

Grey's Anatomy Meets Sesame Street: A Behind the Scenes Experience of
the Pediatric Patient

Alia L. Fox, MD

Pediatric Anesthesiologist, ABA Certified

Infinity Healthcare Inc., Milwaukee WI

WISPAN Conference: May 21, 2016

Disclosures

- No professional conflicts to disclose

Objectives Preoperatively

- Discuss the importance of preoperative and Pre-Anesthetic assessment for the pediatric patient
- Debate the Pros and Cons of oral premedication and family presence at Induction

Objectives Intraoperatively

- Discuss Pediatric fluid management, normal physiologic parameters, and the implications of maintaining thermal homeostasis

Objectives Postoperatively

- Review typical emergence and postoperative issues with the Pediatric patient
- Address pertinent PACU concerns with both the Pediatric patient and their Family
- Discuss new trends in social culture with Anesthetic implications

Professional Background:

Residency: Cleveland Clinic Foundation

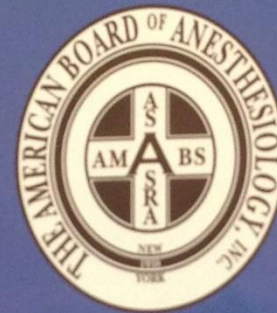
Fellowship: Children's Hospital of WI

Assistant Professor: Duke University

Staff Anesthesiologist: Meriter/Unity Point,
Wheaton Franciscan/Ascension Health



Pediatric Anesthesiology
Subspecialty Certification



The American Board of
Anesthesiology

Preoperative Assessment: “What’s behind door #1?”



Parental presence at Induction

- 2004 National survey: large variability!
- 32% of the hospitals allow parental presence
- 11% *encourage* parental presence
- 23% have no formal policy, and 26% **do not** allow it
- Survey of anesthesiologists: Only 10% have parents present during induction of anesthesia in more than 75% of cases
- 27% have parents present in less than 25% of cases. Half (50%) of the anesthesiologist **never** have parents present during induction
- 1983: Study suggested that it might lower the anxiety of the child to have Parents present.
- This study was nonrandomized, did not control for confounding variables, and lacked outcome measurements. Several studies have since concluded that parental presence *did not* result in decreased anxiety during induction of anesthesia.
- The one exception is when a **calm** parent accompanies an anxious child to the operating room. Parental presence was shown to be less effective than oral midazolam administered 30 minutes before surgery.

Z N Kain, et al, Parental presence during induction of anesthesia versus sedative premedication: which intervention is more effective? *Anesthesiology*: 1998, 89(5);1147-56.

Z N Kain, et al, [Predicting which child-parent pair will benefit from parental presence during induction of anesthesia: a decision-making approach](#). *Anesth. Analg.*: 2006, 102(1);81-4

Anxious Parents Yield Anxious Patients

- Yale study, n=88: oral midazolam (0.5mg/kg) is more effective than either parental presence or no intervention for managing a child's and parent's anxiety during the preoperative period.



Preoperative Assessment

- NPO status
- Anesthetic Family/Patient History
- Current Illness
- Allergies, PMH

Every kid has a runny nose!

- Subjective mostly unless:
- Febrile, vomiting, lethargy, infectious nidus
- Lung adventitial sounds
- Overt dehydration/malaise
- Contributing factors: Passive tobacco??

CHILDREN WITH UPPER AND LOWER RESPIRATORY TRACT INFECTION PRESENTING FOR ELECTIVE SURGERY

There is an 10 fold increase in airway related complications when anesthesia is carried out in the presence of a recent respiratory infection. The airway hyperreactivity and the risk of perioperative complications remains increased for 2-6 weeks after an upper respiratory infection and 6-8 weeks following a lower respiratory tract infection.

Perioperative complications:

- Breath holding
- Laryngospasm
- Bronchospasm
- Airway obstruction
- Oxygen desaturation less than 90%
- Post-extubation stridor caused by subglottic edema
- Atelectasis
- Pneumonia
- Unanticipated tracheal re-intubation

Risk factors:

- Recent URTI/LRTI
- Surgery involving the airway
- History of reactive airway disease or atopy
- OSA
- Age less than 3 y/o
- Need for endotracheal intubation
- Passive smoking

Postpone an elective surgery in children with:

- Purulent nasal discharge
- Fever
- Malaise
- Productive cough
- Rhales/rhonchi
- Wheezing
- Poor feeding

Proceed with surgery in children with mild URTI who have clear rhinorrhea, appear otherwise healthy, have clear lungs to auscultation and no fever.

Postpone surgery for 2-4 weeks in children who present with URTI and symptoms mentioned above.

Postpone surgery for 4-6 weeks in children who present with LRTI and are undergoing surgery involving endotracheal intubation (T&A).

Postpone surgery for 2-4 weeks in children who present with LRTI and are undergoing surgery involving mask anesthesia (ear tubes).

Let's go!



My “Smellies”

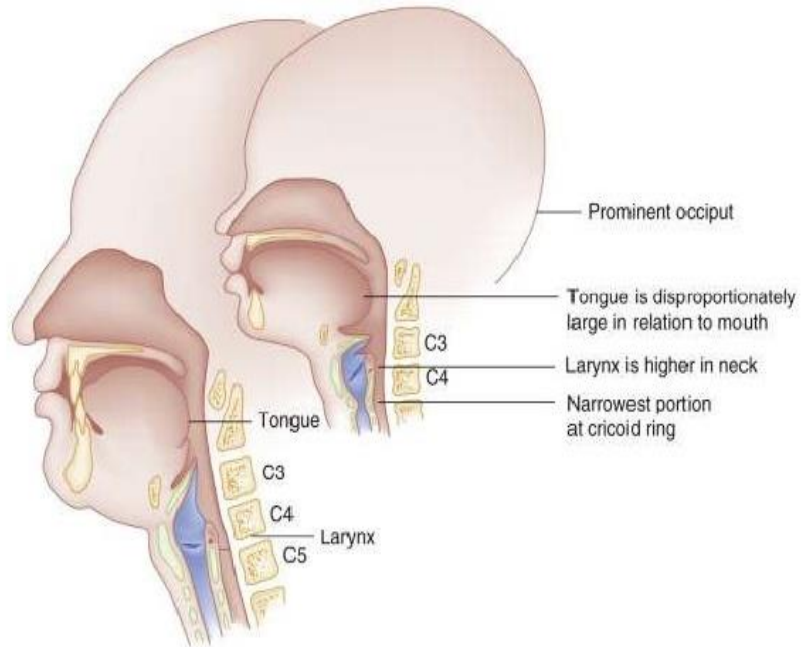


Induction...

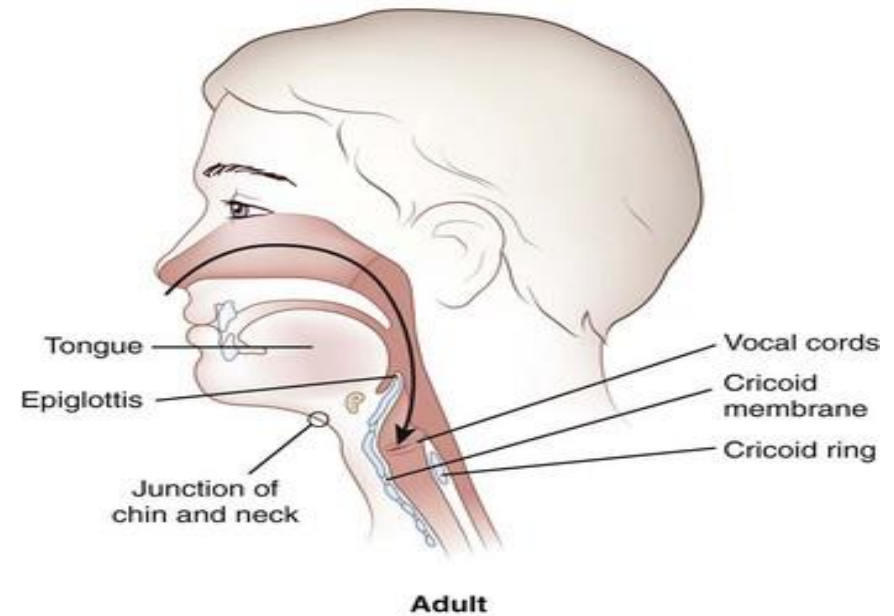
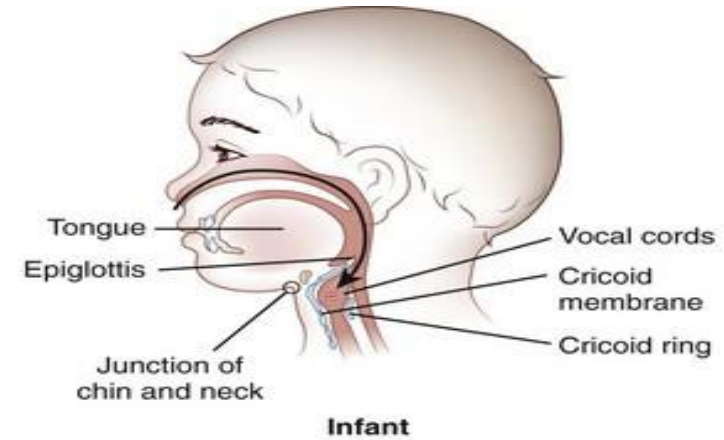


Anatomy

Basic Differences in the Pediatric Airway



Comparison of adult and pediatric airways. (From Finucane BT: Principles of Airway Management. Philadelphia, FA Davis, 1988.)



- “U shaped heavy pancake vs. Half moon regular pancake”
- Tooth fairy time?
- Hand ventilation issues
- “Peanut butter tongue”
- Large unstable occiput
- ETT size appropriate? (Age/4+4)
- Nasal tubes decrease by 0.5
- 2009 study: 2246 children showed rates of ETT exchange 2.1% cuffed and 30.8% Non (p<0.0001). Better ETCO₂ monitor, equal Post Ext Stridor

The prize!



Not just “small adults” ...

Head to body ratio

Thorax to Abdomen ratio

Floppy Chest, highly compliant

Body Surface Area to Mass Ratio is Large

Maturation of alveolar ventilating units

% Total Body water



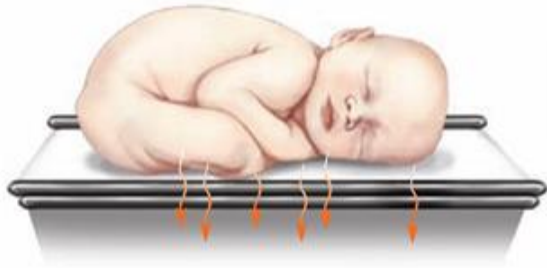
Physiology

- Why such a high heart rate?
- ? Respiratory rate?
- Why lower SBP?

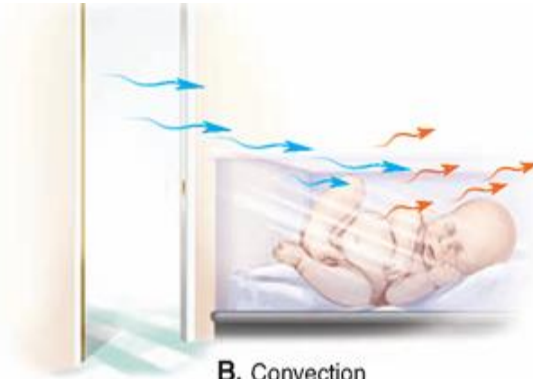
Pediatric Vital Sign Normal Ranges

Age Group	Respiratory Rate	Heart Rate	Systolic Blood Pressure	Weight in kilos	Weight in pounds
Newborn	30 - 50	120 - 160	50 - 70	2 - 3	4.5 - 7
Infant (1-12 months)	20 - 30	80 - 140	70 - 100	4 - 10	9 - 22
Toddler (1-3 yrs.)	20 - 30	80 - 130	80 - 110	10 - 14	22 - 31
Preschooler (3-5 yrs.)	20 - 30	80 - 120	80 - 110	14 - 18	31 - 40
School Age (6-12 yrs.)	20 - 30	70 - 110	80 - 120	20 - 42	41 - 92
Adolescent (13+ yrs.)	12 - 20	55 - 105	110 - 120	>50	>110

Temperature Control



A. Conduction



B. Convection



C. Evaporation



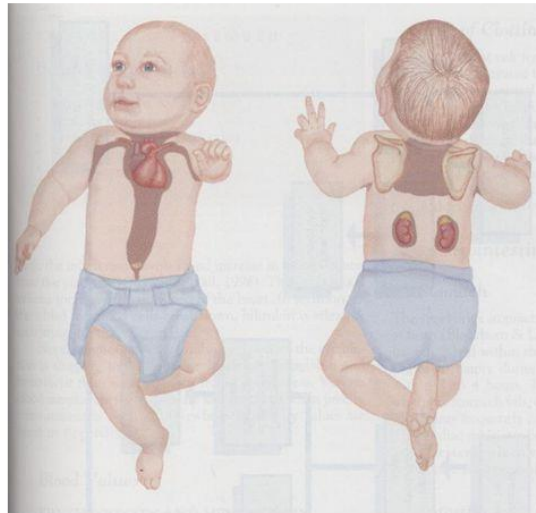
D. Radiation

- First 30 mins of GA: Redistribution
- 90% of heat loss overall is Radiation and Convection

Temperature control

Maintenance of Body Temperature

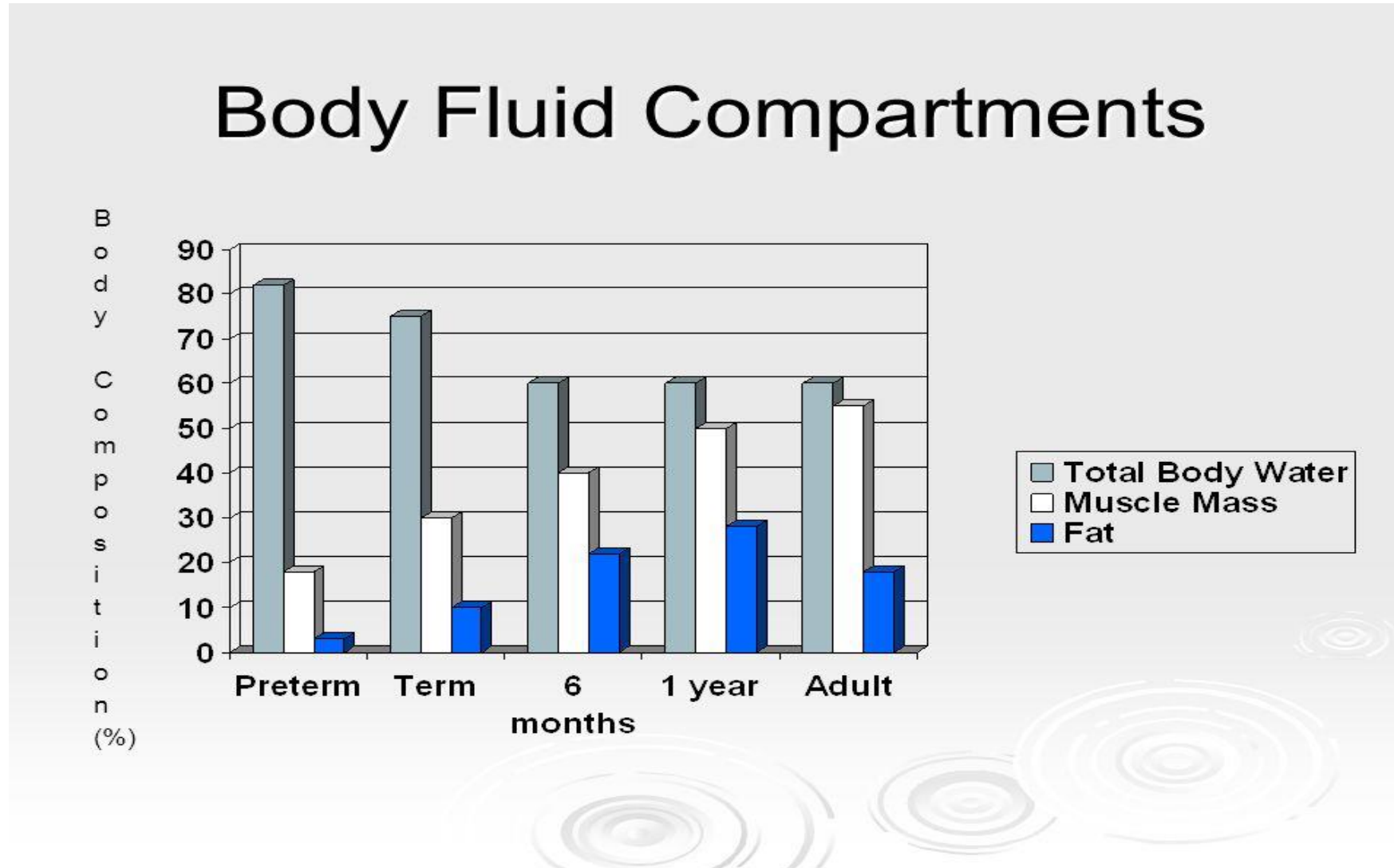
- Thermogenesis
 - ◆ (brown fat metabolism)
 - ◆ Can find on the body in:
 - Intrascapular region
 - Thorax
 - Peri-renal area
- Newborn's ability to conserve heat is lacking due to not able to shiver.



- Ambient room temp (best way!)
- Underbody Bair Hugger
- “Fry lights”
- Warmed IV fluids

- Stress response: Signals NE
- Vasoconstriction, ↑ O₂+Glucose Consumption (hypoglycemia + acidosis)

Normal elective outpatient surgery Fluids:



20 ml/kg of crystalloid in normal elective surgery of an adequately NPO pediatric patient

- PRBCs: 10-15ml/kg
- **Premature infant:**
- Stable, growing, Hgb < 7 g/dL. Resp distress without O2 requirement: Hgb < 10 g/dL, Resp distress with O2 requirement: Hgb < 12 g/dL, Mildly symptomatic anemia (e.g., apnea, tachycardia, poor wt. gain): Hgb < 12 g/dL.
- **Term infant < 4 months of age:**
- Clinical manifestations of anemia (e.g., apnea, tachycardia, poor wt. gain): Hgb < 7 g/dL, Perioperative anemia: Hgb < 10 g/dL, Hypoxia or on ECMO: Hgb < 12 g/dL, Cyanotic heart disease, Hgb < 13 g/dL, Acute blood loss >10% blood volume, not responsive to other forms of therapy, Clinical shock or severe decrease in BP: Hgb < 10g/dL
- **Pt > 4 months of age:**
- Acute blood loss: 15% of blood volume, or anticipation thereof, or hypovolemia not responsive to other forms of therapy, Postoperatively with signs of anemia (e.g., apnea): Hgb < 10 g/dL, Severe cardiopulmonary disease: Hgb < 12 g/dL, Patients receiving chemotherapy or irradiation, or patients with chronic anemia not responsive to medical therapy: Hgb < 7 g/dL, Complications of SC disease (e.g., CVA or acute chest)
- (symptomatic patients may be transfused at a higher hemoglobin level)

To the PACU!

- We look forward to your attendance at Saturday's WISPAN conference where you will find this presentation in its entirety!

