Identifying Asthmatic Symptoms in Very Young Children

Featuring a foreword from Dr. Sarah Jarvis MBE

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Foreword

As a GP for over 30 years, I have seen more than my fair share of children with wheeze. About 1 in 5 infants wheeze in infancy and at least 2 in 5 children have at least one episode of wheezing before the age of 6 years[i], which makes wheeze an almost everyday occurrence for the average GP. In winter, bronchiolitis is a common culprit, and viral induced wheeze can happen at any time of year[ii]. But up to 1 in 11 children have asthma, and for them (and their parents) the risk of a life-threatening exacerbation is all too real[iii].

Perhaps counterintuitively, as a rule, the earlier the onset of wheeze, the better the prognosis. There appears to be something of a cut-off at around two years old; most children who present before this age become asymptomatic by mid-childhood[iv].

Regardless of the cause, an acutely distressed wheezing child is a source of huge concern for parents. Following a diagnosis of asthma, it's all the more anxiety-provoking. Our natural instinct, whether as doctors or as parents, is to help – but that's sometimes easier said than done. I have lost count of the number of worried parents I have reassured that their children aren't really wheezing at all; and of the number who fail to believe me when I tell them their little one isn't about to go into respiratory arrest; and, at the other end of the spectrum, the number of children whose parents only realized the severity of the situation when their lips turned blue.

Recognizing wheeze in a child, without clinical training and the benefit of a stethoscope and pulse oximeter, isn't easy. The fact that 60% of parents and carers failed to identify a wheeze on video is testament to that[v]. If harm in children is to be reduced, parents need all the help they can get.

Dr. Sarah Jarvis MBE

i. https://www.racgp.org.au/afp/2015/june/the-wheezing-child-an-algorithm
ii. https://www.ruh.nhs.uk/patients/services/clinical_depts/paediatrics/documents/patient_info/PAE007_Viral_induced_wheeze_information_and_management.pdf
iii. Asthma UK, https://www.asthma.org.uk/about/media/facts-and-statistics/
iv. SIGN158 British guideline on the management of asthma. A national clinical guideline First published 2003 Revised edition published July 2019. https://www.brit-thoracic.org.uk/document-library/guidelines/asthma/btssign-guideline-for-the-management-of-asthma-2019/
v. OMRON, Literature review of parental understanding of wheeze, 2018

Executive summary

Asthmatic children, and their families, should be able to live healthy and fulfilling lives without anxiety. Sadly, in some cases, young children with asthma or asthmatic symptoms can experience a lower quality of life than their non-asthmatic peers. Across the UK over 1.1 million children are currently receiving treatment for asthma[1], with thousands of emergency admissions each year. Understandably, the impact of asthma and asthmatic symptoms is higher on young children than on other age groups. In particular, children younger than five years old with asthmatic complaints are more likely to require urgent health care than asthma sufferers of any age.[2]

For this very young age group, the responsibility of identifying an issue and managing symptoms thereafter lies with the primary caregiver or parent. While there is generally good awareness of asthma, its triggers and its symptoms, true understanding – the ability to distinguish between instances of wheezing and other lung sounds – is worryingly lacking. Despite only 18% of parents claiming low confidence in their ability to identify wheezing in a report[3], up to 60% failed to identify a wheeze correctly on a video[4]. While older children may, and do, vocalise the need for their inhaler when feeling 'wheezy', this parental lack of understanding when combined with very young children who cannot yet speak greatly exacerbates the challenge of accurate asthmatic symptom detection and the correct course of action.

This paper seeks to expose some of the challenges surrounding asthmatic symptoms and treatment in very young children, and highlight the opportunities for driving better patient care and outcomes.*

Special thanks go to Paul Stevens whose Literature review of parental understanding of wheeze, commissioned by OMRON Healthcare, helped shape this paper.

*It is important to note that children 5 years and younger cannot be officially diagnosed as 'having asthma', rather only 'displaying asthmatic symptoms'. This is due to the fact that the diagnostic procedures cannot be done properly with children of this age group.

[1]Asthma UK, https://www.asthma.org.uk/about/media/facts-and-statistics/
[2]Moorman JE, Akinbami LJ, Bailey CM, et al. National surveillance of asthma: United States, 2001-2010. Vital & health statistics Series 3, Analytical and epidemiological studies. 2012(35):1-58.
[3]OMRON Paediatric Asthma Segmentation Research Report, Nov. 2016 – data on file
[4]Source: OMRON, Literature review of parental understanding of wheeze, 2018

Summary of key findings

- Parents and caregivers are presented with a number of challenges when faced with asthmatic symptoms in very young children. These span their own understanding and ability to take the correct course of action, emotional barriers, as well as gaps in the patient pathway and clinical access:
- Children younger than five years old with asthmatic symptoms are more likely to require urgent health care than any other age[2]
- There is a disconnect between perceived understanding of a child's condition and the reality[3]:
  - 60% of parents and caregivers failed to identify a wheeze on video
  - Yet only 18% of parents claim low confidence in identifying a wheeze
  - Parents and clinicians disagree on the presence of a wheeze in over half of consultation instances (55%)[5]
  - This can result in less effective treatment plans for the child, increasing risk and potentially lowering quality of life
  - Some parents are left feeling under supported and lack confidence and clarity on how to identify and manage symptoms[4]
- There is a fear of both over and under medicating very young children with asthmatic symptoms
- There are significant gaps in the patient pathway with a large proportion of children not being identified as displaying asthmatic symptoms[6]
- Prescription is often delayed (sometimes until after an emergency hospitalisation) and GPs do not commonly refer to a specialist before a certain age[4]
- 80% of the clinical respondents to OMRON Healthcare market research believe that parents are unable to identify wheezing correctly in asthmatic patients, they tend to either underestimate their child's condition or worry too much; leading to unnecessary hospital visits and appointments

What is a wheeze?

A wheeze is a lower respiratory tract symptom caused by the patient's airway narrowing. It is a whistling sound from the chest which is mainly heard on breathing out. Wheezing is highly prevalent in young children, with approximately one-third of the children having at least one wheezing episode by age nine.[8] Parents often struggle to accurately identify and report wheezing in young children because what parents and doctors mean by 'wheezing' is often very different. This can be problematic as wheezing is the most common symptom associated with asthma in children under five years of age.[10]

Asthma is an extremely prevalent chronic disease of the respiratory system in which patients experience symptoms associated with wheezing, coughing, shortness of breath and chest tightening. These symptoms often occur, or are exacerbated by, triggers including viral infections, second hand smoke, exercise, stress or allergies[11]. Symptom intensification, referred to as an asthma exacerbation or, colloquially, an 'attack', is common – a United States (US) Centers for Disease Control and Prevention (CDC) survey showed that almost 53% of children with asthmatic symptoms reported having an asthma attack in a given year.[12] Asthma attacks can be fatal – killing three people in the UK each day according to the NHS[13] – and are more likely when asthma is uncontrolled.

It is therefore vital that parents and caregiversgivers are able to identify wheezing early on, with certainty in their correct course of action - potentially preventing an exacerbation from occurring in the first place.

Furthermore, poorly managed asthma can result in reduced quality of life for patients, a more regular need for healthcare resources, and substantial costs to public health services.[14] A study run by Asthma UK Centre in Applied Research found that asthma costs the UK health service at least £1.1 billion each year.[15] Patients with unmanageable asthma are also referred to a pediatrician or specialist, with roughly 50% of children with medically identified asthma symptoms visiting secondary care at some point.

60% of parents did not recognize wheezing on video.

Yet only **18%** of parents claim low confidence in identifying wheezing.

[5]Cane RS, Ranganathan SC, McKenzie SA. What do parents of wheezy children understand by 'wheeze'? Archives of Disease in Childhood. 2000;82(4):327-332.
[6]OMRON Wheeze Monitor UK Qualitative Report v2 (data on file) – Page 10.
[7]OMRON WheezeScan_Key Findings – Page 11
[8]Inoue Y, Shimojo N. Epidemiology of virus-induced wheezing/asthma in children. Frontiers in Microbiology. 2013;4:391.

Parental understanding of wheezing

It is essential for parents or caregivers of children with asthma to manage their symptoms effectively. Assessment of a child's wellbeing, and therefore the effectiveness of asthma management strategies, often relies on the reporting of symptoms by the parent or caregiver. They are often given asthma action plans and symptom diaries to record and assess the child over time. Adjustments to medication are made in collaboration with a clinician based on symptoms, exacerbations, side effects, patient satisfaction and lung function[3]. Hence, it is important that parents can identify symptoms effectively for both successful long-term condition management and preventing symptom escalation to asthma attacks.

GINA (the Global Initiative for Asthma) estimate that at least 50% of asthma sufferers do not correctly adhere to good management principles, and children younger than five years old with asthmatic symptoms are more likely to require urgent health care than asthma sufferers of any other age group.[16] This suggests asthma management in children is often lacking and that parents struggle to identify and respond to asthma symptoms such as wheeze. This is further evident in anecdotal reports from NHS Trusts across the UK. In response to a recent freedom of information request made by OMRON Healthcare, one such Trust reported 517 cases over the last three years where a young child's (age 7 and under) admission to A&E/ER/Emergency GP for asthmatic symptoms was the first instance of clinical diagnosis of asthmatic symptoms. This implies hundreds of children (potentially even more) per year receive treatment when it is already too late and the parent is ill equipped.

A literature review commissioned by OMRON Healthcare into parental understanding of wheezing found that up to 60% of parents did not recognize wheeze on video and between 13% and 39% of parents struggle to locate wheeze to the chest throughout several research studies.[17] Yet in the same instance, only 18% of parents claimed low confidence in identifying wheezing. Furthermore, when surveying clinicians, 80% of respondents[5] felt parents were unable to identify wheezing correctly in asthma patients, stating they tend to either underestimate their child's condition or worry too much, leading to unnecessary hospital visits and appointments. This disconnect between the perceived understanding of a child's condition and the reality exposes an inherent danger. While it is to be expected that parents are less effectual than clinicians in identifying a wheeze, that in over half (55%) of consultations parents and clinicians disagree on the presence of wheezing[18] further reinforces the need for some form of remedy in bridging this disconnect. The review in fact found that parents of children with asthmatic symptoms were no better at identifying a wheeze than parents of children without, implying that parental experience plays only a very limited role in helping towards accurate identification of wheezing.

A wheeze is the most common symptom associated with asthma in children under five.

[9]Paton J, Bindels P, McMurray A, Biggins J, Nantanda R, Østergaard MS. A young child with a history of wheeze. npj Primary Care Respiratory Medicine. 2017;27(1):19.
[10]Ng MCW, How CH. Recurrent wheeze and cough in young children: is it asthma? Singapore Medical Journal. 2014;55(5):236-241.
[11]Sachin N Baxi, MD, Wanda Phipatanakul, MD, MS, The Role of Allergen Exposure and Avoidance in Asthma: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2975603/
[12]Centers for Disease Control and Prevention. https://www.cdc.gov/asthma/most_recent_national_asthma_data.htm
[13]NHS: https://www.nhs.uk/conditions/asthma/asthma-attack/
[14]Tenero L, Piazza M, Piacentini G. Recurrent wheezing in children. Translational Pediatrics. 2016;5(1):31-36.
[15]Asthma UK: https://www.asthma.org.uk/about/media/news/asthma-uk-study-1.1bn/

Over and under-administration of medication

Lack of parental understanding can lead to distress throughout the treatment chain, be they patient, parent, or clinician. Parental uncertainty can lead to hesitation, or a "wait and see" approach. Parents will sometimes opt for calming and breathing exercises before reaching for the inhaler. Unfortunately, this frequently leads to under medication, resulting in further exacerbation of symptoms, increased emergency admissions and potentially even hospitalisation.

Ironically, the very point at which parents and caregivers attempt to avoid over-medicating a child is when they can end up under medicating. This behaviour pattern – identified as part of OMRON Healthcare's consumer market research[19] - highlights how over-medication is a major concern, yet the consequence is under medication in practice. Conversely, we also see the opposite behaviour pattern from some parents. A "just in case" approach is also commonly adopted by parents. In a 2017 qualitative report[20] conducted by OMRON Healthcare, one parent commented: "I don't worry about giving him the inhaler because I don't think it's going to do him any harm. I would give it to him rather than not." Another described how they, "hate jumping to overmedicate and end up with side effects, but don't want to send my son into a full blown attack." While one-off instances of the corticosteroid treatments would not typically have a lasting negative impact on the child's health, persistent unnecessary administrations should strongly be avoided.[21]

Both of these seemingly conflicting behaviour patterns stem from the same root cause, an uncertainty into a child's state of wellbeing. According to a Nature paper[22], "sub optimal adherence to daily medication is the commonest [sic] cause of poor symptom control in childhood asthma and may lead to increased asthma morbidity, poor school attendance, adverse effects on family life, and increased healthcare costs." Further to this, in recent direct enquiries to NHS Trusts across the UK, various respondents reported a drop in parents or caregivers seeking medical help for children aged 7 and under with asthmatic symptoms as of March 2020. While this is in reaction to COVID-19 precautions and a series of nation-wide and local lockdowns, this presents a new issue of potentially 'undiagnosed'+ children and/or sub-optimally informed asthma management plans.

> "I don't think it's going to do him any harm. I would give it to him rather than not" - Parent with asthmatic child.

[16]Moorman JE, Akinbami LJ, Bailey CM, et al. National surveillance of asthma: United States, 2001-2010. Vital & health statistics Series 3, Analytical and epidemiological studies. 2012(35):1-58.
[17]Source: OMRON, Literature review of parental understanding of wheeze, 2018 – Page 20
[18]Cane RS, Ranganathan SC, McKenzie SA. What do parents of wheezy children understand by wheeze? Arch Dis Child. 2000;82(4):327-332
[19]WheezeScan Comms Research Final – Kantar Media. 2018. Data on file.

OMRON WheezeScan

While wheezing to the parent or caregiver may in first instances seem straightforward to identify, these studies have shown that – outside of the clinic – it is anything but and is all too often a subjective diagnosis by the parent, with only 40% of parental reports proving reliable. In order to meet this need for accuracy in detecting wheezing, minimise patient risk, and to improve both asthma plan adherence, OMRON Healthcare has developed the OMRON WheezeScan.

OMRON WheezeScan is the world's first clinically validated automatic home-use device to detect the presence of a wheeze in children between 4 months and 7 years. It provides an objective assessment of the presence of wheezing with a clear "wheeze" or "no wheeze" display in 30 seconds to remove any guesswork, doubt and indecision on the parent or caregiver's part. This is particularly vital in critical moments with children too young to be able to vocalise and articulate their experiences, or in instances of low volumes that parents may not be able to hear. WheezeScan's unique listening uses a clinically validated algorithm.[23]

WheezeScan also pairs with its companion app, AsthmaDiary for mobile devices. The app keeps track of the wheezing episodes that parents detect with WheezeScan, enabling them to log data of potential trigger factors and response to medication, as well as identifying trends. OMRON WheezeScan and its companion app build on OMRON Healthcare's years of technology innovation in providing medical grade, consumer friendly technology.

[20]OMRON Wheeze Monitor UK Qualitative Report
[21]NHS Inform: https://www.nhsinform.scot/tests-and-treatments/medicines-and-medical-aids/types-of-medicine/corticosteroids
[22]Nature: https://www.nature.com/articles/s41533-017-0053-7
[23]Habukawa C, Ohgami N, Matsumoto N, Hashino K, Asai K, Sato T, et al. (2020) A wheeze recognition algorithm for practical implementation in children. PLoS ONE 15(10): e0240048. https://doi.org/10.1371/journal.pone.0240048

Concluding notes

There is clear evidence that parental and caregivers understanding and identification of wheezing is not extensive enough to provide optimal care of a child's wellbeing on its own, and there is significant room for improvement to minimize risk to the child. Inquiries have shown hundreds of children per year are admitted to emergency care with previously undiagnosed asthmatic symptoms, while parents also harbor anxieties of over and under-medication or, conversely, knowingly overly prescribe it.

There is a wealth of information available to parents, providing education and tools for identifying and managing asthmatic symptoms. Parents and caregivers are also quick to coach children to flag when they are in distress and experiencing asthmatic symptoms, helping nurture independence and improve quality of life in the long term. Yet, in very young children this practice is not possible.

OMRON WheezeScan can be used as a strong, supporting tool to get objective identification, help inform treatment plans, and as a control tool, allowing parents to check if wheezing abates after administering treatment. As sub-optimal adherence to daily medication is the most common cause of poor symptom control, the understanding and accurate reporting of wheezing is an important macro factor that demands an accessible market solution to parents, such as OMRON WheezeScan.

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For all inquiries, please contact: omronuk@hotwireglobal.com