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Diarrhoeal disease control: reviews of potential interventions

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Diarrhoeal diseases are a major cause of sickness and death among young children in most developing countries. Since effective interventions to control these diseases are available, they are a priority target for the primary health care programmes being planned or implemented in many countries. Governments and international agencies, including the World Health Organization, have emphasized oral rehydration as an effective intervention for reducing diarrhoeal disease mortality. Other interventions are, however, needed to reduce morbidity, to reduce mortality not averted by oral rehydration, and to develop a multifaceted approach in which oral rehydration is one of several anti-diarrhoea measures being implemented simultaneously with mutually reinforcing and complementary impacts. This paper presents a classification of potential interventions for the control of diarrhoeal disease morbidity and/or mortality among children under 5 years of age and introduces a series of reviews of these interventions. The first of these reviews, on measles immunization, also appears in this issue of the Bulletin of the World Health Organization.

The concept of primary health care involves the delivery of a package of curative and preventive health services at the community level. Various health service needs have to be satisfied but, owing to manpower, budgetary and other resource constraints, it is necessary to select those few that meet the priority health needs and are, at the same time, affordable. A number of approaches may be used to design an appropriate primary care package in a specific country or region. A rational approach is first to define the major health problems and then select the most cost-effective means of ameliorating them. This approach has been discussed fully elsewhere (1, 2).

Identifying and ranking the major health problems may be done, in defined age groups, by the use of objective measures of the burden of death or illness attributable to specific diseases. If this is done, diar-

rhoeal diseases emerge in most developing countries as a major cause of sickness and death in young children (2). Recent estimates show that diarrhoeal diseases cause nearly 5 million deaths per year in children under 5 years old in developing countries (excluding China) where in every 100 children in this age group there are, on average, 220 diarrhoeal episodes and 1.4 deaths from diarrhoea every year (3). For a health problem to be a target for selective primary health care, it must not only be a major cause of sickness and death but it must also be controllable at a reasonable cost. Diarrhoeal disease mortality can be effectively reduced at reasonable cost by oral rehydration (4) and possibly other measures.

INTERVENTIONS FOR DIARRHOEAL DISEASE CONTROL

In circumstances where diarrhoeal diseases have been identified as a priority health problem, and a commitment has been made to combat the problem, it is necessary to decide how to reduce the mortality and

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morbidity they cause. The funds available in many countries for the total primary health care package are in the order of only US\$ 1-5 per capita per year, and only a proportion of this may be devoted to the control of diarrhoeal diseases. How should this amount be spent?

This is not a new question. The Fifth Caribbean Health Ministers' Conference, meeting in Dominica in 1973, called for a plan of action against diarrhoeal diseases and malnutrition in children under 2 years old. A group of experts was convened and recommended a 10-point programme designed to achieve specified reductions in mortality and morbidity.^a This plan of action, although embracing several important aspects of diarrhoea control, did not provide guidance to governments on the comparative cost-effectiveness of the many different interventions recommended.

More recently, Walsh & Warren (2) identified diarrhoeal diseases as a priority target for selective primary health care and emphasized oral rehydration as the key intervention for the reduction of diarrhoeal disease mortality. Chen (5) drew attention to the importance of diarrhoea morbidity and to the need for interventions (other than oral rehydration) that are specifically addressed to this facet of the overall diarrhoea problem.

It is widely agreed that oral rehydration, delivered within a primary health care programme, is an effective and relatively inexpensive intervention for the reduction of mortality due to dehydrating diarrhoeas. Other interventions are also required, however, for three main reasons. First, like all health services delivered at the community level, oral rehydration programmes face operational constraints that may militate against the achievement of their full potential impact. Second, oral rehydration is of limited use in the treatment of chronic or dysenteric diarrhoeas and, in areas of the world where these are responsible for a considerable proportion of diarrhoeal disease mortality, the effect of oral rehydration programmes on the overall mortality from diarrhoeal diseases may be modest. Third, oral rehydration can be expected to have little or no impact on diarrhoea morbidity rates. A multifaceted strategy is therefore preferable, in which oral rehydration is but one of several anti-diarrhoea measures being implemented simultaneously, with mutually reinforcing and complementary impacts.

The Diarrhoeal Diseases Control (CDD) Programme of the World Health Organization has, since its inception in 1978, advocated the following four-part strategy for diarrhoea control:

- improved case management, with particular emphasis on the early use of oral rehydration therapy in acute diarrhoea and on appropriate feeding during illness and convalescence;

- improved maternal and child health care, with particular emphasis on breast-feeding, weaning practices, personal and domestic hygiene, and maternal nutrition;

- improved use and maintenance of drinking-water and sanitation facilities, and improved food hygiene;

- detection and control of epidemics.

In the first years of the CDD programme, greatest emphasis was placed upon oral rehydration as the primary intervention for reducing diarrhoeal disease mortality among young children (3). The CDD programme has developed detailed recommendations for oral rehydration therapy^b and the production of oral rehydration salts,^c and has worked with governments of Member countries in the planning, implementation and evaluation of oral rehydration and other diarrhoea control measures.^d With the implementation of CDD programmes in over 35 countries, it is now appropriate to supplement the emphasis on oral rehydration by developing, in detail, other interventions for diarrhoea control and undertaking the necessary field research and evaluation to establish their feasibility and cost-effectiveness.

The CDD programme has therefore undertaken a systematic and comprehensive review of the effectiveness, feasibility and cost of the many possible anti-diarrhoea interventions available for the reduction of morbidity and/or mortality among children under 5 years of age. A classification of such interventions is shown in Table 1. Its purpose is to guide and systematize the process of review and not to provide a recommendation for diarrhoeal diseases control. Each intervention listed in Table 1, and possibly others that may subsequently be proposed, will be reviewed using a standard format which places emphasis on information concerning the effectiveness of the intervention. If the intervention is known or believed to be effective, available data on its feasibility and cost are also presented.

As a result of these reviews, each intervention listed in Table 1 will be assigned to one of three categories, each having different requirements for follow-up action by the CDD programme. First are interventions that are clearly shown to be effective, feasible and affordable. For these, the next step will be for

^b *A manual for the treatment of acute diarrhoea.* Unpublished document WHO/CDD/SER/80.2, 1980.

^c *Guidelines for the production of oral rehydration salts.* Unpublished document WHO/CDD/SER/80.3, 1980.

^d *Manual for the planning and evaluation of national diarrhoeal diseases control programmes.* Unpublished document WHO/CDD/SER/81.5, 1981.

^a *Strategy and plan of action to combat gastroenteritis and malnutrition in children under two years of age.* Report of a Technical Group Meeting on Malnutrition and Gastro-enteritis, St Vincent, 8-11 January 1974 (Unpublished document).

Table 1. Potential interventions for reducing diarrhoeal morbidity or mortality among children under five years of age

I. By case management

- A. Oral rehydration therapy**
- Administration of oral rehydration in the home.
 - Administration of oral rehydration at a medical facility.
- B. Non-oral rehydration therapy**
- Administration of rehydration by intravenous or other routes at a medical facility.
- C. Appropriate feeding**
- Promoting the appropriate feeding of children during diarrhoeal illness and convalescence.
- D. Chemotherapy**
- Administration of therapeutic agents in the home.
 - Administration of therapeutic agents at a medical facility.
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II. By increasing host resistance to infection and/or illness and/or death

- A. Maternal nutrition**
- Improving prenatal nutrition to reduce the incidence of low birth-weight.
 - Improving prenatal and postnatal nutrition to improve the quality of breast milk.
- B. Child nutrition**
- Promoting exclusive breast-feeding up to age 4–6 months and partial breast-feeding thereafter.
 - Improving weaning practices for children aged 4–18 months (introducing non-milk foods not later than the sixth month, continuing breast-feeding for as long as possible, and using nutritious and locally available weaning foods).
 - Supplementary feeding to improve the nutritional status of children aged 6–59 months.
 - Promoting the use of growth charts by mothers as an aid to proper child nutrition and child care.
- C. Immunization**
- Rotavirus and/or cholera immunization (when effective and tested vaccines are available) of the child and/or mother.
 - Measles immunization to reduce measles-associated diarrhoea.
- D. Chemoprophylaxis**
- Chemoprophylaxis of children at special risk, such as contacts of known cases, to reduce the incidence and/or severity of diarrhoea.
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III. By reducing transmission of the pathogenic agents of diarrhoeal diseases

- A. Water supply and excreta disposal**
- Constructing water supplies that improve the quality and availability of water for domestic purposes, and improved excreta disposal facilities; and providing the necessary educational support to ensure use and maintenance of these new facilities.
- B. Personal and domestic hygiene**
- Promoting specific features of personal and domestic hygiene, such as hand-washing, by appropriate educational campaigns.
- C. Food hygiene**
- Promoting improved practices for the preparation and storage of foods, both commercially and in the home, and especially emphasizing the hygienic preparation of weaning foods.
- D. Control of zoonotic reservoirs**
- Control of infection of domestic and farm animals by pathogens causing diarrhoea in man.
- E. Fly control**
- Control of flies, especially flies breeding in association with human or animal faeces.
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IV. By controlling and/or preventing diarrhoea epidemics

- A. Epidemic surveillance, investigation and control**
- Improving the ability to identify and investigate an epidemic early in its course and the capacity to implement effective control activities.
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the CDD programme to develop detailed guidelines for their implementation within national primary health care programmes and to promote any operational research needed to improve their delivery or impact. Second are interventions for which there is good theoretical evidence of effectiveness but insufficient field experience to predict impacts precisely or to judge feasibility and cost. For these the next step will be for the CDD programme to promote field research designed to fill the gaps in knowledge. The results of this research will determine whether these category 2 interventions are moved to category 1 or category 3. Third are interventions which are shown to be either ineffective, unfeasible or too costly. These interventions will not be recommended by the CDD programme as important elements of diarrhoeal dis-

ease control activities or priorities for diarrhoeal disease research. It is hoped that this review will help focus the attention of governments, researchers and international agencies on a few interventions of known or suspected effectiveness which, if implemented along with oral rehydration therapy, could markedly reduce the rates of both morbidity and mortality due to diarrhoeal diseases among young children.

Reviews of some of the interventions listed in Table 1 will be published in the *Bulletin of the World Health Organization*. The first of these is published in

this issue (pp. 641–652) and deals with measles immunization as an intervention for diarrhoeal disease control (II.C.2 in Table 1). It is hoped to publish in forthcoming issues of the *Bulletin* reviews on supplementary feeding (II.B.3), breast-feeding (II.B.1), and personal and domestic hygiene (III.B.1). Readers having suggestions to make on the classification of potential interventions in Table 1, or on the individual reviews as they are published, are invited to write to the Programme Manager, Diarrhoeal Diseases Control Programme, World Health Organization, 1211 Geneva 27, Switzerland.

RÉSUMÉ

ANALYSE DES MODES D'INTERVENTION POSSIBLES DANS LA LUTTE CONTRE LES MALADIES DIARRHÉIQUES

Les maladies diarrhéiques constituent dans la plupart des pays en développement l'une des causes principales de morbidité et de mortalité chez les jeunes enfants. Du fait que l'on dispose pour lutter contre ces maladies de modes d'intervention efficaces, ils doivent représenter un objectif prioritaire des programmes de soins de santé primaires planifiés ou mis en œuvre dans nombre de pays. Des gouvernements et des organismes internationaux, y compris l'Organisation mondiale de la Santé, ont souligné que la réhydratation par voie orale était une intervention essentielle pour réduire la mortalité due aux maladies diarrhéiques. Mais il est nécessaire cependant de disposer d'autres façons d'intervenir encore pour diminuer la morbidité, abaisser le

nombre de décès que ne peut empêcher la réhydratation par voie orale et mettre au point une approche conjuguée, dans laquelle la réhydratation orale représente l'une seulement des diverses mesures antidiarrhéiques appliquées simultanément et dont les effets se renforcent et se complètent mutuellement. L'article qui suit contient une classification des interventions possibles pour lutter contre la morbidité et/ou la mortalité dues aux maladies diarrhéiques chez les enfants de moins de 5 ans, et annonce le début d'une série d'analyses de ces stratégies, dont la première — sur la vaccination antimorbilleuse — est publiée dans ce même numéro du *Bulletin de l'Organisation mondiale de la Santé*.

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