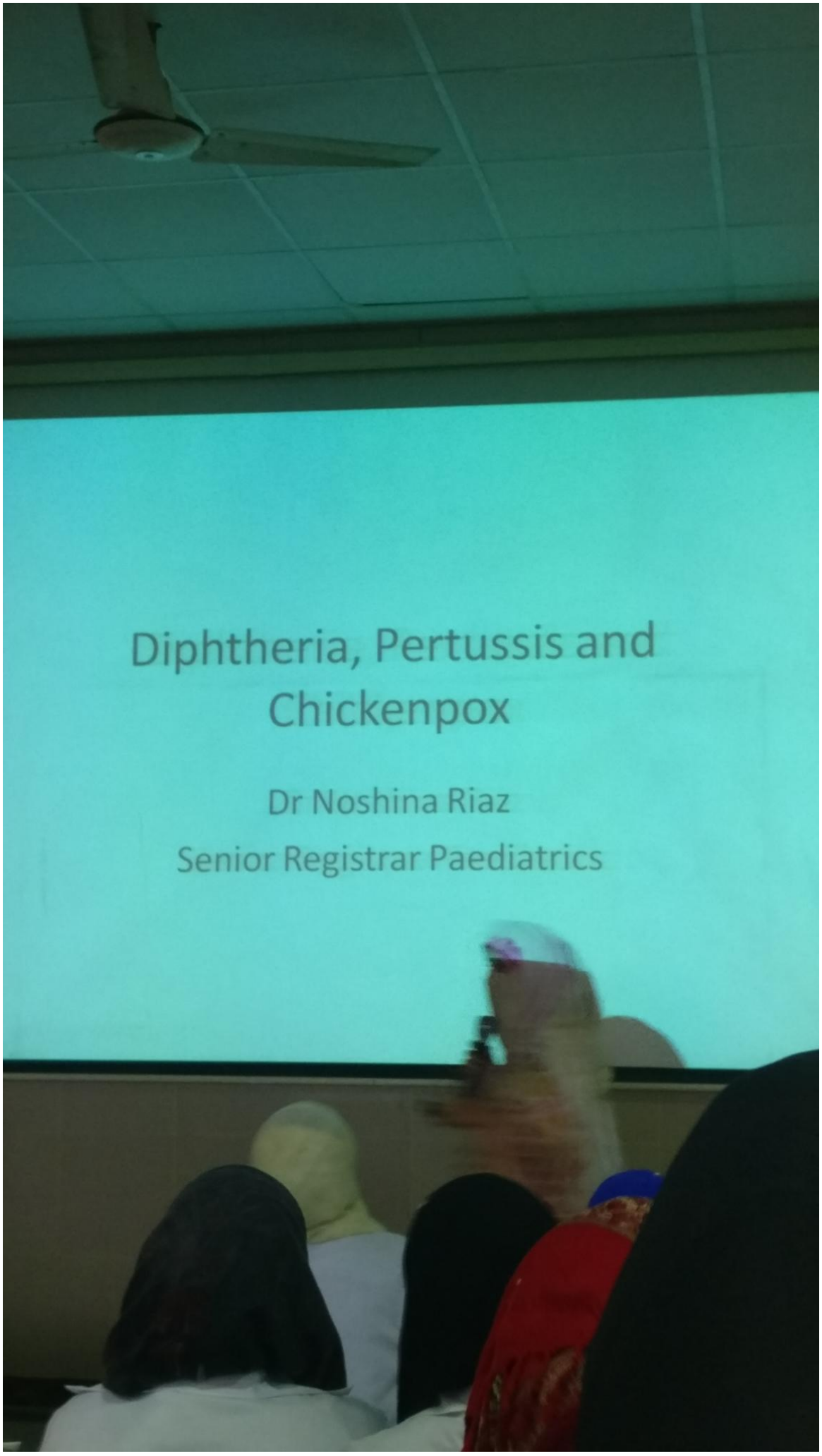
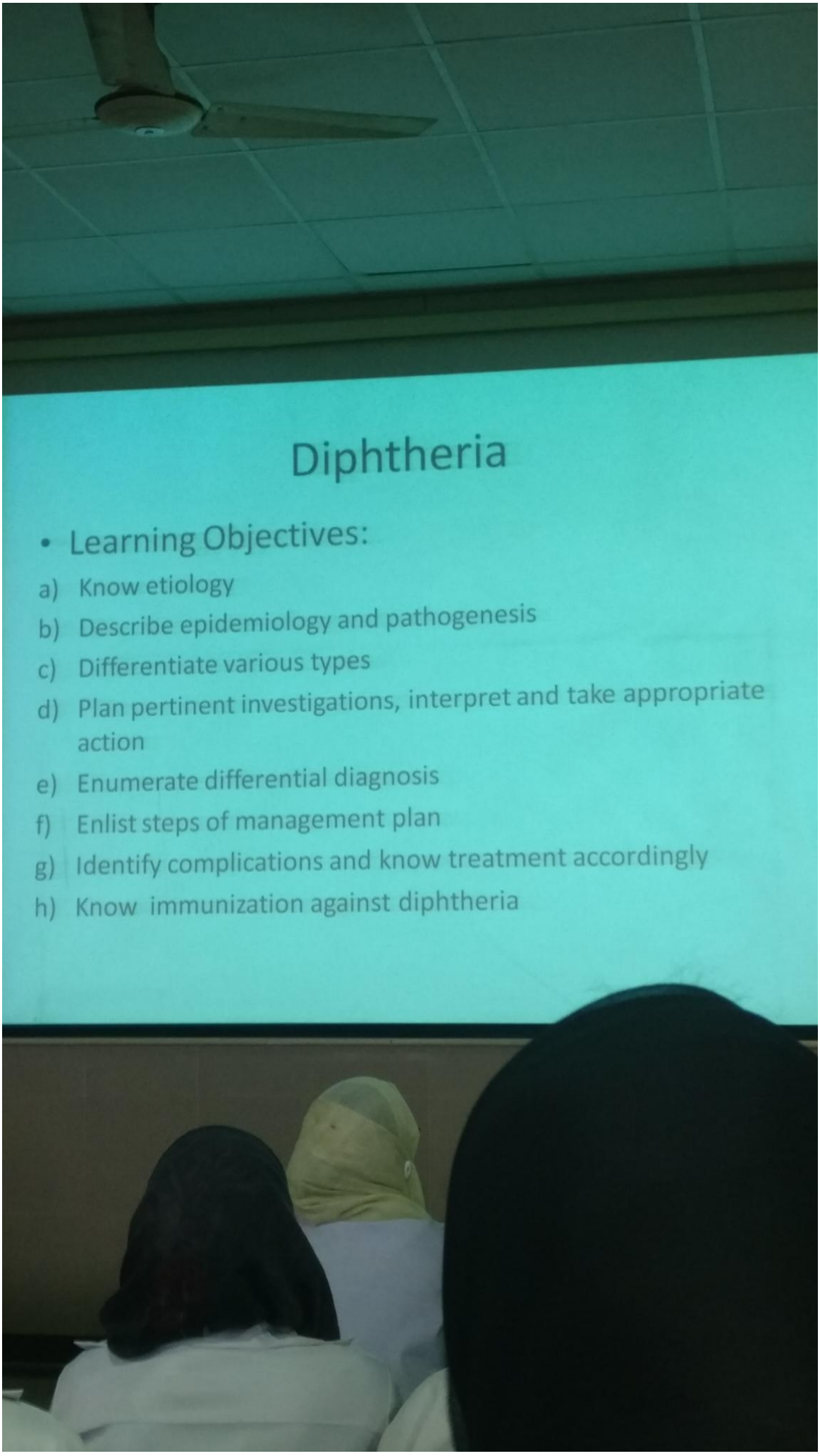
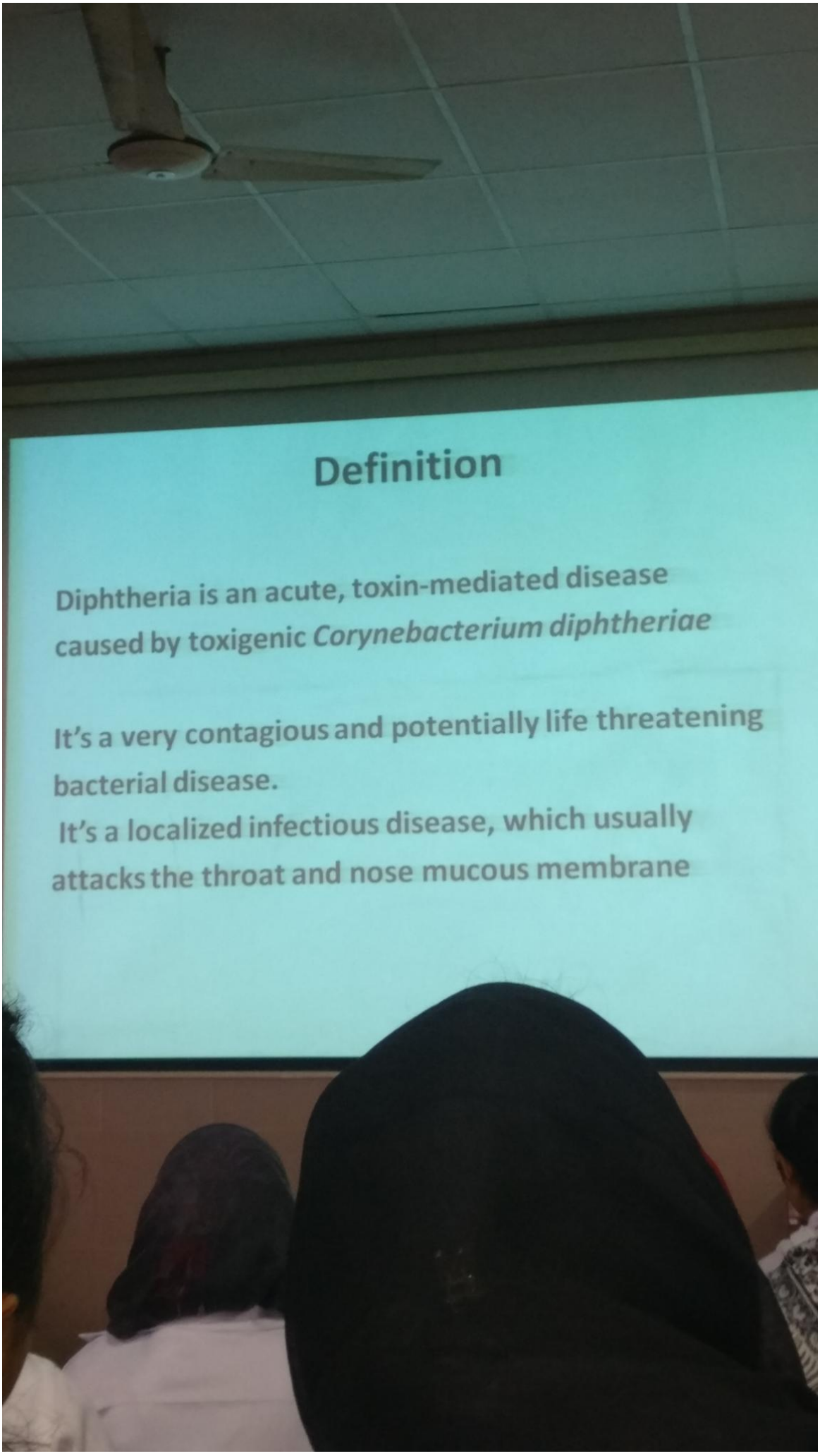
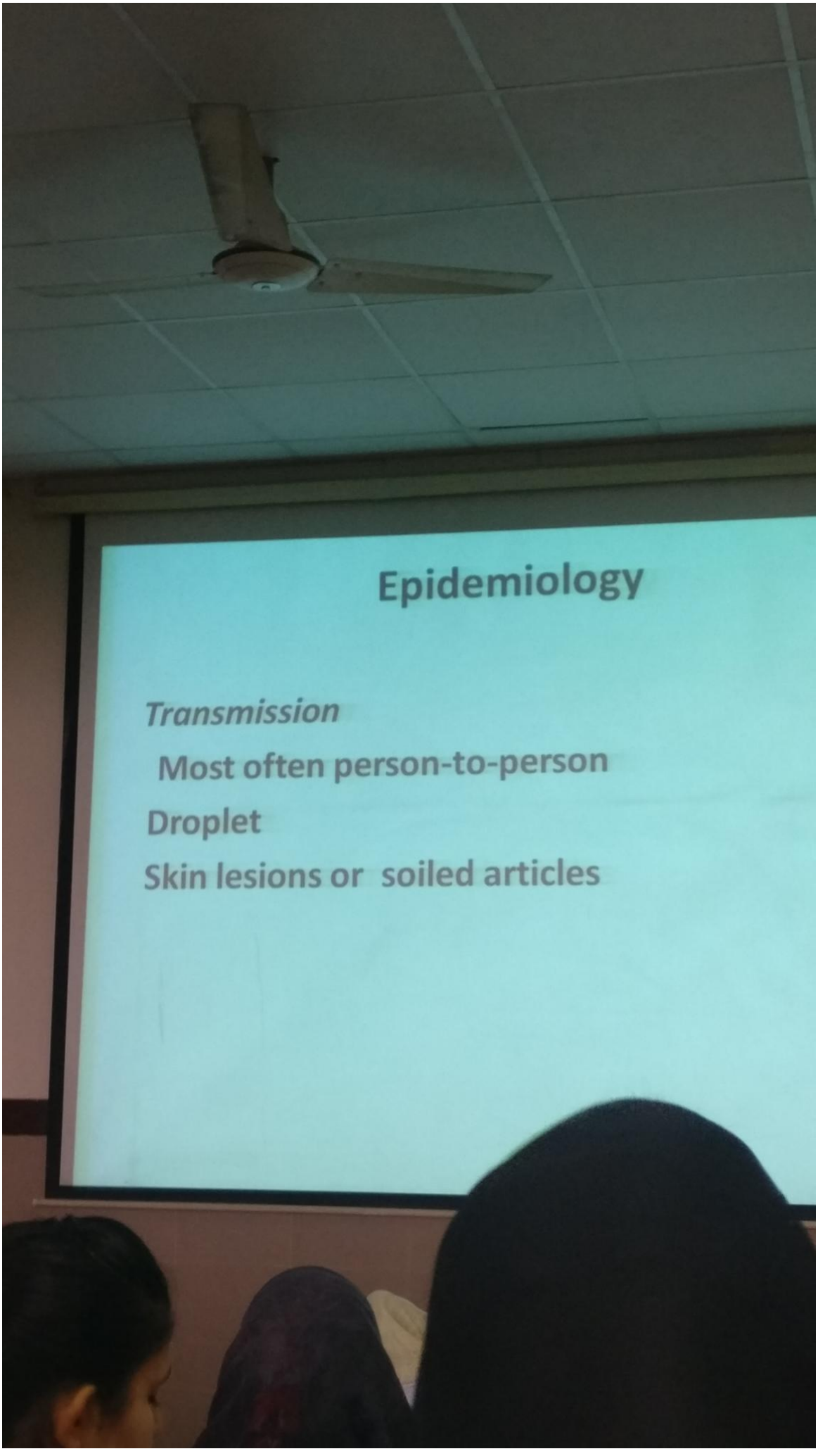
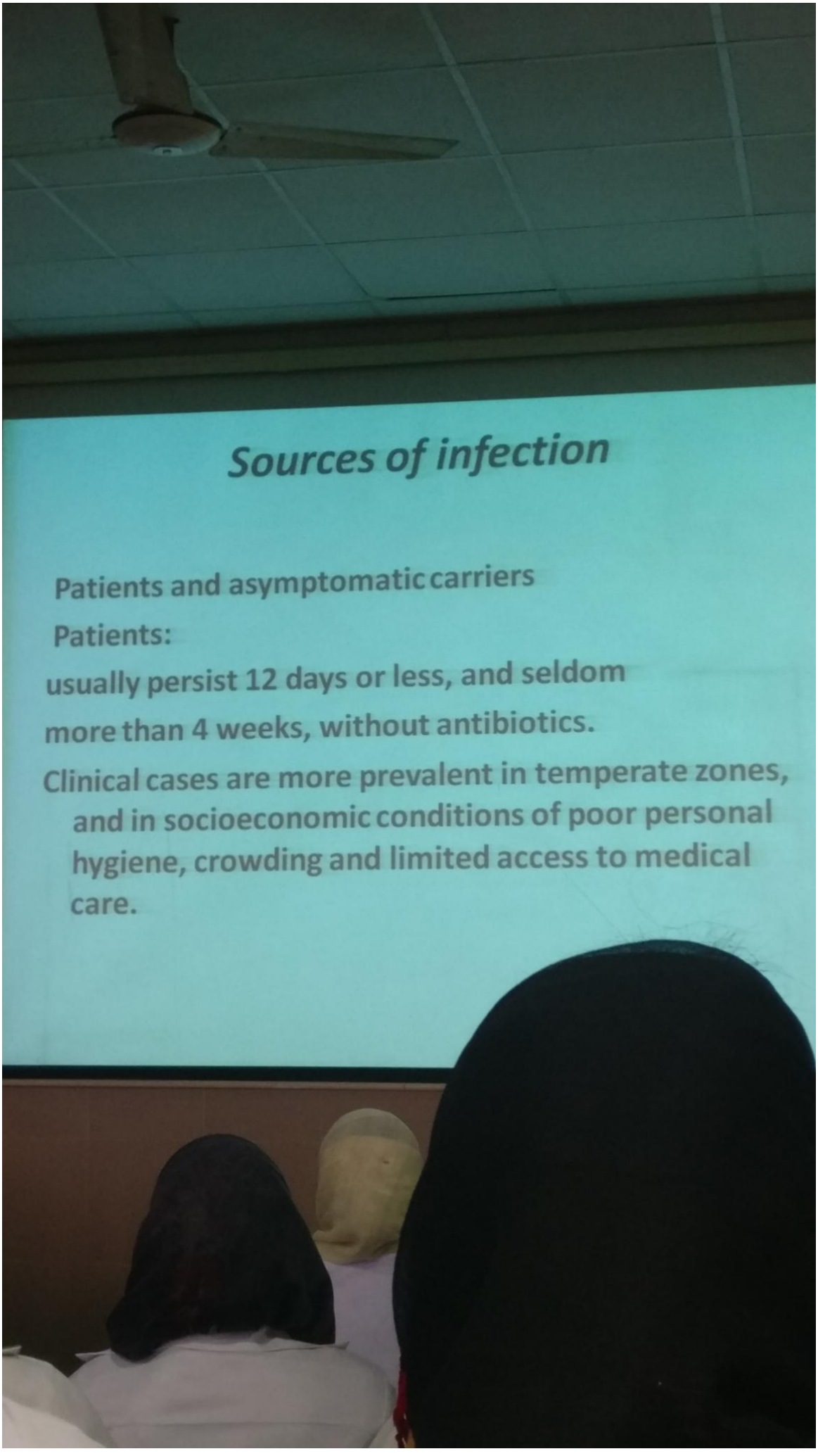
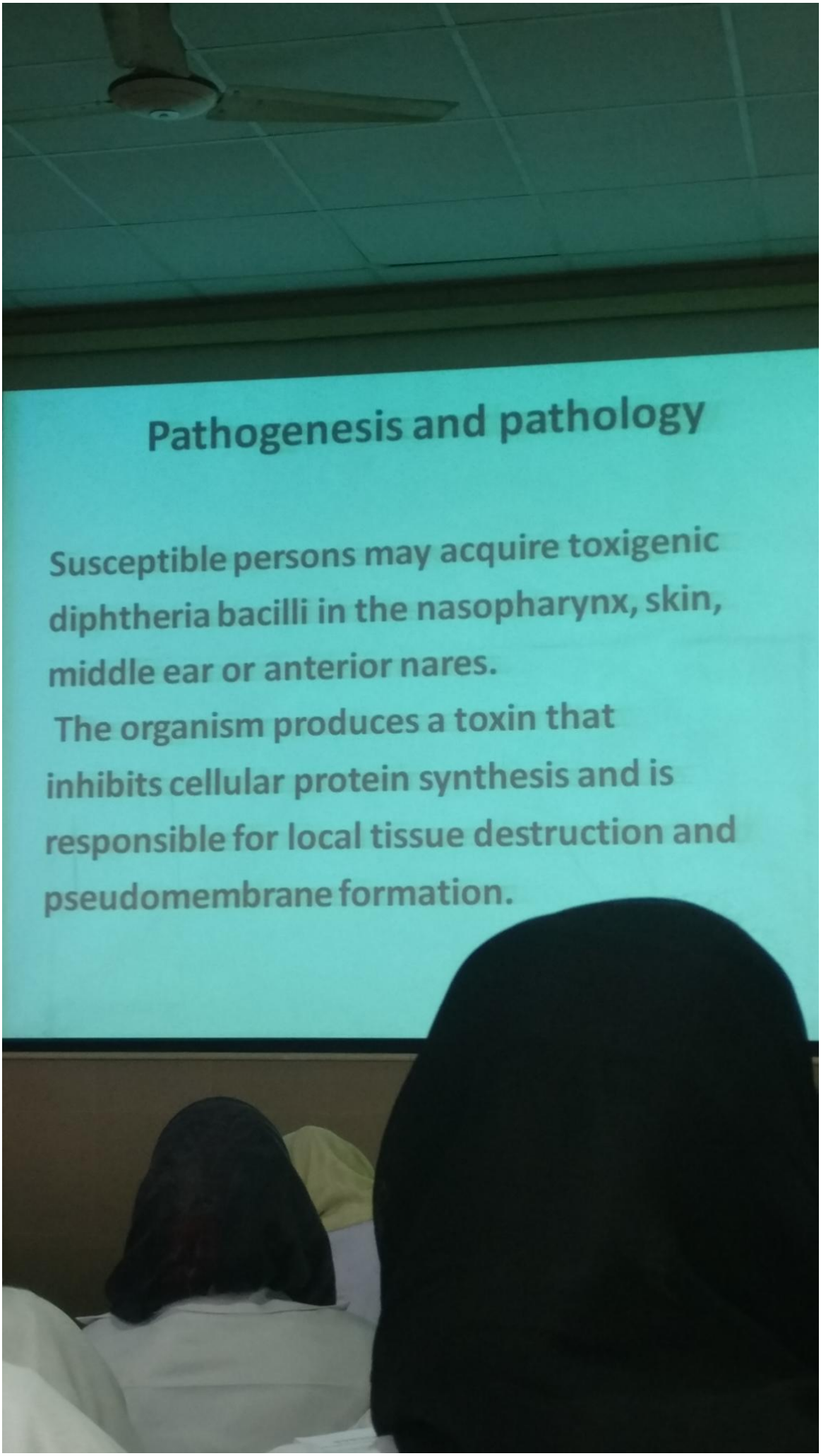

Diphtheria, Pertussis and Chickenpox
Dr Noshina Riaz
Senior Registrar Paediatrics

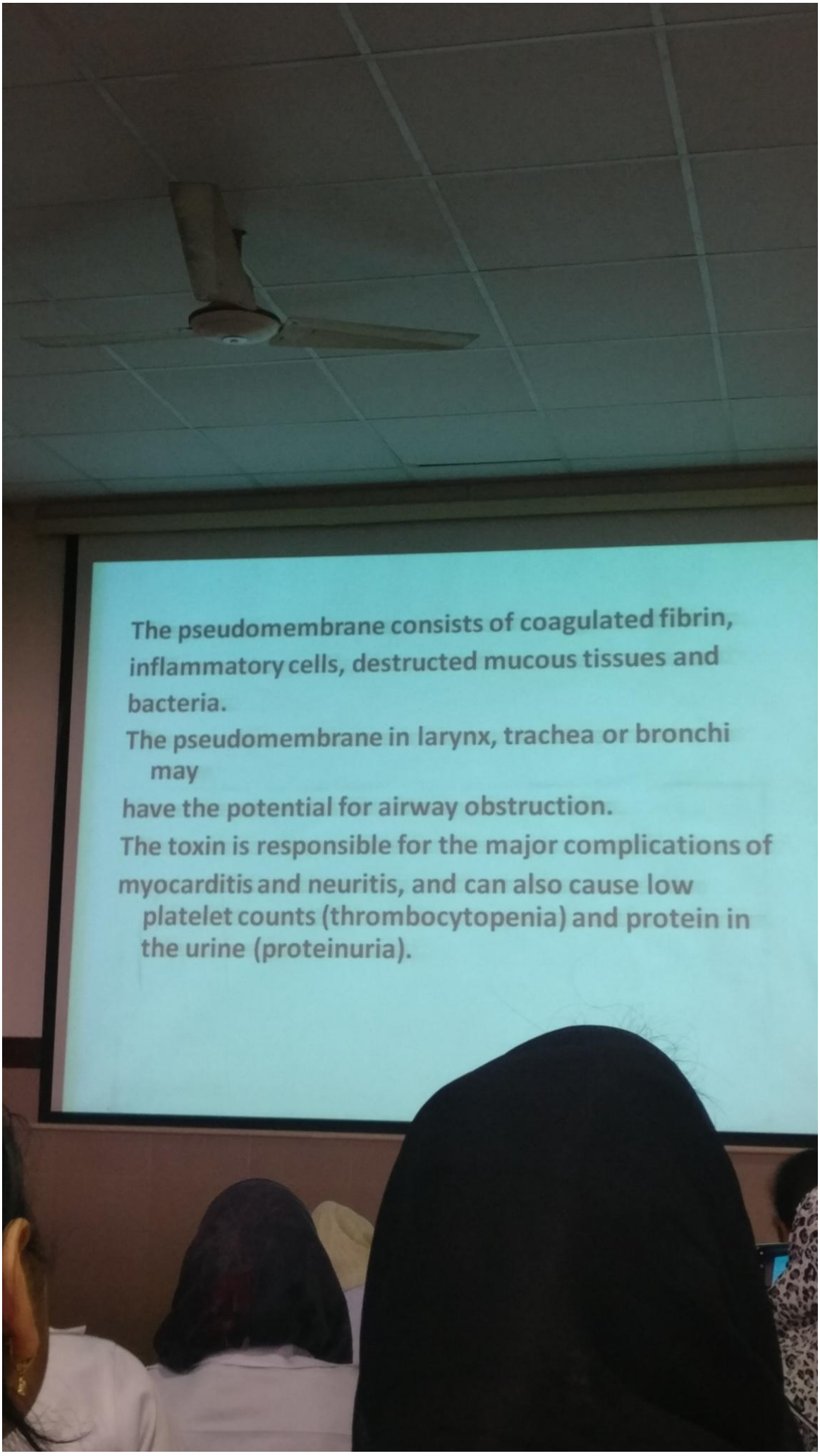

Diphtheria
• Learning Objectives:
a) Know etiology
b) Describe epidemiology and pathogenesis
c) Differentiate various types
d) Plan pertinent investigations, interpret and take appropriate action
e) Enumerate differential diagnosis
f) Enlist steps of management plan
g) Identify complications and know treatment accordingly
h) Know immunization against diphtheria

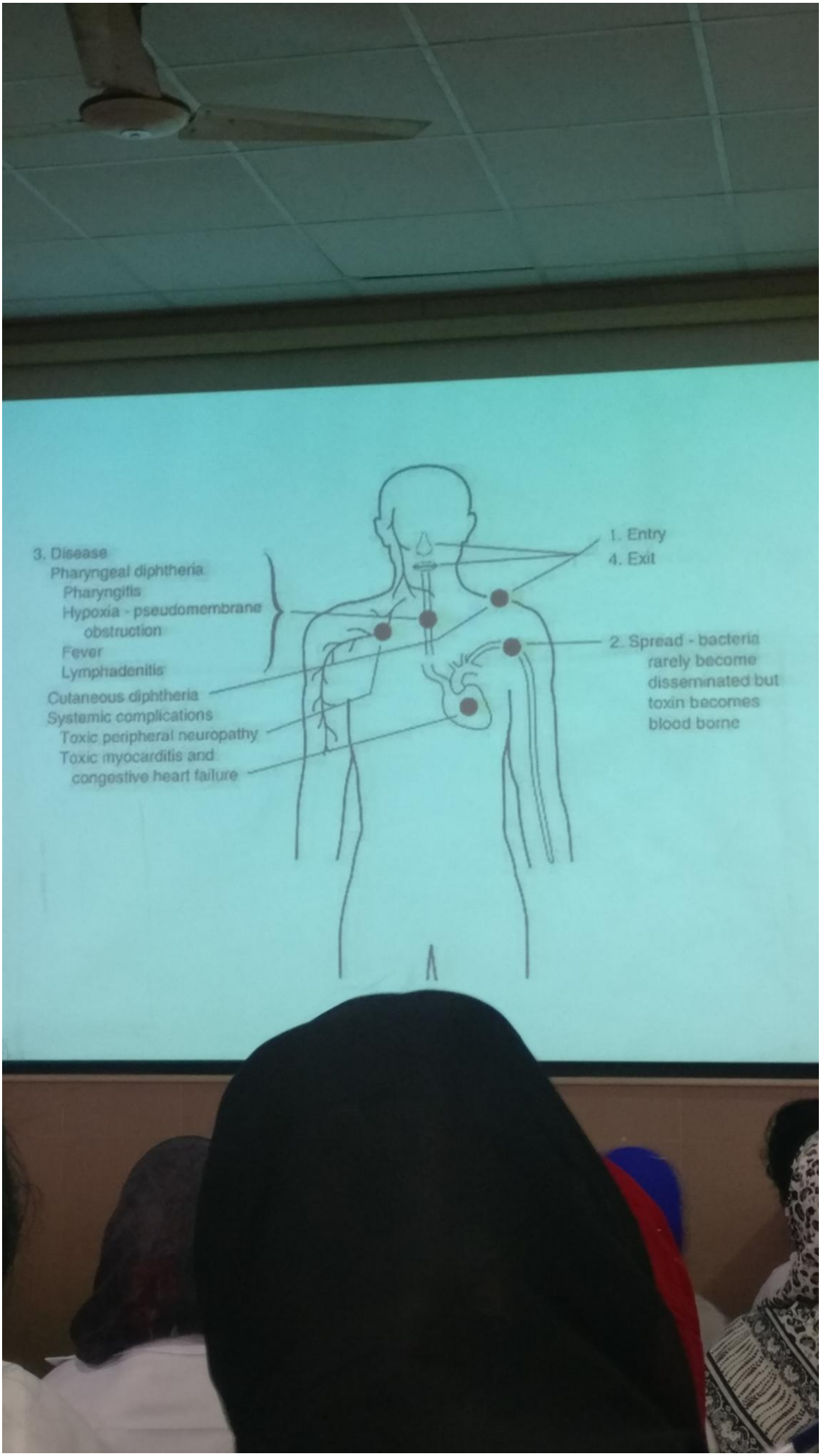

Definition
Diphtheria is an acute, toxin-mediated disease caused by toxigenic *Corynebacterium diphtheriae*
It's a very contagious and potentially life threatening bacterial disease.
It's a localized infectious disease, which usually attacks the throat and nose mucous membrane


Epidemiology
Transmission
Most often person-to-person
Droplet
Skin lesions or soiled articles

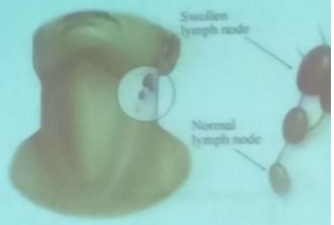

Sources of infection
Patients and asymptomatic carriers
Patients:
usually persist 12 days or less, and seldom
more than 4 weeks, without antibiotics.
Clinical cases are more prevalent in temperate zones,
and in socioeconomic conditions of poor personal
hygiene, crowding and limited access to medical
care.


Pathogenesis and pathology
Susceptible persons may acquire toxigenic diphtheria bacilli in the nasopharynx, skin, middle ear or anterior nares.
The organism produces a toxin that inhibits cellular protein synthesis and is responsible for local tissue destruction and pseudomembrane formation.


The pseudomembrane consists of coagulated fibrin, inflammatory cells, destructed mucous tissues and bacteria.
The pseudomembrane in larynx, trachea or bronchi may
have the potential for airway obstruction.
The toxin is responsible for the major complications of myocarditis and neuritis, and can also cause low platelet counts (thrombocytopenia) and protein in the urine (proteinuria).


3. Disease
Pharyngeal diphtheria
Pharyngitis
Hypoxia - pseudomembrane obstruction
Fever
Lymphadenitis
Cutaneous diphtheria
Systemic complications
Toxic peripheral neuropathy
Toxic myocarditis and congestive heart failure
1. Entry
4. Exit
2. Spread - bacteria rarely become disseminated but toxin becomes blood borne

Signs and symptoms

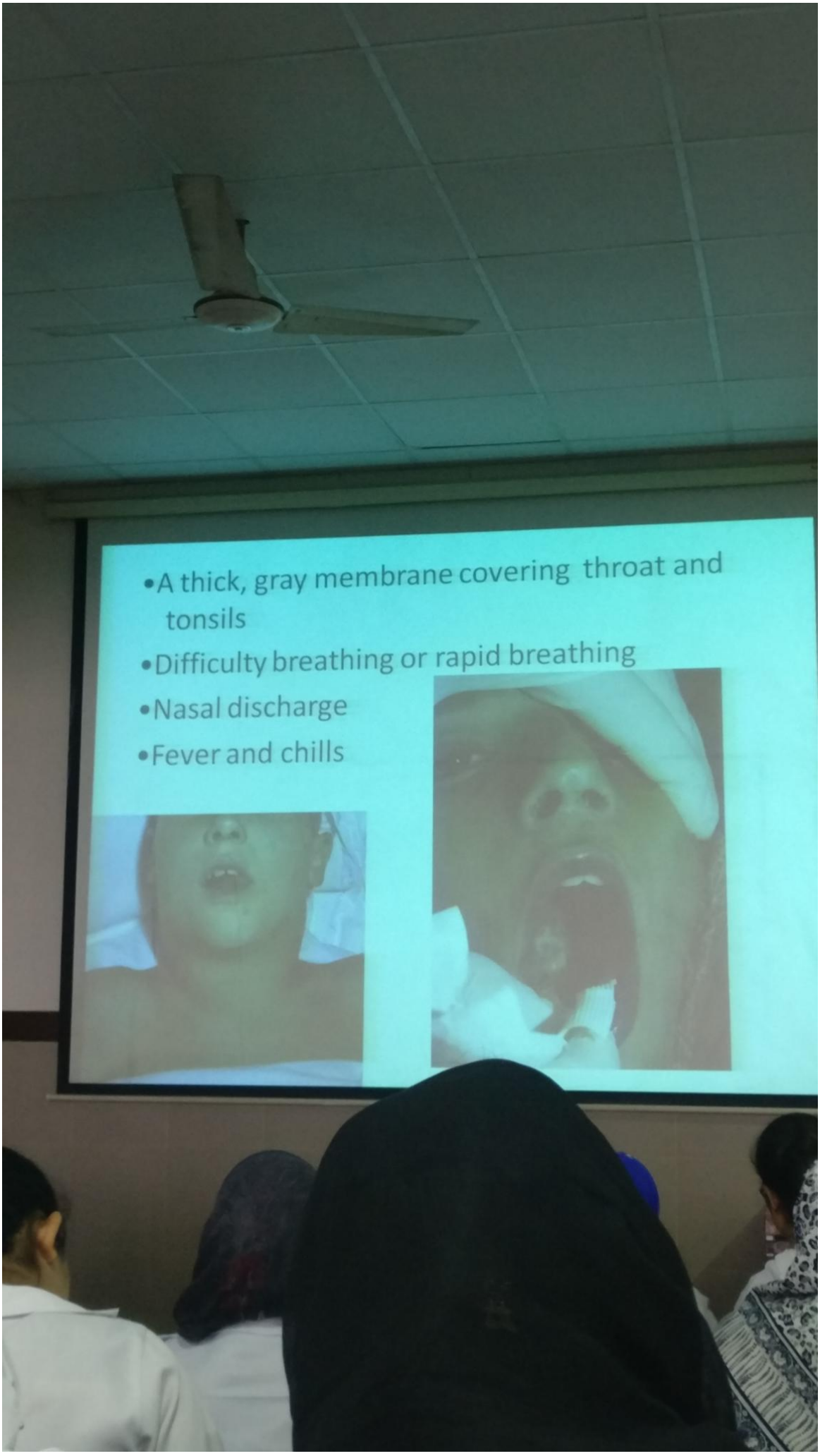


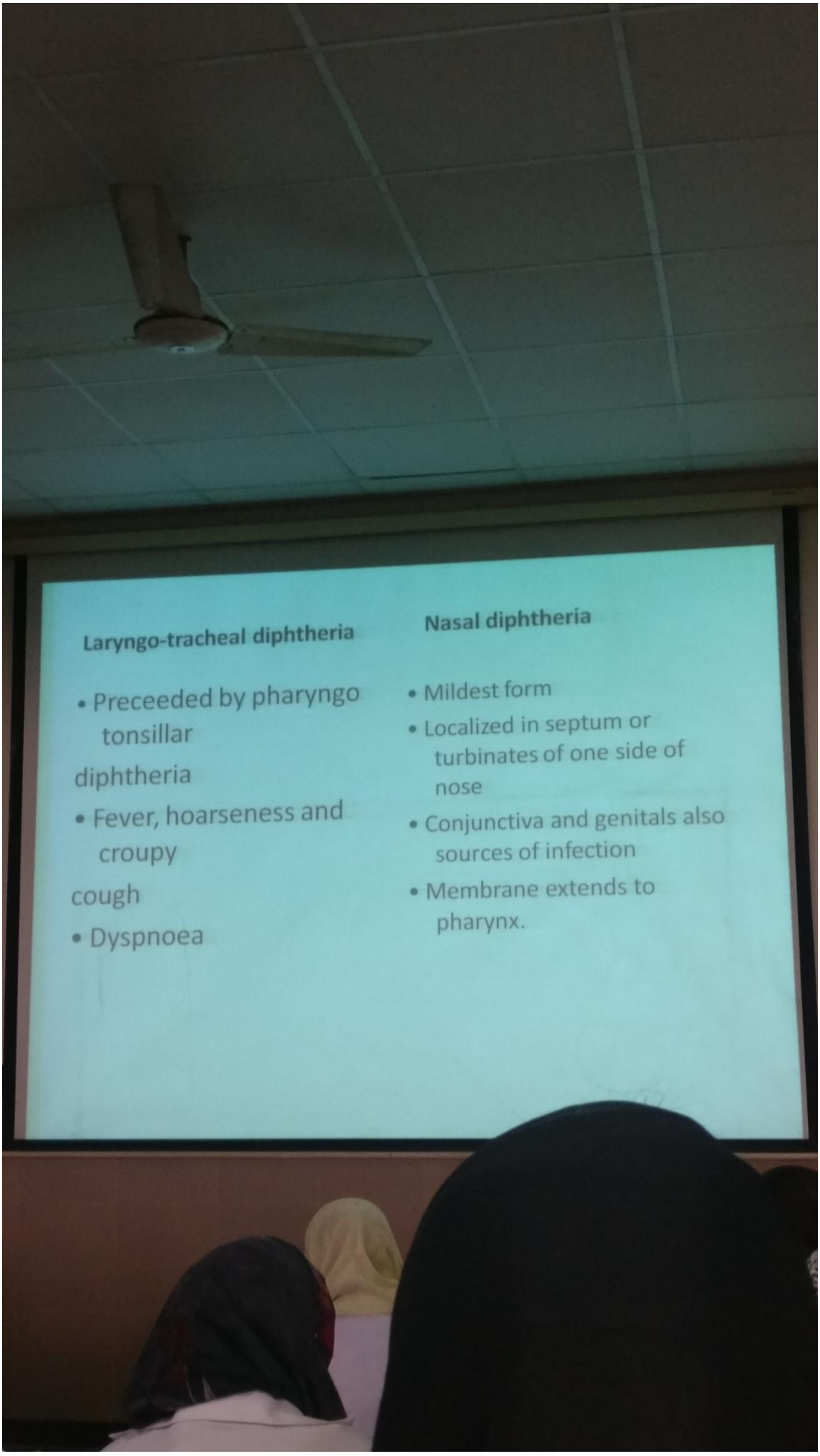
A sore throat and hoarseness

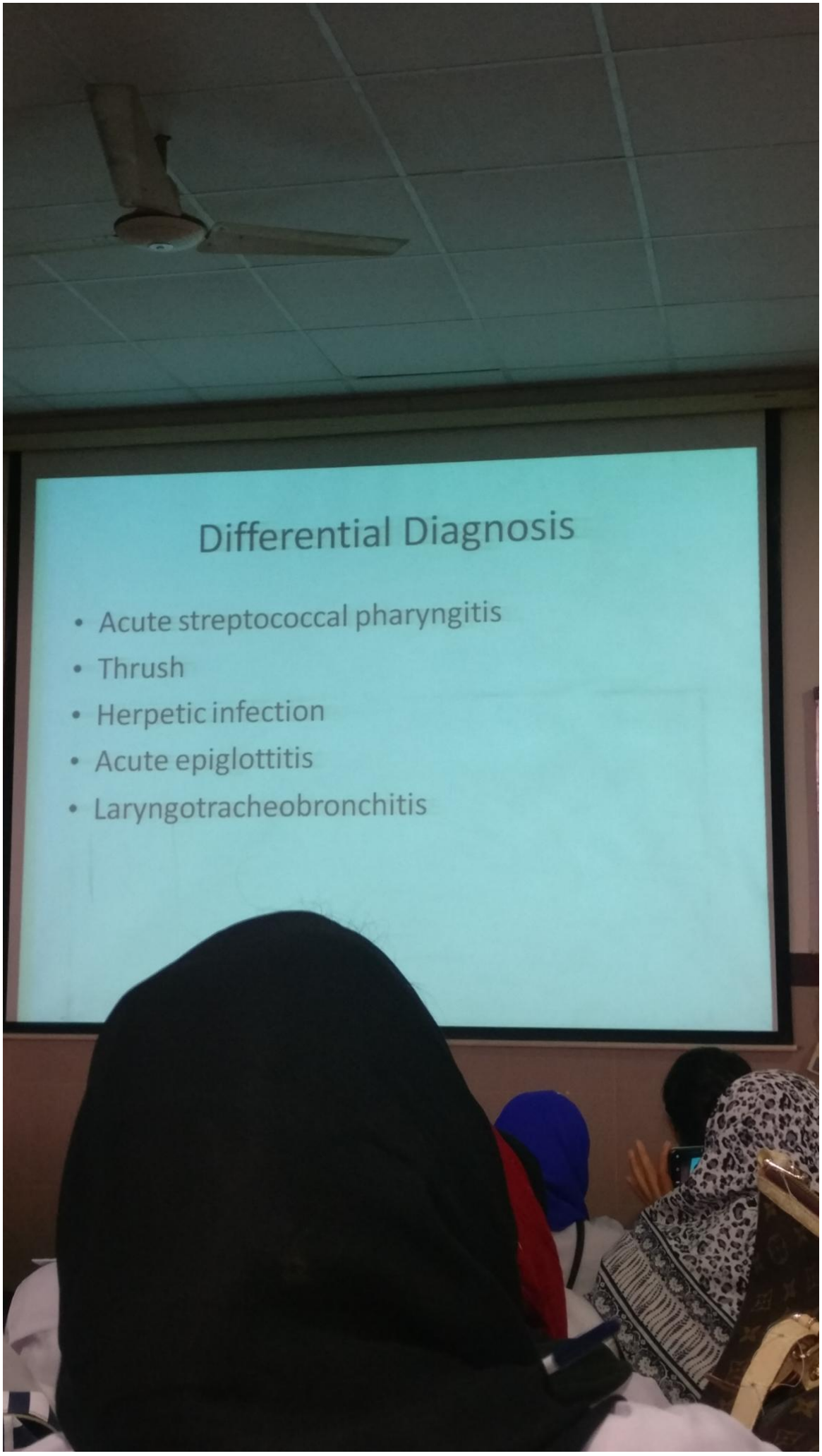
Painful swallowing

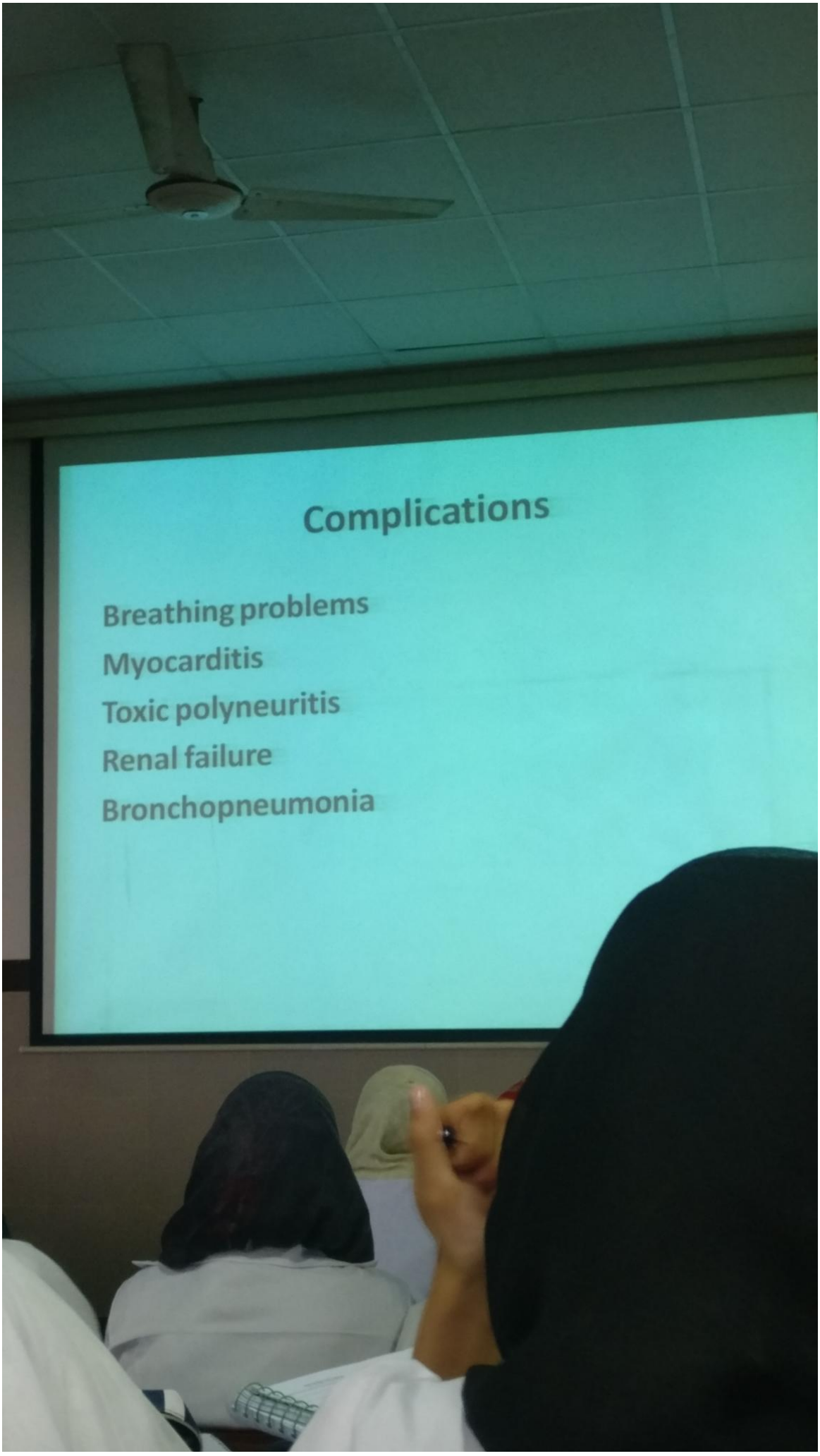
Enlarged lymph nodes in neck

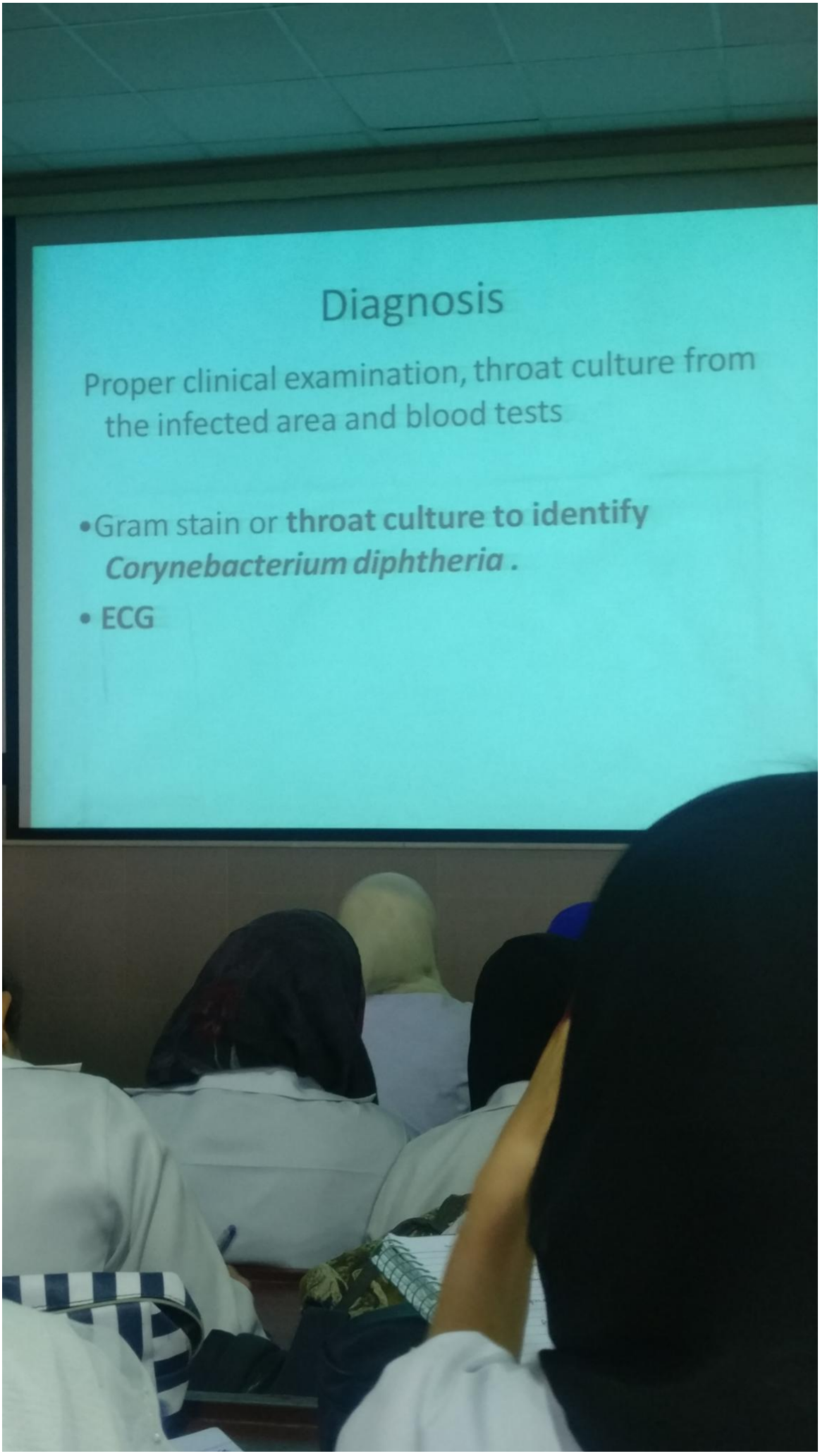
Signs and symptoms usually begin two to five days after a person becomes infected.

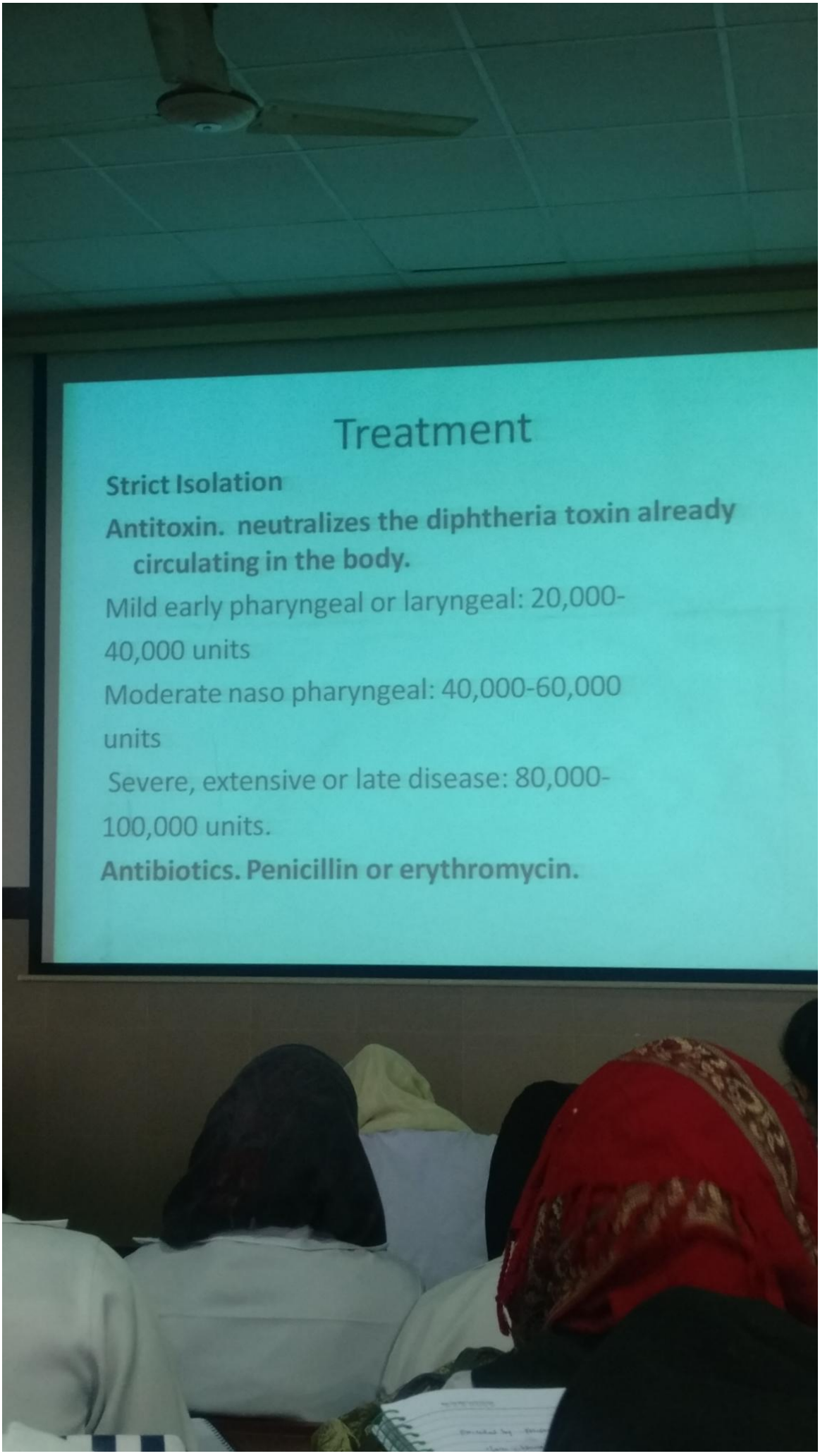

•A thick, gray membrane covering throat and tonsils
•Difficulty breathing or rapid breathing
•Nasal discharge
•Fever and chills

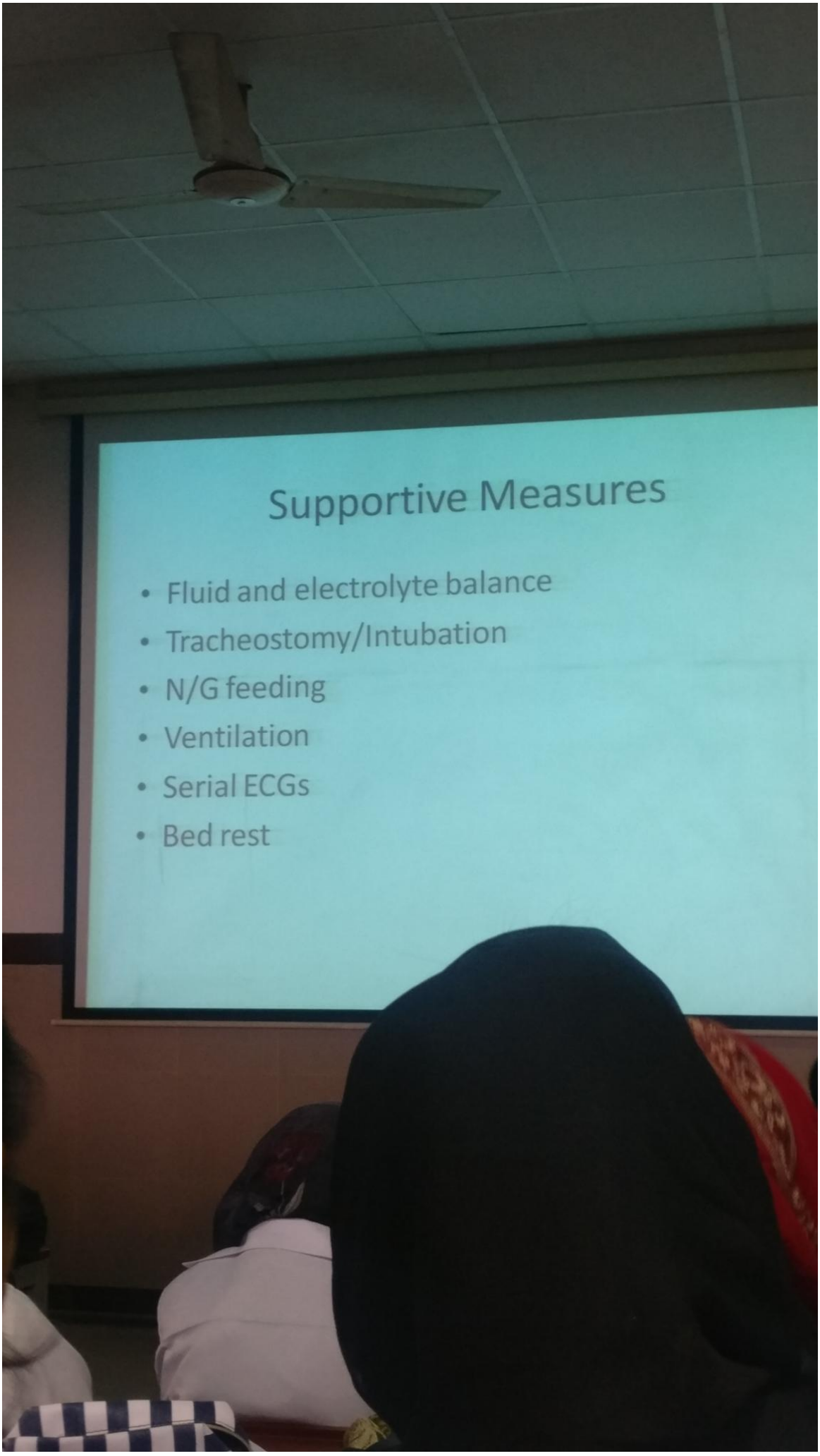

Laryngo-tracheal diphtheria
• Preceeded by pharyngo tonsillar
diphtheria
• Fever, hoarseness and croupy
cough
• Dyspnoea
Nasal diphtheria
• Mildest form
• Localized in septum or turbinates of one side of nose
• Conjunctiva and genitals also sources of infection
• Membrane extends to pharynx.


Differential Diagnosis
• Acute streptococcal pharyngitis
• Thrush
• Herpetic infection
• Acute epiglottitis
• Laryngotracheobronchitis


Complications
Breathing problems
Myocarditis
Toxic polyneuritis
Renal failure
Bronchopneumonia

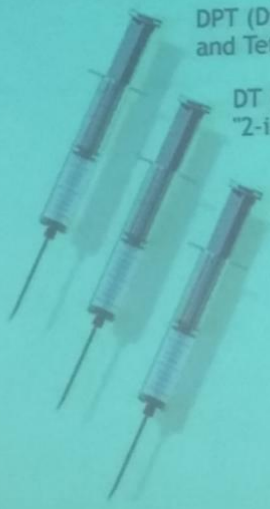

Diagnosis
Proper clinical examination, throat culture from the infected area and blood tests
•Gram stain or throat culture to identify Corynebacterium diphtheria .
• ECG


Treatment
Strict Isolation
Antitoxin. neutralizes the diphtheria toxin already circulating in the body.
Mild early pharyngeal or laryngeal: 20,000-40,000 units
Moderate naso pharyngeal: 40,000-60,000 units
Severe, extensive or late disease: 80,000-100,000 units.
Antibiotics. Penicillin or erythromycin.


Supportive Measures
• Fluid and electrolyte balance
• Tracheostomy/Intubation
• N/G feeding
• Ventilation
• Serial ECGs
• Bed rest

Prevention

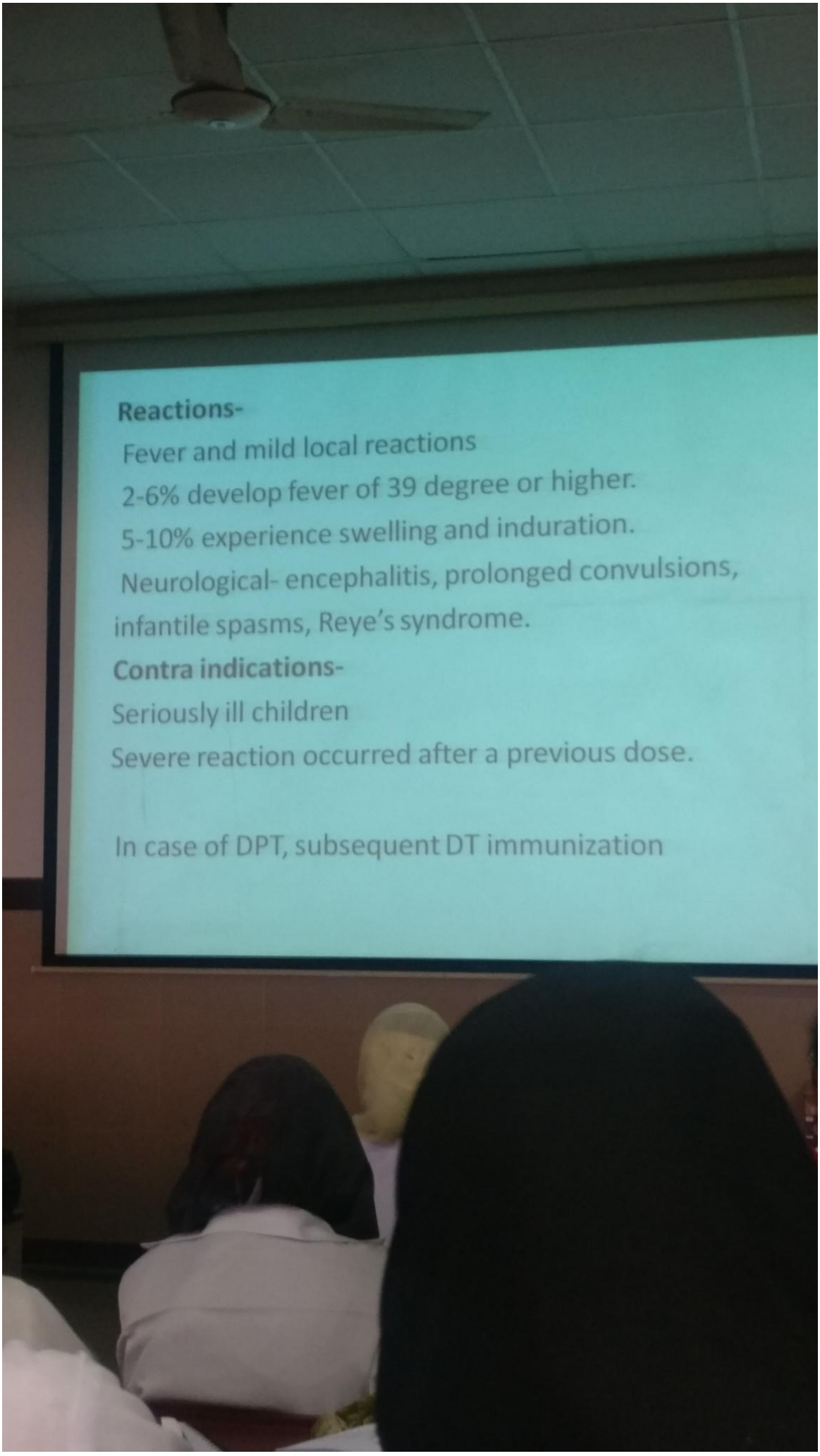
DTP vaccine (diphtheria-tetanus-pertussis).

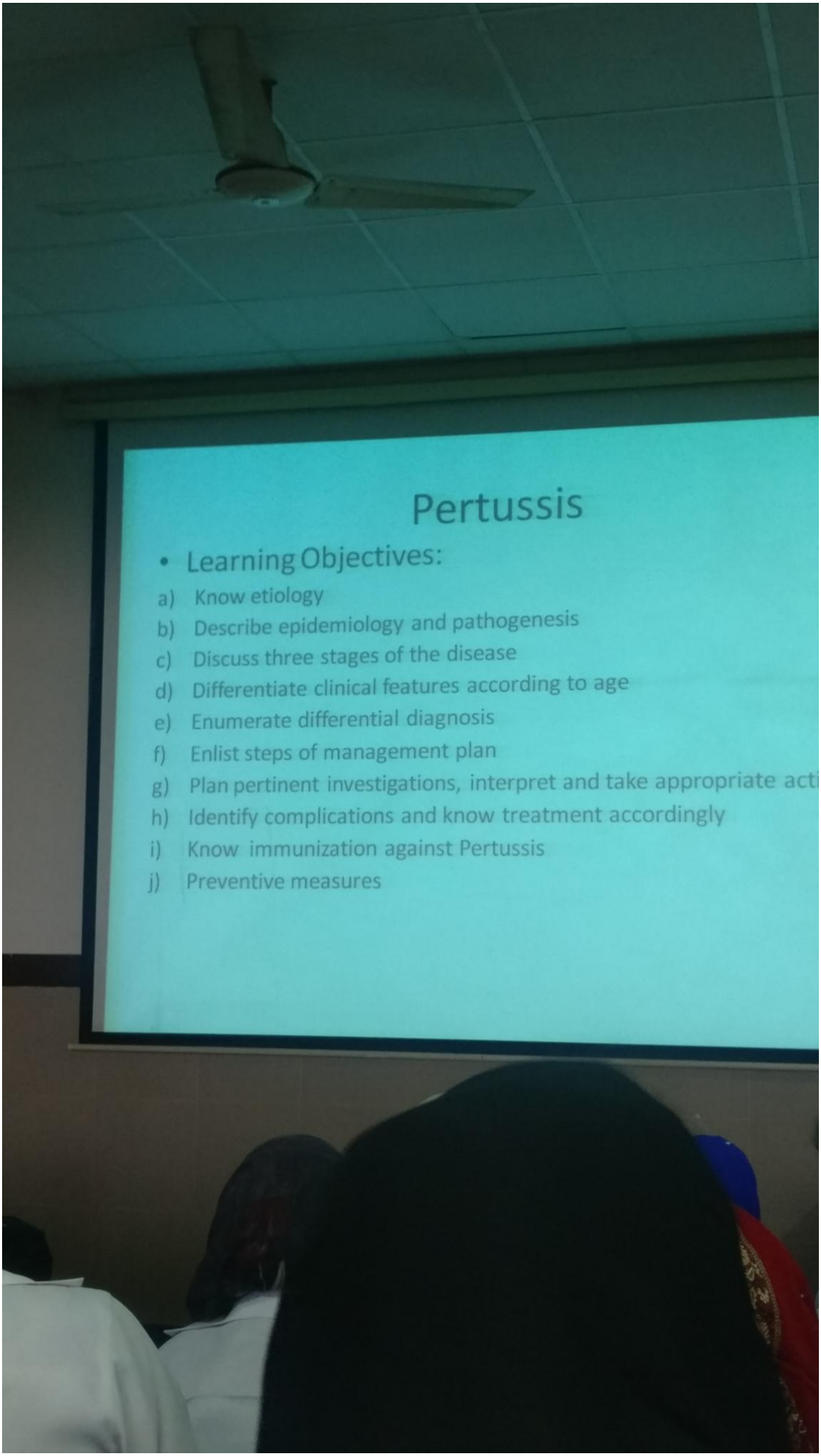


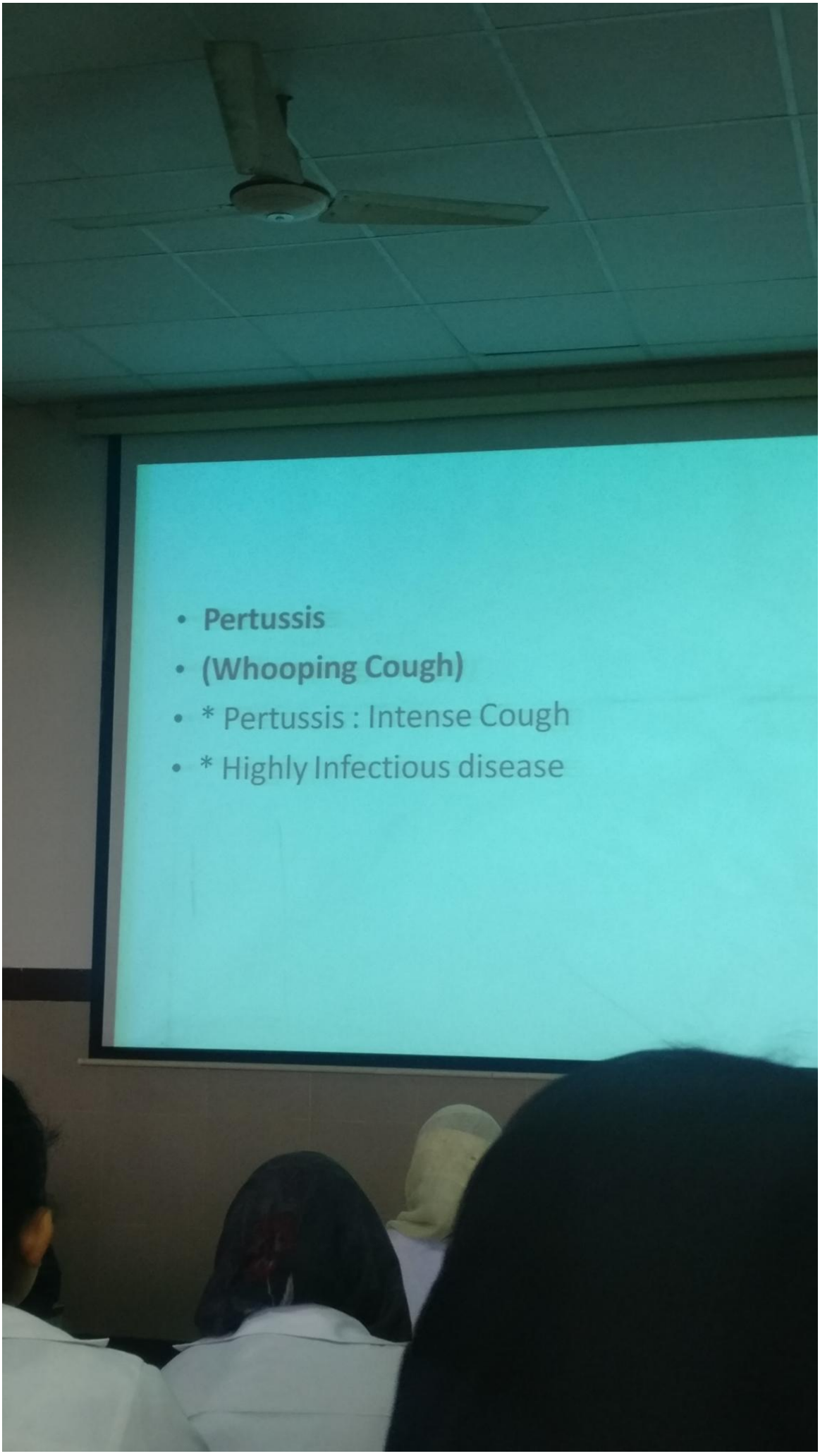
DPT (Diphtheria, Pertussis, and Tetanus) "3-in-1" vaccine

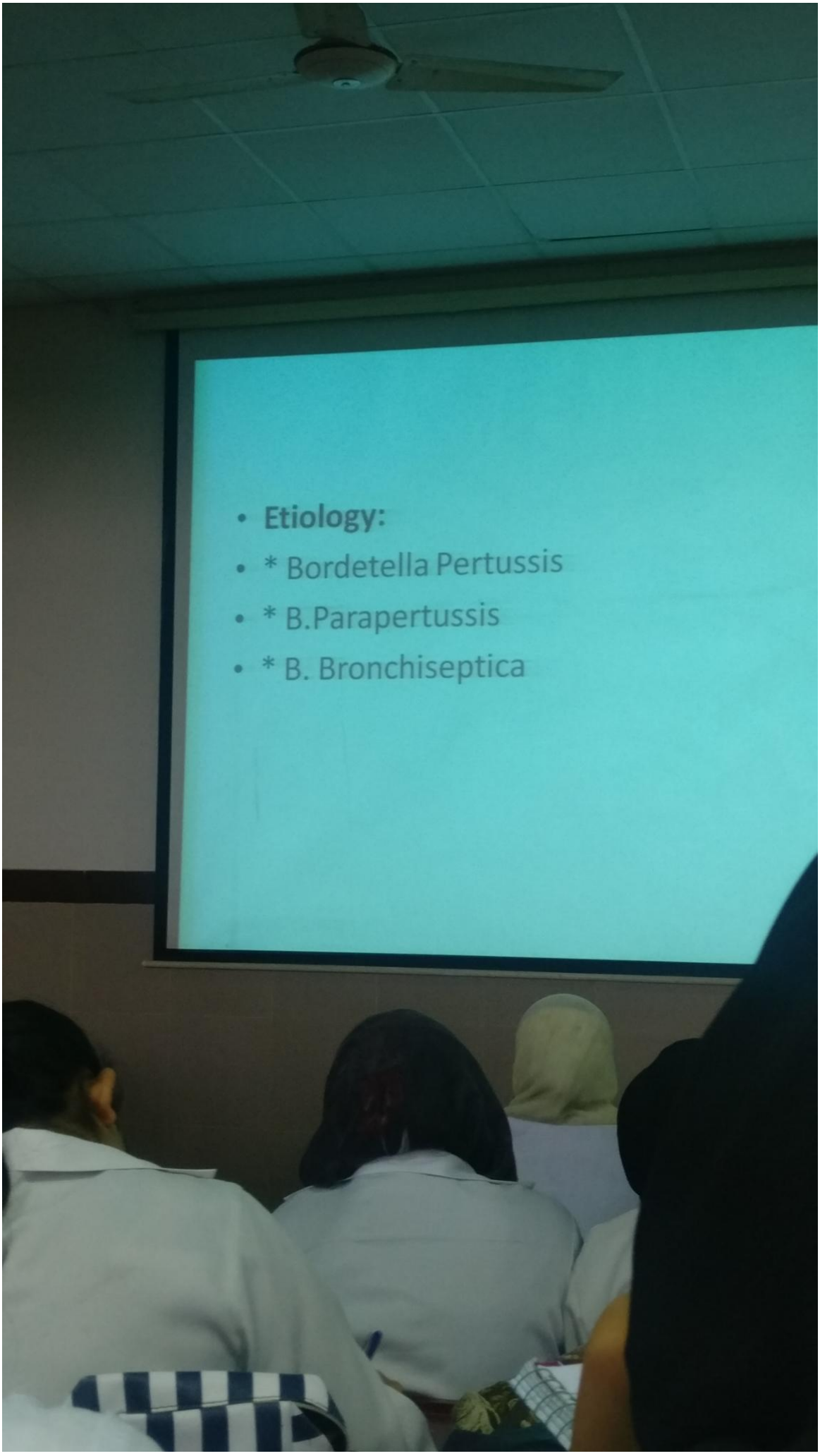
DT (Diphtheria and Tetanus) "2-in-1" vaccine; no pertussis

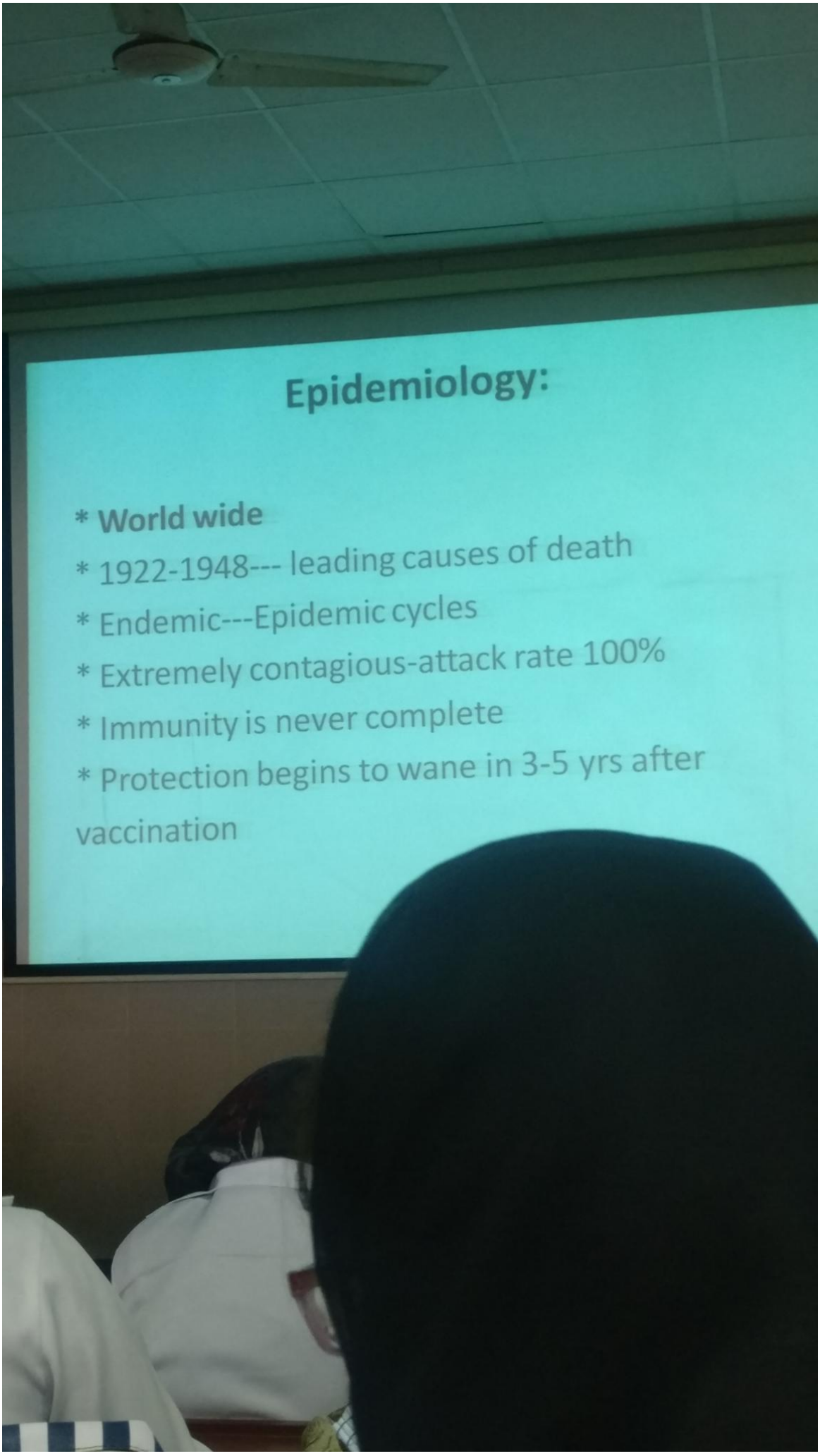
Td (Tetanus and Diphtheria) "2-in-1" vaccine for adults

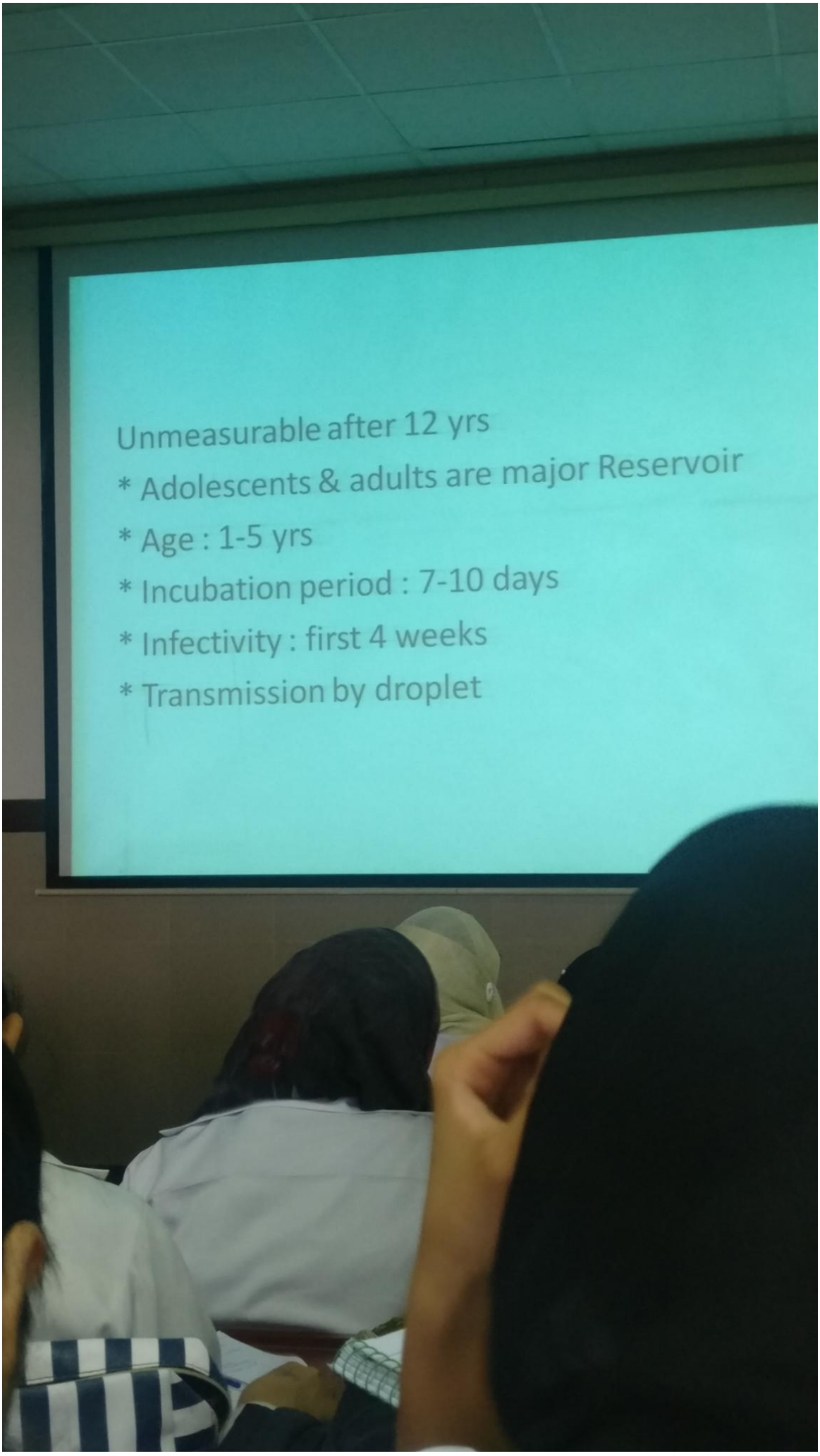

Reactions-
Fever and mild local reactions
2-6% develop fever of 39 degree or higher.
5-10% experience swelling and induration.
Neurological- encephalitis, prolonged convulsions, infantile spasms, Reye's syndrome.
Contra indications-
Seriously ill children
Severe reaction occurred after a previous dose.
In case of DPT, subsequent DT immunization

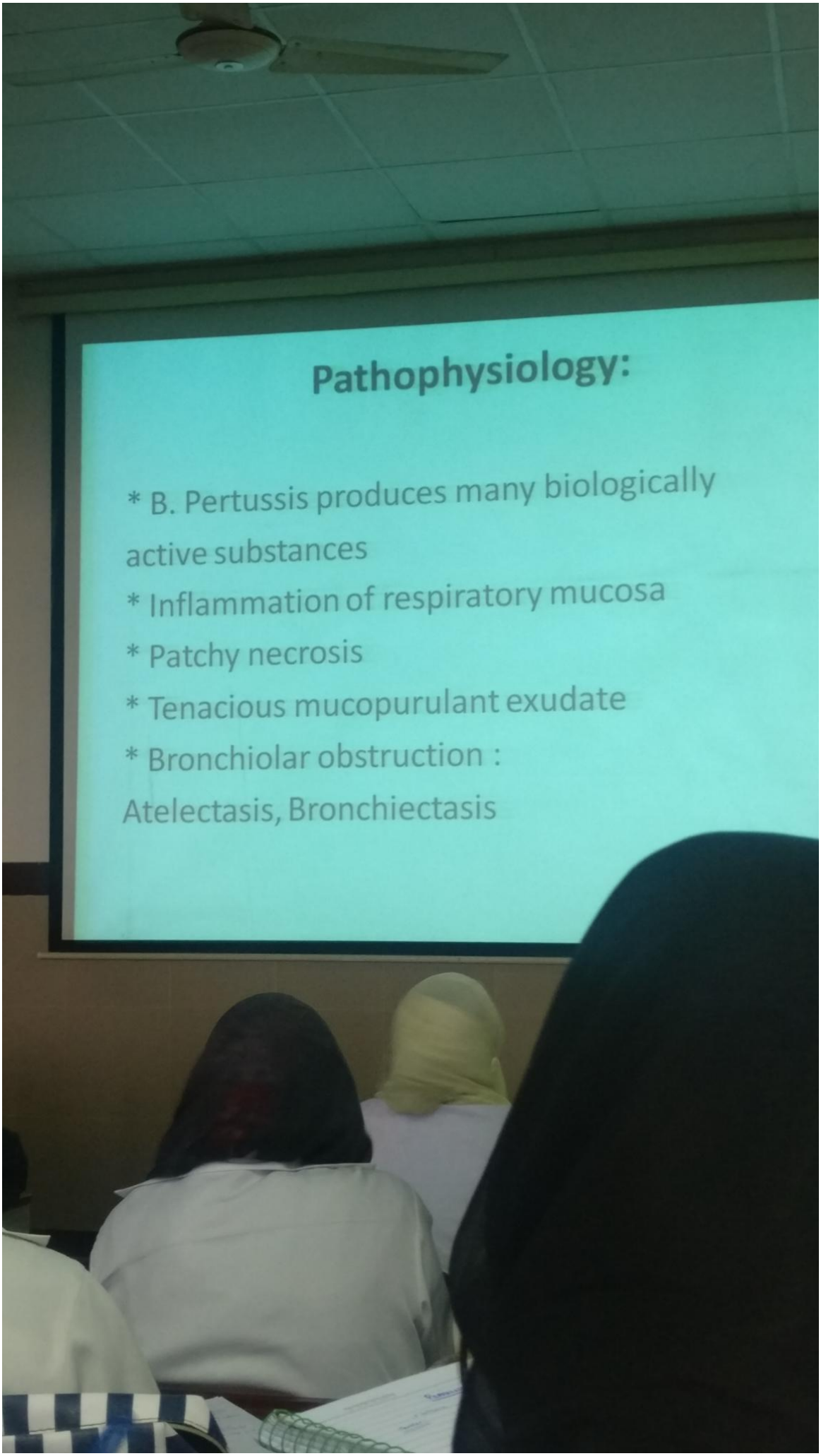

Pertussis
• Learning Objectives:
a) Know etiology
b) Describe epidemiology and pathogenesis
c) Discuss three stages of the disease
d) Differentiate clinical features according to age
e) Enumerate differential diagnosis
f) Enlist steps of management plan
g) Plan pertinent investigations, interpret and take appropriate acti
h) Identify complications and know treatment accordingly
i) Know immunization against Pertussis
j) Preventive measures

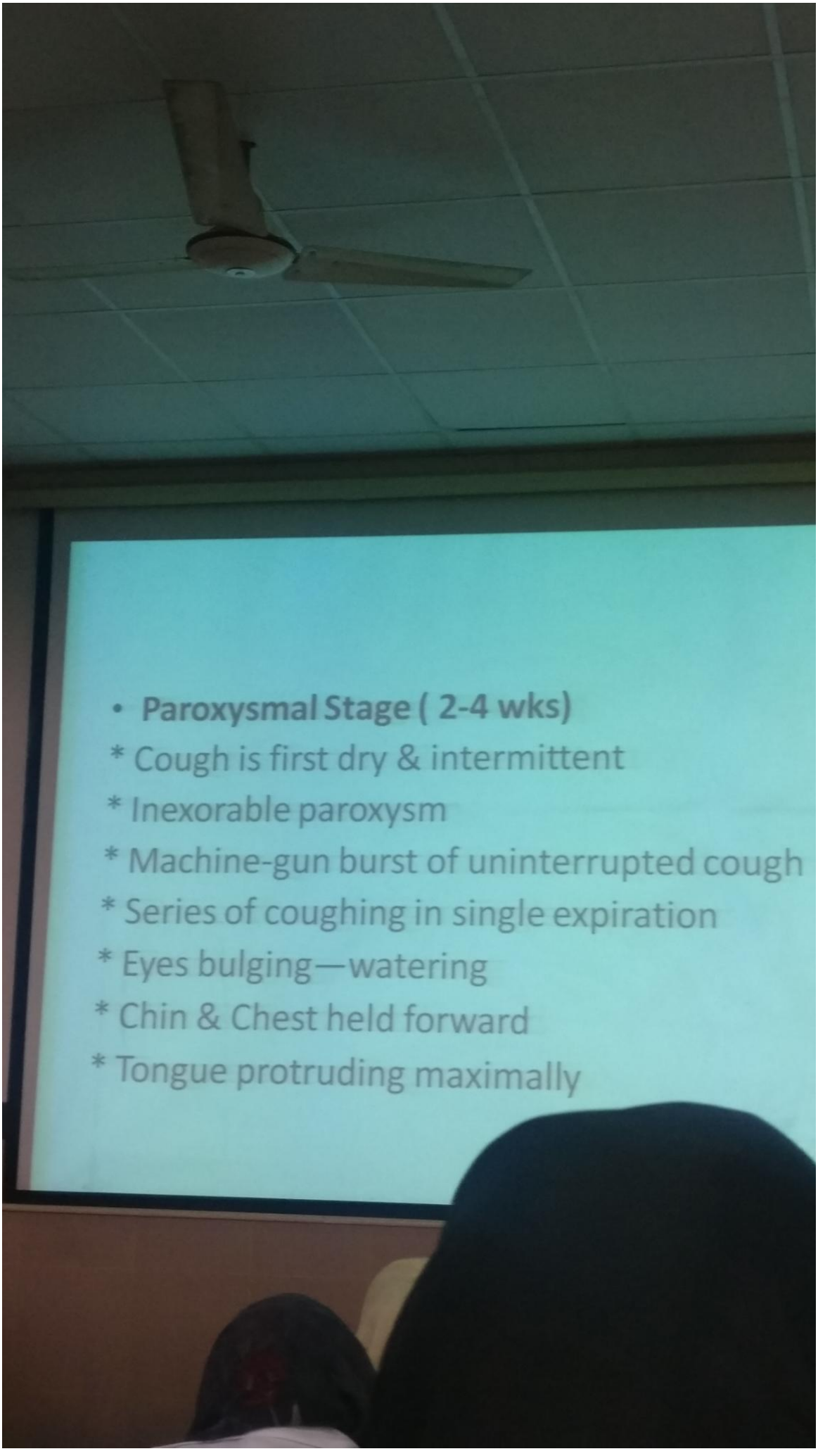

• Pertussis
• (Whooping Cough)
• * Pertussis : Intense Cough
• * Highly Infectious disease

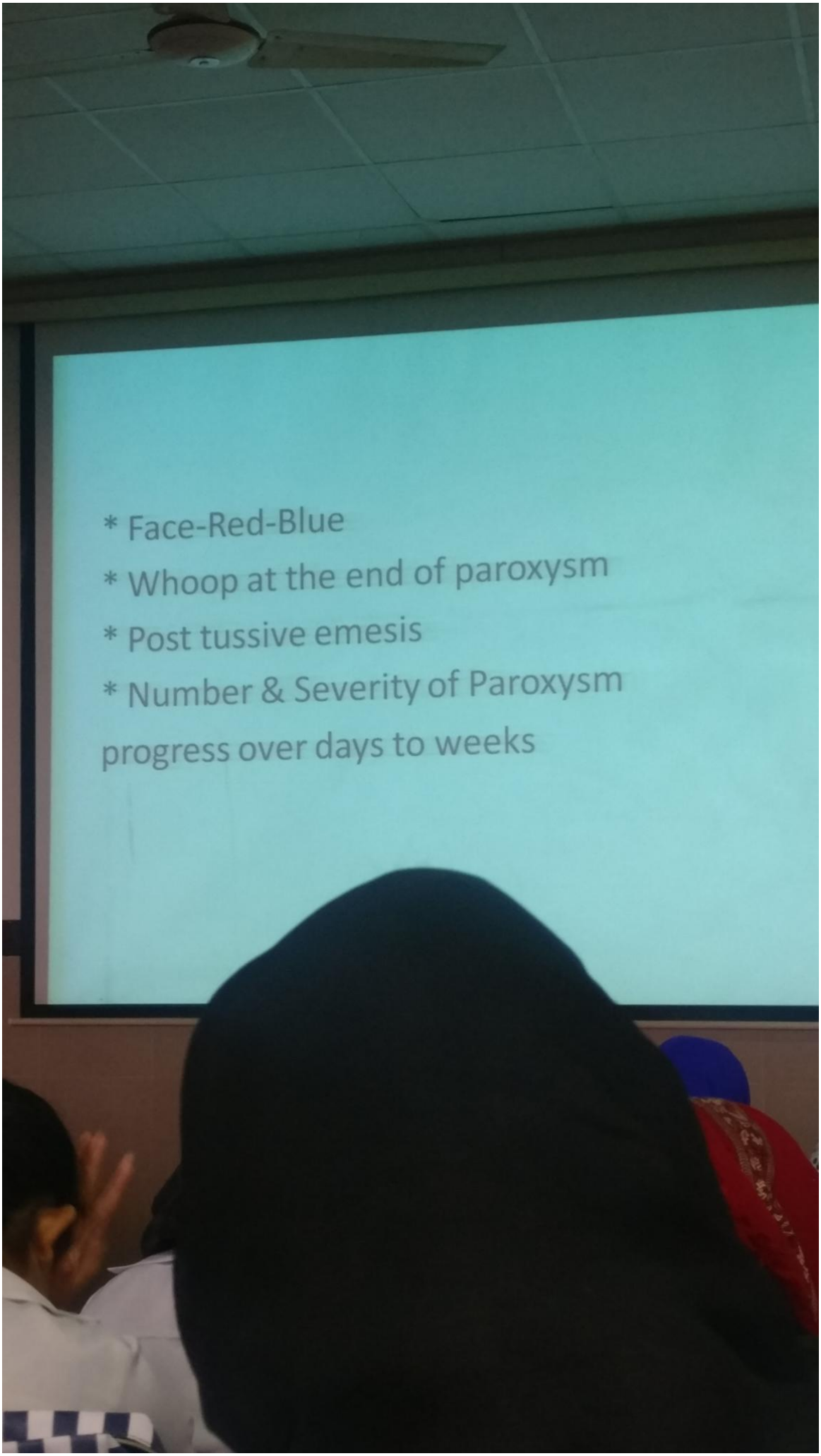

• Etiology:
• * Bordetella Pertussis
• * B.Parapertussis
• * B. Bronchiseptica

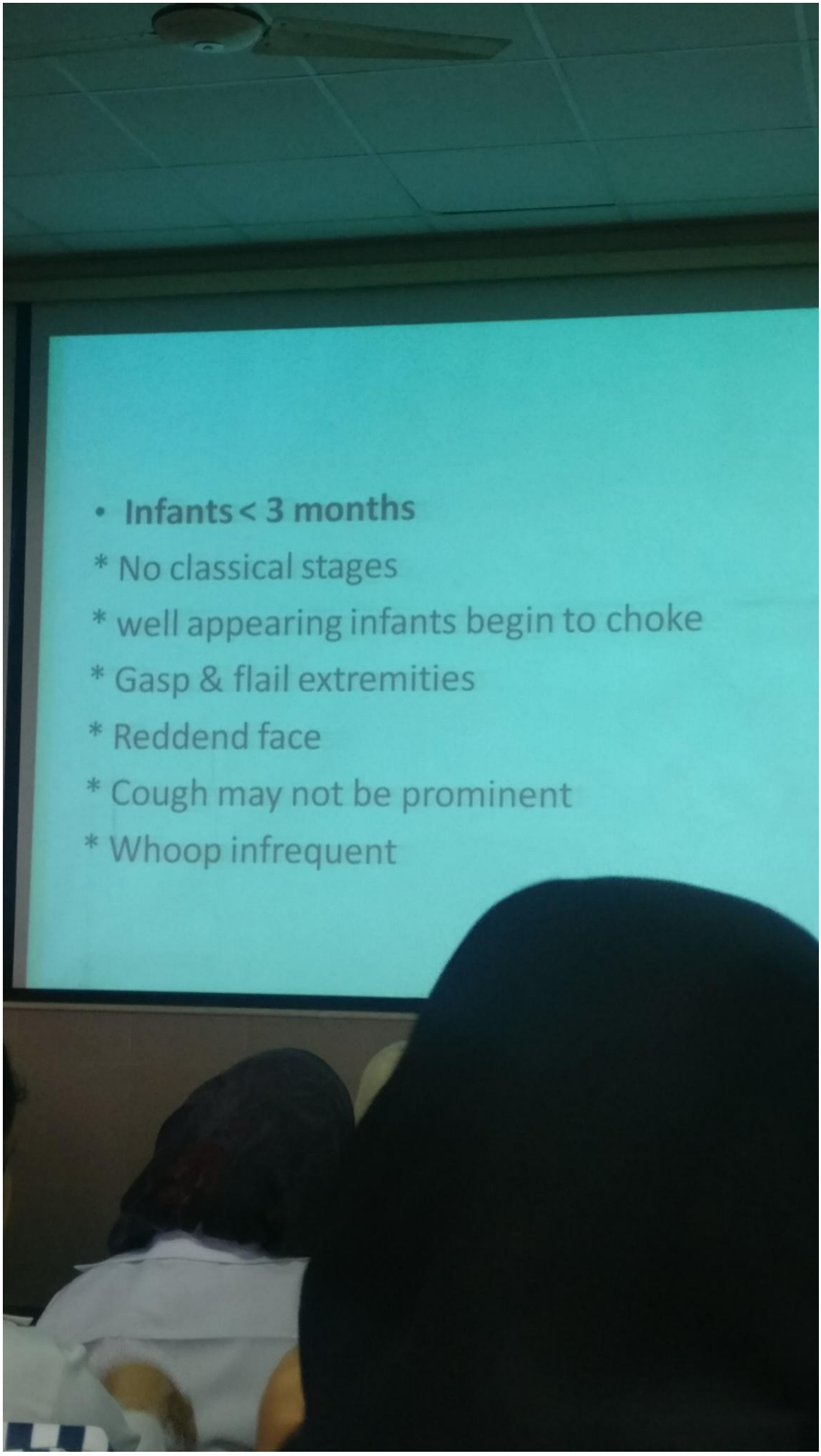

Epidemiology:
* World wide
* 1922-1948--- leading causes of death
* Endemic---Epidemic cycles
* Extremely contagious-attack rate 100%
* Immunity is never complete
* Protection begins to wane in 3-5 yrs after vaccination

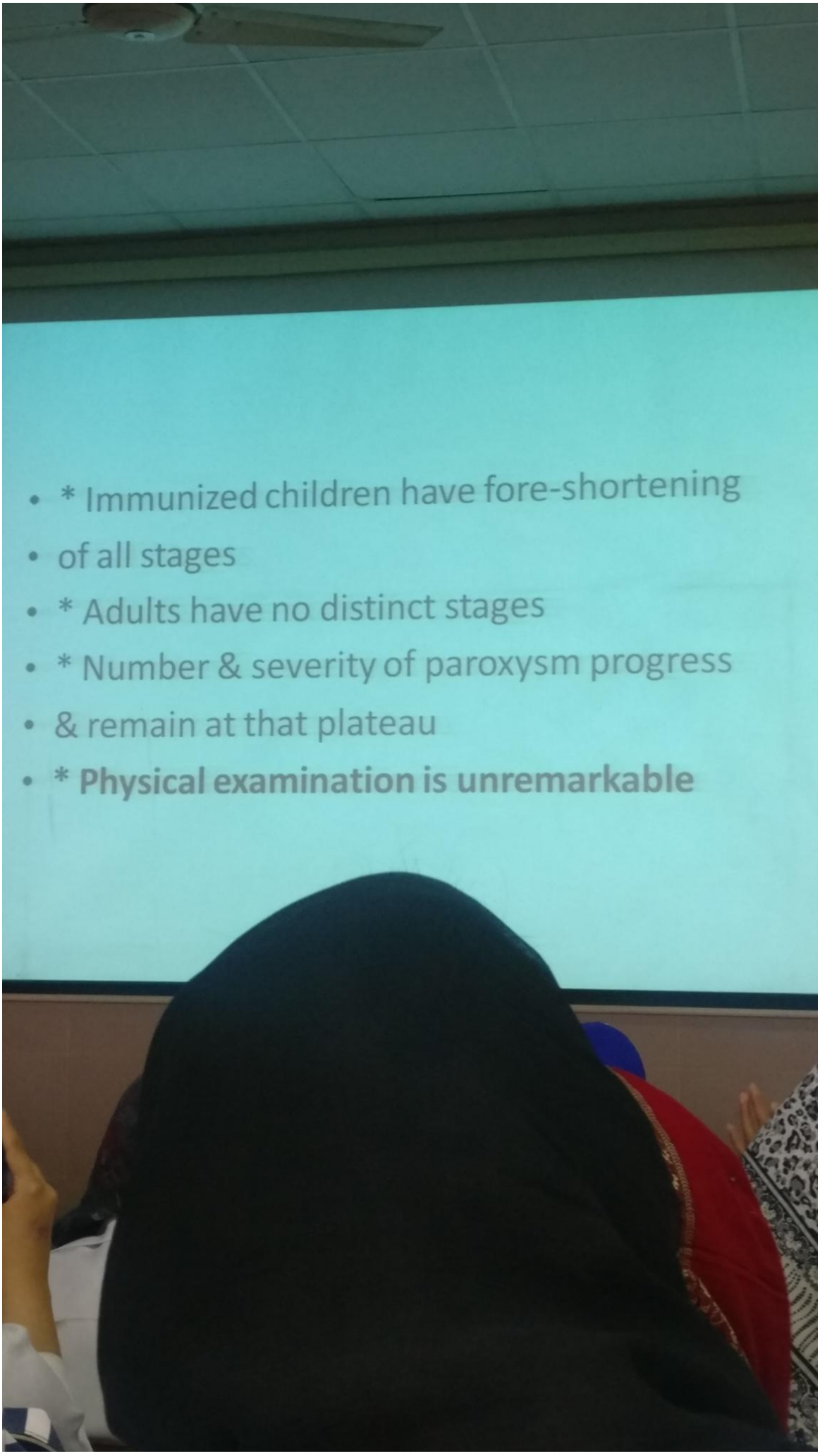

Unmeasurable after 12 yrs
* Adolescents & adults are major Reservoir
* Age : 1-5 yrs
* Incubation period : 7-10 days
* Infectivity : first 4 weeks
* Transmission by droplet

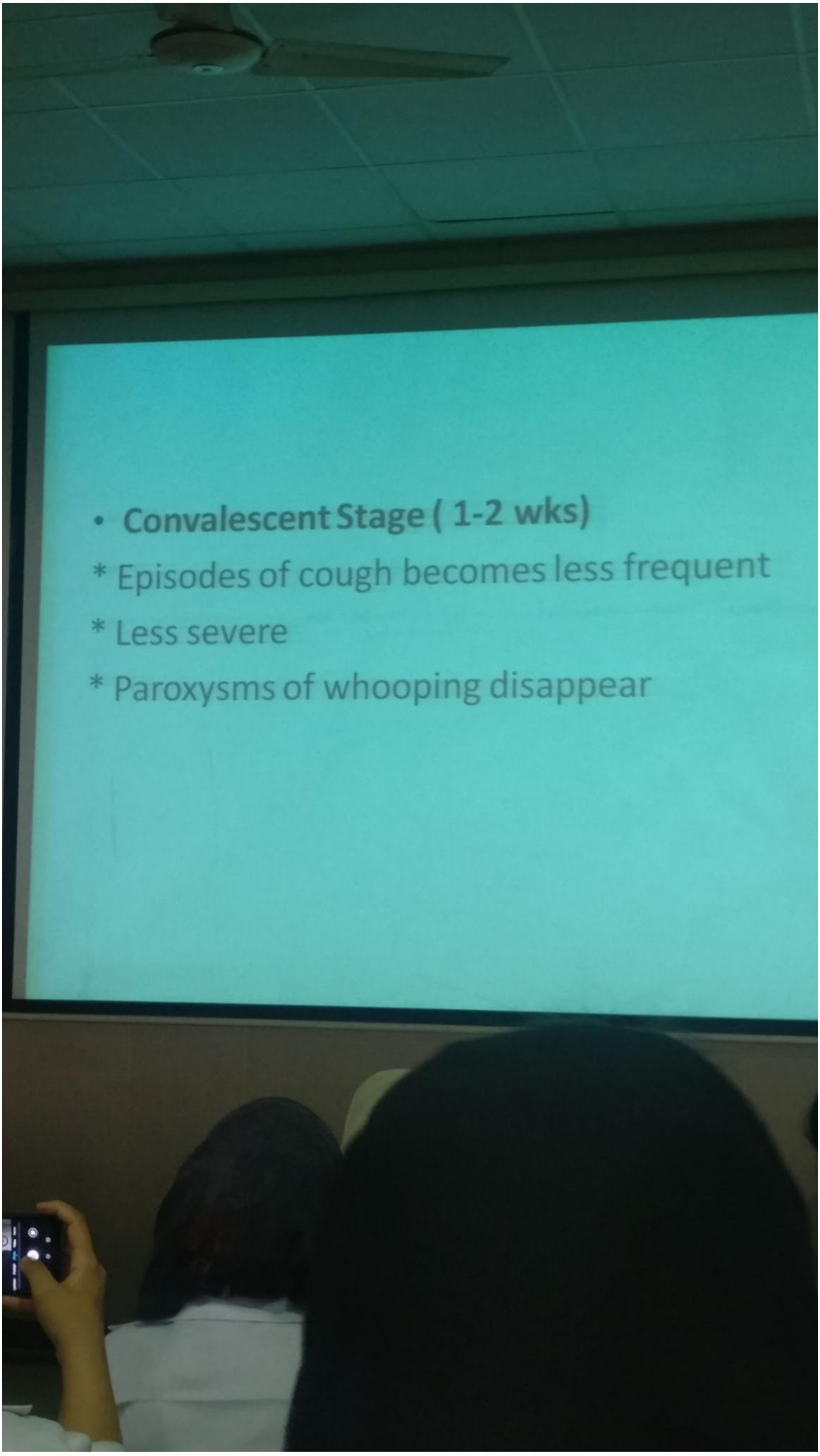

Pathophysiology:
* B. Pertussis produces many biologically active substances
* Inflammation of respiratory mucosa
* Patchy necrosis
* Tenacious mucopurulant exudate
* Bronchiolar obstruction :
Atelectasis, Bronchiectasis

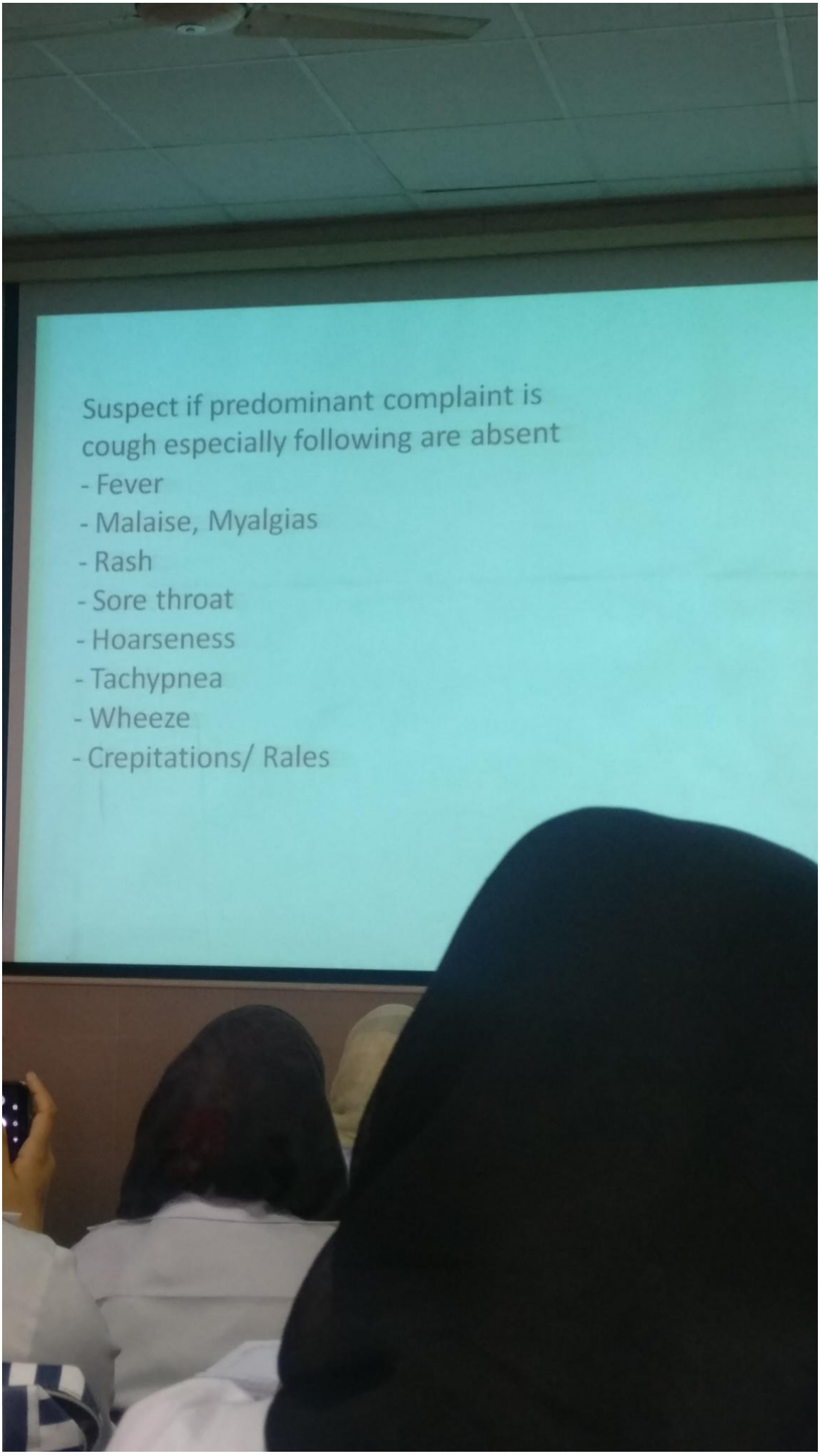

• Paroxysmal Stage (2-4 wks)
* Cough is first dry & intermittent
* Inexorable paroxysm
* Machine-gun burst of uninterrupted cough
* Series of coughing in single expiration
* Eyes bulging—watering
* Chin & Chest held forward
* Tongue protruding maximally

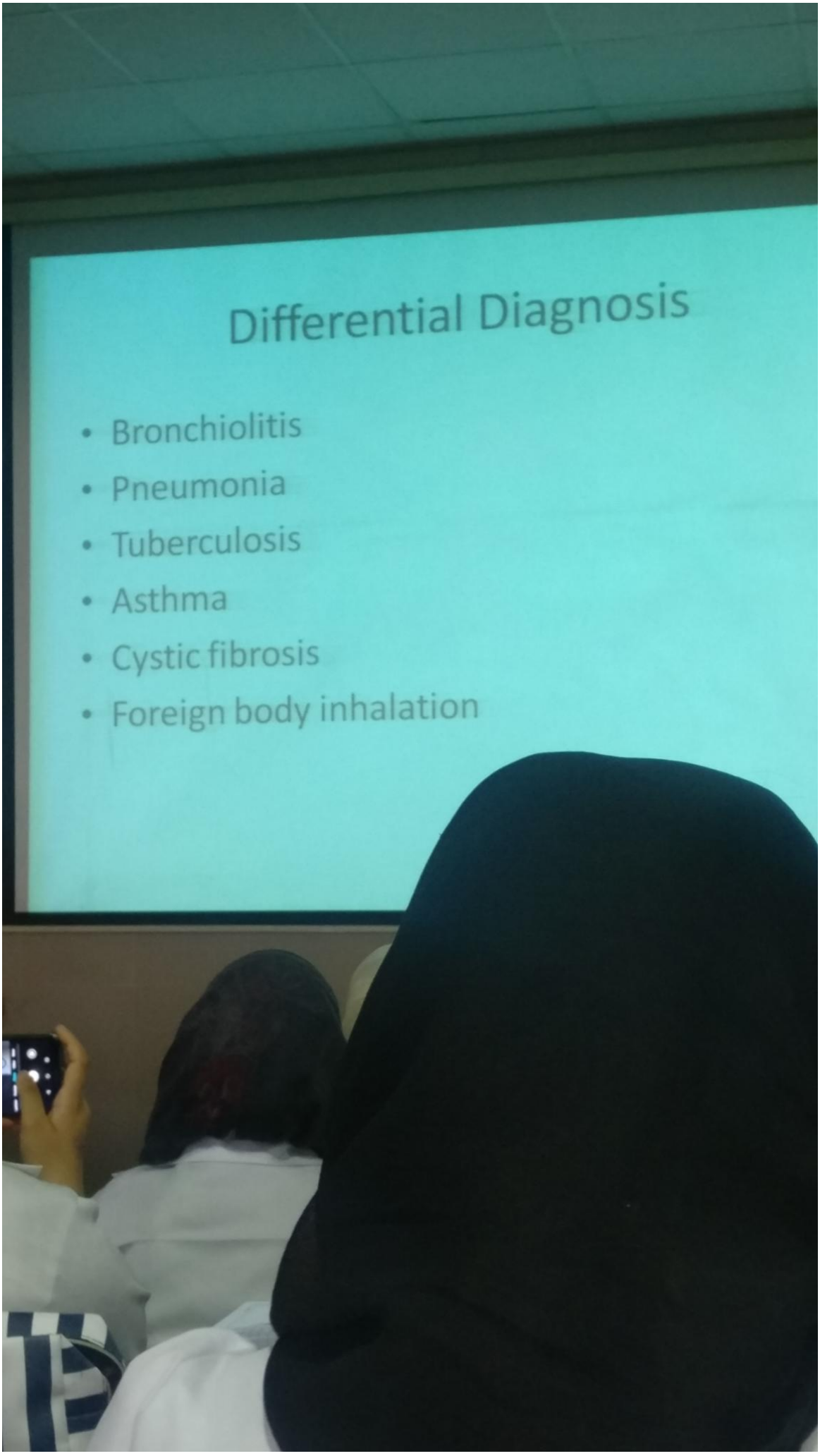

* Face-Red-Blue
* Whoop at the end of paroxysm
* Post tussive emesis
* Number & Severity of Paroxysm
progress over days to weeks

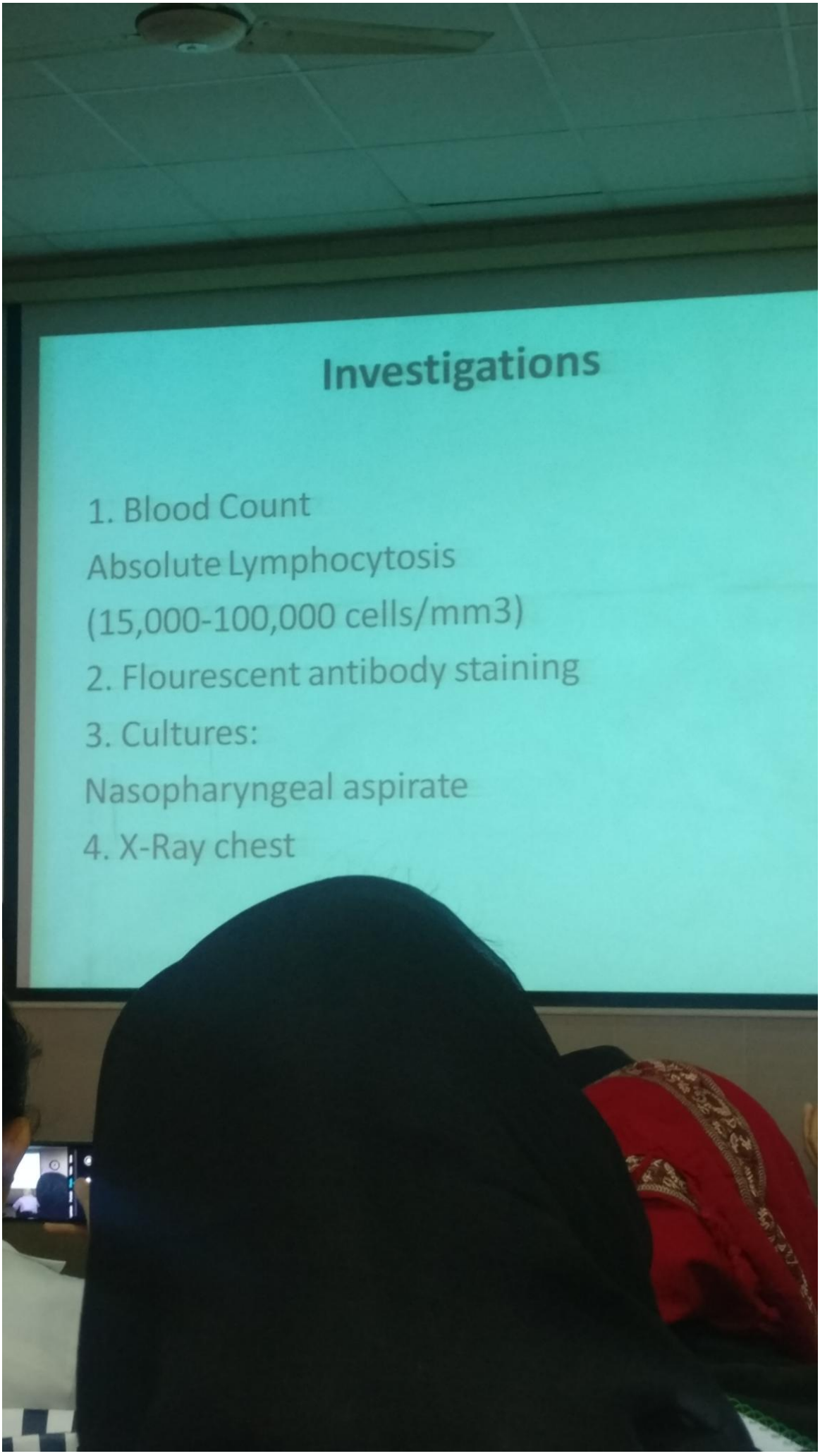

• Infants < 3 months
* No classical stages
* well appearing infants begin to choke
* Gasp & flail extremities
* Reddend face
* Cough may not be prominent
* Whoop infrequent


* Immunized children have fore-shortening
of all stages
* Adults have no distinct stages
* Number & severity of paroxysm progress
& remain at that plateau
* Physical examination is unremarkable

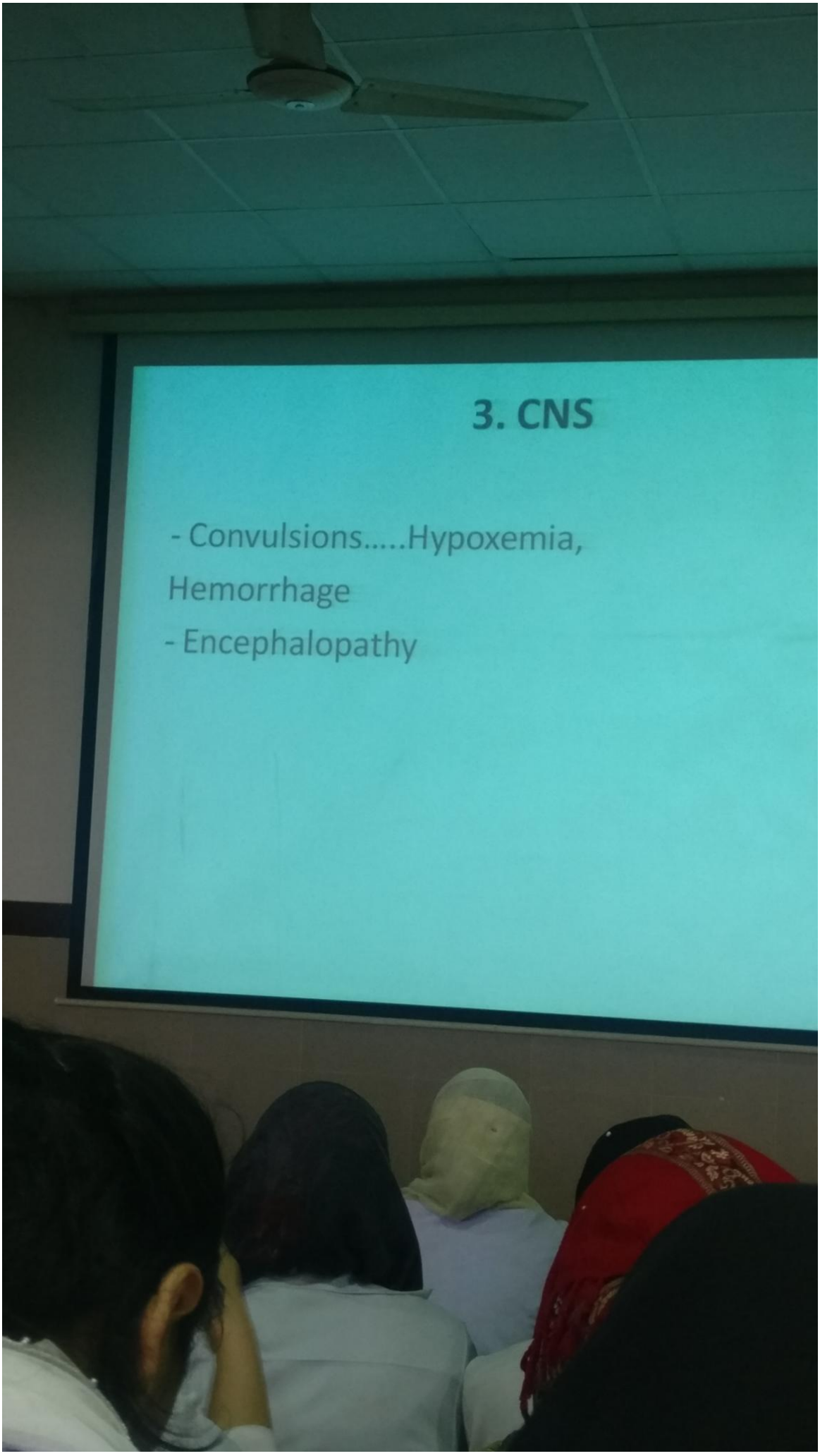

• Convalescent Stage (1-2 wks)
* Episodes of cough becomes less frequent
* Less severe
* Paroxysms of whooping disappear

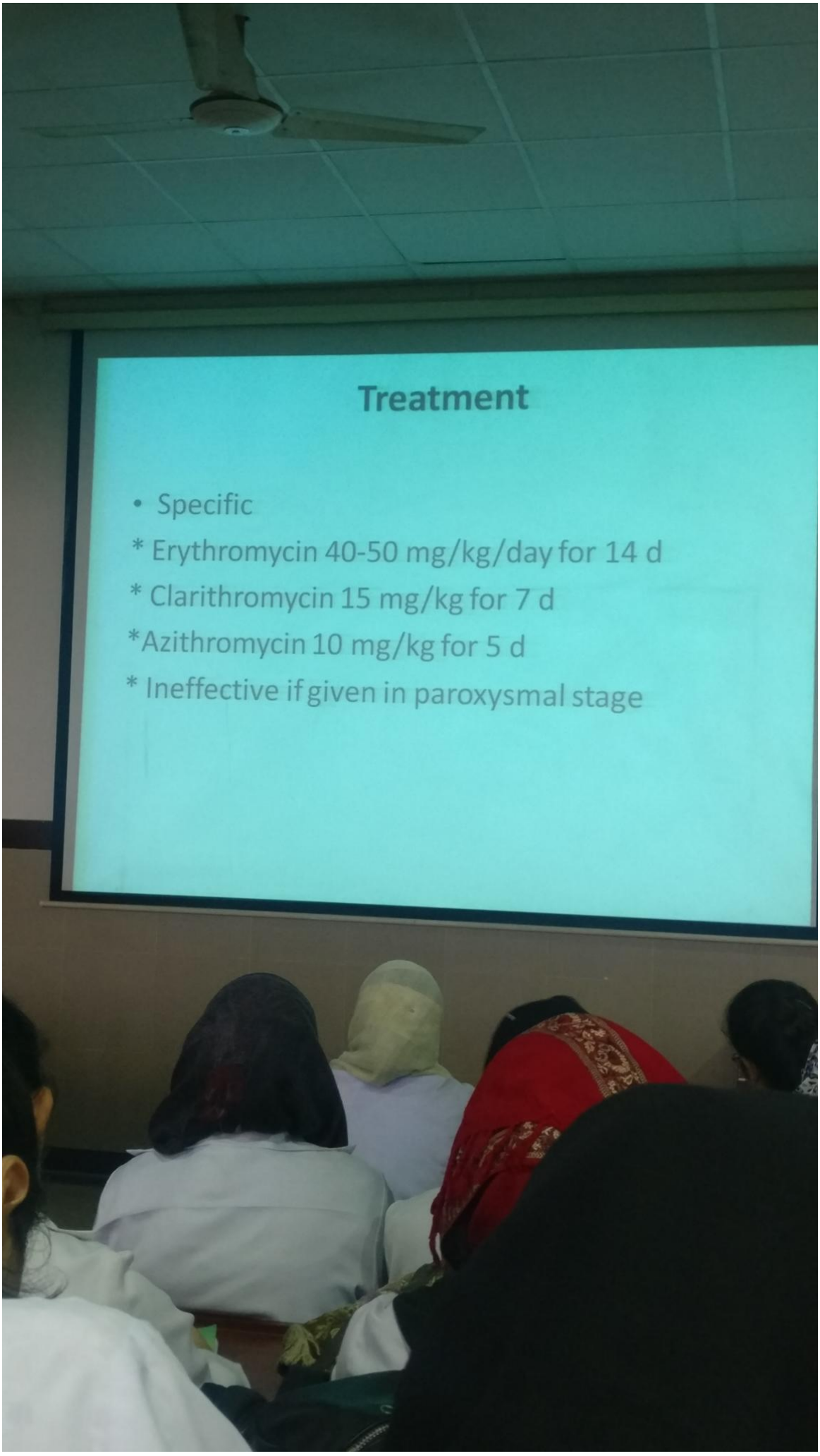

Suspect if predominant complaint is
cough especially following are absent
- Fever
- Malaise, Myalgias
- Rash
- Sore throat
- Hoarseness
- Tachypnea
- Wheeze
- Crepitations/ Rales

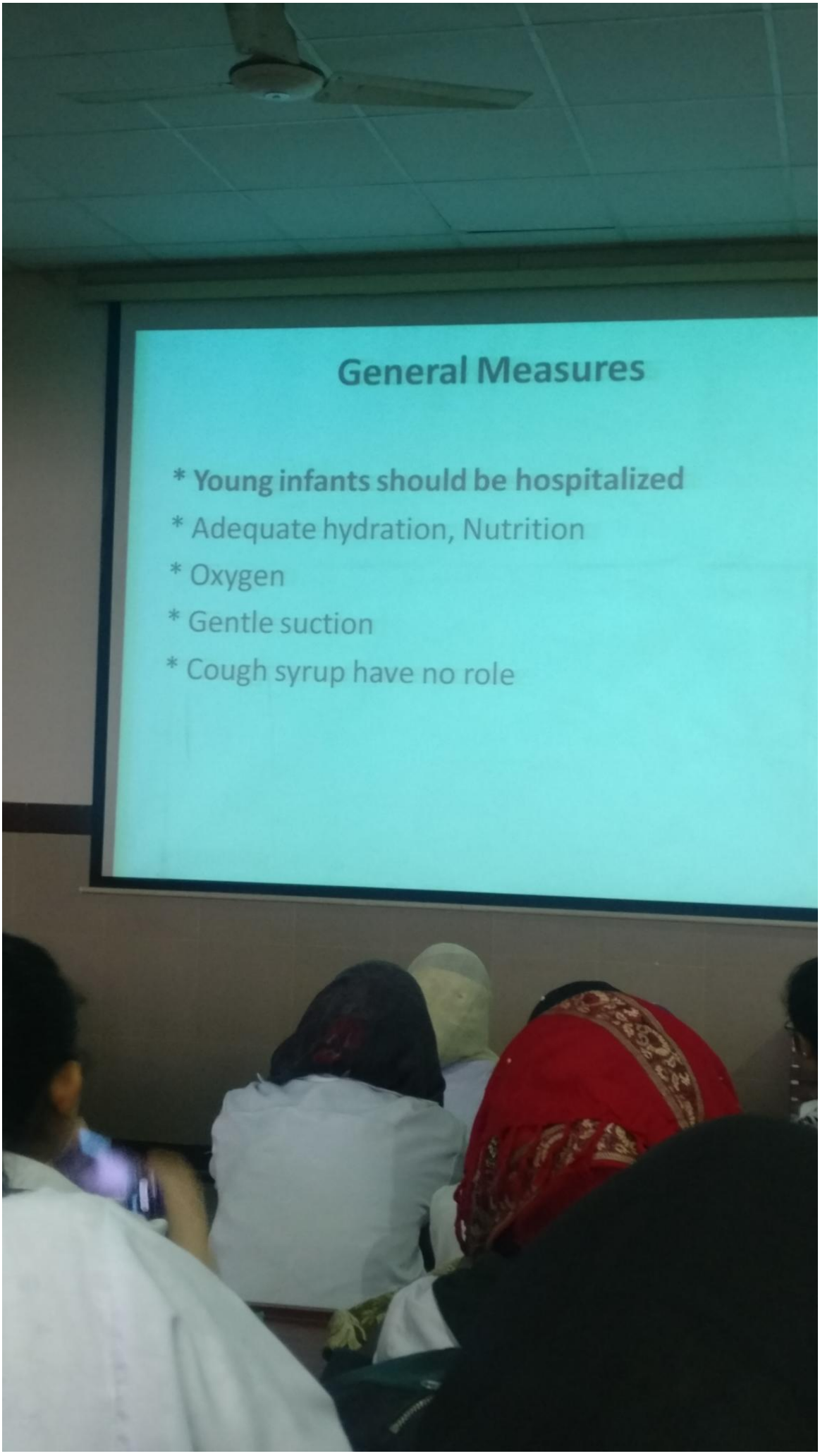

Differential Diagnosis
• Bronchiolitis
• Pneumonia
• Tuberculosis
• Asthma
• Cystic fibrosis
• Foreign body inhalation

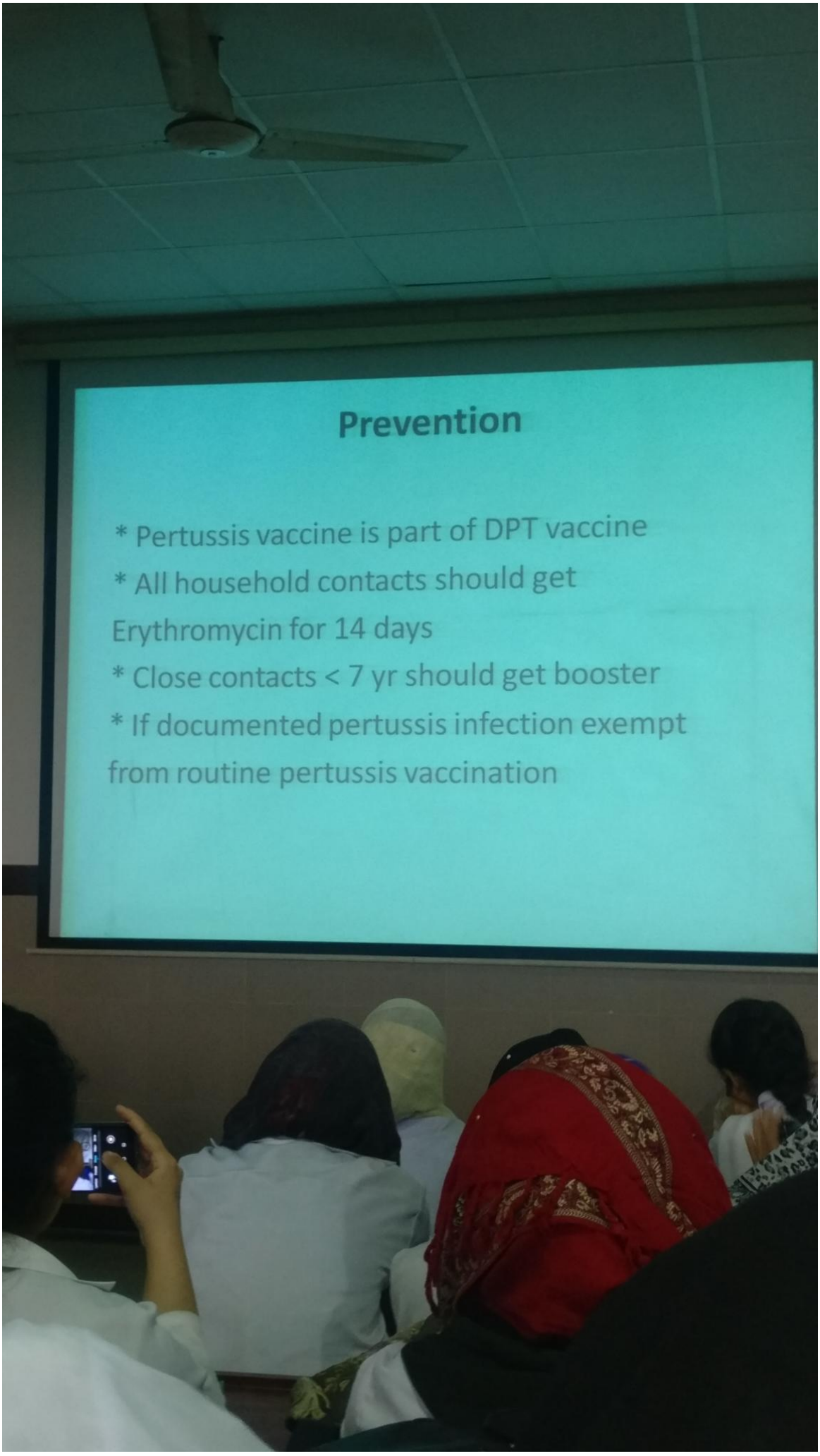

Investigations
1. Blood Count
Absolute Lymphocytosis
(15,000-100,000 cells/mm3)
2. Flourescent antibody staining
3. Cultures:
Nasopharyngeal aspirate
4. X-Ray chest

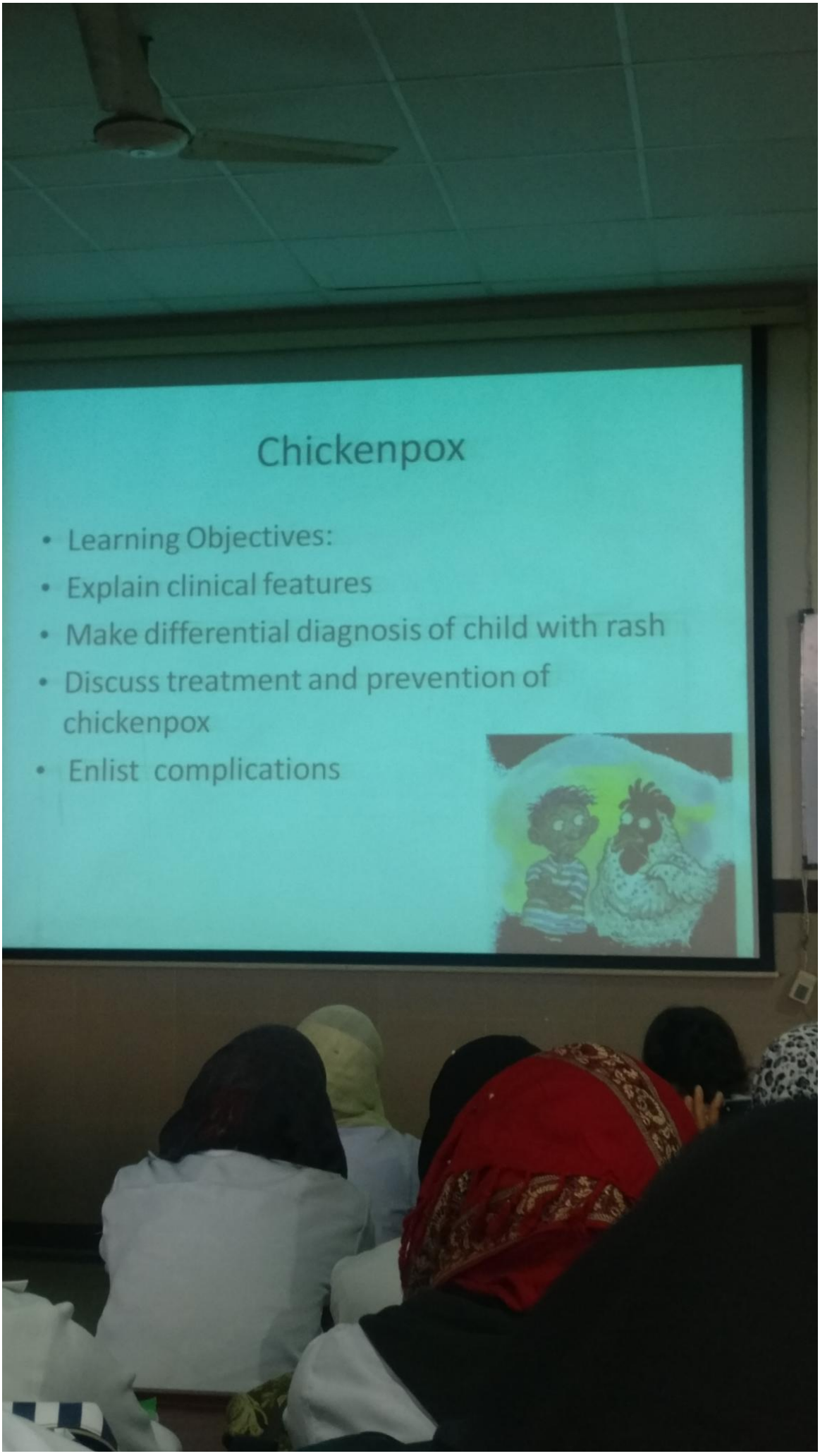

Complication
1.Respiratory
- Apnea
- Bronchopneumonia
- Atelectasis
- Bronchiectasis
- Emphysema—Interstitial / Subcutaneous
- Otitis media
- Reactivation of quiescent tuberculosis

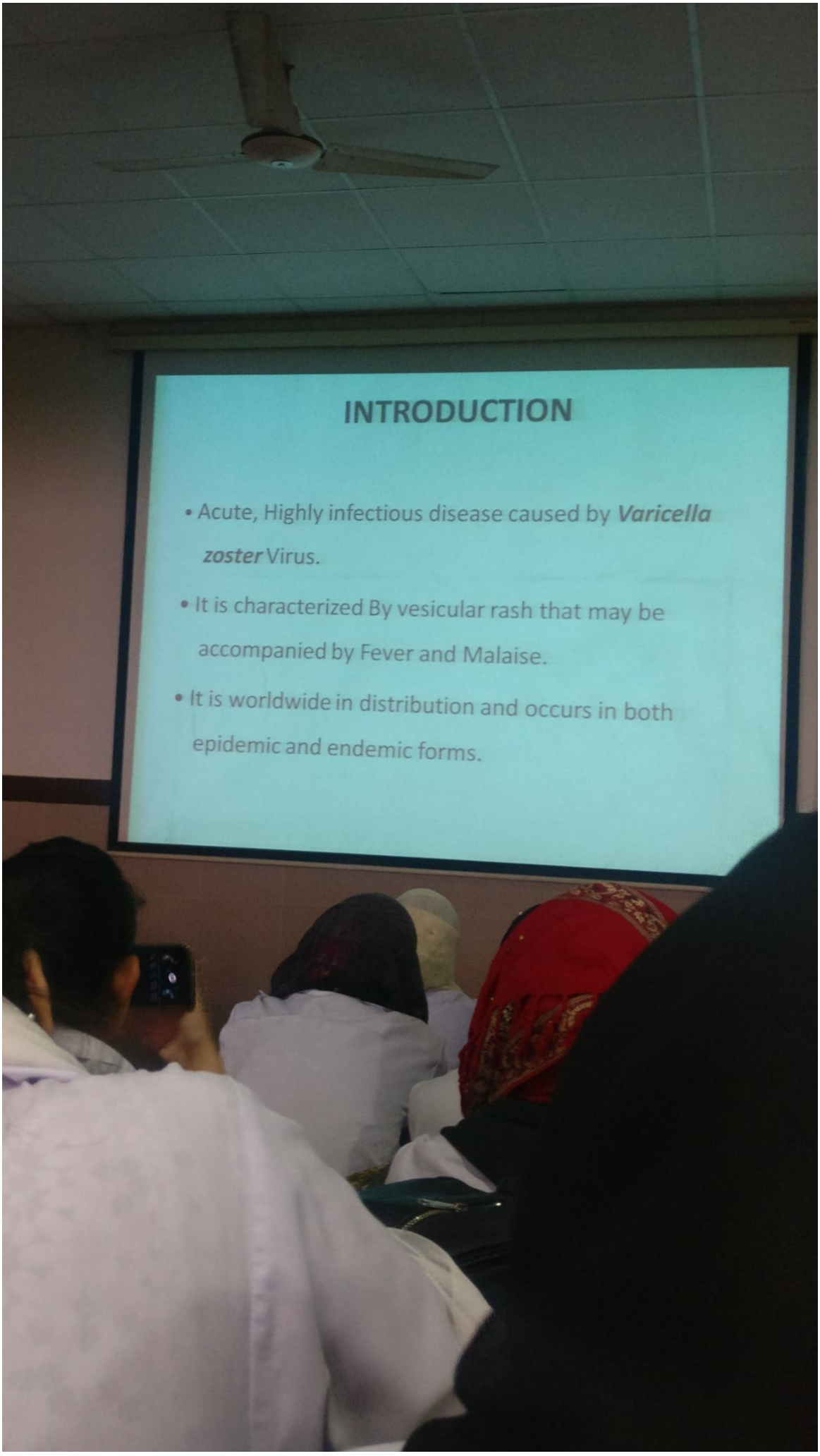

3. CNS
- Convulsions.....Hypoxemia,
Hemorrhage
- Encephalopathy

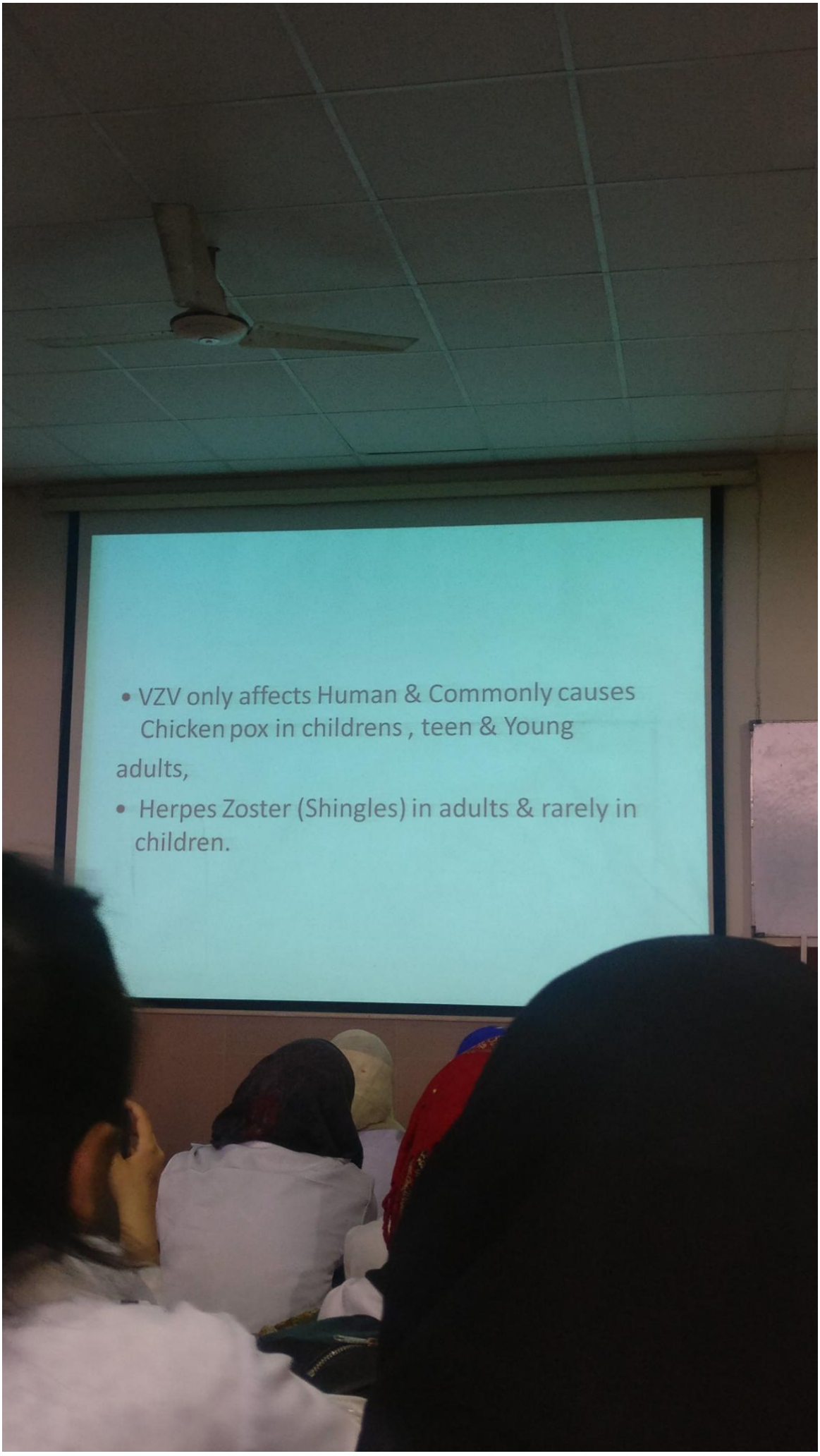

Treatment
• Specific
* Erythromycin 40-50 mg/kg/day for 14 d
* Clarithromycin 15 mg/kg for 7 d
*Azithromycin 10 mg/kg for 5 d
* Ineffective if given in paroxysmal stage

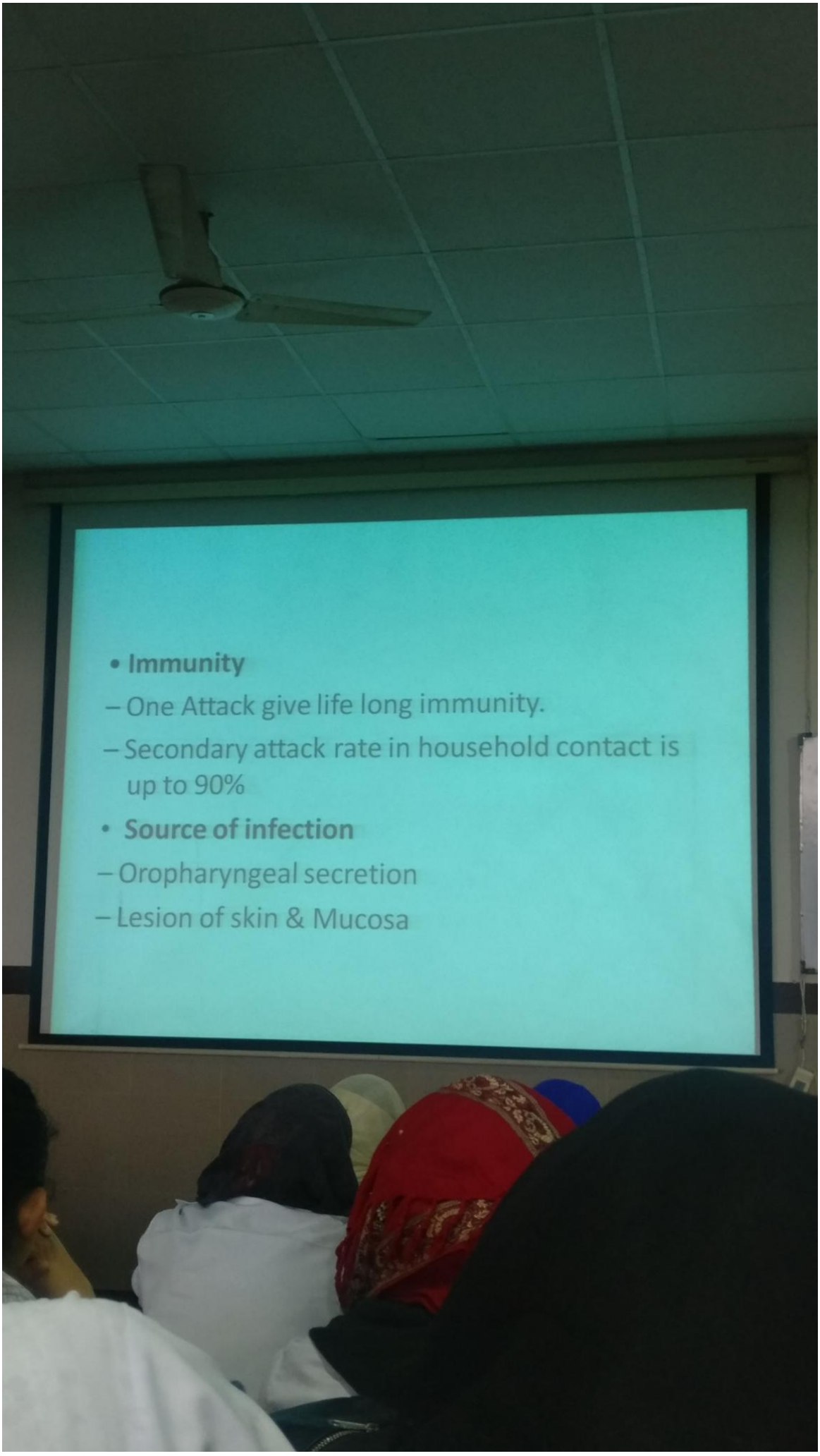

General Measures
* Young infants should be hospitalized
* Adequate hydration, Nutrition
* Oxygen
* Gentle suction
* Cough syrup have no role

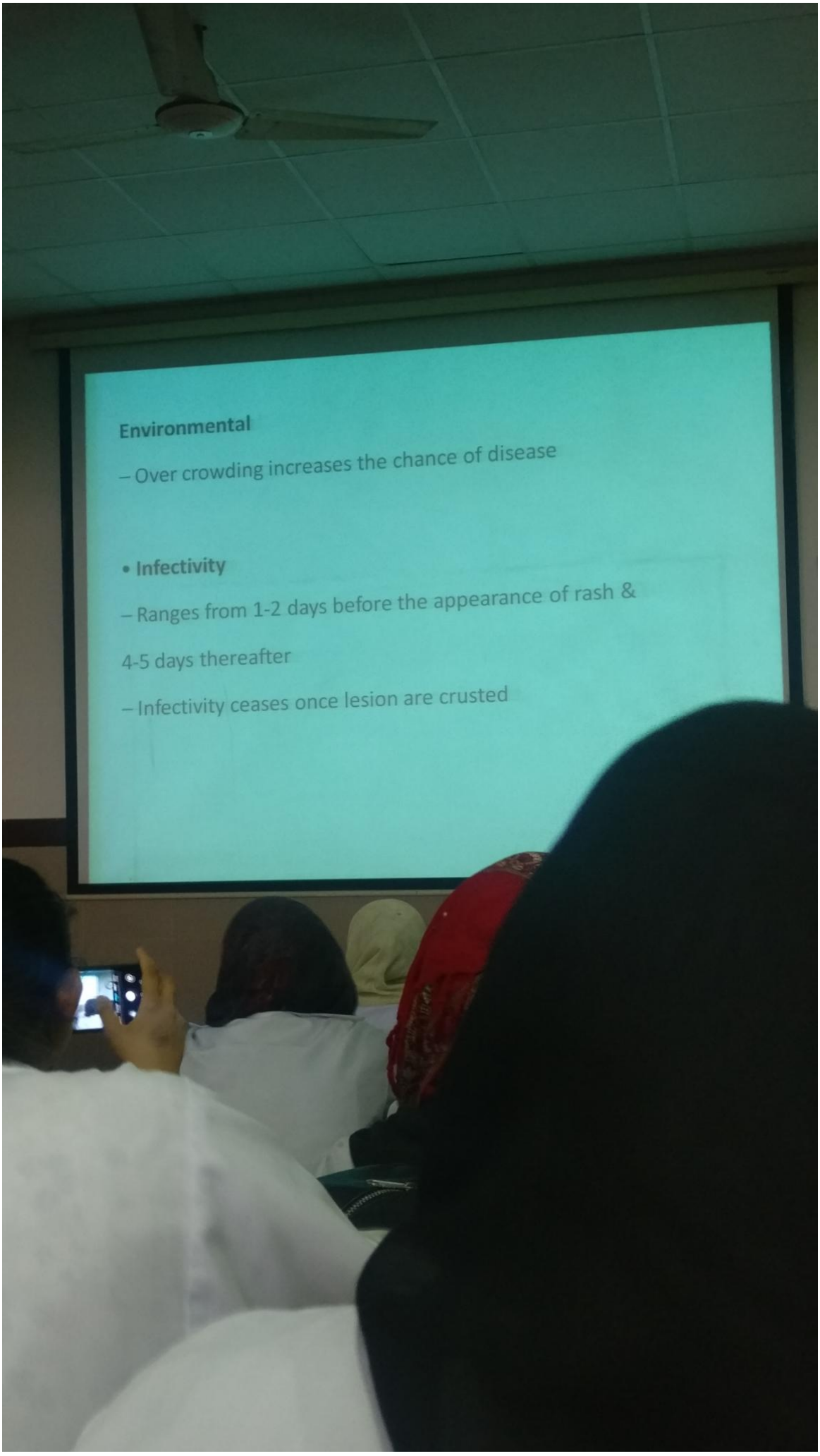

Prevention
* Pertussis vaccine is part of DPT vaccine
* All household contacts should get Erythromycin for 14 days
* Close contacts < 7 yr should get booster
* If documented pertussis infection exempt from routine pertussis vaccination

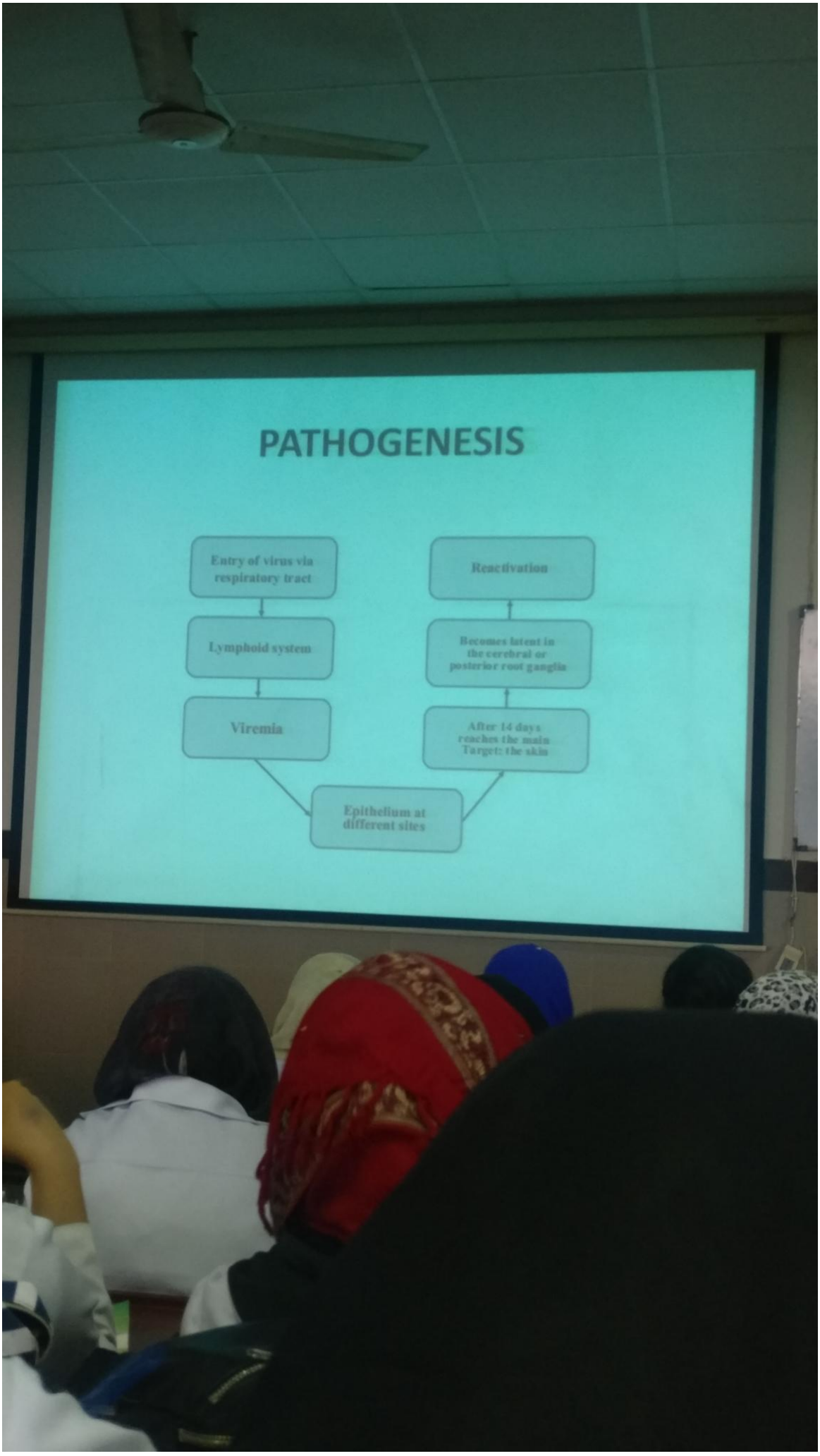

Chickenpox
Learning Objectives:
Explain clinical features
Make differential diagnosis of child with rash
Discuss treatment and prevention of chickenpox
Enlist complications

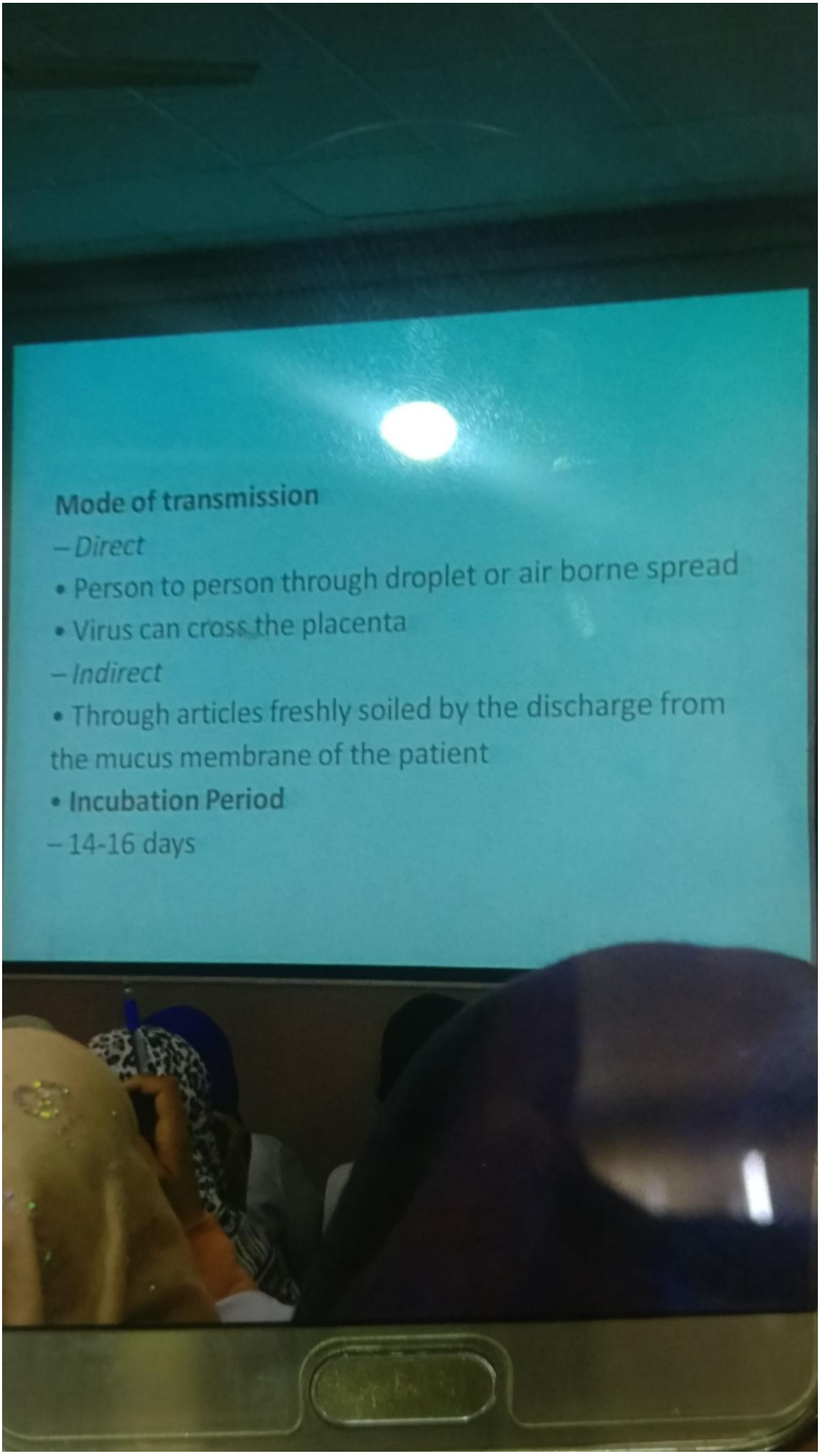

INTRODUCTION
• Acute, Highly infectious disease caused by *Varicella zoster* Virus.
• It is characterized By vesicular rash that may be accompanied by Fever and Malaise.
• It is worldwide in distribution and occurs in both epidemic and endemic forms.


• VZV only affects Human & Commonly causes Chicken pox in childrens , teen & Young adults,
• Herpes Zoster (Shingles) in adults & rarely in children.


• Immunity
– One Attack give life long immunity.
– Secondary attack rate in household contact is up to 90%
• Source of infection
– Oropharyngeal secretion
– Lesion of skin & Mucosa

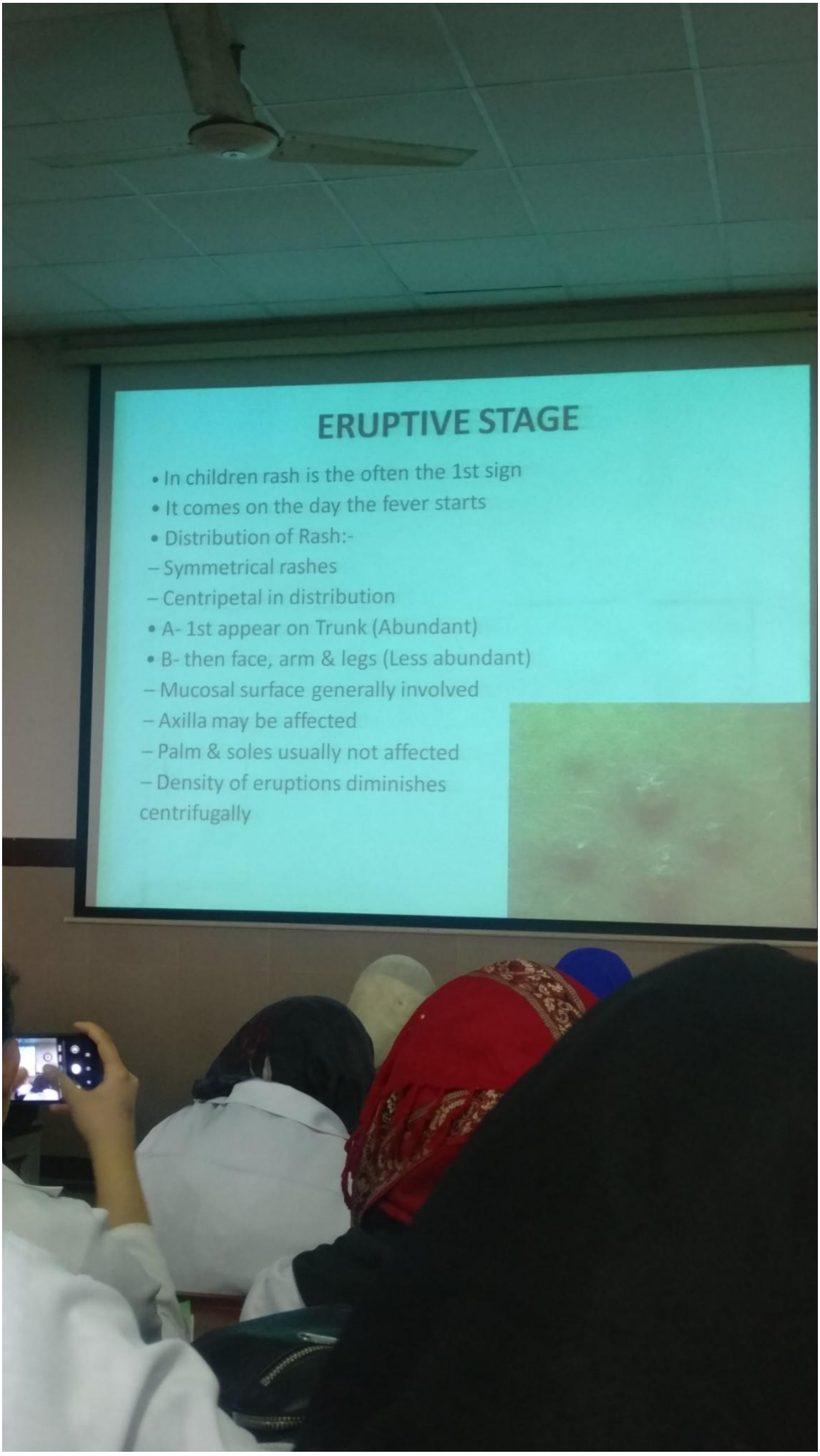

Environmental
– Over crowding increases the chance of disease
• Infectivity
– Ranges from 1-2 days before the appearance of rash &
4-5 days thereafter
– Infectivity ceases once lesion are crusted


PATHOGENESIS
Entry of virus via respiratory tract
Lymphoid system
Viremia
Epithelium at different sites
After 14 days reaches the main Target: the skin
Becomes latent in the cerebral or posterior root ganglia
Reactivation


Mode of transmission
– Direct
• Person to person through droplet or air borne spread
• Virus can cross the placenta
– Indirect
• Through articles freshly soiled by the discharge from the mucus membrane of the patient
• Incubation Period
– 14-16 days

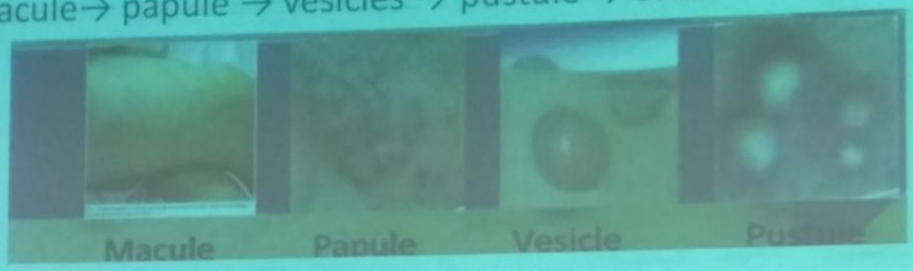
PRE-ERUPTIVE STAGE

- Onset is sudden with mild or moderate fever, pain in back, shivering & malaise.
- Very brief stage lasting for 24 hours.
- In adults more severe & last for 2-3 days before rash comes out.


ERUPTIVE STAGE
• In children rash is the often the 1st sign
• It comes on the day the fever starts
• Distribution of Rash:-
– Symmetrical rashes
– Centripetal in distribution
• A- 1st appear on Trunk (Abundant)
• B- then face, arm & legs (Less abundant)
– Mucosal surface generally involved
– Axilla may be affected
– Palm & soles usually not affected
– Density of eruptions diminishes centrifugally

Rapid Evolution

– Macule→ papule → vesicles → pustule → scab



Pleomorphism

- All stage of rash may be seen simultaneously at one time in same area
- This is due to appearing in successive crop for 4 to 5 days in same area

Fever

- Does not run high but shows exacerbation with each fresh crop of eruption

COMPLICATIONS

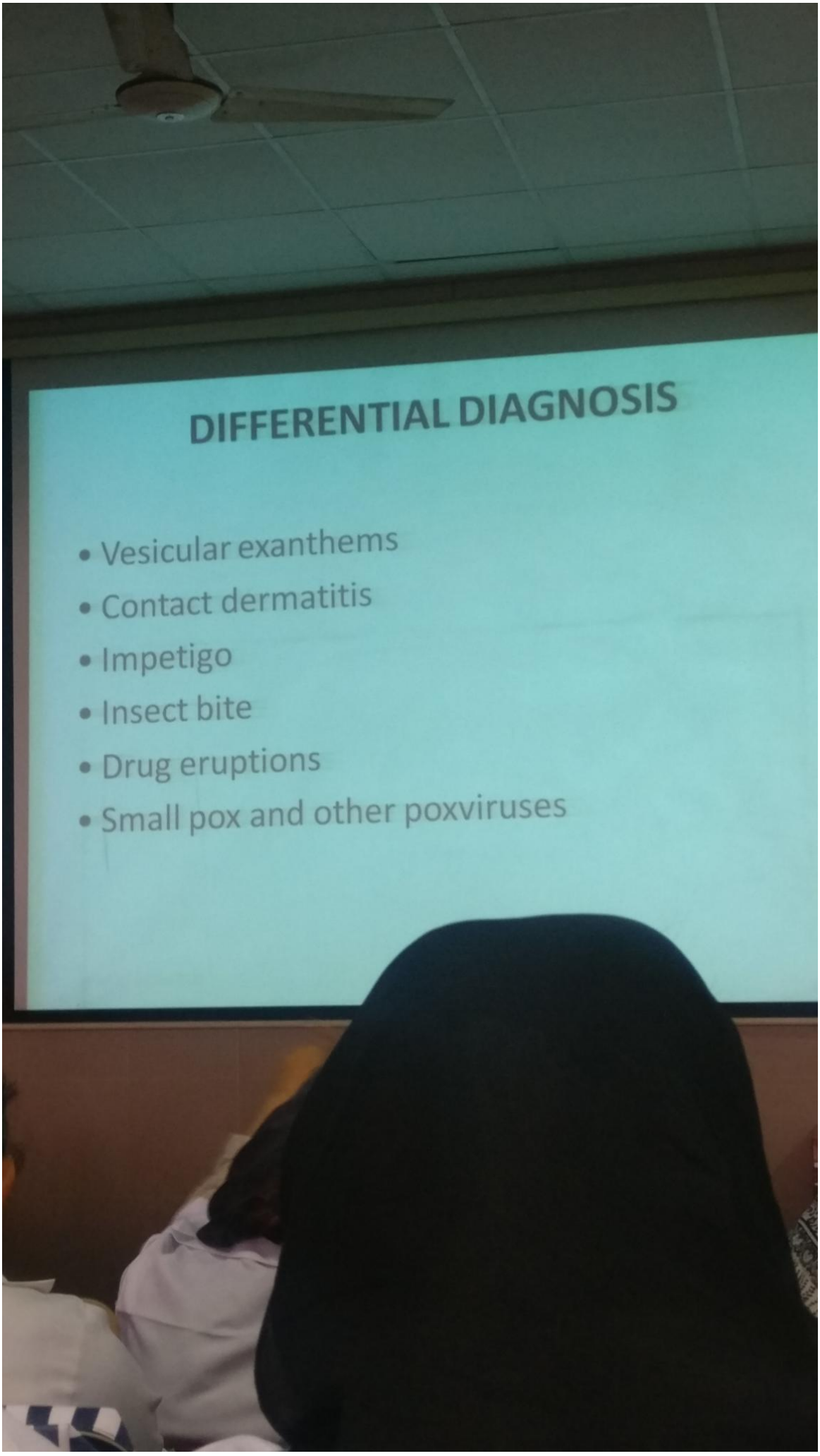
- In most cases, chicken pox a mild, self-limiting disease.

The mortality is less than 1 % in uncomplicated cases.

- Varicella Hemorrhage
- Pneumonia
- Encephalitis
- Acute cerebellar ataxia
- Reye's syndrome
- Fetal death and Birth defects

DIAGNOSIS

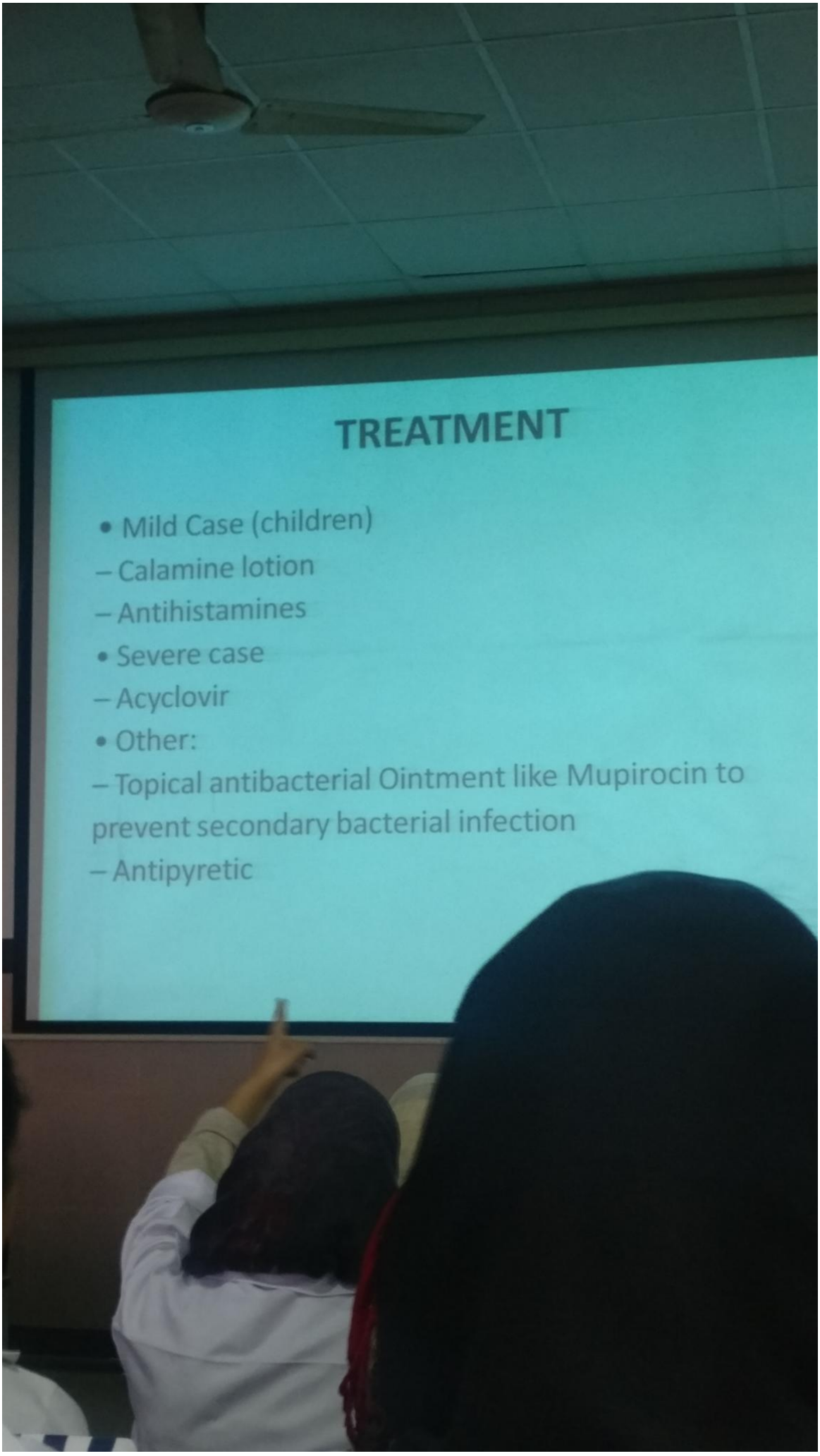
– Prodrome of low-grade fever
– Eruption of papules, vesicles and pustule
– Typical Dew-drop on Rose petal appearance
– Characteristic centripetal distribution


DIFFERENTIAL DIAGNOSIS
• Vesicular exanthems
• Contact dermatitis
• Impetigo
• Insect bite
• Drug eruptions
• Small pox and other poxviruses

INVESTIGATION

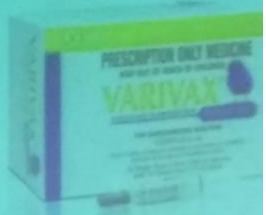
- In doubtful cases **Tzank-smear Done from** floor of vesicles

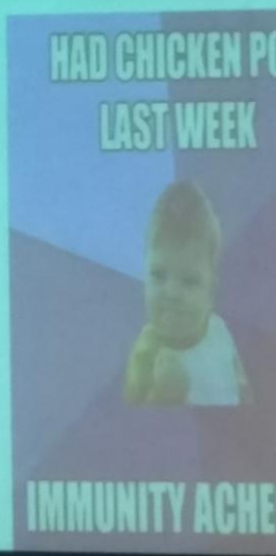
– Floor of vesicles show multinucleated giant cells.

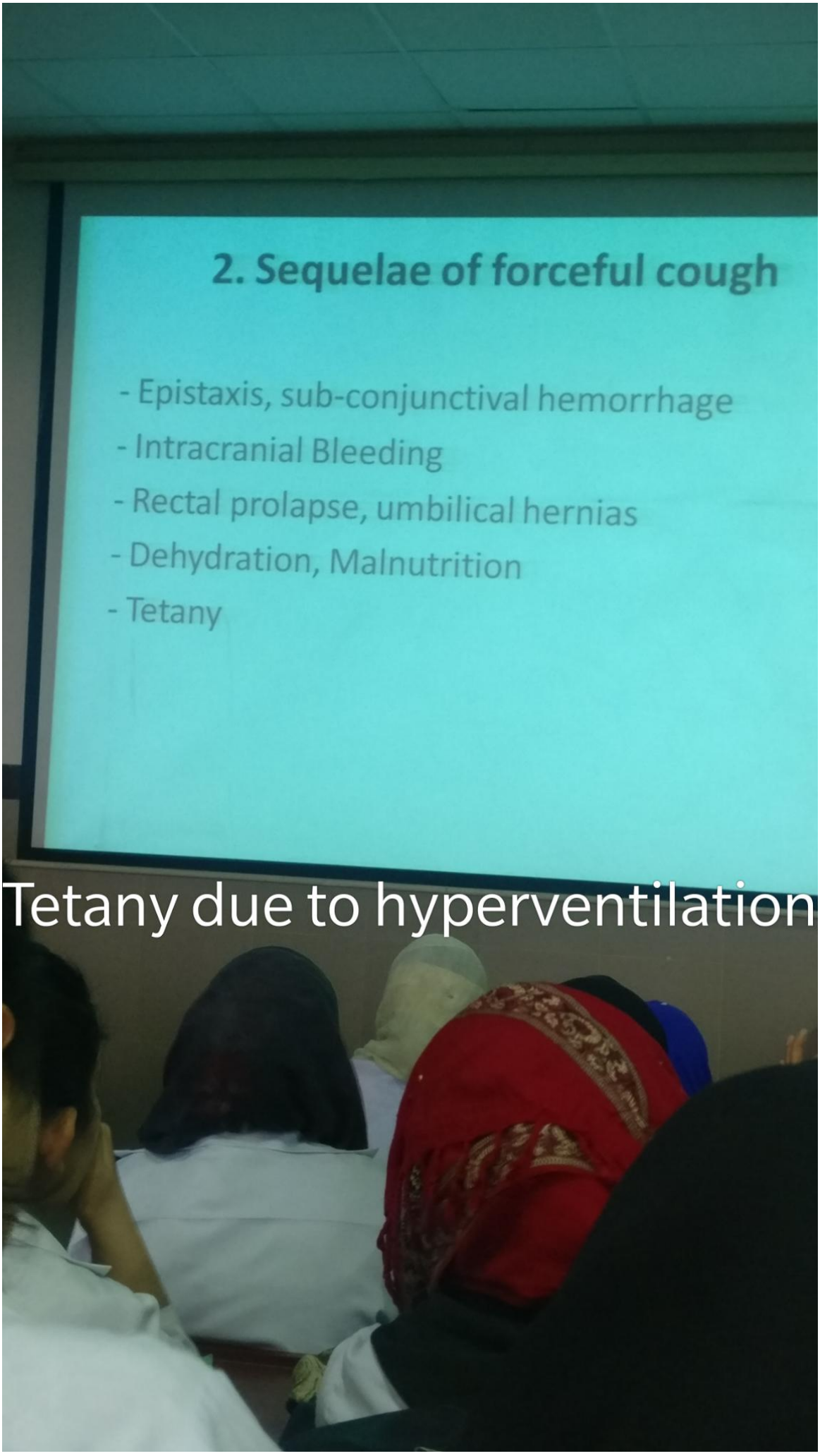

TREATMENT
• Mild Case (children)
– Calamine lotion
– Antihistamines
• Severe case
– Acyclovir
• Other:
– Topical antibacterial Ointment like Mupirocin to prevent secondary bacterial infection
– Antipyretic

PREVENTION & CONTROL

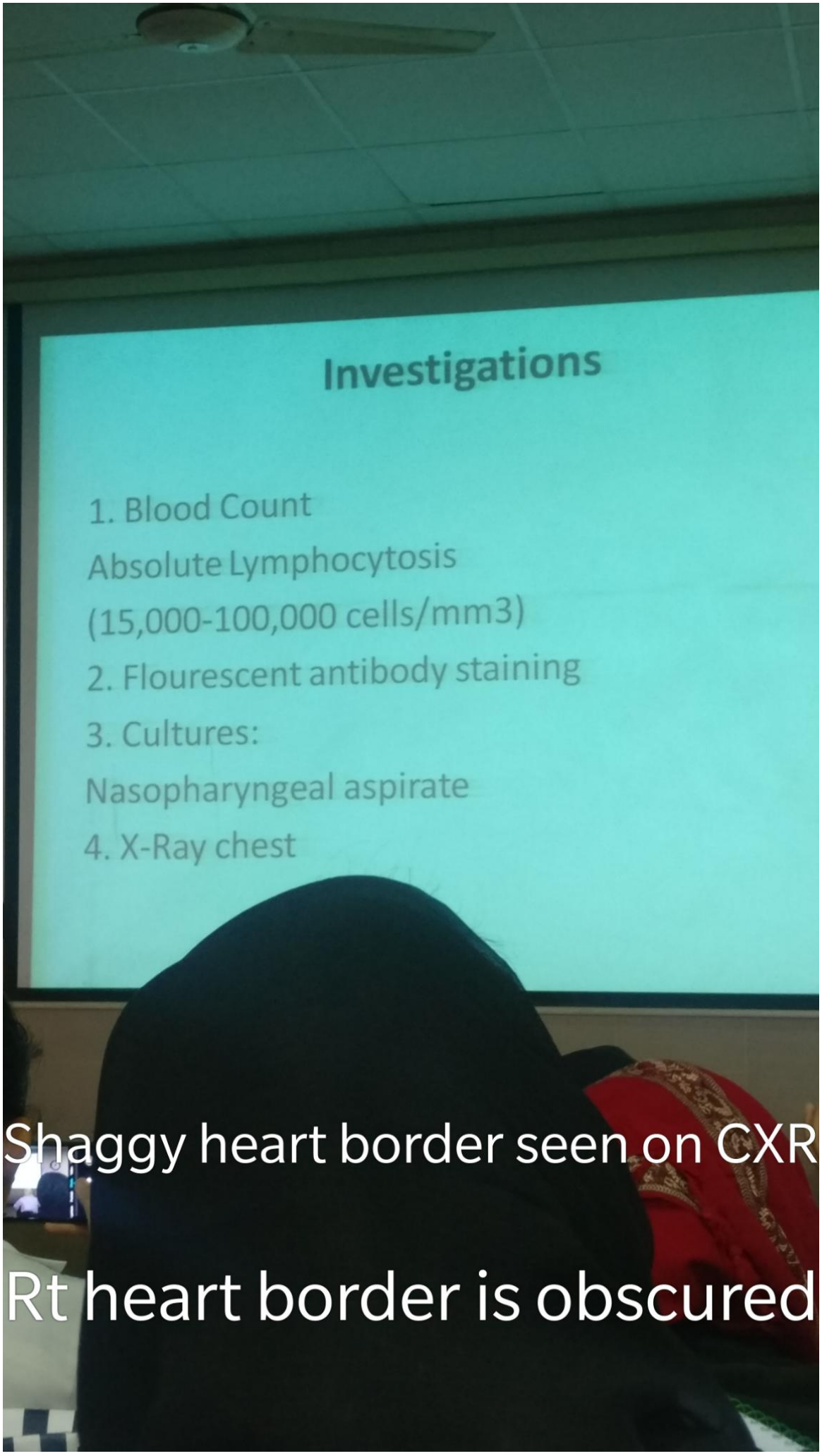
- Control:
  - Notification to the health authorities
  - Isolation for 1 week
  - Contact with susceptible patient is avoided
  - Disinfection of articles soiled by nose and throat discharge
- Prevention:
  - Live attenuated vaccine in susceptible patients
  - hyperimmunoglobulin







Tetany due to hyperventilation


Investigations
1. Blood Count
Absolute Lymphocytosis
(15,000-100,000 cells/mm3)
2. Flourescent antibody staining
3. Cultures:
Nasopharyngeal aspirate
4. X-Ray chest
Shaggy heart border seen on CXR
Rt heart border is obscured