CHRONIC COUGH

Saroj Choudhary, MD
Pediatric Pulmonary
Ochsner Children Hospital

DISCLOSURE STATEMENT:

There are no conflicts of interest or disclosures relevant to this presentation.

OBJECTIVE

Discuss updated CHEST chronic cough guidelines and consensus statements published in 2020 based upon high-quality systematic reviews to assist general and specialist medical practitioners in the evaluation and management of children who present with chronic cough.

[Education and Clinical Practice Guidelines and Consensus Statements]

CHEST

Managing Chronic Cough as a Symptom in Children and Management Algorithms

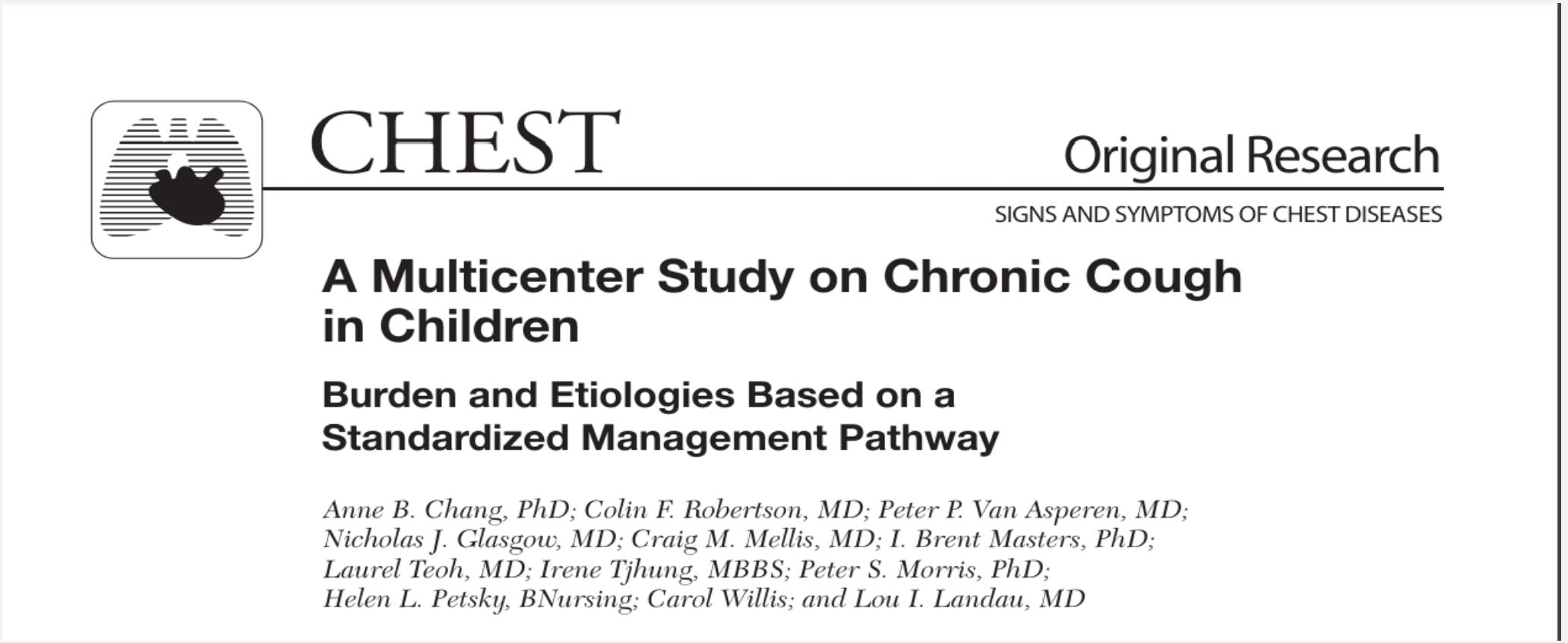
CHEST Guideline and Expert Panel Report

*Anne B. Chang, PhD; John J. Oppenheimer, MD; and Richard S. Irwin, MD, Master FCCP; on behalf of the CHEST Expert Cough Panel**

Check for updates

DEFINING CHRONIC COUGH IN CHILDREN

- For children aged </= 14 years, suggest defining chronic cough as the presence of daily cough of more than 4 weeks in duration (Ungraded Consensus-Based Statement).



CHEST

Original Research

SIGNS AND SYMPTOMS OF CHEST DISEASES

A Multicenter Study on Chronic Cough in Children

Burden and Etiologies Based on a Standardized Management Pathway

Anne B. Chang, PhD; Colin F. Robertson, MD; Peter P. Van Asperen, MD; Nicholas J. Glasgow, MD; Craig M. Mellis, MD; I. Brent Masters, PhD; Laurel Teoh, MD; Irene Tjhung, MBBS; Peter S. Morris, PhD; Helen L. Petsky, BNursing; Carol Willis; and Lou I. Landau, MD

- Prospective multicenter cohort study was conducted in Australia.
- 346 children with chronic cough were included in this study and evaluated using cough algorithm.
- 17.6% of children had a serious underlying diagnosis (bronchiectasis, aspiration, cystic fibrosis). Except for protracted bacterial bronchitis, the frequency of other common diagnoses (asthma, bronchiectasis, resolved without specific-diagnosis) was similar across age categories.

EVALUATING CHILDREN WITH CHRONIC COUGH

Clinical History and Examination:

- Recommend basing the management or testing algorithm on cough characteristics and the associated clinical history such as using specific cough pointers like presence of productive/wet cough (Grade 1A).

COUGH CHARACTERISTIC

Cough Characteristic	Suggested Underlying Etiology or Contributing Factor
Barking or brassy cough	Croup,[34] tracheomalacia,[35] habit cough[36]
Cough productive of casts	Plastic bronchitis[37]
Honking	Psychogenic[38]
Paroxysmal (with/ without whoop)	Pertussis and parapertussis[39,40]
Staccato	Chlamydia in infants[41]

POINTERS TO PRESENCE OF SPECIFIC COUGH:

Abnormality	Examples of etiology
Symptoms or signs	
Auscultatory findings	Wheeze–see below Crepitations–any airway lesions (from secretions) or parenchyma disease such as interstitial disease
Cardiac abnormalities	Associated airway abnormalities, cardiac failure, arrhythmia
Chest pain	Arrhythmia, asthma
Choked	Foreign body inhalation
Dyspnea or tachypnea	Any pulmonary airway or parenchyma disease
Chest wall deformity	Any pulmonary airway or parenchyma disease
Digital clubbing	Suppurative lung disease
Daily wet/productive cough	Protracted bacterial bronchitis, suppurative lung disease, recurrent aspiration, atypical infections, TB, diffuse panbronchiolitis
Exertional dyspnea	Any airway or parenchymal disease
Facial pain/purulent nasal discharge	Chronic sinusitis (protracted bacterial bronchitis), primary ciliary dyskinesia
Feeding difficulties	Any serious systemic including pulmonary illness, aspiration
Growth failure	Any serious systemic including pulmonary illness such as cystic fibrosis

POINTERS TO PRESENCE OF SPECIFIC COUGH:

Hoarse voice/stridor	Laryngeal cleft/problems, airway abnormalities
Hemoptysis	Suppurative lung disease, vascular abnormalities
Hypoxia/cyanosis	Any airway or parenchyma disease, cardiac disease
Neurodevelopmental abnormality	Aspiration lung disease
Recurrent pneumonia	Immunodeficiency, atypical infections, suppurative lung disease, congenital lung abnormalities, trachea-esophageal H-type fistulas
Recurrent infections	Immunodeficiency
Previous history of chronic lung or esophageal disease (eg, neonatal lung disease, esophageal atresia)	Multiple causes (eg, second H-type fistula, bronchiectasis, aspiration, asthma)
Wheeze–monophonic	Large airway obstruction (eg, from foreign body aspiration, malacia and/or stenosis, vascular rings, lymphadenopathy, and mediastinal tumors) TB should be considered in selected settings (eg, high prevalence or HIV)
Wheeze–polyphonic	Asthma, bronchiolitis obliterans, bronchiolitis
Tests	
Chest radiograph (other than peribronchial changes) or spirometry abnormality	Any cardiopulmonary disease

INVESTIGATION:

- Recommend that a chest radiograph and, when age appropriate, spirometry be undertaken (Grade 1B).
- Recommend not routinely performing additional tests (eg, skin prick test, Mantoux, bronchoscopy, chest CT); these should be individualized and undertaken in accordance to the clinical setting and the child’s clinical symptoms and signs (Grade 1B).
- Suggest undertaking tests evaluating recent Bordetella pertussis infection when pertussis is clinically suspected (Ungraded Consensus-Based Statement).

ADDITIONAL TEST:

- Chest CT: digital clubbing, hypoxia, concern about abnormal anatomy.
- Sinus CT: In a prospective study, 50% of 137 children aged < 13 years had sinus CT scans consistent with sinusitis but all were asymptomatic.

ADDITIONAL TEST:

Flexible Bronchoscopy (FB) and BAL and Cellular Assessment:

Indications for FB in children with chronic cough include

(a) suspicion of airway abnormality or inhaled foreign body

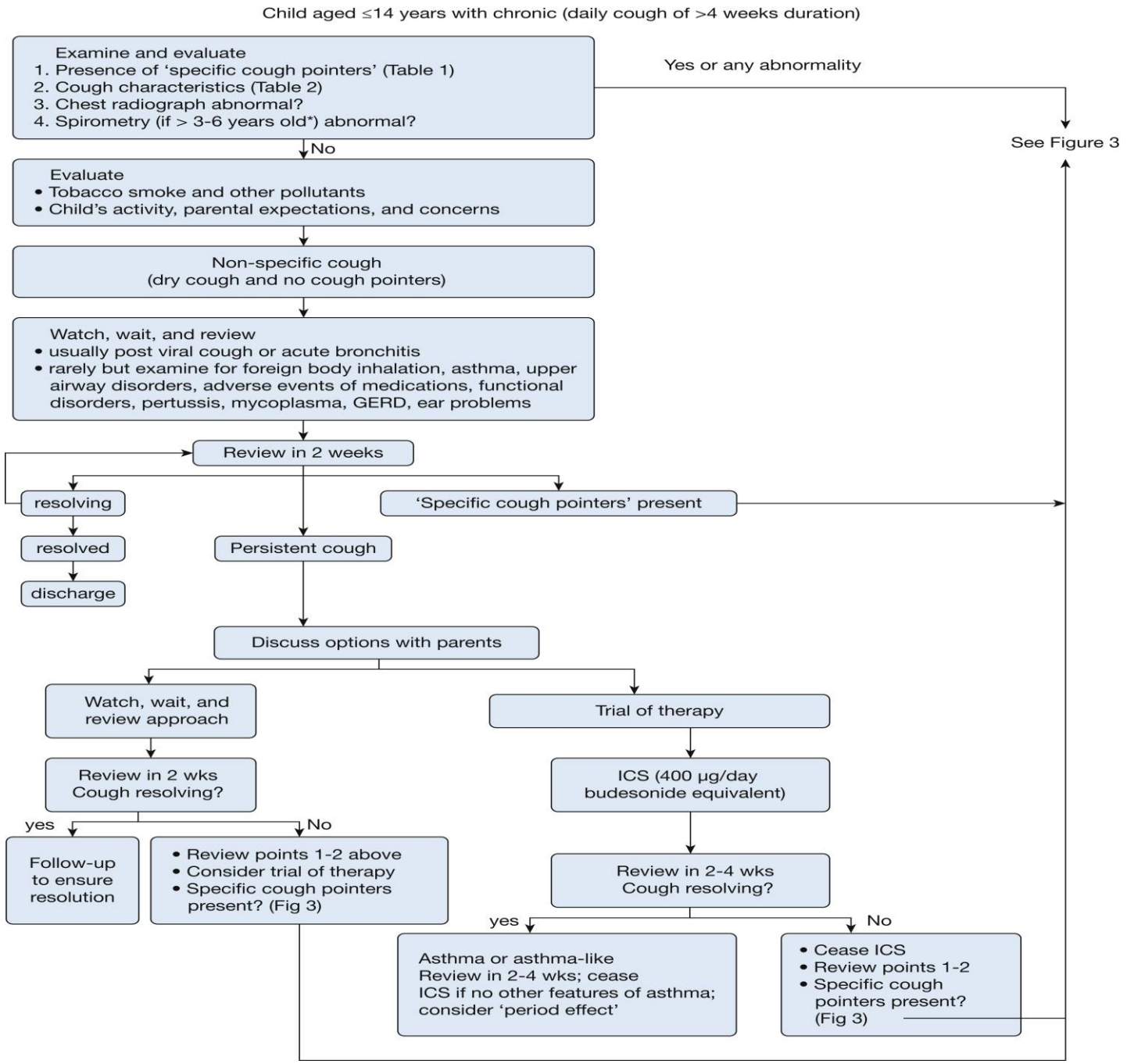
(b) localized changes on radiology of the chest

(c) evaluation of aspiration lung disease

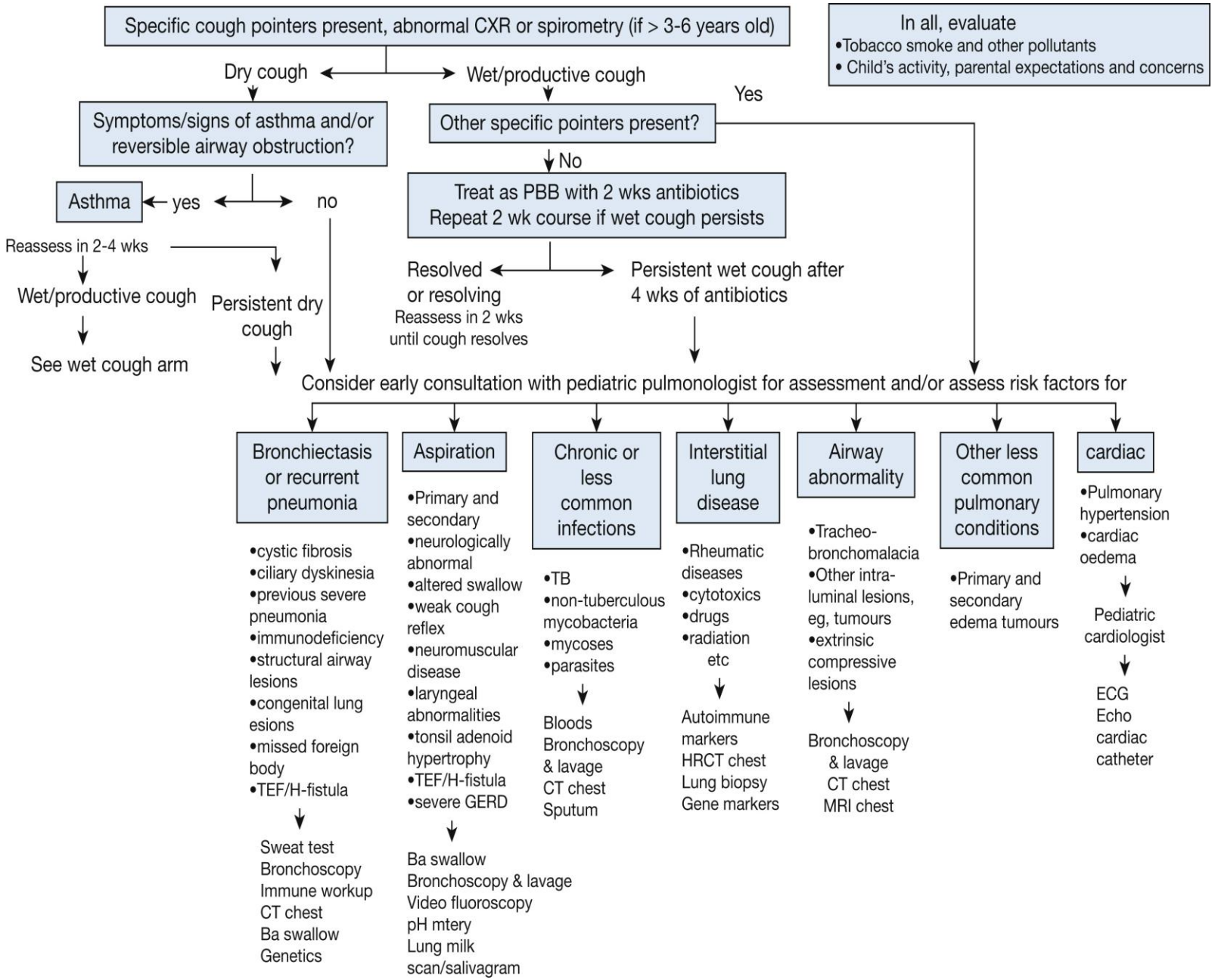
(d) lavage for microbiological, cellularity and other purposes.

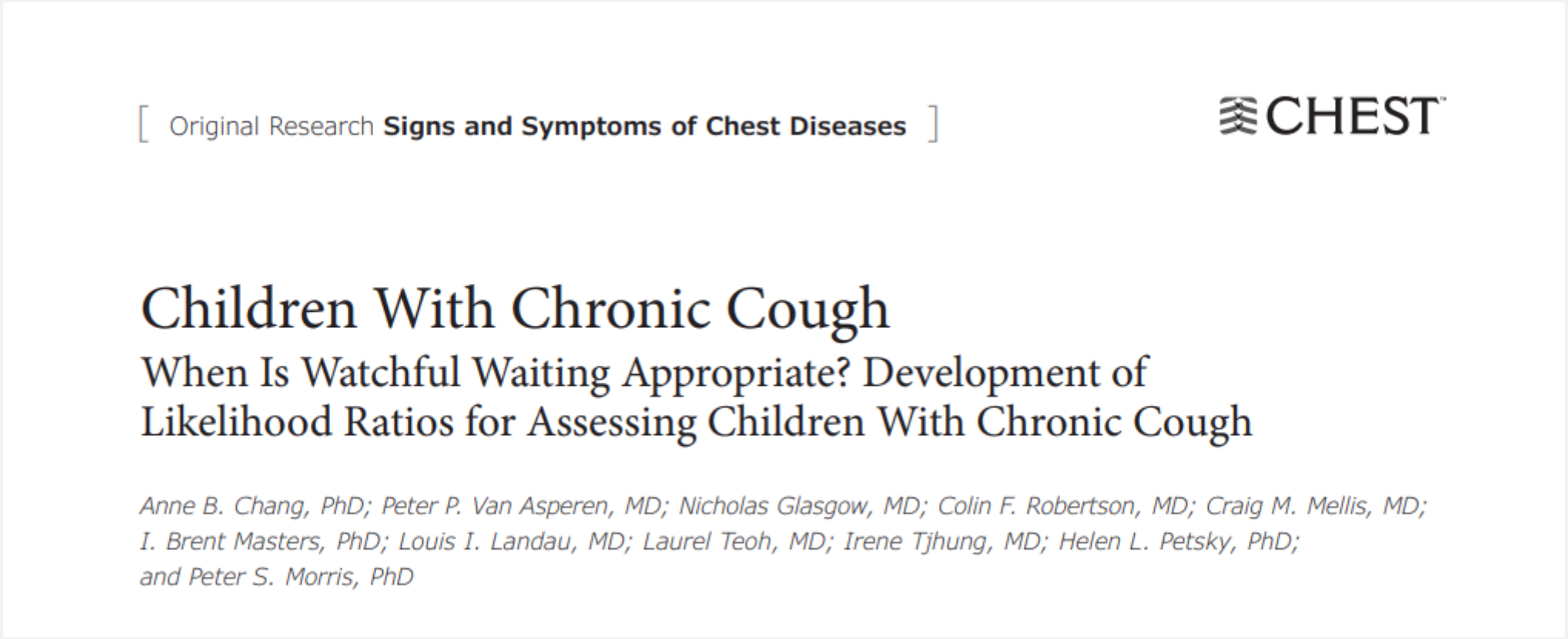
A retrospective aero-digestive clinic based study: 243 patients with complete data who underwent triple endoscopy, 203 (83.5%) children had at least one positive finding.

CHRONIC COUGH ALGORITHM:



CHRONIC COUGH ALGORITHM:





[Original Research **Signs and Symptoms of Chest Diseases**]

CHEST

Children With Chronic Cough

When Is Watchful Waiting Appropriate? Development of Likelihood Ratios for Assessing Children With Chronic Cough

Anne B. Chang, PhD; Peter P. Van Asperen, MD; Nicholas Glasgow, MD; Colin F. Robertson, MD; Craig M. Mellis, MD; I. Brent Masters, PhD; Louis I. Landau, MD; Laurel Teoh, MD; Irene Tjhung, MD; Helen L. Petsky, PhD; and Peter S. Morris, PhD

- Children with chronic dry cough without any cough pointers can be safely managed using the watchful waiting approach. The high pretest probability and high positive LRs of cough pointers support the use of individual cough pointers to identify high risk of specific cough in pediatric chronic cough guidelines.

TREATMENT AND EVALUATION OF TREATMENT

- An empirical approach aimed at treating upper airway cough syndrome due to a rhinosinus condition, gastroesophageal reflux disease and/or asthma should not be used unless other features consistent with these conditions are present (Grade 1A)
- If an empirical trial is used based on features consistent with a hypothesized diagnosis, the trial should be of a defined limited duration in order to confirm or refute the hypothesized diagnosis (Ungraded Consensus-Based Statement)

TREATMENT AND EVALUATION OF TREATMENT

- Suggest that exacerbating factors such as environmental tobacco smoke exposure should be determined and intervention options for cessation advised or initiated (Ungraded Consensus-Based Statement).

- Statement from American Academy of Pediatrics:

"Health care delivery systems should facilitate the effective prevention, identification, and treatment of tobacco dependence in children and adolescents, their parents, and other caregivers."

TREATMENT AND EVALUATION OF TREATMENT

- Suggest that parental (and when appropriate the child's) expectations be determined, and their specific concerns sought and addressed (Ungraded Consensus Based Statement).

- Single and multicenter studies involving children presenting for the first time to respiratory specialists with chronic cough found that:

(a) approximately 80% had seen > 5 doctors for their cough.

(b) their QoL was as poor as those with other chronic diseases (eg, cardiac and GI diseases)

(c) approximately 12% had a serious underlying illness (eg, bronchiectasis)

TREATMENT AND EVALUATION OF TREATMENT

Physician and Parental Expectations……

- Patients who expected medication were nearly **3 times** more likely to receive medication.
- When the general practitioner thought the patient expected medication the patient was **10 times** more likely to receive it.

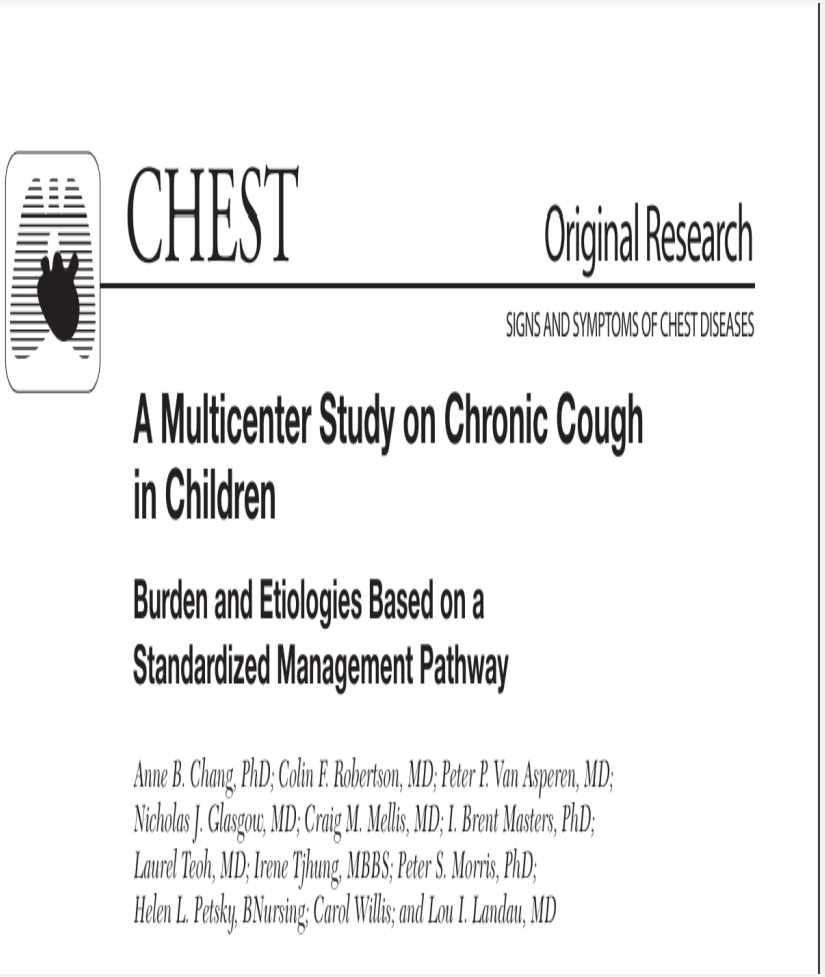
Hutton and colleagues described that “parents who wanted medicine at the initial visit reported more improvement at follow-up, regardless of whether the child received drug, placebo, or no treatment”

CHRONIC COUGH ASSOCIATED WITH SPECIFIC ETIOLOGIES

Wet Cough and Protracted bacterial bronchitis (PBB):

- The evidence using antibiotics for a chronic wet cough when there no other symptoms and signs (eg, dysphagia or digital clubbing) suggesting PBB is strong.

CHRONIC COUGH ASSOCIATED WITH SPECIFIC ETIOLOGIES



CHEST

Original Research

SIGNS AND SYMPTOMS OF CHEST DISEASES

A Multicenter Study on Chronic Cough in Children

Burden and Etiologies Based on a Standardized Management Pathway

Anne B. Chang, PhD; Colin F. Robertson, MD; Peter P. Van Asperen, MD; Nicholas J. Glasgow, MD; Craig M. Mellis, MD; I. Brent Masters, PhD; Laurel Teoh, MD; Irene Tjhung, MBBS; Peter S. Morris, PhD; Helen L. Petsky, BNursing; Carol Willis; and Lou I. Landau, MD

TABLE 2] OR of Symptoms, Signs, and Chest Radiograph and Spirometry Abnormalities of the Various Groups Compared With Spontaneous Resolution

		Specific Cough-All Causes (n = 286)		PBB (n = 138)		Asthma (n = 52)		Bronchiectasis (n = 29)	
Specific Pointers (at Initial Visit)	No. Resolved Without Medications (ie, Spontaneously Resolved) (n = 40)	No.	OR (95% CI)	No.	OR (95% CI)	No.	OR (95% CI)	No.	OR (95% CI)
Wet cough	1	187	73.7 (10-544.2)[a]	138	(Infinite)[a]	7	6.1 (0.7-51.5)	27	527 (45.4-6,102)[a]
Wheeze or reversible airway obstruction	0	60	21.2 (1.3-349.8)[a]	17	11.4 (0.7-195.2)	41	312.2 (17.7-5,509)[a]	0	NA
Exertional dyspnea	0	9	2.7 (0.15-47.6)	5	3.3 (0.2-60.6)	3	5.7 (0.3-113.7)	1	4.3 (0.2-109.7)
Differential airway sounds	0	8	2.4 (0.14-42.7)	4	2.7 (0.1-50.5)	0	NA	2	7.5 (0.3-161.5)
Failure to thrive	0	1	0.4 (0.02-10.4)	0	NA	1	2.3 (0.1-59.2)	0	NA
Feeding difficulties	0	16	4.8 (0.3-82.2)	7	4.5 (0.3-81.3)	0	NA	6	22.8 (1.2-424.3)[a]
Recurrent PBB	0	21	6.4 (0.4-108.1)	12	7.9 (0.5-135.9)	0	NA	5	18.4 (1.0-349.7)[a]
Wet cough not resolved after 4 wk	0	10	3.0 (0.2-52.4)	0	NA	0	NA	2	7.5 (0.3-161.5)
Digital clubbing	0	3	1.0 (0.05-19.3)	0	NA	0	NA	2	7.5 (0.3-161.5)
Suspected medications	0	0	NA	0	NA	0	NA	0	NA
Crepitations present	0	6	1.8 (0.1-32.4)	2	1.5 (0.07-31.0)	0	NA	3	10.8 (0.5-218.9)
Hyperinflated or pectus carinatum	1	5	0.7 (0.08-6.1)	4	2.7 (0.1-50.5)	0	NA	1	4.3 (0.2-109.7)
Chest pain	0	1	0.4 (0.02-10.4)	0	NA	1	2.3 (0.1-59.2)	0	NA
Recurrent pneumonia	0	10	3.0 (0.2-52.4)	4	2.7 (0.1-50.5)	0	NA	6	22.8 (1.2-424.3)[a]
Chest radiograph abnormal	0	58	20.3 (1.2-335.4)[a]	31	23.4 (1.4-391.0)[a]	9	17.7 (1.0-313.5)[a]	10	41.6 (2.3-750)[a]
Spirometry abnormal	0	8	2.4 (0.14-42.7)	2	1.5 (0.07-31.0)	5	9.3 (0.5-174.3)	1	4.3 (0.2-109.7)

Diagnostic groups are primary diagnosis. Some children within a diagnostic group had more than one diagnosed condition. ORs of all conditions were compared with the resolved spontaneously group. The nonsignificance of other pointers are likely related to low frequency of the pointer and the small sample size. NA = not applicable. See Table 1 legend for expansion of other abbreviation.

[a]Statistically significant findings.

CHRONIC COUGH ASSOCIATED WITH SPECIFIC ETIOLOGIES

PBB….

- Chronic (> 4 weeks duration) wet or productive cough unrelated to an underlying disease and without any other specific cough pointers, recommend 2 weeks of antibiotics targeted to common respiratory bacteria (Streptococcus pneumoniae, Haemophilus influenzae, Moraxella catarrhalis) targeted to local antibiotic sensitivities s (Grade 1A).
- Cough resolves within 2 weeks of treatment with antibiotics targeted to local antibiotic sensitivities, recommend that the diagnosis of PBB be made (Grade 1C).
- Wet cough persists after 2 weeks of appropriate antibiotics, recommend treatment with an additional 2 weeks of the appropriate antibiotic(s) (Grade 1C).

CHRONIC COUGH ASSOCIATED WITH SPECIFIC ETIOLOGIES

PBB….

- Wet cough persists after 4 weeks of appropriate antibiotics, suggest that further investigations (eg, flexible bronchoscopy with quantitative cultures and sensitivities with or without chest CT) be undertaken (Grade 2B).

CHRONIC COUGH ASSOCIATED WITH SPECIFIC ETIOLOGIES

GERD:

- There is little current convincing evidence that GER is a common cause of isolated chronic cough.
- In summary, the CHEST panelists recommended that: (i) treatment(s) for GERD should not be used when there are no GI clinical features of GERD; and (ii) pediatric GERD guidelines should be used to guide treatment and investigations.

CHRONIC COUGH ASSOCIATED WITH SPECIFIC ETIOLOGIES

Bronchiolitis:

- Suggest that the cough be managed according to the CHEST pediatric chronic cough guidelines, asthma medications not be used for the cough unless other evidence of asthma is present, and inhaled osmotic agents not be used (Ungraded Consensus-Based Statement).

CHRONIC COUGH ASSOCIATED WITH SPECIFIC ETIOLOGIES

Somatic Cough Syndrome (psychogenic cough) and Tic Cough (habit cough):

- Suggest that the presence or absence of night time cough or cough with a barking or honking character should not be used to diagnose or exclude psychogenic or habit cough (Grade 2C).
- Recommend that the diagnosis of tic cough be made when the patient manifests the core clinical features of tics that include suppressibility, distractibility, suggestibility and variability (Grade 1C).
- Trials of hypnosis or suggestion therapy or combinations of reassurance, counselling, or referral to a psychologist and/or psychiatrist.

CHRONIC COUGH ASSOCIATED WITH SPECIFIC ETIOLOGIES:

Cough Post-infections:

- The mean annual incidence of total respiratory illness per person year ranges from 5.0 to 7.95 in children aged < 4 years to 2.4 to 5.02 in children aged 10 to 14 years.
- Following URTIs, acute cough typically resolves within 1 to 3 weeks but 10% may cough for > 20 to 25 days.

CHRONIC COUGH ASSOCIATED WITH SPECIFIC ETIOLOGIES:

Asthma:

- Cough in children associated with asthma without a co-existent respiratory infection is usually dry.
- When airway profiles have been examined in children with isolated chronic cough, the studies have shown very few children with airway inflammation consistent with asthma.
- Persistent cough and recurrent chest colds without wheeze should not be considered a variant of asthma.

CHRONIC COUGH ASSOCIATED WITH SPECIFIC ETIOLOGIES:

Anatomical Airway Abnormalities and Cough:

- Airway malacia impedes clearance of secretions and it is plausible that the prolonged cough in these children relates to a bronchitic process distal to the lesion.
- Children with malacia found increased likelihood of respiratory illness frequency, severity, significant cough and a tendency for delayed recovery.

CHRONIC COUGH ASSOCIATED WITH SPECIFIC ETIOLOGIES:

Medications and Adverse Events:

- Angiotensin converting inhibitors (ACEI)
- Asthma medications immediately after inhalation
- Psychostimulant medications (eg, dextroamphetamine resulting in new onset tics)
- Etanercept
- Complication of chronic Vagus Nerve Stimulation

CHRONIC COUGH ASSOCIATED WITH SPECIFIC ETIOLOGIES:

Inhalation of Foreign Body:

- Although presentations are usually acute, chronic cough can also be the presenting symptom in a previously missed foreign body inhalation.

MANAGEMENT OF NON-SPECIFIC COUGH

- Suggest that if cough does not resolve within 2 to 4 weeks, the child should be re-evaluated for emergence of specific etiological pointers (Table 1) (Ungraded Consensus-Based Statement).
- Suggest when risk factors for asthma are present, a short (2-4 weeks) trial of 400 mg/day of beclomethasone equivalent may be warranted, and these children should always be re-evaluated in 2 to 4 weeks (Ungraded Consensus-Based Statement).

MANAGEMENT OF NON-SPECIFIC COUGH

- Suggest that the use of over the counter cough and cold medicines should not be prescribed until they have been shown to make cough less severe or resolve sooner (Ungraded Consensus-Based Statement).
- Suggest that honey may offer more relief for cough symptoms than no treatment, diphenhydramine, or placebo (Ungraded Consensus-Based Statement).
- Suggest avoiding using codeine-containing medications because of the potential for serious side effects including respiratory distress (Ungraded Consensus Based Statement).

CONCLUSION:

- Child-specific cough guidelines should be used for children aged </= 14 years.
- All children with chronic cough should have a thorough clinical review to identify pointers suggestive of an underlying respiratory and/or systemic illness.
- Cough in children should be treated based on etiology and there is no evidence for using medications for symptomatic relief of cough.
- If medications are used, children must be followed up and medications ceased if there is no effect on the cough within an expected timeframe.
- Environmental influences should be discussed and managed accordingly.

THANK YOU!