An Initial Approach to the Crashing Neonate and Young Infant

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Disclosures

• No financial disclosures
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Objectives

- Recognize an algorithmic approach to the potentially sick neonate and infant presenting to the general emergency department
- Efficiently and safely provide early diagnosis and stabilization of sick infants prior to transfer to higher level of care
- Understand key elements of emergency department preparedness for young children
- Develop increased confidence to take care of critically ill infants in the emergency department
Case

• You are working a single coverage overnight at 3 am in your community ED when parents bring in a 3 week old infant with concern for poor feeding.

• The child looks moderately ill. Vital signs show the child is afebrile ....

• What is your approach? How fast can you safely get the child out of your department?
The problem

- Truly sick infants are uncommon in general, and even less so in community emergency departments
- Staff often have limited pediatric skills and training
- Equipment often missing, malfunctioning, or hard to find
- Stressful and high risk situation for all involved
Solution: Algorithmic Approach

- THE MISFITS
- T: Trauma
- H: Heart and Lung
- E: Endocrine
- M: Metabolic
- I: Inborn errors of metabolism
- S: Sepsis
- F: Formula mishaps
- I: Intestinal catastrophes
- T: Toxins and poisons
- S: Seizures
THE MISFITS: T for Trauma

- Non accidental and accidental
- Non accidental difficult to diagnosis
  - Approximately 30% of children with abusive head trauma had previous physician contact
  - 70% morbidity, 30% mortality in some studies
- Low threshold for imaging if infant is sick - don’t worry about radiation

http://rad.desk.nl/images/thmb_43d33bad1298cCNSinjury.jpg
THE MISFITS: H for Heart and Lung

- Pulmonary: bronchiolitis, pertussis, etc
- Congenital Heart disease: 1/125 newborns
  - Often presents in the first 2-3 weeks with ductus arteriosus closes
  - CHF can present in the first few months (or later)
- Do not need to remember all the details!
  - Key: blood flow to lungs, systemic circulation
  - When in doubt, use prostaglandin and get to a cardiologist
Cyanotic heart disease

- Right to left shunt with ductal dependent pulmonary blood flow
- Hypoxia, central cyanosis that does not correct with 100% oxygen
- CXR: lungs clear if ductal dependent pulmonary blood flow
- Treatment:
  - Prostaglandins
  - Hypotensive: phenylephrine, epi, dopamine

Outflow obstruction: pink or grey

- Ductal dependent systemic circulation
- Critical coarctation, hypoplastic left heart
  - 4 extremity blood pressure
- Treatment:
  - Prostaglandins
  - Pressors: milrinone, dobutamine
    - Avoid anything that raises SVR!

http://o.quizlet.com/J64uZTzYeCeTcUssQuRO7A_m.jpg
Pulmonary Overcirculation: pink baby, CHF

- Usually presents later in life
- Left to right shunt causes pulmonary over-circulation
- CXR with pulmonary congestion, patients usually pink (not cyanotic)

Treatment:
- Lasix 1 mg/kg
- Typical CHF treatment
THE MISFITS: E for Endocrine

• Congenital Adrenal Hyperplasia
  • Circulatory collapse in first two weeks of life (less severe can be delayed longer)
  • Clitoromegaly in girls, small phallus in boys
  • Acidosis, hyperkalemia, hypoglycemia, shock

• Neonatal Thyrotoxicosis
  • 16% mortality
  • Can occur in first two weeks of life
  • Irritable, CHF, tachycardia, shock, etc

http://www.dshs.state.tx.us/uploadedImages/Content/Family_and_Community_Health
THE MISFITS: M for Metabolic

- Electrolyte Imbalance
- Often related to other underlying disorders
- Hypoglycemia: 2.5 ml/kg of D10
- Hyponatremia: 3% saline at 1 ml/kg to get to a sodium of 125 (or 5-10 ml/kg)
- Hypocalcemia: 100 mg/kg of 10% calcium gluconate
THE MISFITS: I for Inborn Errors of Metabolism

- Uncommon but still happens
- Do not need to remember any of the details!
- VBG with lactate, ammonia, glucose, electrolytes
  - Nice if you remember: urine ketones, LFTs, blood/urine amino and organic acids
- NPO, correct abnormalities, fluids
THE MISFITS: S for Sepsis

- Most common etiology
  - Hypo or hyperthermia
  - Apnea alone

- Full work-up with LP, labs, antibiotics

- Acyclovir if sick, consider vancomycin

- Treat all sick kids for sepsis, but consider the other MISFITS
THE MISFITS: F for Feeding Mishaps

• Formula dilution: hyponatremia
• Giving free water, sodas, juice, homemade, etc.
• Underlying social/educational issues


HOW TO MAKE HOMEMADE BABY FORMULA
THE MISFITS: I for Intestinal

- Malrotation with midgut volvulus: bilious vomiting until proven otherwise, needs a surgeon
- Necrotizing enterocolitis (NEC)
- Toxic Megacolon (Hirschprung’s)
- Hyperbilirubinemia

THE MISFITS: T for Toxins

- Always think about tox causes
- From mother - breastmilk, from pregnancy
- Environmental exposure: CO, cigarette smoke
- Home remedies: teething gel - methemoglobinemia
- Abuse
THE MISFITS: S for Seizures

- Difficult to recognize in infants
  - Often not generalized - eye movement, tongue movements, apnea

- Stop the seizure
  - Lorazepam, phenobarbital, fosphenytoin

- Etiology
  - Sepsis: 5-10%
  - Glucose, calcium, sodium
  - CT or ultrasound of head
Emergency Department Preparedness
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Questions?
References


