

E-communication : E3267

Predicting persistence of childhood wheeze using a symptom based severity score

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Description of E-communication

The aim of this study was to evaluate the role of symptom severity of wheeze in predicting future wheeze in early childhood. The broad results are summarised in the main text. For the methodologically interested further details are added as footnotes to the tables.

Background and Aims

Wheeze severity tracks strongly during school age and early adulthood. Less is known about the preschool period. In a childhood cohort we aimed to asses the role a symptom based severity score in predicting

- a) current wheeze and
- b) severity of wheeze 3 and 5 years later.

In particular we wanted to find out whether severity predicted these outcomes independently of other potential predictors.

Methods

Population: We used data from repeated questionnaire surveys (1998, 2001, 2003) of a population based (N=4400) childhood cohort in Leicestershire, UK.[1] The children reporting current wheeze at baseline (1998) were stratified into two age groups: 1-2 (N=449) and 3-4 years old (N=356).

Factor extraction: For each of the time points, baseline (1998), 3-year follow-up (2001), and 5-year follow-up (2003), we computed severity scores for the children with current wheeze. These severity scores were extracted from a factor analysis using the variables frequency of wheeze, shortness of breath, sleep disturbance, and interference with activities.

Statistical analysis: For each of the age groups we assessed the association between severity at baseline and outcomes at 3 and 5-year follow-up using two different analyses:

- a) Outcome current wheeze: Logistic regression
- b) Outcome severity of wheeze: Linear regression.

Each analysis was first performed using baseline severity as the only predictive variable (unadjusted model) and then also including further baseline variables (adjusted model).

Results

- a) In unadjusted models severity at baseline was strongly associated with current wheeze at 3- and at 5year follow-up for both age groups (table 1). Baseline severity remained an important predictor of both outcomes in the adjusted models. Other independent predictors included triggers of wheeze and, in the younger age group, eczema at baseline.
- b) In children who reported current wheeze again at follow-up, baseline severity was clearly associated with severity at follow-up (figure 1 and unadjusted models in table 1). This association was similar for 3- and 5-year follow up and across age groups. In adjusted models the effect of baseline severity remained significant at the 5% level for 3-year but not for 5-year follow-up. Other important independent predictors included triggers of wheeze at baseline and socioeconomic status.

Conclusions

These data suggest that severity of wheeze during the first four years of life is an important independent predictor of later wheeze (measured 3 and 5 years later). i.e. the contribution of severity to predicting later wheeze is not accounted for by other baseline variables such as triggers of wheeze, accompanying symptoms, and socioeconomic characteristics. Furthermore symptom severity tracks during preschool years and current severity is an independent predictor for later severity up to a period of at least 3 years.

References

1 Kuehni CE et al. Cohort profile: The Leicester Respiratory Cohorts. Int J Epidemiol 2007; 36:977-985

Table 1: Baseline wheeze severity score as a predictor of current wheeze 3 and 5 years later (Unadjusted and adjusted odds ratios (OR) and 95% confidence intervals (CI) based on logistic regression models)

Baseline age group	3 year follow-up					5 year follow-up					
	Unadjusted model		Adjusted model		Unadjusted model		Adjusted model				
	n	OR [95% CI]	OR [95% CI]	Most important predictors*	n	OR [95% CI]	OR [95% CI]	Most important predictors*			
1-2 years old	293	1.92 [1.42, 2.60]	1.61 [1.16, 2.23]	eczema, severity, trigger exercise	244	1.72 [1.22, 2.44]	1.62 [1.12, 2.35]	gas cooking, central heating, severity, trigger food, eczema			
3-4 years old	214	2.41 [1.65, 3.51]	2.22 [1.51, 3.27]	severity, trigger grass	177	2.38 [1.55, 3.66]	1.74 [1.05, 2.88]	frequency of colds, mother smoking in pregnancy, wheeze also apart from colds, severity			

* We considered environmental and socioeconomic variables (sex, ethnicity, Townsend score, parental education, parental smoking, cooking with gas, central heating, nursery attendance, parental asthma) and symptoms at baseline (triggers of wheeze, frequency of colds, runny or blocked nose without cold, habitual snoring, dry cough at night, eczema) as potential predictors.

Statistical footnotes:

Model: Univariable (baseline severity score as only predictor variable) and multivariable (severity score and other potential predictors^{*}) logistic regression models for the outcome current wheeze at 3- and 5-year follow-up. We used a combination of forward and backward selection. The severity score and any variables with a p-value close to 0.1 or lower were retained in the model.

Interpretation of OR: Because the severity score was modelled with a standard deviation (SD) of one, the OR compares the odds of current wheeze at follow-up between two people whose baseline severity score differs by 1 SD and whose values in the other covariates do not differ. Thus an OR of 2 represents a doubling of the odds of current wheeze at follow-up for every SD increase in baseline severity.

	3 year follow-up							5 year follow-up						
Baseline age group	Una	djusted r	nodel	Adjusted model			Unadjusted model			Adjusted model				
	n	Coeff. [95% CI]	adj. R ²	Coeff. [95% CI]	adj. R ²	Most important predictors*	n	Coeff. [95% CI]	adj. R ²	Coeff. [95% CI]	adj. R ²	Most important predictors*		
1-2 years old	103	0.50 [0.33, 0.67]	0.23	0.41 [0.24, 0.57]	0.36	severity, trigger food, gas cooking	77	0.26 [0.05, 0.48]	0.06	0.13 [-0.09, 0.36]	0.25	father's education, trigger exercise		
3-4 years old	90	0.39 [0.19, 0.59]	0.13	0.41 [0.21, 0.61]	0.22	severity, ethnicity, cooking with gas, parental asthma	60	0.50 [0.24, 0.75]	0.19	0.22 [-0.06, 0.50]	0.42	mother smoking in pregnancy, wheeze also apart from colds, frequency of colds, townsend score		

Table 2: Baseline wheeze severity score as a predictor of wheeze severity 3 and 5 years later (Unadjusted and adjusted linear regression coefficients and 95% confidence intervals (CI))

* See corresponding footnote to table 1

Statistical footnotes:

Model: Univariable (baseline severity score as only predictor variable) and multivariable (severity score and other potential predictors*) linear regression models for the outcome current wheeze at 3- and 5-year follow-up. We used a combination of forward and backward selection. The severity score and any variables with a p-value close to 0.1 or lower were retained in the model.

Interpretation of regression coefficient: Because the severity scores at baseline and follow-up were both modelled with a standard deviation (SD) of one, the regression coefficients represent differences in severity at follow-up measured in SD associated with differences in baseline also measured in SD. Thus a coefficient of 0.5 represents an increase by 0.5 SD in the severity score at follow-up per SD increase in the severity score at baseline.

Figure 1: Scatter plots of wheeze severity scores at follow-up (y-axis) against severity scores at baseline (x-axis), linear fits with corresponding 95% confidence intervals for prediction, and correlation coefficients.



1-2 years at baseline









Severity 3 years later

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