

LETTERS TO THE EDITOR

Sulphur dioxide levels and asthma

The article by Walters, Ayres and Griffiths (February 1994;49:133-40) was a most welcome and timely contribution to the evidence concerning current air pollution and health in Britain. The paper concludes that daily variations in smoke and SO₂ levels were significantly associated with hospital admissions for asthma and respiratory disease during the winter in Birmingham at levels of pollutants which are within the current EC guide levels. Before these conclusions are accepted we would like to raise the possibility that the findings may have been confounded, at least in part, by factors not taken account of in the analysis. The one of most concern is the occurrence of a major influenza epidemic in the winter of 1989/90¹ which is likely to have had a significant effect on admissions for respiratory disease, including asthma,² in one of the two winters analysed. Studies of daily health events need to be carefully controlled for all long term trends and cycles in the data, most of which are related to both pollution and admission. Analysing the data by season has probably removed the main cycle (three month) but may not have been sufficient to remove others such as effects of day of the week and holidays. In daily analyses the most important confounders are meteorological variables such as temperature. It is therefore customary to include meteorological variables, regardless of significance, to control for any effects that are present. This also helps to control for seasonal cycles which are normally closely related to temperature.

This type of time series analysis is complex and techniques continue to evolve rapidly. It would be interesting to reanalyse the Birmingham data incorporating methods which help to overcome the above problems.^{3,4} However, it may be found that the occurrence of an influenza epidemic in one of the two years presents a difficult problem. Until these matters are clarified it is our opinion that the associations reported in the study should not be regarded as firm evidence for a causal effect of air pollution.

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- 1 Curwen M, Dunnell K, Ashley J. Hidden influenza deaths: 1989-90. *Popul Trends* 1990; 61:31-3.
- 2 Lung and Asthma Information Agency. Seasonal variations in asthma. London: Department of Public Health Sciences, St George's Medical School, Factsheet 93/4.
- 3 Schwartz J. Particulate air pollution and daily mortality: a synthesis. *Publ Health Rev* 1991; 19:39-60.
- 4 Spix C, Heinrich J, Dockery D, Schwartz J, Volksch G, Schwinkowski K, et al. Air pollution and daily mortality in Erfurt, East Germany from 1980 to 1989. *Environ Health Perspect* 1993;101:518-26.

AUTHORS' REPLY We agree that the associations reported in our study should not be taken to infer a causal relationship between pollutants and health. At the time of this study, which took place in 1990-1, software for full time series analysis was not available to the authors. With regard to confounding by meteorological conditions, temperature was included in regression models for winter, spring and autumn, but not

for summer admissions where it had no relation with hospital admission. Relative humidity was significantly associated with hospital admissions during the summer and was included in the model. During winter relative humidity was also included as it was significantly and independently associated with hospital admissions.

We agree, however, that there may be potential confounding factors which remain unaccounted for by the published analysis. Although influenza was excluded specifically from the hospital admissions, it is likely that some admissions for other respiratory complaints were precipitated by influenza. Although it may act as a confounding factor, particularly for weekly hospital admissions, it would require an association between influenza virus infection and air pollution levels to exist for it to be a major confounder for daily hospital admissions, otherwise it would simply have the effect of raising the baseline levels of admissions during one of the winters studied.

In order to address this issue a further study is currently being undertaken which also addresses some of the other points raised. Analysis using autoregressive time series and Poisson regression models, on an extended data set from 1988 to 1993, together with additional health outcome measures is underway. This employs complex adjustment for temperature, seasonality, linear trend and day of the week. Although the estimates of effect differ slightly, preliminary data suggest that the conclusion is not altered and that hospital admissions for respiratory disease are significantly and independently associated with black smoke levels.

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Pulmonary infiltrates following bone marrow transplantation

I enjoyed reading this paper by Campbell and colleagues (December 1993;48:1248-51) which reviewed their experience of fiberoptic bronchoscopy and bronchoalveolar lavage in the investigation and management of pulmonary infiltrates following bone marrow transplantation. The conclusions they drew were valid given the data presented, but I suggest that they should have emphasised that the impact on overall survival was disappointingly poor when the investigation was carried out after failed empirical therapy.

The essential point here is that in this series the practice was to bronchoscope and lavage only those patients who had not responded to empirical therapy. By definition, therefore, there was a delay from presentation to investigation. It would be helpful to know whether or not there was a standard approach to empirical therapy in the patients reported in this series, and some idea of the length of delay between initial presentation and subsequent investigations.

Although I agree that there are no published data showing a clear benefit from open lung biopsy in such patients, when patient survival is used as the outcome measure, review of those papers suggests an unacceptably high morbidity and mortality relating to the procedure itself.

The situation with regard to usefulness of early fiberoptic bronchoscopy and bronchoalveolar lavage will not be resolved until a randomised prospective clinical trial is carried out to assess the impact of making a specific microbiological diagnosis early in the course of the disease. Such clinical trials would have to be

conducted within different subgroups of immunocompromised patients to produce data of clinical value.

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Guidelines on management of acute asthma

In the revised *Guidelines on the management of asthma* (March 1993;48 Supplement) the statement "sedation is contraindicated outside the intensive care unit" has been changed to "any sedation is contraindicated" in patients with acute asthma. Enquiry of colleagues has confirmed that I am not unique in the view that sedation is sometimes appropriate in the management of acute asthma. It has always seemed illogical to me that sedation may not be tried in a situation where one does not know whether a patient is frightened because he has severe asthma, or has severe asthma because he is frightened. It is the practice in both the units in which I work, with the full cooperation of the anaesthetists, that such patients are transferred to the ITU. Sedation is tried. All parties accept that the patient may require ventilation as a result and are prepared for this.

Admissions in the last five years recorded in the ITU registers for asthma have been reviewed. Twenty nine subjects (30 admissions) were transferred to ITU where it was felt that ventilation was probably indicated. On 10 occasions (nine subjects) sedation was used before possible ventilation. In one instance sedation was clearly inappropriate in a patient in the terminal stages of chronic airway obstruction with carbon dioxide retention. Five patients did not improve and were ventilated without any problems. Three other patients did improve, with improvement in blood gases. One of these patients also improved on a different occasion, but blood gases were not measured after sedation. Sedation may have saved three patients the trauma and expense of ventilation on four occasions in all. I accept that the first patient mentioned illustrates the necessity for this decision to be taken by senior staff, experienced in the management of acute respiratory problems.

Guidelines and protocols are proliferating and will be increasingly used as reducing working hours inevitably reduce continuity of care. In an increasingly litigious atmosphere they will also be increasingly used by lawyers. I have taken informal advice from a senior member of the judiciary who, as a barrister, has wide experience in medicolegal work.

In his opinion it is extremely unwise to make unqualified statements where there is a significant minority of opinion which disagrees. In this specific example the implications are particularly serious, as litigation might concern the death of a young person.

I have already shown¹ that regular bronchodilators are used by 70% or more of patients attending hospital clinics, very much higher than one would have suspected from the guidelines for chronic asthma. One wonders if the same may be true of the use of sedatives in acute asthma, at least in the ITU.

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- 1 Connolly CK, Prescott RJ, Alcock SM, Harding T. An audit of the management of asthma in several outpatient clinics: therapy. *Thorax* 1991;46:777P.