# Current Practice

## MEDICINE IN THE TROPICS

# Severe Measles in the Tropics.—II*

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*Brit. med. J.*, 1969, **1**, 363–365

### Management of the Child with Measles

An understanding of the attitude of the local people towards measles and their methods of managing the disease is essential. Information needs to be collected on whether the child with measles is hidden away, what foods or fluids are given or not given, how the people believe the disease is caused and spread, and what treatment, if any, they believe to be effective.

Because of fear that they will spread infection, children with measles do not gain admission easily to many children's wards; frequently only those who are very sick are admitted. However, the infectivity of children with measles declines rapidly after the appearance of the rash. Within 24 hours it is negligible, and non-existent after 48 hours, at a time when most of the dangerous "complications" occur. At this stage children can be admitted without risk of passing on measles to others.

The study of 2,164 and 2,376 children admitted respectively to children's wards in West and East Africa offered an opportunity to determine the clinical features on admission most frequently associated with death. These have been considered in detail elsewhere[2 3] and are presented in summarized form below:

*At all ages.*—Darkening of the rash, or a rash desquamating in large plaques; signs of laryngeal obstruction; evidence of dehydration, blood and mucus in the stool, or a frequency of more than five stools per day; convulsions or loss of consciousness; and a weight below the tenth percentile.

*In the child under 3 years of age.*—Soreness of the mouth, particularly if it interferes with sucking; dyspnoea, or other evidence of pneumonia.

These findings may be used in areas where measles is severe in order to decide which of the many children with measles require admission to hospital.

### Treatment

No drug is known which influences the course of the virus disease. A priority in treatment must be to maintain the child's intake of food and fluid at a satisfactory level. Milk, if available, is the food most acceptable, and if skimmed milk only can be obtained this should be converted into a "filled" milk by mixing with oil, as described in King's[37] book. This book also gives practical advice on the management of the dehydration so frequently experienced.

No study of the routine prophylactic use of antibiotics in severe measles has been undertaken. In the U.S.A., Weinstein[43] showed that antibiotics did not prevent bacterial complications of measles, nor was the decline in mortality from measles in that country related to the introduction of antibiotics (Fig. 2). In Africa, I used sulphadimidine routinely, but no real evidence of its value is otherwise available. When the child's condition suggests secondary bacterial invasion antibiotic therapy is essential. The choice is difficult. A combination of long-acting penicillin and streptomycin (10 mg./lb., or 20 mg./kg.) is economical.

The immediate illness of measles will be followed by a period of ill-health lasting sometimes for months, in which the child is in danger of a recurrence of diarrhoea, further respiratory involvement, or frank kwashiorkor, any of which may be fatal. This is a period when "nutritional rehabilitation" is necessary. In managing this period, a simple weight chart is particularly valuable.[36]

### Measles Vaccination

Well-tried measles vaccines are now available. In my experience their use in areas where severe measles exists is the public health measure that will do most to reduce mortality and malnutrition in children under 5. Over 34 million doses had been given in the U.S.A. by the end of 1968, and in 1968, at the height of the epidemic season, notifications were only 4% of those in the period before the use of measles vaccines (Fig. 2). In Britain measles vaccination for all children is now being actively encouraged.

In West Africa, experience since 1962 in one village has shown that reduction of the incidence of the disease in a community to a low level is possible, and has demonstrated how much the overall health of the children can be improved.[44] Three million doses of measles vaccine were used last year in Nigeria in a campaign jointly undertaken by the World Health Organization and the Communicable Diseases Center at Atlanta, U.S.A. Measles vaccination has been used in Iran. Over half a million doses have been given in Chile, and initial campaigns are being undertaken in many other developing countries. The development of the vaccines, their testing and evaluation, have been described in several conferences[45–47] and will not be described here. Instead, brief answers will be given to some of the questions most frequently asked about measles vaccine.

### What Vaccine Should be Used in Developing Countries?

In the U.S.A., both Edmonston attenuated vaccine and Schwarz further attenuated has been widely used. The first of these vaccines may give a rather severe reaction in West African children, and the further attenuated Schwarz or Beckenham strains are preferable.[48 49]

Killed vaccines should not be used. Pneumonia or an obscure fever may develop if children receiving these vaccines are later exposed to measles, or a severe local reaction may develop if they are given a live vaccine later.[50] Children who

* Part I was printed in last week's issue (p. 297).

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have already received killed vaccine should probably be given a further attenuated vaccine.[51]

### Can Developing Countries Afford Measles Vaccine ?

The cost of treating children with measles in the U.S.A. has been shown to be only a fraction of the cost of prevention.[52] However, this argument will not apply to most developing countries, as the majority of children with measles go untreated.

The principal cost of a new vaccine lies in its development, testing, and initial production. The price of vaccines should fall in the next few years. Economy in the cost of syringes and personnel to give the vaccines is difficult. The wider use of jet injectors[37] by staff specifically trained to use them offers scope for economy.

### Are Reactions to the Further Attenuated Vaccine Severe ?

Reaction to this vaccine is only slightly greater than that experienced with other vaccines used for immunization in children. A mild fever and slight malaise for two or three days can be expected around the tenth day. A small proportion, under 5%, of children may have a fleeting rash. In developing countries, where children have frequent febrile illnesses, these symptoms are likely to go unnoticed, and drawing attention to them may result in other intercurrent illness being blamed on the vaccine.

### Can Convulsions or Encephalitis Occur after Measles Vaccination ?

A small proportion of children develop a convulsion when their temperature rises above 103° F., whatever the cause for the fever. Only 5–10% of children receiving the further attenuated vaccine will develop fever of this level. For this reason, convulsions following its use are infrequent ; convulsions with measles will be many times as frequent.

Abnormal E.E.G. tracings are seen in over 50% of children with measles, but in less than 5% of children with measles vaccination.[53] In the U.S.A. in 1966 it was estimated that encephalitis illness occurred at a rate of 0.9 cases per million doses of measles vaccine distributed, and on detailed inquiry other agents were probably responsible for a number of these. For comparison, the incidence of encephalitis of unknown aetiology was 37 per million per year.

### How Long will Protection from Measles Last ?

As the first measles vaccination was given only 10 years ago, no answer can be given to this question. However, the evidence suggests that protection is prolonged and may be lifelong. The decline of antibody level following measles vaccination is similar to that seen following measles. The level in children no longer exposed to measles falls below that which can be measured. If these children are re-exposed to measles, a proportion will become " infected " and show a rise in antibody level without any clinical manifestations.[23] Panum's[55] account of measles in the Faroe Isles suggests that complete immunity established 65 years previously still existed among those who had not been in contact with the disease during that time.

### At What Age Should Measles Vaccine be Given ?

In countries such as Britain, where measles in infancy accounted for only 4% of all notifications in 1966, the vaccine can be given after the 1st birthday. In the developing countries, where more than 30% of children in urban areas may develop measles in the 1st year, the correct age presents some difficulties. A proportion of children given vaccine before the 9th month will not be protected, as the residual antibody they received from their mother will prevent the vaccine virus from multiplying. If, however, the vaccination is left till after 9 months, a proportion of children will already have developed measles, and by the age of 1 year as much as a third of the children may have become infected. If possible, vaccination should be given between the 9th and 10th month of life, and vaccination programmes must be undertaken at least every six months or be continuously available.

### When a Woman, Immunized in Childhood, Gives Birth, Will Her Child be Protected in the First Six Months ?

There seems to be no information on this point as yet, but the evidence available suggests that the child may be protected. In my experience a child born to a mother who had not had measles developed only a very mild disease in the first few months of life.

### What Contraindications are there to Giving Measles Vaccine ?

In the developing countries these are few, if any. The condition of the children with malnutrition may be made marginally worse by giving them vaccine. On the other hand, if they contract measles these children suffer a high mortality. If possible, children with malnutrition or with known primary tuberculosis should be under treatment for a period before the vaccine is given. If hyperimmune measles sera (gammaglobulin) is available, 0.2 mg./lb. given simultaneously with the further attenuated vaccine, but in a different site, will further decrease the reaction. Children with leukaemia should not receive measles vaccine.

### Is Eradication of Measles in a Country or Continent Possible ?

Speculation on this possibility will increase. Fig. 2 shows the dramatic decline (on a log scale) of notifications and deaths

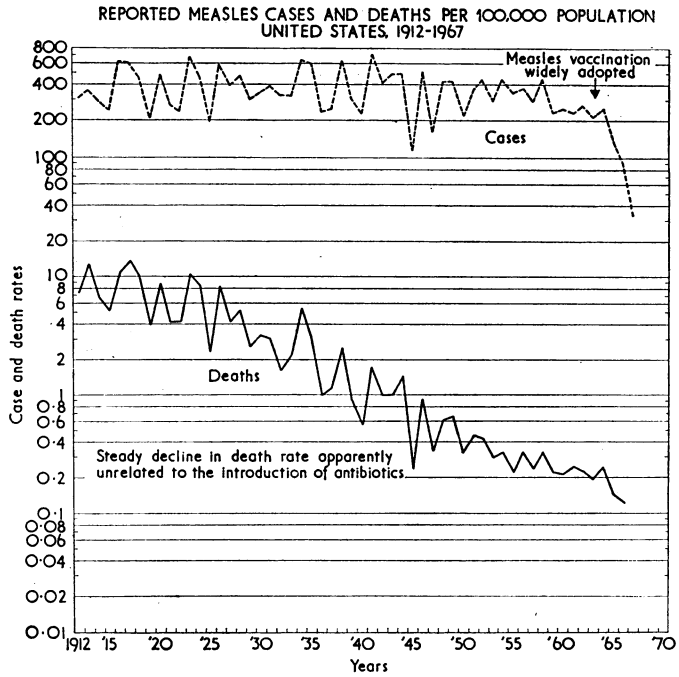


FIG. 2.—Decline in notifications and deaths from measles in the U.S.A. (From National Community Diseases Center, *Morbid. Mortal.*, 1968, **17**, 23.)

from the disease in the U.S.A. Measles eradication programmes are likely to be successful only if built upon a foundation of child care services available to the whole community.

### Conclusions

There is now good evidence that measles is a severe disease of infancy and early childhood in many developing countries. Information and understanding of the disease has been and is still impeded by the strong beliefs and customs associated with the disease. Measles has a serious effect on the nutrition of a child, and evidence is presented suggesting that the severe form described in West Africa develops as a result of the child being poorly nourished.

The use of the further attenuated measles vaccine in developing countries in the next few years is a safe and essential development. In many areas such programmes may be the simplest and cheapest single measure to improve child health, but need to be undertaken within the context of an overall service for small children.

I wish to acknowledge with thanks assistance with the text received from Dr. W. R. Aykroyd; also from Miss Irene Allen of the Medical Research Council's Statistical Research Unit.

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# TODAY'S DRUGS

*With the help of expert contributors we print in this section notes on drugs in current use.*

## Anticoagulant Drugs

Anticoagulants are of two main types: *direct anticoagulants* with a rapid effect, such as heparin and arvin, and *indirect anticoagulants* with a delayed effect, such as the coumarin and indanedione groups of drugs.

### Heparin

Heparin is a sulphate-containing mucopolysaccharide with a molecular weight of about 16,000. A naturally occurring substance probably produced by the mast cells, it is prepared commercially from animal sources, especially beef lung. The anticoagulant action of heparin—manifest in vitro as well as in vivo—is probably attributable to its high content of esterified sulphuric acid and its strong negative charge. The powerfully acidic groups of heparin react with certain basic compounds such as protamine and toluidine blue, which neutralize its anticoagulant action, and it is possible that similar reactions with proteins that normally take part in the clotting process are responsible for its powerful inhibitory effect on coagulation. The action of heparin is complex, and it appears to affect every stage in the clotting sequence with the exception of contact activation. It inhibits the end-stage of the thrombin-fibrinogen reaction by its antagonism to thrombin, interferes with the conversion of prothrombin to thrombin, and inhibits thromboplastin generation. In sufficiently high concentration it has also been shown to reduce platelet adhesiveness, though it is unlikely that it has a significant effect in the usual clinical