and agar) was probably not sensitive enough to isolate *C difficile* in the original episode of diarrhoea. The absence of toxin in faeces does not reliably indicate the absence of an organism. Histological examination of the rectal biopsy specimen, however, showed no evidence of pseudomembranous colitis.

C difficile is rarely found outside the bowel,[2] though two recent reports have described its isolation from the frontal bone in a patient with osteomyelitis[3] and from a splenic abscess,[4] both cases being due to spread in the blood. There have also recently been increased reports of polymicrobial septicaemia, and some workers have recommenced subsequent subculture of previous positive cultures.[5] Our case shows that *C difficile* is indeed capable of dissemination from the gastrointestinal tract and the value of repeat subcultures of previous positive blood cultures.

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Oral rehydration without added bicarbonate for childhood gastroenteritis

Oral rehydration with glucose electrolyte solution has become recognised as the best treatment for childhood gastroenteritis.[1] The following unresolved problems were recently identified: (*a*) what formula is best? (*b*) who are the health care personnel best suited to give treatment? (*c*) how should it be packaged? (*d*) how to avoid the largest errors in final electrolyte concentration that arise from measuring the water rather than the salts? (*e*) what are the effects on morbidity and mortality?[2]

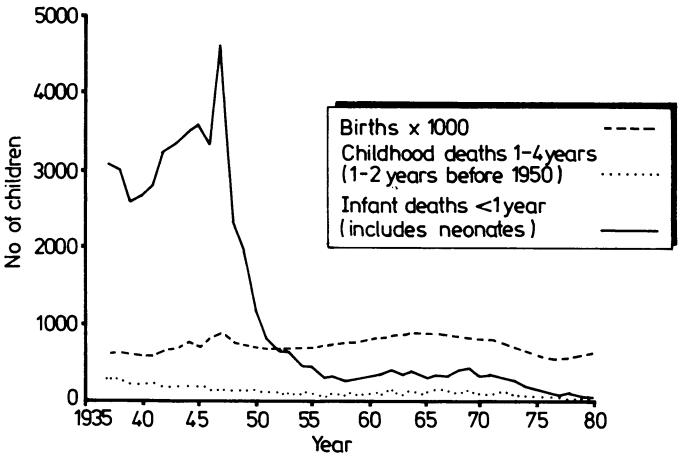
Unlike most solutions recommended for oral rehydration, those used for intravenous rehydration do not include bicarbonate and achieve results that are equally satisfactory.[1] Aqueous solutions of bicarbonate slowly decompose to form carbonate, and also attack glass containers. On heating glucose solutions become discoloured and produce furfural and other deposits. Bicarbonate accelerates these reactions making it difficult and expensive to produce sterilised preparations containing both bicarbonate and glucose.[3] Prepacked powders containing bicarbonate must be reconstituted and diluted using water that has been boiled and cooled. For the past 14 years we have overcome this problem in Cardiff by using a prepacked sterile oral rehydration solution that is free of bicarbonate.

Methods and results

All children admitted with gastroenteritis during one year were studied prospectively. Oral rehydration was carried out with a solution containing sodium 34 mmol(mEq)/l, potassium 20 mmol(mEq)/l, chloride 54 mmol(mEq)/l, and glucose 183 mmol/l (3·2 g/100 ml). This is prepared and sterilised by the hospital pharmacy and supplied in sealed 500 ml glass bottles at a cost of 36p.

During one year 50 boys and 40 girls under 5 were admitted for gastroenteritis to this unit, which serves a population of about 250 000. Ten were under 1 month, 48 from 1 to 12 months, and 32 under 5 years. Four breast fed infants were admitted, none of whom required intravenous fluids. Eighty two children were managed with oral rehydration fluids alone. None had received similar standard solutions at home. Eight were given intravenous fluids within two hours of admission of whom one was given intravenous bicarbonate. None of those managed with oral fluids required sodium bicarbonate supplements or intravenous fluids. After rehydration standard formula or low lactose feeding was resumed.

On admission the mean serum electrolyte concentrations and blood gases were; sodium 137 mmol/l, range 122-164 mmol/l; potassium 4·2 mmol/l, range 3·3-5·1 mmol/l; urea 6·4 mmol/l (38·4 mg/100 ml), range 1-12 mmol/l (6-72 mg/100 ml); pH 7·4, range 7·3-7·47; carbon dioxide pressure 4·1 kPa (31 mm Hg), range 2·5-5·4 kPa (19-41 mm Hg); standard bicarbonate 21 mmol(mEq)/l, range 16-24 mmol/l; base deficit 4 mmol(mEq)/l, range 0-9 mmol/l. Serum sodium concentration was over 150 mmol/l in two children and under 125 mmol/l in another two. Various pathogenic bacteria and viruses were detected. Fifty per cent of the children were home within four days and 78% within one week. No obvious neurological damage or deaths occurred.



Deaths from childhood gastroenteritis in England and Wales 1937-80. ICD 008-009. Data from Office of Population Censuses and Surveys.

Comment

Nowadays deaths from childhood gastroenteritis are rare in England and Wales (figure). The greatest reduction in mortality occurred between 1945 and 1955 before the introduction of oral rehydration treatment. Under 0·4% of all local children under 5 were admitted with gastroenteritis, but they constituted 10% of all admissions to our unit from this age group. Family doctors did not give oral rehydration powders to the patients they admitted, who were mainly infants or older children with severe attacks. Incorrect reconstitution of powdered milk, with which parents are familiar, has often been reported: many (occasionally fatal) mistakes are also made in the preparation of oral rehydration powders by parents under stress caring for an ill child.[4]

The use of sterile prepacked solutions stored at 4°C after opening minimises the problem of bacterial growth.[5] We suggest that in Britain and probably other developed countries childhood gastroenteritis can be treated advantageously with a sterile prepacked oral rehydration solution that is free of bicarbonate.

We thank Dr A M George of the Welsh Office for help in compiling the figure.

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