

The Changing Incidence of Paediatric Empyema in NE England 2006-2010

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Introduction

- ❖ The incidence of empyema has been increasing in children over the last 15 years¹. However a recent report has suggested that numbers in the UK may now be declining².
- ❖ Empyema in UK children is predominantly a pneumococcal disease³.
- ❖ The 7 - valent pneumococcal conjugate vaccine (PCV-7) was introduced to the UK routine immunisation schedule in September 2006.
- ❖ Previous reports have suggested that the vaccine may have only a limited impact on empyema but this has not been formally studied in the UK⁴.
- ❖ We investigated trends in the incidence of paediatric empyema in the NE England from 2006 - 2010.

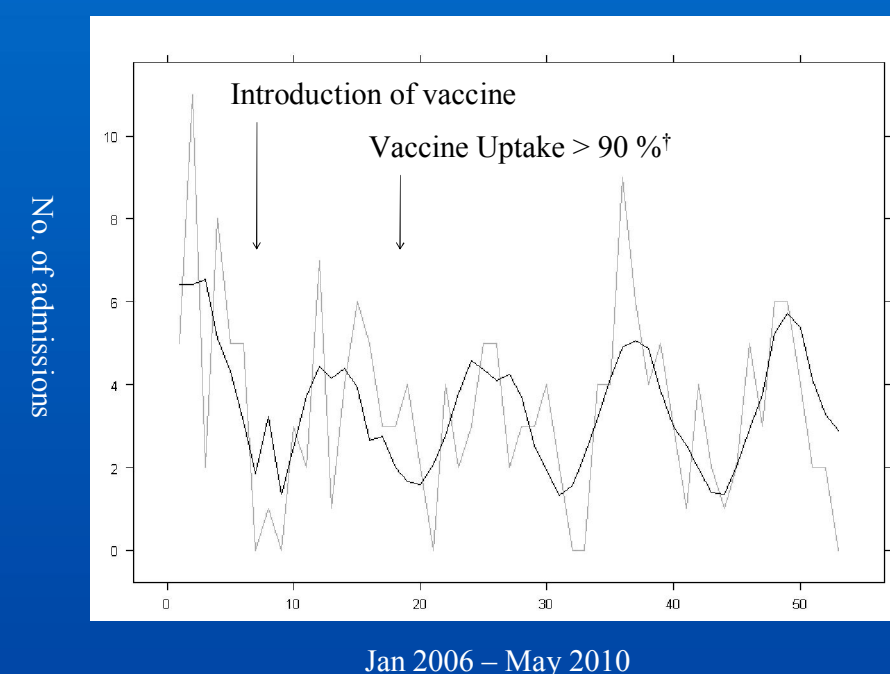
Methods

- ❖ All admissions of patients aged 0 - 18 yrs with ICD-10 codes J86.0 and J86.9 for pyothorax with/without fistula from 1st January 2006 until 31st May 2010 to the Newcastle Upon Tyne Hospitals Trust were collated.
- ❖ A generalised least squares modelling technique was employed to investigate trends in child cases in relation to local average monthly maximum and minimum temperature and monthly rainfall.
- ❖ The timing of the introduction of the PCV-7 vaccine was included as a co-variate.
- ❖ Temperature, rainfall and introduction of PCV-7 included in regression analysis.

Results

- ❖ 183 cases identified.
- ❖ Introduction of the PCV-7 vaccine was associated with a reduction in cases ($t = -5.00$, $p = 0.02$).
- ❖ There was a negative relationship between number of cases and average maximum temperature in the month of admission ($t = -2.24$, $p > 0.0001$).
- ❖ No significant relationship between the number of cases and average monthly rainfall.
- ❖ Fitted values from the model and the observed trend in cases are shown in the Figure below.
- ❖ R-squared of the final model was 0.36, whilst that for model without the vaccine was 0.30. This suggests that only 6 % of the variation in cases could be explained by the introduction of the vaccine.

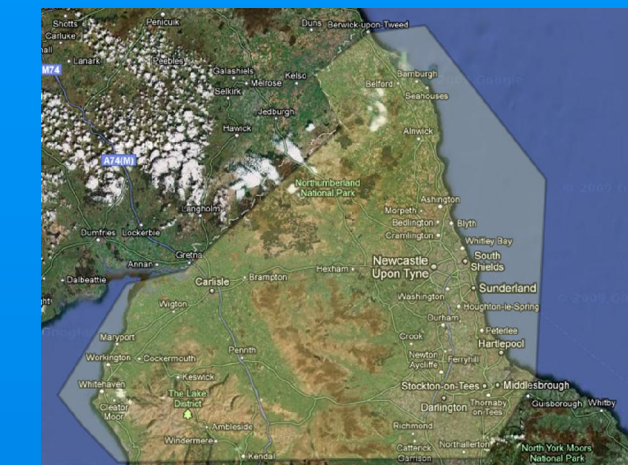
Figure



Regression model of monthly admissions of children with empyema

Grey line - No. of admissions / month
Black line - Cases estimated by model

† Source: Health Protection Agency COVER Database 2006-7



Map of study catchment area

Discussion

- ❖ Introduction of PCV-7 vaccine was associated with a reduction in the number of cases which may be related to a combination of direct and indirect vaccine effects including improved herd immunity.
- ❖ Mean maximum temperature in the month of admission appears to be a significant predictor of cases of empyema and correlates with the cyclical pattern of cases.
- ❖ Further work is required to establish whether this finding is generic across the UK and the underlying mechanisms driving this phenomenon.

Conclusion

- ❖ The PCV-7 vaccine had a negative impact on the number of cases of paediatric empyema in North East England.
- ❖ Empyema is a seasonal condition and low monthly temperatures are strongly associated with greater numbers of cases.

References

1. Spencer DA, Cliff D. Paediatrics and Child Health 2009 **18**:513-8
2. Koshy E, et al. Thorax 2010 **65**:770-4
3. Eastham KM, et al. Thorax 2004 **59**:522-5
4. Fletcher M, et al. Paediatr Infect Dis J 2006 **25**:559-60