bronchial asthma

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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- 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 [illegible] years of age.

Asthma

" A **chronic inflammatory disorder** of the airways in **susceptible individuals**, characterized by widespread variable and recurring symptoms of **cough, wheezing, dyspnea and chest tightness**

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- Reversible airflow obstruction

Pathophysiology

Airflow limitation

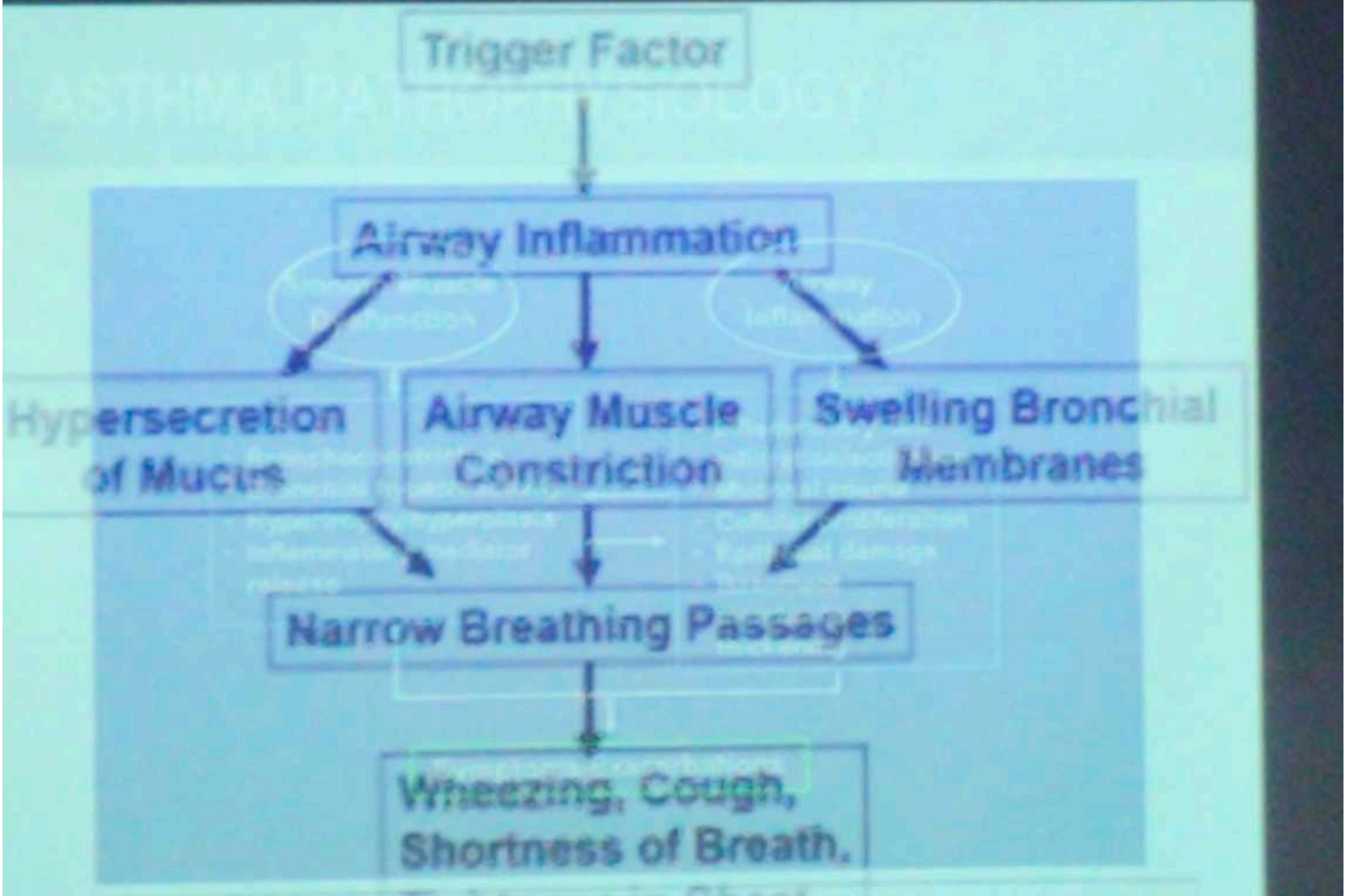
USUALLY REVERSES SPONTANEOUSLY OR WITH TREATMENT

Airway hyper-reactivity

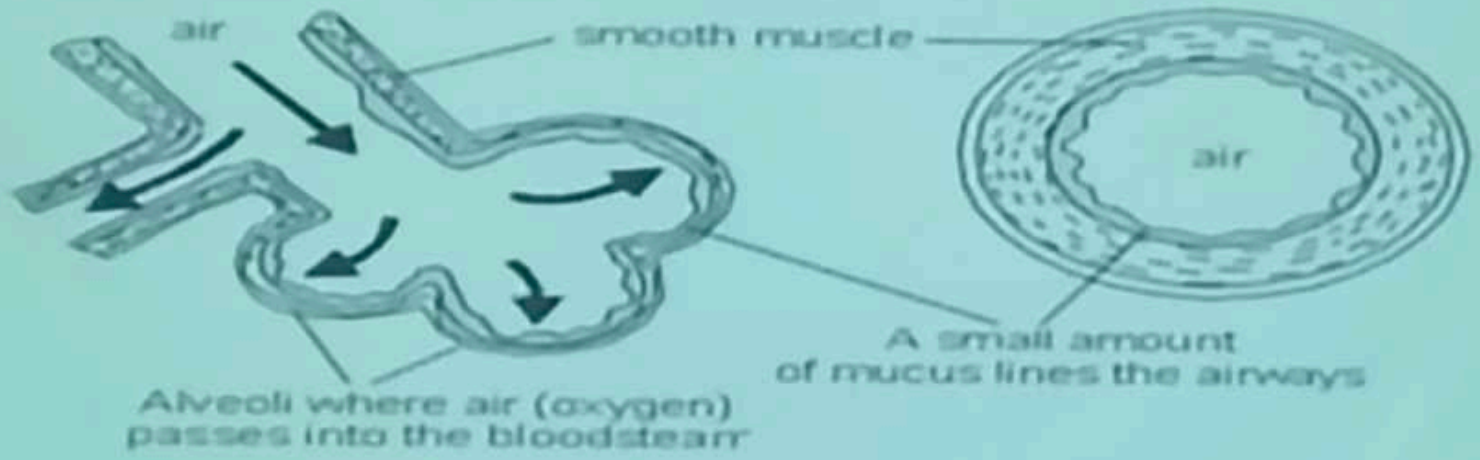
EXAGGREATED BRONCHOCONSTRICTION TO WIDE RANGE OF STIMULI

Airway inflammation

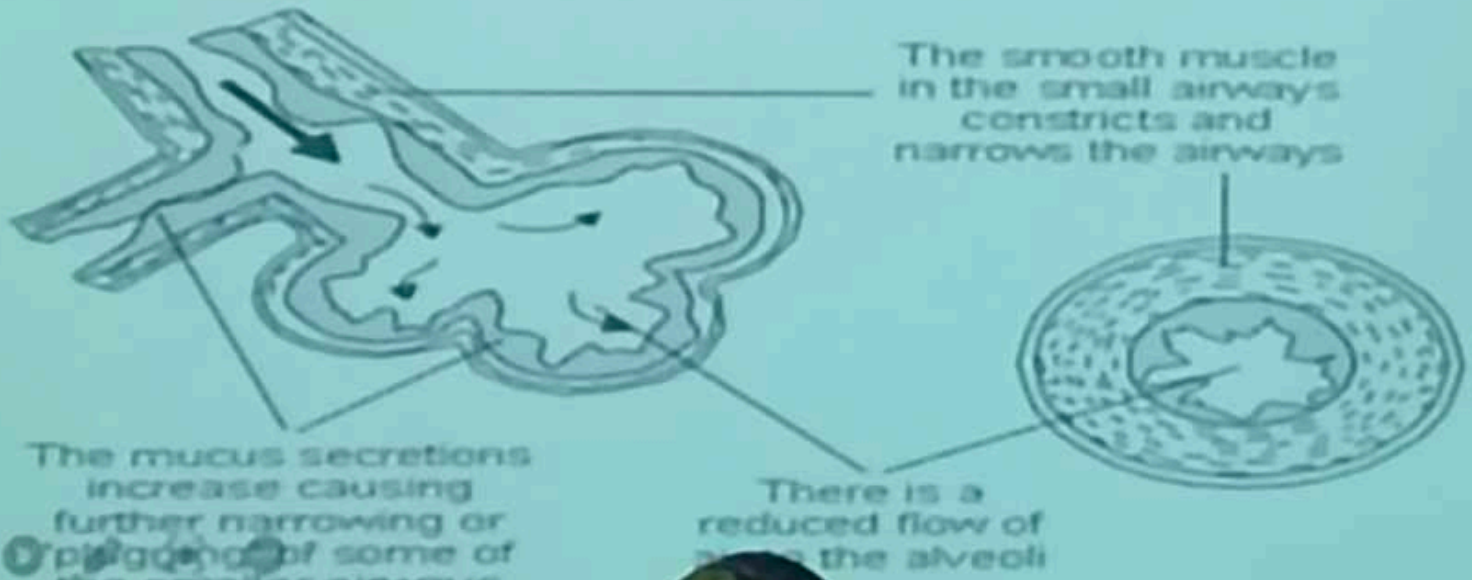
INFLAMMATORY CELLS ASS. WITH OEDEMA, SMO[illegible]SCLE [illegible], MUCOUS

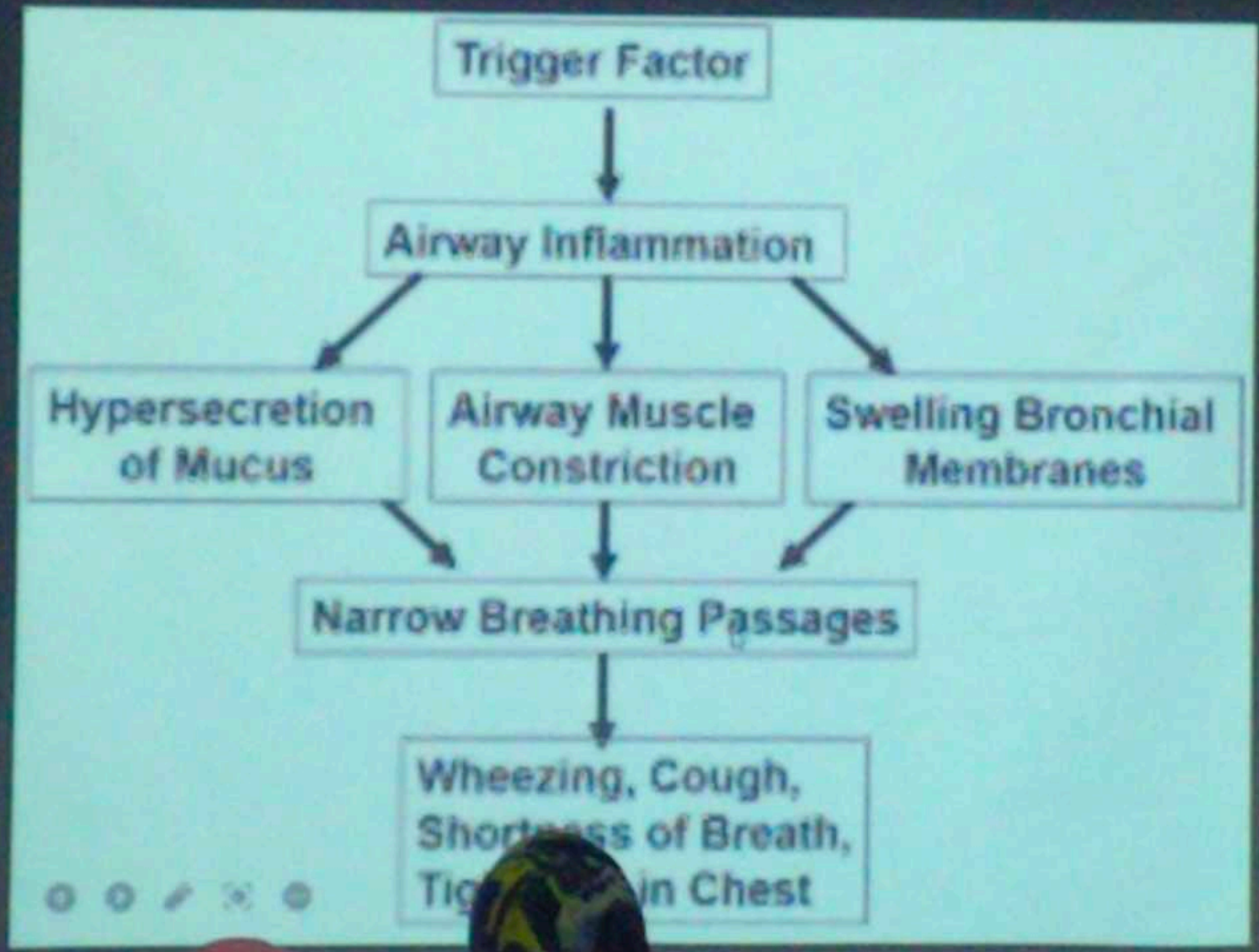

Trigger Factor
Airway Inflammation
Hypersecretion of Mucus
Airway Muscle Constriction
Swelling Bronchial Membranes
Narrow Breathing Passages
Wheezing, Cough, Shortness of Breath,

1. NORMAL LUNG - cross section of small airways



2. THE LUNG DURING AN ASTHMA ATTACK

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Airway Inflammation
Hypersecretion of Mucus
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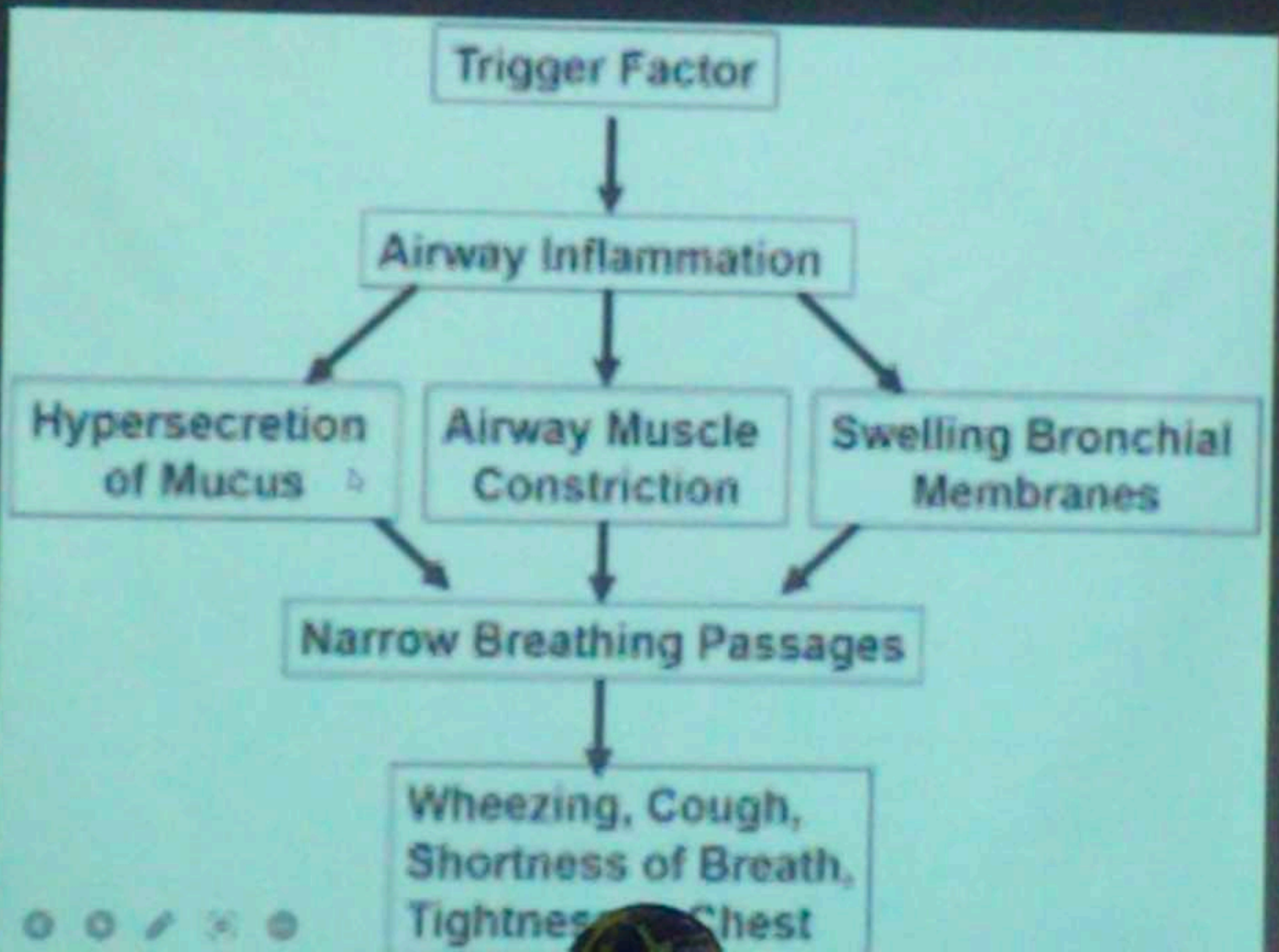
Wheezing, Cough,
Shortness of Breath,
Tightness in Chest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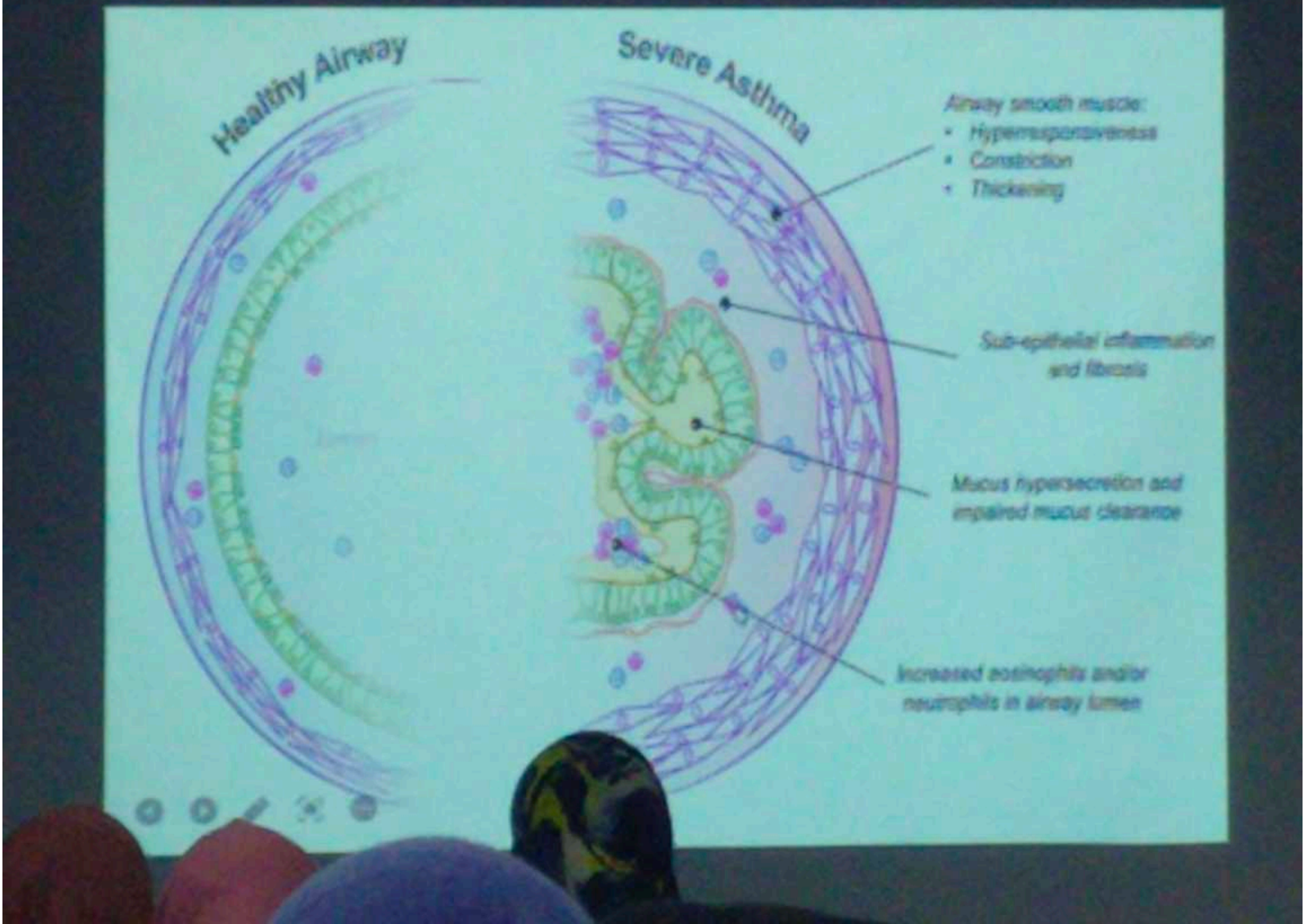
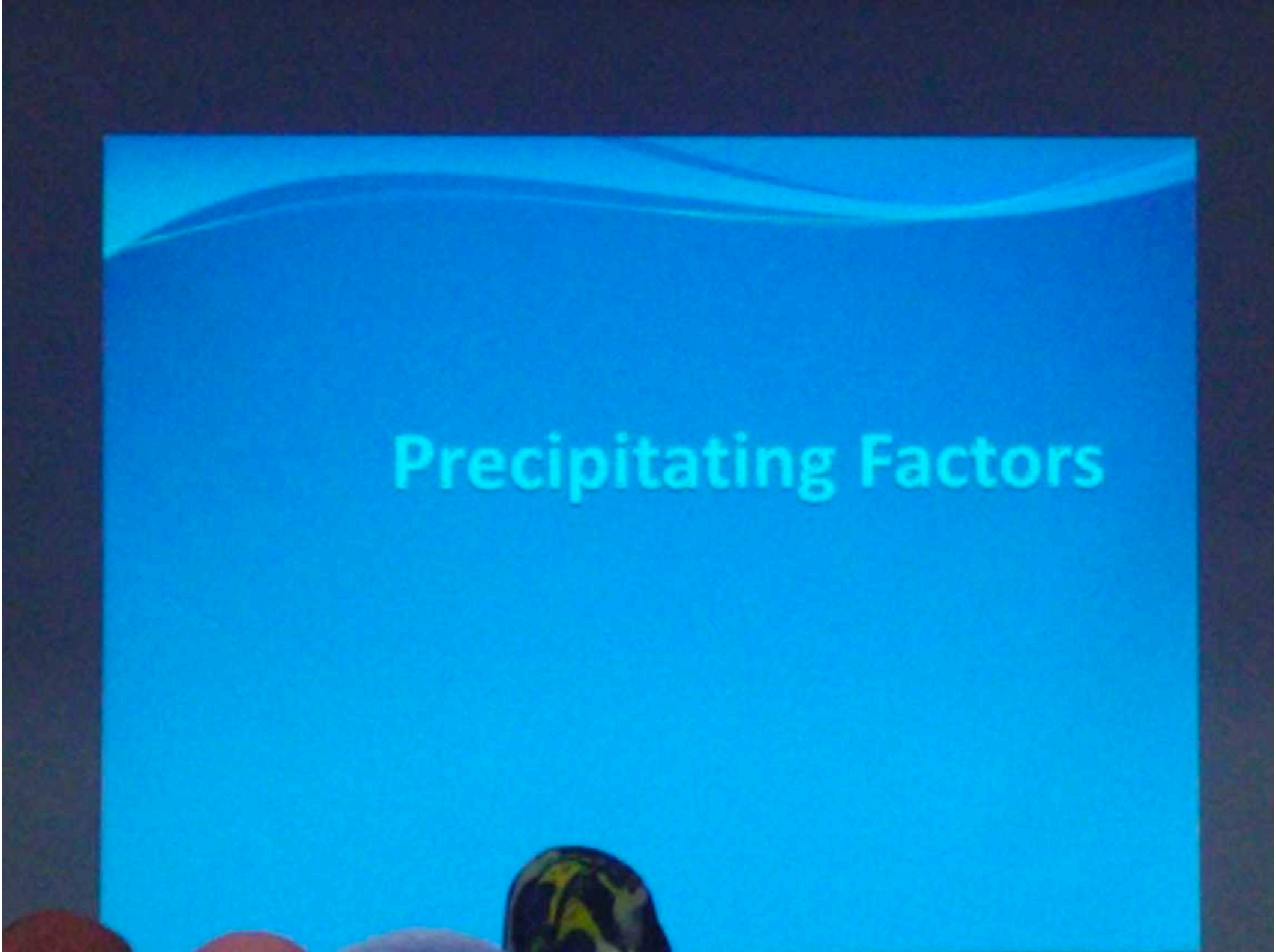

Healthy Airway
Severe Asthma
Airway smooth muscle:
• Hyperresponsiveness
• Constriction
• Thickening
Sub-epithelial inflammation and fibrosis
Mucus hypersecretion and impaired mucus clearance
Increased eosinophils and/or neutrophils in airway lumen


Precipitating Factors

What are the Triggering Factors?

External

- Non-specific
- Specific
- seasonal

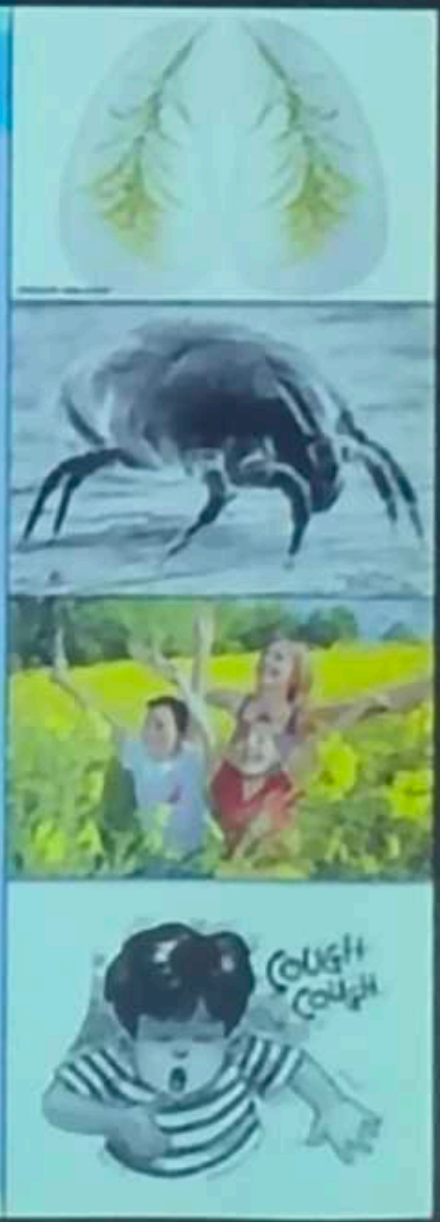
Internal

- 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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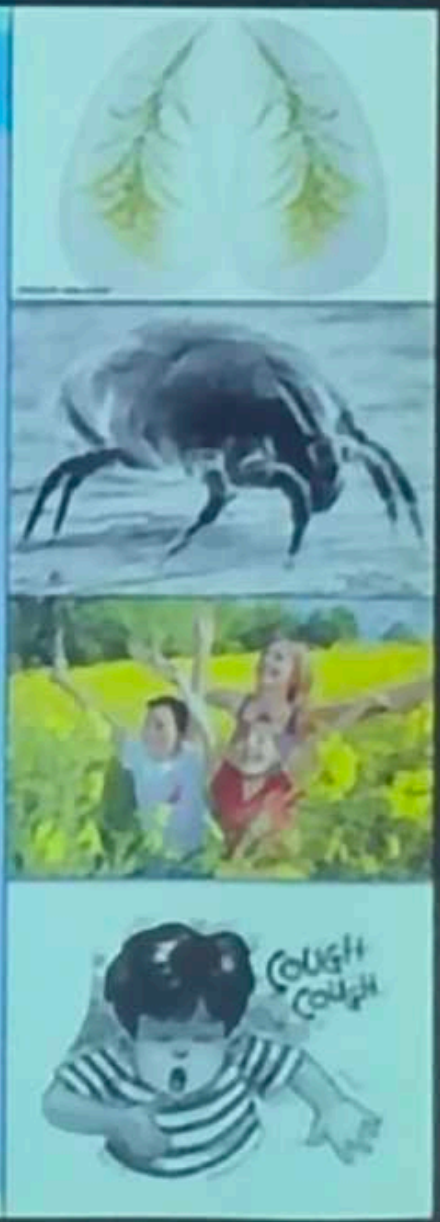
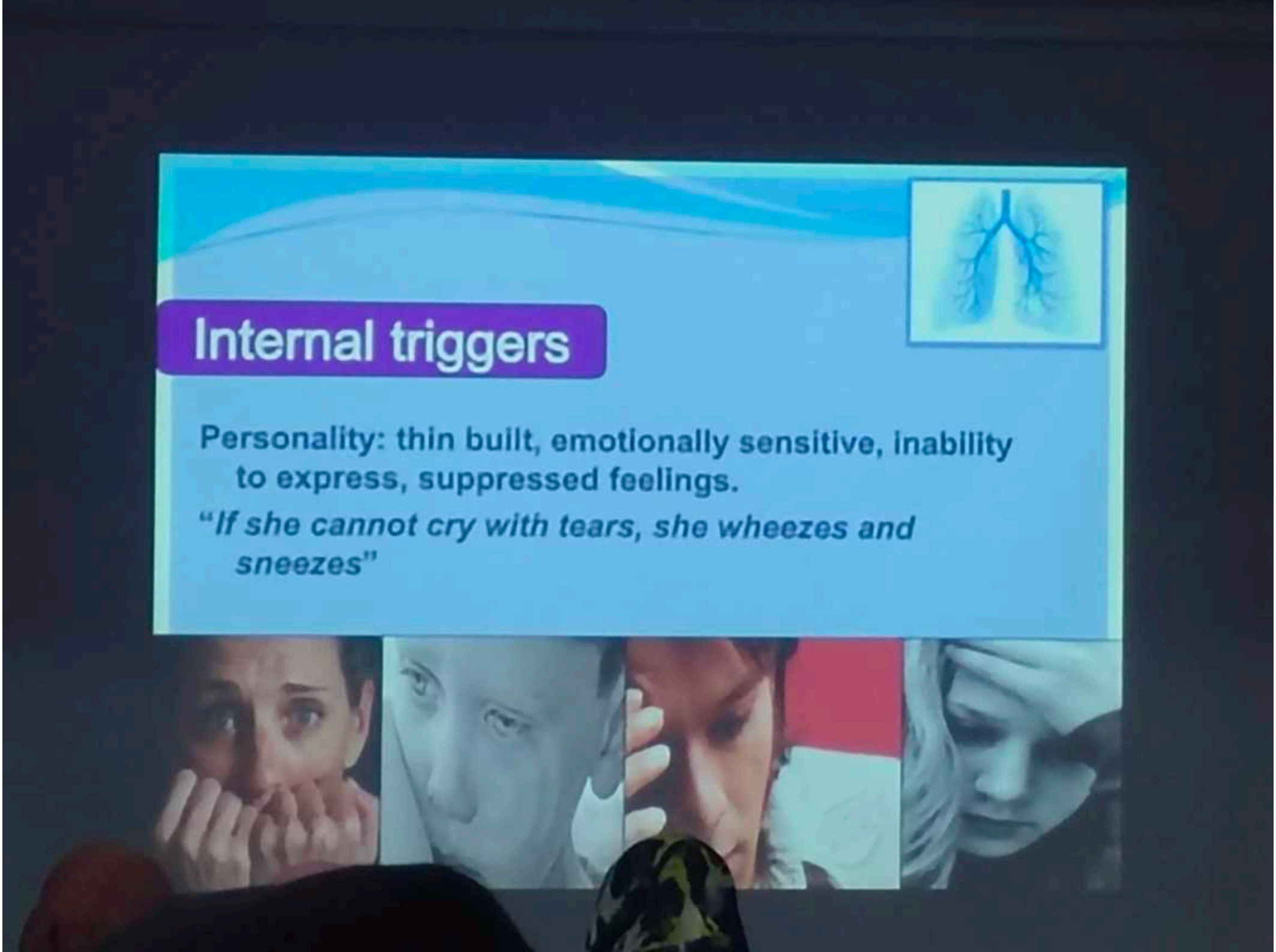
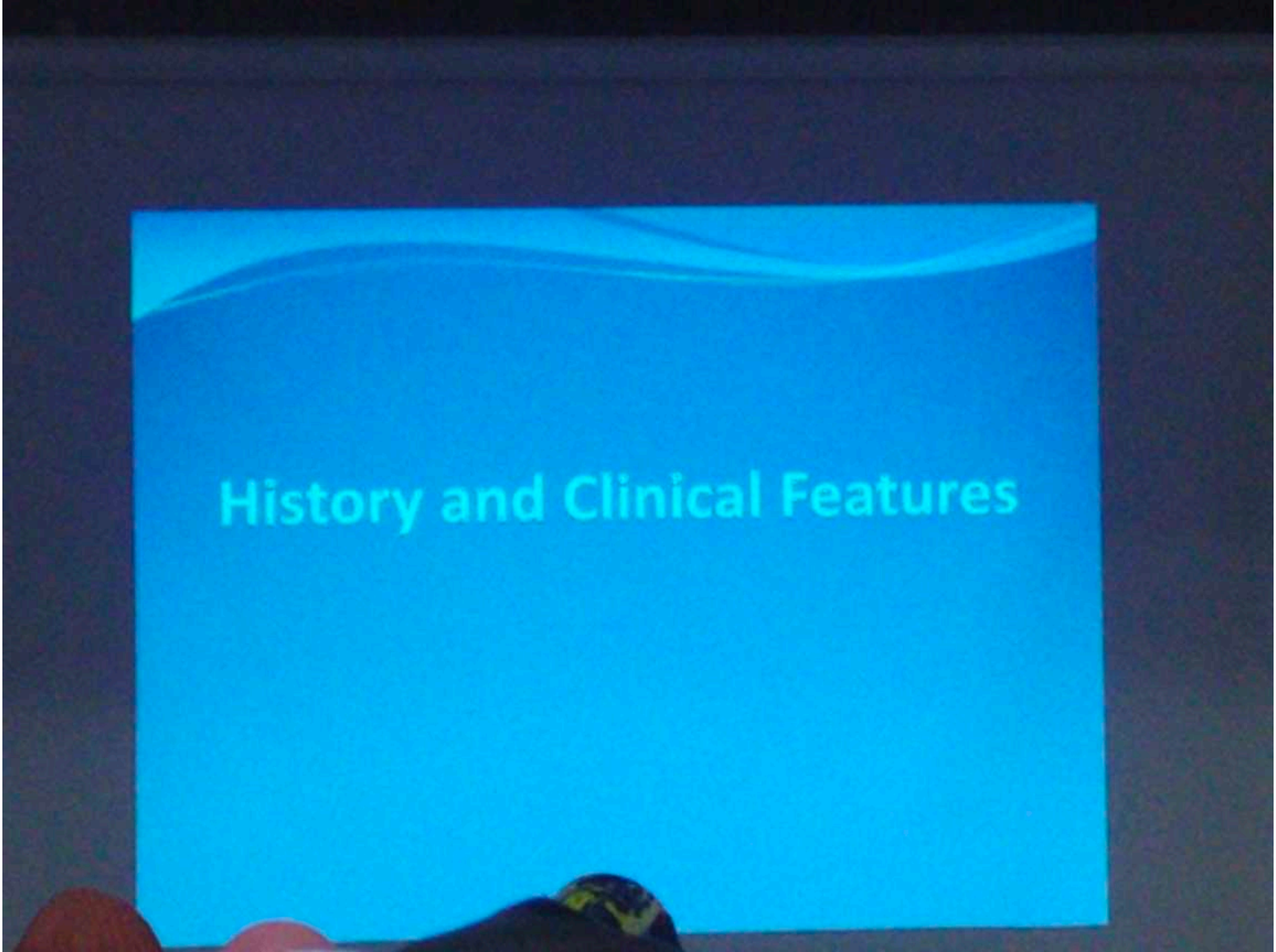



Internal triggers
Personality: thin built, emotionally sensitive, inability to express, suppressed feelings.
"If she cannot cry with tears, she wheezes and sneezes"


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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- Wheezing—(Lack of wheezing and a normal chest examination do not exclude asthma.)

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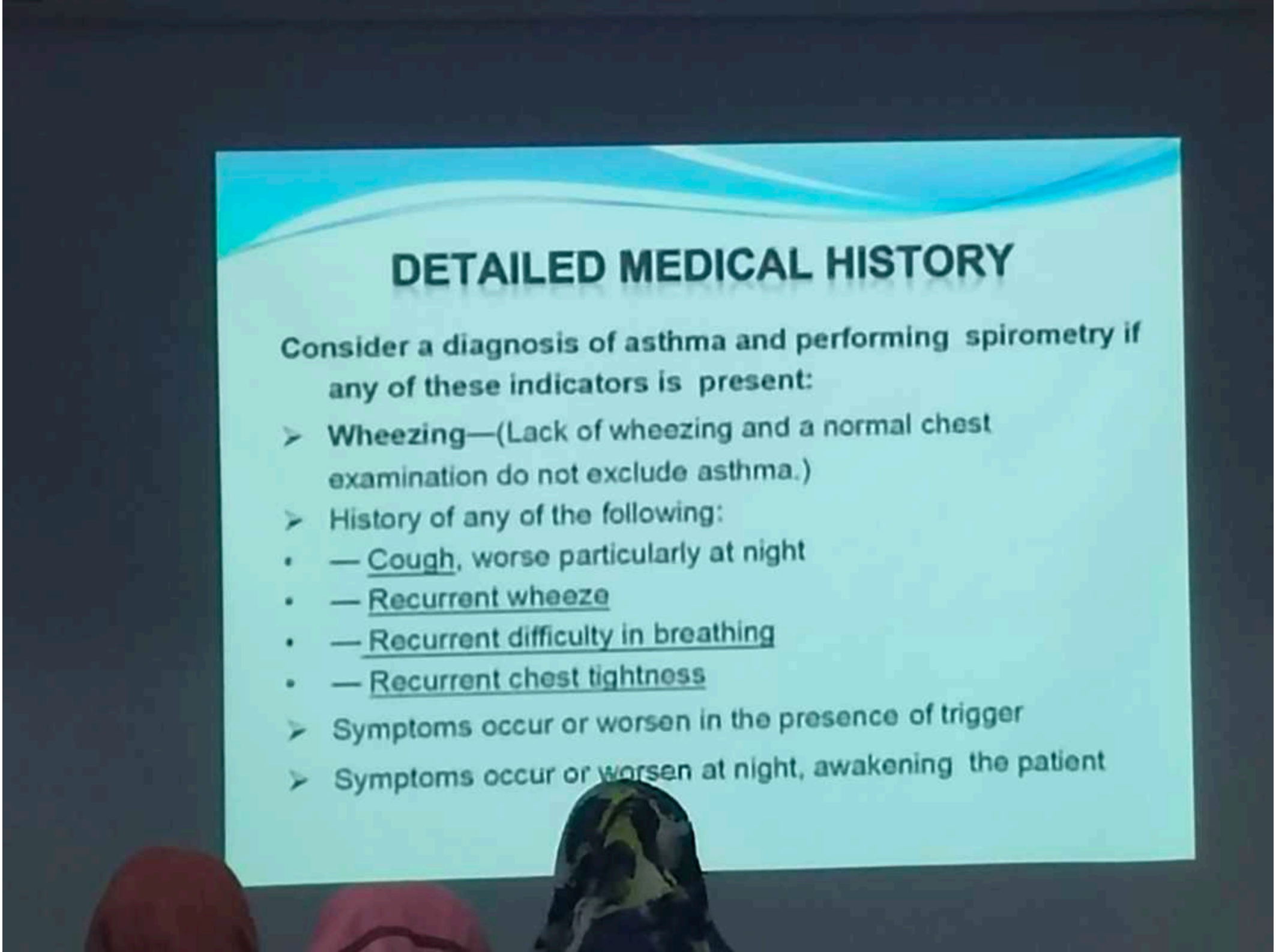
- **Wheezing**—(Lack of wheezing and a normal chest examination do not exclude asthma.)
- History of any of the following:
  - — Cough, worse particularly at night
  - — Recurrent wheeze
  - — Recurrent difficulty in breathing
  - — Recurrent chest tightness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History of any of the following:
— Cough, worse particularly at night
— 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)

- Hyp[illegible] / pu[illegible] oxsus

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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
- Hyp[illegible]sion / pulsus para[illegible]

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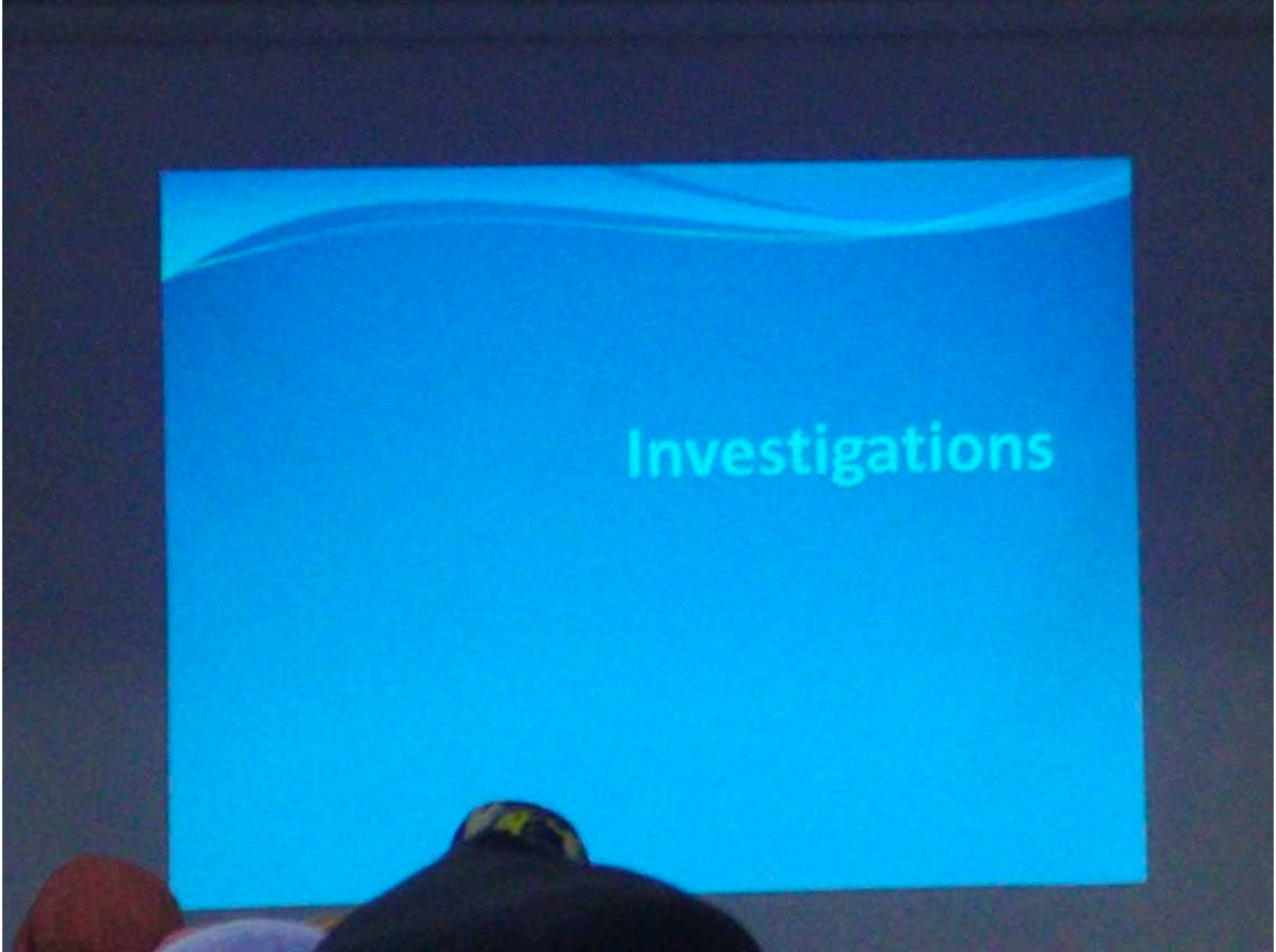
- Hypotension / pulsus


Investigations

INVESTIGATIONS

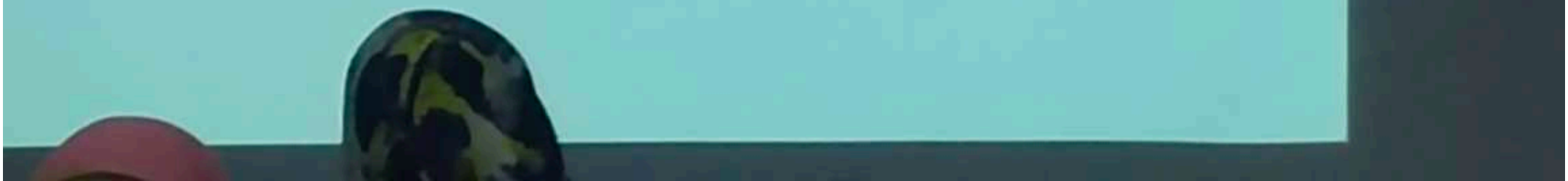
PULMONARY FUNCTION TESTS, FEV1, VC, PEF

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

OTHER INVESTIGATIONS:

- X-ray chest
- Arterial blood gases, pco2, po2
- Skin hypersensitivity tests
- CBC pedipheral 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
- Asprin induced asthma

Clinical Severity of Asthma

Symptoms

- Speech
- Night time awkenings
- Frequency of SOB

Signs

Clinical Severity of Asthma

Symptoms

- Speech
- Night time awkenings
- 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	≥80%	<20%	≤2 days per week
Mild persistent	>2 per week but not daily	3-4 per month	≥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 ≥ 25 breaths/min
- Heart rate ≥ 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

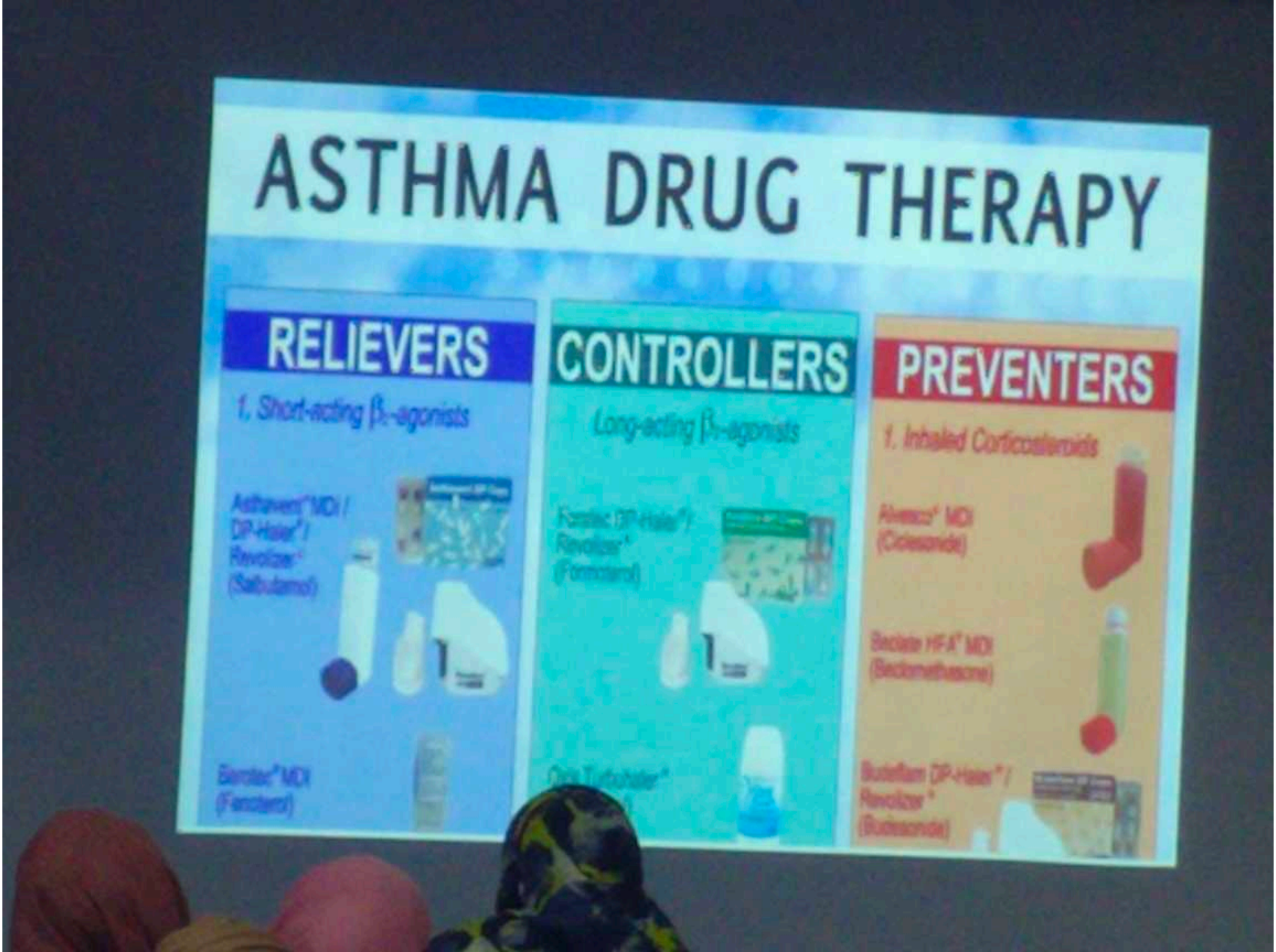
Near-fatal asthma

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

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 β2-agonists
CONTROLLERS
Long-acting β2-agonists
PREVENTERS
1. Inhaled Corticosteroids

Inhaler Devices Available in the United States

Metered Dose Inhaler

Flexhaler®

Handihaler®

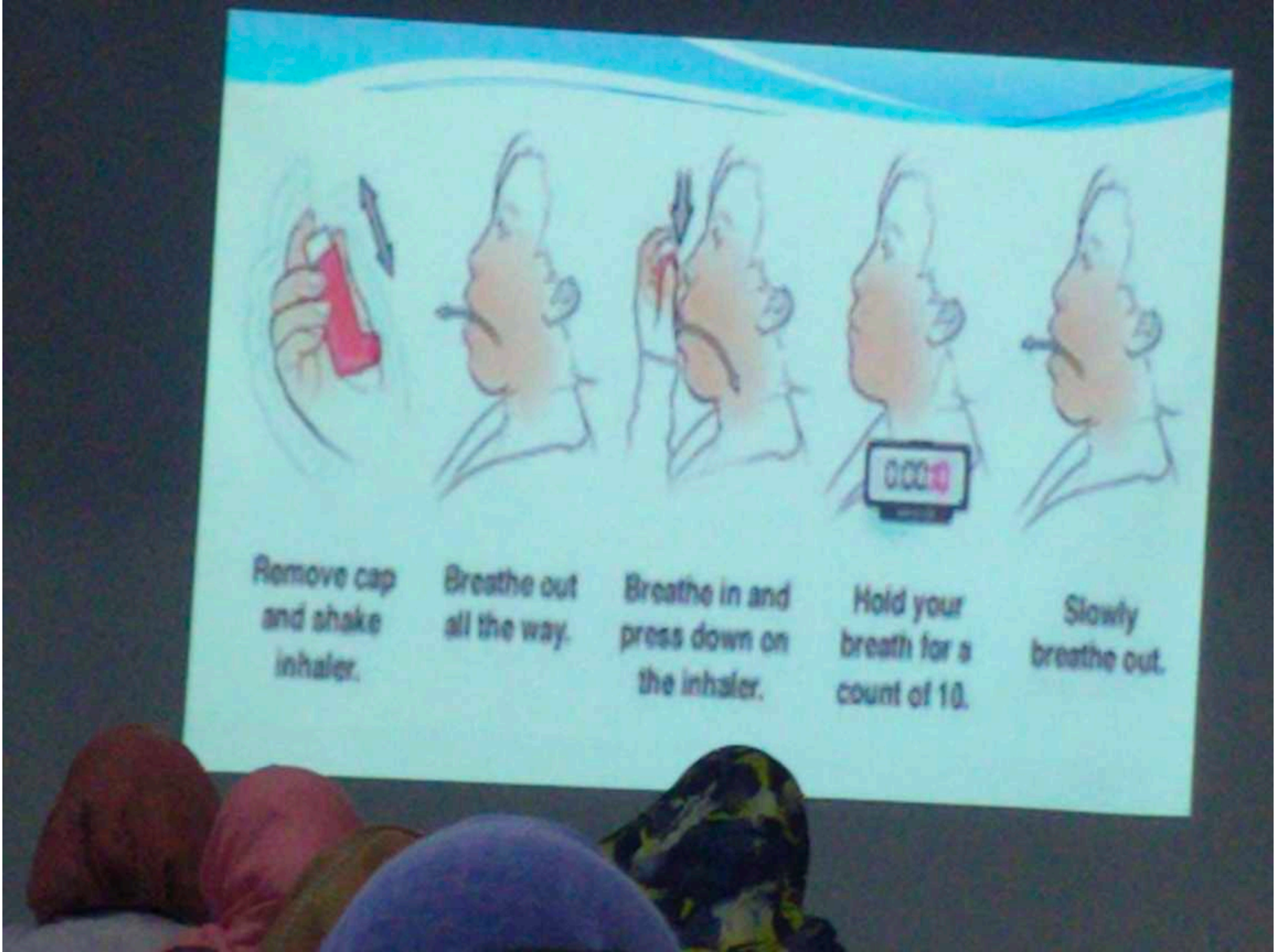
Aerolizer™

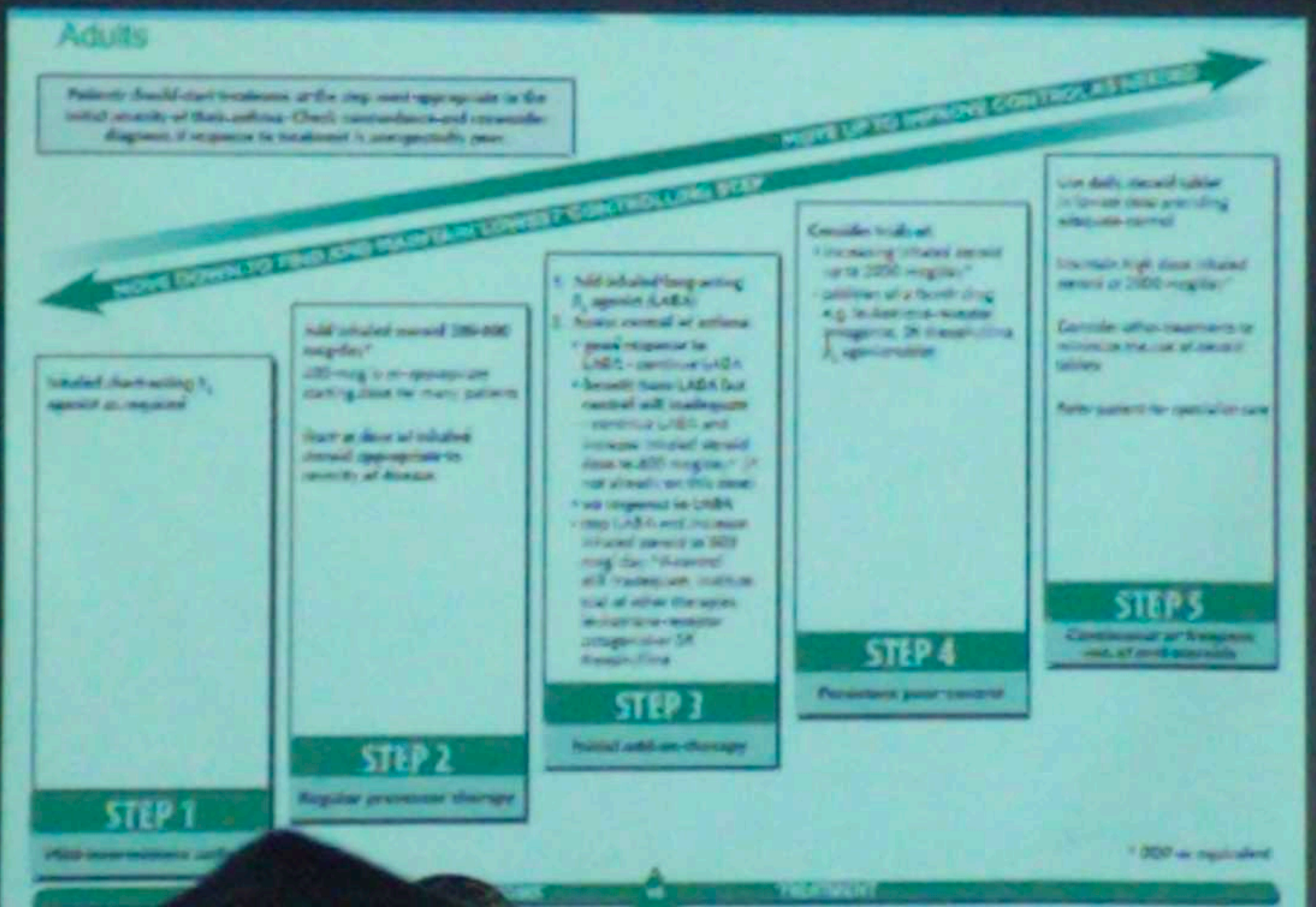
Twisthaler®

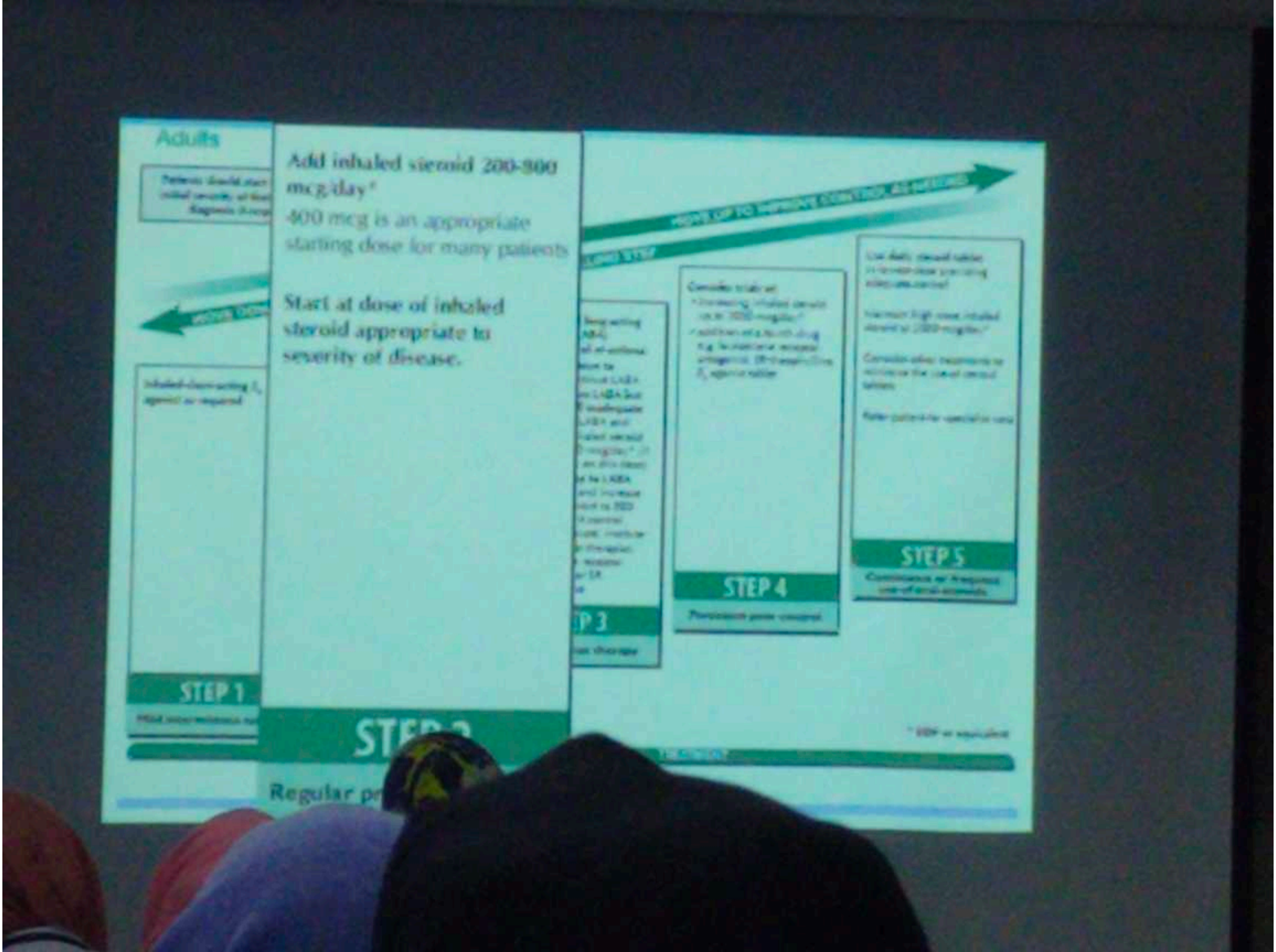
Spacer Device

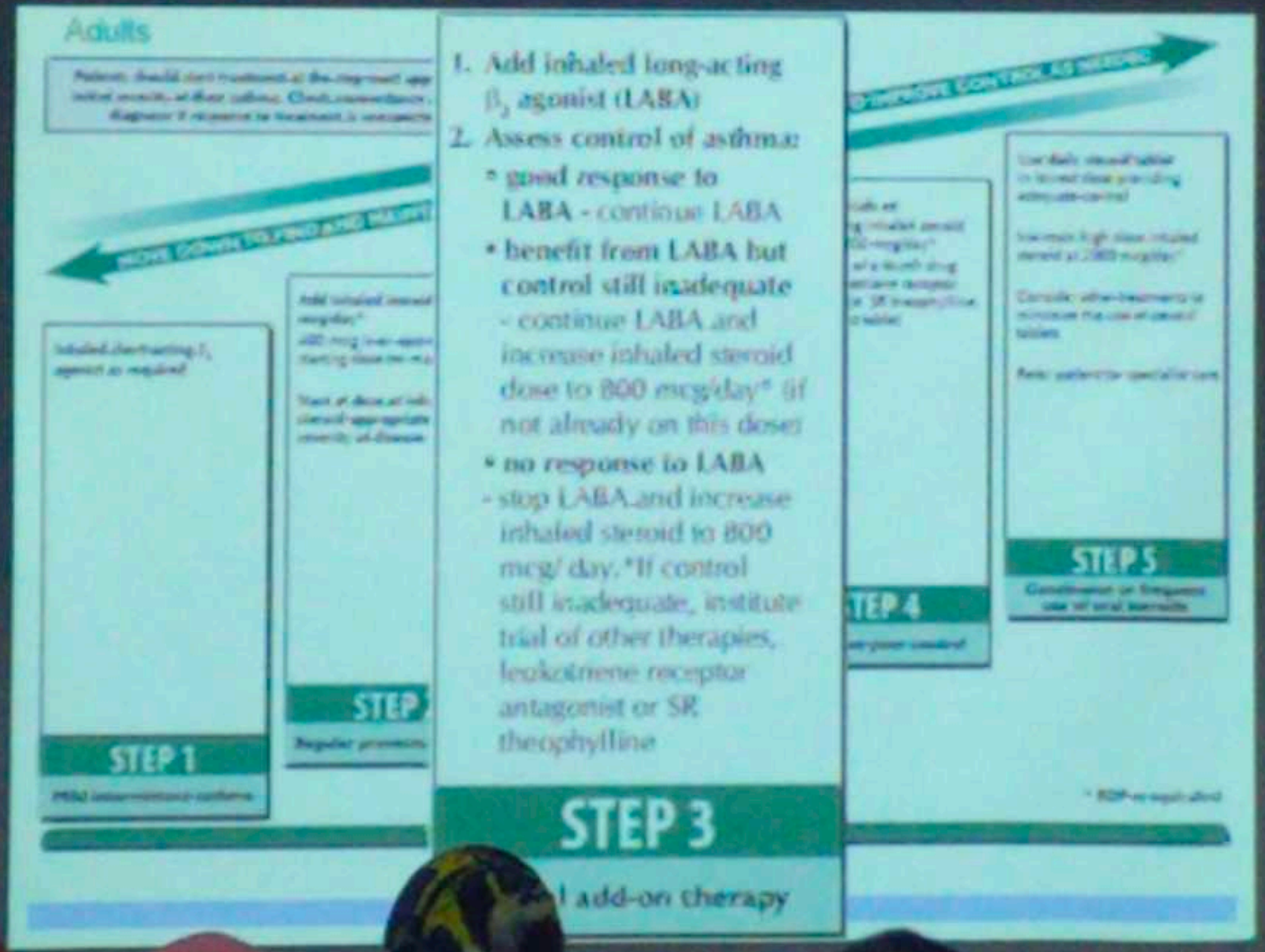
Diskus®

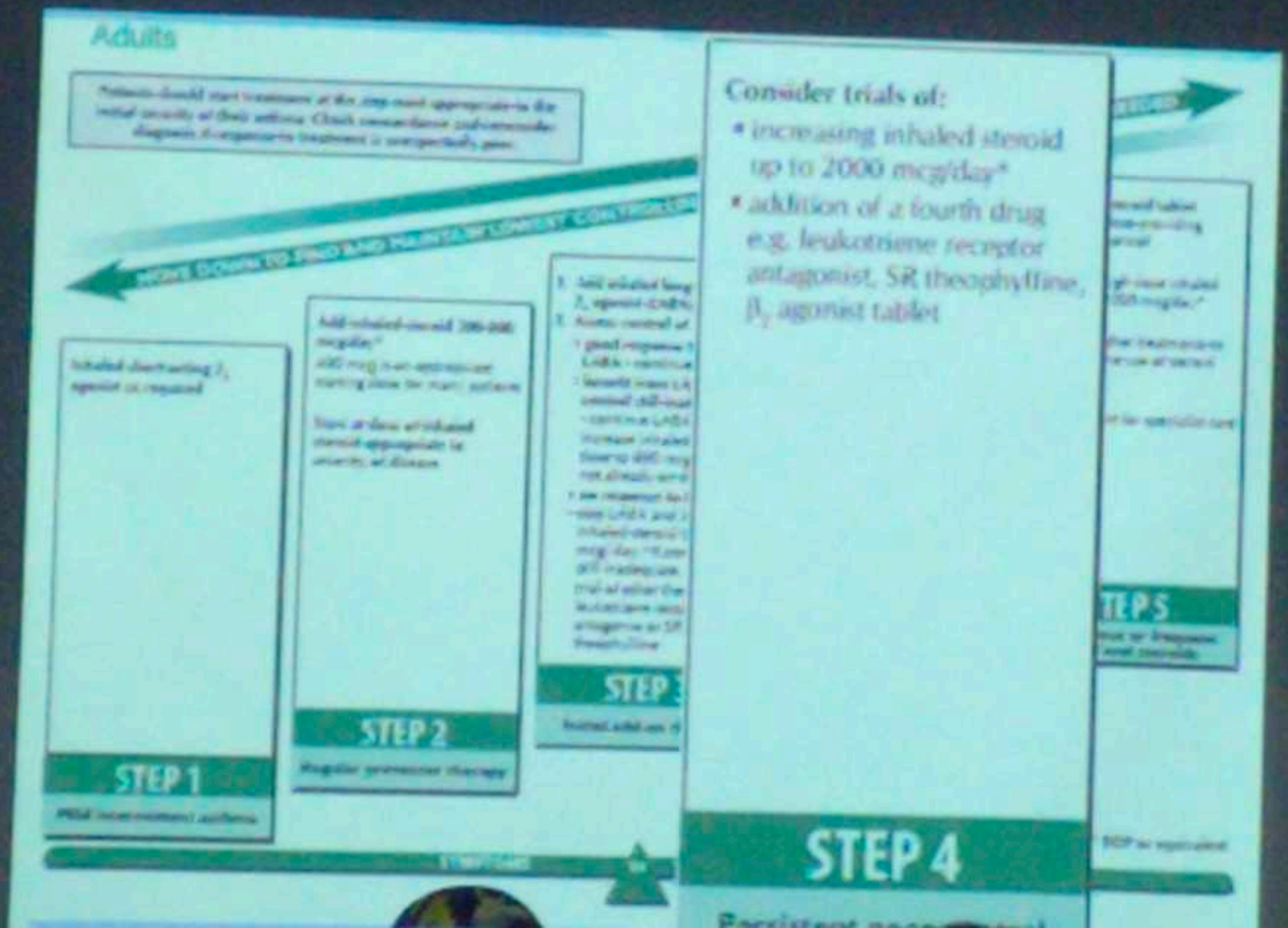
Small Volume Nebulizer

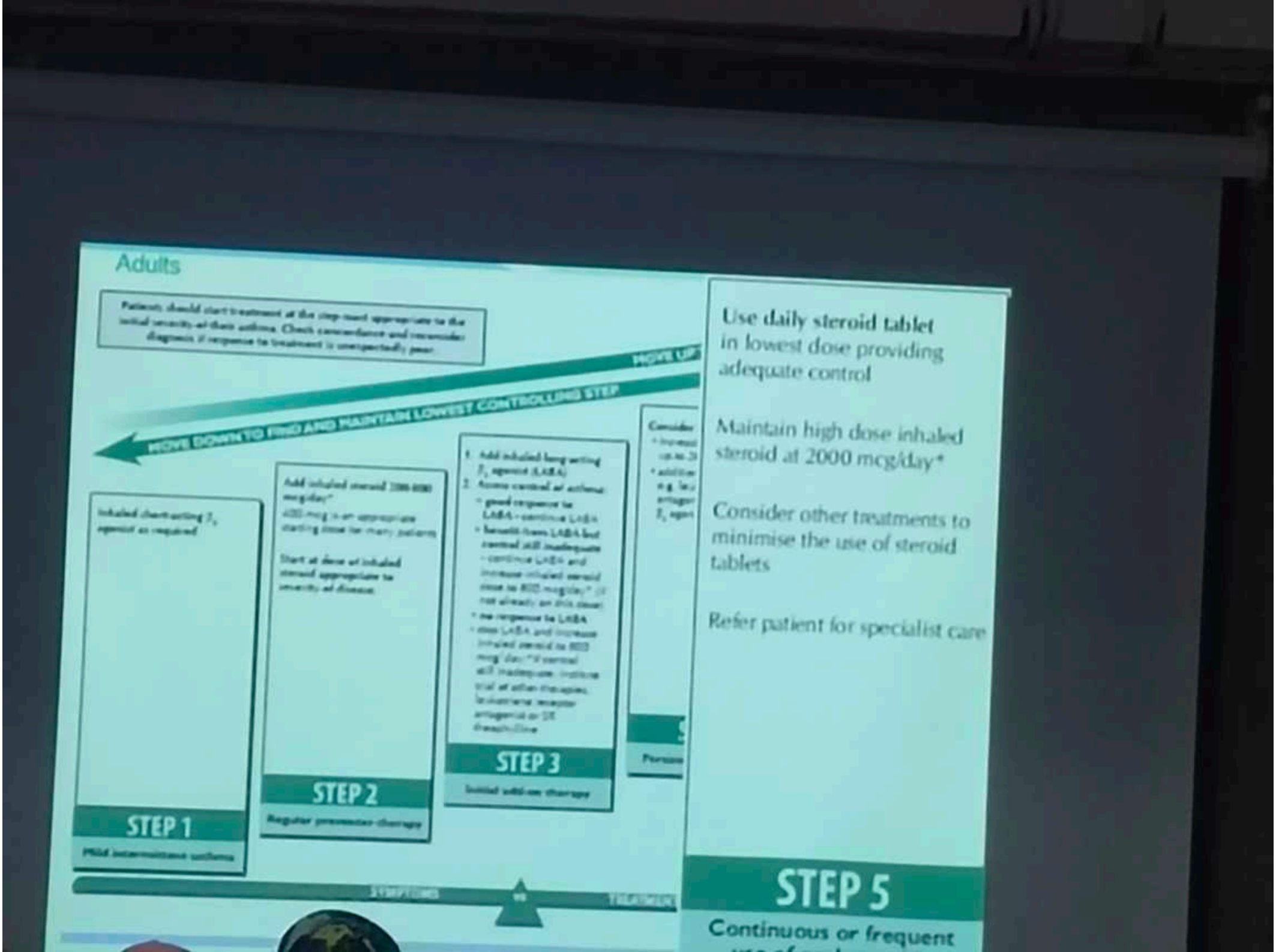

Remove cap and shake inhaler.
Breathe out all the way.
Breathe in and press down on the inhaler.
Hold your breath for a count of 10.
Slowly breathe out.

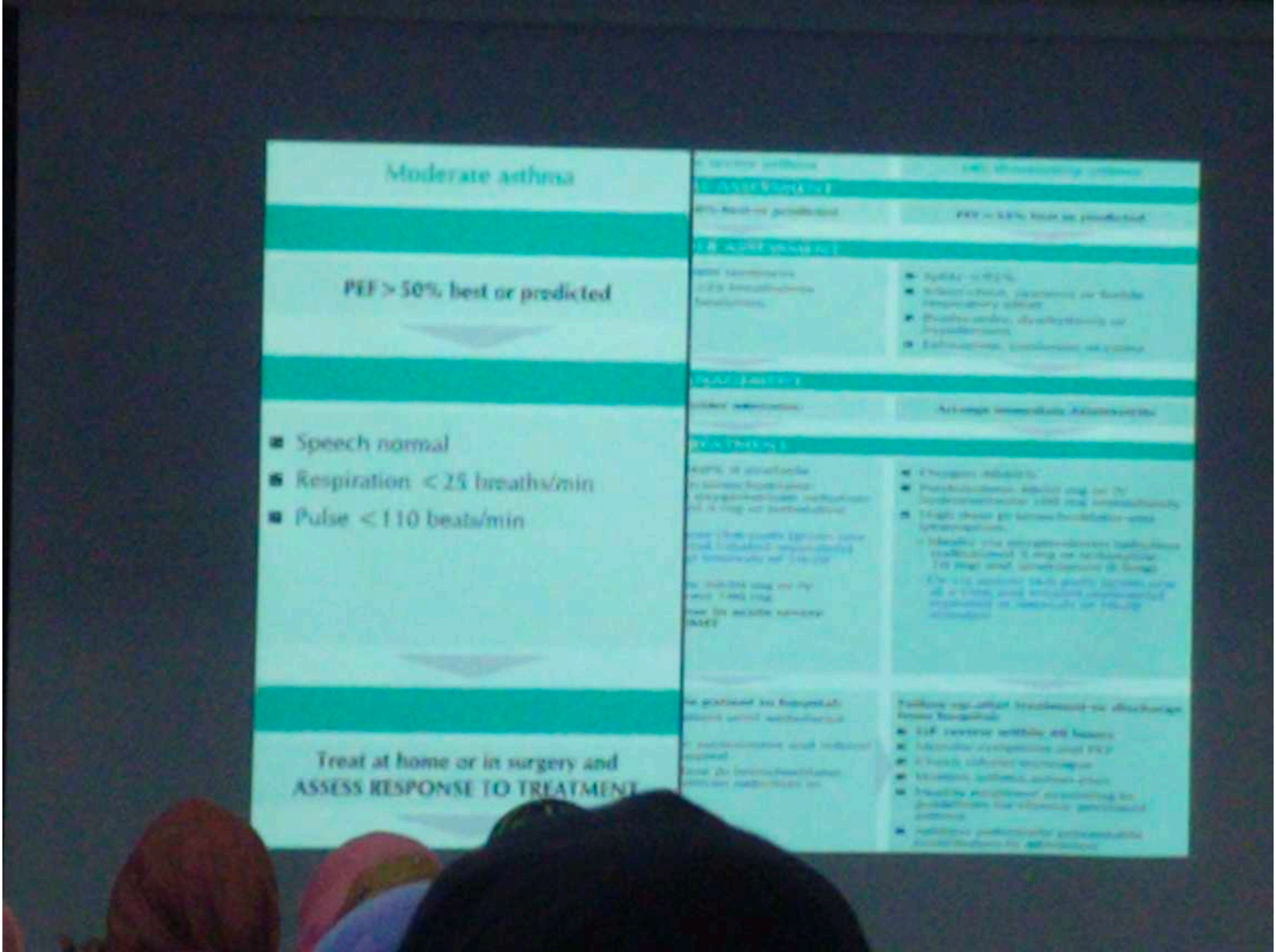

Adults
STEP 1
STEP 2
Regular preventer therapy
STEP 3
STEP 4
Persistent poor control
STEP 5

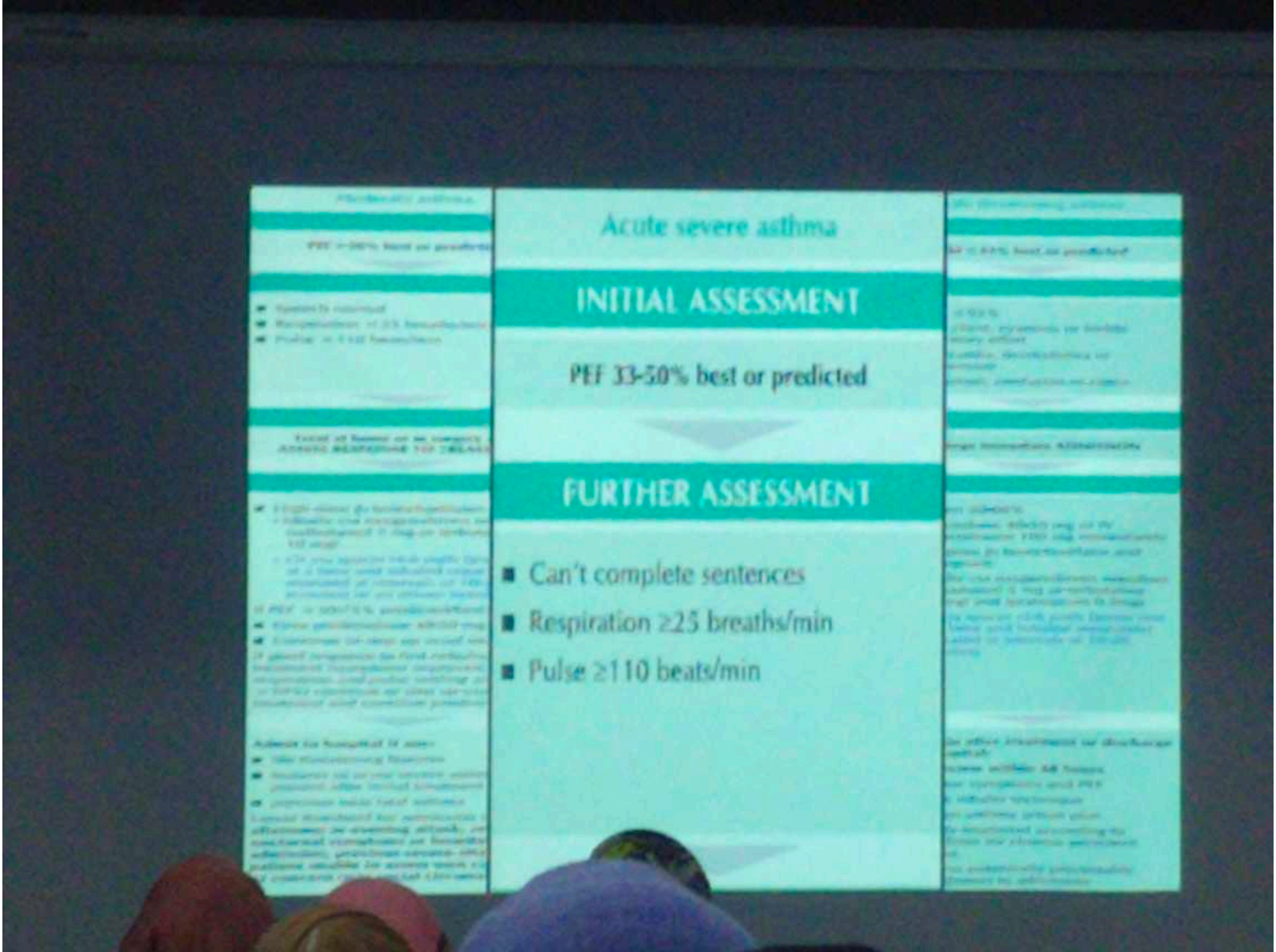

Adults
Add inhaled steroid 200-800 mcg/day*
400 mcg is an appropriate starting dose for many patients
Start at dose of inhaled steroid appropriate to severity of disease.
STEP 1
STEP 4
STEP 5

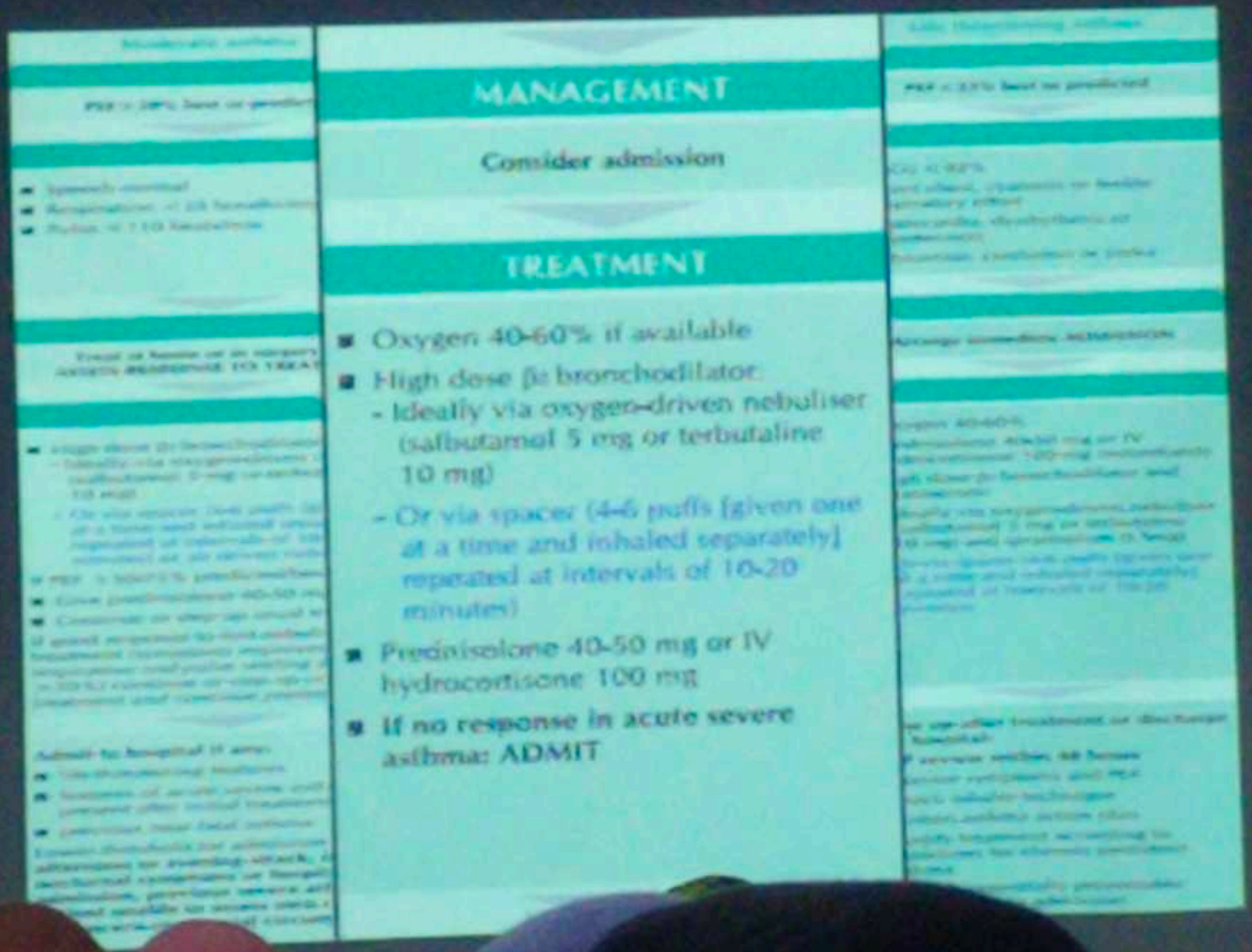

Adults
1. Add inhaled long-acting β_2 agonist (LABA)
2. Assess control of asthma:
• good response to LABA - continue LABA
• benefit from LABA but control still inadequate - continue LABA and increase inhaled steroid dose to 800 mcg/day* (if not already on this dose)
• no response to LABA - stop LABA and increase inhaled steroid to 800 mcg/ day. *If control still inadequate, institute trial of other therapies, leukotriene receptor antagonist or SR theophylline
STEP 1
STEP 3
STEP 5


Adults
STEP 1
STEP 2
STEP 4
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 5


Adults
MOVE UP
MOVE DOWN TO FIND AND MAINTAIN LOWEST CONTROLLING STEP
STEP 1
STEP 2
STEP 3
STEP 5
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
Continuous or frequent


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


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

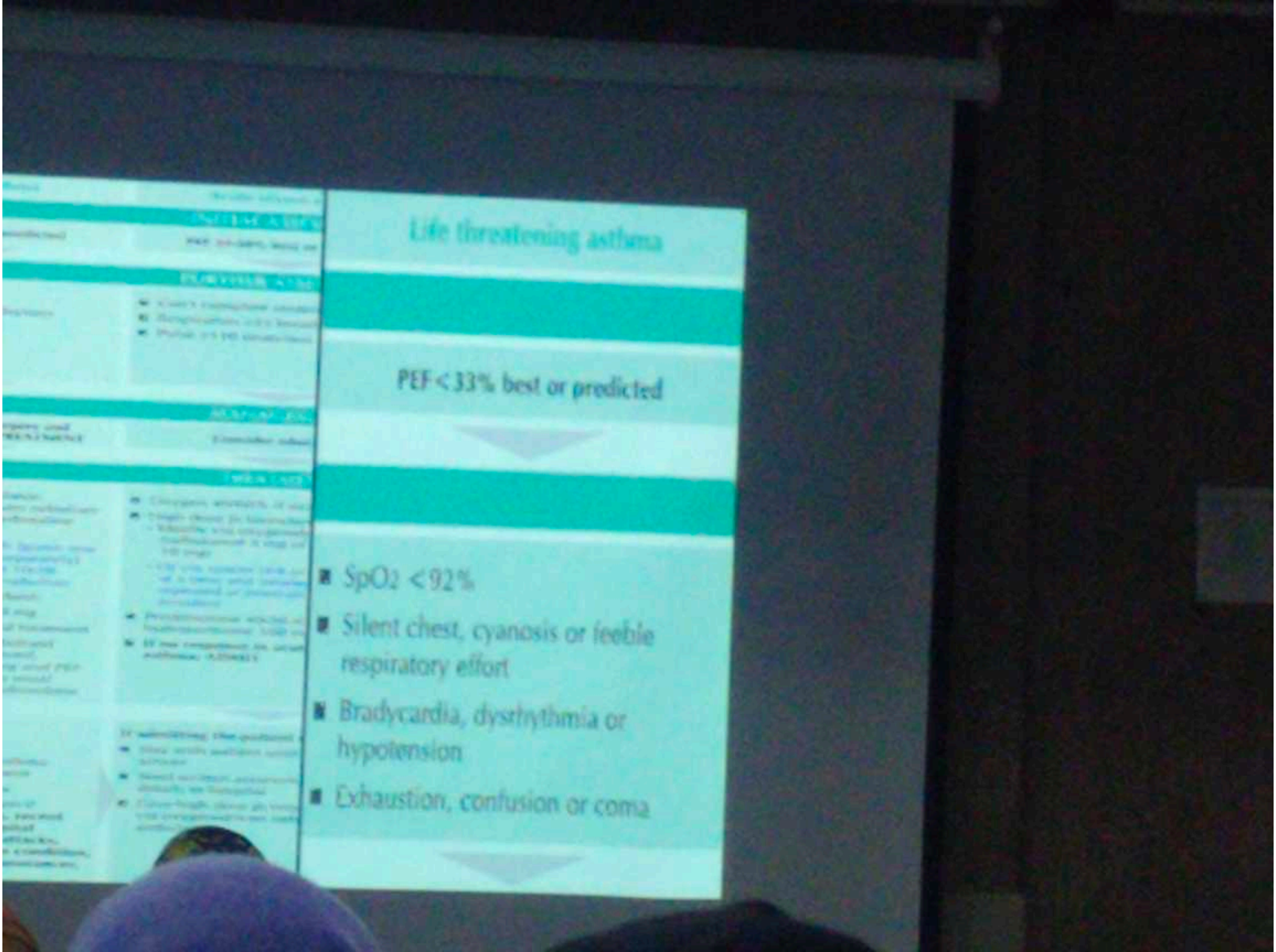


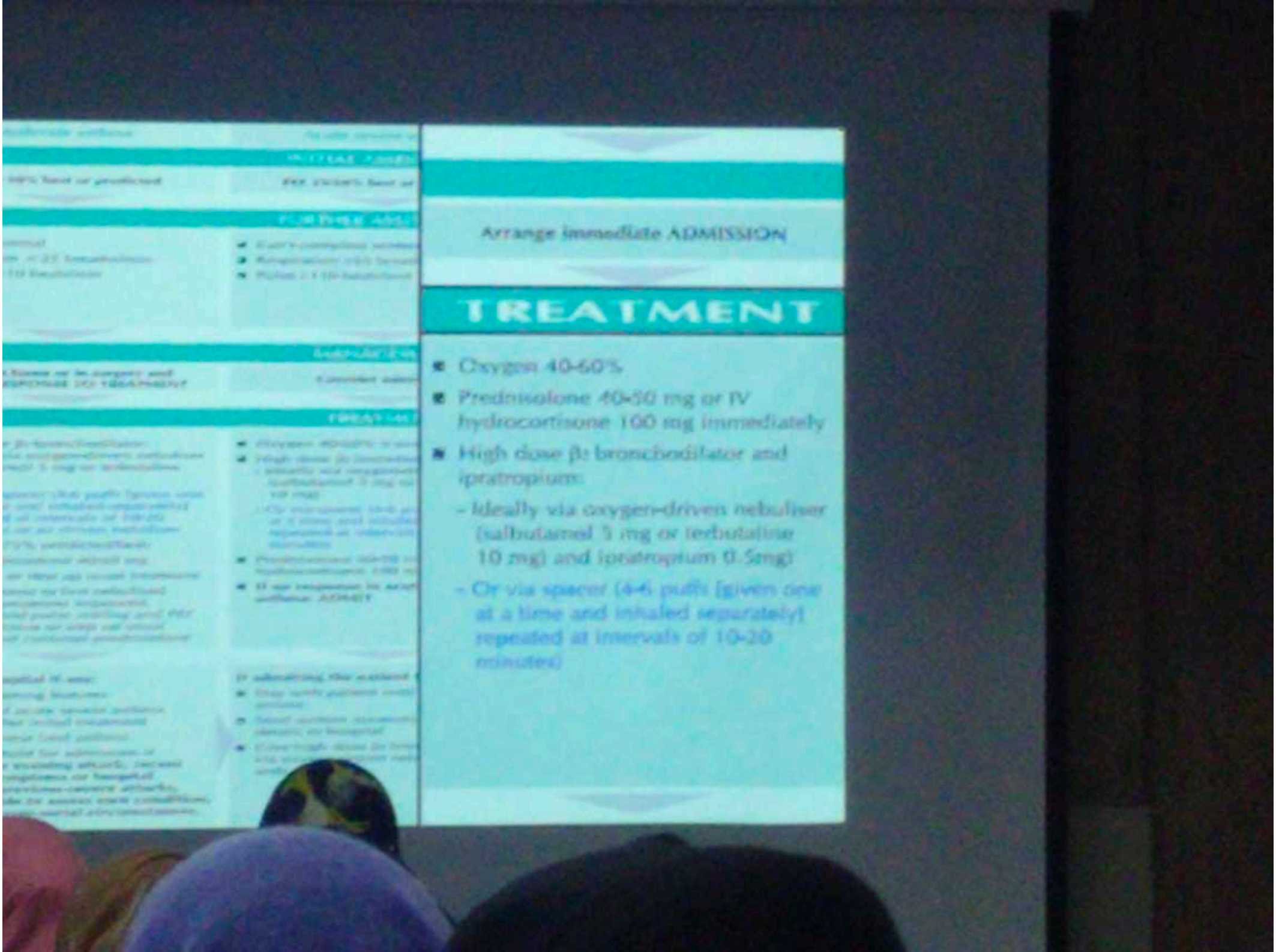
MANAGEMENT

Consider admission

TREATMENT

- Oxygen 40-60% if available
- High dose β2 bronchodilator:
  - Ideally via oxygen-driven nebuliser (salbutamol 5 mg or terbutaline 10 mg)
  - Or via spacer (4-6 puffs [given one at a time and inhaled separately] repeated at intervals of 10-20 minutes)
- Prednisolone 40-50 mg or IV hydrocortisone 100 mg
- **If no response in acute severe asthma: ADMIT**


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


Arrange immediate ADMISSION
TREATMENT
Oxygen 40-60%
Prednisolone 40-50 mg or IV hydrocortisone 100 mg immediately
High dose β2 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)