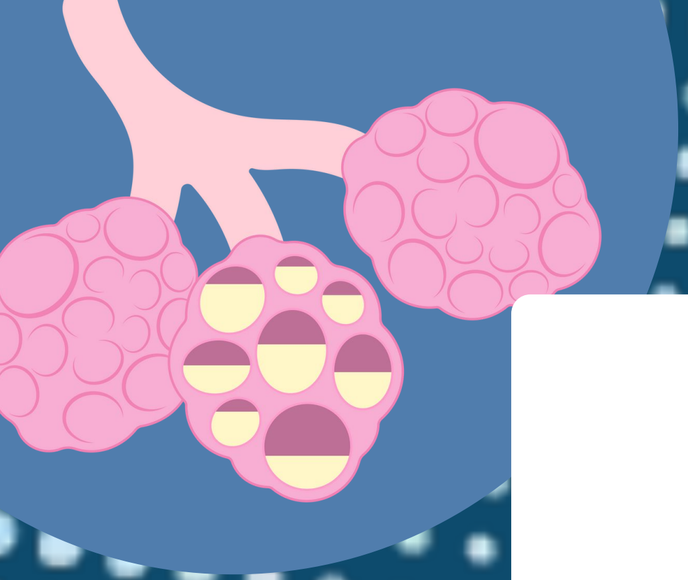
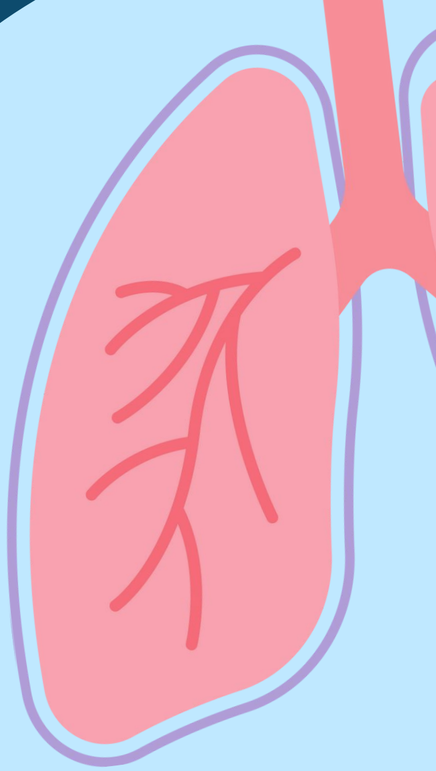
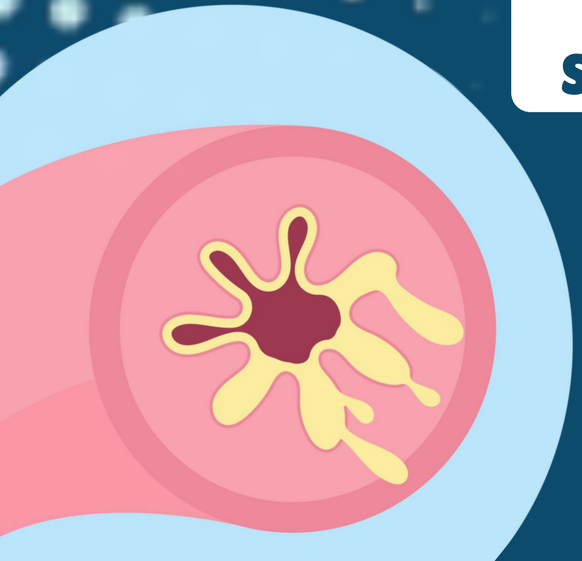
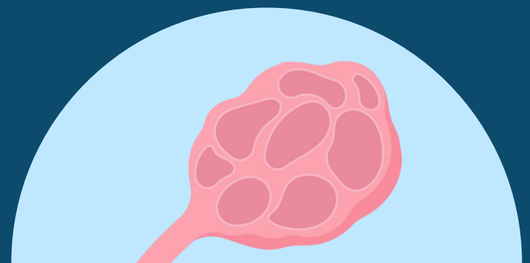




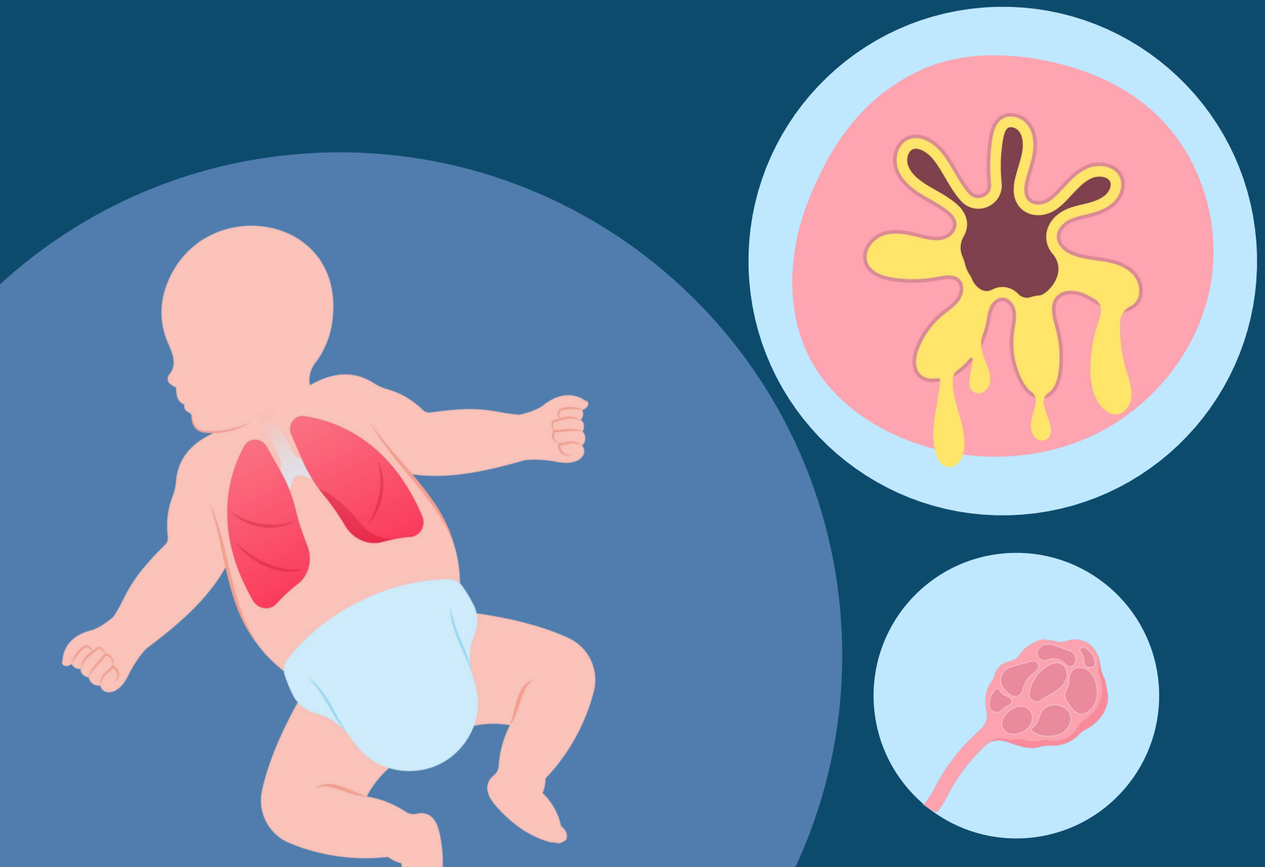
Pulmonary Pudding

Shari Flores DNP, MBA, MSN, CEN, CPEN, TCRN, SCRN, CHFN





Your eyes can not see
what your brain doesn't know



No Disclosures

Psychological Safety Warning: Pediatric Cadaver Images may initiate a trauma response

Learning Points

1. Not just a little adult Anatomy Differences
2. Pathophysiology of pressure points
3. Asthma in Arizona
4. Bronchiolitis
5. Effects of Vaping
6. Treatment Plans

You can't assess the airway if you can't open the mouth

Gentle Nose Pinch

Cuticle Pressure

Photo Credit: https://youtu.be/R-cBoPfLwgE?si=kNYzdM9ndLtUGDy1

Acupuncture Sites

Activate: Vibrate & Press Inward

Think Electricity

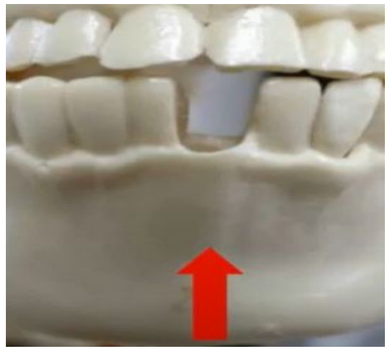
DC (Direct Current) body will acclimate

AC (Alternating Current) more successful

Chin Button External

45 degree inward

CO-24

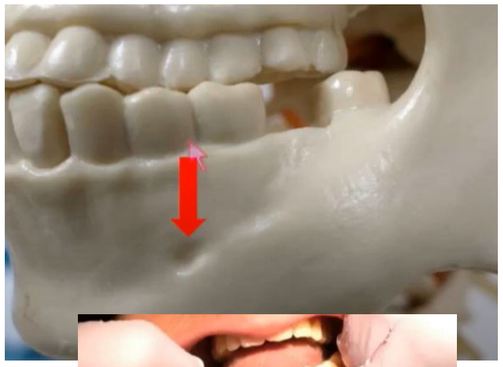


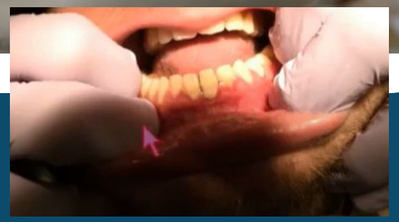
Mental Foramen

External or Internal

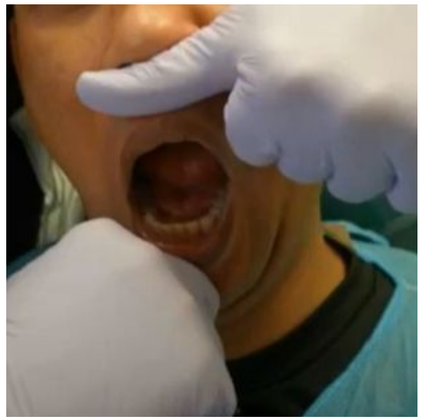
2 Knuckles

MHN -18





Stop the chin tuck



Use knuckle 45 degrees

Acupuncture Sites

Activate: Vibrate & Press Inward

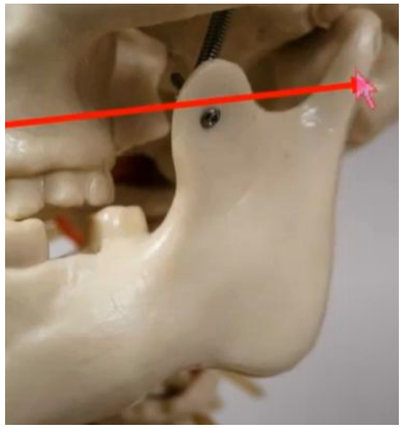
Think Electricity

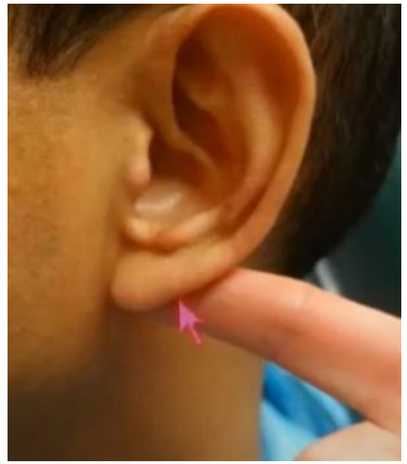
DC (Direct Current) body will acclimate

AC (Alternating Current) more successful

180 degree inward

Triple Burner 17





Where is the epiglottis?

- Newborn C1
- Toddler C3
- Adult C5

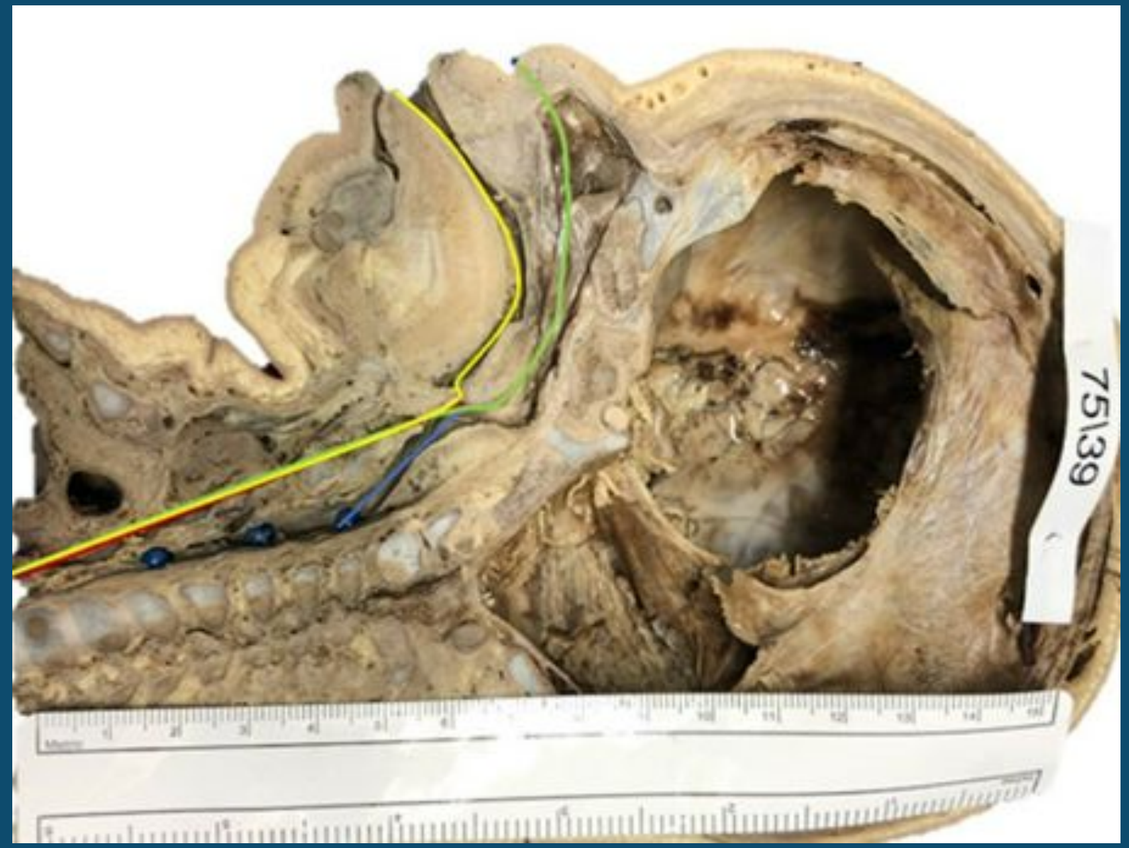


Photo Credit: https://advance.sagepub.com/doi/full/10.22541/au.159818335.53623804

Obligatory Nose Breathers

Did you know that the adult human is the only mammal that is not an obligatory nose breather?

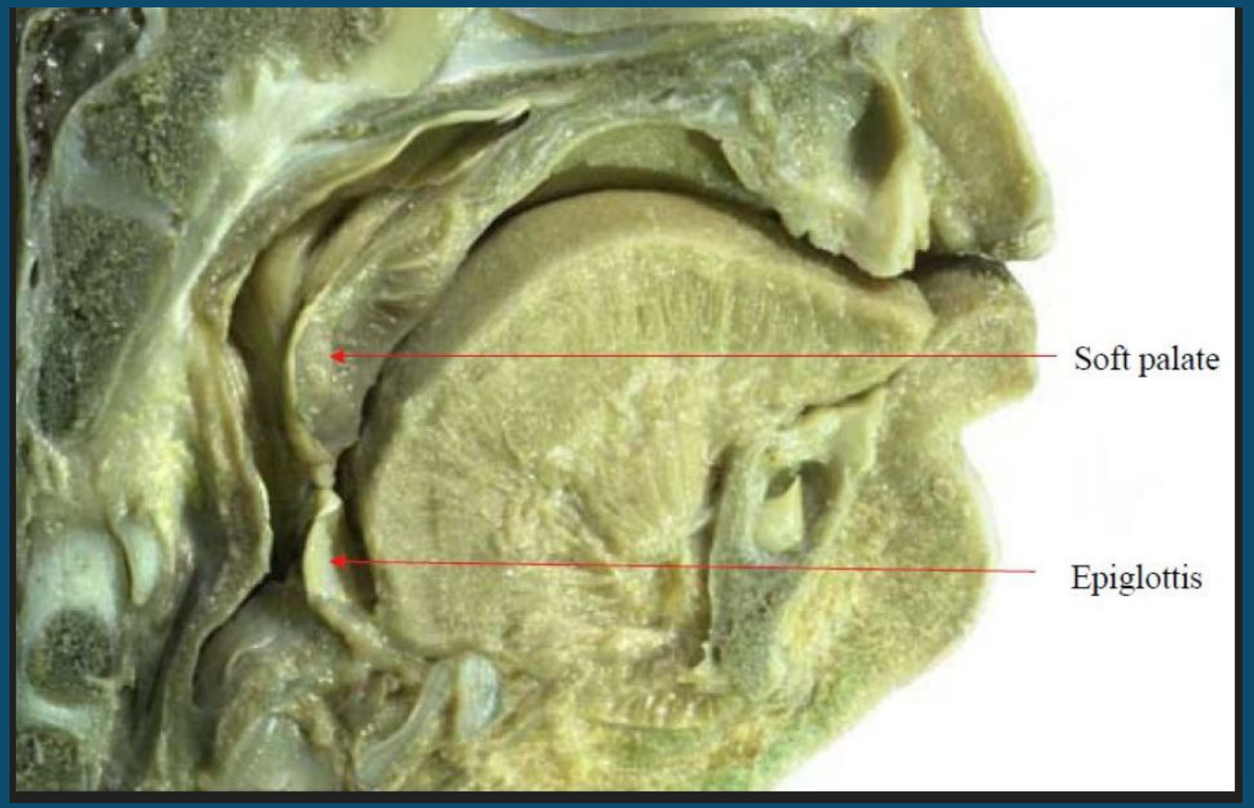


Photo Credit: https://advance.sagepub.com/doi/full/10.22541/au.159818335.53623804

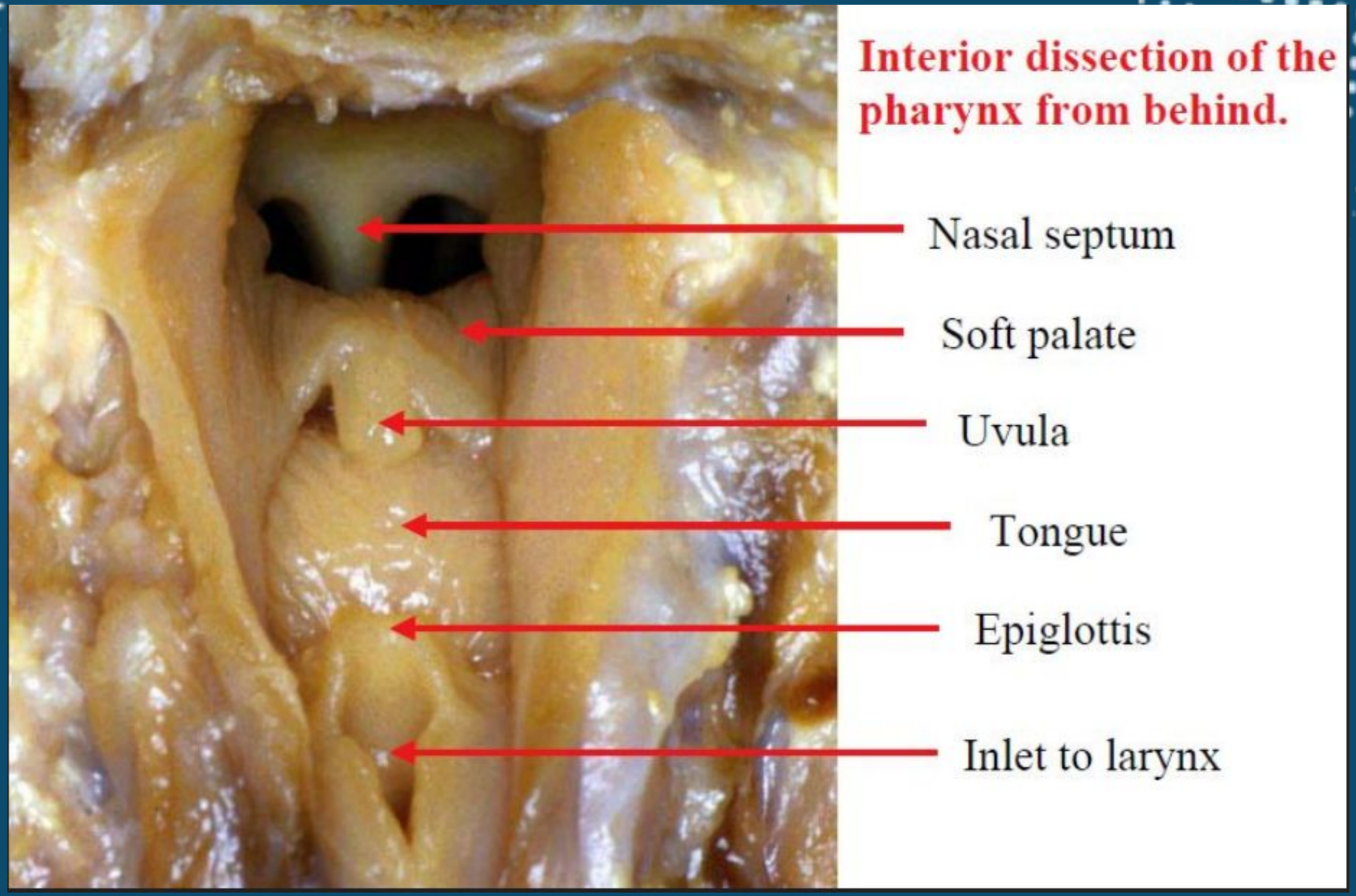
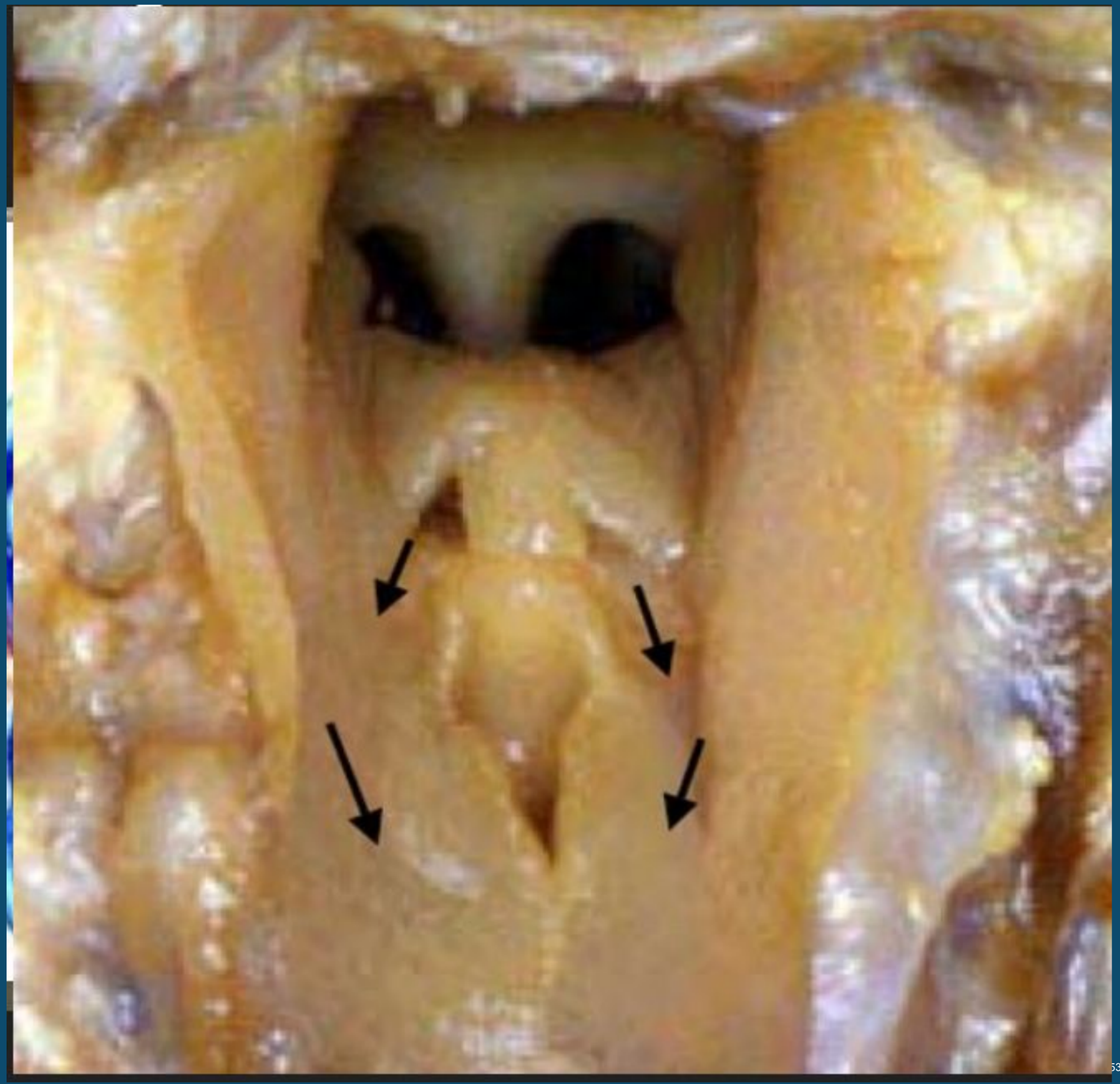
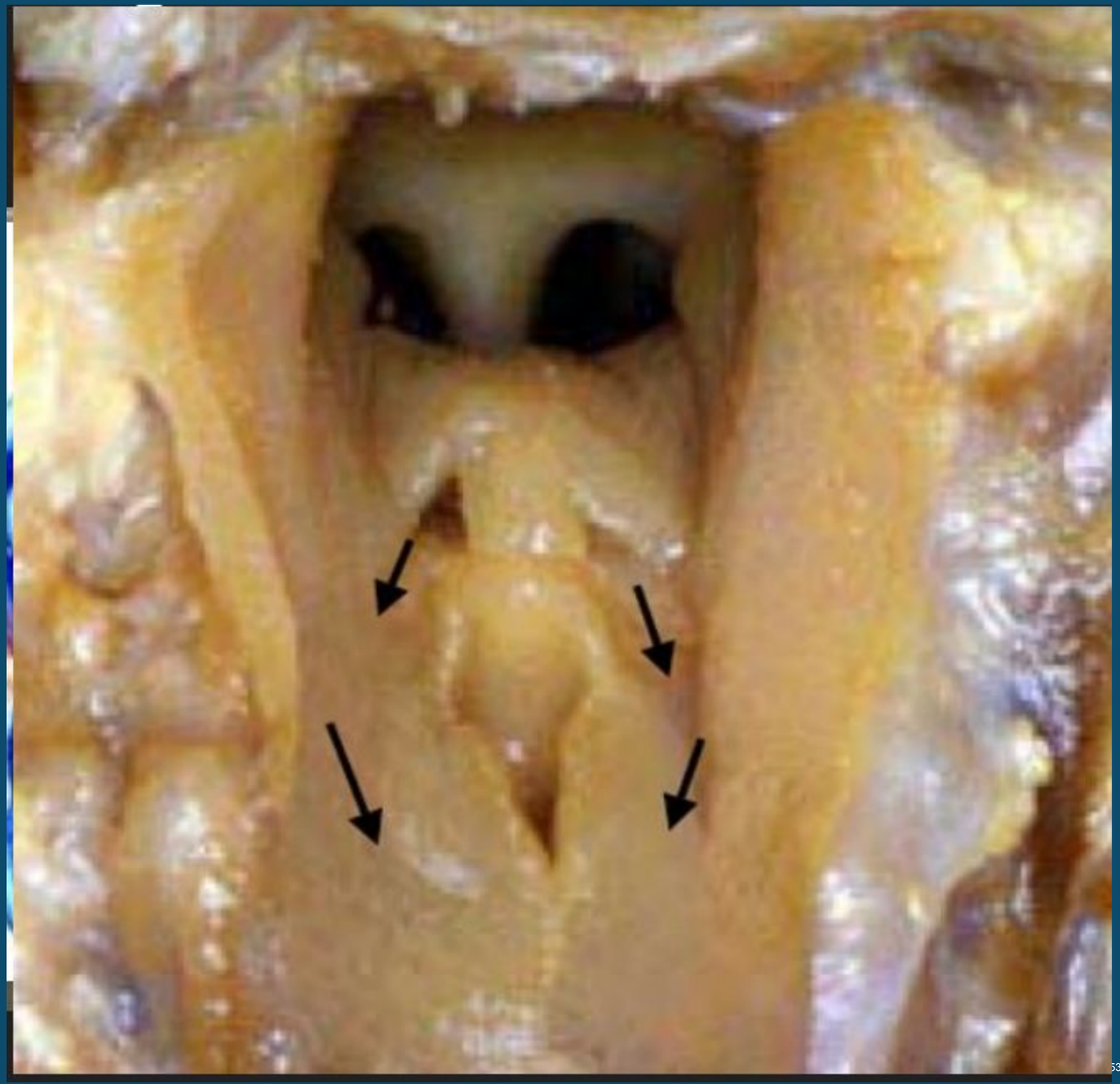
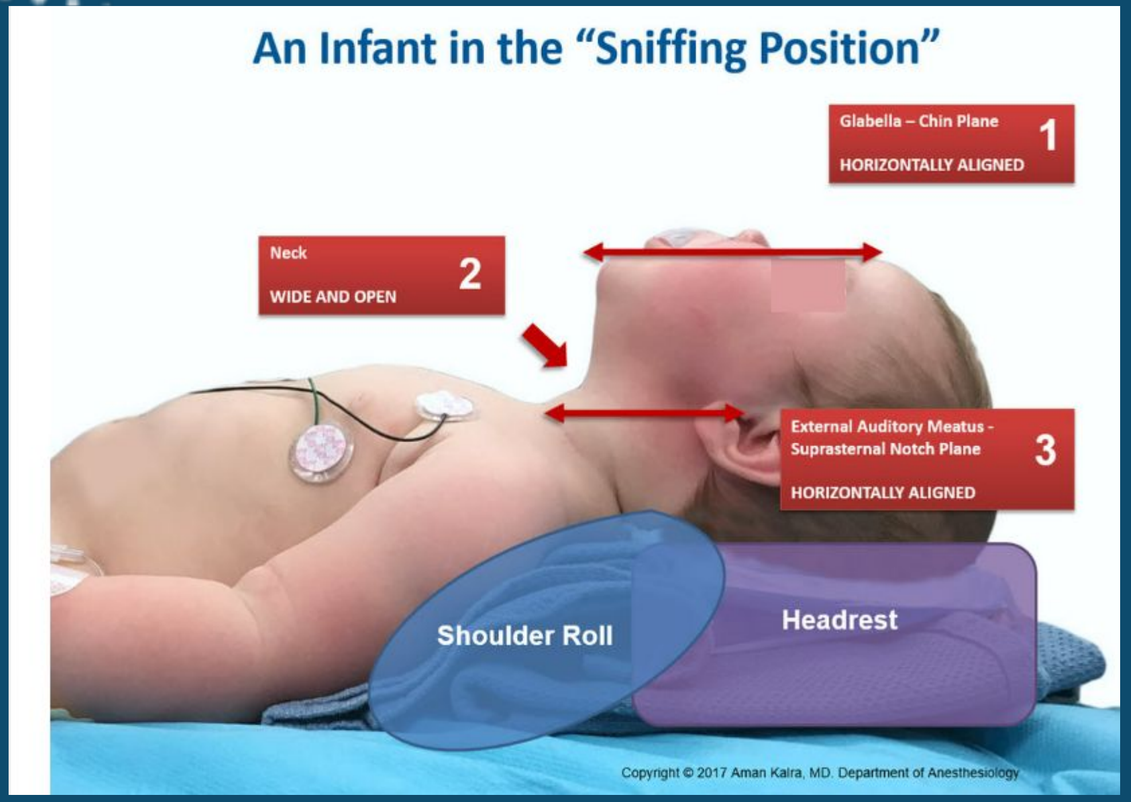


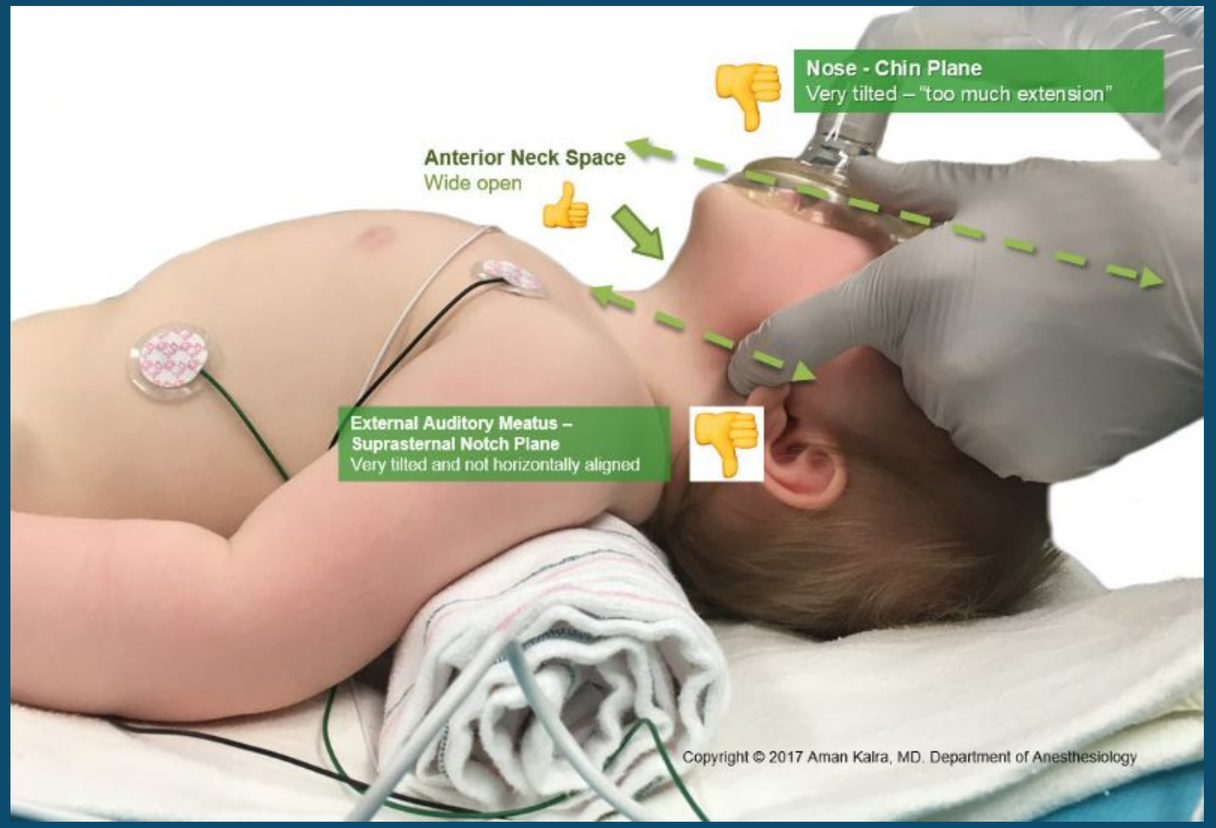
Photo Credit: https://advance.sagepub.com/doi/full/10.22541/au.159818335.53623804





Positioning without spinal concerns





Kalra, A. (2017) Positioning infants for airway management. Pediatric Anesthesia Tufts Medical Center.

Look familiar?

Kalra, A. (2017) Positioning infants for airway management. Pediatric Anesthesia Tufts Medical Center.

Pinkies are important

Laryngeal grip to allow 5th finger pressure on anterior neck

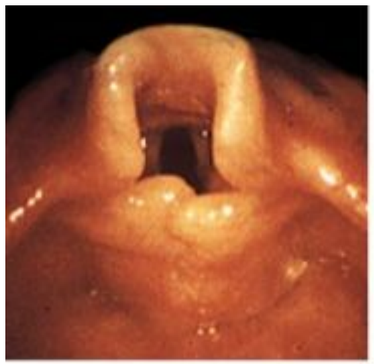
Using the thumb as a fulcrum for finite pivots works for IV's too

Photo Credit: https://www.stick-to-safety.com/products/automatic-safety-iv-catheters/clipr-ported

Larynx

Infant – Wider at the top – Funnel Shaped

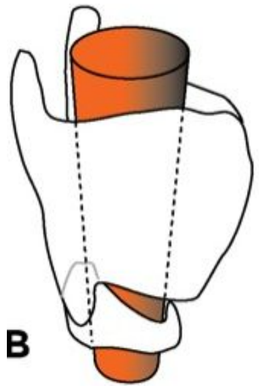
Epiglottis is short Omega Shaped

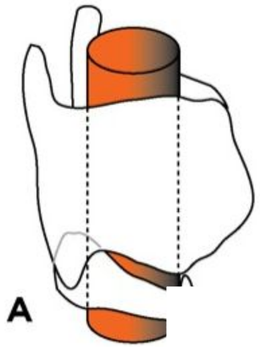


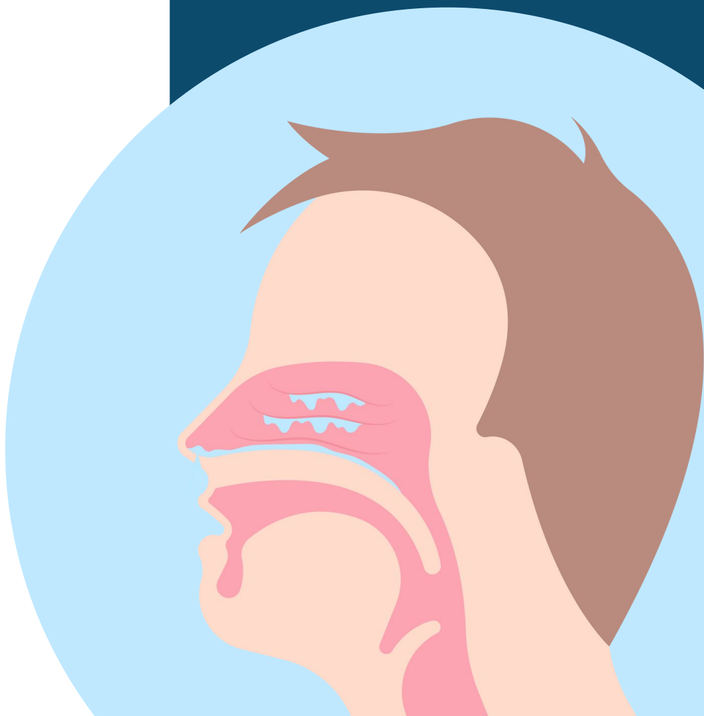
Infant

Toddler

Adult







Trick: Don't look for the vocal cords in pediatrics

Arytenoid Cartilage is an easier landmark in children less than 3 years of age

They control the tension and the movement of vocal cords

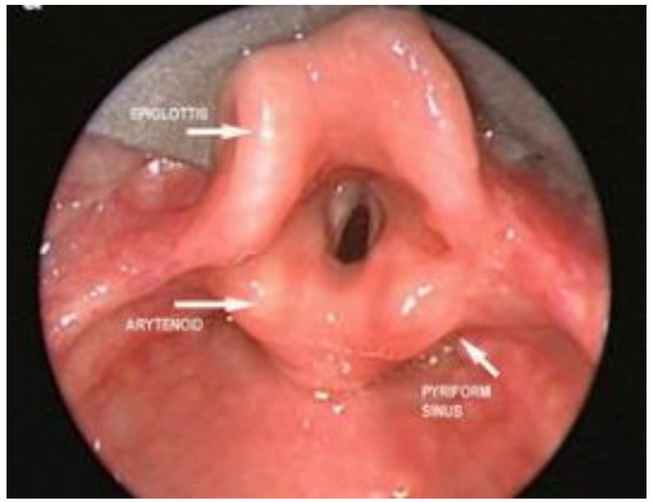


Photo Credit: https://www.paediatricemergencies.com/intubationcourse/course-manual/paediatric-airway-anatomy/

The Grunt

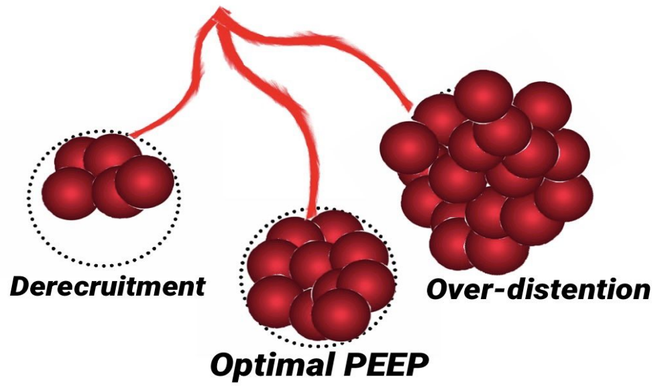
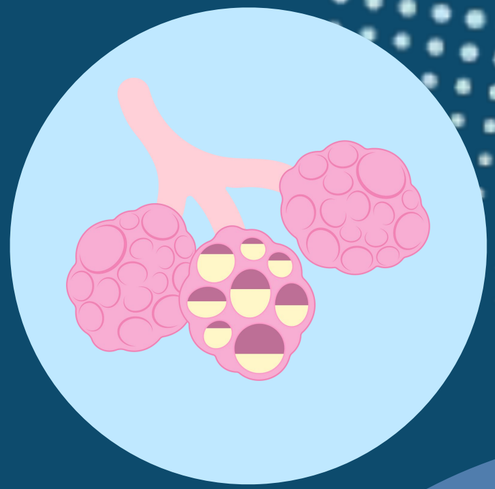


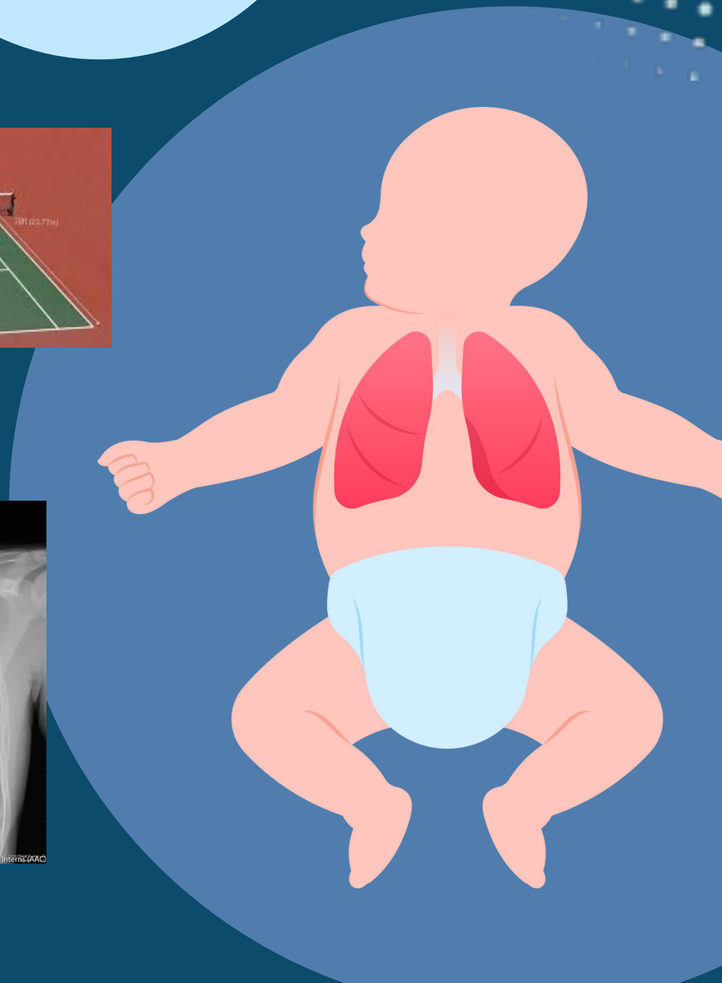
Photo Credit: https://www.paediatricemergencies.com/intubationcourse/course-manual/paediatric-airway-anatomy/

Alveoli & Ribs



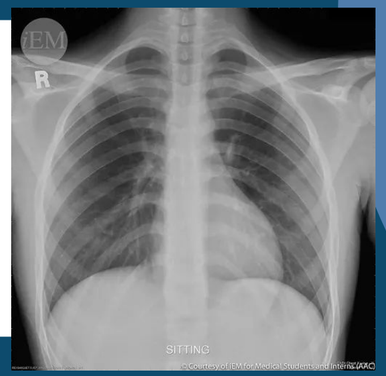
Full Term Infants
20-50 Million Sacs
Surface area of a baby blanket

Adults
200-500 Million Sacs
Surface area of about half a tennis court



Infant Ribs: Horizontal
Little expansion so abdominal continents push down and away as diaphragm descends

> age 8:
Angled Ribs



Masks for O2 and Nebs

- Remove the nasal clip
- Roll the edges

Reality of Using Pediatric Advanced Airway Skills

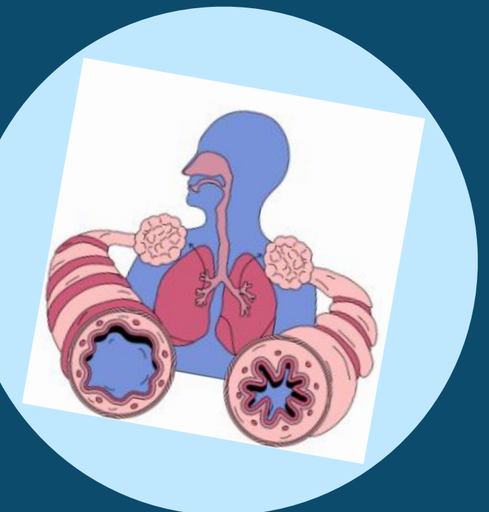
- Suburban Setting (Boston) - 50 paramedics in system
  - 555 Pediatric patients
    - 28 BVM (5%) - 2.5% of paramedics annually
    - ET 15 (3%) - 1.5% of paramedics annually
- Urban Setting (Orange County California) - 2520 paramedics
  - 830 Pediatric patients
    - All BVM - 12% of paramedics annually
    - 114 ET (14%) - 1.6% of paramedics annually

Babl, et al Pediatric Emergency Care 2001
Gausche, M. JAMA 2000

Asthma

Teammates remember 12-year-old who died following an asthma attack

By Jordan Bowen | Published January 7, 2023 6:39pm EST | Pasco County | FOX 13 News |



Asthma

Case Scenario:

Dispatched to a 8 year-old male is severe respiratory distress. On arrival to his school you find him seated in a tripod position. The school nurses says he developed cold symptoms yesterday has used his inhaler many times today. He has expiratory wheezing with significant intercostal and supraclavicular retractions. When you ask him to recite the alphabet he only says “D”. He appears exhausted. Mom is on speaker phone.

Vitals: HR 150, BP 116/72, Resp 45 O2 sats 84%

PMHx: Asthma, mild eczema

Medications: Albuterol, Flovent, Singulair

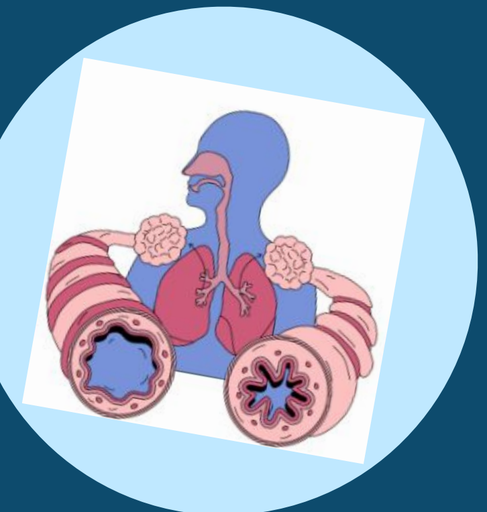
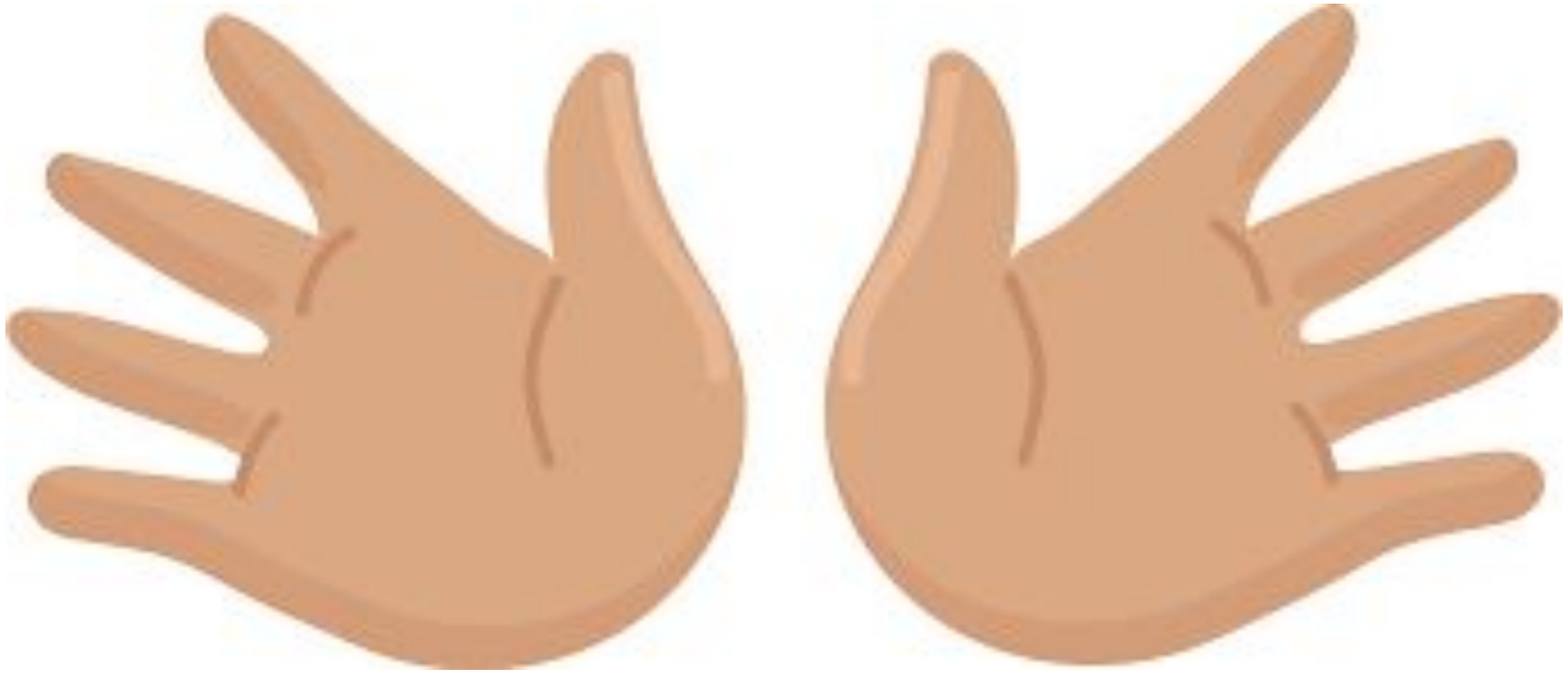
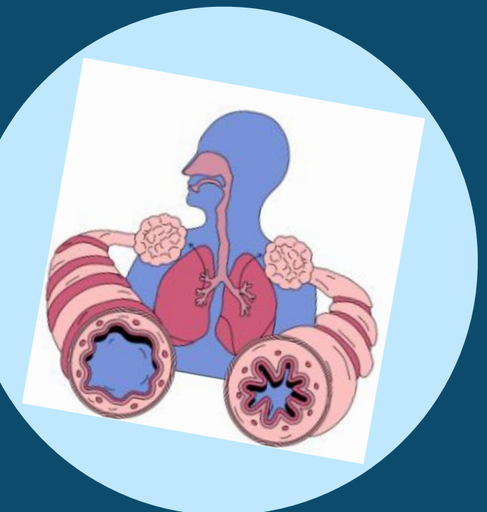


Photo Credit: https://www.health.com/condition/asthma/does-asthma-go-away

Let's Start to Prepare in Route

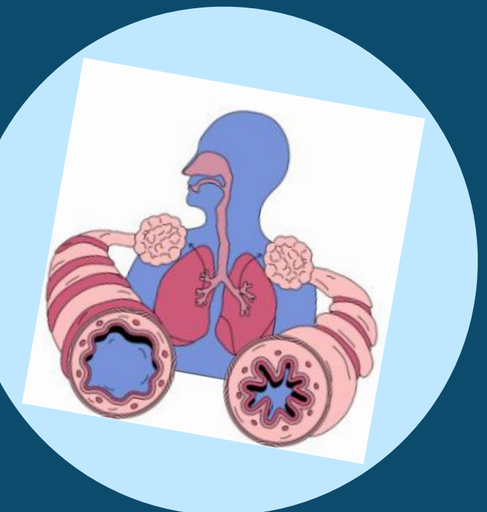
- Dispatch informed us he was 8 years old
  - How much does he approximately weigh?





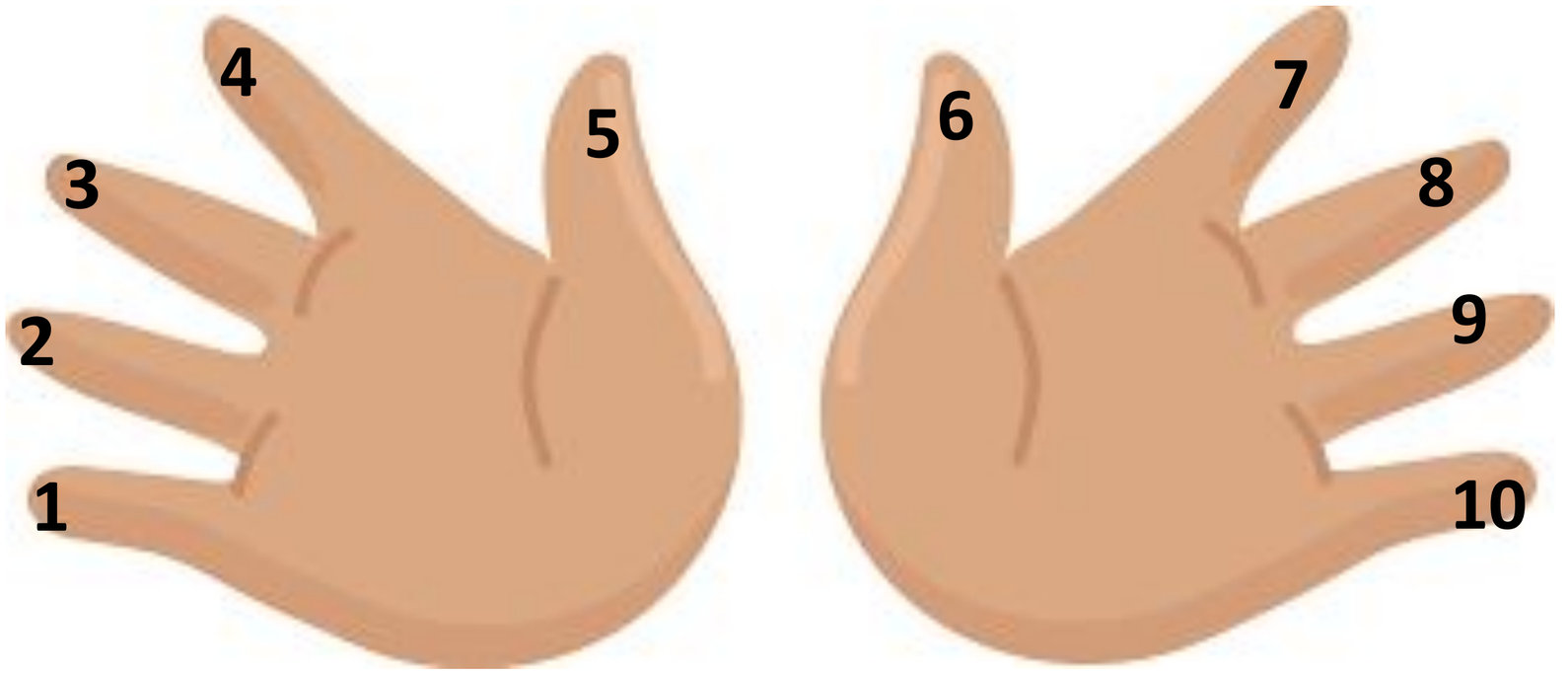
Let's take a moment to remember

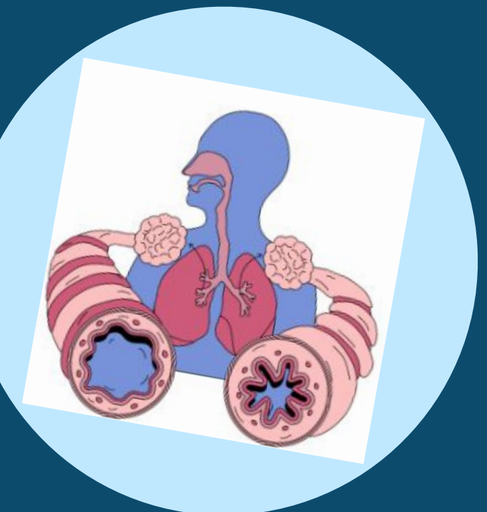
Dr. James Broselow 1/12/1943 – 2/20/2025



Let's work on our hands

50 % for the USA





Let's work on our hands

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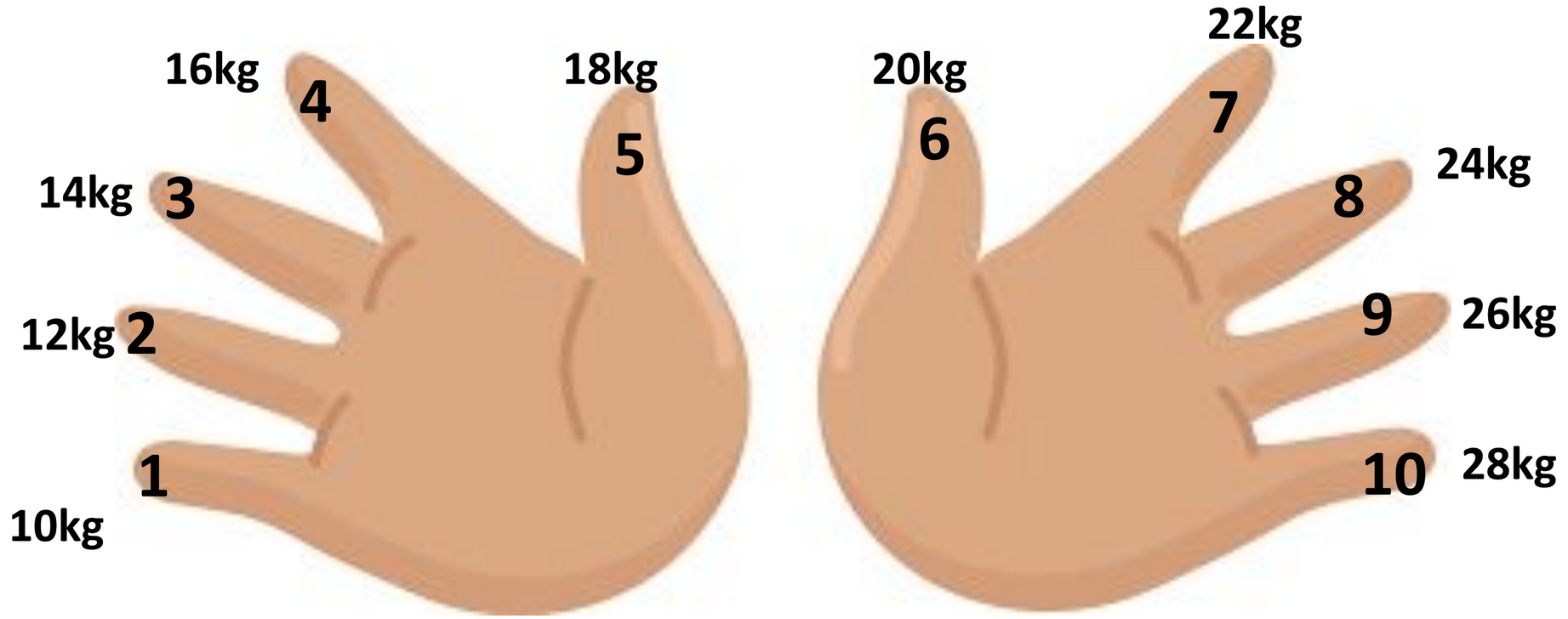

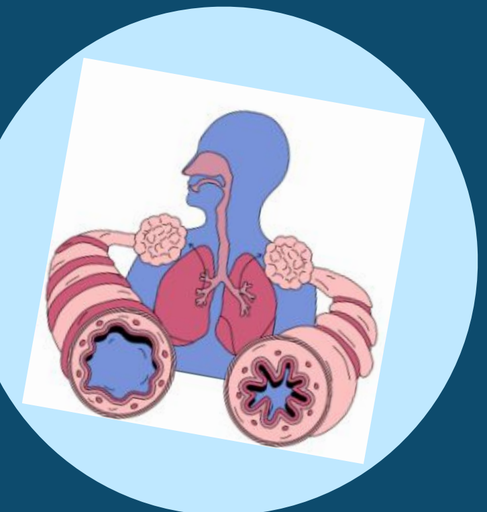

Let's work on our hands

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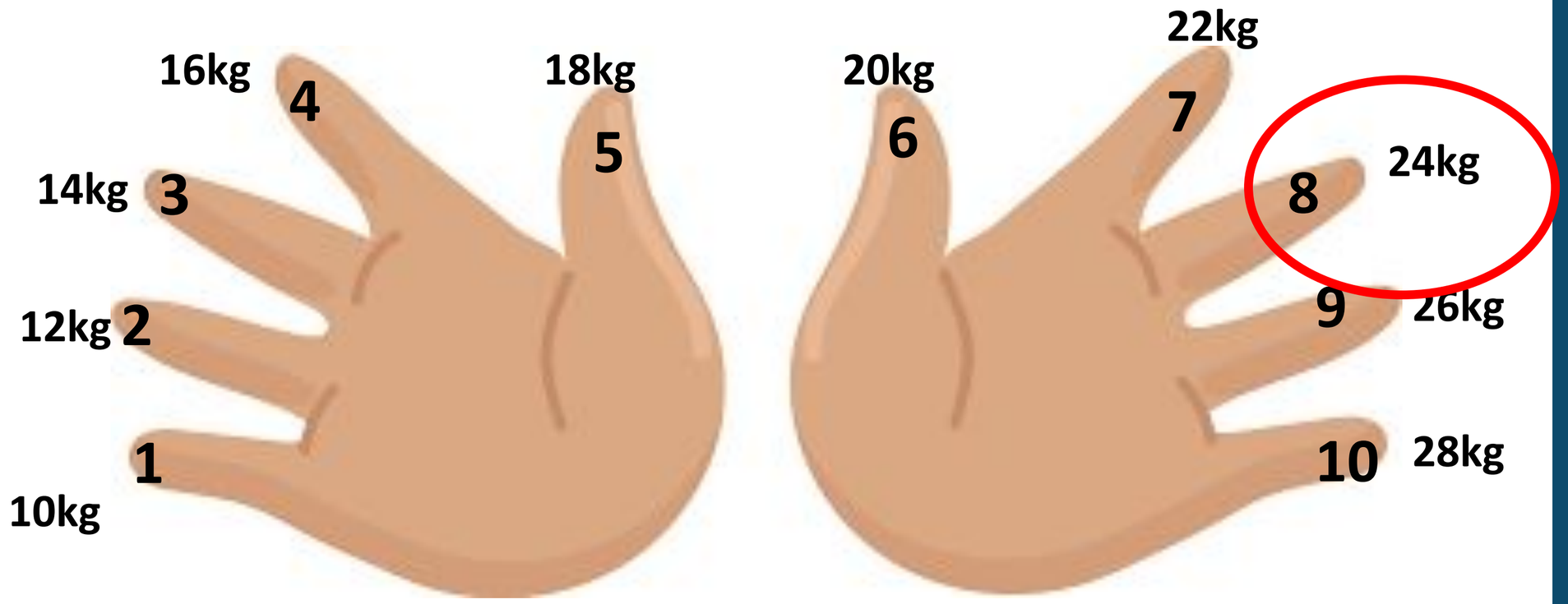
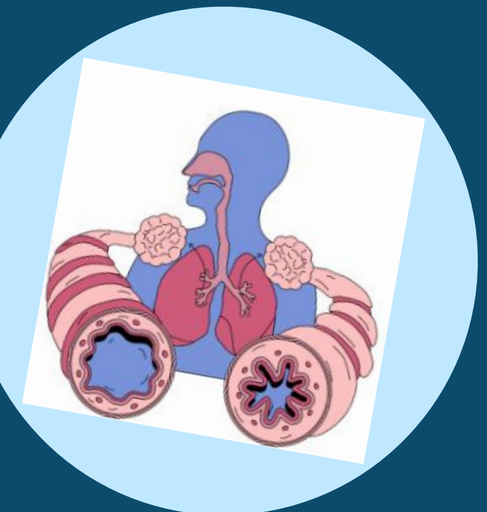


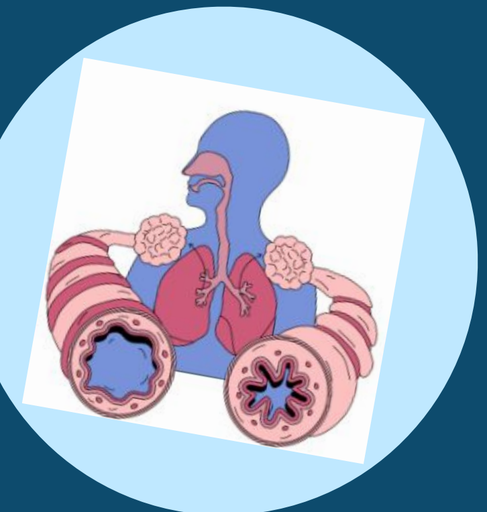


24 Kilograms

WHAT KIND OF EQUIPMENT DO WE NEED?

Oxygen Delivery Devices

What age do we transition from a pediatric non-rebreather to an adult non-rebreather?



At approximately 12 years of age
The Pediatric Non-Rebreather is 2-12 years of age

24 Kilograms

WHAT KIND OF EQUIPMENT DO WE NEED?

We ne ze?

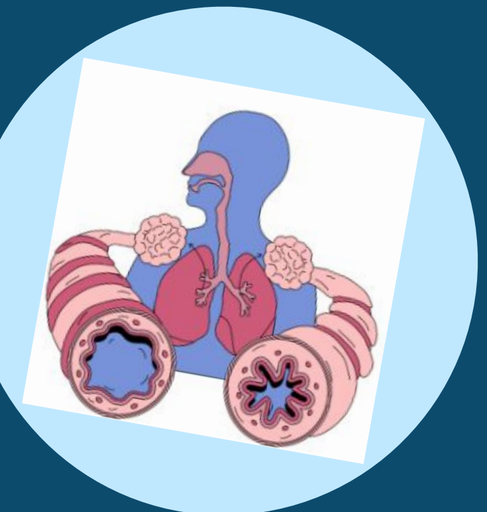
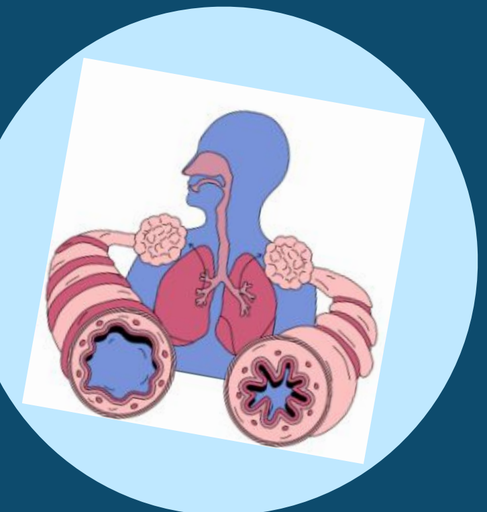


Photo Credit: https://images.app.goo.gl/vD2bvjqHPzcmHPiEA

How do you set the mask for a pediatric patient?

Photo Credit: https://www.rch.org.au/trauma-service/manual/breathing-procedures/



Normal Range Blood Pressure Determination

Lowest SBP = 70 + (2 x years of age)

= 70 + (2x8)

= 70+16

=86

Highest SBP = 90 + (2 x years of age)

=90 + (2x8)

=90 + 16

=106

Fluids

IVF = 20cc x kg

IVF= 20 x 24

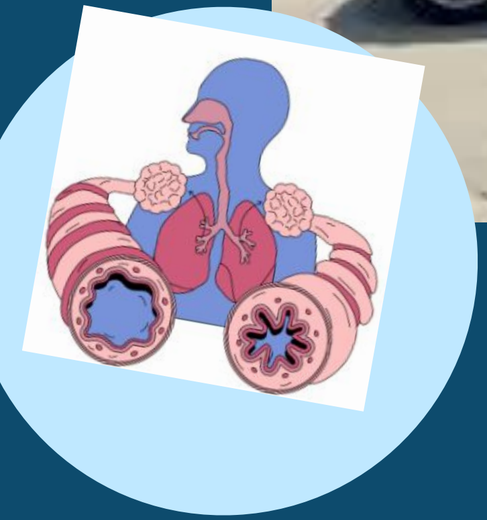
= 480cc

BIOOD = 10cc x kg

= 10 X 24

= 240cc

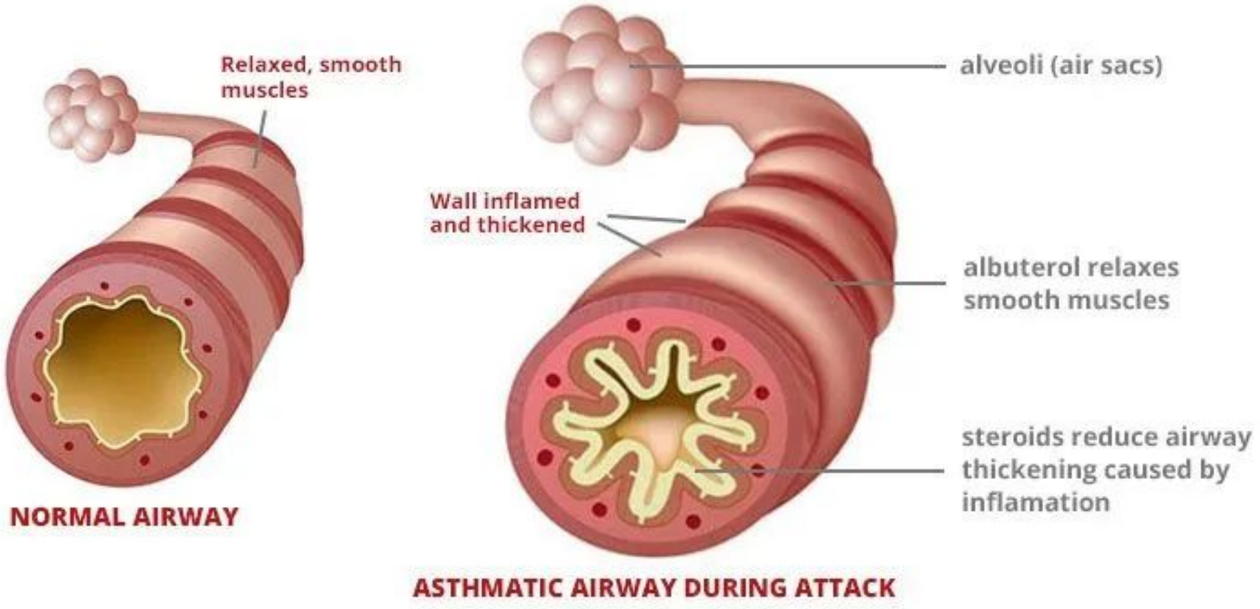
You have arrived at the school



Tripoding

Photo Credit: http://www.bioline.org.br/request?jp09065

Take a deep breath



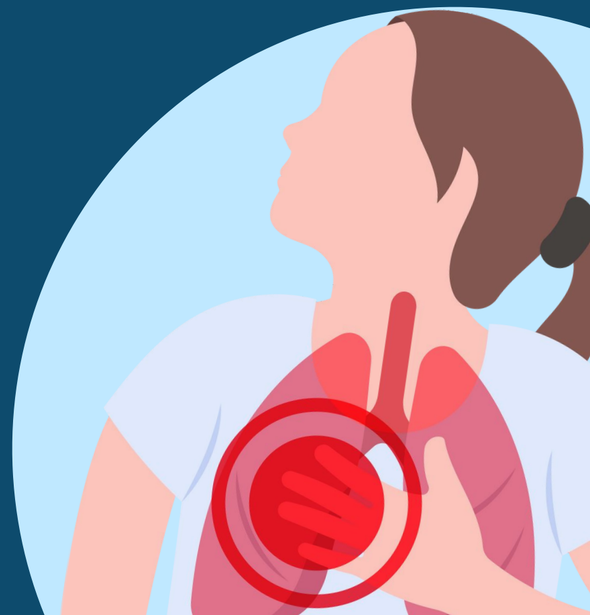
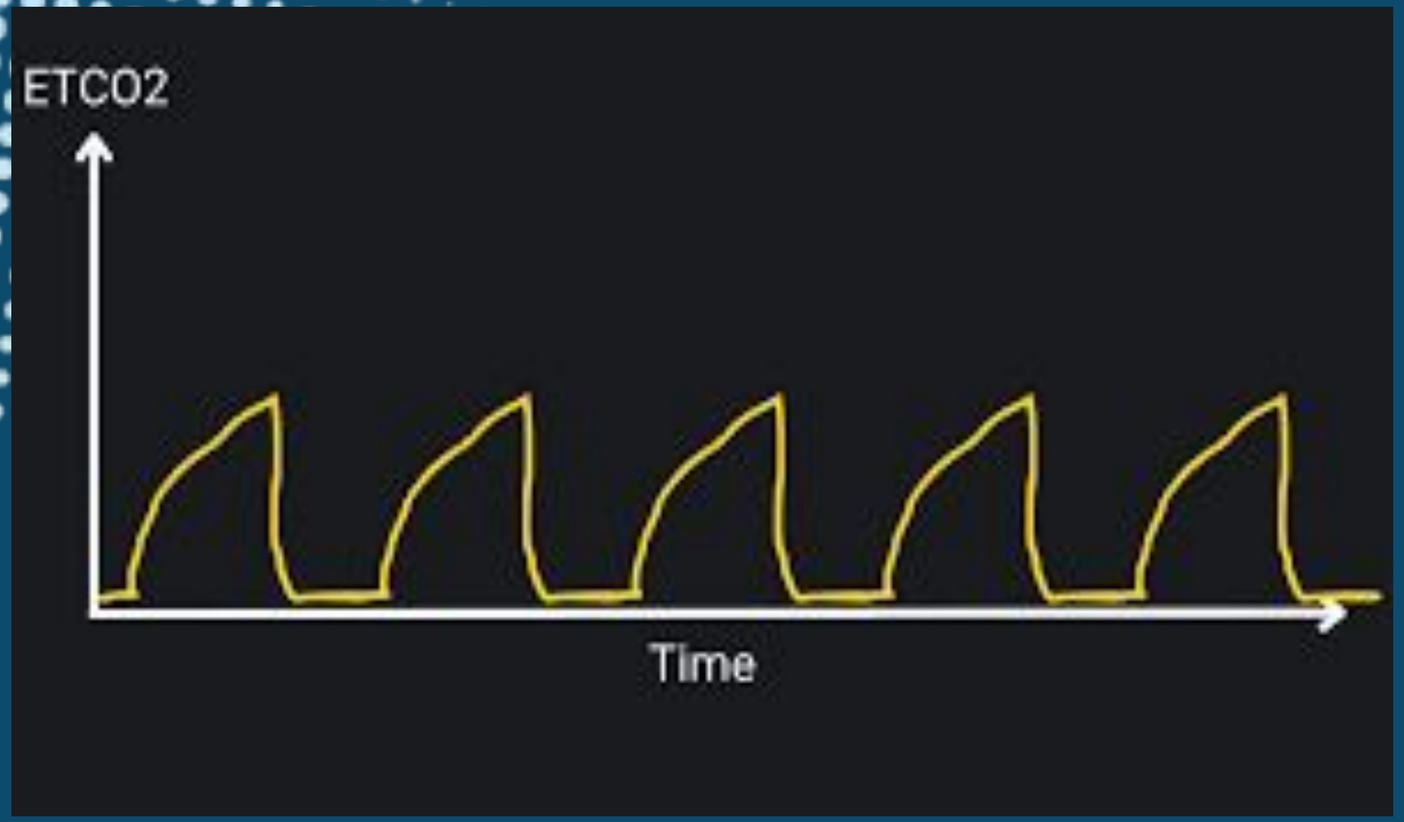
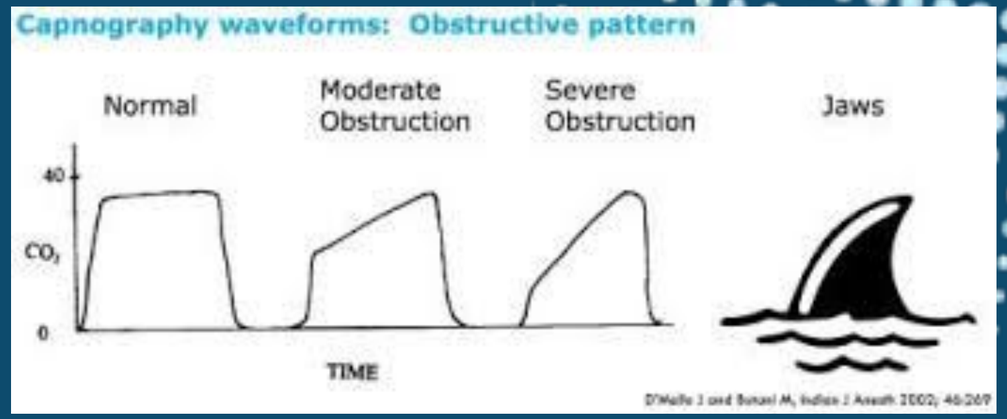
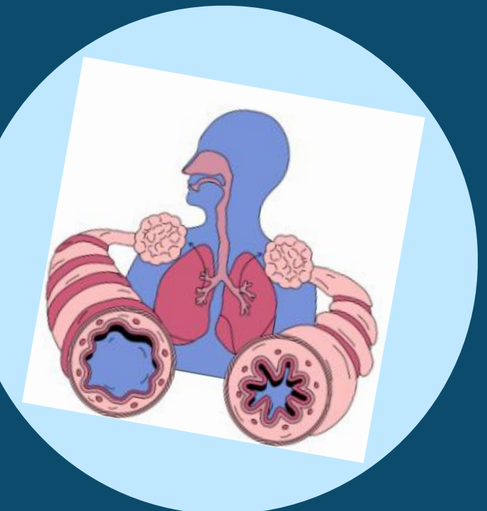


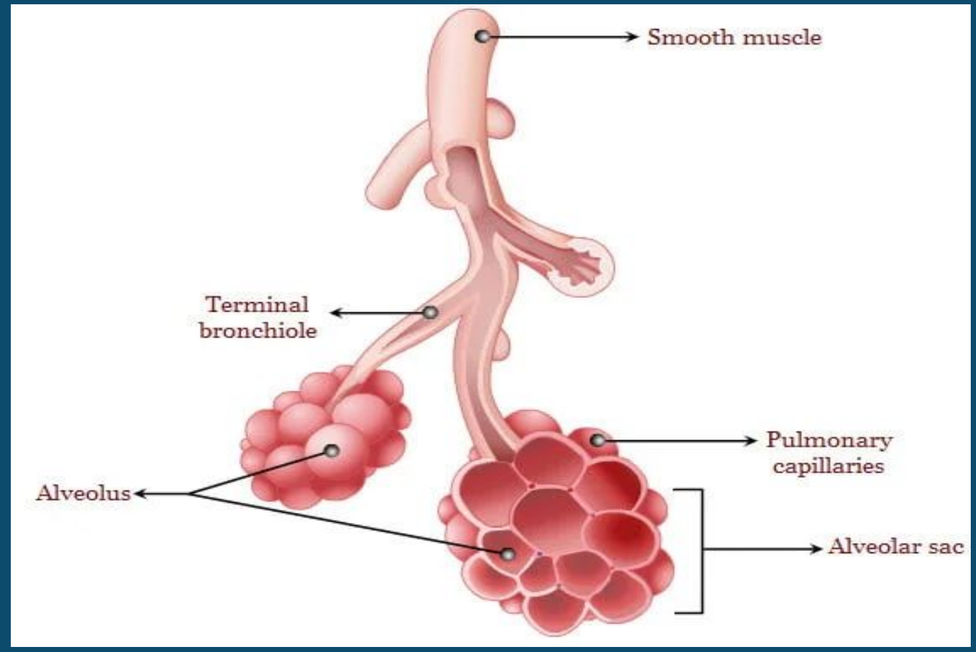
Photo Credit: http://www.bioline.org.br/request?jp09065

https://emcrit.org/ibcc/co2/









What is actually happening

Bronchospasm

Edema and mucous production

Smooth Muscle Contraction

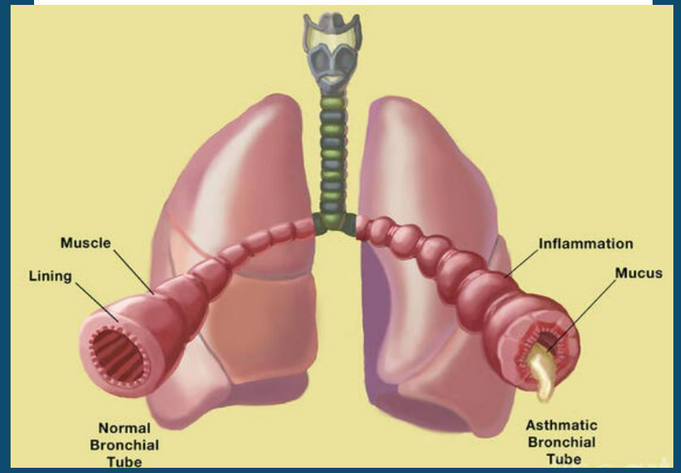
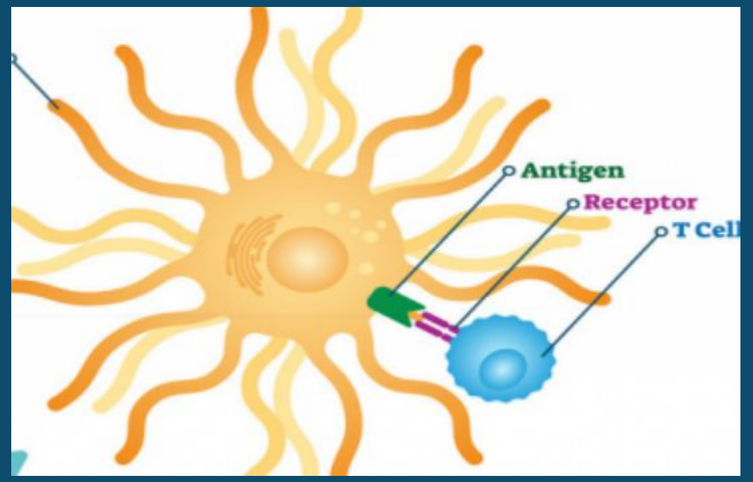


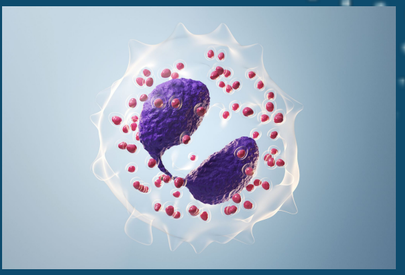
Photo Credit:https://www.saintlukeskc.org/health-library/your-childs-asthma-what-happens-lungs

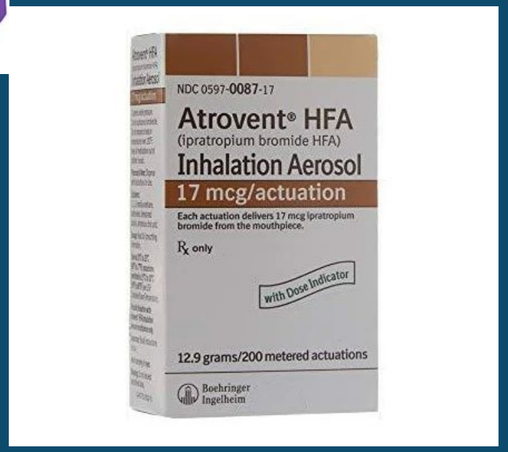
Trigger



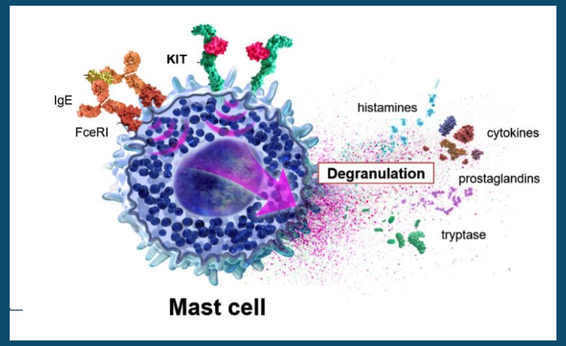
Dendritic Cells sense the trigger and take a piece to T helper cell

T Helper 2 cells release **IL 4 IL 5** and stimulates **Eosinophils** act on bronchial smooth muscle for constriction





Plasma cells will make antibodies igE that cause mast cells to degranulate histamine leukotrienes go to bronchial wall to increase edema and mucous



A comparison of albuterol administered by metered-dose inhaler and spacer with albuterol by nebulizer in adults presenting to an urban emergency department with acute asthma

2002 Apr;121(4):1036-41. doi: 10.1378/chest.121.4.1036.

Kenneth B Newman [1], Scott Milne, Cathy Hamilton, Kent Hall

Affiliations + expand

PMID: 11948030 DOI: 10.1378/chest.121.4.1036

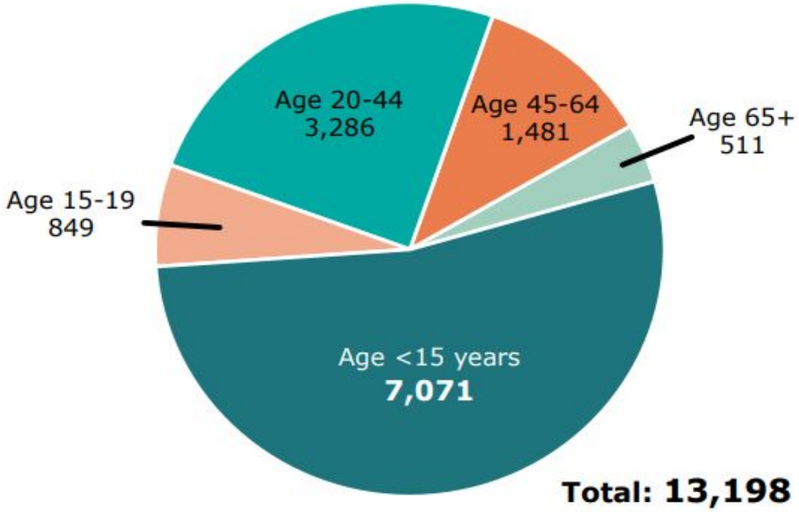
5 mg neb = 8 puffs
10 mg neb= 16 puffs

The 2016 Arizona Asthma Burden Report

ARIZONA DEPARTMENT OF HEALTH SERVICES

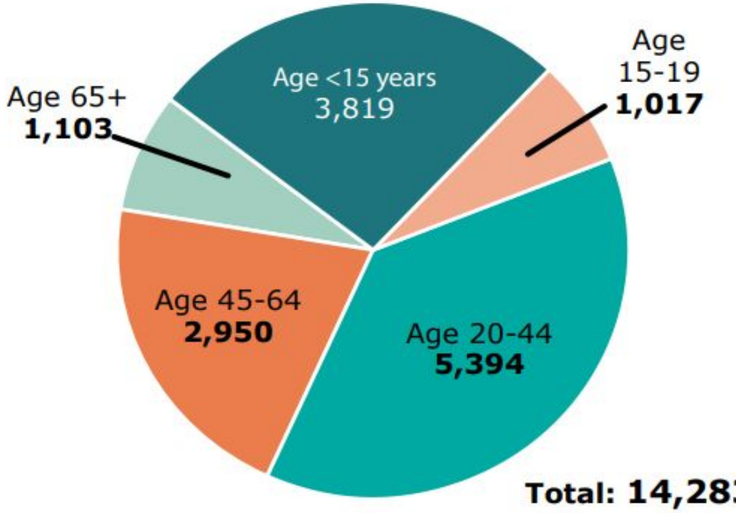
Figure 9. ED Visits by age and gender, Arizona, 2014

MALE



Total: 13,198

FEMALE



Total: 14,283

Age Group	TOTAL
< 15 years	10,890
15 – 19 years	1,866
20 – 44 years	8,680
45 – 64 years	4,321
65+ years	1,614
Total:	**27,371**

Table 3. Lifetime asthma prevalence among youth (CDC, 2013)

	Arizona	United States
Total	24.0%	21.0%
9th grade	25.6%	21.3%
10th grade	25.7%	21.4%
11th grade	24.1%	19.7%
12th grade	20.1%	21.3%

Arizona Asthma Coalition

Founded 1996

- **Arizona House Bill 2208 passed**
  - Allows schools to procure, stock, and administer albuterol sulfate to any child experiencing respiratory distress.
  - Indemnifies schools, school personnel, nurses, medical authorities, and dispensing pharmacists from civil liability when administering albuterol sulfate in good faith to students experiencing respiratory distress.
- **The Stock Inhaler for Schools Program - Started during the 2017-2018 school year in Pima C**
  - Provides schools with the necessary tools to ensure all students have access to emergency albuterol sulfate at school via Mercy C.A.R.E.S grant
    - Schools receive one **(1) albuterol inhaler** and **(10) Thayer LiteAire® valved-holding chambers** (spacers)
    - Fall of 2024 - 645 schools
  - School Carry Law - Students can carry their asthma medications.

Does it make a difference in the 645 schools?

- This evidence-based program is modeled on a 2-year pilot program in Tucson that demonstrated:
  - 20% reduction in 911 calls
  - 40% reduction in emergency transports

You can make a difference in Arizona and your community!

- 1500 district public schools
- 550 public charter schools
- 400 private schools

Thunderstorm Asthma

- Cold downdrafts concentrate air particles, such as pollen and mold
- These air particles are swept up into clouds where humidity is high
- In the clouds, wind, humidity, and lightning break up the particles to a size that can readily enter the nose, sinuses, and lungs
- Wind gusts concentrate these small particles so large amounts can be inhaled.

Case #2

- You are dispatched to a 3 month old who is breathing funny
- Mom states 2 day history of cough and nasal congestion requiring frequent suctioning. Siblings in the home are also sick
- Vitals: HR 195 Resp 70 02 Sats 93% cap refill is 3 seconds
- PMHx: 38 week gestation vaginal delivery
- No Medications or Allergies
- Weight 4 kg

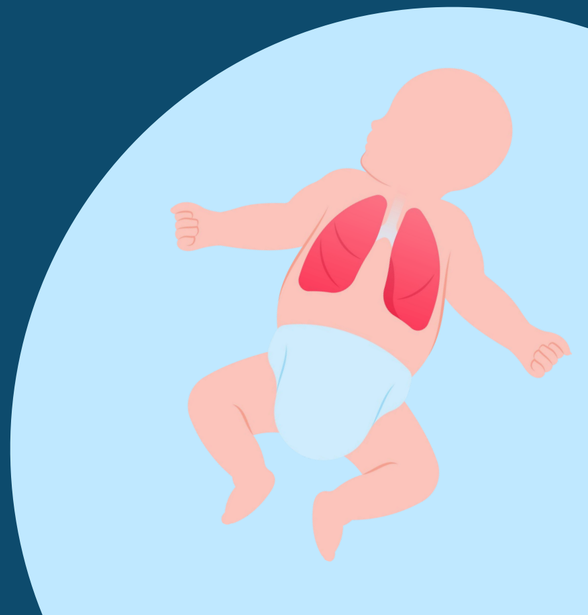
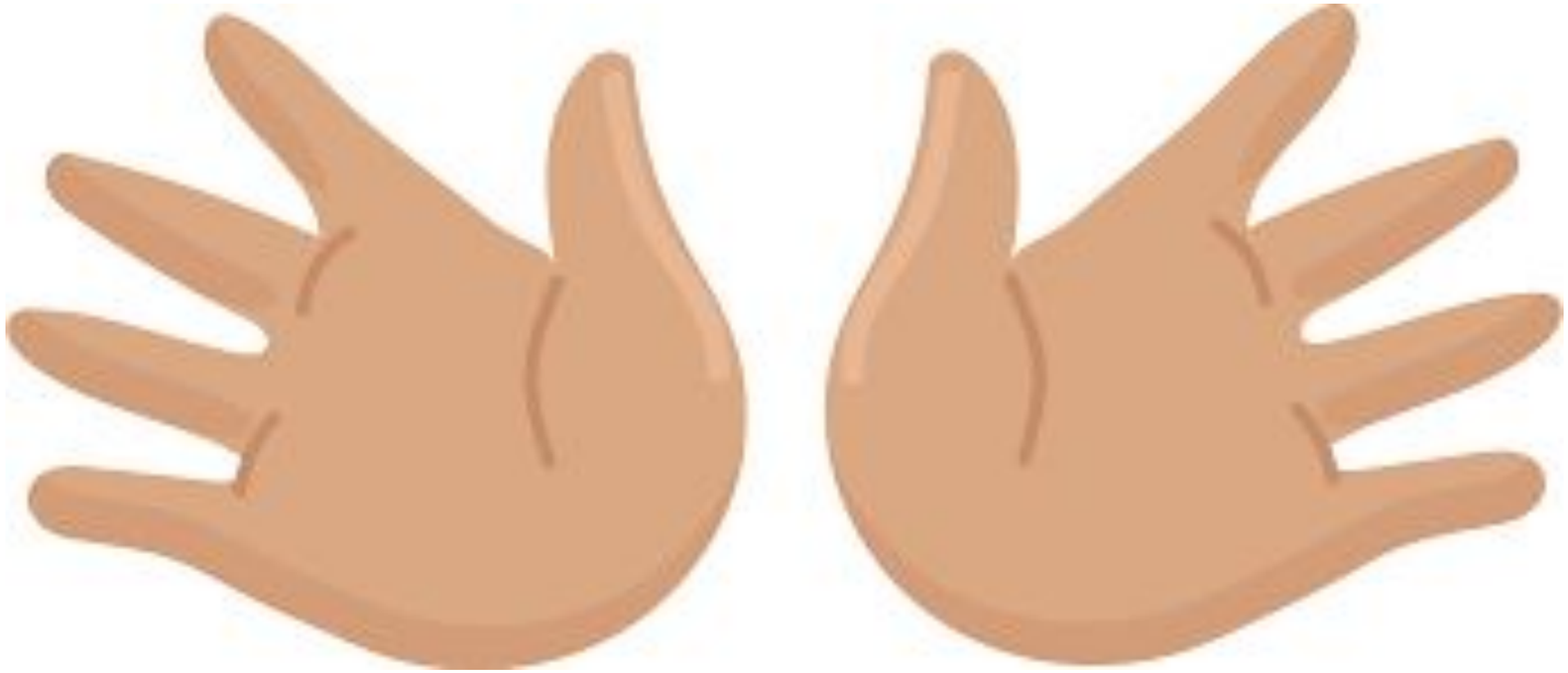
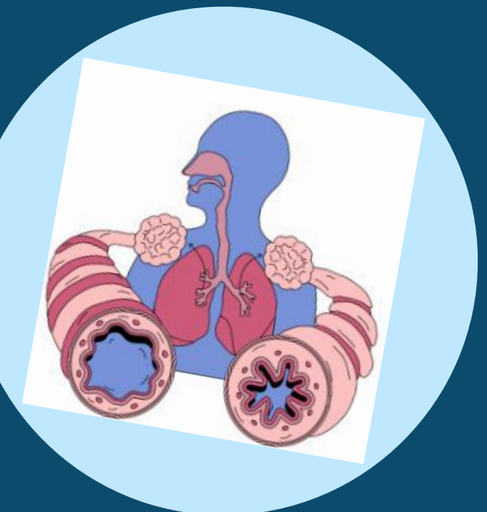


Photo Credit: http://www.bioline.org.br/request?jp09065

Let's Start to Prepare in Route

- We know that the infant weighs 4 KG

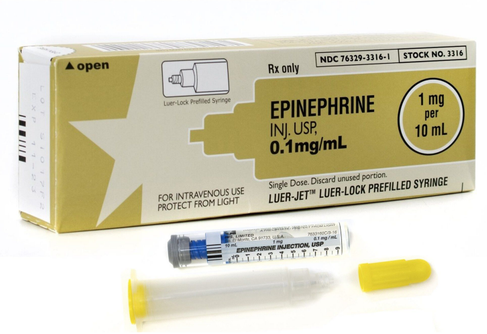




Let's Start to Prepare in Route

- Epi 0.01mg/kg of 1: 10, 000

Take the weight 4 kg



Now imagine there is decimal point after the weight

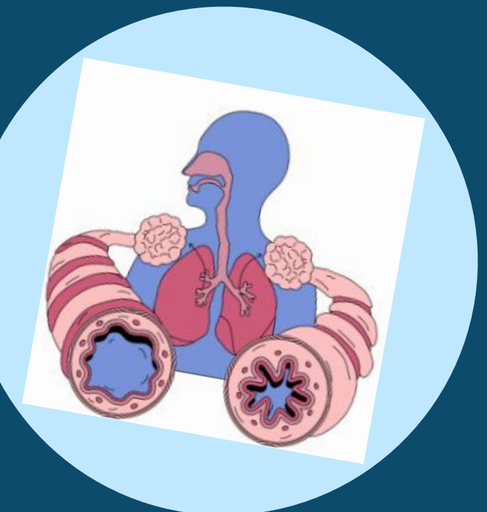
4. kg

Move the decimal point one spot to the left to determir

0.4 cc in the push

Move the decimal point again for the documentation of how much you gave

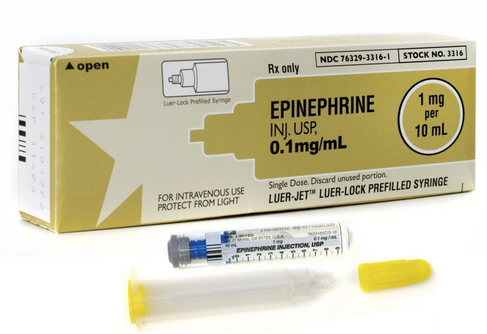
0.04 mg



Let's try another example

- Epi 0.01mg/kg of 1: 10, 000

Take the weight 19 kg



Now imagine there is decimal point after the weight

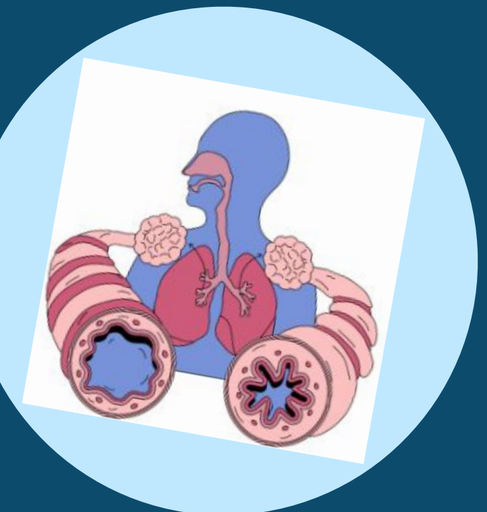
19. kg

Move the decimal point one spot to the left to determir

1.9 cc in the push

Move the decimal point again for the documentation of how much you gave

0.19 mg

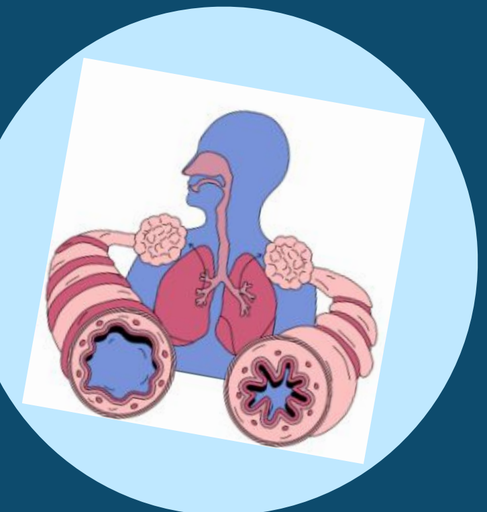


2nd line code med

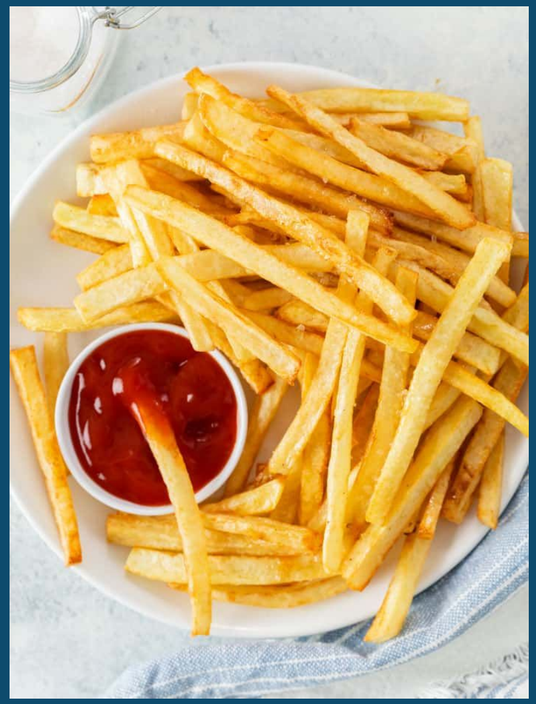
Amiodarone

Count the syllables

5 MG per Kg
= 5 x 4
= 20 mg



Suction Before Auscultation



Suction Before Auscultation

Suction Before Auscultation

Suction Before Auscultation

RSV stays on hard surfaces for 24 hours

Why is it called RSV

- The virus causes infected cells to fuse, or stick together, in the respiratory tract.
  - The virus's F protein directs viral penetration and the fusion of infected cells with neighboring cells.
- The name "syncytial" relates to a syncytium, which is a mass of protoplasm that contains many cell nuclei.

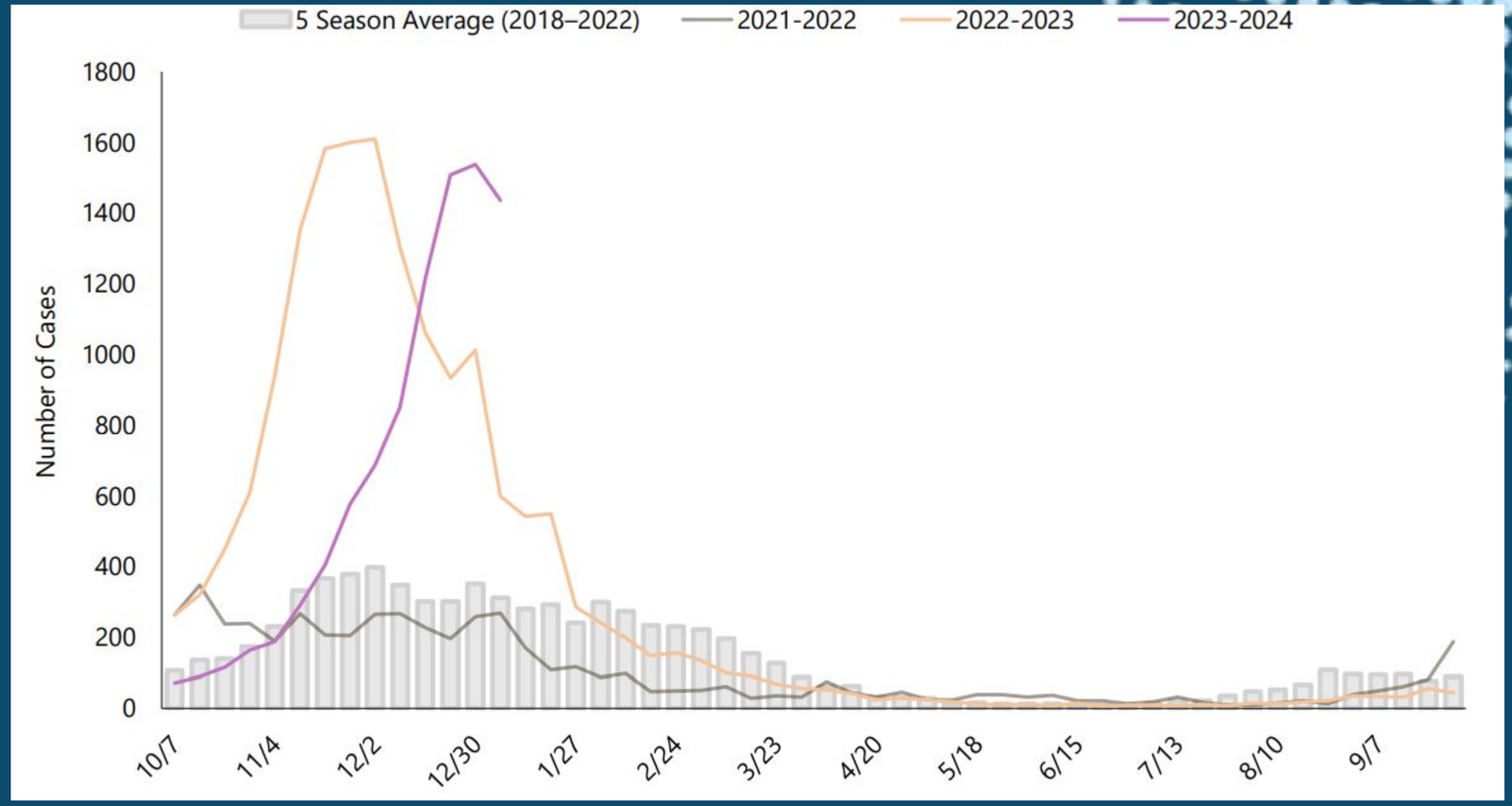
  It was originally called "chimpanzee coryza agent" because it was thought to originate from chimpanzees.

Respiratory Syncytial Virus

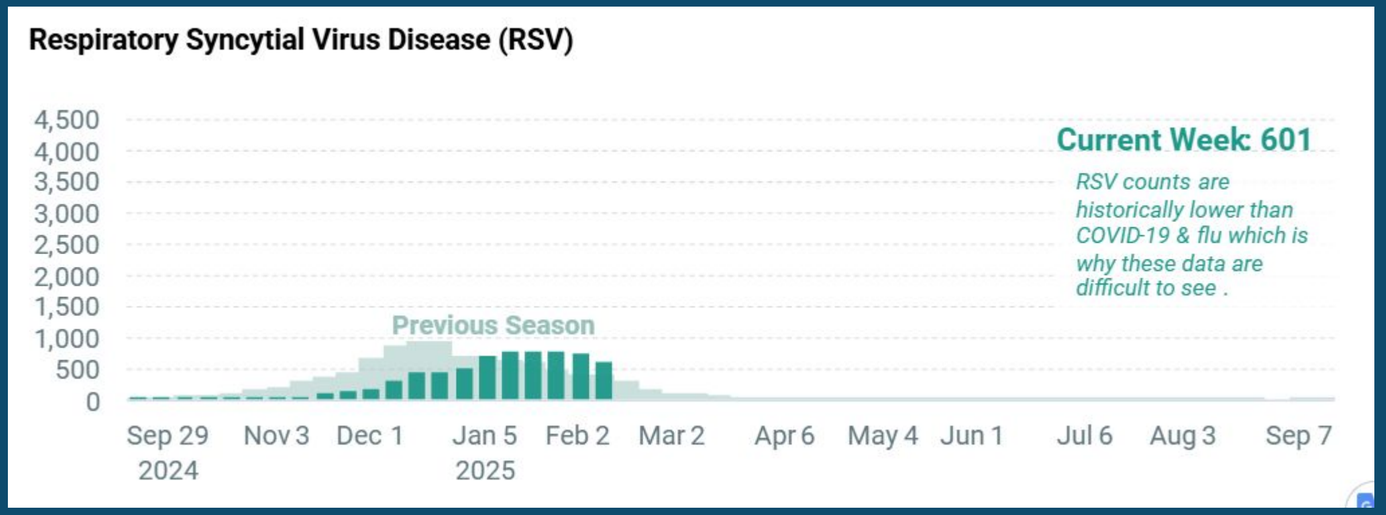
- Single Stranded RNA Virus
- Concerning for children less than 1 year of age
- 100% of children will have by 3 years of age
- Upper and Lower tract respiratory infection
  - Can also lead to pneumonia and otitis media

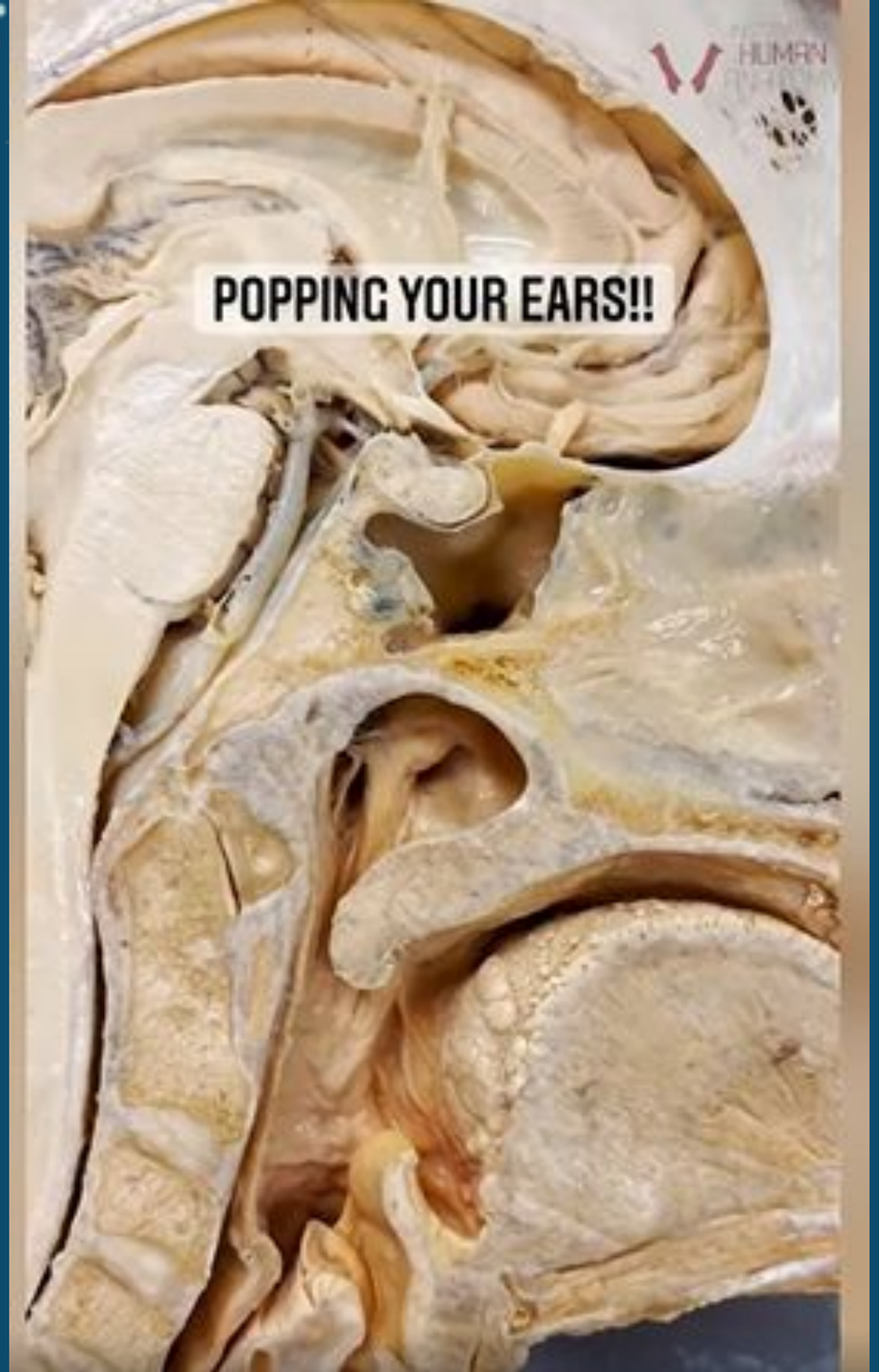
HAND WASHING HAND WASHING HAND WASHING

ADHS
PREPAREDNESS



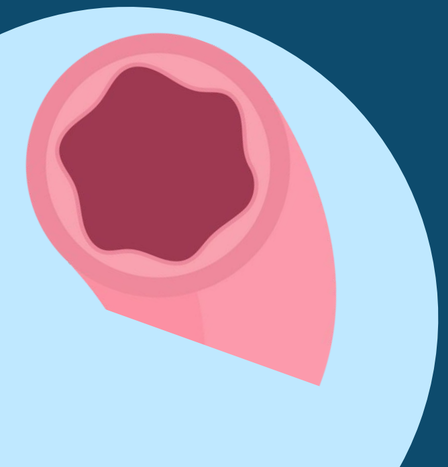
MARICOPA COUNTY




HUMAN
POPPING YOUR EARS!!

- CDC recommends all babies be protected from severe RSV by one of two immunization options
- The maternal RSV vaccine (Pfizer's Abrysvo) is given during weeks 32 through 36 of pregnancy.
  - Need to have it two weeks before delivery to develop antibodies
  - Maternal antibodies protect the baby against RSV for approximately 6 months after birth.
- An RSV antibody (nirsevimab) can be given to babies and some young children. This antibody provides immediate protection against RSV and lasts at least 5 months.

You are dispatched to your local high school for a 15 year female coughing up blood in the nurse's office. Sats per the school nurse are 94%. She denies smoking cigarettes. The patient states he is short of breath and just finished vaping in the bathroom between classes.



EVALI

E– Cigarette or Vaping Associated Lung Injury

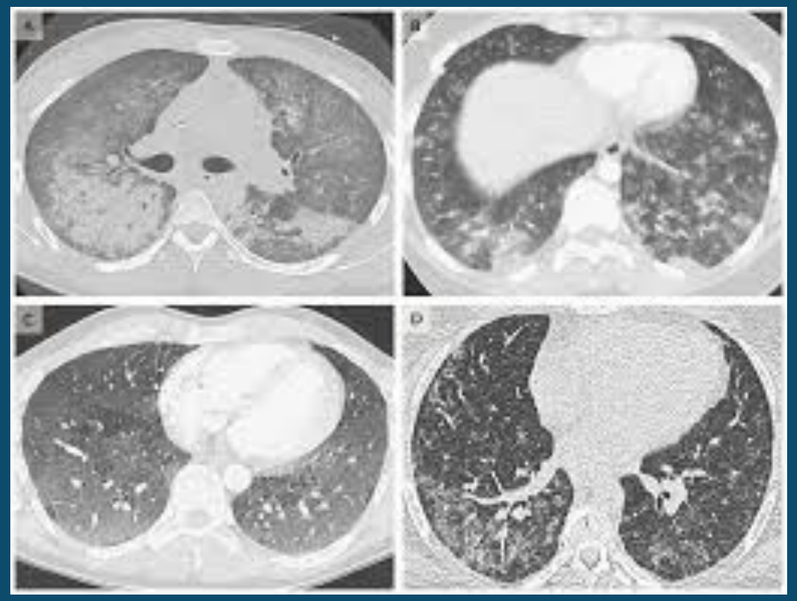
first identified in Arizona in 2019

Popcorn lung or popcorn workers lung is so called because the condition was first documented in 2000 among microwave popcorn factory workers who were exposed
to the flavoring chemical diacetyl (butter flavor).

Guess what is a component of vape flavoring?
Diacetyl – There of 20,000+ flavorings

- Cough (usually without phlegm
- Shortness of breath with movement
- Wheezing
- Low Sats
- Night Sweats

- **Bronchial Washing 805 cases**
  - **Vitamin E Acetate – 100%**
  - **THC –82 %**
  - **Nicotine – 62%**



The NEW ENGLAND JOURNAL of MEDICINE

CURRENT ISSUE | SPECIALTIES | TOPICS | MULTIMEDIA | LEARNING/CME | AUTHOR CENTER | PUBLICATIONS

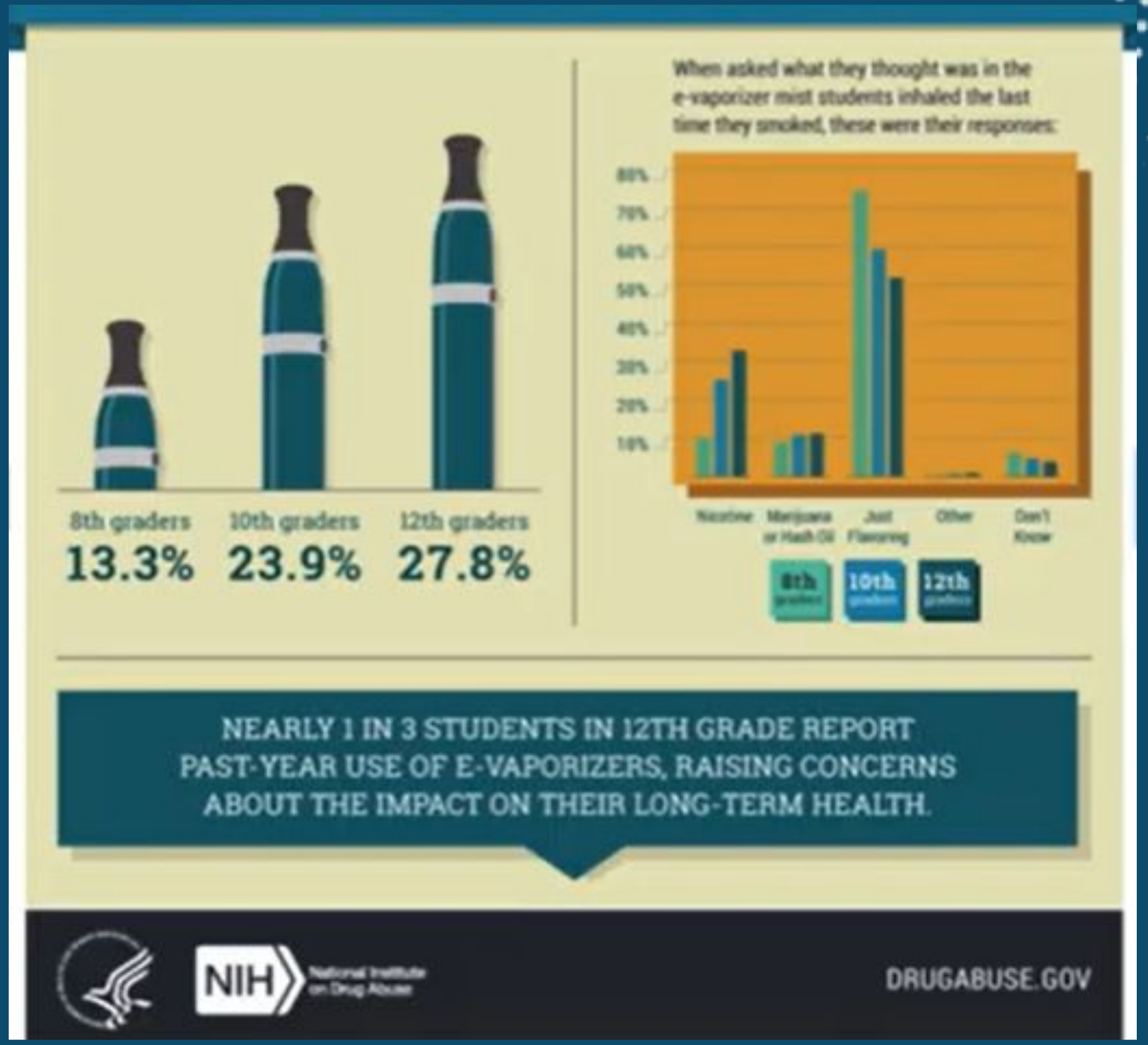
CORRESPONDENCE

Imaging of Vaping-Associated Lung Disease

Published September 6, 2019 | N Engl J Med 2019;381:1486-1487 | DOI: 10.1056/NEJMc1911995
VOL. 381 NO. 15 | Copyright © 2019

Photo Credit: https://www.youtube.com/watch?v=I5Pu-H6YS6Y

- The vehicle that is used to dissolve the e liquids actually makes it easier to dissolve into your lungs and then into the bloodstream
- Nicotine inhibits bone forming cells
- Results in decreased bone mass/density
- University of Idaho has found Menthol and Cinnamon are most toxic


8th graders
13.3%
10th graders
23.9%
12th graders
27.8%
When asked what they thought was in the e-vaporizer mist students inhaled the last time they smoked, these were their responses:
80%
70%
60%
50%
40%
30%
20%
10%
Nicotine
Marijuana or Hash Oil
Just Flavoring
Other
Don't Know
8th
10th
12th
NEARLY 1 IN 3 STUDENTS IN 12TH GRADE REPORT PAST-YEAR USE OF E-VAPORIZERS, RAISING CONCERNS ABOUT THE IMPACT ON THEIR LONG-TERM HEALTH.
NIH
National Institute on Drug Abuse
DRUGABUSE.GOV

The Nicotine Content of a Sample of E-cigarette Liquid Manufactured in the United States

Raymond, Barrett H. BSN, RN, FNP-S, NREMT-P; Collette-Merrill, Katreena PhD, RN; Harrison, Roger G. PhD; Jarvis, Sabrina DNP, FNP-BC, ACNP-BC, FAANP; Rasmussen, Ryan Jay MS, RN, FNP

Journal of Addiction Medicine: December 26, 2017 - Volume Publish Ahead of Print - Issue - p
doi: 10.1097/ADM.0000000000000376
Original Research: PDF Only

BUY PAP

Abstract | Author Information

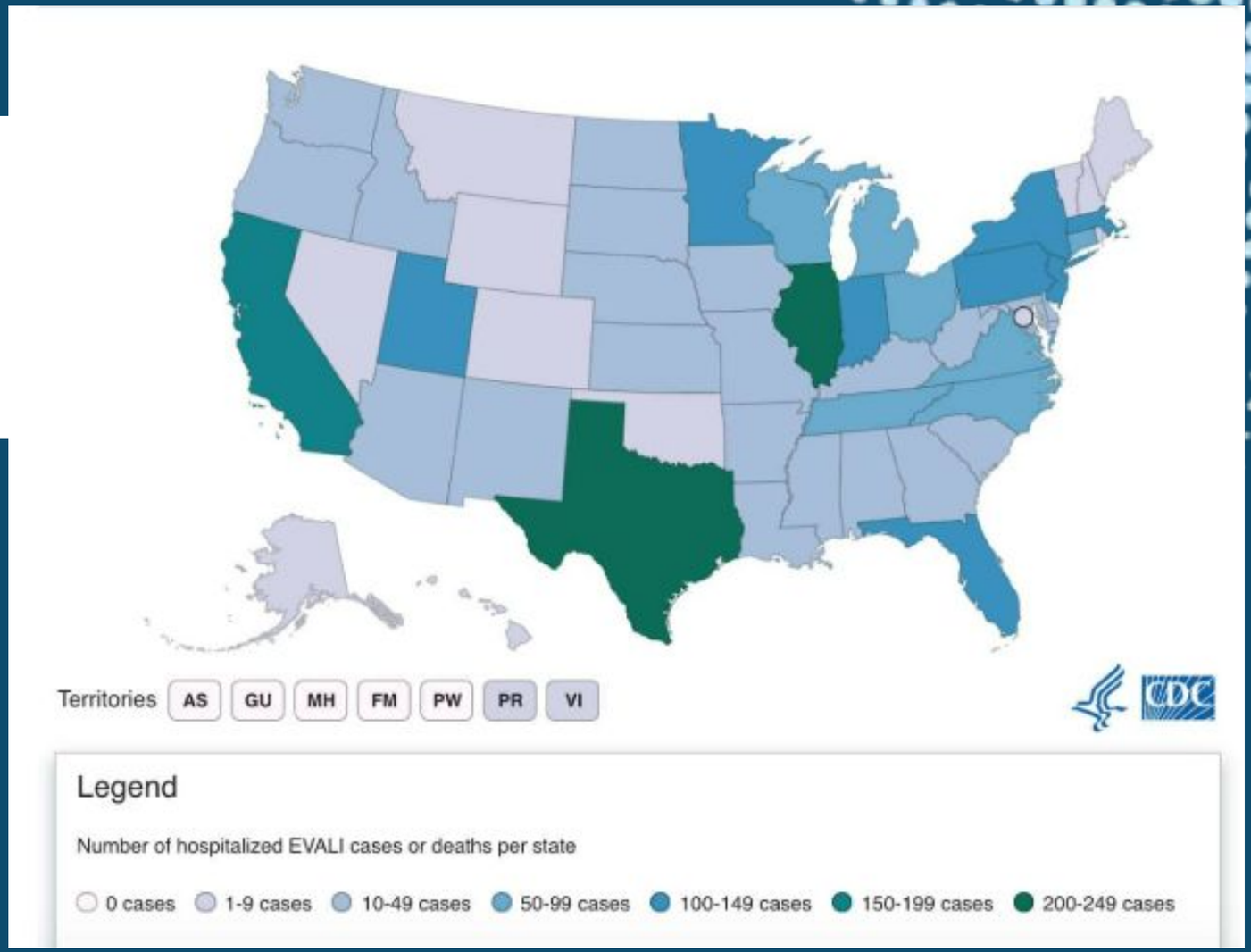
SD = 3.3) nicotine. The labeled 18 mg/mL samples measured as little as 35% less nicotine and as much as 52% greater nicotine. In the 35 samples labeled 0 mg/mL, nicotine was detected (>0.01 mg/mL) in 91.4% of the samples (range 0–23.9 mg/mL; M = 2.9, SD = 7.2). Six samples from 2 manufacturers labeled as 0 mg/mL were found to contain nicotine in amounts ranging from 5.7 to 23.9 mg/mL.

popular flavors from each manufacturer were purchased in nicotine concentrations of 0 and 18 mg/mL. Of the samples purchased (n = 70), all were labeled as produced in the United States of America. The researchers anonymized the samples before sending them to an independent university laboratory for testing.

Results: The 35 e-liquid samples labeled 18 mg/mL nicotine measured between 11.6 and 27.4 mg/mL (M = 18.7, SD = 3.3) nicotine. The labeled 18 mg/mL samples measured as little as 35% less nicotine and as much as 52% greater nicotine. In the 35 samples labeled 0 mg/mL, nicotine was detected (>0.01 mg/mL) in 91.4% of the samples (range 0–23.9 mg/mL; M = 2.9, SD = 7.2). Six samples from 2 manufacturers labeled as 0 mg/mL were found to contain nicotine in amounts ranging from 5.7 to 23.9 mg/mL.

EVALI

STATE	CASES				
		KY	10-49	OH	50-99
AL	10-49	LA	10-49	OK	1-9
AK	1-9	ME	1-9	OR	10-49
AZ	10-49	MD	10-49	PA	100-149
AR	10-49	MA	100-149	PR	1-9
CA	150-199	MI	50-99	RI	1-9
CO	1-9	MN	100-149	SC	10-49
CT	50-99	MS	10-49	SD	10-49
DE	10-49	MO	10-49	TN	50-99
DC	1-9	MT	1-9	TX	200-249
FL	100-149	NE	10-49	UT	100-149
GA	10-49	NV	1-9	VT	1-9
HI	1-9	NH	1-9	VI	1-9
ID	10-49	NJ	100-149	VA	50-99
IL	200-249	NM	10-49	WA	10-49
IN	100-149	NY	100-149	WV	10-49
IA	10-49	NC	50-99	WI	50-99
KS	10-49	ND	10-49	WY	1-9



Number of Hospitalized EVALI Cases or Deaths Reported to CDC as of February 4, 2020

2700 Hospitalizations

YOUTH ACCESS TO E-CIGARETTES

States with Laws Restricting Youth Access to E-Cigarettes[1]

Enacted as of June 15, 2024

State	≥1 Laws Restricting Youth Access	Minimum Legal Sales Age	State	≥1 Laws Restricting Youth Access	Minimum Legal Sales Age
Alabama	Yes	21	Nevada	Yes	21
Alaska	Yes	19	New Hampshire	Yes	21
Arizona	Yes	18	New Jersey	Yes	21
Arkansas	Yes	21*	New Mexico	Yes	21
California	Yes	21*	New York	Yes	21
Colorado	Yes	21	North Carolina	Yes	18
Connecticut	Yes	21	North Dakota	Yes	21
Delaware	Yes	21	Ohio	Yes	21
District of Columbia	Yes	21	Oklahoma	Yes	21
Florida	Yes	21*	Oregon	Yes	21
Georgia	Yes	21	Pennsylvania	Yes	21*
Hawaii	Yes	21	Rhode Island	Yes	21
Idaho	Yes	21	South Carolina	Yes	18
Illinois	Yes	21	South Dakota	Yes	21
Indiana	Yes	21	Tennessee	Yes	21
Iowa	Yes	21	Texas	Yes	21*
Kansas	Yes	21	Utah	Yes	21
Kentucky	Yes	21	Vermont	Yes	21
Louisiana	Yes	21	Virginia	Yes	21*
Maine	Yes	21	Washington	Yes	21
Maryland	Yes	21*	West Virginia	Yes	18
Massachusetts	Yes	21	Wisconsin	Yes	18
Michigan	Yes	21	Wyoming	Yes	21
Minnesota	Yes	21	American Samoa		
Mississippi	Yes	21	Guam	Yes	21
Missouri	Yes	18	Northern Mariana Isl.	Yes	21
Montana	Yes	18	Puerto Rico	Yes	21
Nebraska	Yes	21	U.S. Virgin Islands	Yes	18

[1] As used in this table, *e-cigarette* broadly refers to any product, and its component parts and accessories, that contains nicotine and/or other substances intended for use in the form of an aerosol, often referred to as vapor.

* Certain exceptions apply; see specific law for details.

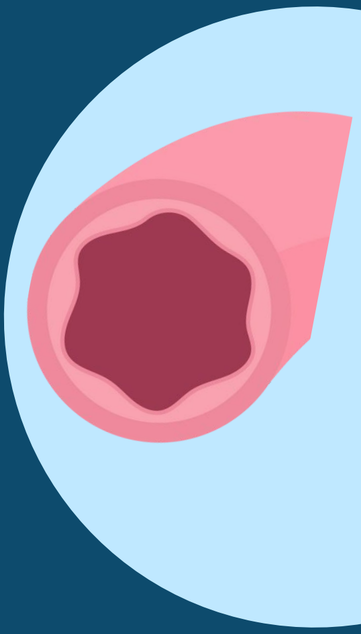
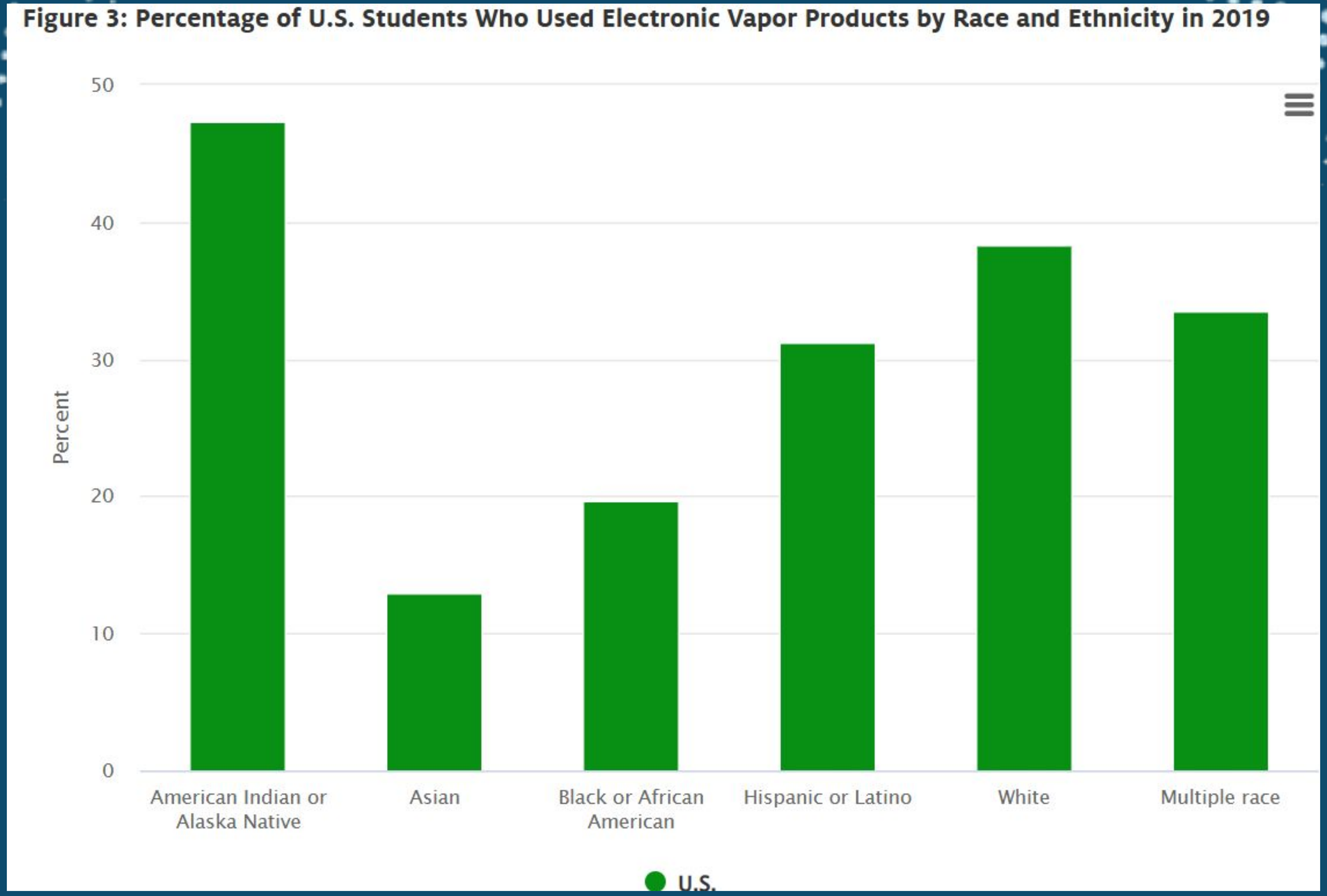


Figure 3: Percentage of U.S. Students Who Used Electronic Vapor Products by Race and Ethnicity in 2019



High School Youth Risk Behavior Survey via MAP (mapazdashboard.arizona.edu)

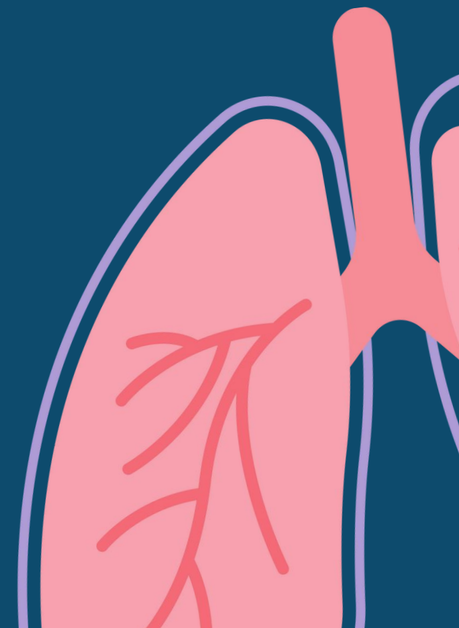
Nearly 20% Of 12th-Graders Vape According To Arizona Department Of Health Services - New Awareness Campaign Launched

Tuesday, April 12 2022 by Richard D. Hunt/Steve Elliott

In Arizona, 51% of high school students have tried a vaping device at least once

Maricopa County Attorney's Office

In December 2024, a 2nd Grader in a Phoenix elementary school as found vaping in the bathroom.

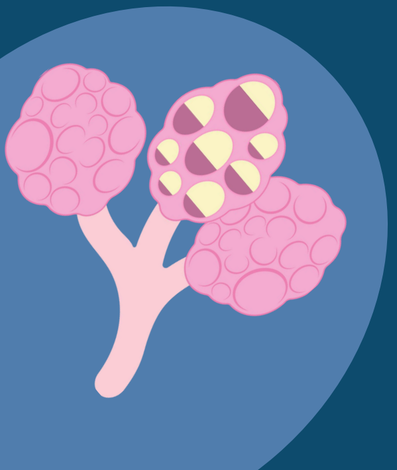


High School Youth Risk Behavior Survey via MAP (mapazdashboard.arizona.edu)

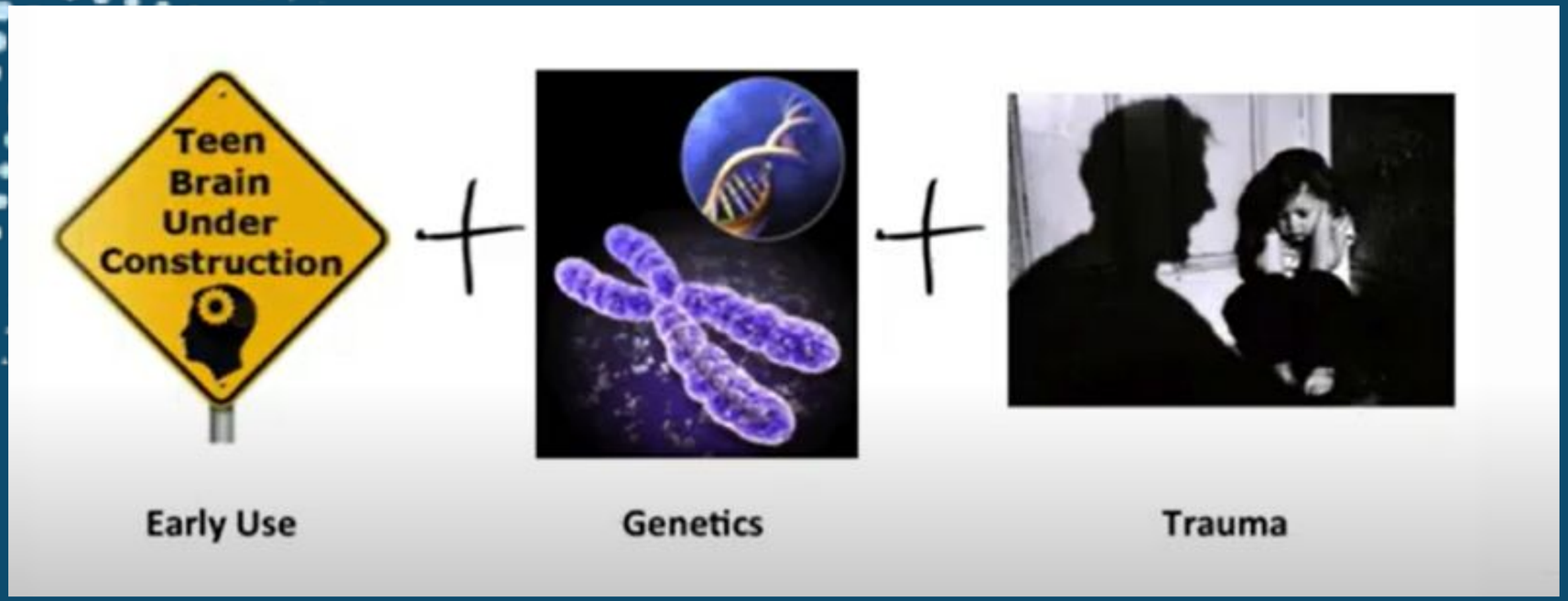
Feds warn e-cig companies about packaging after thousands of kid drink toxic liquid

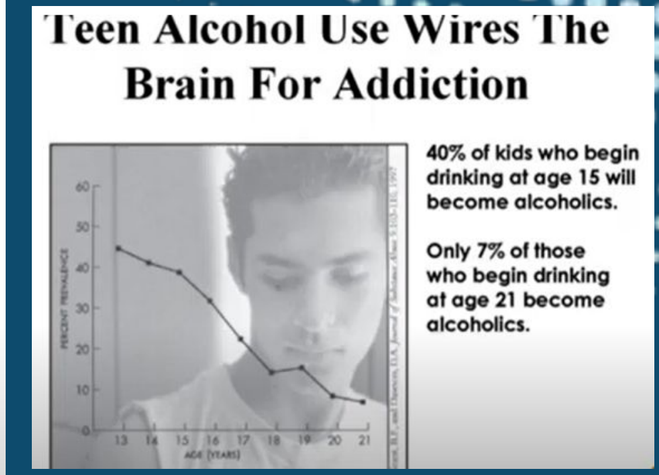
Jayne O'Donnell
USA TODAY

Published 10:00 a.m. ET May 1, 2018 | **Updated 4:47 p.m. ET May 1, 2018**



There were more than 8,200 e-cigarette and liquid nicotine exposures among children younger than 6 over a five year span according to the National Poison Data System





3 Things that can lead to addiction

1) 98-99% of addiction starts while brain is developing try to postpone use until after brain development you can almost erase the genetics of addiction (every year delay you drop the addiction rate by 8%)
2) 50% chance of addiction with family history
3) Childhood Trauma

https://youtu.be/25mK4yXzOkQ?si=reoboNW5EH_UDVYW Dr,Ruth Poteet

Babl, F.E., Vinci, R.J, Bauchner, H. (2001). Pediatric prehospital advanced life support care in an urban setting. Pediatric Emergency Care. 17(1):5–9.

Gausche, M., Lewis, R.J., Stratton, S.J., Haynes, B. (2000). Effect of out–of hospital pediatric endotracheal intubation on survival and neurological outcomes A controlled clinical trial. JAMA. 283(6):783–790.

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Morray, J.P., Geiduschek, J.M. & Caplan, R.A. (1993). A comparison of pediated and adult anesthesia closed malpractice claims. Anesthesiology 78(3):461–467.

Schmerling, R (2022). Thunderstorm Asthma. Harvard Health Publishing . Retrieved from

Whitten, C.E. (2019). 10 Common pediatric airway problems and their solutions. Anesthesiology News. Retrieved 1/31/2025 https://anesthesiaexperts.com/uncategorized/10–common–pediatric–airway–problems–and–solutions–2/.

Babl, F.E., Vinci, R.J, Bauchner, H. (2001). Pediatric prehospital advanced life support care in an urban setting. Pediatric Emergency Care. 17(1):5–9.