volume in one second (FEV\textsubscript{1} in ml, Pulmotron, Physiosystem), peak expiratory flow rate (PEFR in 1/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 (Nebulizer: 8-5 years, range 4-5-13 and Turbuhaler: 10 years, range 6-14). There was no difference between the baselines for these 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 Nebulizer 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 Nebulizer 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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Dr Cutfield and Professor Gluckman comment: Sister Hamill and Mr Stanhope hope to have misinterpreted the major theme of our paper. We addressed patient perception and satisfaction of growth hormone delivery systems, not growth hormone effects. Publications to date have largely ignored patients' perception of growth hormone delivery. As the primary goal of growth hormone treatment is to promote greater psychosocial wellbeing, achieved in part by attempting to increase adult height, it is essential to consider patient acceptance of the method of treatment. In our study most children and their families prefered a pen to a syringe delivery system. Children self administered at an earlier age with the pen than with the syringe, we presume these are real differences perceived by the patients. If the prime motive of treatment is to facilitate large steps in dose schedules and to support psychological wellbeing, then use of the injector pen, despite a minor compromise in dose regimen, must be considered by the physician in the choice of treatment modality.

If there is a real advantage to the extreme accuracy of the regimens proposed by Hamill and Stanhope, hopefully pharmaceutical companies will be encouraged to introduce vials giving a varying growth hormone concentrations to allow more precise titration of dose using pens or other easy use administration devices.

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 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 92 infants of birth weight 1500 g of which 173 had birth weight 1000 g. Our survival rates compare favourably with the other four large neonatal regional centres, and long term survival (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 not ethically sound to claim 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 very sick 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 will not delay, because of the increased 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 small number of our patients we cannot address the wider issues relating to the management of the patent arterial duct in the neonatal unit. We
Evaluation of a pen injector system for growth hormone treatment.

G Hamill and R Stanhope

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