IN THE NAME OF GOD

Acute Laryngitis in Children

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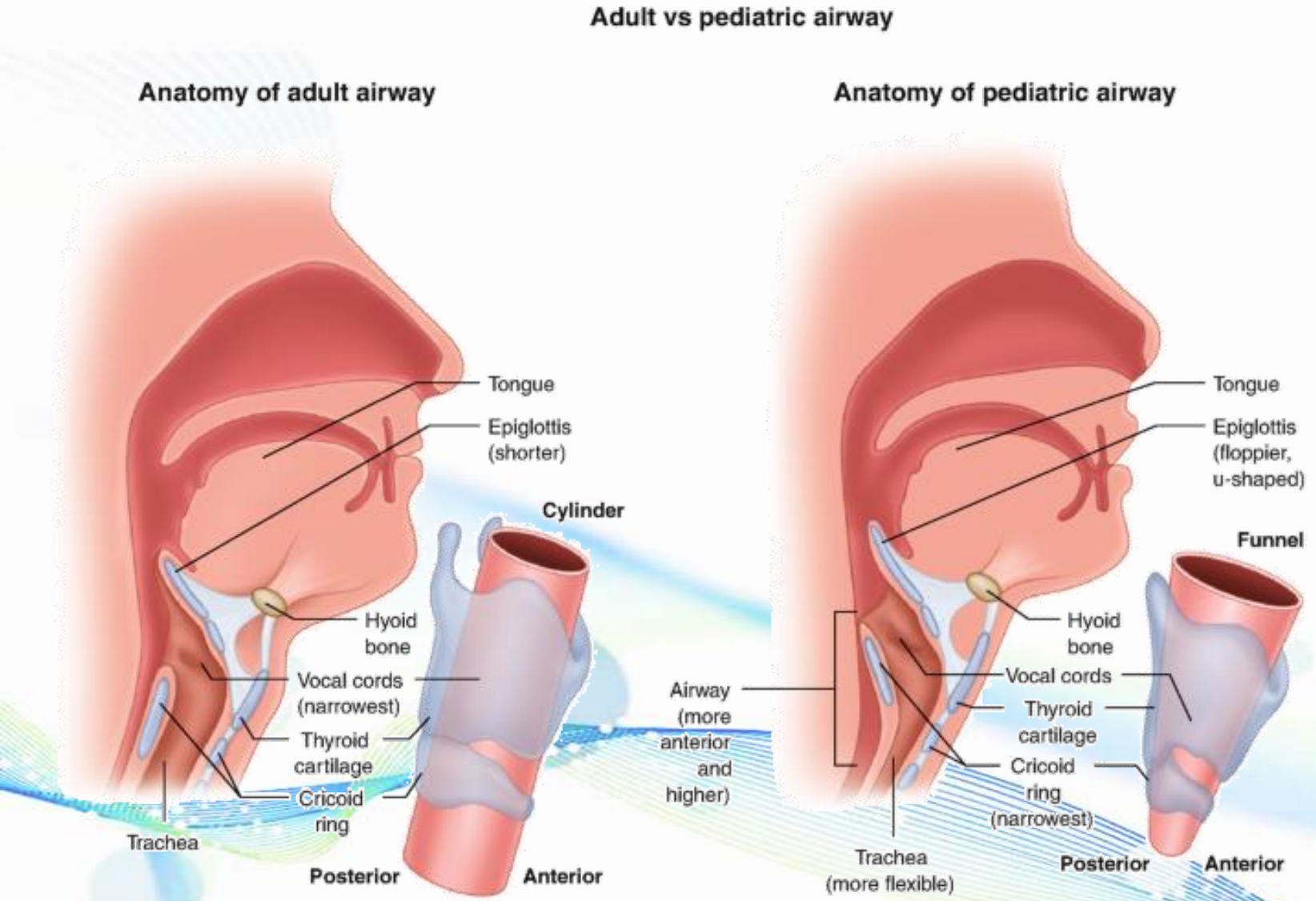


The larynx is **situated higher in the neck in the early childhood.**

The <u>infant</u> **cricoid** is situated at approximately the level of the **third cervical vertebra**; in the <u>adult</u> it is opposite the **fifth vertebra.**

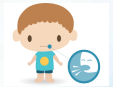
Etiopathogenesis

- Loss of function
  - » Phonation
  - » *External breathing*

Effect of 1 mm of Edema on the Cross-sectional Area of the Subglottic Larynx in the Neonate, Child, and Adult (Area = πr^{2*})

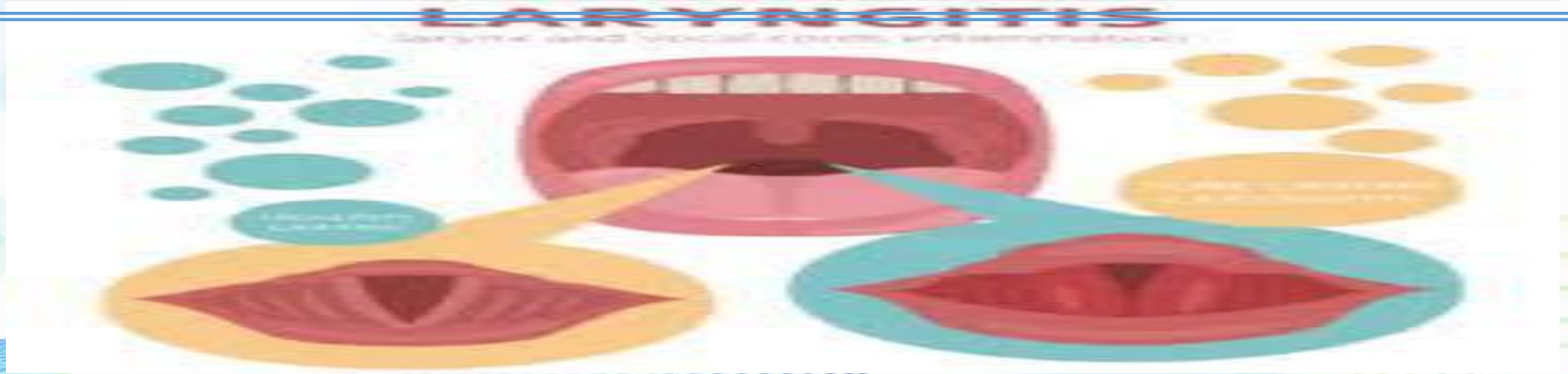
	Neonate	*Child*	*Adult*
Normal			
Subglottic diameter (mm)	4	8	14
Subglottic radius (mm)	2	4	7
Subglottic area (mm^2)	12	48	147
Effect of 1 mm of edema			
Subglottic diameter (mm)	2	6	12
Subglottic radius (mm)	1	3	6
Subglottic area (mm^2)	3	27	108
Percent reduction of airway area	75	44	27

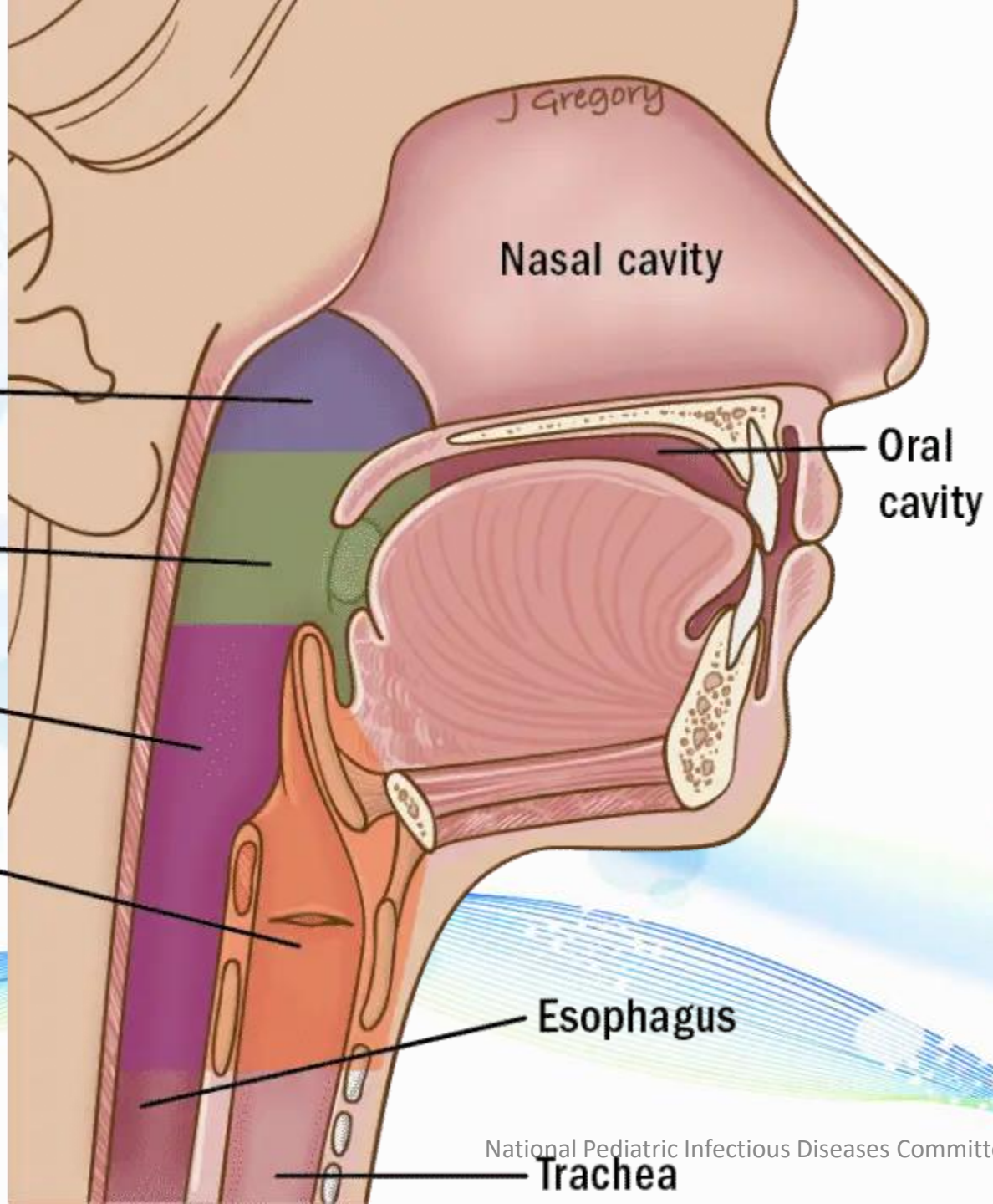
Croup

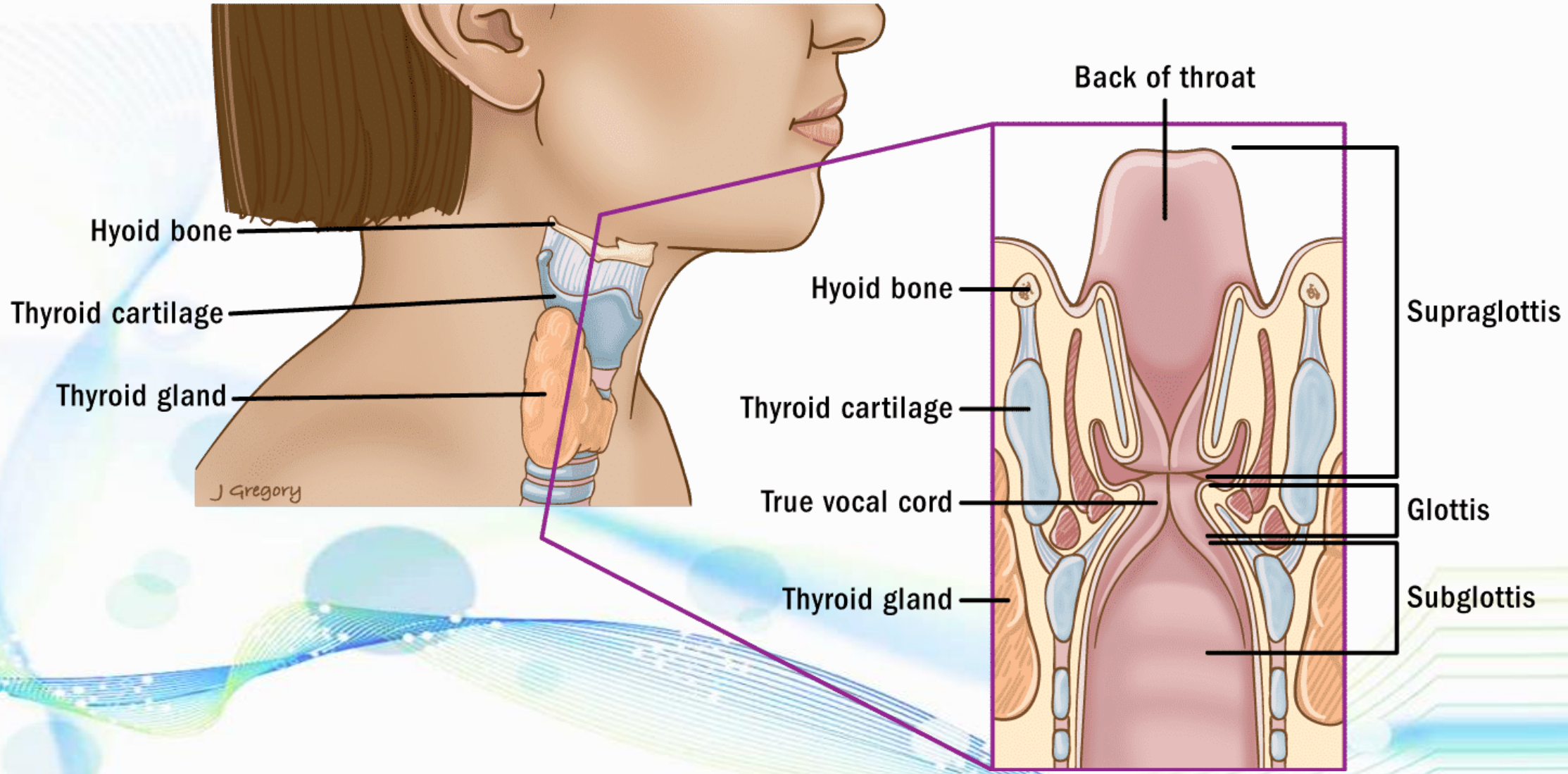


“Croup" refers to viral Laryngitis (Voice Box), Laryngotracheitis (Voice Box) and (Wind Pipe) Trachea and Larygotracheobronchitis

Acute laryngitis



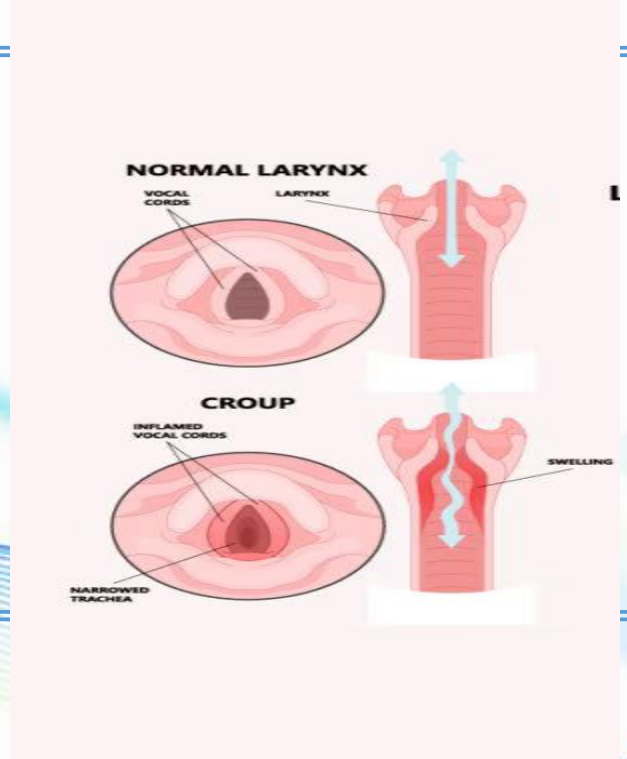

J Gregory
Nasal cavity
Nasopharynx
Oral cavity
Oropharynx
Hypopharynx
Larynx
Esophagus
Trachea


Hyoid bone
Thyroid cartilage
Thyroid gland
J Gregory
Back of throat
Hyoid bone
Thyroid cartilage
True vocal cord
Thyroid gland
Supraglottis
Glottis
Subglottis

The etiology of acute laryngitis includes **vocal misuse, exposure to noxious agents, or infectious agents** Rarely, laryngeal inflammation results from an **autoimmune condition such as rheumatoid arthritis, relapsing polychondritis, Wegener granulomatosis, or sarcoidosis.**

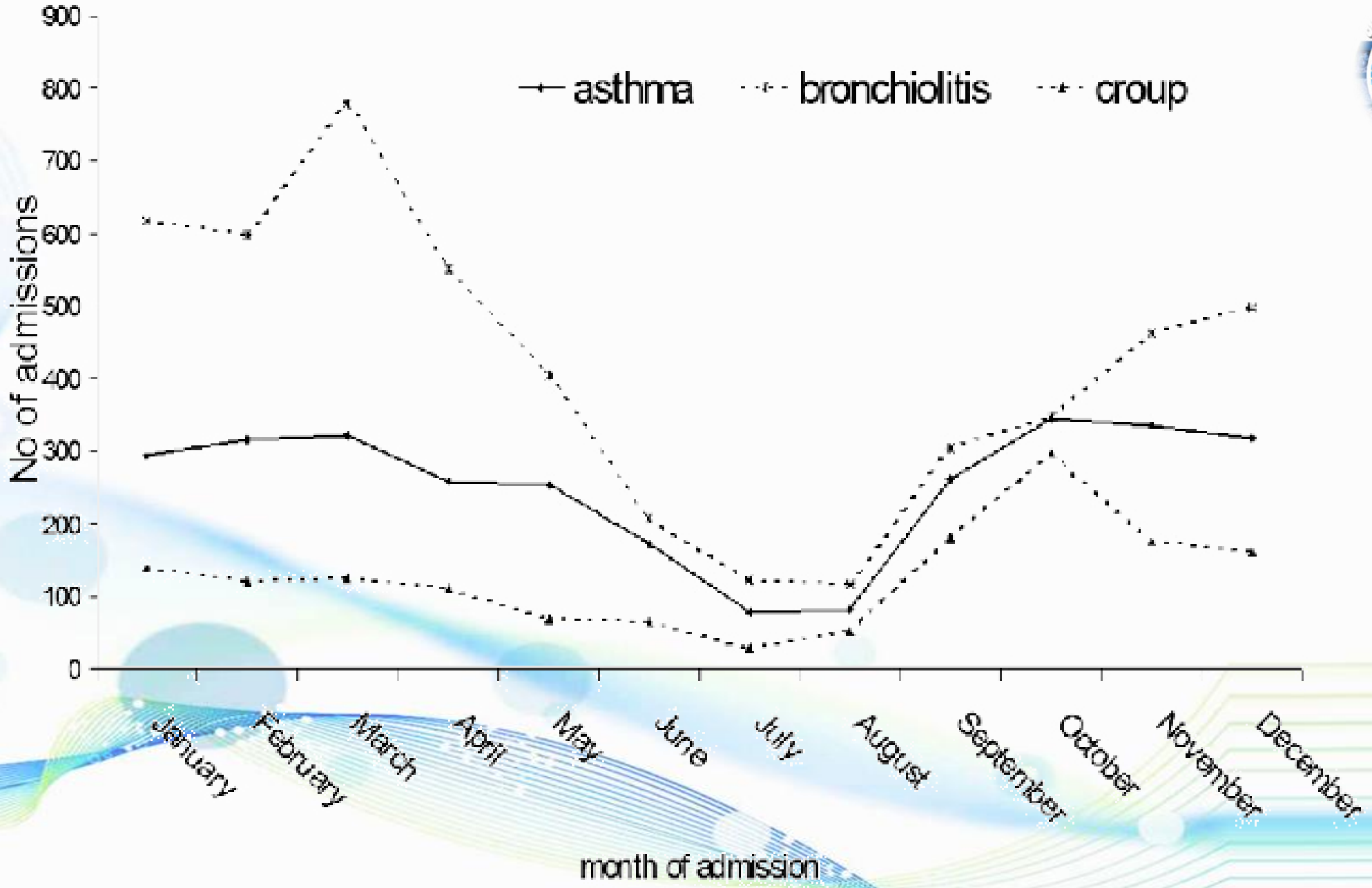
Chronic laryngitis may be caused by environmental factors such as inhalation of **cigarette smoke or polluted air** (eg, gaseous chemicals), **irritation from asthma inhalers, vocal misuse** (eg, prolonged vocal use at abnormal loudness or pitch), or **gastrointestinal esophageal reflux.**

Acute laryngotracheitis



Occurrence in year

Croup occur in the **fall or early winter**, with the major incidence peaks coinciding with parainfluenza type 1 activity (often in October)


asthma
bronchiolitis
croup
No of admissions
900
800
700
600
500
400
300
200
100
0
January
February
March
April
May
June
July
August
September
October
November
December
month of admission

Epidemiology

- Mostly in **children ≤6 years old, with a peak incidence between six months to three years of age**
- 1.3% – 30% percent of all ED visits
  - Children <2 years old accounted for 43 percent of the visits,
  - children ages two to seven years made up to 50 percent of visits,
  - and children ≥7 years accounted for only 7 percent.
  - Croup is more common in boys, with reported **male:female ratios ranging from 1.4:1 to 2:1**

Host factors

- Familial
- Previous congenital malformation hemangioma
- Allergy
- Hyper reactive airway

Causes (Viral)

- Parainfluenza viruses
- Respiratory syncytial virus (RSV)
- adenoviruses
- Influenza
- Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)
- Measles
- Rhinoviruses
- enteroviruses (especially coxsackie types A9, B4, and B5
- echovirus types 4, 11, and 21)

Causes (Bacterial)

- Mycoplasma pneumonia
- Staphylococcus aureus,
- Streptococcus pyogenes,
- Streptococcus pneumonia,

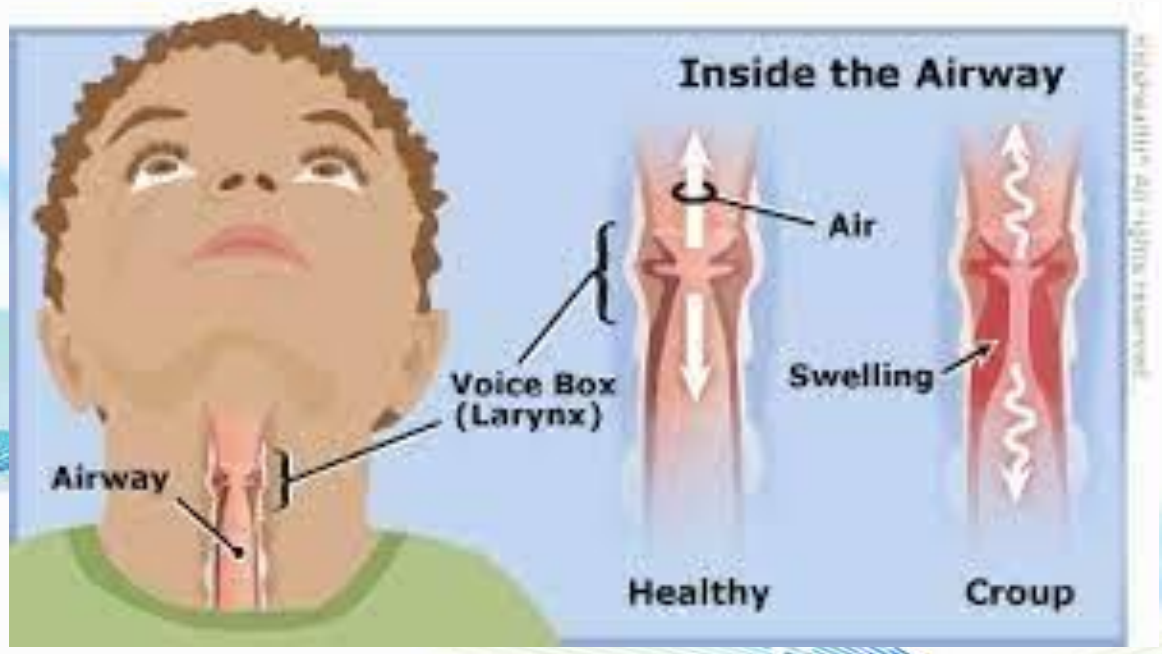
BACTERIAL TRACHEITIS

Causes

- Fungal
- Environmental
- Direct Injury

Important Symptoms

Inspiratory stridor, barking cough, and hoarseness



Clinical Findings

Nasal discharge, congestion, and coryza and progress over 12 to 48 hours to fever, hoarseness, barking cough, and stridor.

Clinical Findings

As airway obstruction progresses, stridor develops **Biphasic stridor (stridor heard on both inspiration and expiration)** at rest is a sign of significant upper airway obstruction.

When airway obstruction becomes severe, suprasternal, subcostal, and intercostal retractions may be seen.

As upper airway **obstruction progresses, the child may become restless or anxious.**

Related Diseases

Spasmodic croup "frequently recurrent croup."

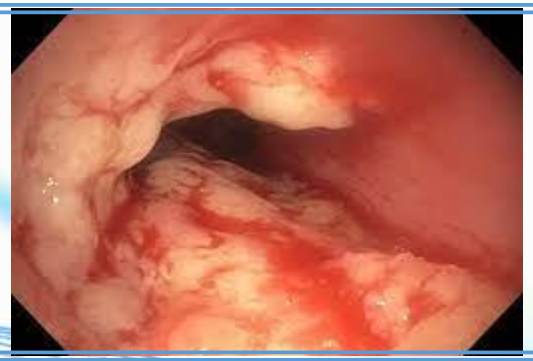
Children six months to three years of age

Always occurs at night.

Clinical symptoms:

- abrupt,
- **short duration,**
- **Fever** is typically **absent**,
- **Coryza** may be **present but less common**,
- **Episodes can recur** the same night and for two to four successive evenings,
- **familial** predisposition,
- more common in children with a family history of allergy **"allergic croup."**

Bacterial Tracheitis



marked worsening with high fevers, toxic appearance, and severe respiratory distress.

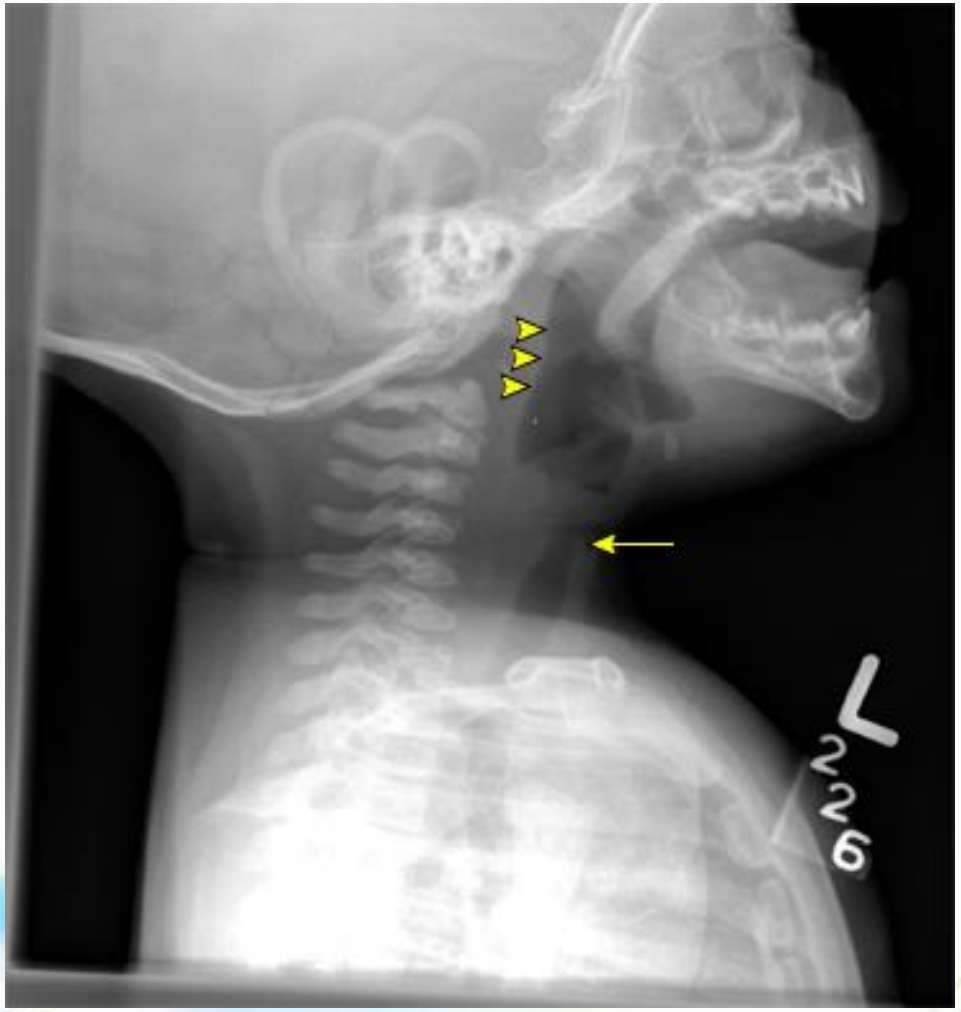
Invasive exudative bacterial infection of the soft tissues of the trachea

1-extension to the subglottic laryngeal structures or the upper bronchial tree.

2- primary infection or as a complication of viral croup.

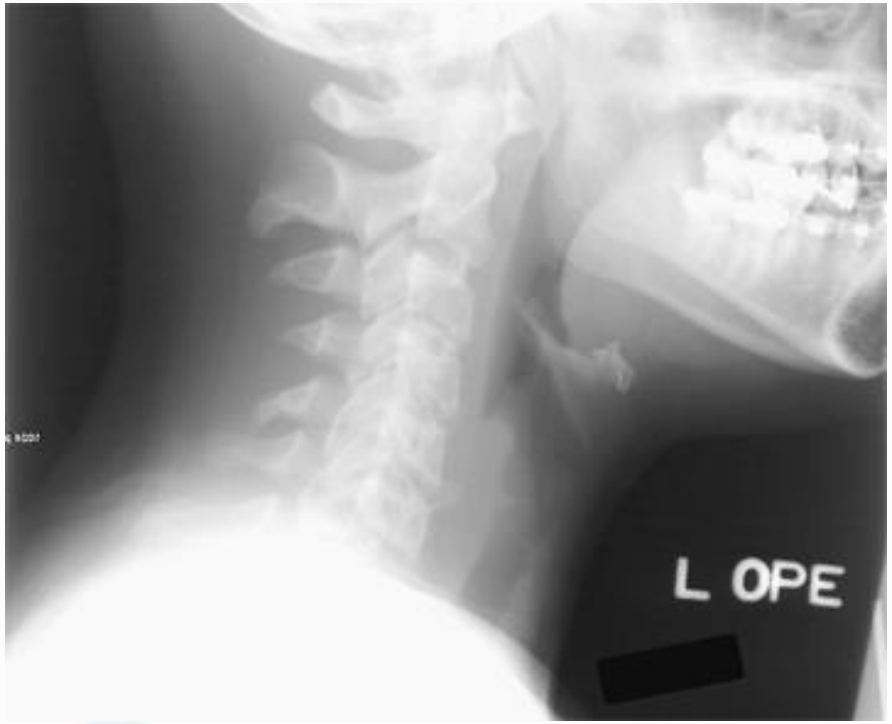
Radiology

Steeple sign



Lateral neck radiograph showing **subglottic narrowing (arrow) and distended hypopharynx (arrowheads)** consistent with acute laryngotracheitis.

Lateral neck radiograph demonstrating **swollen epiglottis (arrow) and aryepiglottic folds (asterisks)** in a child with **epiglottitis** due to *Haemophilus influenzae* type b. The swollen epiglottis is often called a **"thumb sign."**



Lateral neck radiograph showing intraluminal membranes and **tracheal wall irregularity** consistent with bacterial tracheitis.

Treatment

Calculator: Westley croup severity score (appropriate for use in children ≤6 years of age)

Level of consciousness

- ○ Normal, including sleep (0 points)
- ○ Disoriented (5 points)

Cyanosis

- ○ None (0 points)
- ○ With agitation (4 points)
- ○ At rest (5 points)

Stridor

- ○ None (0 points)
- ○ With agitation (1 point)
- ○ At rest (2 points)

Air entry

- ○ Normal (0 points)
- ○ Decreased (1 point)
- ○ Markedly decreased (2 points)

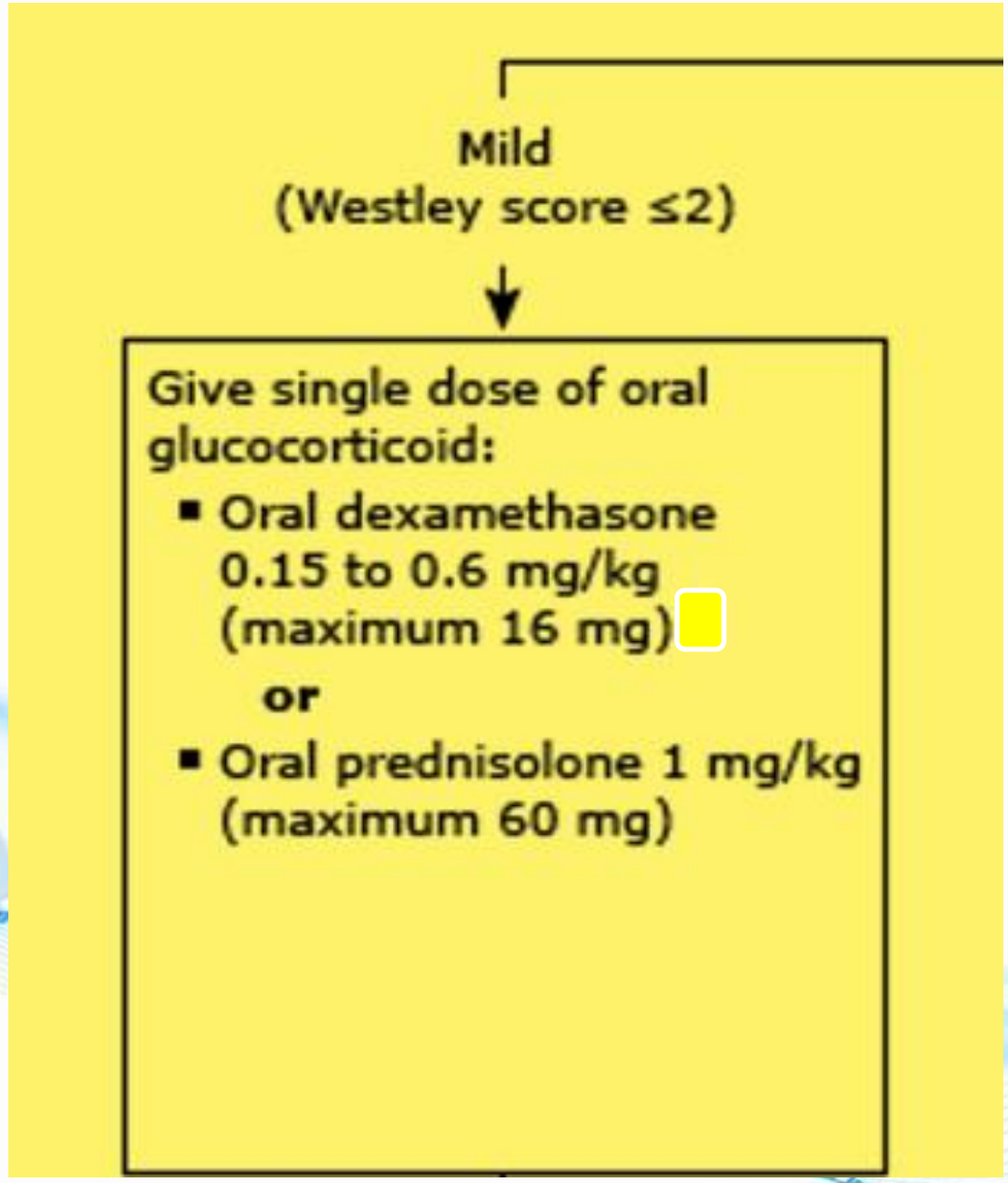
Retractions

- ○ None (0 points)
- ○ Mild (1 point)
- ○ Moderate (2 points)
- ○ Severe (3 points)

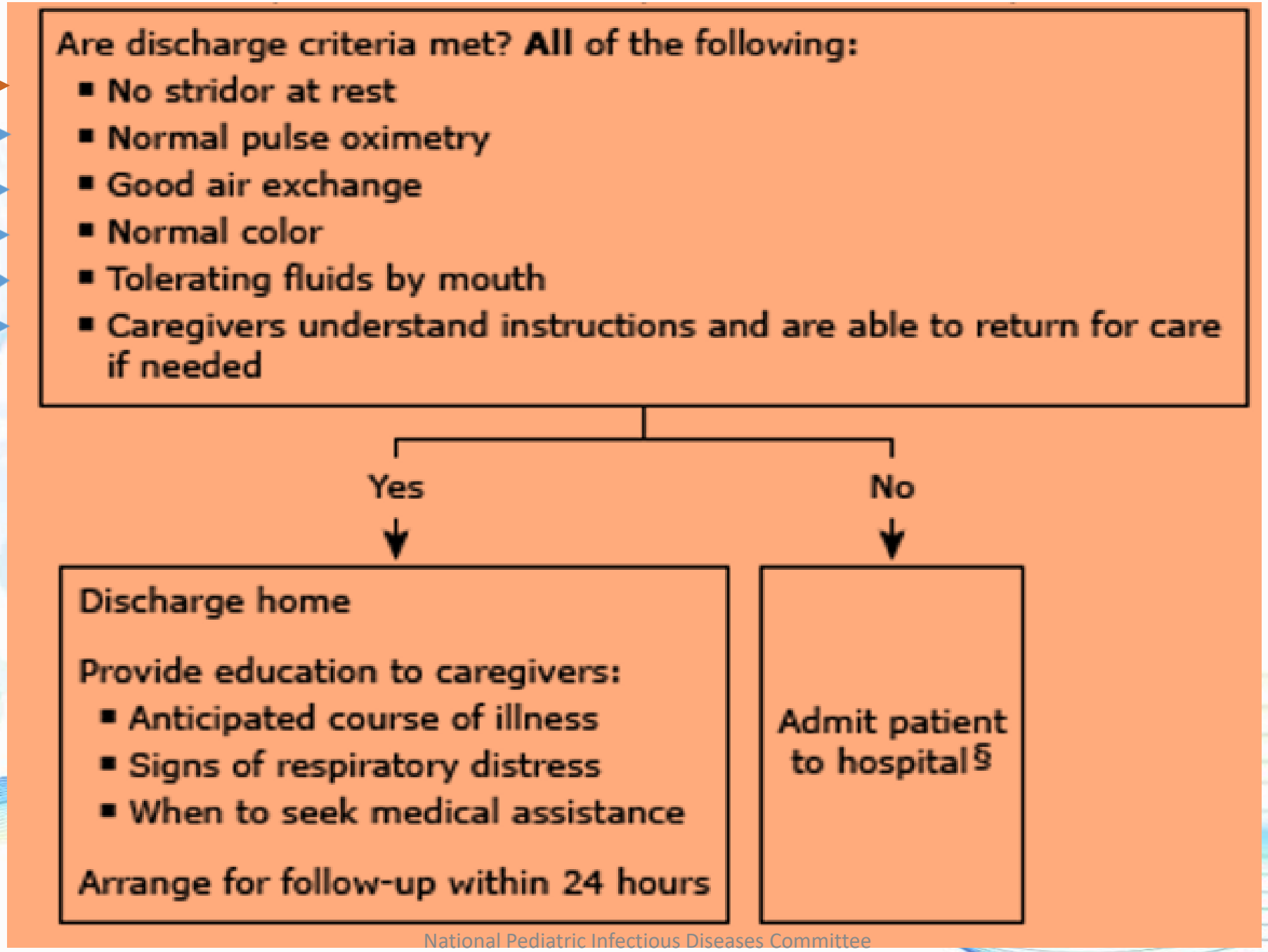
1. Level of consciousness
2. Cyanosis
3. Stridor
4. Air entry
5. Retraction

Westley croup severity score interpretation

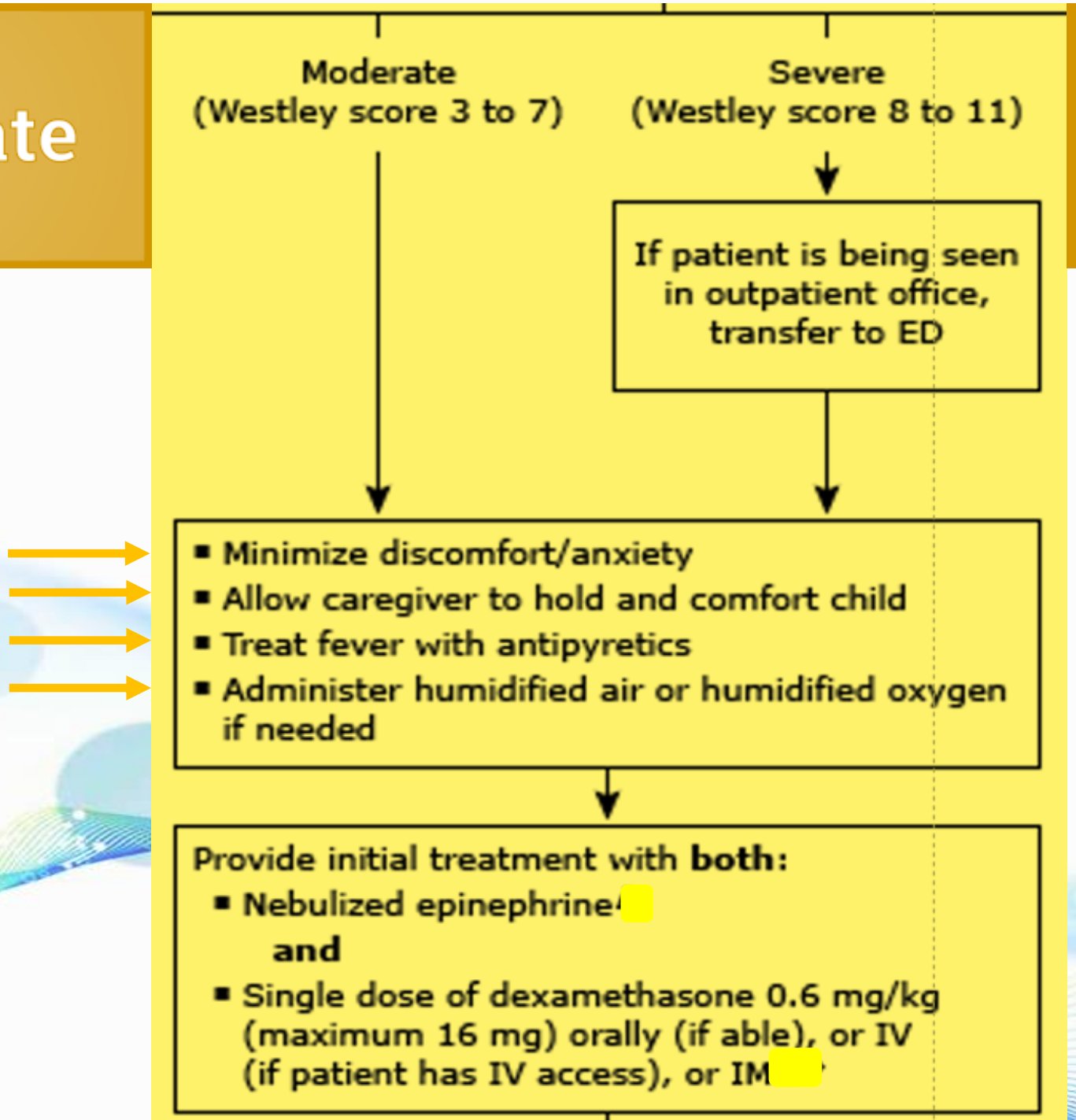
Score	Severity	Description
0 to 2	Mild	Occasional barky cough, no stridor at rest, mild or no retractions
3 to 7	Moderate	Frequent barky cough, stridor at rest, and mild to moderate retractions
8 to 11	Severe	Frequent barky cough, stridor at rest, marked retractions, and significant distress
12 to 17	Impending respiratory failure	Depressed level of consciousness, stridor at rest, severe retractions, poor air entry, cyanosis, or pallor


Mild
(Westley score ≤2)
Give single dose of oral glucocorticoid:
Oral dexamethasone 0.15 to 0.6 mg/kg (maximum 16 mg)
or
Oral prednisolone 1 mg/kg (maximum 60 mg)

Mild


Are discharge criteria met? All of the following:
No stridor at rest
Normal pulse oximetry
Good air exchange
Normal color
Tolerating fluids by mouth
Caregivers understand instructions and are able to return for care if needed
Yes
No
Discharge home
Provide education to caregivers:
Anticipated course of illness
Signs of respiratory distress
When to seek medical assistance
Arrange for follow-up within 24 hours
Admit patient to hospital§

moderate

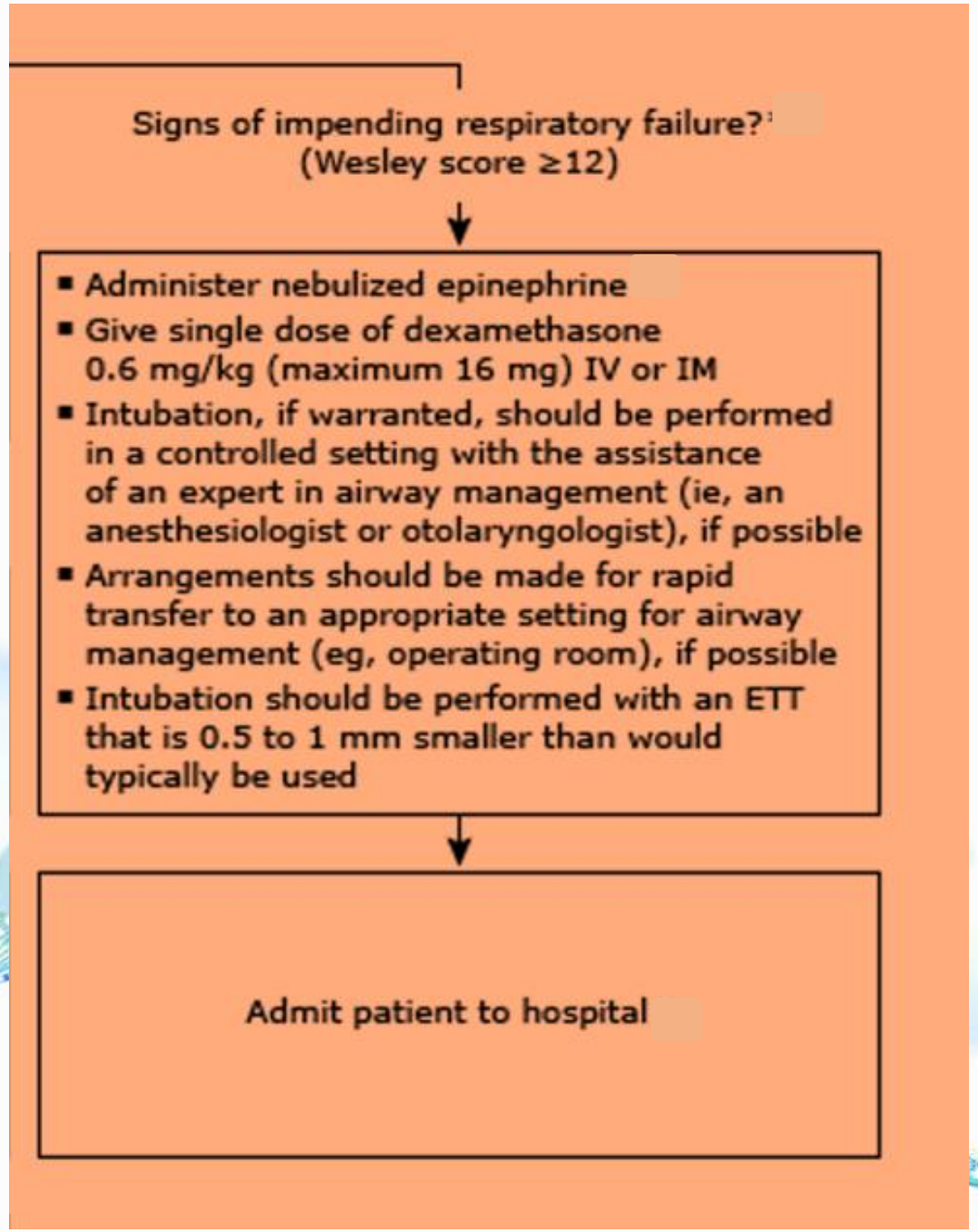


SEVERE

<4 years: 0.05 mL/kg of 2.25% solution (S2) via jet nebulizer (diluted to 3 mL with NS) over 15 minutes q3-4 hr PRN; not to exceed 0.5 mL/dose

≥4 years old: 0.5 mL of 2.25% solution (S2) via jet nebulizer (diluted to 3 mL with NS) over 15 minutes q3-4 hr PRN

Assess response after 15 to 30 minutes



Indications for intubation

- exhaustion from increased work of breathing
- hypercapnic respiratory failure
- hypoxic respiratory failure (child would usually be obtunded)
- decreased LOC (and not protecting own airway, responding to pain only)
- imminent airway obstruction

Poor response to nebulized epinephrine in conjunction with high fever and toxic appearance should prompt consideration of **bacterial tracheitis**


Thank
YOU