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Analgesia in the neonate

The traditional reluctance to prescribe analgesic drugs to alleviate postoperative or other pain in neonates has recently been challenged by pain researchers.¹ The main reasons for the reluctance to prescribe are doubts about whether neonates feel pain to the same extent as adults and concerns over the potentially harmful effects of powerful analgesics, particularly on the respiratory system. Most doctors have naturally based their opinions about whether neonates experience pain on clinical observation.

Even after major operations most babies who are not hypoxic or hypovolaemic settle down quickly and sleep peacefully for normal periods, especially if they can be fed early and orally. Burton and Derbyshire in 1958 described a severe withdrawal state in a young infant, which they called a "sleeping fit."² They postulated that it was caused by the excruciating pain of acute glaucoma, but this phenomenon has not been described elsewhere, and no one has suggested that this mechanism operates regularly in babies.

There are theoretical reasons for suspecting that neonatal perception of pain is reduced in proportion to the degree of myelination of the central nervous system. Neonates also have immature receptors and neurological pathway development, and nerve transmission in response to pain seems to be modified in immature nerve tissue.^{3,4} They also have circulating concentrations of β endorphins higher than those in adults, and the immature blood brain barrier may allow these easier access to neuronal tissue.⁵ On the other hand, acute painful stimulation such as circumcision, which is often performed without anaesthesia in neonates in the United States, produces an obvious immediate response of breathholding, crying, and body movement. The observer is left in no doubt that the baby is experiencing pain.

Increasing acceptance that neonatal pain requires treatment has been shown from the results of a recent survey of members of the Association of Paediatric Anaesthetists (F Dorman, personal communication). More than half (56%) of the 60 replying said that they used opioid analgesia in the neonate either occasionally or often. Though this is safe in babies being ventilated, it is associated with an important incidence of respiratory depression in those breathing spontaneously. This is probably because of altered pharmacokinetics and increased sensitivity to opioids related to the immature blood brain barrier and glucuronide metabolism. Apnoea in the neonate is potentially catastrophic, and even prolonged apnoea may remain undetected despite modern monitoring systems.⁶ Personnel skilled at tracheal intubation may not be immediately available, and hypoxic cerebral damage may occur. Infusions of opioids may be safer than

bolus doses, and regional block may be safer still. That opioids may be dangerous in spontaneously breathing neonates does not necessarily mean that they should not be used; it might be argued that the evidence of severe pain justifies elective tracheal intubation and ventilation when opioids are to be given.

Little work has been published on the behavioural response to pain in infancy, and clearly more research is required. No single independent variable—whether it be crying, facial expression, body movement, or heart rate—is likely to correlate closely with pain, since these variables are affected by so many other factors; but analysis of several simultaneous responses may be helpful. Owens and Todt studied the effect of a heel lance on crying and heart rate in neonates and showed a statistically significant correlation despite wide baseline variability for each individual measure.⁷ A similar approach was used to study the effects of local anaesthesia on reactions to circumcision,⁸ and more recently metabolic and hormonal responses to operations have been shown in the newborn. Only with the results of such research can we produce firm guidelines for using potent analgesics in neonates.

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Diet of young children and cardiovascular disease

Should the diet of young children be changed to reduce their chances of developing cardiovascular disease? The National Advisory Committee on Nutrition Education (NACNE) thought so in 1983 and produced nutritional guidelines for the whole population,¹ but the Committee on the Medical Aspects of Food Policy (COMA) in its recommendations of the next year specifically excluded children under 5.² This split extends downwards, and community dietitians are keen to promote healthy eating throughout the community, whereas paediatric dietitians are cautious about changing established feeding practices for children.^{3,4}

Any important changes in dietary advice should benefit health, and any disadvantages, either predictable or unforeseen, should not outweigh the putative benefits. The COMA recommendations meet these criteria for adults and children over 5. They state that the amount of food energy as fat should not be more than 35%, that the saturated to unsaturated fatty acid ratio should be about 0.45, that fibre rich food should be increased and salt intake restrained, and that obesity should be avoided. Some of these rec-

ommendations are accepted for children under 5, but the timing of when to introduce two of the proposals—reducing the proportion of total food energy that is fat and increasing fibre—is disputed.

In a nutshell, the problem is how to change the diet of an unweaned baby—whether breast or bottle fed—from a fibre free, high fat intake (50% food energy as fat) to a high fibre, low fat diet by 5. Paediatricians and paediatric dietitians believe that this should happen gradually because full cream milk is important in the diets of young children; they are concerned about offering babies and young children skimmed or semiskimmed milk and bulky high fibre, low energy dense foods.⁵ They fear that such diets may lead to inadequate energy intake and undernutrition in some children, possible deficiencies of fat soluble vitamins, and diarrhoea in toddlers because of the more rapid gastric emptying with low fat foods.⁶ They are also concerned about the difficulty of devising acceptable diets for toddlers that are high in fibre and low in fats. The panel on child nutrition of COMA shares these concerns and has recently proposed guidelines roughly in line with them.⁷

The more radical approach is based partly on the desirability of the whole family sharing similar diets and eating similar foods. There is also the argument that the earlier changes are made the more likely they are to become permanent. Ultimately pressure for changes in childhood nutrition comes from the belief that it will lead to better adult health, but data to support this are lacking.

The Bogalusa study, a long term longitudinal study of cardiac risk factors in children, has shown that risk factors for heart disease are present in children and increase through adolescence into early adult life.⁸⁻¹⁰ Childhood obesity, for example, predisposes to adult obesity but accounts for only a small proportion of it.¹¹ What neither the Bogalusan nor other studies have yet shown is that dietary manipulation at an early age will reduce the later prevalence of hyperlipaemia and cardiovascular disease in an unselected population.¹²⁻¹⁵ A recent study linked cardiovascular disease with early undernutrition rather than excess fat intake,¹⁶ although whether that study has identified independent “markers” of disadvantage rather than a causal relation is not clear.

What advice should be given to the parents of young children? Infant formula should continue as the “milk” element of the diet until about 1 year, and by then most of the diet will be solid food and a switch to whole cows’ milk will not add to the total fat intake. Progressive reduction of milk fat as a proportion of energy needs during childhood would ensure that the COMA goals would be reached by 5, without resorting to skimmed milk, particularly if vegetable rather than animal fats were used in solid foods. Fibre can be gradually increased, and the policy of “no added salt after cooking” seems sensible for the whole family. No one can argue with the principle that obesity should be avoided by ensuring adequate physical activity as well as watching the child’s diet.

Until there is clearer evidence on the importance of early diet on later health dietary advice for children under 5 should not be radically changed.

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The unacceptable face of tipping

Lying head down over a bed once or twice a day for 20 minutes is an exercise that few doctors would find time to adopt unless the rewards were appreciable, so it is hardly surprising that many patients with chronic suppurative lung disease find postural drainage unpleasant and difficult—as do their spouses.¹ Postural drainage is widely prescribed to help drain excessive lung secretions and has been a mainstay of treatment since at least the 1920s.² But is it adhered to, does it work, and if so when?

Two studies suggest that compliance is poor.^{3,4} Forty per cent of patients with cystic fibrosis or their parents admitted to lapses of greater than one month in carrying out prescribed chest physiotherapy, and compliance deteriorated as patients grew older.³ Almost half of 50 consecutive patients attending a clinic with a particular interest in suppurative lung problems said that they performed postural drainage less often than instructed; they did not have the time and found postural drainage distasteful, uncomfortable, and occasionally painful.⁴ Patients with less severe disease and smaller sputum volumes were more likely to default. Independent confirmation of compliance is difficult to obtain, and both studies relied on information from the patients. Since, in addition, one study was of motivated patients and the other of patients attending a highly specialised unit the results are probably a considerable overestimate of general compliance.

Does postural drainage work? Most studies have looked at it together with chest physiotherapy and in the short term the combination increases the clearance of lung secretions, as measured by radiotracer techniques,⁵⁻¹⁰ improves airway function,¹¹ and increases the amount of sputum expectorated at least in patients producing 30 ml or more daily.^{7,8,10} Patients with little sputum do not benefit,¹² and those with pneumonia may deteriorate.¹³ The increase in sputum volume occurs at the time of postural drainage, and whether there is an increase in 24 hour sputum production or simply a change in the time at which sputum is expectorated is less clear.¹⁴ Attempts to separate the contribution of the various components of physiotherapy suggest that postural drainage, when coughing is allowed, increases sputum production⁷