manage urgent complaints with supervision. Residents must exhibit sufficient content knowledge of common conditions to provide care with minimal supervision by completion of the PGY-1 year.
2. PGY-2 residents will demonstrate a progression in knowledge and analytical thinking in order to develop well-formulated differential diagnoses for multi-problem patients. They will also demonstrate socio-behavioral knowledge.
3. PGY-3 residents in addition to the above will demonstrate appropriate habits to stay current with new medical knowledge, and will exhibit knowledge of effective teaching methods.

C. Interpersonal and Communication Skills.

1. PGY-1 residents will develop and refine their individual style when communicating with patients. They will strive to create ethically sound relationships with patients, the physician team and supporting hospital personnel. They will create effective written communications through accurate, complete, and legible notes. They will exhibit listening skills appropriate to patient-centered interviewing and communication. Residents will recognize verbal and nonverbal cues from patients.
2. PGY-2 and PGY-3 residents will also exhibit team leadership skills through effective communication as manager of a team. PGY-2 residents are expected to assist junior peers, medical students, and other hospital personnel to form professional relationships with support staff. Residents will respond to feedback in an appropriate manner and make necessary behavioral changes.

D. Professionalism

All residents will demonstrate integrity, accountability, respect, compassion, patient advocacy, and dedication to patient care over self-interest. Residents will demonstrate a commitment to excellence and continuous professional development. They will be punctual and prepared for teaching sessions. Residents will demonstrate a commitment to ethical principles pertaining to provision or withholding of clinical care, confidentiality of patient information, and informed consent. Residents are expected to show sensitivity and responsiveness to patients' culture, age, gender and disabilities.

E. Practice Based Learning and Improvement

1. PGY-1 residents will use the web-based resources to critically appraise medical literature and apply evidence to patient care. They will use hand-held computers, desktop PC's and Internet electronic references to support patient care and self-education. They will model these behaviors to assist medical students in their own acquisition of knowledge through technology. They will begin to understand the importance of a systems-based approach to reducing medical errors and improving quality of care.
2. PGY-2 residents will, in addition, consistently seek out and analyze data on practice experience, identify areas for improvement in knowledge or patient care performance and make appropriate adjustments. They will regularly demonstrate knowledge of the impact of study design on validity or applicability to individual practice. They will recognize the importance of the systems-based approach to reducing medical errors and improving quality of care.
3. PGY-3 residents will additionally model independent learning and development.

F. Systems Based Practice.

1. PGY-1 residents will be sensitive to health care costs while striving to provide quality care. They will begin to effectively coordinate care with other health care professionals as required for patient needs.
2. PGY-2 residents, in addition to the above, will consistently understand and adopt available clinical practice guidelines and recognize the limitations of these guidelines. They will work with patient care managers, discharge coordinators and social workers to coordinate and improve patient care and outcomes.
3. PGY-3 residents, in addition, will enlist social and other out-of-hospital resources to assist patients with therapeutic plans. PGY-3 residents are expected to model cost-effective therapy.