CHEST

Use of Management Pathways or Algorithms in Children With Chronic Cough

CHEST Guideline and Expert Panel Report

Anne B. Chang, MBBS, PhD, MPH; John J. Oppenheimer, MD; Miles M. Weinberger, MD, FCCP; Bruce K. Rubin, MD; Kelly Weir, BSpThy, MSpPath, PhD, CPSP; Cameron C. Grant, MBChB, PhD; Richard S. Irwin, MD, Master FCCP; on behalf of the CHEST Expert Cough Panel

BACKGROUND: Using management algorithms or pathways potentially improves clinical outcomes. We undertook systematic reviews to examine various aspects in the generic approach (use of cough algorithms and tests) to the management of chronic cough in children (aged ≤ 14 years) based on key questions (KQs) using the Population, Intervention, Comparison, Outcome format.

METHODS: We used the CHEST Expert Cough Panel's protocol for the systematic reviews and the American College of Chest Physicians (CHEST) methodological guidelines and Grading of Recommendations Assessment, Development and Evaluation framework. Data from the systematic reviews in conjunction with patients' values and preferences and the clinical context were used to form recommendations. Delphi methodology was used to obtain the final grading.

RESULTS: Combining data from systematic reviews addressing five KQs, we found high-quality evidence that a systematic approach to the management of chronic cough improves clinical outcomes. Although there was evidence from several pathways, the highest evidence was from the use of the CHEST approach. However, there was no or little evidence to address some of the KQs posed.

CONCLUSIONS: Compared with the 2006 Cough Guidelines, there is now high-quality evidence that in children aged ≤ 14 years with chronic cough (> 4 weeks' duration), the use of cough management protocols (or algorithms) improves clinical outcomes, and cough management or testing algorithms should differ depending on the associated characteristics of the cough and clinical history. A chest radiograph and, when age appropriate, spirometry (pre- and post-β_2 agonist) should be undertaken. Other tests should not be routinely performed and undertaken in accordance with the clinical setting and the child's clinical symptoms and signs (eg, tests for tuberculosis when the child has been exposed).

CHEST 2017; 151(4):875-883

KEY WORDS: cough; evidence-based medicine; guidelines; pediatrics

ABBREVIATIONS: ACCP = American College of Chest Physicians; AHR = airway hyperresponsiveness; KQ = key question; LR = likelihood ratio; PC-QOL = Parent Cough-Specific Quality of Life; PedsQL = Pediatric Quality of Life Inventory; PICO = Population, Intervention, Comparison, Outcome; PV = predictive value; QoL = quality of life; RCT = randomized controlled trial

AFFILIATIONS: From the Menzies School of Health Research (Dr Chang), Respiratory Department, Lady Cilento Children's Hospital, and Queensland University of Technology, QLD, Australia; New Jersey Medical School (Dr Oppenheimer) and Pulmonary and Allergy Associates, Morristown, NJ; UMass Memorial Medical Center (Dr Irwin), Worcester, MA; Lady Cilento Children's Hospital (Dr Weir), Brisbane, Australia; Children's Hospital of Richmond at Virginia Commonwealth University (Dr Rubin), Richmond, VA; Department of Paediatrics, Child and Youth Health (Dr Grant), Faculty of Medicine and Health Sciences, The University of Auckland, Auckland, New Zealand; and Pediatric Allergy, Immunology, and Pulmonology Division (Dr Weinberger), University of Iowa Children's Hospital, Iowa City, IA.

Summary of Recommendations/Suggestions

1. For children aged ≤ 14 years, we suggest defining chronic cough as the presence of daily cough of at least 4 weeks in duration (Ungraded, Consensus Based Statement).

2. For children aged ≤ 14 years with chronic cough, we suggest that an assessment of the effect of cough on the child and the family be undertaken as part of the clinical consultation (Ungraded, Consensus Based Statement).

3. For children aged ≤ 14 years with chronic cough, we recommend using pediatric-specific cough management protocols or algorithms (Grade 1B).

4. For children aged ≤ 14 years with chronic cough, we recommend taking a systematic approach (such as using a validated guideline) to determine the cause of the cough (Grade 1A).

5. For children aged ≤ 14 years with chronic cough, we 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).

6. For children aged ≤ 14 years with chronic cough, we recommend basing the management on the etiology of the cough. 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).

7. For children aged ≤ 14 years with chronic cough, we suggest that 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).

8. For children aged ≤ 14 years with chronic cough, we recommend that a chest radiograph and, when age appropriate, spirometry (pre- and post-β_2 agonist) be undertaken (Grade 1B).

9. For children aged ≤ 14 years with chronic cough, we suggest undertaking tests evaluating recent *Bordetella pertussis* infection when pertussis is clinically suspected (Ungraded, Consensus Based Statement).

10. For children aged ≤ 14 years with chronic cough, we recommend not routinely performing additional tests (eg, skin prick test, Mantoux, bronchoscopy, chest CT); these should be individualized and undertaken in accordance with the clinical setting and the child's clinical symptoms and signs (Grade 1B).

11. For children aged > 6 years and ≤ 14 years with chronic cough and asthma clinically suspected, we suggest that a test for airway hyperresponsiveness (AHR) be considered (Grade 2C).

Chronic cough among children is associated with impaired quality of life,[1] multiple physician visits,[2] and adverse effects from inappropriate use of medications.[3] Also, it may signify a serious underlying disease such as bronchiectasis or an inhaled foreign body.[1] Further, early diagnosis is important, as delayed diagnosis (eg, foreign body) may cause chronic respiratory morbidity,[4] whereas early diagnosis of chronic disease leads to appropriate management and subsequent resolution of cough and improved quality of life (QoL).[1] Use of cough algorithms or pathways can potentially lead to earlier diagnosis and reduce morbidity, unnecessary costs, and medication use associated with chronic cough.

In the management of chronic cough (ie, cough of more than 4 weeks' duration), investigations are undertaken to confirm or rule out specific causes. When undertaking investigations in children, the pediatric-specific issues and risk-benefit ratio needs to be taken into consideration. For example, although respiratory function tests are standard assessments in adults, most young children are unable to generate reliable data from pulmonary function tests (such as spirometry and AHR challenges) until the age of 6 years in most clinical laboratories. Chest CT scans are associated with higher adverse events in young children (future cancer)[5] and may require a general anesthetic in children aged < 3 years.

The 2006 American College of Chest Physicians (CHEST) guidelines on chronic cough in children[6] advocated use of a cough pathway based on available but

FUNDING/SUPPORT: The authors have reported to *CHEST* that no funding was received for this study.

CORRESPONDENCE TO: Anne B. Chang, MBBS, PhD, MPH, Department of Respiratory and Sleep Medicine, Lady Cilento Children's Hospital, South Brisbane, QLD 4101, Australia; e-mail: annechang@ausdoctors.net

DOI: http://dx.doi.org/10.1016/j.chest.2016.12.025