

Drugs Affecting the Respiratory System

Antihistamines,
Decongestants,
Antitussives,
and
Expectorants

Understanding the Common Cold

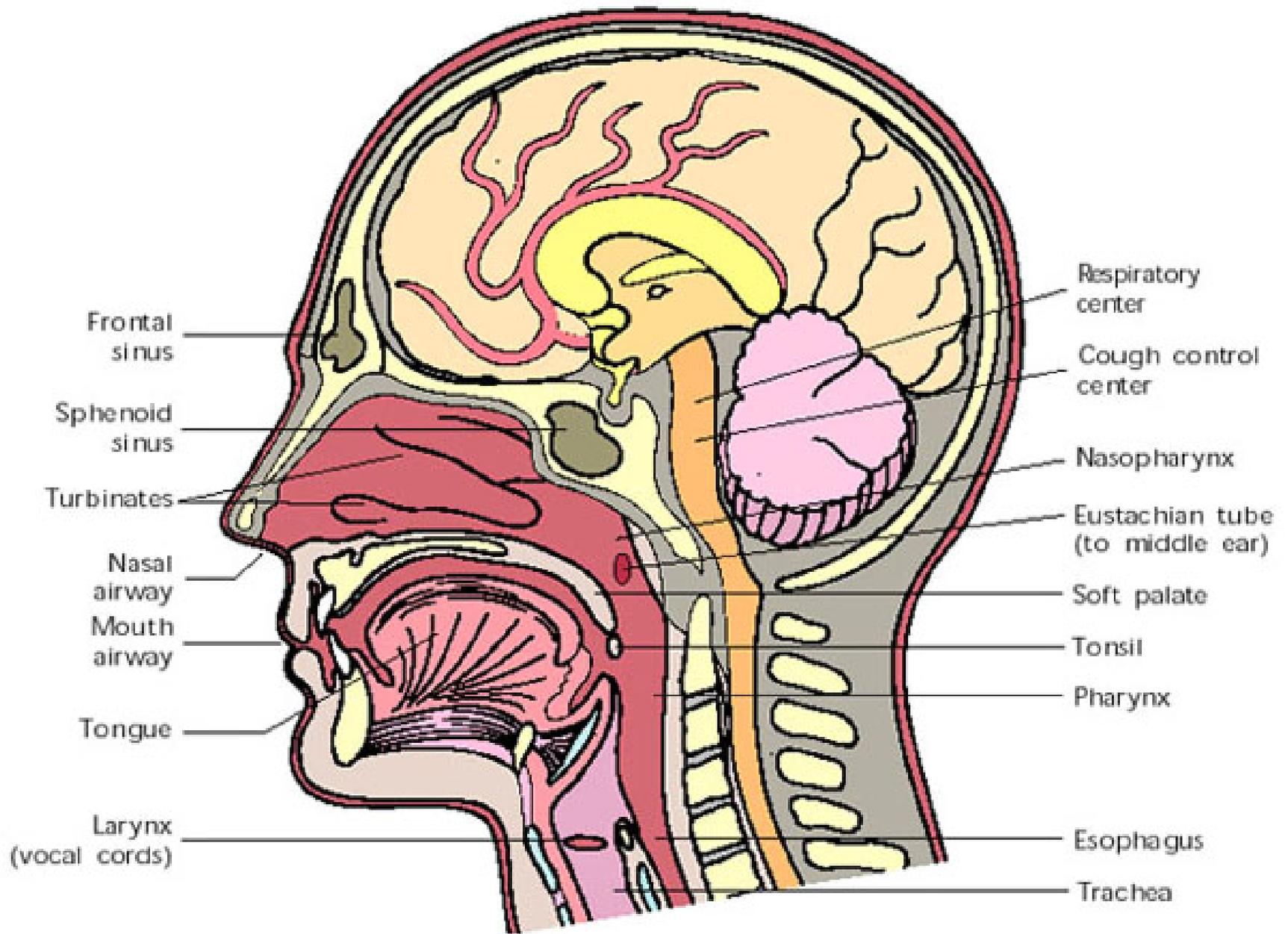
- Most caused by viral infection
 - Rhinovirus or influenza virus
 - The “flu”
- Virus invades tissues (mucosa) of upper respiratory tract
 - Causing upper respiratory infection (URI)

Understanding the Common Cold

- Excessive mucus production
 - Results from the inflammatory response to this invasion
- Fluid drips down the pharynx into the esophagus and lower respiratory tract
 - Causing cold symptoms
 - Sore throat, coughing
 - Upset stomach

Understanding the Common Cold

- Irritation of nasal mucosa
 - Often triggers the sneeze reflex
 - Causes release of several inflammatory and vasoactive substances
 - Result in dilation of small blood vessels in the nasal sinuses
 - Causing nasal congestion



Common Cold

Treatment

- Involves combined use
 - Antihistamines
 - Nasal decongestants
 - Antitussives
 - Expectorants
- Treatment is SYMPTOMATIC
 - Not curative.
 - Does not eliminate the causative pathogen.

Common Cold

Treatment

- Difficult to identify whether cause viral or bacterial
 - Antivirals and antibiotics may be used
- Treatment
 - “Empiric therapy”
 - Treating the most likely cause

Antihistamines

Antihistamines

- Drugs that directly compete with histamine for specific receptor sites.
- Two histamine receptors:
 - H₁ histamine-1
 - H₂ histamine-2

Antihistamines

H₂ Blockers or H₂ Antagonists

– Used to reduce gastric acid in PUD

– Examples:

- cimetidine (Tagamet),
- ranitidine (Zantac)
- famotidine (Pepcid)

Antihistamines

H₁ antagonists are commonly referred to as antihistamines

- Antihistamines have several effects
 - Antihistaminic
 - Anticholinergic
 - Sedative

Antihistamines

Mechanism of Action

- BLOCK action of histamine at the receptor sites
 - Compete with histamine for binding at unoccupied receptors
 - CANNOT push histamine off the receptor if already bound

Antihistamines

Mechanism of Action

- The binding of H₁ blockers to the histamine receptors prevents the adverse consequences of histamine stimulation
 - Vasodilation
 - Increased gastrointestinal and respiratory secretions
 - Increased capillary permeability

Antihistamines

Mechanism of Action

- More effective in preventing the actions of histamine
 - Rather than reversing them
- Should be given early in treatment
 - Before all the histamine binds to the receptors

Histamine vs. Antihistamine Effects

Cardiovascular (small blood vessels)

- Histamine effects:
 - Dilation and increased permeability
(allowing substances to leak into tissues)
- Antihistamine effects:
 - Prevent dilation of blood vessels
 - Prevent increased permeability

Histamine vs. Antihistamine Effects

Smooth Muscle (on exocrine glands)

- Histamine effects:
 - Stimulate salivary, gastric, lacrimal, and bronchial secretions
- Antihistamine effects:
 - Prevent salivary, gastric, lacrimal, and bronchial secretions

Histamine vs. Antihistamine Effects

Immune System

Histamine effects:

- Mast cells release histamine and other substances

- Resulting in allergic reactions

- Antihistamine effect:

- Binds to histamine receptors

- Preventing histamine from causing a response.

Antihistamines

Other Effects

Skin:

- Block capillary permeability, wheal-and-flare formation, itching

Anticholinergic:

- Drying effect that reduces nasal, salivary, and lacrimal gland secretions
 - runny nose, tearing, and itching eyes

Sedative:

- Some antihistamines cause drowsiness

Antihistamines

Therapeutic Uses

Management of:

- Nasal allergies
- Seasonal or perennial allergic rhinitis (hay fever)
- Allergic reactions
- Motion sickness
- Sleep disorders

Antihistamines

Therapeutic Uses

- Histamine-mediated disorders:
 - Allergic rhinitis
(hay fever, mold and dust allergies)
 - Anaphylaxis
 - Angioneurotic edema
 - Drug fevers
 - Insect bite reactions
 - Urticaria (itching)

Antihistamines

Therapeutic Uses

- Relief of symptoms associated with the common cold
 - Sneezing, runny nose
 - Palliative treatment, not curative

Antihistamines

Side effects

- Anticholinergic (drying) effects most common
 - Dry mouth
 - Difficulty urinating
 - Constipation
 - Changes in vision
 - Drowsiness
 - Mild drowsiness to deep sleep

Antihistamines

Two Types

- Traditional
- Non-sedating/Peripherally Acting

Antihistamines

Traditional

- Older
- Work both peripherally and centrally
- Increased anticholinergic effects
- Examples:
 - diphenhydramine (Benadryl)
 - chlorpheniramine (Chlor-Trimeton)

Antihistamines

Nonsedating/Peripherally Acting

- Developed to eliminate unwanted side effects
 - Mainly sedation
- Work peripherally to block the actions of histamine
 - Thus, fewer CNS side effects
- Longer duration of action
 - Increases compliance

Antihistamines

Nonsedating/Peripherally Acting

- Examples:
 - fexofenadine (Allegra)
 - loratadine (Claritin)
 - Cetirizine (Zyrtec)
 - Desloratadine (Clarinex)

Antihistamines

Nursing Implications

- Gather data about the condition or allergic reaction that required treatment
 - Assess for drug allergies
- Contraindicated in the presence of acute asthma attacks and lower respiratory diseases
- Use with caution
 - Increased intraocular pressure
 - Cardiac or renal disease, hypertension
 - Asthma, COPD
 - Peptic ulcer disease, BPH, or pregnancy

Antihistamines

Nursing Implications

- Instruct patients to report excessive sedation, confusion, or hypotension
- Avoid driving or operating heavy machinery
- Avoid alcohol or other CNS depressants
- Do not take these medications with other prescribed or OTC medications without checking with prescriber

Antihistamines

Nursing Implications

- Best tolerated when taken with meals
 - Reduces GI upset.
- If dry mouth occurs
 - Teach patient to perform frequent mouth care, chew gum, or suck on hard candy (preferably sugarless)
- Monitor for intended therapeutic effects.

Decongestants

Nasal Congestion

- Excessive nasal secretions
- Inflamed and swollen nasal mucosa
- Primary causes:
 - Allergies
 - Upper respiratory infections (common cold)

Decongestants

- Two main types are used
 - Adrenergics (largest group)
 - Corticosteroids
- Two dosage forms
 - Oral
 - Inhaled/topically
 - Applied to the nasal membranes

Decongestants

Oral

- Prolonged decongestant effects
 - Delayed onset
- Effect less potent than topical
- No rebound congestion
- Exclusively adrenergics
- Examples:
 - phenylephrine
 - pseudoephedrine (Sudafed)

Decongestants

Topical Nasal

- Adrenergics and steroids
- Prompt onset
- Potent
- Steroids
 - Sustained use over several days
- Adrenergics
 - Can cause rebound congestion
 - Making the condition worse

Decongestants

Topical Nasal

- Adrenergics:
 - ephedrine (Vicks)
 - naphazoline (Privine)
 - oxymetazoline (Afrin)
 - phenylephrine (Neo-Synephrine)

Decongestants

Topical Nasal

- Intranasal Steroids:
 - beclomethasone dipropionate (Beconase, Vancenase)
 - flunisolide (Nasalide)
 - Budesonide (Pulmicort, Rhinocort)
 - Fluticasone (Flonase)
 - Triamcinolone (Nasacort)

Nasal Decongestants Mechanism of Action

- Site of action
 - Blood vessels surrounding nasal sinuses
- Adrenergics
 - Constrict small blood vessels that supply upper respiratory structures
 - Tissues shrink
 - Nasal secretions better able to drain
 - Nasal stuffiness is relieved

Nasal Decongestants Mechanism of Action

- Nasal steroids
 - Anti-inflammatory effect
 - Suppress the immune system response
 - Decreased inflammation
 - Results in decreased congestion
 - Nasal stuffiness is relieved

Nasal Decongestants

Drug Effects

- Shrink engorged nasal mucous membranes
- Relieve nasal stuffiness

Nasal Decongestants

Therapeutic Uses

- Relief of nasal congestion associated with:
 - Acute or chronic rhinitis
 - Common cold
 - Sinusitis
 - Hay fever
 - Other allergies

Nasal Decongestants

Side Effects

- Adrenergics

- Nervousness
- Insomnia
- Tremors
- Palpitations

- Steroids

- local mucosa irritation & dryness

Nasal Decongestants

Nursing Implications

- Avoid in patients with cardiac history
 - Decongestants may cause hypertension, palpitations, and CNS stimulation.
- Assess for drug allergies

Nasal Decongestants

Nursing Implications

- Patients should avoid caffeine & caffeine-containing products
- Report a fever, cough, or other symptoms lasting longer than a week
- Monitor for intended therapeutic effects

Antitussives

Cough Physiology

- Cough reflex
 - Induces coughing and expectoration
 - Initiated by irritation of sensory receptors in the respiratory tract
 - Naturally removes respiratory secretions and foreign objects

Two Basic Types of Cough

- Productive Cough
 - Congested
 - Removes excessive secretions
- Nonproductive Cough
 - Dry cough

Coughing

- Coughing is beneficial
 - Most of the time
 - Removes excessive secretions
 - Removes potentially harmful foreign substances

Antitussives

- Drugs used to stop or reduce coughing
- Opioid and nonopioid (narcotic and non-narcotic)
- Used only for **NONPRODUCTIVE** coughs!

Antitussives

Opioid

- Mechanism of Action
 - Suppress the cough reflex by direct action on the cough center in the medulla.
- Examples:
 - codeine (Robitussin A-C, Dimetane-DC)
 - hydrocodone

Antitussives

Nonopioid

Mechanism of Action

- Suppress the cough reflex
 - Numbing the stretch receptors in the respiratory tract
 - Preventing the cough reflex from being stimulated
- Examples:
 - benzonatate (Tessalon)
 - dextromethorphan (Vicks Formula 44, Robitussin-DM)

Antitussives

Therapeutic Uses

- Used to stop the cough
 - When the cough is nonproductive and/or harmful

Antitussives

Side Effects

- Benzonatate
 - Dizziness, headache, sedation
- Dextromethorphan
 - Dizziness, drowsiness, nausea
- Opioids
 - Sedation, nausea, vomiting, lightheadedness, constipation

Antitussive Agents

Nursing Implications

- Perform respiratory and cough assessment
 - Assess for allergies
- Instruct patients to avoid driving or operating heavy equipment
 - Possible sedation, drowsiness, or dizziness
- Chewable tablets or lozenges
 - do not drink liquids for 30 to 35 minutes afterward

Antitussive Agents

Nursing Implications

- Report any of the following symptoms to the caregiver:
 - Cough that lasts more than a week
 - A persistent headache
 - Fever
 - Rash
- Use in NONPRODUCTIVE coughs only!
- Monitor for intended therapeutic effects.

Expectorants

Expectorants

- Aid in the expectoration
 - Removal of mucus
- Reduce the viscosity of secretions
- Disintegrate and thin secretions

Expectorants

Mechanisms of Action

- Two mechanisms
 - Direct stimulation
 - Reflex stimulation

Final result: thinner mucus that is easier to remove

Expectorants

Mechanisms of Action

- Direct stimulation
 - The secretory glands are stimulated directly to increase their production of respiratory tract fluids.
- Examples:
 - Iodinated glycerol
 - Potassium iodide

Expectorants

Mechanisms of Action

Reflex stimulation:

- Agent causes irritation of the GI tract.
- Loosening and thinning of respiratory tract secretions occur in response to this irritation.
- Examples
 - Guaifenesin
 - Syrup of ipecac

Expectorants

Drug Effect

- By loosening and thinning sputum and bronchial secretions
- Tendency to cough is indirectly diminished.

Expectorants

Therapeutic Uses

- Used for the relief of nonproductive coughs associated with:
 - Common cold
 - Bronchitis
 - Laryngitis
 - Pertussis
 - Influenza
 - Measles
 - Pharyngitis
 - Coughs caused by chronic paranasal sinusitis

Expectorants

Common Side Effects

| Guaifenesin | Iodinated glycerol | Potassium iodide |
|--|---|---|
| <ul style="list-style-type: none">• Nausea• Vomiting• Gastric irritation | <ul style="list-style-type: none">• GI irritation• Rash• Enlarged thyroid gland | <ul style="list-style-type: none">• Iodism• Nausea• Vomiting• Taste perversion |

Expectorants

Nursing Implications

- Use with caution
 - Elderly
 - Asthma
 - Respiratory insufficiency.
- Increase fluids, if permitted
 - To help loosen and liquefy secretions

Expectorants

Nursing Implications

- Report a fever, cough, or other symptoms lasting longer than a week.
- Monitor for intended therapeutic effects.

Mucolytic

- Example
 - Acetylcysteine (Mucomyst)
- Action
 - Disruption of the chemical bonds between mucoprotein molecules of the respiratory secretions
 - Result
 - Liquefaction of the mucous

Mucolytic

- Uses
 - Facilitate removal of viscous, tenacious mucous
 - Antidote for acetaminophen OD
- Side effects
 - n/v, stomatitis, rhinorrhea
 - Rash, fever, drowsiness
 - Chest tightness, bronchoconstriction, respiratory tract irritation
 - Increase amount respiratory secretions

Mucolytic

- Nursing responsibilities
 - Disagreeable odor
 - Disappears quickly
 - May cause facial stickiness
 - Nebulizer
 - Instruct patient to wash face