

# The prevalence and natural history of wheezing in early childhood

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**SUMMARY.** *The general practice records of 437 children were reviewed at seven years of age. Of 369 children with complete records, 115 (31 per cent) had some record of wheeze. Over half of these had first presented before the age of three years. In terms of consultations for wheezing or lower respiratory tract illness at the ages of five to seven years, the earlier the onset of wheeze the better the prognosis.*

*Comparison of data from parental questionnaires with the general practice records of 174 children suggested that parental recall of early episodes of wheeze is incomplete and biased by the severity and persistence of the symptoms of the child. Questionnaire surveys may therefore have excluded many mild cases of wheezing in early childhood, thus underestimating the prevalence of wheezing in infancy, and overestimating the proportion of such cases who progress to persistent wheezing in later childhood.*

## Introduction

OUR knowledge of the prevalence and natural history of asthma and wheezing in childhood has hitherto relied heavily upon parental recall of medical diagnoses<sup>1-4</sup> or symptoms.<sup>3-6</sup> Incomplete or biased recall of events in the first few years of the life of the child may have distorted some of the conclusions relating to the prevalence and outcome of wheezing illness in early childhood. General practice records have been used in two studies<sup>7,8</sup> and offer an alternative source of information about illness in the first few years of life. They have limitations of their own and have never been validated or compared with the results of a symptom questionnaire. This study makes such a comparison and attempts to clarify the prognosis of wheezing illness presenting to the general practitioner in the first five years of life.

## Method

The general practice records of children born in 1975 and 1976 and registered with the West Granton Medical Group, Edinburgh, were studied from October to December 1983. The practice, presently consisting of nine full-time and two part-time partners with two trainee practitioners, covers an area of predominantly local authority housing, including one of the most socially deprived areas of the city.

Entries in the records were analysed up to October 1983 for the 1976 cohort and up to October 1982 for the 1975 cohort. Consultations for wheezing illness were identified by a record of wheeze, rhonchi or 'bronchospasm'. In January 1984, a postal questionnaire was sent to the parents of the 198 children in the 1976 cohort. Parents were asked if their child had ever had

attacks of wheezing, defined in the questionnaire as breathing making a high-pitched whistling sound, and, if so, whether there had been any attacks in the past two years.

In the records survey, consultations with a record of cough, wheeze or breathlessness, or auscultatory signs in the chest, were identified as lower respiratory tract illnesses. Coryza, pharyngitis and otitis media were excluded, but an isolated symptom of cough was considered as a lower respiratory tract complaint. By definition, lower respiratory tract illnesses included all the wheezing illnesses.

## Results

Of the 437 records analysed, 369 (84 per cent) were complete from birth. Overall, 127 children (29 per cent) had some record of wheeze, and among the 369 children for whom full records were available the prevalence was similar; 115 (31 per cent) having wheezed at some time. Fifty-five (48 per cent of those having wheezed at some time) had more than one recorded wheezing illness. Males were in the majority, both for any wheeze (1.5:1), and for recurrent wheeze (2.8:1). Over half of the wheezy children of both sexes first presented before three years of age (Table 1).

**Table 1.** Age at first recorded wheezing illness among children with records complete from birth to the age of seven years.

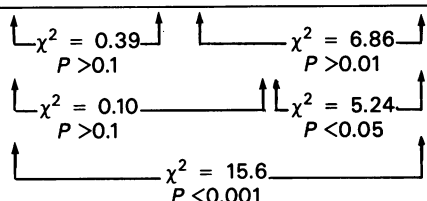
	Age (years)					Total population
	Under 1	1-2	3-4	5-7	0-7	
Number of males (%)	25 (36)	12 (17)	21 (30)	12 (17)	70 (100)	188
Number of females (%)	18 (40)	11 (24)	7 (15)	9 (20)	45 (100)	181

Among those with complete records, the frequency of consultations for lower respiratory tract illness over the past two years (ages of five to seven years) was compared in 94 children whose wheezing had commenced prior to their fifth birthday, and for 254 children whose records made no mention of wheeze (Table 2). The significance of the differences in the proportion in each group not consulting with lower respiratory tract illness was calculated by the chi-square test (one degree of freedom). Children whose wheeze started in the first three years of life consulted no more frequently than did non-wheezers, but the number of lower respiratory tract illnesses among those with a later onset of wheeze was significantly higher.

Of those with wheeze commencing in the first three years of life 51 per cent developed further episodes, compared with 63 per cent of those first presenting with wheeze at the age of three or four years (chi-square = 0.63,  $P > 0.1$ ). Of children wheezing in the first five years of life 27 per cent presented again with wheeze at the age of five to seven years, this proportion being 39 per cent for wheeze commencing at the age of three or four years, compared with 21 per cent of those with an earlier onset of wheeze (chi-square = 2.42,  $P > 0.1$ ). Of 10 children who had

**Table 2.** Consultations for lower respiratory tract illness at the ages of five to seven years related to age at onset of wheezing.

Number of consultations	Number (%) of children consulting over two years No record of wheeze	Wheezing illness first recorded aged		
		Under 1 yr	1 or 2 yrs	3 or 4 yrs
0	158 (62)	24 (56)	13 (57)	6 (21)
1	62 (24)	14 (33)	4 (17)	6 (21)
2-3	28 (11)	4 (9)	3 (13)	10 (36)
4+	6 (2)	1 (2)	3 (13)	6 (21)
Total	254 (100)	43 (100)	23 (100)	28 (100)



been diagnosed and treated as asthmatic, only three had presented with wheeze in the first three years of life.

The questionnaire was sent to the parents of 198 children and 174 replies were obtained (response rate 88 per cent). The response was similar for those children whose records mentioned wheeze (89 per cent) and those who had no record of wheeze (87 per cent), suggesting minimal bias with respect to wheezing. Of these 174 children, 35 (20 per cent) were said to have wheezed at some time, and all but three of these had wheezed in the past two years. The general practice records of the same 174 children showed that 28 per cent had at some time presented with wheeze, but less than half of these had done so in the past two years. Comparison of the two methods of enquiry revealed a surprising lack of overlap (Table 3). On the one hand, only half of those said by their parents to have wheezed during the past two years had consulted during that time with wheeze; on the other hand, parents recalled wheeze in only 45 per cent of children with a recorded wheezing illness in their general practice notes. Thus, over one-third of this child population (36 per cent) had been noted as wheezing, either by their parents or by their family doctor.

Among those children with wheeze recorded in their general practice notes, parents recalled wheezing more frequently in those with more than one recorded wheezing illness (75 per cent) than if only a single episode of wheeze was recorded (24 per cent) (chi-square = 10.4,  $P < 0.01$ ). Recall was more common if the child had presented with wheeze over the past two years (78 per cent) than if they had not (15 per cent) (chi-square = 17.0,  $P < 0.001$ ).

Wheezing over the past two years was reported by parents in 34 per cent of children presenting with wheeze in the first five years of life (95 per cent confidence interval for this proportion: 18-50 per cent). This proportion varied little with age at first presentation with wheeze, being 33 per cent for children presenting in the first year of life, 38 per cent for those whose wheeze commenced at the age of one or two years, and 33 per cent for those starting to wheeze at the age of three or four years.

## Discussion

One of the areas of uncertainty concerning the natural history of asthma in childhood is the relationship between the wheezy baby and the asthmatic child. The most comprehensive study of the natural history of childhood wheezing is that of Melbourne schoolchildren.<sup>5,9</sup> That study population was recruited on the basis of a parental questionnaire when the children were between seven and eight years old, and relied upon parental recall of events in early childhood. Calculations based on published figures<sup>5</sup> suggest that 82 per cent of the Melbourne children who were said to have wheezed in the first five years of life were still wheezing at the ages of five to seven years (this proportion varying only slightly with the age at onset of wheeze).

Recall of events in the first few years of life is unlikely to be complete, and may be biased by the severity of the current symptoms of the child. In a study of older children, only one-third of parents of children who had wheezed before the age of seven years could recall such episodes four years later.<sup>2</sup> These problems can be avoided by prospective study of children known to have wheezed in early childhood. Those studies that have hitherto been published have been based on infants admitted to hospital, usually with respiratory syncytial virus infection or bronchiolitis. About half of such cases have further episodes of wheezing but few progress to severe or persistent wheeze by the ages of eight to 10 years.<sup>10,11</sup> Although wheezing is commonly presented to the general practitioner during the first three years of life,<sup>7,8</sup> such episodes rarely require admission to hospital and, even in the first year of life, respiratory syncytial virus is seldom implicated.<sup>12</sup> Hospitalized patients are unlikely to be representative of illness presenting in general practice.

General practice records were therefore used here to identify children who had wheezed in early childhood. Although this excludes cases that do not result in a consultation, the results can be applied directly to illness presenting to the general practitioner. The limitations posed by incompleteness of recording (particularly on home visits), differences in clinical interpretation between doctors, and possible bias introduced by the mobility of the patient population, should be considered in interpreting the results presented here.

**Table 3.** Comparison of data from general practice records and the parental questionnaire in children from the 1976 cohort. Numbers of children in each category.

Wheezing in general practice records	Parental response to questionnaire				
	Wheezed				
	Never wheezed (n=139)	At some time (n=35)	In the past 2 years (n=32)	Any reply (n=174)	No reply (n=24)
Never wheezed (n=143)	112	13	11	125	18
At some time (n=55)	27	22	21	49	6
In the past 2 years (n=24)	5	18	17	23	1

Wheezing identified from the general practice records may have included some episodes with rhonchi in the absence of audible wheeze. It is unclear to what extent this may have inflated the prevalence figures thereby obtained, but comparison with the questionnaire data demonstrates that such figures nevertheless underestimate, by about one-half, the prevalence of symptoms in the community, at least for children aged five to seven years. If the same proportion of wheezy children attended their general practitioner at all ages, then the true prevalence of wheeze during the first seven years of life could be even higher than found here, perhaps twice that suggested by the questionnaire to parents of children aged seven years.

Although the records search yielded a higher cumulative prevalence of wheezing illness at the age of seven years than in similar studies from general practice<sup>7,8</sup> and the questionnaire survey showed a higher prevalence of wheezing over the past two years than in Tyneside seven-year-olds,<sup>6</sup> the cumulative prevalence at the age of seven years obtained by the questionnaire was similar to that obtained in the same way in the Melbourne study (19 per cent).<sup>5</sup> In common with that study, the vast majority of parents reporting that their child had ever wheezed also reported wheeze at the ages of five to seven years. However, a comparison of questionnaire data with that from the records survey confirmed that parental recall is biased by the severity and persistence of the symptoms of the child. The prognosis of wheezing presenting in general practice in the first five years of life was found to be much more favourable than suggested by the questionnaire survey, with only 34 per cent

reported by parents as wheezing, and 27 per cent consulting with wheeze, at the ages of five to seven years.

The discrepancy between these and the Melbourne results may be explained by the different methods of case ascertainment. Despite similar prevalence figures from parental questionnaires in the two populations, the cumulative prevalence obtained from general practice records was, at all ages, higher than in the Melbourne study (Figure 1). This is largely due to a threefold difference in the prevalence of wheezing during the first year of life — 11.6 per cent versus 3.5 per cent. In view of the selective nature of parental recall of events in early childhood, it seems probable that the distribution of age at onset of wheezing in the Melbourne study was similar to the present records survey, but that many early episodes with a better prognosis were forgotten by parents and excluded from the analysis.

Although a number of children who develop wheezing in infancy do undoubtedly progress to persistent wheeze or asthma, the majority appear to have a favourable outcome. This presentation in general practice is probably more common, and carries a better prognosis, than has previously been supposed.

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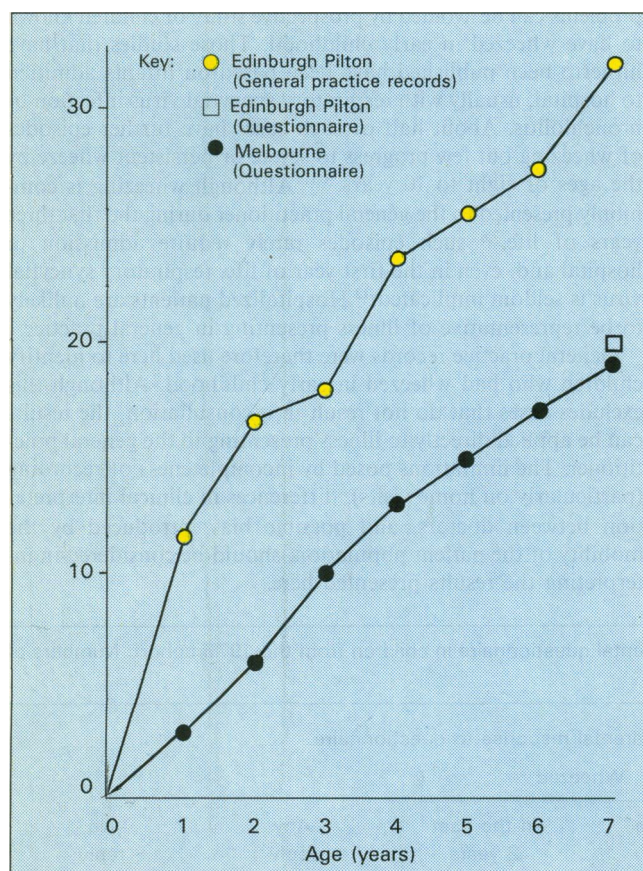
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## Acknowledgements

My thanks are due to the partners of the West Granton Medical Group, Edinburgh for permitting me to study their records; to Dr I. W. B. Grant and Dr M. Fulton for their comments on an earlier draft of this paper; and to Miss H. Moore for typing the manuscript.

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**Figure 1.** Cumulative prevalence of wheezing by years of age in this study, as determined from general practice records and the parental questionnaire, and in the Melbourne study.<sup>5</sup>