

CASE SCENARIO

A 26 yr old patient presented in ER with complaint of recurrent episodes of shortness of breath and chest tightness for 1 month. SOB was progressive, which got worse on exposure to cold weather and perfumes. It was associated with cough which was worse at night. Patient lives in a poorly ventilated room.

ON EXAMINATION

- pulse=80/min B.P= 120/60, resp. rate= 24/min
Temp=98 F
- On auscultation bilateral rhonchi are audible all over the chest.

EPIDEMIOLOGY

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- It is estimated that asthma has a 7-10% prevalence worldwide.

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- Nearly 20 million persons — 12% of Pakistani adult population — are suffering from asthma.
- The prevalence of asthma in Pakistan is increasing day-by-day with an annual increase of 5% of which 20% to 30% are children between 13 and 15 years of age.

Asthma

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- Reversible airflow obstruction

Pathophysiology

Airflow limitation

USUALLY REVERSES SPONTANEOUSLY OR WITH TREATMENT

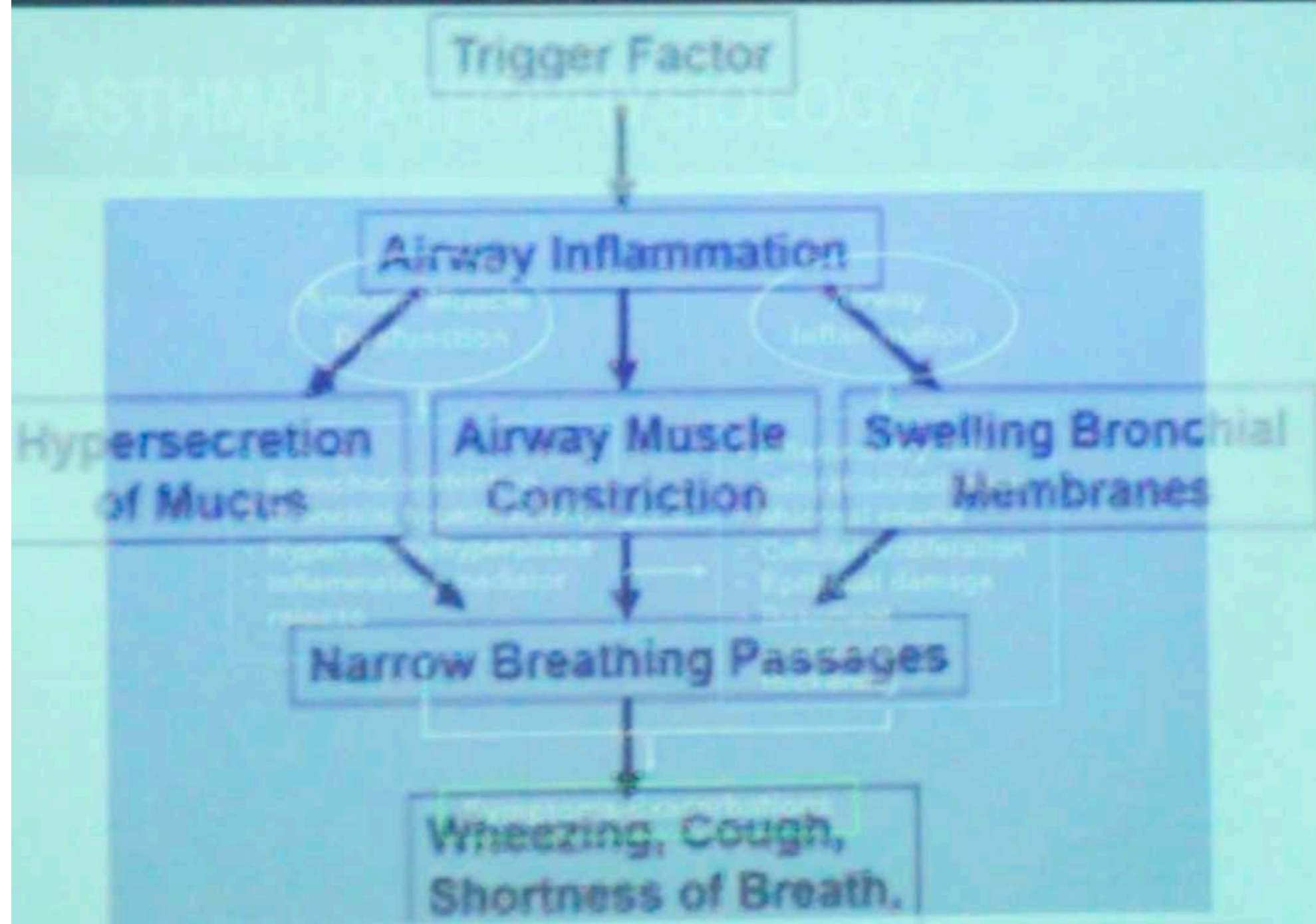
Airway hyper-reactivity

EXAGGERATED BRONCHOCONSTRICTION TO WIDE RANGE OF STIMULI

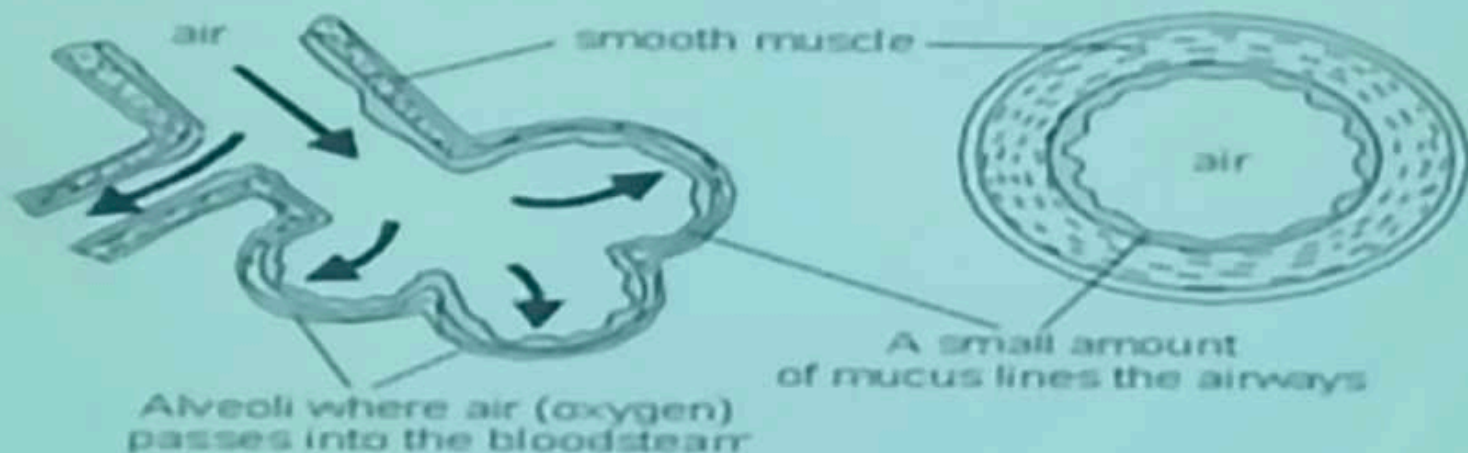
Airway inflammation

INFLAMMATORY CELLS ASS. WITH OEDEMA, SMOOTH MUSCLE HYPERTROPHY, MUCOUS

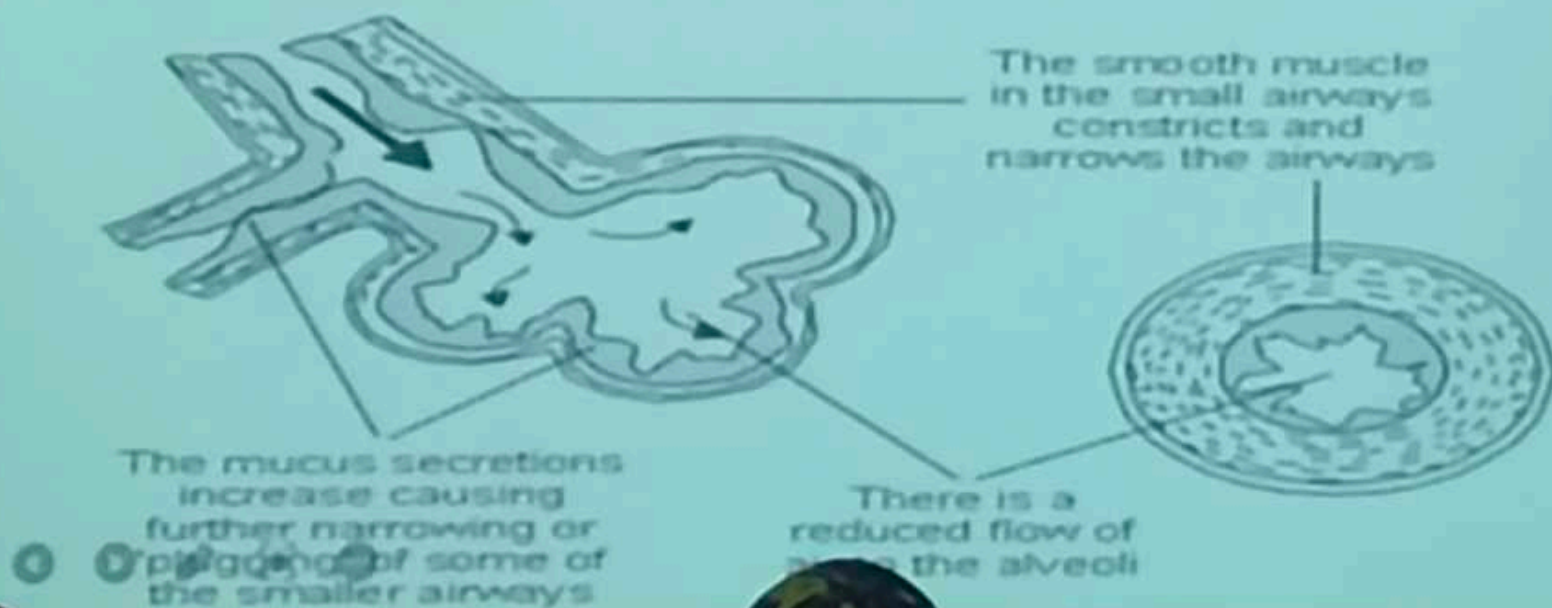
ASTHMA PATHOPHYSIOLOGY

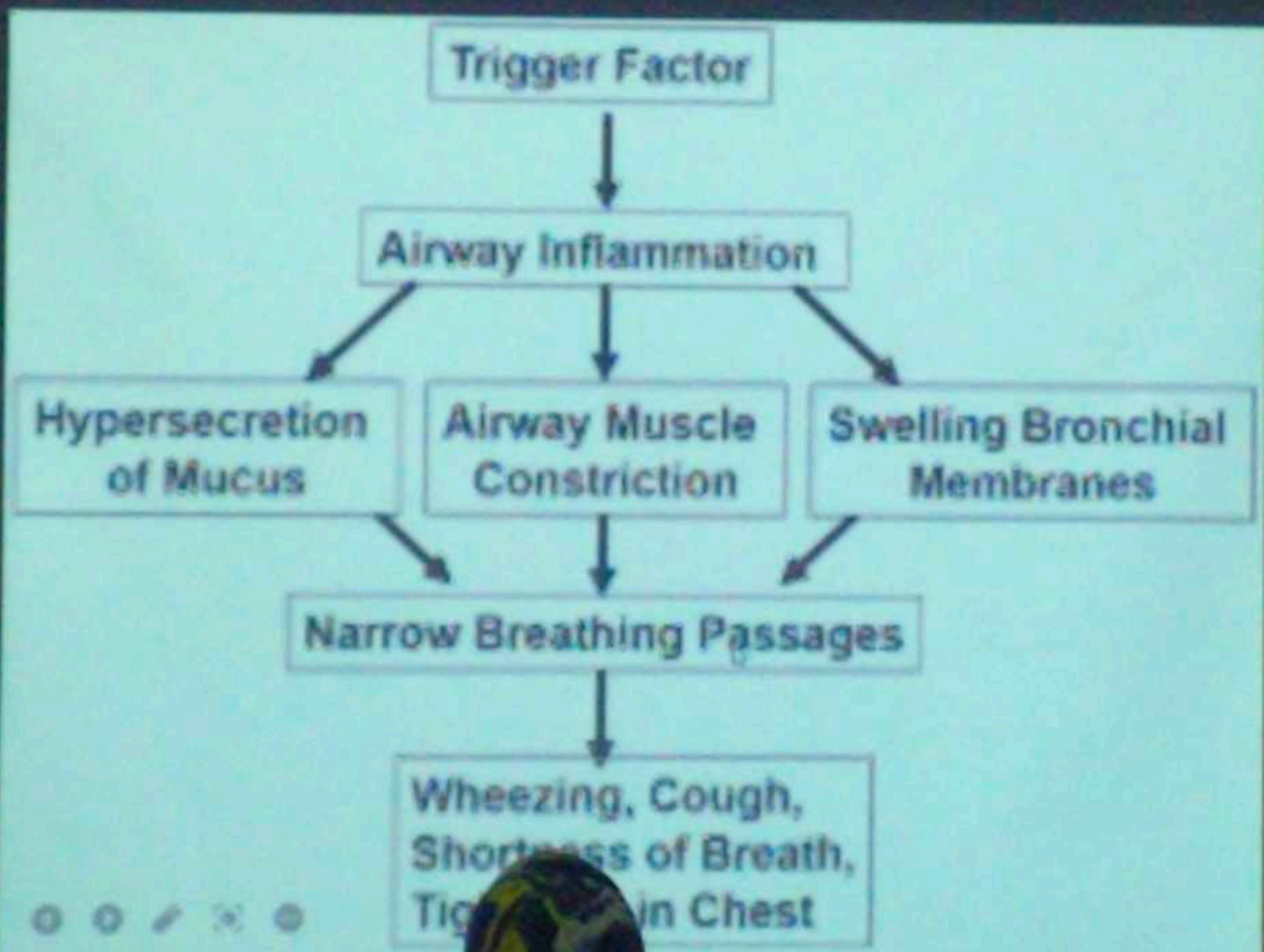


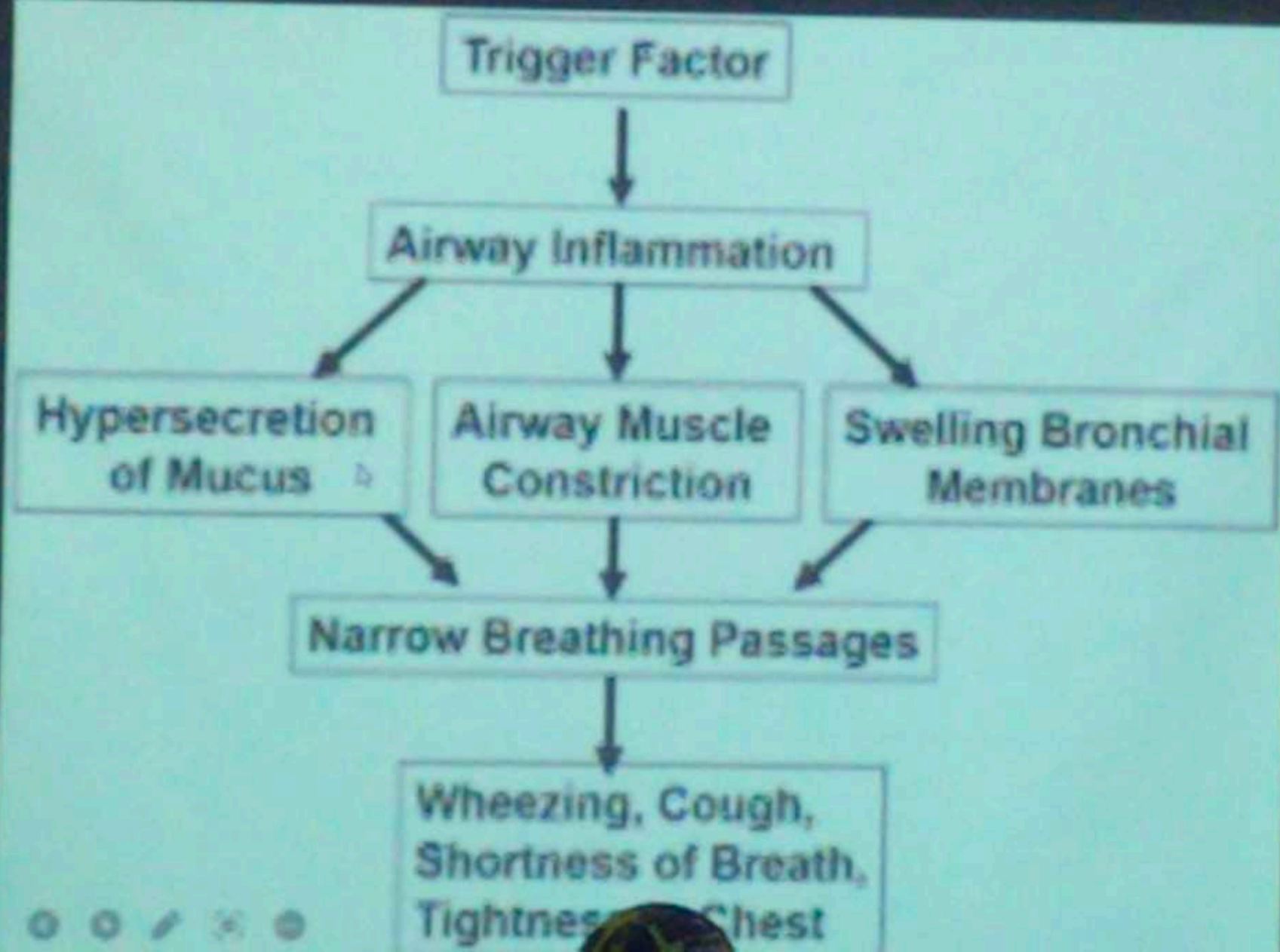
1. NORMAL LUNG - cross section of small airways



2. THE LUNG DURING AN ASTHMA ATTACK

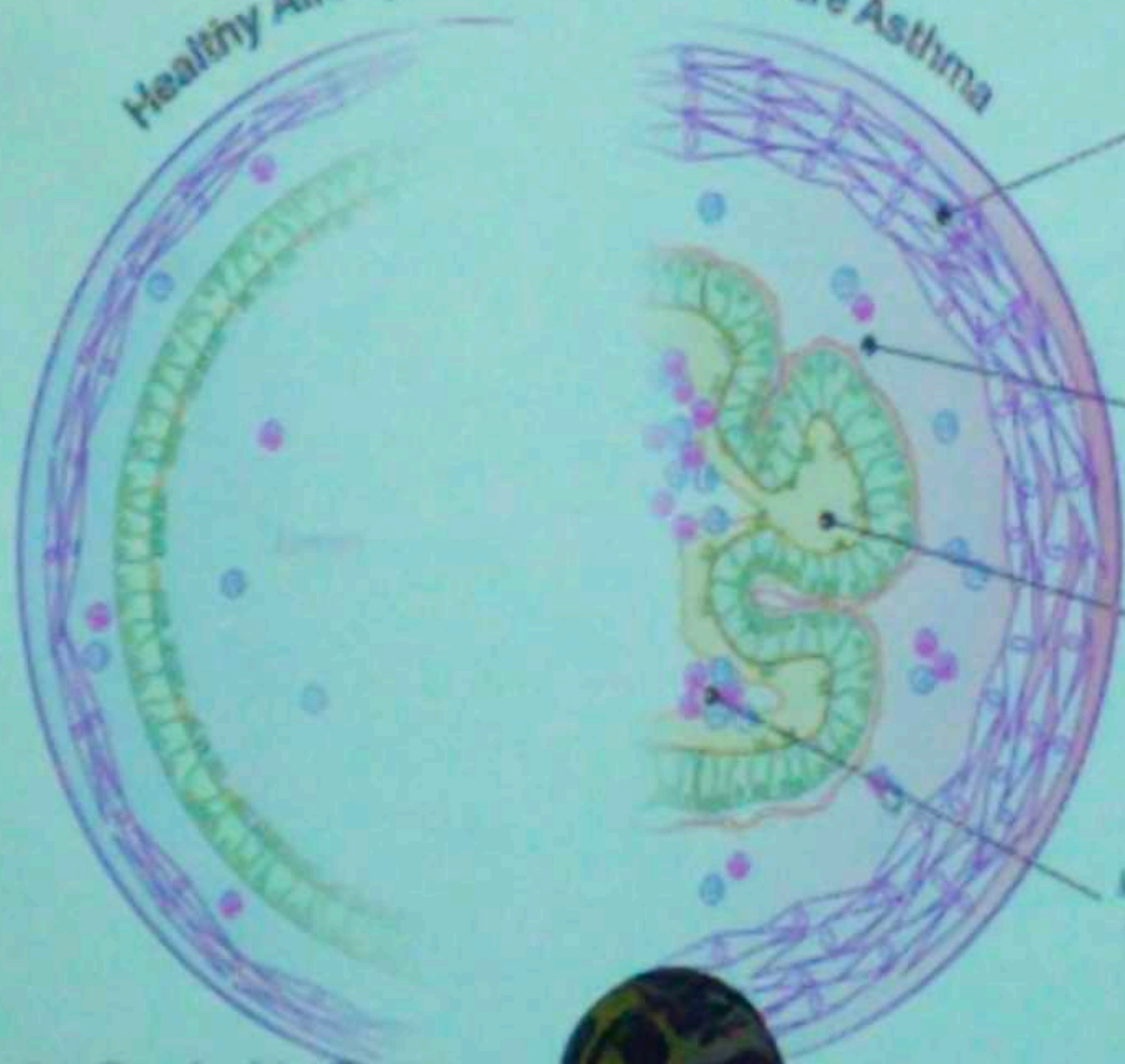






Healthy Airway

Severe Asthma



- Airway smooth muscle:*
- Hyperresponsive
 - Constriction
 - Thickening

Sub-epithelial inflammation and fibrosis

Mucus hypersecretion and impaired mucus clearance

Increased eosinophils and/or neutrophils in airway lumen

Precipitating Factors

What are the Triggering Factors?

External

- Non-specific
- Specific
- seasonal

Internal

- Emotions
- Perennial
- Elderly



- House dust mites
- Pollens
- Food, fish, egg, milk, pulses etc..
- Chemical Irritants
- Drugs (aspirin, beta blockers)

Specific

- Antigens- proteins
- Antibodies- Immunoglobulin



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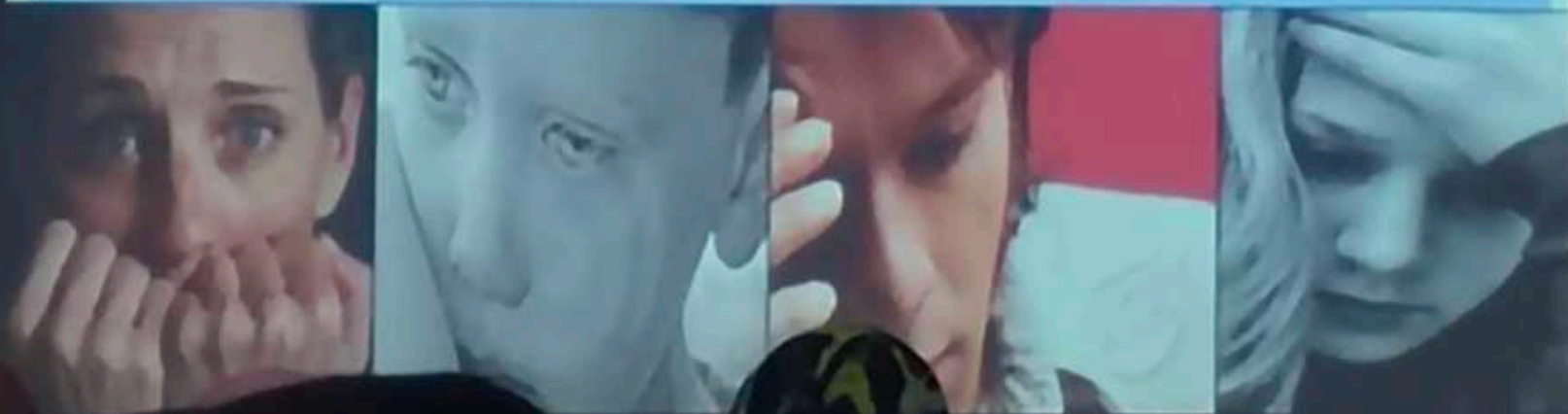


Internal triggers



Personality: thin built, emotionally sensitive, inability to express, suppressed feelings.

"If she cannot cry with tears, she wheezes and sneezes"



History and Clinical Features

DETAILED MEDICAL HISTORY

Consider a diagnosis of asthma and performing spirometry if any of these indicators is present:

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 - — Recurrent wheeze
 - — Recurrent difficulty in breathing
 - — Recurrent chest tightness

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 - — Recurrent wheeze
 - — Recurrent difficulty in breathing
 - — Recurrent chest tightness
- Symptoms occur or worsen in the presence of trigger
- Symptoms occur or worsen at night, awakening the patient

Clinical Examination

- Hyperexpansion of the thorax, use of accessory muscles; appearance of hunched shoulders.
- **wheezing** during normal breathing, or a prolonged phase of forced exhalation (typical of airflow obstruction).
- **Silent chest** is a medical emergency (so severe obstruction that there is no airflow to cause wheeze)

➤ Hypotension / pulse oximetry

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- Increased nasal secretion, mucosal swelling, and/or nasal polyps.
- Atopic dermatitis/eczema or any other manifestation of an allergic skin condition.
- Tachycardia/bradycardia
- Hypertension / pulsus para

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- Tachycardia/ bradycardia
- Hypotension / pulsus paradoxus

Investigations

INVESTIGATIONS

PULMONARY FUNCTION TESTS, FEV1, VC, PEF

- FEV1 \geq 15% (200ml) increase following administration of bronchodilator/ trial of corticosteroid.
- $>20\%$ diurnal variation on \geq 3 days in a week for 2 weeks on PEF diary.
- FEV1 \geq 15% decrease after 6 mins of exercise.

OTHER INVESTIGATIONS:

- X-ray chest
- Arterial blood gases, pco2, po2
- Skin hypersensitivity tests
- CBC peripheral eosinophilia
- Serum IgE levels



Classification of Asthma

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- Cough Variant asthma
- Occupational Asthma
- Exercise Induced Asthma

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- Cough Variant asthma
- Occupational Asthma
- Exercise Induced Asthma
- Aspirin induced asthma

Clinical Severity of Asthma

Symptoms

- Speech
- Night time awakenings
- Frequency of SOB

Signs

Clinical Severity of Asthma

Symptoms

- ⇒ Speech
- ⇒ Night time awakenings
- ⇒ Frequency of SOB

Signs

- ⇒ Respiratory rate
- ⇒ Blood pressure

Severity in patients ≥ 12 years of age	Symptom frequency	Night time symptoms	%FEV ₁ of predicted	FEV ₁ Variability	Use of short-acting beta ₂ agonist for symptom control
Intermittent	≤ 2 per week	≤ 2 per month	$\geq 80\%$	$< 20\%$	≤ 2 days per week
Mild persistent	> 2 per week but not daily	3-4 per month	$\geq 80\%$	20-30%	> 2 days/week but not daily
Moderate persistent	Daily	> 1 per week but not nightly	60-80%	$> 30\%$	Daily
Severe persistent	Throughout the day	Frequent (often)	$< 60\%$	$> 30\%$	Several times per day

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19.25 Immediate assessment of acute severe asthma

Acute severe asthma

- PEF 33–50% predicted (< 200 L/min)
- Respiratory rate \geq 25 breaths/min
- Heart rate \geq 110 beats/min
- Inability to complete sentences in 1 breath

Life-threatening features

- PEF < 33% predicted (< 100 L/min)
- SpO_2 < 92% or PaO_2 < 8 kPa (60 mmHg) (especially if being treated with oxygen)
- Normal or raised $PaCO_2$
- Silent chest
- Cyanosis
- Feeble respiratory effort
- Bradycardia or arrhythmias
- Hypotension
- Exhaustion
- Confusion
- Coma

Near-fatal asthma

- Raised $PaCO_2$ and/or requiring mechanical ventilation with raised inflation pressures

HOW TO MANAGE BRONCHIAL ASTHMA

GOALS OF ASTHMA MANAGEMENT:

- Educate patient
- Achieve and maintain control of symptoms
- Prevent asthma exacerbations
- Maintain pulmonary functions as close to normal as possible
- Avoid adverse effects from asthma medications
- Prevent development of irreversible airflow limitation
- Prevent asthma mortality

ASTHMA DRUG THERAPY

RELIEVERS

1. Short-acting β_2 -agonists

Asthaven[®] MDI /
DP-Haler[®] /
Revolver[®]
(Salbutamol)



Eurotec[®] MDI
(Formoterol)

CONTROLLERS

Long-acting β_2 -agonists

Fostic DP-Haler[®] /
Revolver[®]
(Formoterol)



Ona Turbuhaler[®]

PREVENTERS

1. Inhaled Corticosteroids

Alexis[®] MDI
(Ciclesonide)



Bectate HFA[®] MDI
(Beclomethasone)



Budeflam DP-Haler[®] /
Revolver[®]
(Budesonide)



Inhaler Devices Available in the United States



Metered Dose Inhaler



Flexhaler[®]



Handihaler[®]



Aerolizer[™]



Twisthaler[®]



Spinner Device



Eklus[®]



Small Volume nebulizer



Remove cap
and shake
inhaler.



Breathe out
all the way.



Breathe in and
press down on
the inhaler.



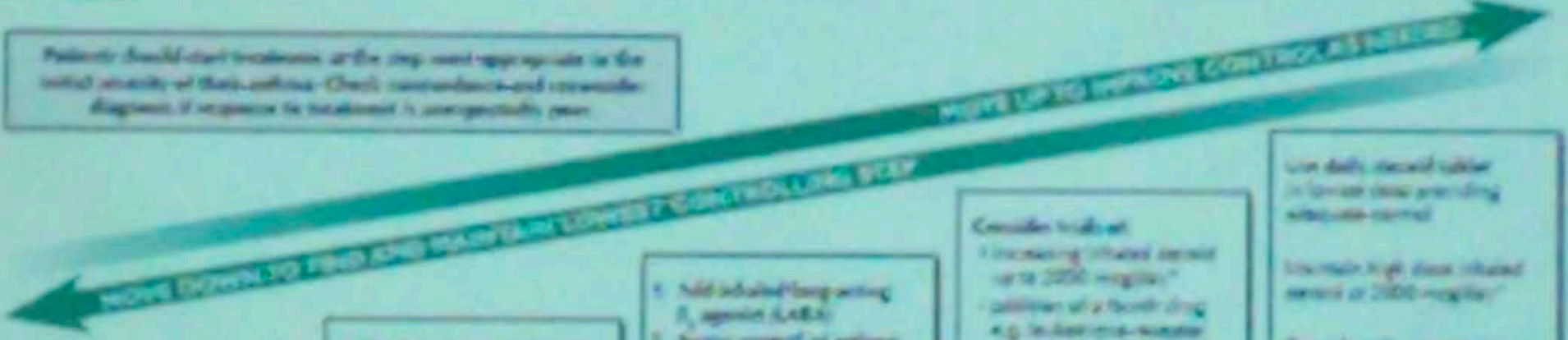
Hold your
breath for a
count of 10.



Slowly
breathe out.

Adults

Patients should start treatment at the step most appropriate to the initial severity of their asthma. Check compliance and reassess diagnosis if response to treatment is unspectacularly poor.



Inhaled short-acting β_2 agonist as required

STEP 1

Add inhaled steroid 200-400 mcg/day*
 200 mcg is an appropriate starting dose for many patients.
 Start at dose of inhaled steroid appropriate to severity of disease.

STEP 2

1. Add inhaled long-acting β_2 agonist (LABA)
 2. Assess control of asthma
 • good response to LABA - continue LABA
 • benefit from LABA but control still inadequate - continue LABA and increase inhaled steroid dose to 400 mcg/day* if not already on this dose
 • no response to LABA - stop LABA and increase inhaled steroid to 800 mcg/day. *Assess all treatment including use of other therapies including rescue inhaler or rescue oral corticosteroid

STEP 3

Consider trial of:
 • increasing inhaled steroid up to 2000 mcg/day*
 • addition of a fourth drug e.g. leukotriene-receptor antagonist, or theophylline β_2 agonist

STEP 4

Use daily inhaled corticosteroid in lowest dose providing adequate control
 Consider high dose inhaled steroid at 2000 mcg/day*
 Consider other measures to minimize the cost of steroid tablets
 Refer patient for specialist care

STEP 5

* 200 mcg equivalent

* 200 mcg equivalent

Adults

Patients should start initial therapy at the appropriate dose

Add inhaled steroid 200-800 mcg/day*

400 mcg is an appropriate starting dose for many patients

Start at dose of inhaled steroid appropriate to severity of disease.



Inhaled corticosteroid (ICS) agent as required

STEP 1

Regular use of ICS as required

STEP 2

Regular use of ICS



STEP 3

Consider adding LABA to ICS or LABA/LAMA combination ICS and LABA or LABA/LAMA and ICS and LABA

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STEP 4

Consider adding LABA to ICS or LABA/LAMA combination ICS and LABA or LABA/LAMA and ICS and LABA

Use daily inhaled corticosteroid to improve control, as needed

Maximum high-dose inhaled steroid is 2000 mcg/day*

Consider other treatments to improve the level of control

Refer patient for specialist care

STEP 5

Consider oral corticosteroids

* ICS as required

Adults

Patients should start treatment at the step that appropria-
tely reflects their asthma. Clinical assessment
frequency is related to treatment intensity.



Inhaled corticosteroid,
aspirin as required

STEP 1

PRN as-needed short-acting beta₂-agonist

Add inhaled long-acting
beta₂-agonist*

400 mcg (over 200 mcg)
starting dose (no max)

Start at dose of inhaled
steroid appropriate
severity of disease

STEP 2

Regular preventive

1. Add inhaled long-acting β_2 agonist (LABA)
2. Assess control of asthma:
 - good response to LABA - continue LABA
 - benefit from LABA but control still inadequate - continue LABA and increase inhaled steroid dose to 800 mcg/day* (if not already on this dose)
 - no response to LABA - stop LABA and increase inhaled steroid to 800 mcg/day.* If control still inadequate, institute trial of other therapies, leukotriene receptor antagonist or SR theophylline

STEP 3

1 add-on therapy



Use daily inhaled
steroid or
LABA/steroid
combination
at 200 mcg/day*
or a short-acting
beta₂-agonist
rescue
or SR theophylline
(2 tablets)

STEP 4

2 or more add-ons

Use daily inhaled
steroid in lowest dose providing
adequate control

Use max high-dose inhaled
steroid at 2000 mcg/day*

Consider other treatments to
increase the use of inhaled
steroid

Refer patient to specialist care

STEP 5

Continuation or frequent
use of oral steroids

* RDP as required

Adults

Patients should start treatment at the step most appropriate to the initial severity of their asthma. Check compliance and consider diagnosis if response to treatment is unsatisfactory, poor.

MOVE DOWN TO STEP TWO AND UPON TO STEP ONE ONLY IF NECESSARY

Inhaled short-acting β_2 agonist as required

STEP 1

Mild intermittent asthma

Add inhaled steroid 200-500 mcg/day*
400 mcg is an appropriate starting dose for many patients

Step 1 or less if inhaled steroid appropriate for severity of disease

STEP 2

Regular preventive therapy

1. Add inhaled long β_2 agonist (LABA)
2. Assess control of

- 1. good response LABA + inhaled steroid
- 2. benefit from LABA + inhaled steroid
- 3. continue LABA + inhaled steroid

Increase inhaled steroid to 400 mcg not allowed

1. no response to LABA + inhaled steroid
2. LABA and inhaled steroid 400 mcg/day not used
3. LABA + inhaled steroid 400 mcg/day not used
4. LABA + inhaled steroid 400 mcg/day not used
5. LABA + inhaled steroid 400 mcg/day not used
6. LABA + inhaled steroid 400 mcg/day not used
7. LABA + inhaled steroid 400 mcg/day not used
8. LABA + inhaled steroid 400 mcg/day not used
9. LABA + inhaled steroid 400 mcg/day not used
10. LABA + inhaled steroid 400 mcg/day not used

STEP 3

Consider addition of

Consider trials of:

- increasing inhaled steroid up to 2000 mcg/day*
- addition of a fourth drug e.g. leukotriene receptor antagonist, SR theophylline, β_2 agonist tablet

STEP 4

Persistent poor control

STEP 5

Consider addition of

STEP 6

Consider addition of

Adults

Patients should start treatment at the step most appropriate to the initial severity of their asthma. Check concordance and re-assess diagnosis if response to treatment is unexpectedly poor.

MOVE DOWN TO FIND AND MAINTAIN LOWEST CONTROLLING STEP

MOVE UP

Inhaled short-acting β_2 agonist as required

STEP 1

Mild intermittent asthma

Add inhaled steroid 200-500 mcg/day*
400 mcg is an appropriate starting dose for many patients

Start at dose of inhaled steroid appropriate to severity of disease

STEP 2

Regular preventive therapy

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 - no response to LABA - stop LABA and increase inhaled steroid to 800 mcg/day** if control still inadequate. Institute trial of other therapies. Consider leukotriene antagonist or OTC bronchodilator

STEP 3

Initial add-on therapy

Consider:

- increase up to 2000 mcg/day
- add-on e.g. leukotriene antagonist, β_2 agonist

Use daily steroid tablet in lowest dose providing adequate control

Maintain high dose inhaled steroid at 2000 mcg/day*

Consider other treatments to minimise the use of steroid tablets

Refer patient for specialist care

STEP 5

Continuous or frequent use of oral

SYMPTOMS

VS

TREATMENT

Moderate asthma

PEF > 50% best or predicted

- Speech normal
- Respiration < 25 breaths/min
- Pulse < 110 beats/min

Treat at home or in surgery and
ASSESS RESPONSE TO TREATMENT

PEF < 50% best or predicted

PEF < 50% best or predicted

ASSESSMENT

PEF < 50% best or predicted

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- Respiration < 25 breaths/min
- Pulse < 110 beats/min

Acute severe asthma

INITIAL ASSESSMENT

PEF 33-50% best or predicted

FURTHER ASSESSMENT

- Can't complete sentences
- Respiration ≥ 25 breaths/min
- Pulse ≥ 110 beats/min

Life threatening asthma

PEF < 33% best or predicted

- SpO₂ < 92%
- Silent chest, cyanosis or feeble respiratory effort
- Bradycardia, dysrhythmia or hypotension
- Exhaustion, confusion or coma

<p>100% humidified oxygen</p> <p>100% humidified oxygen</p>	<p>100% humidified oxygen</p> <p>100% humidified oxygen</p>
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INITIAL PLAN

Arrange immediate **ADMISSION**

TREATMENT

- Oxygen 40-60%
- Prednisolone 40-50 mg or IV hydrocortisone 100 mg immediately
- High dose β_2 bronchodilator and ipratropium:
 - Ideally via oxygen-driven nebuliser (salbutamol 5 mg or terbutaline 10 mg) and ipratropium 0.5mg)
 - Or via spacer (4-6 puffs [given one at a time and inhaled separately] repeated at intervals of 10-20 minutes)