injection volume in one second (FEV1 in ml, Pulmotest, Physiosystem), peak expiratory flow rate (PEFR in f/min, mini Wright), heart rate (pulses/min). Results as mean (SD) were compared by analysis of variance. The two groups (11 in each) did not significantly differ in age (Neubhaler: 8.5 years, range 4.5-13 and Turbuhaler: 10 years, range 6-14). There was no difference between the baseline for any variables. Results in efficacy are presented in the table. Both treatments were effective at 15 minutes to improve lung function compared with baseline (p<0.01 for all variables) with little further improvement at 30 minutes. No difference between treatments could be demonstrated at any time for these variables. No cardiovascular effect was observed in the Neubhaler group. In the Turbuhaler group, a slight increase in heart rate (median: 80 to 86 pulses/min) was observed.

In conclusion, inhalation of terbutaline via Turbuhaler gave similar increase in lung function as a metered dose inhaler plus Neubhaler in children above the age of 5 years with moderately acute exacerbation of asthma. The Turbuhaler is easy to use and to carry and can be recommended for paediatric use.

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Evaluation of a pen injector system for growth hormone treatment

Sir,—We agree with many of the comments of Gluckman and Cutfield about convenience and compliance using a pen injector system (0.5 unit increments up to a maximum of 40 units per injection) and the important role of a nurse educator. The authors have demonstrated that if convenient doses of growth hormone using a pen injection system are administered, such as 2 or 4 units (which by serendipity fit the 0.5 unit increments and divide into 16 with no residual) then indeed this pen system is accurate and efficient. However the authors have convincingly argued that traditional fixed dose regimens of 4 units three times a week are obsolete and that the dose of growth hormone should be related to the patient's size. If the dose schedule of growth hormone is related to either weight or surface area, then usually the resulting dose will not be convenient using this pen injector system, which may lead to wastage of growth hormone at the end of the cartridge. The authors demonstrated that with minimum injections of 3.5 units, what happens to the 2 units remaining in the cartridge vial?

Day case ligation of patent ductus arteriosus in preterm infants

Sir,—I read with interest about the brave new world of day case ligation of patent ductus arteriosus (PDA) in preterm infants and was relieved to learn that infants were not discharged home on the day of surgery. The authors are to be commended on developing a safe and efficient service but are not justified in concluding in their abstract that 'if it is carried out early [ligation of PDA] will reduce the time before extubation and discharge from the neonatal intensive care unit'. They present no control data to support this conclusion. Indeed they refer in their discussion to a multicentre comparative study which showed no significant difference in mortality, duration of respiratory support, and number of days in hospital between infants receiving medical or surgical treatment.

My own experience (also uncontrolled) over the last 10 years in a neonatal intensive care unit serving approximately 5500 births a year is that surgical ligation of PDA in preterm infants is very rarely necessary, only one infant having been operated on in the neonatal period. During this time we cared for 2 preterm infants of birth weight <1500 g of which 173 had birth weight ≤1000 g. Our survival rates compare favourably with the other four large regional centres, and long-term follow-up (beyond 14 days) is now rarely needed.

Fluid restriction, early use of indomethacin, effective treatment of underlying lung disease including dexamethasone, and above all patience will allow the preterm infant's duct to close in all but exceptional cases. I am very worried at the apparent early resort to surgery which many appear to adopt.

It is important to show an operation is safe and readily available, it must also be shown to be necessary.

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Dr Satur and Dickinson comment:

As cardiologists and cardiac surgeons at a supraregional centre for paediatric cardiac surgery we see a highly selected group of preterm infants with a patent arterial duct, namely those referred by paediatricians specifically for ligation of the duct because the measures suggested by Dr Dodd had either failed or were considered inappropriate. Our conclusions at the end of the paper relate only to this group of patients. We have shown that if a paediatrician feels that active surgical management of the duct is necessary he or she should not delay for fear of the hazards of transportation and operation. However we would agree entirely with the statement that the operation must be shown to be necessary. Because of the delay in the paper relate only to this group of patients. We have shown that if a paediatrician feels that active surgical management of the duct is necessary he or she should not delay for fear of the hazards of transportation and operation.