

Trends in hospital admissions and mortality from asthma and chronic obstructive pulmonary disease in Australia

An article published in April last year has prompted debate about the interpretation of time series analyses.
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TO THE EDITOR: Our comments and question relate to the interesting article by Wilson et al on asthma and chronic obstructive pulmonary disease (COPD) in Australia.¹ The statistics on mortality trends for these diseases were complex, but the gist of the matter seems to relate to averaged trends for COPD and asthma over a 10-year period.

However, the rigorous statistics missed (or the article did not comment on) what seemed from the figures to be a single step in opposite directions for COPD and asthma

mortality in about 1997 — most marked in a downward direction for asthma from 1997 to 1998 and an upward direction for COPD in females from 1996 to 1997. (Box 3 and Box 4 from the original article by Wilson et al are reproduced here for ease of referral.) To us, the data seem, for the most part, to suggest sets of two horizontal lines linked by a sudden, presumably artefactual, discrete change for both conditions at around the same time. Do the complex statistical trend analyses miss an essential feature? Was there, for example, a change to International classification of diseases coding for airway disease specifically around 1997?

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1 Wilson DH, Tucker G, Frith P, et al. Trends in hospital admissions and mortality from asthma and chronic obstructive pulmonary disease in Australia, 1993–2003. *Med J Aust* 2007; 186: 408-411. □

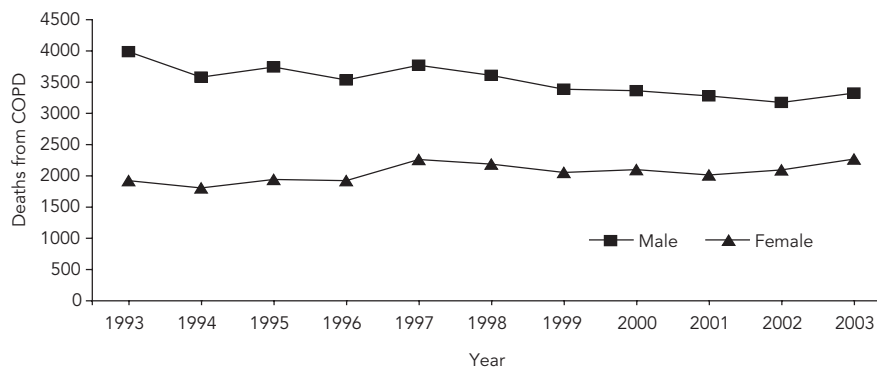
David H Wilson, Graeme Tucker and
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IN REPLY: In response to Walters and Wood-Baker, we point out that changes to the International classification of diseases, 10th revision (ICD-10) coding for mortality occurred in January 1997¹ and changes to morbidity coding occurred later.² The General Record of Incidence of Mortality books¹ identify “comparability factors” (CFs) for comparing the closeness of agreement between ICD-9 and ICD-10 codes. The CFs for asthma and chronic obstructive pulmonary disease (COPD) are 0.75 and 0.93, respectively. CFs close to 1.0 indicate little difference between the manual ICD-9 and automated ICD-10 coding.

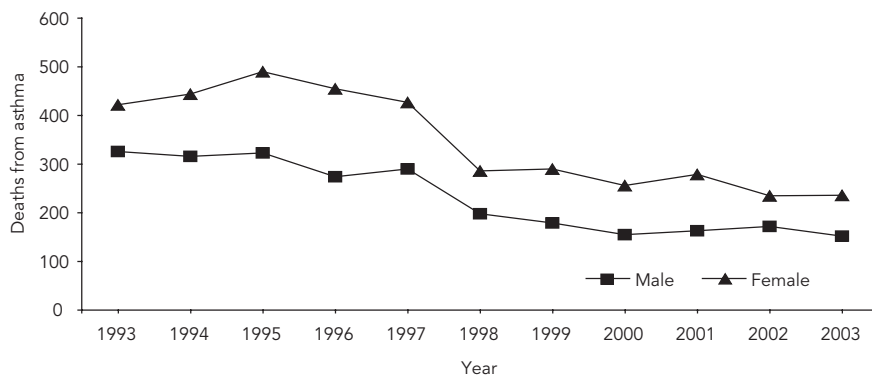
In the article by us that Walters and Wood-Baker refer to,³ there would seem to be a dislocation for asthma between 1997 and 1998 — not between 1996 and 1997, when the ICD coding changed. For COPD there was little or no change in trends for men and women over time, and coding made little difference to comparability before and after 1997. It is, therefore, difficult for us to accept an “artefactual” discrete change for both conditions at essentially the same time.

Our conclusion from the data is that, over the observed period, there was a downward trend in deaths from asthma in both men and women. Deaths from COPD in men showed a similar downward trend, but the trend for COPD deaths in women showed no change. Given that COPD imposes a much greater burden on women than asthma, we think the most important question to ask is why this is so and what needs to be done about it — which was the main thrust of our article.

3 Deaths from chronic obstructive pulmonary disease (COPD) in Australia, 1993 to 2003, by sex (reproduced from original article by Wilson et al¹)



4 Deaths from asthma in Australia, 1993 to 2003, by sex (reproduced from original article by Wilson et al¹)



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1 Australian Institute of Health and Welfare. National GRIM (General Record of Incidence of Mortality) books. Canberra: AIHW, 2005. http://www.aihw.gov.au/mortality/data/grim_books_national.cfm (accessed Oct 2007).

2 Roberts RF, Innes KC, Walker SM. Introducing ICD-10-AM in Australian hospitals. *Med J Aust* 1998; 169 Suppl: S32-S35.

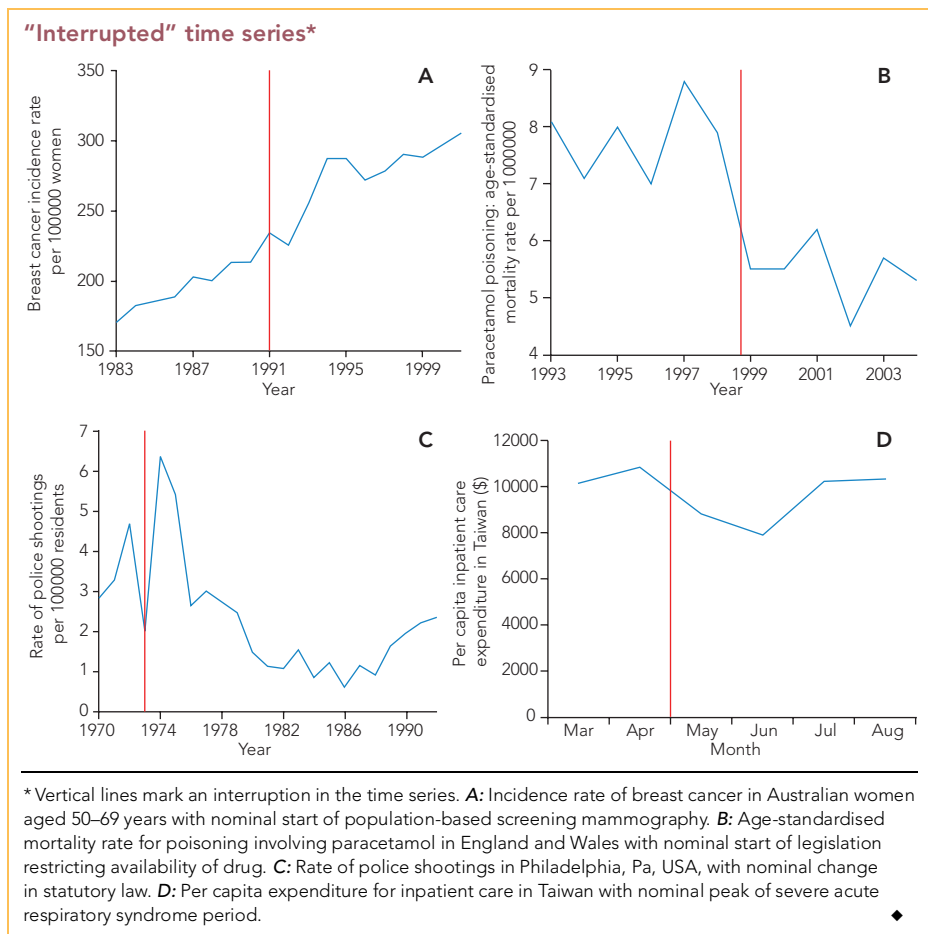
3 Wilson DH, Tucker G, Frith P, et al. Trends in hospital admissions and mortality from asthma and chronic obstructive pulmonary disease in Australia, 1993–2003. *Med J Aust* 2007; 186: 408-411. □

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COMMENT: Attributing cause in the context of sparse data is fraught with difficulty. I invite readers to consider what the four graphs depicted here (Box) have in common with Wilson and colleagues' description of deaths from asthma in Australia.¹

Surprising as it may seem, the graphs all describe similar phenomena — temporal changes in outcome (eg, incidence, mortality), which may or may not be related to an identified change in circumstance at a particular point in time — albeit in different contexts: breast cancer incidence (A),² paracetamol poisonings (B),³ police shootings (C),⁴ and health care expenditure (D).⁵ The data in all of these graphs arise from uncontrolled time series. The vertical lines in the graphs mark an “interruption” in the time series — a point at which a nominated change occurred. The common question in such studies is simple (and expressed eloquently by Walters and Wood-Baker⁶): did the interruption result in a change?

The answer, I'm afraid, will be unpalatable to some: we don't know for sure. No amount of statistical analysis will make up for lack of data or the presence of extraneous effects threatening internal validity (eg,



events that co-occur with the intervention and that account for the observed changes). In such cases, statements attributing causality are, at best, speculative. While speculations may lead to testable hypotheses, those that can not be tested remain conjectural and must be viewed in this manner.

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1 Wilson DH, Tucker G, Frith P, et al. Trends in hospital admissions and mortality from asthma and chronic

obstructive pulmonary disease in Australia, 1993–2003. *Med J Aust* 2007; 186: 408-411.

2 Australian Institute of Health and Welfare, National Cancer Statistics Clearing House. C50 incidence, 1983–2001. Canberra: AIHW, 2005.

3 Morgan OW, Griffiths C, Majeed A. Interrupted time-series analysis of regulations to reduce paracetamol (acetaminophen) poisoning. *PLoS Med* 2007; 4: e105.

4 White MD. Examining the impact of external influences on police use of deadly force over time. *Eval Rev* 2003; 27: 50-78.

5 Chang HJ, Huang N, Lee CH, et al. The impact of the SARS epidemic on the utilization of medical services: SARS and the fear of SARS. *Am J Public Health* 2004; 94: 562-564.

6 Walters EH, Wood-Baker R. Trends in hospital admissions and mortality from asthma and chronic obstructive pulmonary disease in Australia [letter]. *Med J Aust* 2008; 188: 258-258. □