

EM Cases Course 2017

Pediatrics EM Controversies



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Podcasts to listen to prior to the course

Link to: [Pediatric Congenital Heart Disease](#)

Link to: [Management of Acute Pediatric Asthma Exacerbation](#)

Link to: [Pediatric Procedural Sedation](#)

Link to: [Pediatric Pain Management](#)

Objectives

1. Discuss the clinical presentations, management and differential considerations for infants with duct dependent lesions
2. Review the presentation and inpatient/outpatient management of severe asthma in pediatrics patients
3. Understand the indications/contraindications, modalities, and potential complications of procedural sedation in the pediatric population

Case 1: The Cyanotic Infant

A 3 day-old male who was delivered uneventfully following prolonged rupture of membranes, comes into your resuscitation room via EMS with a sudden onset of respiratory distress for a few hours.

He has obvious central cyanosis, intercostal indrawing, is tachycardic at 170, has an O₂ saturation of 75% on a non-rebreather, and a normal rectal temp of 36.8. Glucose is 5.

Q1: How will you manage this patient in the first 5 minutes?

Q2: What is your differential diagnosis? What are the 4 main causes of neonatal cyanosis?

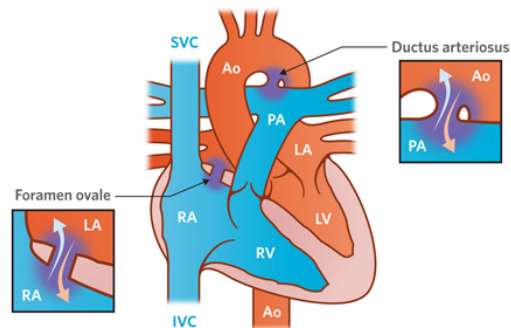
Q3: How can you use age, colour and bedside tests to help you narrow your differential diagnosis?

Approach:

1. Age < 1month vs > 1month
2. Colour – Pink vs Blue vs Grey
3. Tests – the usual tests plus hyperoxia test, BP/pulse and O₂ differentials, ECG, POCUS

Q4: The CXR is done and shows 'blackened' out lung fields.
How does this narrow your differential diagnosis?

Heart of a newborn



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Case 2: The Wheezing Child

A 10 year-old boy with a history of asthma is triaged to the acute area of your ED with a 7-day history of shortness of breath on exertion. Today, during recess at school he suddenly became much more short of breath and didn't have his inhaler as his ran out of it the day prior. EMS was called and the child came to your ED. On arrival he appears alert but tachypenic with nasal flaring and neck retractions. He's able to speak in single word phrases. His RR is 40, HR is 140, O2 sat is 88% on Room Air and temp is 37.4. His chest is silent.

Q1: What else would you want to know on history and physical to help you distinguish Asthma from Asthma mimics like bronchiolitis, airway FB, pneumonia, tracheomalacia and GERD?

Q2: What historical elements predict a severe asthma exacerbation? Are prediction tools such as the PRAM and PASS (see below) useful?

Emergent & Urgent Care Asthma Clinical Score (PRAM)*

| Signs | 0 | 1 | 2 | 3 |
|-------------------------------|--------|--------------------|----------------------------|--|
| Suprasternal Indrawing | absent | | present | |
| Scalene Retractions | absent | | present | |
| Wheezing | absent | expiratory only | inspiratory and expiratory | audible without stethoscope/ silent chest with minimal air entry |
| Air entry | normal | decreased at bases | widespread decrease | absent/ minimal |
| Oxygen saturation on room air | > 93% | 90% - 93% | < 90% | |

| Severity Classification | PRAM CLINICAL Score |
|-------------------------------|---|
| Mild | 0 - 4 |
| Moderate | 5 - 8 |
| Severe | 9 - 12 |
| Impending Respiratory Failure | 12+ following lethargy, cyanosis, decreasing respiratory effort, and/or rising pCO ₂ |

*Modified to adjust for higher altitude

Chalut D, Ducharme F, Davis G. *Journal of Pediatrics* 2000;137:762-768

JUNE 2008

PASS score

| Clinical Finding | 0 | 1 | 2 |
|----------------------------|-----------------------------|-----------------------|---------------------|
| Wheezing | None or mild | Moderate | Severe or absent |
| Air Entry | Normal or mildly diminished | Moderately diminished | Severely diminished |
| Work of breathing | None or mild | Moderate | Severe |
| Prolongation of expiration | Normal or mildly prolonged | Moderately prolonged | Severely prolonged |
| Mental Status | Normal | Depressed | |

Q3: Which kids with wheezing need a CXR?

Q4: What medications should be given in the ED to a child with moderate-severe asthma?

Q5: What is the role of Peak Expiratory Flow in the management of pediatric asthma?

Q6: What medications do you subscribe for children who are discharged from the ED with an asthma exacerbation?

Case continued:

You give this boy continuous ventolin and atrovent plus oral dexamethasone 0.6mg/kg and an hour later he's worse....much worse. He's now satting 86% and looks like he is starting to tire. His GCS is 14 and the nurse asks you what you want to do next? How would you manage this child now? Would you intubate the child if he worsens? Give MgSO₄? Heliox? Ketamine? Epinephrine?

Putting it all together for Severe Pediatric Asthma Exacerbation: A Step-wise Approach

*note that the **blue** indicates evidence-based treatment while the **red** indicates therapies that are reasonable to try when all else has failed but do not have strong evidence for benefit

Put the child on the cardiac monitor

|

Obtain IV access and draw blood work including electrolytes and a VBG

(with particular attention to the K)

|

Call your RT and pediatric intensivist early

|

Continuous salbutamol nebulizers with the first 3 including ipratropium bromide

|

IV steroids: methylprednisolone 1mg/kg or hydrocortisone 5mg/kg

(if dexamethasone 0.3mg/kg, max 10mg was not given prior to starting nebs)

|

IV NS 20mL/kg bolus (preferably before the MgSO₄)

|

IV Magnesium Sulphate 40mg/kg to a maximum of 2g over 20 mins

(in the first hour if possible)

|

Consider epinephrine 0.01mg/kg IM and nebulized MgSO₄

(especially if you are having trouble obtaining IV access)

|

Consider BiPaP or high flow nasal oxygen

|

Consider IV salbutamol 1-5mcg/kg/min

(beware tachycardia, low DBP, rising lactate)

|

Consider subdissociative dose ketamine

|

Consider Heliox

Case 3: Pain Management & Procedural Sedation

A 3-year-old presents to the ED with a fracture of their distal radius requiring manipulation. He is previously healthy, and on no medications.

Q1: How do you assess for pain severity in infants and toddlers?

FLACC Scale

| Categories | 0 | 1 | 2 |
|-----------------|-----------------------|----------------------------|----------------------------|
| Face expression | No special expression | Slight frowning, grimace | Mop, teeth clenching |
| Legs | Normal position | Tight, stressful | Kick at anybody |
| Activity | Calm | Turn around | Hop off, jerk |
| Cry | No cry | Groan, moaning | Shouting cry, with screams |
| Consolability | Relaxed | Consoled with hug or touch | Never consoled |

FLACC=Face, leg, activity, cry, consolability

Q2: What non-pharmaceutical techniques can be used to help with sedation in children?

Q3: What medications options does your team give this child at triage or if there is a delay to procedural sedation?

| Agent | Dose | Onset of Action |
|--------------------|-----------------------------------|-----------------|
| Fentanyl IN | 1-2mcg/kg (max 100mcg) | 2- 3 min |

Q4: What topical analgesic options do you have for venipuncture? For a very anxious child requiring imaging?

Q5: Under what circumstances would you NOT sedate a child in the ED for a procedure?

Q6: What is your medication and route of choice for procedural sedation for this child?

| | Ketamine IV | Ketamine IM | Ketamine + Midazolam IV |
|---------------------|--|--------------------------------------|--|
| Dose | 1-2 mg/kg slow IV push. | 4-5 mg/kg IM | Ketamine 1-2 mg/kg + Midazolam 0.01-0.5mg/kg IV |
| Onset | 1-5 min | 4-5 min | Same as IV |
| Duration | Approx. 20min | Approx. 25 min | > 25 min |
| Benefits | 1. Provides Analgesia, Sedation and Amnesia 2. Predictable onset and offset. 3. Does not decrease respiratory drive. | Same as IV | 1. Theoretically postulated to reduce emergence reaction → no evidence to support this. 2. Good for long procedures. 3. Reduced emesis |
| Side-effects | Emesis Laryngospasm Emergence reaction | Similar IV but higher rate of emesis | Prolongs recovery time |
| Recovery | Approx. 60 min | Approx. 90-120 min | > 120 min |

Q7: What criteria do you use to ensure that a child is safe to be discharged post-sedation?

Key References

Strobel AM, Lu le N. The Critically Ill Infant with Congenital Heart Disease. Emerg Med Clin North Am. 2015;33(3):501-18. <https://emergencymedicinecases.com/wp-content/uploads/2017/01/EMCNA-CCHD-Strobel-8.2015.pdf>

O Ortiz-Alvarez, A Mikrogianakis; Managing the Patient with an acute asthma exacerbation. Canadian Paediatric Society, Paediatr Child Health 2012;17(5):251-5 <http://www.cps.ca/documents/position/management-acute-asthma-exacerbation>

TREKK bottom line recommendations for procedural sedation http://trekk.ca/resources?tag_id=D016292