

LETTERS TO THE EDITOR

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Diagnostic value of tachypnoea

EDITOR,—I was interested in the two papers on respiratory rate^{1,2} in the January edition of this journal, because this physical sign and its interpretation fascinate me.

With various caveats Palafox *et al* suggest that tachypnoea is useful for identifying pneumonia.¹ I am concerned that the only children included in their study were those presenting to hospital with acute respiratory infections. To generalise from this setting to the usefulness of this sign outside this specific context could be misleading. In the community a high respiratory rate is quite common in normal healthy infants when awake and interested in their surroundings. The sensitivity and specificity of a diagnostic test depend on the population included. These are likely to have been very different if all children presenting to the hospital or a group seen at random in the community had been included. In our study³ of 1007 infants under 6 months old seen in the community ($n = 298$) and presenting to hospital ($n = 709$) there were 30 with a chest x ray picture showing changes of a lower respiratory infection. Their respiratory rate was not significantly different from that of the other 953 children.

Interestingly, in the adjacent paper of Rajesh *et al*, investigating 200 infants under 2 months presenting to hospital with a variety of illnesses, 34% had pneumonia and 50.5% had a respiratory rate above 59 breaths per minute.² This all suggests that respiratory rate is too insensitive for diagnosing pneumonia.

Rajesh *et al* suggest that in infants less than 2 months of age a respiratory rate of more

than 59 per minute is a good predictor of hypoxia.² Their first sentence says, "rapid breathing is an important clinical manifestation of many illnesses in young infants" and quotes one of my papers in support.⁴ However, this was not our conclusion. In our main paper on respiratory rate in infants under 6 months old³ we say, "the respiratory rate when awake did not correlate with the severity of a baby's illness or the presence of serious lower respiratory tract infection". In this paper they conclude that acutely ill infants less than 2 months old presenting with a respiratory rate above 59 per minute should be considered hypoxic and treated with oxygen. However, of the 101 infants with a respiratory rate in this range 39 were not hypoxic, and so on these criteria 38% would be treated with oxygen unnecessarily. Perhaps of more concern is that of the 99 children who had respiratory rates below 60 per minute, 15 were hypoxic, and so on their criteria 15% of children who needed oxygen would not receive it.

I remain unconvinced that respiratory rate on its own is a good guide to diagnosis or a "good predictor of hypoxia".

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- 1 Palafox M, Guiscafre H, Reyes H, Munoz O, Martinez H. Diagnostic value of tachypnoea in pneumonia defined radiologically. *Arch Dis Child* 2000;82:41-5.
- 2 Rajesh VT, Singhi S, Kataria S. Tachypnoea is a good predictor of hypoxia in acutely ill infants under 2 months. *Arch Dis Child* 2000;82:46-9.
- 3 Morley CJ, Thornton AJ, Fowler MA, Cole TJ, Hewson PH. Respiratory rate and severity of illness in babies under 6 months old. *Arch Dis Child* 1990;65:834-7.
- 4 Morley CJ, Thornton AJ, Cole TJ, Hewson PH. Interpreting the symptoms and signs of illness in infants. In: David T, ed. *Recent advances in paediatrics*. London: Churchill Livingstone, 1991:137-55.

Dr Martinez and Dr Guiscafre comment:

We are very sorry that Prof. Morley still has doubts about the utility of tachypnoea for the diagnosis of pneumonia in children with acute respiratory infection. Maybe his lack of faith in the usefulness of this sign as an early predictor of pneumonia stems from the expectation that tachypnoea should be as good a predictor of severity of illness among normal healthy children chosen at random in the community as it is among children with signs of acute respiratory infection (including common cold, cough, or fever), either in a community or in a hospital setting.

In our study,¹ we included 35 children with radiological signs of pneumonia (defined as the gold standard) who presented to a clinical unit specialising in the treatment of acute respiratory infection and acute diarrhoea, and compared them with 75 children without such radiological signs; all children included in the study had an acute respiratory infection. In this setting, we found that tachypnoea—defined as a respiratory rate

over 40 breaths/min in children 1-5 years old, over 50 breaths/min in children 2-12 months old, and over 60 breaths/min in children under 2 months old, according to WHO recommendations²—was the single most useful clinical sign to identify pneumonia in children under 5 years of age. This sign had a sensitivity of 74%, specificity of 67%, and 69% of correct classification of cases. In contrast, the study by Morley *et al* included 30 children under 6 months of age who had changes of lower respiratory infection on chest radiography, although only six infants had a clinical diagnosis of pneumonia, and compared their mean respiratory rate with that of other 953 babies who either had a normal chest radiography or no radiograph.³ Not surprisingly, he found no statistically significant difference between these two means. The purpose of comparing mean respiratory rate between two groups of infants with different diagnosis is completely different from that of assessing the diagnostic value of age specific cut off points of a clinical sign. Actually, Morley *et al* recognise that their study was not designed specifically to study respiratory rate in relation to pneumonia.

In our study, we also confirmed that tachypnoea was a useful sign to predict pneumonia, independent of the child's age or nutritional status, although we recognised that we had too few children under 2 months of age with severe malnutrition, and thus cautioned about the generalisability of our findings for this population, in which more studies have to be carried out. The most important issue that we stressed in our article in relation to the usefulness of tachypnoea as an early predictor of pneumonia is that in children with less than three days duration of disease, the sensitivity, specificity, and percentage of correct classification of pneumonia dropped significantly (to 55%, 64%, and 62%, respectively), while false negatives increased from 8% to 11%.

Lastly, we emphasise that both in clinical and epidemiological research as in regular clinical practice, there is a growing body of evidence that supports the usefulness of tachypnoea to establish the clinical suspicion of pneumonia in children who present with an acute respiratory infection, and would thus encourage Prof. Morley and other sceptics to rely on the adequate use of this sign, simple as it is, to initiate the prescription of early and appropriate treatment for children with an acute respiratory infection. This conduct has been shown to save lives.^{4,5}

- 1 Palafox M, Guiscafre H, Reyes H, Muñoz O, Martinez H. Diagnostic value of tachypnoea in pneumonia defined radiologically. *Arch Dis Child* 2000;82:41-5.
- 2 Programme for the Control of Acute Respiratory Infections. *WHO/ARI/90.5*. 1990:62-3.
- 3 Morley CJ, Thornton AJ, Fowler MA, Cole TJ, Hewson PH. Respiratory rate and severity of illness in babies under 6 months old. *Arch Dis Child* 1990;65:834-7.
- 4 Berman S, Dueñas A, Bedoya A, *et al*. Acute lower respiratory tract illnesses in Cali, Colombia: a two year ambulatory study. *Pediatrics* 1983;71:171-6.
- 5 World Health Organisation. *The management of acute respiratory infections in children in developing countries*. Document WHO/RD/85.15. Rev. 2. Geneva: WHO, 1986.