Short papers

Repeaters count: a sentinel method for asthma outbreaks

Joan B Soriano, Josep M Antó, Antoni Plasència, and the Barcelona Soybean-Asthma Group*

Abstract

***Background* – Asthma outbreaks have not been detected in Barcelona, Spain since the epidemic of 1981–7. On 29 October 1994 several subjects attended a Barcelona hospital because of acute attacks of asthma and were identified as former soybean epidemic asthma patients (repeaters), raising the possibility of an asthma soybean-related episode. The usefulness of counting repeaters to evaluate small increases of acute asthma in a non-epidemic period is illustrated.**

***Methods* – A retrospective identification of asthma admissions was performed, pollution filters collected before and after the index day were analysed for contents of low molecular weight soybean allergen, and soybean unloading activities were investigated.**

***Results* – There was no epidemic increase of asthma patients during this day in the whole of Barcelona, but an unusually high number were repeaters (seven observed *v* 0·483 expected). A relationship with increased levels of low molecular weight soybean allergen (U/m^3) was detected in the available pollution filters collected the day before and after the index day. Two ships were unloading soybean in the city harbour on the index day.**

***Conclusion* – Soybean unloading at the harbour of Barcelona released soybean dust and produced a small cluster of emergency room visits for asthma in patients formerly affected by soybean asthma epidemics. It is suggested that counting repeaters could provide the basis for a systematic epidemiological surveillance of sensitised populations.**

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Keywords: soybean asthma, sentinel method, cluster.

Department of Epidemiology and Public Health, Institut Municipal d'Investigació Mèdica, UAB, Carrer del Doctor Aiguader 80, Barcelona 08003, Spain
J B Soriano
J M Antó

Department of Health Information, Institut Municipal de la Salut, Pl. Lesseps 1, Barcelona 08023, Spain
A Plasència

*A list of members of the Barcelona Soybean-Asthma Group is presented in the Appendix.

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Asthma epidemics in Barcelona, Spain have been described elsewhere.[1–3] In summary, from 1981 to 1987 26 epidemic days were detected, affecting 688 asthma patients, producing 1155 emergency room admissions and about 20 deaths. Epidemiological research on outbreaks of asthma established the inhalation of dust from the unloading of soybean in a silo in Barcelona harbour as a cause. An environmental intervention was undertaken and bag filters were properly installed at the top of silo A in September 1987. After that, there was a substantial decrease in airborne soybean concentrations and asthma epidemics disappeared.[4]

A surveillance register of respiratory emergency room admissions[5] was established during and after the outbreaks. Due to its high cost and other logistic difficulties this register was stopped in 1989, 27 months after the last epidemic asthma day.

Here we report a small cluster of former soybean asthma epidemic patients who developed acute severe asthma on a given day. Our findings suggest that counting repeaters may provide a useful sentinel method for the investigation and surveillance of asthma outbreaks.

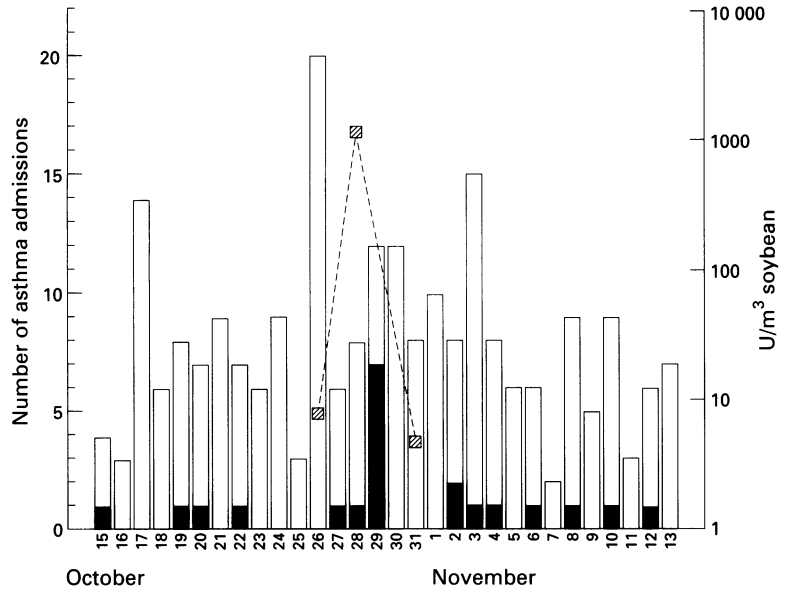
Methods

INDEX DAY

On 29 October 1994 nine asthmatic patients of mean age 49 years (range 15–82) were seen at the emergency department of l'Hospital Clínic i Provincial de Barcelona. The usual number is 0–2 asthma cases per day. Three of nine required admission, but all responded well to treatment. The similarity in onset of this group of patients (they went to sleep the previous night without symptoms and woke up breathless), the close time cluster, and the knowledge of the previous asthma outbreaks prompted clinicians to notify this event to the public health authorities, and an epidemiological investigation was carried out.

FIELD SURVEY

A retrospective identification of asthma visits to emergency rooms was performed for the 15 days before and after the index day for the five largest hospitals in Barcelona, using the same methods and definitions of the former register.[5] Epidemic and unusual asthma days were defined as before.[3] The probability of having a given number of repeaters on a given day was estimated by comparing the observed mean number of repeaters in the control period around the index day with the expected number assuming a Poisson distribution. Available air filters routinely collected by the air pollution



Distribution of asthma admissions in Barcelona in October–November 1994 (□) and of epidemic asthma "repeaters" from the period 1981–7(■); relationship with air levels of soybean (▨).

monitoring network were obtained for the days before and after the index day and assayed for contents of soybean allergen by a RAST inhibition method,[6] blinded for the awareness of the index day. Information on soybean unloading activities at the Barcelona harbour was provided by the harbour authorities.

Results

On the index day a total of 12 cases of asthma were seen in the emergency departments of Barcelona (figure) which in itself did not correspond to either epidemic or unusual asthma days: the city mean was 7·9 cases (range 2–20) of asthma per day during the 30 day period studied. However, seven out of the 12 patients who attended during the index day were asthmatic subjects who were also seen during the asthma outbreaks in 1981–7, so-called "repeaters". The mean number of repeaters in a given day during the 30 day period centred around the index day was 0·483 repeaters/day. Assuming a Poisson distribution, the probability of having seven asthma epidemic patients on a given day by chance is highly unlikely (seven observed versus 0·483 expected, $p<0·001$, Poisson value).

Air pollution filters had the following contents of low molecular weight soybean allergen: 26 October, 8·0 U/m^3; 28 October, 1122·5 U/m^3; and 31 October, 4·7 U/m^3. On 27 October a ship started unloading soybean at silo A, and on 28 October another started unloading soybean at silo B. No accidental events in the unloading process were identified. No abrupt changes in meteorological conditions were noted during that period, and pollution levels remained low: 82–112 μg/m^3 total suspended particles, 50–66 μg/m^3 nitrogen dioxide, and 20–28 μg/m^3 sulphur dioxide.

Discussion

The coincidence of a statistically significant cluster of emergency room visits in epidemic asthma patients, the presence of ships unloading soybean, and a high level of soybean allergen in air filters strongly support a causal association between these events. The 1122·5 U/m^3 level of soybean allergen was substantially higher than the highest value (165 U/m^3) recorded in 22 unloading days during our post-intervention study,[4] and close to the lowest value recorded during an asthma epidemic day (1555 U/m^3).[7] For reasons not yet established, it seems that soybean unloading released soybean dust and produced acute attacks of asthma in a few sensitised patients in October 1994.

In our previous studies the definitions of epidemic and unusual asthma days were based on both substantive and statistical evidence, but the presence of small clusters of asthma attacks in a few patients affected by increases of airborne soybean levels cannot be ruled out. Indeed, the smallest epidemic asthma day affected 12 subjects. An alternative method for detecting soybean asthma clusters might be the proportion of repeaters in a given day, which we had considered in previous studies as a tentative validation criterion of our definition of asthma epidemic days.[8] In the present study the expected number of repeaters was obtained from a one month reference period around the index day, but this estimate (daily mean 0·48 repeaters) was consistent with the proportion of emergency room visits reported by the epidemic asthma patients in a previous study.[9] The increase of repeaters is a very sensitive indicator of a soybean-releated episode as, in our study, a cluster of three repeaters on a given day is more than would be expected by chance. Counting repeaters represents a means of monitoring for smaller soybean-related epidemics. Whether this technique can be applied to other causes of epidemic asthma remains to be seen.

Appendix

Members of the Barcelona Soybean-Asthma Group: Josep M Antó (coordinator), Mercè Aceves, Jordi Castellsagué, Joan Caylà, Ferran Morell, Helena Pañella, Antoni Plasència (coordinator), Josep Roca, María J Rodrigo, Robert Rodríguez-Roisín, Marc Saez, Joan B Soriano (analysis and manuscript preparation) and Jordi Sunyer.

JBS, JMA, MS, JS, Departament d'Epidemiologia i Salut Pública, Institut Municipal d'Investigació Mèdica, Universitat Autònoma de Barcelona; AP, JC, HP, Department of Health Information, Institut Municipal de la Salut; MA, Àrea de Medi Ambient, Entitat Metropolitana de Barcelona; JC, Consorci Hospital de la Creu Roja de l'Hospitalet de Llobregat; JR, R R-R, Servei de Pneumologia, Hospital Clínic i Provincial; FM, MJR, Serveis de Pneumologia i Bioquímica, Hospital General Universitari Vall d'Hebron, Universitat Autònoma de Barcelona; all in Barcelona, Spain.

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Review of the prescription of domiciliary long term oxygen therapy in Scotland

D Morrison, K Skwarski, W MacNee

Abstract

Background **– Since 1989 long term oxygen therapy (LTOT) in Scotland has been prescribable only by respiratory physicians, whereas in England and Wales general practitioners can also prescribe this treatment. The effect of this policy has been audited.**

Method **– Six hundred and thirty patients were prescribed LTOT in Scotland between 1 October 1989 and 30 September 1991, of which 519 case notes were reviewed.**

Results **– In 79% of patients the diagnosis was chronic obstructive pulmonary disease (COPD), with a near equal male to female ratio. The mean (SD) age was 65 (13) years (range 0·2–90). Sixty percent of patients died during the study period. Compliance with treatment was 14·9 (6·0) hours daily (range 1–24) and in 44% was less than 15 hours daily. Sixty one percent were clinically unstable when assessed and 14% were still smoking. Only 14% of those with COPD fulfilled all of the relative criteria for the prescription of LTOT. Only 56% had a repeated arterial blood gas measurement within 12 months of prescription and 51% of these were taken during a period of clinical instability. Expenditure on oxygen cylinders was six times greater than on oxygen concentrators over this period.**

Conclusions **– Compliance with LTOT in Scotland, where prescription is the responsibility of respiratory physicians, is similar to other studies and ranges widely. The greatest problem concerning adherence to the guidelines is assessment during clinical instability. The number of deaths suggest that prescription occurs late in the course of the disease. This study highlights the areas where the prescription of LTOT needs to be improved.**

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Unit of Respiratory Medicine, Department of Medicine, Royal Infirmary, Edinburgh EH3 9YW, UK
D Morrison
K Skwarski
W MacNee

Reprint requests to:
Dr W MacNee.

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Long term oxygen therapy (LTOT) prolongs survival in patients with chronic obstructive pulmonary disease (COPD) and respiratory failure.[1] In 1985 the Department of Health issued guidelines in England and Wales for the prescription of LTOT by oxygen concentrator by general practitioners.[2] In October 1989 these guidelines were modified by the Scottish Home and Health Department (SHHD). The main change was that only respiratory physicians would be allowed to prescribe LTOT in Scotland.[3] This has provided an opportunity to audit whether this change in policy has had a beneficial effect.

Methods

A data base was established on all 630 patients who were prescribed LTOT by oxygen concentrator monitored centrally by the Common Services Agency (CSA) between 1 October 1989 and 30 September 1991. We reviewed the case notes of 519 of these patients and assessed prescription criteria and follow up arrangements. Patients were regarded as clinically unstable during an exacerbation of their respiratory condition and for six weeks thereafter. Evidence for an exacerbation was taken from the physician's written opionion in the case notes or, when not available, the presence of purulent sputum or the prescription of an antibiotic. Compliance data were provided by the CSA in the form of three monthly oxygen concentrator meter returns. The number of deaths was recorded over three years from the start of the study.

Results

Between 1 October 1989 and 30 September 1991 632 concentrators were prescribed to 630 patients in Scotland with almost equal numbers of men and women (M:F 310:320). The prescription rate in relation to the population was greatest in the main urban areas. Twenty one patients were prescribed LTOT because of excessively high cylinder use. Twenty one concentrators were withdrawn, seven because of