Pediatric Critical Care

Description:

The Pediatric Critical Care rotation will give the pediatric resident exposure to acute emergencies, airway management, and complete the process of disease progression from emergency department and clinic to PICU and the pediatric floor.

By managing these patients one-on-one with the pediatric intensivist, the resident will gain an appreciation of physiology, anatomy, respiratory mechanics, and hemodynamics. In addition, the resident will acquire the ability to stabilize acutely ill patients and give anticipatory guidance to the families of critically ill children and adolescents.

The pediatric residents will be required to master technical procedures including vascular access, airway, and ventilator management.

Note:
The goals and objectives described in detail below are not meant to be completed in a single one month block rotation but are meant to be cumulative, culminating in a thorough and complete Pediatric Critical Care experience at the end of residency.

Primary Goals for this Rotation

GOAL: Resuscitation and Stabilization. Recognize the critically ill patient and initiate appropriate stabilization and/or resuscitative measures.

Explain and perform steps in resuscitation and stabilization, particularly airway management, volume replacement and resuscitative pharmacology.

Describe the common causes of acute deterioration in the previously stable patient in the PICU.

Function appropriately in codes and resuscitations as part of the PICU team.

GOAL: Common Signs and Symptoms. Evaluate and manage, under the supervision of an intensivist, common signs and symptoms seen in critically ill infants, children and adolescents in the intensive care setting.

Evaluate and manage, under supervision of an intensivist, patients with signs and symptoms that present commonly to the intensive care unit (examples below).

1. Cardiovascular: acute life-threatening event, bradycardia, cardiopulmonary arrest, congestive heart failure, cyanosis, hypertension, hypotension, poor capillary perfusion, rhythm disturbances, tachycardia
2. Endocrine: signs and symptoms suggestive of hypo- and hyperglycemia and adrenal insufficiency/crisis
3. GI: abdominal distension, hematemesis and melena, icterus, peritoneal signs, vomiting
4. Hematologic: pallor, petechiae, purpura, uncontrolled bleeding
5. Infectious Diseases: endotoxic shock, fever
6. Neurologic: acute weakness, altered mental status, coma, delirium, encephalopathy, seizures, tetany, thermoregulatory abnormalities
7. Renal: anuria, hematuria, oliguria, polyuria, severe electrolyte disturbance
8. Respiratory: apnea, cyanosis, dyspnea, hemoptysis, hypercarbia, hyperpnea, hypoxemia, increased or decreased respiratory effort, poor air movement,

pulmonary edema, respiratory failure, stridor, tachypnea, wheezing

GOAL: Common Conditions. Recognize and manage, under the supervision of an intensivist, conditions that commonly present to the intensive care unit, using consultation when appropriate.

Evaluate and manage, under the supervision of an intensivist, patients with conditions that present commonly to the intensive care unit (examples below).

1. General: burns (thermal, electrical), common intoxications, drug overdose, shock (cardiogenic, hypovolemic, distributive, toxic), inhalation injury, malignant hyperthermia, non-accidental trauma, submersion injury, toxic or caustic ingestion or inhalation injury, toxic shock syndrome
2. Allergy Immunology: anaphylaxis, life-threatening angioedema, Stevens Johnson Syndrome
3. Cardiovascular: arrhythmias, cardiac tamponade, congestive heart failure, cyanotic congenital heart disease, malignant hypertension, myocarditis/cardiomyopathy
4. Endocrine: diabetes insipidus and adrenal insufficiency/crisis, diabetic ketoacidosis, hypo- and hyperglycemia, syndrome of inappropriate antidiuretic hormone (SIADH)
5. Fluids, electrolytes, metabolic: inborn errors of metabolism, severe dehydration (hyper-, normo-, or hyponatremic), severe acid-base disturbances, severe electrolyte disturbance
6. GI/Surgery: abdominal trauma (blunt/penetrating), acute abdomen, acute GI bleeding, fulminant hepatic dysfunction, hepatic dysfunction, pancreatitis, pre- and post-operative management, stress ulcer
7. Hematologic: anemia (severe), disseminated intravascular coagulopathy (DIC), Deep venous thrombosis (DVT), neutropenia, sickle crisis, polycythemia, thrombocytopenia, tumor lysis syndrome
8. Infectious disease: encephalitis, infant botulism, meningitis, nosocomial infections, sepsis
9. Neurologic: acute increased intracranial pressure, brain death, cerebral edema, cerebrovascular accident (CVA), coma, encephalopathy, Guillain-Barre, head injury, spinal muscle atrophy, status epilepticus
10. Pulmonary: acute respiratory distress syndrome (ARDS), epiglottitis, pulmonary edema, pneumothorax, respiratory failure/impending respiratory failure, severe croup and bacterial tracheitis, status asthmaticus, upper airway obstruction (infectious, structural, foreign body)
11. Renal: acute renal failure, hemolytic uremic syndrome

GOAL: Diagnostic Testing. Utilize common diagnostic tests and imaging studies appropriately in the intensive care unit, obtaining consultation as indicated for interpretation of results.

Demonstrate understanding of common diagnostic tests and imaging studies used in the PICU by being able to:

1. Explain the indications for and limitations of each study.

2. Know or be able to locate readily age-appropriate normal ranges (lab studies).

3. Apply knowledge of diagnostic test properties, including the use of sensitivity, specificity, positive predictive value, negative predictive value, likelihood ratios, and receiver operating characteristic curves, to assess the utility of tests in various clinical settings

4. Discuss cost and utilization issues.

5. Interpret the results in the context of the specific patient.

6. Discuss therapeutic options for correction of abnormalities.

Use appropriately the following laboratory and imaging studies when indicated for patients in the PICU setting:

1. CBC with differential, platelet count, RBC indices
2. Blood chemistries: electrolytes, glucose, calcium, magnesium, phosphate
3. Renal function tests
4. Tests of hepatic function (PT, albumin) and damage (ammonia, bilirubin, liver enzymes)
5. Serologic tests for infection (e.g., hepatitis, HIV)
6. C-reactive protein, erythrocyte sedimentation rate
7. Therapeutic drug concentrations
8. Coagulation studies: platelets, PT/PTT, fibrinogen, FSP, D-dimers, "DIC screen"
9. Arterial, capillary, and venous blood gases
10. Detection of bacterial, viral, and fungal pathogens
11. Urinalysis
12. CSF analysis
13. Gram stain
14. Stool studies
15. Toxicologic screens/drug levels
16. Other fluid studies (e.g., pleural fluid, joint fluid)
17. Chest X-ray
18. Abdominal series
19. Skeletal survey
20. Cervical spine films
21. CT scans of abdomen, chest and head
22. MRI scans
23. Basic concepts of cerebral blood flow studies

GOAL: Monitoring and Therapeutic Modalities. Understand how to use the physiologic monitoring, special technology and therapeutic modalities used commonly in the intensive care setting.

Demonstrate understanding of the monitoring techniques and special treatments commonly used in the PICU by being able to:

1. Discuss the indications, contraindications and complications
2. Have a basic understanding of the general techniques (e.g., Seldinger technique for central venous line placement)
3. Interpret the results of monitoring

Use appropriately the following monitoring techniques in the intensive care unit under supervision of an intensivist:

1. Central venous pressure monitoring
2. Invasive arterial blood pressure monitoring
3. Intracranial pressure monitoring
4. Pulse oximetry
5. End-tidal carbon dioxide monitoring

Use appropriately or be familiar with the following treatments and techniques in the intensive care unit, including monitoring effects and anticipating potential complications specific to each therapy:

1. Oxygen administration by cannula, masks, hood
2. Positive pressure ventilation, including non-invasive modalities such as nasal/mask BiPAP/CPAP, bag and mask ventilation
3. Principles of ventilator management, intubation and extubation procedures and criteria
4. Analgesics, sedatives, and paralytics
5. Enteral and parenteral nutrition
6. Blood and blood product transfusions
7. Vasoactive drugs (pressors and inotropes)

GOAL: Pediatric Competencies: Demonstrate high standards of professional competence while working with patients in the Pediatric Intensive Care Unit.

Competency 1: Patient Care. Provide family-centered patient care that is development- and age-appropriate, compassionate, and effective for the treatment of health problems and the promotion of health.

1. Use a logical and appropriate clinical approach to the care of critically ill patients, applying principles of evidence-based decision-making and problem-solving.

2. Provide sensitive support to patients with serious illness and to their families, and arrange for on-going support or preventive services if needed.

Competency 2: Medical Knowledge. Understand the scope of established and evolving biomedical, clinical, epidemiological and social-behavioral knowledge needed by a pediatrician; demonstrate the ability to acquire, critically interpret and apply this knowledge in patient care.

1. Demonstrate a commitment to acquiring the knowledge base expected of general pediatricians caring for seriously ill children under the guidance of an intensivist.

2. Know and/or access medical information efficiently, evaluate it critically, and apply it appropriately to care of patients in the PICU.

Competency 3: Interpersonal Skills and Communication. Demonstrate interpersonal and communication skills that result in information exchange and partnering with patients, their families and professional associates.

1. Provide effective and sensitive communication with patients and families in the intensive care setting.

2. Participate effectively as part of an interdisciplinary team in the intensive care unit to create and sustain information exchange, including communication with the primary care physician.

3. Maintain accurate, timely and legally appropriate medical records on complex and critically ill children.

Competency 4: Practice-based Learning and Improvement. Demonstrate

knowledge, skills and attitudes needed for continuous self-assessment, using scientific methods and evidence to investigate, evaluate, and improve one's patient care practice.

1. Use scientific methods and evidence to investigate, evaluate and improve one's patient care practice in PICU setting.

2. Identify personal learning needs, systematically organize relevant information resources for future reference, and plan for continuing acquisition of knowledge and skills.

Competency 5: Professionalism. Demonstrate a commitment to carrying out professional responsibilities, adherence to ethical principles and sensitivity to diversity.

1. Demonstrate a commitment to carrying out professional responsibilities while providing care in the PICU setting.

2. Adhere to ethical and legal principles, and be sensitive to diversity in the care of critically ill children.

Competency 6: Systems-Based Practice. Understand how to practice high quality health care and advocate for patients within the context of the health care system.

1. Identify key aspects of health care systems, cost control, and mechanisms for payment as they relate to the intensive care setting.

2. Recognize the limits of one's knowledge and expertise and take steps to avoid medical errors.

Level Specific Competencies

Second Year (PL-2)

Patient Care:

1. Understands and weighs alternatives for diagnosis and treatment
2. Elicits subtle findings on physical examination
3. Is able to manage multiple problems at once
4. Is able to prioritize patient problems
5. Develops and carries out management plans
6. Competently understands/performs/interprets procedures:
   - _____ Physiologic Monitoring: Cardiac, Resp, & Oximetry
   - _____ Radiologic Evaluation: CXR, AXR, CT Scans
   - _____ Abscess: Aspiration
   - _____ Pain Management: Conscious Sedation & Analgesia
   - _____ Arterial Puncture
   - _____ Burn Management: 1st & 2nd Degree
   - _____ Resuscitation: BLS, PALS, ACLS
   - _____ Ventilation: BVM
   - _____ Central Line: Use & Care
   - _____ Thoracentesis (Attempts)
   - _____ Chest Tube Placement (Need and Management)
   - _____ Intubation (Attempts)
   - _____ Intubation (Rapid Sequence - Attempts)
   - _____ OG/NG placement
   - _____ Bladder Catheterization
   - _____ Gastric Lavage

_____ Intravenous Line Placement
_____ Intraosseous Line Placement (during PALS course)
_____ Lumbar Puncture
_____ Tracheostomy Care
_____ Ventilator Management: Initiation
_____ Trauma Care: Stabilization
_____ Peripheral Arterial Line Placement
_____ Able to Direct Transport of Critical Ill Patients

Medical Knowledge:

1. Is aware of indications, contraindications, and risks of commonly used medications and procedures in PICU
2. Applies the basic science, clinical, epidemiologic, and social-behavioral knowledge to the care of the patient
3. Appropriate use of sedatives, analgesics and neuromuscular blockers as well as their risks and complications.

Interpersonal Skills and Communication:

1. Creates and sustains therapeutic and ethically sound relationships with patients and families
2. Provides education and counseling to patients, families, and colleagues
3. Works effectively as a member of the health care team

Practice-based Learning and Improvement:

1. Undertakes self-evaluation with insight and initiative
2. Facilitates the learning of students and other health care professionals

Professionalism:

1. Displays initiative and leadership
2. Is able to delegate responsibility to others
3. Is responsive to needs of patients and society, which supersedes self-interest

Systems Based Practice:

1. Applies knowledge of how to partner with health care providers to assess, coordinate and improve patient care
2. Uses systematic approach to reduce errors

Third Year (PL-3)

Patient Care:

1. Makes informed decisions about diagnosis and therapy after analyzing clinical data
2. Includes the family when making medical decisions
3. Reasons well in ambiguous situations
4. Spends time appropriate to the complexity of the problem
5. Competently understands/performs/interprets procedures:
   _____ Physiologic Monitoring: Cardiac, Resp, & Oximetry
   _____Radiologic Evaluation: CXR, AXR, CT Scans
   _____Abscess: Aspiration, I&D
   _____Pain Management: Procedural, Conscious Sedation & Analgesia
   _____Arterial Puncture
   _____Burn Management: 1st & 2nd Degree
   _____Resuscitation: BLS, PALS, ACLS
   _____Ventilation: BVM

_____ Central Line: Use & Care
_____Thoracentesis (Successful)
_____Chest Tube Placement (Participation)
_____Intubation (Mostly Successful)
_____Intubation (Rapid Sequence – Mostly Successful)
_____OG/NG placement
_____Bladder Catheterization
_____Gastric Lavage
_____Intravenous Line Placement (Mostly Successful)
_____Intraosseous Line Placement (during PALS course)
_____Lumbar Puncture
_____Tracheostomy Care
_____Ventilator Management: Initiation & Ongoing Management
_____Trauma Care: Stabilization & Ongoing Management
_____Central Line Placement (Participation)
_____ Peripheral Arterial Line Placement

Medical Knowledge:

1. Is aware of indications, contraindications, and risks of commonly used medications and procedures
2. Demonstrates an investigatory and analytic approach to clinical situations

Interpersonal Skills and Communication:

1. Creates and sustains therapeutic and ethically sound relationships with patients and families
2. Provides education and counseling to patients, families, and colleagues
3. Works effectively as a member of the health care team

Practice-based Learning and Improvement:

1. Analyzes personal practice patterns and looks to improve
2. Compares personal practice patterns to larger populations
3. Facilitates the learning of students and other health care professionals

Professionalism:

1. Demonstrates commitment to on-going professional development
2. Is effective as a consultant
3. Is responsive to needs of patients and society, which supersedes self-interest

Systems Based Practice:

1. Demonstrates ability to adapt to change
2. Provides cost effective care
3. Practices effective allocation of health care resources that does not compromise the quality of care

References:

1. American Board of Pediatrics, Content Specification, 2007
2. Ambulatory Pediatric Association
3. Association of Pediatric Program Directors
4. Pediatric RRC, January 2006

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