LETTERS TO THE EDITOR

Evaluation of a district growth screening programme: the Oxford growth study

EDITOR,—We would like to point out the danger inherent in using a Minimetre, the height measuring instrument recommended by Ahmed *et al.*[1] A recent spot check of 55 similar instruments in use in one health district revealed that 10 were giving readings that were a centimetre or more out.[2] The newly developed Leicester Height Measure is also an inexpensive portable instrument, designed for use in the community, but the fact that it is self calibrating means that inaccurate measurements resulting from careless installation cannot arise.

We welcome the authors' recommendation that growth problems be identified at an early age in a community height screening programme. Once screening has been carried out on initial height however, there is little to be gained from waiting a year and screening on velocity using the 25th centile as a cut off, as in the Oxford study. First, the normal short child, on the third centile for height, only requires an average velocity on the 25th centile for steady growth, and single estimates of velocity will fluctuate around this point, with as many below as above. It has been shown that while the proportion of short children growing below the 25th centile remains constant from year to year, the identity of the children inevitably changes.[3] The imprecision of the height measurement itself is such that it is rarely possible to label a child's rate of growth, after only one year, as good or poor. A child who is very short must already have sustained a considerable period of slow growth – any further delay is therefore unnecessary.

Ideally, we should be monitoring the long term growth of every child in the community, regardless of height, but we have shown that the shorter the child, the more likely an underlying organic cause.[4] Where resources are limited therefore, we would suggest the routine investigation of all exceptionally short children, as soon as they are identified.

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1 Ahmed ML, Allen AD, Sharma A, Macfarlane JA, Dunger DB. Evaluation of a district growth screening programme: the Oxford Growth Study. *Arch Dis Child* 1993; **69:** 361–5.
2 Voss LD, Bailey BJR, Cumming K, Wilkin TJ, Betts PR. The reliability of growth measurement. *Arch Dis Child* 1990; **65:** 1340–4.
3 Voss LD, Wilkin TJ, Bailey BJR, Betts PR. The reliability of height and height velocity in the assessment of growth. *Arch Dis Child* 1991; **66:** 833–7.
4 Voss LD, Mulligan J, Betts PR, Wilkin TJ. Poor growth in school entrants as an index of organic disease. *BMJ* 1992; 305: 1400–2.

Ms Ahmed and colleagues comment:

We accept the criticisms that Linda Voss makes regarding the inherent dangers in the installation of the Minimetre. The aim of our study, however, was to establish a district wide screening service involving 360 general practitioners, 125 health visitors, 30 school nurses, and various other nurses and doctors who might be involved in the primary care of the children. In order to do this we needed a cheap, portable, easy to use device and at the time of the start of our programme (1988) the Minimetres were felt to be the most appropriate instruments.[1] The Leicester Height Measure was not (to our knowledge) available then.

We agree with Linda in her comments regarding the lack of correlation from year to year of a child's height velocity, this was established many years ago by J M Tanner.[2] We did not delay the referral of any child merely to acquire additional information. All 'exceptionally short' children – that is height SD score <-3 were referred immediately to the paediatric endocrinologist. Equally all children whose height SD score decreased significantly between 3 and 4·5 years (even if they were still within the centiles) were reviewed by the auxologist.

Those children whose heights were <-2 SD scores but >-3 SD scores were felt not to warrant immediate referral. Although perhaps in an ideal world it may be desirable to refer all short children, in a district the size of Oxford (population=550 000, birth rate =7500/year) it would mean the annual referral rate to a growth clinic would be over 200/year for short stature alone using the new UK growth charts. To avoid overwhelming our clinics with many children who are essentially normal individuals from short families or children with constitutional delay we advocate the use of a triage system of assessment such as we have employed. Indeed before any of the children were seen by the auxologist, the child's general practitioner had been contacted and pathology which had already been identified was highlighted.

We feel we have established an efficient and inexpensive growth screening service in our district.

1 Ahmed ML, Yudkin PL, Macfarlane JA, McPherson K, Dunger DB. Are measurements of height made by health visitors sufficiently accurate for routine screening of growth? *Arch Dis Child* 1990; **65:** 1345–8.
2 Tanner JM. *Foetus into man.* London: Open Books, 1978.

EDITOR,—In their Oxford screening programme, Ahmed *et al* assess short children's progress by comparing their velocities with the 25th centile one year after screening at the nominal third centile point for height.[1] Such an *ad hoc* procedure has its origin in the fact that the difference between two heights, a year apart, on the third centile of a height chart lies on about the 25th centile of a velocity chart. In reality, children with heights on the third centile have an average velocity over the ensuing year that is nearer the 30th centile in view of a slight regression back to the population mean. The details may be found in Bailey.[2]

Ahmed *et al* found that the proportion of children with heights below -2 SD scores was 1·3%, a figure in close agreement with that found in other studies. For normal 3 year olds this short, the mean annual velocity lies on about the 27th centile of a standard, that is unconditional, chart for velocity, while for 4·5 year olds the mean lies on about the 21st centile. The authors' finding of only 28 children out of 80 (presumably of both initial ages 3 and 4·5 years) with annual velocities greater than the 25th centile is consistent with these expectations once the known cases of pathology (seven so far) are removed.

It must be emphasised that the correct, that is formal, method for assessing a child's growth after he or she has been first selected on the basis of height is to consider subsequent heights and velocities conditional on that initial height. Such methods have previously been explored by Cameron[3] and will be found in Bailey.[2]

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1 Ahmed ML, Allen AD, Sharma A, Macfarlane JA, Dunger DB. Evaluation of a district growth screening programme: the Oxford growth study. *Arch Dis Child* 1993; **69:** 361–5.
2 Bailey BJR. Monitoring the heights of prepubertal children. *Ann Hum Biol* 1994; **21:** 1–11.
3 Cameron N. Conditional standards for growth in height of British children from 5·0 to 15·99 years of age. *Ann Hum Biol* 1980; **7:** 331–7.

EDITOR,—There is clearly much to admire in the Oxford growth screening programme, and in its thorough evaluation by Ahmed *et al.*[1] However, while the case for community investigation of children with short stature who have come to medical attention is well made, I do not see how the data they present can be used to support their conclusion that 'community growth screening is a useful part of the child health surveillance programme'.

An evaluation exercise of this kind cannot tell us at what age those children who were 'picked up' by the screen would have been detected were no screening programme in place, nor the extent to which diagnosis is delayed in those children with pathological causes for short stature who have screened as false negatives. The cost of the primary growth screen in the evaluation covers only that of the primary screen itself, excluding that for the extra work generated at secondary and tertiary level over what would have been required if no screen were in place (although of course this may be a negative figure!).

From these data, therefore, we cannot begin to estimate how many centimetres of final adult height are gained across the screened population, if any, nor how much it has cost us to achieve that gain. Only a randomised controlled trial could really answer those questions.

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1 Ahmed ML, Allen AD, Sharma A, MacFarlane JA, Dunger DB. Evaluation of a district growth screening programme: the Oxford growth study. *Arch Dis Child* 1993; **69:** 361–5.

Breathing expired gases from bedding

EDITOR,—We were interested in the paper by Bolton *et al* and surprised to find that the carbon dioxide concentrations rose to the levels reported (up to 10%).[1] In our opinion these raised levels are artefactual and result from the unphysiological nature of the model.

The figure illustrates the accumulation of carbon dioxide which occurs in a realistic scenario. The recording in the lower panel is from a healthy 6 week old boy who had a