Management of cough in children

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Outline of the presentation

- Burden of cough in children

- The cough reflex arc: understanding the physiology of cough

- Causes of cough

- Approach to clinical assessment of a child with cough

- Treatment

Burden of cough

- Cough is one of the most common symptoms in children

  more than 40% of outpatient visits are due to cough

- A survey in urban settings in Uganda showed high prevalence of persistent cough (20-90%) in children from household using biomass as cooking energy.

- One of the most common reasons for irrational use of antibiotics and cough syrups for children

Polverino et.al 2012, Yaya s et.al. 2019, Coker,E. 2020

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Impact of cough

Cough has a negative impact on a child's quality of life.

It affects:

- Play/social interactions
- Sleep
- School performance
- Feeding

It also causes a lot of anxiety and stress to caregivers and teachers

It is associated with high healthcare costs

Reasons for seeking care

- Associated symptoms e.g. vomiting, fever, difficult breathing

- Long/unusual duration

- Concern that there may be a serious underlying illness

- Perceived severity – usually not objectively measured in terms of frequency, duration, or intensity;

- Sleep disruption for child and caregiver/parent

- Disturbing effect on teacher/classmates

What is cough?

- Cough is a physiological response to airway irritation.

- It plays a big role in protecting the airways and maintenance of airway patency (defensive reflex)

- Main functions of cough
  - Prevent the entry of food and fluids into the lower airways (Aspiration)
  - Removal of material, which (due to its quantity, size, or other characteristics) exceeds the transport capacity of the mucociliary system.

It can be voluntary or in response to a stimulus and can be both reflexive and nonreflexive, such as behavioural cough

Physiology of cough:

Cough Reflex Arch: Comprises three pathways

Afferent pathway: Sensory nerve fibers (branches of the vagus nerve) located in the ciliated epithelium of the upper airways (pharynx, larynx,) gastric, cardiac and esophageal branches from the diaphragm.

Central Pathway (cough center): a central coordinating region for coughing (upper brain stem and pons).

Efferent pathway: Impulses from the cough center →vagus, phrenic, and spinal motor nerves to diaphragm, abdominal wall muscles

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Physiology of cough

- Triggers such as cold, chemical irritants, touch activate cough receptors (URT, LRT, diaphragm, pericardium, stomach)

- Types of cough receptors
  - ✓ **Mechanical cough receptors** can be stimulated by triggers such as touch, displacement, or acidity
  - ✓ **Chemical cough receptors** stimulated b by cold, heat, capsaicin-like compounds, and other chemical irritants

- Activation of the receptors causes stimulation of the cough reflex arc

Physiology of cough-illustrated
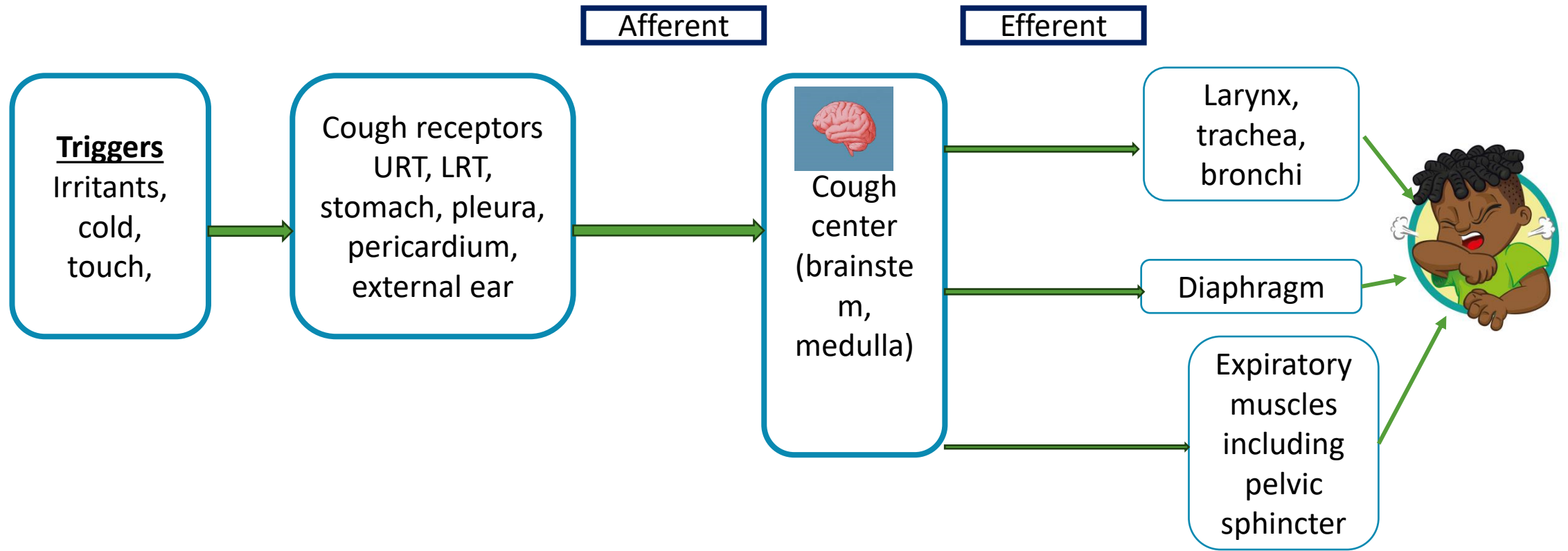
Causes of cough

Cough in children is predominantly due to infections

Pulmonary

Infections

- Viral- most common cause
- Bacterial
- Fungal
- Mycobacterium tuberculosis

Others

- Foreign body
- Bronchiectasis
- Inflammatory diseases- asthma
- Pulmonary hypertension
- Genetic conditions- cystic fibrosis

Extrapulmonary

- Heart failure
- GIT Disorders –
  - Gastric Reflux
  - Gastro-oesphageal fistula

Types of cough according to duration

Type of cough	Duration
Acute	Less than 3 weeks
Sub-acute	3 up to 8 weeks
Chronic	8 weeks or more

NB: Other sources classify chronic cough in children any lasting 4 or more weeks

Types of cough based on pattern

❖Recurrent cough = repetitive acute coughs with periods of relief for a a week or so and then re-occur.

❖Persistent cough – a form of chronic cough; may only wane or progressively increase
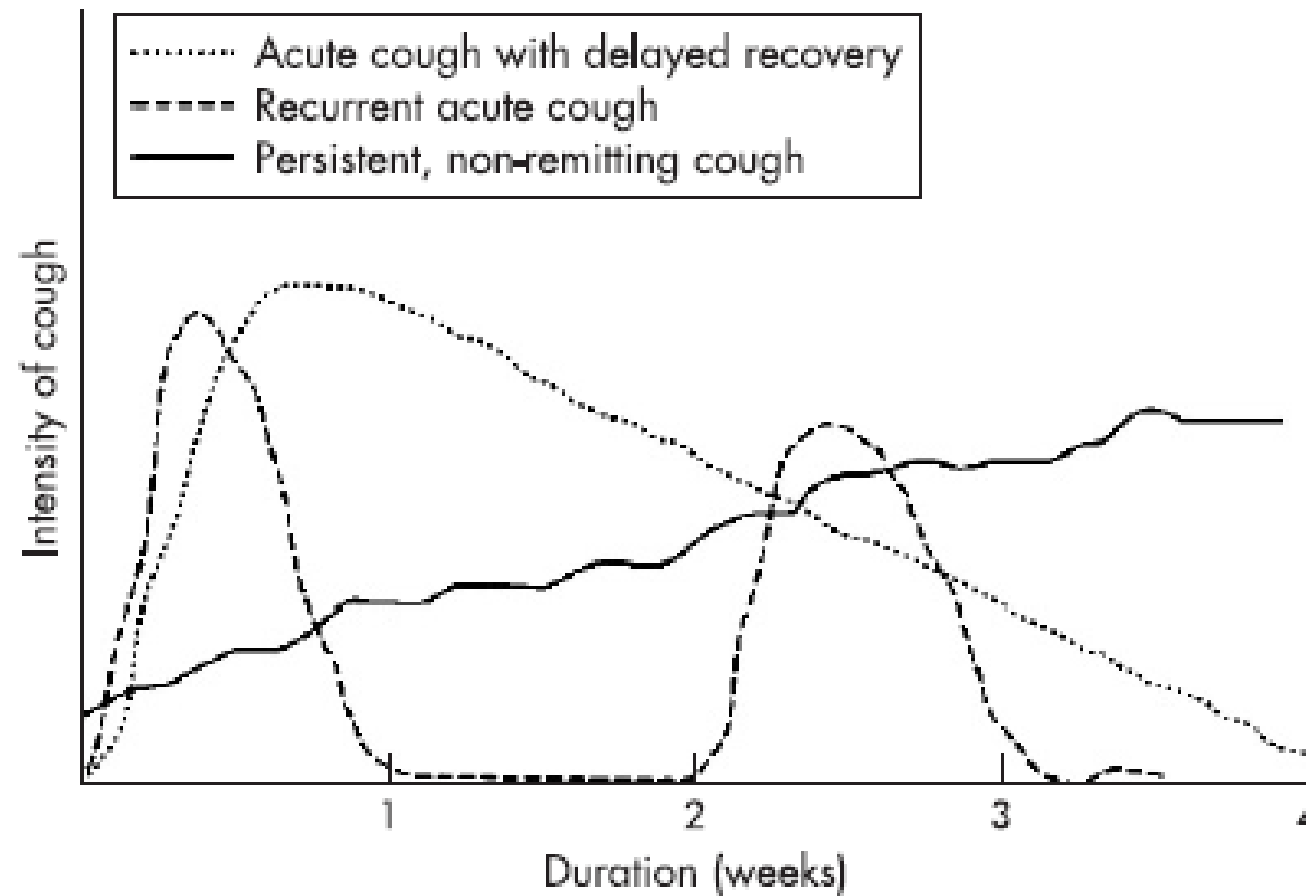
Cough patterns

Figure 1 Illustration of how patterns of cough intensity vary over time. Reproduced with permission of the publishers from Marais *et al*[21].
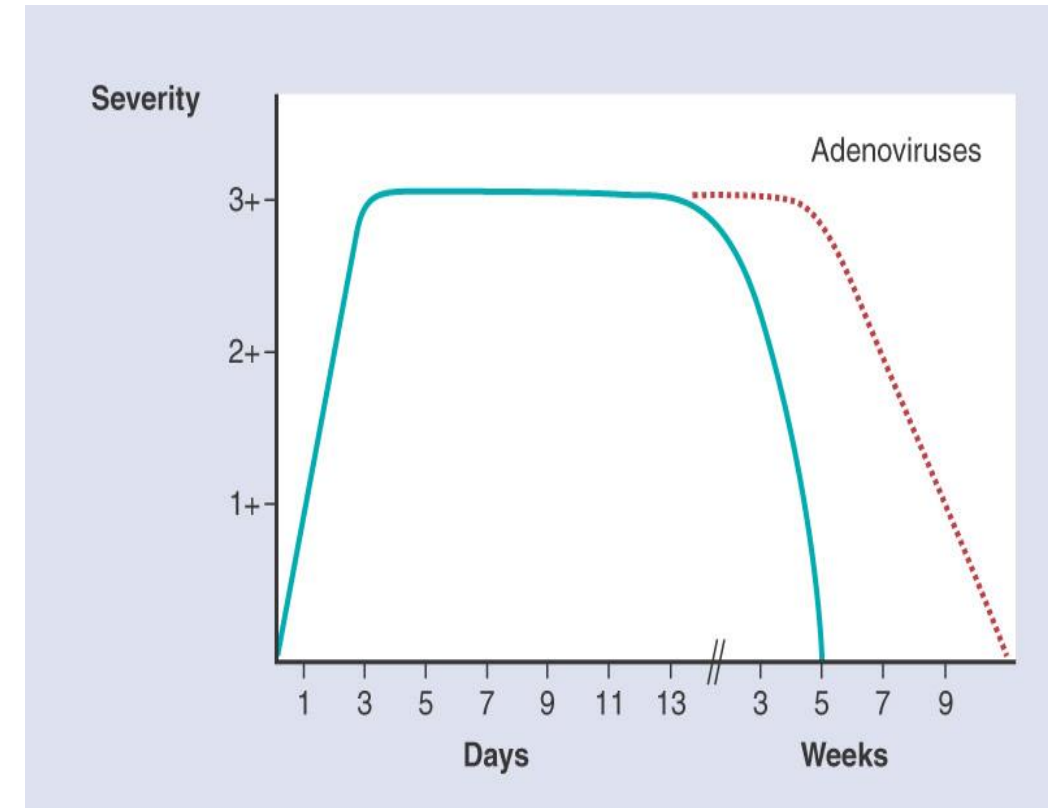
Recurrent or 'nasty' viral infections account for most children with isolated recurrent, prolonged or chronic coughs

Coughs due to viral RTI

- Average cough duration <u>1-3 weeks</u>

- Persistent cough and muco-purulent secretions common for weeks after URTI

- Cough is first and last symptom to resolve

- No effective Rx

Approach to assessment of cough

The main purpose of investigating a   cough is to exclude any treatable or serious underlying condition

A comprehensive observatory and accurate history taking is essential

and

A thorough physical Examination to identify a possible underlying cause

OXFORD

Health Workers' Practices in Assessment and Management of Children with Respiratory Symptoms in Primary Care Facilities in Uganda: A FRESH AIR Descriptive Study

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TABLE 2. Health workers' practices in eliciting history and signs of respiratory illnesses in children with cough and/or difficult breathing (N = 218)

Characteristics	Frequency asked by health worker [missing]	Percentage (%)
Core symptoms		
Fever	75 [5]	34.4
Recurrent cough	13 [8]	6.0
Difficult breathing during this illness	16 [6]	7.3
Recurrent difficult breathing	5 [6]	2.3
Noisy breathing	8 [5]	3.7
Wheezing during this illness	5 [6]	2.3
Night or early morning cough	15 [6]	6.9
At least one of the above except fever	36 [3]	16.5
History of asthma triggers asked, n = 7 (3.2) [4][a]		
Upper respiratory tract infections	0	0.0
Dusty environment	0	0.0
Biomass smoke	2	29.0
Cigarette smoke	1	14.0
Aerosols	0	0.0
Changes in temperature (cold)	1	14.0
Keeping animals at home	0	0.0
Exercise-induced symptoms (incl. crying/laughing)	1	14.0
Other relevant history, n = 17 (7.8) [2][a]		
History of allergy in child	3	18.0
Family history of allergy	4	24.0
Family history of asthma	3	18.0
Previous medications asked, n = 44 (20.2) [3]		
Salbutamol	2	5.0
Steroids	2	5.0
Clinical examination (n = 218)	Frequency assessed by health worker [missing]	
Expose the child's chest	47 [8]	21.8
Respiratory rate taken	23 [8]	10.6
Checked for chest in-drawing	22 [15]	10.1
Listen for audible wheeze	8 [8]	3.7
Listen for auscultatory wheeze	30	13.8
Checked throat/oropharynx	23	10.6

Things you need to ask about the cough

- When did it start? (duration)
- How did it start ?
- What "air does the child" breath everyday/exposures?
- Attending day care or not?
- Did or does it always start with a cold/fever ?
- What kind of cough? Wet/dry/paroxysmal
- Productive or not?
- What is the pattern day/night?
- Does it go away and then recur? (recurrent vs persistent)
- What are the triggers and what helps?

Examples

- Cough present for <3 months, especially if spasmodic and disturbs sleep, requires consideration of pertussis syndrome

- Cough in infant with feeding – likelihood of TOF/GERD

- Coughs in the night or early morning and cessation of cough after a short course of an oral corticosteroid is consistent with asthma

- Cough present since neonatal period, history of transient tachypnea of newborn, and chronic otitis media warrants consideration of primary ciliary dyskinesia

- Repetitive cough absent once asleep indicates likelihood of habit cough syndrome

Differential diagnoses of chronic cough in children

Isolated cough: otherwise healthy child:

- Recurrent viral bronchitis

- Post-infectious cough

- Cough variant asthma

- Postnasal drip

- Psychogenic cough
  - Habit ("tic" like)
  - Bizarre honking cough

- Gastro-oesophageal reflux

Isolated cough: significant underlying cause:

- Chronic suppurative lung disease

- Immune deficiencies

- Recurrent pulmonary aspiration
  - e.g. TOF

- Retained inhaled foreign body

- Primary ciliary dyskinesia

- Cystic fibrosis

- Chronic bronchitis

de Jongste JC, Shields MDCough Thorax 2003;58:998-1003.

Treating significant isolated chronic cough

Treatment

- Chronic purulent rhinosinusitis

- Persistent bronchitis/ wet cough

- Possible asthma

- Environmental exposures e.g. Smokers, daycare

- Habit cough

- Antibiotics if > 10 days ; topical nasal decongestants

- Antibiotics 10 -14 days and review

- Trial of asthma Rx: oral steroids (5 days) or 3 months ICS. Stop Rx and observe, if symptoms re-occur, most likely asthma –treat as such

- Smoking cessation, Consider removing from daycare for a while

- Counsel, behavioural interventions, chlorpromazine or pholcodeine.

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OTC medications and antibiotics for treating the COUGH

- **Antibiotics**: bacterial pneumonia, chronic bronchitis, purulent rhinosinusitis, tonsillitis (Strep), otitis media, not for colds

- **Mucolytics:** no evidence

- **Antitussives:** ineffective

- **Anti-histamines:** chronic allergic rhinitis

- **Decongestants**: no evidence

- **Topical /nasal steroids**: allergic rhinitis

- **Systemic or inhaled steroids::** asthma, viral triggered cough/wheeze

- **LTRA** e.g. Montelukast: mild asthma, viral-triggered cough/wheeze

Unmet need and data gaps in paediatric cough (Research gaps)

- Understanding different cough phenotypes and their treatment
- Effectiveness of over-the-counter drugs
- Controlled clinical trial for therapy for habit cough
- Lack of established international guidelines for acute or chronic paediatric cough.
- Economic burden of cough: individual, families, health systems
- Why HCWs and parents give antibiotics and cough syrups to 'break the cough'?

Vogelberg et al. BMC Pediatrics (2023)

Take home messages

- A careful detailed history is essential

- Identify coughing patterns and associated factors

- Evaluate the patient

- Investigations are mostly indicated for persistent symptoms or features of serious underlying illness

- Parents must be counselled that antibiotics will not cure a cough – most coughs in young children are viral.

- Trials of therapies must be stopped if no benefit or unlikely the reason for symptom improvement.

- Re-assure, re-assure and re-assure….

Acknowledgements

Contributions from:

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