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Validity of using Hospital Episode Statistics data on monitoring disease trends

We read with interest the article by Koshy *et al*.[1] The findings are important in documenting changes in admission rates of childhood pneumonia and empyema since the introduction of heptavalent pneumococcal conjugate vaccine (PCV7). We are concerned that undue emphasis has been placed on Hospital Episode Statistics (HES) data to define the aetiology of childhood pneumonia, particularly 'bacterial pneumonia'.[2]

Given the magnitude of the case numbers reported, it would appear that the analyses are based on all pneumonia codes collectively. This would also (although it is not clear from the article) include 'unspecified pneumonia', which describes pneumonia of any aetiology. Our analysis of national HES data on childhood pneumonia (1997–2006) showed that 91% of cases were coded as unspecified pneumonia. This may be of significance given that much unspecified pneumonia in children is likely to be viral; in routine clinical practice it can be difficult to differentiate between viral and bacterial pneumonia.[3]

The authors[1] also assert that 'PCV7 offers protection against the most common serotypes accounting for most of the bacterial pneumonias in children'. The references provided do not support this statement. There are international variations in serotype distributions of laboratory-confirmed pneumococcal disease.[4] There are no published data on the serotype distribution of pneumococcal pneumonia for UK children.

We have evaluated the accuracy of HES data for paediatric pneumonia in the North East of England. The incidence was previously established in a prospective study,[5] and we repeated it prospectively between 2008 and 2009. Of 50 subjects identified during prospective recruitment, 14 (28%) had misattributed codes and were not identified in the coding list. These patients were coded, for example, as unspecified acute upper respiratory tract infection (J06.9), dyspnoea (R06.0) and cough (R05), despite a clinical diagnosis of pneumonia. Among those identified by HES codes, pneumonia (N=5) and lower respiratory tract infection (N=2) were coded as secondary diagnoses. These figures suggest that reliance on primary diagnostic codes on the basis of HES data could underestimate the levels of pneumonia. There are no reasons to think that levels of miscoding have changed over time.

This article does not describe trends in bacterial pneumonia as stated throughout the paper but all causes of pneumonia. We suggest that use of HES data should be limited to analysis of changes in the overall incidence of pneumonia.

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Authors' response

Elemraid and colleagues raise important points about potential diagnostic misclassification and under-ascertainment using the Hospital Episodes Statistics (HES) database, as well as the absence of national pneumococcal serotype data for children.

The HES database covers all NHS hospital activity in England and has been widely used to report disease trends. It also provides the opportunity to estimate the clinical impact of major clinical policies on disease burden but, as with any large epidemiological dataset, has inherent weaknesses at the individual level.

Our study aimed to focus on common community-acquired bacterial pneumonia trends to evaluate the impact of the heptavalent pneumococcal conjugate vaccine (PCV7). We agree that pneumonia is a clinical diagnosis and that it is difficult to differentiate between bacterial and viral causes. Furthermore, a significant proportion of cases (8–40%) of community-acquired pneumonia can be of mixed aetiology.[1] Hence, we applied broad pneumonia definitions. We aimed to focus on bacterial pneumonias and so excluded specific viral pneumonia ICD-10 codes (eg, 'viral pneumonia, not elsewhere classified'—all J12 codes). The codes we searched are listed in the Appendix.

The authors highlight a useful point that some children diagnosed with pneumonia may have symptoms and/or signs recorded in the primary diagnosis field. Hence, we acknowledge under-ascertainment is possible for some pneumonia admissions. HES coding is dependent on the recording of the 'reason for admission' by clinicians and the subsequent coding by the trained staff, and we included this as a potential limitation in our discussion. We agree that such levels of miscoding are unlikely to have significantly changed over time. Therefore, this would suggest that the pneumonia admission trends that we observed are likely to represent real changes.

We used the Health Protection Agency cumulative weekly incidence reports of PCV7 and non-PCV7 isolates for children under 5 years,[2] together with the national serotype surveillance for all ages,[3] as the best available source of information on pneumococcal serotypes causing invasive pneumococcal disease. Admittedly, this covers a broader spectrum of invasive diseases. In

the absence of published data specifically relating to serotype distribution of pneumococcal pneumonia for children, this is the only up-to-date national reference source available spanning our study time frame.[2 3] It provides data on pneumococcal serotype distribution for cases of invasive pneumococcal disease for 2000/1 to 2005/6 and shows the most common serotypes present prior to the introduction of PCV7, which was relevant to our study.

We agree that it is not possible to determine fully the exact aetiology of pneumonia from an HES diagnosis, although we have made every attempt to do so. However, we do think the trends in diagnosed pneumonia following the introduction of PCV7 remain of interest.

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Ultrasound performs better than radiographs

We applaud the British Thoracic Society (BTS) for its efforts to improve patient care through scientific evidence. We thus recognise the recent guidelines on pleural procedures and thoracic ultrasound (TUS) as an important attempt to develop a rational approach to chest sonography.[1] However, we are concerned that the BTS has reached conclusions based on a less complete review of TUS.

The guidelines state that 'the utility of thoracic ultrasound for diagnosing a pneumothorax is limited in hospital practice due to the ready availability of chest x-rays (CXR) and conflicting data from published reports'.[1] This conclusion appears to be based on a small (but landmark) study of 11 patients from 1986 to 1989, two small studies with only four pneumothoraces in one and another small series whose ultrasounds were retrospectively reviewed. Against these small and somewhat dated studies, a large number of recent investigations support a quite different conclusion.

Many well-performed retrospective reviews and a number of prospective studies have compared TUS to chest radiographs (CXR) in the detection of pneumothoraces using CXR as the criterion standard. Noting the limitations of CXR in detecting pneumothoraces, we feel that only prospective studies utilising CT as the reference criterion are valid to assess the relative merits of ultrasound versus radiography. Although methodology and populations have varied, at least nine comparative trials, conducted in the last decade, have noted a higher sensitivity for TUS than CXR in the detection of pneumothorax. While the widely reported sensitivities (49%–100%) for TUS detection of pneumothoraces has not been explained, a more important point is that, in each of these studies, the sensitivity of TUS was significantly higher than CXR. Sonographic specificities were not significantly different from those of CXR, ranging from 94% to 100%. Furthermore, in the studies where it is reported, the likelihood ratios have ranged from 36 to 153.[2–4] Since a typical benchmark of a useful test is one that can generate positive likelihood ratios of greater than 10, these test characteristics have persuaded many, including the authors of two systematic reviews, that TUS is a more accurate test than supine anteroposterior CXR for the detection of pneumothorax. Finally, we would also like to take issue with the assumptions underlying the phrase 'ready availability of chest x-rays'. For many critical care and emergency department patients with sudden unexplained dyspnoea, the delay involved in obtaining a 'stat' portable CXR can be lethal. For such patients, bedside TUS may allow for rapid initiation of life-saving interventions.

We are keenly aware that TUS has pitfalls, and that its use requires due caution by properly trained sonologists. However, recognising that guidelines are living documents reflecting best evidence,[5] we respectfully submit that the BTS guidelines in question are thus somewhat incomplete. In our view, after further review and consensus development according to the GRADE criteria, data reported from the 21st century, far from being conflicted, provide strong and consistent evidence regarding the superiority of sonography over CXR in the diagnosis of pneumothorax (see online supplement).

The World Interactive Network Focused on Critical Ultrasound (WINFOCUS) International Liaison Committee on Pleural and Lung Ultrasound (ILCPLUS) is constituted by experts in pleural and lung ultrasound and clinical epidemiology experts in the process of evidence assessment, including GRADE and RAND Appropriateness Methodologies for the development of evidence-based clinical recommendations and consensus statements.

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► Additional materials are published online only. To view these files please visit the journal online (http://thorax.bmj.com).

Competing interests This letter is being written on behalf of the WINFOCUS International Liaison Committee on Pleural and Lung Ultrasound (ILCPLUS). The goal of this group is to promote the use of point of care ultrasound although none of the members has any specific financial conflicts.

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