ABC of 1 to 7

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VOMITING AND ACUTE DIARRHOEA

Common causes of vomiting

- 1 Acute gastroenteritis
- 2 Acute otitis media (see later article)
- 3 Urinary tract infection (see later article)
- 4 Onset of acute appendicitis or intussusception (see earlier article on acute abdominal pain)
- 5 Intestinal obstruction (see earlier article on acute abdominal pain)
- 6 Whooping cough
- 7 Meningitis
- 8 Infective hepatitis

Doctors should always be worried about vomiting in a young child. Although it may herald only the onset of a trivial illness, such as acute otitis media, vomiting may be the first symptom of a potentially lethal disease such as meningitis or intestinal obstruction. The child needs to be seen urgently if the vomitus is bile-stained (suggesting intestinal obstruction) or if he is drowsy or refusing feeds, which may occur in meningitis. Diagnosis over the telephone without seeing a vomiting child may be disastrous. By the age of 1 year regurgitation of feeds has usually stopped, and vomiting signifies a new illness.

Whooping cough

Lobar collapse

Vomiting may be so severe in infants with whooping cough that the mother is more worried by the vomiting than the cough. During the first one to two weeks of the illness (catarrhal phase) there is a short dry nocturnal cough. Later, bouts of 10 to 20 short coughs occur both day and night. The cough is dry and each cough is on the same high note or goes up in a musical scale. Vomiting may occur towards the end of a long attack of coughing. The coughing is followed by a sharp indrawing of breath, which causes the whoop. Some children with proved pertussis infection never develop the whoop. Feeding often provokes a spasm of coughing, which may culminate in vomiting. Afterwards there is a short period when the child can be fed again without provoking more coughing. In uncomplicated cases there are no abnormal signs in the respiratory system.

Whooping cough may occur in children who have been fully immunised against it. *Bordetella pertussis* may be isolated from a pernasal swab, which should be plated on a special culture medium immediately after being taken. A blood lymphocyte count of over $10 \times 10^9/l$ with a normal erythrocyte sedimentation rate suggests whooping cough. A seven-day course of oral erythromycin or ampicillin reduces the infectiousness of the patient but does not usually affect the course of the disease if vomiting has already started. Symptomatic treatment with promethazine, salbutamol, or phenobarbitone to try to reduce the cough usually has little effect, and the parents can be consoled only by being told that the vomiting will eventually stop.

If there are abnormal signs in the respiratory system, the child becomes generally ill, or the cough persists longer than six weeks a chest radiograph is necessary to exclude the secondary complications of bronchopneumonia or lobar collapse, which need treatment with physiotherapy and antibiotics. If the coughing attacks are severe admission to hospital may be necessary. Ideally a child should be admitted with his mother to an isolation room on the children's ward.

Meningitis

In children aged under 3 years it is difficult to recognise early signs of meningitis. There may be fever, vomiting, irritability, a high pitched cry, and convulsions. Refusal of feeds and drowsiness are ominous signs. In younger children particularly neck stiffness may be difficult to detect. The fontanelle may be depressed due to dehydration from the persistent vomiting.

Older children may have fever, vomiting, and severe headache, but irritability, drowsiness, and unusual behaviour are more useful features. To detect neck stiffness the degree of flexion of the neck is observed when the child is asked to look at his umbilicus. If there is any doubt an attempt can be made to flex the head gently. A test for older children is Kernig's sign, which is present if there is pronounced resistance to extension of the knee when the patient is supine with both the thigh and knee flexed.

A purpuric rash suggests meningococcal infection, and an immediate intravenous or intramuscular injection of 0.5 megaunit of benzylpenicillin is needed.

The highest incidence of meningitis occurs between 6 and 12 months of age and the younger the child the more difficult the diagnosis. A useful rule is that if a doctor thinks that a lumbar puncture might be needed, it should be done. If papilloedema is present the child should be transferred to a neurosurgical unit before lumbar puncture is attempted. Except in patients with a purpuric rash no antibiotics should be given before the lumbar puncture is performed. Every child with meningitis needs intravenous fluids and antibiotics given by bolus injection into the infusion line. Chloramphenicol should be used when the meningitis is due to *Haemophilus influenzae* or when no organism can be identified on the smear of cerebrospinal fluid. High doses of intravenous penicillin G are used for meningococcal, pneumococcal, or streptococcal infection. Intrathecal penicillin has no place in treatment and is potentially lethal.

Acute gastroenteritis

Diarrhoea is the passage of loose stools more often than usual. When diarrhoea is severe the stools may be mistaken for urine. When this is a possibility a urine bag should be placed in position and the child nursed on a sheet of polyethylene. Acute gastroenteritis is the most common cause of acute diarrhoea.

Acute gastroenteritis is an acute infection mainly affecting the small intestine which causes diarrhoea with or without vomiting. In children aged over 3 years abdominal pain may be a prominent feature. The main danger is dehydration and electrolyte imbalance, but the infant may also be very infectious for other infants in a ward or nursery. Gastroenteritis is particularly dangerous to infants aged under 2 years.

Early signs of dehydration are often difficult to detect, particularly in fat toddlers, but recent weight loss is often a valuable indicator. Sunken eyes, inelastic skin, and a dry tongue are late signs, but if the infant has not passed urine for several hours severe dehydration is probable. The infant must be examined in detail to exclude any other acute infections.

The rotavirus is the commonest cause of gastroenteritis in infants and children throughout the world. It affects every age group and infection easily spreads throughout a family. Several distinct episodes of diarrhoea can be due to the rotavirus as there are several serotypes. The incubation period is 24 to 48 hours and a respiratory illness, including acute otitis media, precedes the gastrointestinal symptoms in about half the patients. Vomiting which lasts for one to three days is followed by abnormal stools for about five days. Treatment is aimed at keeping the child well hydrated until he recovers spontaneously.

If the patient is given an antibiotic early in the illness subsequent diarrhoea may be attributed to the antibiotic rather than to the rotavirus infection. Other drugs—for example, iron—may also be associated with diarrhoea.

Management

Clinical signs of severe dehydration or the loss of 5% or more of body weight are definite indications for admission. If the infant relapses after treatment or social problems prevent him being treated at home he should also be admitted. Infants who vomit persistently usually need to be admitted, though mild symptoms may be managed at home by giving frequent small volumes of liquid by mouth.

In mild cases the main principle of management is to stop milk and solids and give a glucose or sucrose solution. After 24 hours fruit or vegetable purées may be introduced and then other items from the child's normal diet. The mother should be asked not to give the child milk or milk products for a week and then to introduce them gradually. Vomiting may be reduced by giving small volumes of fluid every half hour or hour. The child should be allowed to drink as much as he wants but he needs at least 1 litre each 24 hours.

Kaolin or Lomotil should not be prescribed as it deflects the mother's attention from the main treatment. Lomotil has no place in the management of children. No antibiotics should be given to children with gastroenteritis treated at home.

In severe cases of dehydration or persistent vomiting oral fluids may have to be replaced with intravenous fluids in infants admitted to hospital. During the next day a third of the fluid requirement should be given as an oral glucose-electrolyte mixture, and later fruit and vegetable purées are introduced. Most children are discharged from hospital on normal diets within a week. Infants in hospital with diarrhoea must be barrier nursed in a cubicle, which should ideally be in an annexe to the children's ward.

The ideal oral rehydrating fluid is a glucose-electrolyte mixture, but a 5% glucose or 5% sucrose solution is easily available and safe. The 5% glucose solution can be supplied as a one-litre plastic pack of intravenous fluid, though single-dose sachets of glucose-electrolyte powder (Dioralyte) have recently become available, which enable mothers to make up the mixture accurately at home. A safe alternative is 5% sucrose solution, which can be made up by the mother using 2½ level teaspoonfuls of granulated sucrose in 200 ml (6 oz) water. *It is dangerous for mothers to add salt to this mixture.*

Investigations

Ideally a stool should be sent to the laboratory for culture of pathogens, but this is not necessary for mild cases treated at home. Only a small proportion of children have a bacterial pathogen such as *Escherichia coli*, *Shigella*, or *Campylobacter* isolated from their stools. Most cases of gastroenteritis in children are caused by viruses, usually rotaviruses, and these can be identified by direct electron microscopy of the stool.

Children needing intravenous fluids should have their plasma electrolyte and urea concentrations measured urgently.

If two or more infants in a ward or nursery have diarrhoea at the same time cross-infection should be presumed, even if their stool cultures show no pathogens. Stools from all the infants on the ward should be sent for culture and electron microscopy. Admissions to the ward may have to be stopped.

Progress

Date	Weight	Treatment
2.1.80	5.1 kg	Glucose-electrolyte mixture
2.1.80	5.4 kg	Glucose-electrolyte mixture
3.1.80	5.4 kg	

The infant must be seen again by the doctor within 12 hours of starting treatment to ensure that the illness is improving, the infant is not losing too much weight, and the mother understands the management. Severe dehydration can occur within a few hours, and it is helpful to have a specific policy to ensure adequate follow-up visits.

The main cause of relapse or persistent symptoms which demand admission to hospital is failure to follow a plan of treatment. A few infants aged under 2 years have temporary mucosal damage. This causes the diarrhoea to persist for longer than two weeks and is considered in the later article on chronic diarrhoea.

Gastroenteritis in developing countries

In developing countries the continuation of breast-feeding may be essential for survival. Although infants who are completely breast-fed rarely have severe gastroenteritis weaning foods made up with water may infect a breast-fed infant. These infants can be managed by continuing the breast-feeding and supplementing the fluid intake to prevent dehydration until the infant spontaneously recovers. Supplements may be given by mouth in mild cases and intravenously in severe cases. An easier method is to give them by continuous intragastric infusion, for which the fluid does not have to be sterile.

Oral rehydrating fluids can be made up using specially designed spoons to measure the sugar and salt. Mothers and older siblings can be taught to use this mixture at the beginning of an episode of diarrhoea rather than wait until the child is dehydrated. Simple slogans such as "a cup of fluid for every stool" are effective.

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Jaundice due to hepatitis A virus

Infectious hepatitis is most commonly due to hepatitis A virus. Before jaundice appears there is often headache, anorexia, nausea, vomiting, abdominal pain, and occasionally fever. The liver may be enlarged and tender, and the spleen and lymph nodes may also be enlarged. Jaundice starts as the fever subsides, and as the jaundice increases the child's appetite improves. The urine is dark because of bile and the stools may be very pale. Jaundice lasts for 8-11 days. In children under 3 years, especially those in institutions, hepatitis may occur without jaundice.

If a child wants to stay in bed he should be allowed to, but prolonged bed rest is not essential. While there is anorexia or vomiting small volumes of glucose-electrolyte mixture flavoured with fruit juice should be given every hour during the day. As the appetite returns a normal diet may be given with no restriction of fat. No drugs are needed though some clinicians recommend vitamin supplements. Viral hepatitis is one of the mildest childhood infections and the prognosis is excellent.

The patient is potentially infectious for no more than a week after the onset of jaundice. The virus is spread by the faecal-oral route, and spread can be prevented by hand washing and by boiling food utensils for at least a minute.

When features are typical no tests are needed and the child should be nursed in his own home. Drowsiness or jaundice lasting longer than two weeks should prompt a further opinion.

Prophylaxis—Type A viral hepatitis has an incubation period of 15-40 days with an average of 30 days. Most human sera, and therefore most human globulin preparations, contain antibody, and if this is given by injection during the incubation period it protects against the disease. The indications for giving this injection are controversial and vary between countries and units. Hepatitis A infections in children are usually mild and confer lifelong immunity, but the incidence of such infections has declined recently in northern Europe, though in southern Europe most people are infected by the time they are adults. In adults hepatitis A is more severe but rarely causes persisting or serious liver disease. In future it is more likely that adults will contract the disease from their children. Nevertheless, globulin should be used only within the incubation period, and preferably within 15 days of contact, and if there is some special reason to fear hepatitis in a sibling or adult. In future it may be thought that all parents of children with hepatitis should be protected and that only gammaglobulin preparations known to contain anti-hepatitis A antibody should be used.