



Management of Chronic Cough in Adult Primary Care: A Qualitative Study

Tayler M. Gowan¹ · Monica Huffman¹ · Michael Weiner^{1,2,3} · Tasneem L. Talib¹ · Jonathan Schelfhout⁴ · Jessica Weaver⁴ · Ashley Griffith¹ · Ishita Doshi⁴ · Paul Dexter^{1,2,5} · Vishal Bali⁴

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Affecting about 10% of adults [1–3], chronic cough (CC) is one of the most common reasons for primary care visits [2, 4, 5]. CC, persisting longer than 8 weeks [1, 6, 7], affects quality of life, causing incontinence, pain, exhaustion, and depression [1, 2, 8]. In patients without roentgenographic abnormalities, conditions most often associated with CC are gastroesophageal reflux disease (GERD), asthma, and upper airway cough syndrome [2, 3].

Evaluation and treatment can be difficult [9], often including empiric antihistamines, decongestants, corticosteroids, proton-pump inhibitors (PPIs) [2], or lifestyle modifications [10], allergen avoidance [11], or behavioral therapy [3, 12, 13]. Pulmonology is a common referral target [14]. A UK survey found that only 31% of 51 PCPs were aware of CC guidelines, leading to estimation that 87% of patients were needlessly referred [15]. Accessibility and use of clinical guidelines [12, 16–19] by US PCPs are unknown.

This study is the first to describe, qualitatively, PCPs' experiences evaluating and treating CC in adults. By interviewing clinicians, we sought to understand reasons for referrals, accessibility and use of clinical guidelines, confidence in evaluation and treatment, perceptions and attitudes, and desired resources. Findings may help in elucidating

clinical decision-making and could indicate areas for improvement in dissemination and use of guidelines.

Study Design

Faculty PCPs of patients whose medical records from Eskenazi Health or Indiana University Health indicated CC treatment were contacted by an institutional recruitment service, to ascertain interest in completing an interview regarding experience in evaluating and treating CC. Fifteen consenting participants were targeted, as a number that could accommodate thematic saturation. A \$50 e-gift card was offered. The Institutional Review Board approved the study.

Interviews

A semi-structured interview guide was developed (Table 1). Three researchers (TLT, TG, MH) trained in interviewing used it to conduct and audio-record one-on-one interviews lasting 25–50 min, in person or by telephone. Transcripts were de-identified; one-third were checked against recordings for accuracy.

Analysis

Qualitative data were analyzed using an iterative inductive and deductive approach, with codes defined a priori from the interview guide and revised during initial analysis to include emerging themes. Two researchers (TG, MH) independently read transcripts, becoming familiar with data, and assessing utility of a codebook. Using a corresponding template (Table 2), one researcher (MH) reviewed and summarized four transcripts. The other (TG) used software (NVivo 12) to code transcripts and sort quotes. Researchers

✉ Michael Weiner
mw@cogit.net

¹ Regenstrief Institute, Inc., 1101 West Tenth Street, Indianapolis, IN 46202-4800, USA

² Indiana University, Indianapolis, IN, USA

³ Center for Health Information and Communication, U.S. Department of Veterans Affairs, Veterans Health Administration, Health Services Research and Development Service CIN 13-416, Richard L. Roudebush VA Medical Center, Indianapolis, IN, USA

⁴ Merck & Co., Inc., Kenilworth, NJ, USA

⁵ Eskenazi Health, Indianapolis, IN, USA

Table 1 Interview guide

1. How do you decide whether a patient has a chronic cough?
2. How long have you worked with patients with chronic cough?
3. How often does chronic cough come up in practice?
4. In your clinical experience, how do you define chronic cough? (*What criteria have to be met for you to diagnose a patient with chronic cough?*)
5. When you see a patient with chronic cough, how do you decide which patients need diagnostic testing to evaluate the cough?
6. Are there certain patient characteristics or medical conditions for which you believe that chronic cough is more common?
7. When do you start the process of diagnostic testing or treatment for chronic cough? (*How much time elapses before you initiate testing or treatment?*)
8. How do you go about evaluating a patient with chronic cough?
9. Do you give patients an empiric trial of treatment prior to diagnosis?
10. How often do you succeed in identifying the cause of chronic cough when it does occur?
11. How often do you think there is a psychogenic component to chronic cough? What makes you suspect that there may be a psychogenic component?
12. How do you determine an appropriate course of treatment for patients with chronic cough?
13. How helpful do you think prescription medications are in treating chronic cough?
14. Do you recommend any specific home remedies to your patients to try for chronic cough?
15. How often do your patients respond to recommended treatments?
16. What do you do if you try a treatment and it does not work?
17. How often have you been in a situation where a patient's chronic cough does not seem to be getting better and you and the patient feel frustrated?
18. How do you decide when to refer your patients with chronic cough to another specialist?
19. Do you tend to refer patients with chronic cough to any particular specialties?
20. Do you use any clinical guidelines to help you evaluate or treat chronic cough?
21. How confident do you feel evaluating and treating chronic cough?
22. Would any additional supports or resources help your patients with chronic cough?

met for discussions and agreement on codes, sharing memos, questioning interpretations, and seeking data-based answers. Codes were extracted to compare with summaries and achieve thematic consensus. Investigators thus achieved understanding of participants' experiences and perceptions.

Among 317 eligible participants, 231 were approached, 18 responded to the initial email, and 15 completed an interview. Table 3 summarizes demographics. Participants practiced medicine through Indiana University Health. Clinical experience with CC ranged from 5 to 40 years (data not shown). Table 4 outlines themes and subthemes, from analysis.

Theme 1: Defining CC

All participants defined CC by duration, ranging from 2 weeks to 6 months. When etiology was unidentifiable, participants tended to diagnose CC. "If there is no other clear cause, then that's when it would be called CC for me." Numerous causes were reported, including GERD, asthma, and serious lung diseases. Some reported that patients commonly have multiple causes, hindering diagnosis and treatment. Some indicated a possible psychogenic component,

stemming from anxiety, depression, and life stressors. Although psychogenic CC was largely reported as rare, a few believed that it is common. "I think there's a psychogenic component to a lot of coughs... whether they did have a CC and now they're just in the habit of coughing..."

Theme 2: Evaluation and Treatment

Participants indicated that they would seek information related to common risk factors and causes of CC. Several indicated importance of reviewing medications for known causes. "I can make most of the diagnoses with a H & P and a med review, because sometimes it's their medication." Empiric treatments are often trialed; some participants recommend non-prescription medications first. Testing could include imaging, pulmonary function tests, allergy testing, or laryngoscopy. "We have a spirometer in our office, but I personally don't feel as confident in my ability and our staff's ability to get a great reading and then to read that result well. So I send all of my patients to a pulmonary lab." Another participant noted, "I refer them to a pulmonologist. That's the great thing about being a primary care doctor. If you're dealing with a patient and you're tired of dealing with them,

Table 2 Rapid-analysis episode profile template

Brief summary of transcript (three to six sentences describing highlights and overall experience)

Chronic cough criteria: Providers' perception of the definition of and criteria for chronic cough (e.g., duration of cough, consistency)

Conditions of chronic cough: Provider identified conditions that make chronic cough more likely to occur or can cause chronic cough, including patients who may be more at risk for having a chronic cough (e.g., those with gastroesophageal reflux disease, allergies, asthma, postnasal drip, chronic obstructive pulmonary disease, smokers)

A. Psychogenic component: Providers' experience with, and thoughts regarding, the perceived psychogenic cause of cough

Prevalence of chronic cough: Providers' perception of how often they see chronic cough in practice

Medical evaluation: The processes and procedures used to assess and diagnose chronic cough (e.g., medical history, physical examination, diagnostic testing, referral)

Medical treatments and provider's advice:

- *Home-based recommendations:* Home-based remedies that providers recommend to patients to manage cough, such as over-the-counter medications, elevating the head of the bed, adjusting meal times, restricting diet, weight loss, and smoking cessation
- *Helpfulness of prescribed treatments:* The extent to which prescribed treatments are helpful in treating chronic cough, and what makes treatments more or less effective (e.g., compliance, knowing the cause of the cough)

Providers' confidence

- *Identifying cause:* The extent to which providers feel they are successful in identifying the cause of the chronic cough
- *Treating chronic cough:* The extent to which providers feel successful in treating the chronic cough

Clinical guidelines for chronic cough: Providers' knowledge of, or usage of, clinical guidelines in their practice for evaluating and treating chronic cough

Additional resources: Supports or resources suggested by providers that would be helpful in treating patients with chronic cough, or would be helpful to patients in managing their chronic cough

Quotable quotes: Poignant quotes that highlight providers' experiences, knowledge, or thoughts about treating and evaluating patients with chronic cough

Understanding effects on patients: Providers' expressing their understanding of how chronic cough affects patients' lives

Emergent themes: Recurrent themes identified upon further analysis of transcripts that are not represented with the current codebook

Table 3 Demographics of participants ($N=15$)

Characteristic	Frequency (%)
Age, years	
Unreported	1 (6.7)
26–35	2 (13)
36–45	4 (27)
46–55	4 (27)
56 or over	4 (27)
Education or degree	
MD	13 (87)
DO	1 (6.7)
NP	1 (6.7)
Female	7 (47)
Race	
Unreported	1 (6.7)
Multiracial	1 (6.7)
White	13 (87)
City of practice in Indiana	
Indianapolis	11 (73)
Other	4 (27)

you just refer them on.” Managing CC may include a multiplicity of visits, tests, trials, and referrals. Many PCPs mentioned CC's impact on quality of life. “I think that it makes

it hard for them to sleep. If they're in a business meeting, everybody is looking at them. They can't be quiet in church. It's an embarrassing symptom.”

Theme 3: Experiences in Managing CC

Overall, participants reported confidence in their abilities to address CC. Nearly, all measured their confidence by the frequency with which they refer patients. “I am not like, ‘No, you need to go somewhere else right away’. No, I work with them. Get them comfortable and get them better.” Use of prescription medications depended on participants' perceptions of helpfulness, cost, and fear of masking symptoms. “I want to solve the underlying problem rather than maybe giving them something like a Tessalon Perle, and maybe making them feel better, but we haven't really solved the issue.” Several indicated that they avoid prescribing codeine, due to sedative, addictive effects. Thirteen of 15 participants indicated unawareness of clinical guidelines for CC. Two indicated following such guidelines but were unable to recall their source. “I guess I'm not aware of any specific ones for the evaluation and treatment of chronic cough, but I mean I'm certainly aware of guidelines for treating asthma, for treating COPD, treating GERD.”

Table 4 Themes and subthemes of providers' experiences and perceptions in evaluating and treating chronic cough (CC)

Theme		Description
<i>Theme 1: "There are so many different causes." Defining CC</i>		
A	CC criteria	Providers indicate their definition of CC (e.g., duration, consistency, absence of obvious cause)
B	Prevalence of CC	Providers report their perception of how often they see CC in practice
C	Causes of CC	Reported conditions that make CC more likely to occur, or that can cause CC, including patients who may be more at risk for having a CC (e.g., gastroesophageal reflux disease, allergies, asthma, postnasal drip, chronic obstructive pulmonary disease, smokers) and patients who develop a psychogenic component to their cough
<i>Theme 2: "Sometimes it's just trial and error." Evaluation and treatment process</i>		
A	Gather information	Providers gather information about the patient through history and physical examination, including reviewing medication lists, and observing patients during visits; and performing diagnostic tests
B	Trial treatments	Based on the information from the patient's history and physical examination, providers recommend treatments to aid in evaluation of the cough's cause and offer strategies to manage CC
C	Refer to specialists	Providers refer patients to specialists (e.g., pulmonologist, otolaryngologist, gastroenterologist, allergist) for diagnostic testing early in the process. After months of ineffective treatment or unsuccessfully trying to identify the cause of the cough, providers refer patients to specialists for treatment and further diagnostic workup
<i>Theme 3: "CC in general is non-confidence building because it's challenging..." Experiences managing CC</i>		
A	Confidence of providers	Providers report their confidence in their ability to evaluate, treat, and work with patients who have CC. Providers describe their confidence in and perceived helpfulness of their recommendations, prescribed treatments, and home remedies in treating CC
B	Clinical guidelines for CC	Providers' knowledge of, or usage of, clinical guidelines in their practice for evaluating and treating CC
C	Desired additional resources	Identified resources that are lacking or would be beneficial in evaluating and treating patients with CC

Participants wanted additional resources, including better access to specialists and testing. Many desired "...a universal health tool for chronic cough...I feel like I have all the resources, but it's sometimes difficult to get them all together." Another participant desired a CC clinic: "So a one-stop shop. You go, and all of this stuff happens in one fell swoop, and you don't need to make all of these different appointments..." Others wanted accessible and comprehensible educational resources and support groups for patients, information about guidelines, increased availability of counselors for psychogenic cough, and more affordable medications.

This qualitative examination of experiences and insights into CC revealed important misunderstandings among PCPs. Lack of knowledge and apparently low use of guidelines were surprising, considering the high prevalence of CC.

Instead, participants relied on experiences and education from residency training. They appeared confident in management, but confidence appeared related to frequency of specialty referral. Treatments were largely empiric.

Several studies refer to the complexity of, and multifactorial approaches to, CC [8, 20, 21]. Following history and physical examination [20, 22, 23], participants used testing, supporting recommendations for tests such as radiographs and pulmonary function tests [2, 16, 18, 21]. Empirical treatment followed investigation. Participants reported prescribing PPIs frequently, though some studies do not support their use for nonacid GERD [1, 2].

Although guidelines demonstrate discrepancies and limited evidence, participants' inconsistent definition of CC, and lack of awareness of guidelines [13, 15, 22], remain concerning. Lack of guideline utilization has consequences.

First, clinical care can suffer, through unproductive tests, and more appointments, pharmacologic trials, and expenses for patients [20, 23]. With potentially misguided approaches, patients might experience prolonged CC durations and severity, along with anxiety and decreased quality of life. Patients may abandon treatment, living with dangerous conditions [1]. Varying definitions of CC can delay investigation [7, 12, 16, 18, 21]. Second, clinicians' inattention to guidelines may limit confidence in management, sparking referrals. Our study found this association: the more participants referred patients to other specialties, the less confident they were in their own management. Third, translation of research suffers: if guidelines are not applied, resources used to generate evidence-based knowledge that informs them are less useful.

Our study has limitations. Because the institutional recruitment service protects privacy, information about characteristics of people who declined to participate is limited. Because participants came from one health institution, findings might not apply elsewhere. Sampling bias may exist due to voluntary participation; a qualitative study such as this does not seek to represent a population, but to describe a minimum range of perspectives and characteristics. Despite limitations, this study's strength is qualitative exploration of clinicians' experiences in working with CC. To our knowledge, it is the first such study.

In summary, PCPs expressed confidence in identifying CC's cause, yet uncertainty or misunderstanding about its definition. Treatment often comprises trial and error. Prescription medications were often ineffective. Improvement in quality of care begins with access to, and knowledge and utilization of, clinical guidelines. Avenues for future research include studies investigating use of CC guidelines among larger populations. Better access to, or coordination with, specialists might also help and warrants study.

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Declarations

Conflict of interest Jessica Weaver, Jonathan Schelfhout, and Vishal Bali are employees of Merck Sharp & Dohme Corp., a subsidiary of Merck & Co., Inc., Kenilworth, NJ, USA, and have stock ownership of Merck & Co., Inc., Kenilworth, NJ, USA. Ishita Doshi was an em-

ployee of Merck Sharp & Dohme Corp., a subsidiary of Merck & Co., Inc., Kenilworth, NJ, USA, and was stock holder of Merck & Co., Inc., Kenilworth, NJ, USA. Michael Weiner's potentially relevant stock holdings are as follows: Abbvie, Inc., Accuray Inc., Allscripts Healthcare Solutions, Amgen, Inc., Boston Scientific Corp., Bristol Myers Squibb, Crispr Therapeutics Ag Com, Express Scripts Hldg Co., General Electric Co., Globus Med, Inc., Integer Hldgs Corp Com, Integra Lifesciences Holdings Corp., Intl Business Mach, Johnson & Johnson, Mallinckrodt PLC, Mead Johnson Nutrition, Medtronic PLC, Metlife Inc Com, Mylan N V SHS Euro, Novo-Nordisk A S ADR, Nuvasive, Inc., Orthofix Intl N.V., Perspecta Inc Com, Pfizer, Inc., Resmed, Inc., Roche Hldg Ltd., Seaspine Hldgs Corp., Senseonics Hldgs, Inc., Stryker Corp., Teva Pharmaceutical Industries, Varex Imaging Corp., Varian Med Sys, Inc., Walgreens Boots Alliance, Inc., Zimmer Biomet Hldgs, Inc., Zoetis, Inc. The study was sponsored by Merck, Sharp and Dohme. The following co-authors received funding for their work through Merck, Sharp and Dohme: Tayler Gowan, Michael Weiner, Monica Huffman, Tasneem L. Talib, Ashley Griffith, and Paul Dexter.

Ethical Approval Approval was obtained from the Institutional Review Board of Indiana University. The procedures used in this study adhere to the tenets of the Declaration of Helsinki.

Consent to Participate Participants provided written consent.

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