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# ‘Dry’ and ‘wet’ cough: how reliable is parental reporting?

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## ABSTRACT

**Introduction** Chronic cough in childhood is common and causes much parental anxiety. Eliciting a diagnosis can be difficult as it is a non-specific symptom indicating airways inflammation and this may be due to a variety of aetiologies. A key part of assessment is obtaining an accurate cough history. It has previously been shown that parental reporting of ‘wheeze’ is frequently inaccurate. This study aimed to determine whether parental reporting of the quality of a child’s cough is likely to be accurate.

**Methods** Parents of 48 ‘new’ patients presenting to a respiratory clinic with chronic cough were asked to describe the nature of their child’s cough. They were then shown video clips of different types of cough using age-appropriate examples, and their initial report was compared with the types of cough chosen from the video.

**Results** In a quarter of cases, the parents chose a video clip of a ‘dry’ or ‘wet’ cough having given the opposite description. In a further 20% parents chose examples of both ‘dry’ and ‘wet’ coughs despite having used only one descriptor.

**Discussion** While the characteristics of a child’s cough carry important information that may be helpful in reaching a diagnosis, clinicians should interpret parental reporting of the nature of a child’s cough with some caution in that one person’s ‘dry’ cough may very well be another person’s ‘wet’ cough.

## Key messages

- Does the quality of cough reported by parents of children with chronic cough provide a reliable indication of the nature of a child’s cough?
- The use of terms such as ‘wet’ and ‘dry’ to characterise a cough is very subjective, and parental descriptions frequently do not reflect the clinician’s view.
- Eliciting information regarding the characteristics of a child’s chronic cough is one of the key components of the history when formulating a presumptive diagnosis, but clinicians should not rely solely on the accuracy of the parent’s assessment of whether the cough is ‘dry’ or wet’.

## BACKGROUND

Cough is a very common and troublesome symptom in childhood and can lead to much parental anxiety. By far the most common cause of an acute cough is a self-limiting acute respiratory viral infection. Chronic cough, defined variously as a cough persisting more than 3, 6 and 8 weeks,[1 2] is less common than recurrent acute cough but is responsible for significant levels of morbidity in affected children and their families.[3 4] Epidemiological studies suggest that there is a substantial, and frequently unrecognised, burden of morbidity attributable to chronic cough in childhood, with prevalence in many studies of around 10%,[5–7] although much higher levels of productive cough have been reported.[7–9] Despite this relatively high prevalence, chronic cough has received very little attention over the past two decades when compared with the number of publications relating to ‘asthma’, which has, depending on the method of ascertainment, a similar prevalence. Diagnosing the cause of chronic cough can be challenging and is generally dependent on clinical assessment and response to treatment as there are few non-invasive ‘diagnostic’ tests.

Recommendations regarding cough history include enquiring about the timing and nature of the cough. Coughs are often described as ‘wet’/‘moist’ or ‘dry’, and it has been stated that a moist cough is most likely due to suppurative lung disease, and a loose, rattling cough suggests excess secretions or exudates in the larger airways.[10] Others have questioned this interpretation, suggesting that the term moist cough is subjective and carries no physiological significance.[11] One study attempting to objectively explore this issue found that a clinician and/or parental report of a wet cough was reasonably predictive of secretions within the airways being noted on bronchoscopy, with a sensitivity and specificity of around 0.75.[12] The converse was not true with secretions being present in a significant number who appeared to have a dry cough. This study was undertaken in patients attending for a bronchoscopy and had therefore been reviewed by the respiratory team prior to the assessment. The same group found that the most reliable predictor of there being a specific treatable cause was the presence of a wet cough with a sensitivity

of 96% but a specificity of 24%.[13] It should be noted that both studies were undertaken in a secondary care setting.

Previous work from our group[14 15] and others[16 17] has indicated that the use of the term 'wheeze' by both parents and doctors is imprecise, and indeed there is an extensive literature documenting the poor intrasubject agreement among clinicians regarding a wide variety of clinical signs.[18–21] Of note experience has not been found to be associated with improved reproducibility in the assessment of clinical signs.

In relation to reporting the nature of a child's cough, it has been our impression that parents can struggle to decide whether their child's cough is 'dry' or 'wet/moist', and given the difficulties clinicians find in agreeing on the presence or absence of particular signs it might be expected that the use of these terms by parents may lack accuracy. The purpose of this study was to determine whether the quality of cough reported by parents attending for their child's first secondary-care respiratory clinic appointment provides a reliable indication of the nature of a child's cough. Parental reports of the type of coughing were recorded, and parents were subsequently shown age-appropriate video clips of children coughing and asked to choose which one(s) most closely resembled their child's cough.

## METHODS

### Patient and public involvement

The study design arose from the common experience of parents stating they were uncertain as to whether their child's cough was 'wet' or 'dry' and the observation that parental reporting often contrasted with the clinician's assessment.

### Generation of videos

In order to generate the videos, videos of children who were attending hospital with coughing were obtained. Consent was obtained from the parents to video their children for this study. A total of 26 clips were obtained, and of these 19 were chosen by the two investigators as being representative of 'dry' or 'wet' coughs. These were then shown to three respiratory nurses and three doctors working in the respiratory team who made their own independent assessment. Hence all 19 clips were reviewed by eight doctors and nurses. One further example was removed due to a 50:50 split in assessment. Of the remaining 18 samples, one assessor disagreed with the other seven assessors in five cases. No one individual consistently deviated from the majority decision.

Three composite videos of children with different types of cough were generated for each of the three age groups. These were infant (under 2 years old), young child (2–8 years old) and older child (8–16 years old). video 1 contained two examples of a wet cough, two of a dry cough and one of a paroxysmal cough associated with pertussis. video 2 contained two examples each of wet and dry coughs and one barking 'croupy' cough. video 3 had three examples each of wet and dry coughs.

### Parental description of cough in outpatient department

Subjects recruited into this study were new referrals to one of the paediatric respiratory outpatient clinics at the Sheffield Children's Hospital. Subjects were eligible to participate if the referral letter to the clinic made reference to cough as a prominent symptom irrespective of any diagnostic label, such as 'difficult asthma', 'recurrent chest infection' or 'persistent cough', in order to obtain a spectrum of diagnostic entities. Consent to participate was obtained from parents and, when the child was old enough, assent from the patient.

Parents were seen prior to being called in for their clinic appointment by an investigator (DD) independent of the clinical team. Parents were asked to describe the pattern and nature of the cough. They were then asked directly if the cough was wet or dry, if they had not already given this information, and whether this was associated with expectorating sputum. Finally, parents were shown an age-appropriate video and asked to identify the cough most like their child's cough.

The correlation between parental description and the choice of video clip(s) was assessed. Responses were judged to be full agreement where the parent chose a video clip(s) that matched their description, and full disagreement where the choice of video clip appeared to be the opposite of the description given. When the parents chose clips from both the 'dry' and 'wet' categories, agreement was deemed to be partial.

## RESULTS

All but one of the 49 parents of patients attending their first outpatient clinic who were approached agreed to participate. The most common reason for referral in every age group was chronic or persistent cough, accounting for 31 (65%) of the total referred. Cough with wheeze/troublesome asthma (8, 17%), recurrent chest infections (5, 10%), recurrent chestiness (3) and possible inhalation of foreign body (1) accounted for the others.

Many parents described the nature of their child's cough using terms such as chesty, wheezy, tight, heavy, croupy, barking, deep or hoarse. A little over half spontaneously commented on whether it was 'dry' or 'wet', using these, or similar, terms. However, 42% required prompting before using the terms 'wet' or 'dry'. Six stated that their child's cough was mixed, and two were unsure if their child's cough was wet or dry.

The majority of parents chose at least one video consistent with their verbal description. Partial agreement occurred when two video clips were chosen, one of which matched the parental description and one of which appeared to differ. Of the 27 (56%) parents who said that their child's cough was dry, 18 (66%) chose a video clip which had been assessed as being a 'dry' cough, 1 (4%) chose a video clip with a wet cough and 8 (30%)

chose more than one video clip, their choices including both dry and wet coughs. Of the 13 (27%) parents who described their child's cough as wet, 3 (23%) chose a video clip of a wet cough, 7 (54%) chose a video clip of a dry cough and 3 (23%) chose more than one video clip, including both wet and dry coughs.

## DISCUSSION

This is the first study we are aware of that compares the spontaneous reports of the nature of a child's cough by a parent with their choice of cough from options provided by a collection of video clips. Just over half of the parents used the terms 'wet/moist' or 'dry' spontaneously to describe their child's cough. When prompted, nearly a fifth of parents suggested that their child's cough was mixed, being wet on occasions and dry on other occasions, or were unable to decide on a single category. In those who chose a single descriptor, dry or wet, the correlation between the reported nature of the cough and the video clips chosen by the parent as being closest to that of the child's was relatively poor. Just over half the parents' description was associated with a choice of a clip with the same characteristics as judged by the investigators. In more than 20% of cases, the verbal description was completely contrary to the video clip chosen. A further 27% of parents chose an example of both a 'dry' cough and a 'wet' cough.

In part the lack of accuracy may be attributable to the variable nature of a chronic cough. It is common to see a child in clinic who has a 'dry' cough when requested to cough in clinic, yet first thing in the morning the cough can sound very 'wet' and productive. On other occasions a parent will appear to describe a productive-sounding cough as a 'dry' cough because the child is not expectorating sputum.

The subjective nature of assessing whether a cough is dry or not was highlighted by the fact that of the 26 clips recorded 8 were rejected as there was no agreement reached, and in 5 of the 18 included clips one of eight experienced healthcare professionals disagreed with the other seven assessors. No one individual consistently disagreed with the others. There was no correlation between the levels of disagreement noted when using the clips and these five examples. These results are consistent with those generated in surveys of parental use of the term 'wheeze' and in studies of doctors' use of a variety of terms including wheeze when listening to the chest,[14–21] which have consistently found significant variations across individuals.

Cough is a non-specific symptom indicating inflammation of the airways, and hence the list of potential causes is extensive, with asthma and persistent bacterial bronchitis[22–25] being common causes among young children with chronic cough. Our results would be consistent with the suggestion that the term 'moist cough' is subjective and not an entirely reliable descriptor. However, the data do not support the suggestion that the nature of the cough carries no physiological significance.[11] As noted in the introduction, one study involving young children with chronic cough[12] found a reasonable correlation between doctor-assessed wet cough and secretions in the airways and hence can carry information that is valuable in the overall assessment. However, as noted in our study, the use of the terms such as wet and dry is indeed subjective and is not a robust indicator of pathology in isolation.

Eliciting a description of the nature of the cough is a key component of taking a good cough history, but it is important to recognise that by itself the nature of the cough is not diagnostic. It is simply one of a number of components in trying to reach an informed differential diagnosis. Young patients with a viral lower respiratory tract infection often have a wet cough due to the secretions in the airways which are similar in nature to the accompanying snotty nose. While asthma is classically associated with a 'dry' nocturnal cough, some patients with poorly controlled or untreated asthma can have a wet cough in the morning. It is a common observation to note that patients with asthma have a wet cough following a significant acute exacerbation of asthma often accompanied by harsh sounds on auscultation attributable to residual secretions after resolution of the acute bronchospasm. In contrast, most patients with a persistent bacterial bronchitis will have a daily wet cough, although some patients with relatively mild disease may appear to have a dry cough particularly in the summer. We have also seen children with an unequivocally dry irritating cough who have had thick secretion associated with chronic endobronchial infection on bronchoscopy. Several studies have now established persistent bacterial bronchitis as the most likely diagnosis when a persistent (>6 weeks) wet cough is reported,[22–27] yet this diagnosis is frequently missed and misdiagnosis as asthma is common.[21–27] The diagnostic challenge is compounded on occasions when bacterial bronchitis and asthma coexist, presumably secondary to the impaired mucociliary clearance and mucus plugging. Hence there are a number of reasons why the nature of a cough cannot be interpreted in isolation, one of which being uncertainty among some parents as to whether a cough is 'wet/moist' or 'dry'. We often find it more helpful in getting a true picture to ask more general questions, such as 'does he sound like a 60 a day smoker first thing in the morning?'

Our results suggest that the use of the term wet or moist by parents is highly variable. In one study Chang *et al*[12] suggested that parental reporting correlated reasonably with the doctor's assessment. However, it should be noted that the parents participating in our study were attending a respiratory clinic for the first time and participated before meeting a respiratory paediatrician, while those in the study of Chang *et al*[12] had all been through the clinic for assessment of chronic symptoms prior to attending for a bronchoscopy and were probably influenced by the previous

assessments. A subsequent study from the same group found reporting of frequency and quality of cough by a group of indigenous mothers whose children had been admitted to hospital to be 'unreliable'.[28] Our findings would suggest this is not limited to indigenous mothers as they suggested.

The key to accurate diagnosis and management of a child with a chronic cough is obtaining a good cough history, generating a hierarchy of likely diagnoses and then assessing the response to the treatment chosen. The response must be dramatic and unequivocal. Parents generally do not report that their child is coughing less or wheezing less when appropriate treatment is instituted, rather they instead commonly report their child is a 'new child'. The response needs to be assessed at the appropriate time; for bacterial bronchitis, this is after 2 weeks of high-dose oral antibiotics, by which time the cough should have resolved in the vast majority, or after 6–8 weeks of inhaled steroids for a child with probable asthma. A diagnosis of definite asthma should never be made without a dramatic and unequivocal response to treatment, be it a dramatic change in forced expiratory volume in 1 s after a β-agonist, a complete resolution of symptoms after a short course of oral steroids or a dramatic change over 6 weeks with inhaled corticosteroids.

The results from this study suggest that although parental reports of the quality of a cough can be helpful when a clinician is attempting to determine the cause of a chronic cough, the description, as with parental reports of wheeze, may not be accurate and needs to be interpreted as part of the overall assessment. These results suggest that parental reporting of the nature of a cough can on occasions be quite subjective and that one person's 'dry' cough may be another person's 'wet' cough.

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